

10-07-15 Tonto NF Draft Forest Plan Amendment – MSO Component

In 2012 the Mexican Spotted Owl Recovery Plan, First Revision was published (USDI FWS 2012). There is a need for the 4FRI Rim Country analysis to be in alignment with the management direction provided in the revised Recovery Plan and the other forest plans that are part of this landscape EIS. A project-specific plan amendment is needed because the 1985 Tonto National Forest Plan, as amended, includes direction from the former (1995) recovery plan.

The draft plan amendment would:

- Update definitions and direction for protected (protected activity centers (PACs)), recovery habitat, and other forest and woodland types to be in alignment with the current recovery plan.
- Update language and direction related to prescribed cutting and fire treatments in PACs to be consistent with the current recovery plan.
- Add forest structure guidelines for recovery habitat.
- Add direction for riparian forest habitats.
- Update survey information and remove population and habitat monitoring direction. The MSO monitoring plan from Coconino and Kaibab NF 4FRI decision would serve as a starting point for continuing monitoring across MSO habitat on Tonto NF, in consultation with US FWS.
- Remove the direction for treating habitat in incremental percentages. The MSO monitoring plan for the Coconino and Kaibab NF 4FRI decision would serve as a starting point for continuing monitoring across MSO habitat on Tonto NF, in consultation with US FWS. The monitoring plan includes a phased implementation and monitoring strategy.

Related Planning Efforts

Tonto NF is revising its forest plan. A DEIS and draft revised land and resource management plan is expected to be released for comment in 2018.

Background

Dr. Joseph Ganey and other Mexican spotted owl experts published the “Status and ecology of Mexican spotted owls in the Upper Gila Mountains Recovery Unit, Arizona and New Mexico” in 2011 (RMRS GTR256). The intent of this report was to aid planners in evaluating potential benefits or impacts of management actions for Mexican spotted owls and their habitat.

Each stand within PACs on the Tonto NF would be modeled to identify silvicultural and prescribed fire treatments that would yield the best existing and future Mexican spotted owl habitat conditions. Selecting trees for removal would prioritize the release of large and old pine (and potentially) oak. The goal for PAC treatments would be to move existing owl habitat toward the desired conditions described in the 2012 Mexican spotted owl Recovery Plan, First Revision (USDI FWS 2012). Whether nesting and roosting habitat would benefit from selectively cutting trees greater than 9 inches d.b.h. would be determined with the FWS. Treatments up to 9 inches d.b.h. are consistent with the current Tonto NF forest plan. The proposal would be in alignment with the revised Mexican spotted owl Recovery Plan (USDI FWS 2012).

In order to improve habitat conditions within the PAC, including core areas, there may be a need to use prescribed fire within select PACs. Without the use of low-intensity prescribed fire within the core area, each core area may have an acceptable amount of fuels and need a fire line constructed around it to prevent fire from entering the nest site (during treatment in the surrounding PAC habitat). Depending on site and weather conditions, this could be anything from a 3-foot-wide hand line to a dozer line. The number of acres potentially affected from fire line activities within PACs would likely range from 0.80 (hand line) acre to 3.2 (dozer) acres. Most fire line would require post-treatment habitat rehabilitation.

Burning in Mexican spotted owl PACs is difficult as there is a need to address the high fuel loadings while maintaining many of the habitat elements that contribute to fuel loading. Burning has to be conducted in a very short timeframe to avoid the breeding season (i.e., the nonbreeding season – September 1 to February 28). Lining numerous core areas greater than or equal to 100 acres would be expensive in terms of time, money, and other resource commitments. In many projects, PAC treatments have been eliminated for these reasons. Applying low-intensity prescribed burning within the 100-acre core areas may eliminate the need for fire line construction and will potentially minimize impacts to protected habitat.

A geographic layer for recovery habitat across the 4FRI Rim Country project area will be developed and will merge all available pine-oak data. A landscape-scale approach would meet the goal of providing continuous replacement nesting and roosting habitat over space and time, as described in the revised Recovery Plan.

Recovery habitat would be managed to meet a 110 square feet basal area or greater for Mexican spotted owl nest and roost habitat as recommended in the revised Recovery Plan. The purpose is to allow more of the uncharacteristically dense in-growth of mid-aged and mid-sized trees that currently dominate the 4FRI landscape to be removed while retaining nesting and roosting habitat components. The purpose is to improve forest health and increase the ability to retain large trees and increase large tree growth rates as described in the revised recovery plan. Based on a cursory review of existing condition data there will likely be a need to increase forest spatial heterogeneity, improve tree age diversity, and benefit prey habitat. Increasing the basal area range would provide opportunities to mimic canopy gap processes which produce horizontal variation in stand structure. These changes would both increase and retain nesting and roosting structure and increase understory cover. Research suggests that small mammal biomass (including voles and mice) drives spotted owl reproductive output, and thinning smaller trees would improve sub-canopy flight zone, thereby increasing Mexican spotted owl foraging effectiveness.

Monitoring assesses the effectiveness of management actions and provides the adaptive framework for more successful management guidelines. Monitoring habitat allows for modeling future forest conditions to determine if there will be adequate habitat to support Mexican spotted owl populations. Occupancy, reproduction and habitat monitoring and final project design for all activities in all Mexican spotted owl habitat was developed for the first 4FRI analysis in consultation with the U.S. Fish and Wildlife Service. Monitoring requirements from the first 4FRI analysis' biological opinion and objection resolution process would be used as a starting point.

Table 1. Draft Tonto NF Forest Plan Amendment for Mexican spotted owl

Current Tonto NF Forest Plan Direction	Draft Forest Plan Amendment: Desired Condition, Standard and Guideline Language	Crosswalk and/or Comments
Mexican spotted owl Standards		
Provide three levels of habitat management - protected, restricted, and other forest and woodland types to achieve a diversity of habitat conditions across the landscape (Tonto NF Forest Plan, page 40-1).	Standard: Three levels of habitat management will be provided – protected (protected activity centers (PACs)), recovery habitat and other forest and woodland types.	Updated to reflect new definitions in revised Recovery Plan, p. VIII.
Protected areas include delineated protected activity centers; mixed conifer and pine-oak forests with slopes greater than 40 percent 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 (Tonto NF Forest Plan, page 40-2).	Delete	Deleted because the revised Recovery Plan does not include direction for steep slopes (see direction for canyons) and reserved lands (below)
Restricted areas include all mixed-conifer, pine-oak, and riparian forests outside of protected areas (Tonto NF Forest Plan, page 40-2).	<p>Glossary and Background: Recovery habitat is primarily ponderosa pine-Gambel oak, mixed-conifer, and riparian forest and rocky canyons that are either currently is, or has the potential for becoming, nest/roost habitat or does or could provide foraging, dispersal, or wintering habitats. Nesting/roosting habitat typically occurs either in well-structured forests with high canopy cover, large trees, and other late seral characteristics, or in steep and narrow rocky canyons formed by parallel cliffs with numerous caves and/or ledges within specific geologic formations.</p> <p>Guideline: Ten percent in pine oak and 25 percent in mixed conifer of forested recovery habitat should be managed as recovery nest/roost habitat varying by forest type and Ecological Management Unit (EMU) (formerly called Recovery Units).</p> <p>This habitat should be managed to replace nest/roost habitat</p>	<p>Updated to reflect new definitions in the revised Recovery Plan, p. VIII.</p> <p>The 4FRI wildlife biologist will work with FWS to review best available science and information (BASI) to determine the site-specific project extent of steep and narrow canyons that meet habitat criteria</p> <p>The project would be stratified using the forest vegetation simulator (FVS) to determine potential habitat. Coordination with the Tonto NF (and other forests within the analysis) will determine if they have potential recovery habitat acres/boundary and determine what best available information to use for this analysis. In the first analysis 4FRI created a project-specific</p>

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	<p>lost due to disturbance (e.g., fire) or senescence and to provide additional nest/roost habitat to facilitate recovery of the owl. The remainder of forested recovery habitat should be managed for other needs (such as foraging, dispersing, or wintering) provided that key habitat elements are retained across the landscape.</p>	<p>layer that was accepted by the forests because it had involved the FWS and all forest biologists. This strategy allowed the forests to pick the best nesting/roosting habitat.</p> <p>A query that identifies what is currently habitat will occur. All stands that have 110 BA and greater in ponderosa pine and stands that have greater than 20 BA for Gambel oak will be identified. For mixed conifer the query would use criteria displayed in table C.3. of the revised Recovery Plan. An MSO habitat layer will be developed to determine nest/roost habitat at the landscape scale and forest by forest.</p> <p>For an example of how habitat was determined for the first 4FRI analysis, see the methodology section in the final wildlife report on pp. 16 to 28 and appendix 11.</p> <p>For an example of how the remainder of the forested recovery habitat can be managed for foraging, dispersing and wintering needs, see the habitat designs on pages 10-13 of the final (post objection) 4FRI appendix D. The design focuses on having bigger, denser groups when compared to the general forest. This design benefits MSO because they use the recovery habitat for foraging with most forage being voles and mice. Developing an herbaceous understory with coarse woody debris provides the</p>

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		openings/habitat for prey. Silviculture will determine what is potential recovery habitat and silviculture and wildlife will field-verify assumptions in the fall of 2015.
Other forest and woodland types include all ponderosa pine, spruce-fir, woodland, and aspen forests outside protected and restricted areas (Tonto NF Forest Plan, page 40-2).	<p>Glossary and Background: Other forest and woodland types include ponderosa pine forest, and pinyon-juniper woodland that are neither restricted or within PACs.</p> <p>Guideline: No specific management is suggested for these habitat types. However, the needs of the owl should be designed to be compatible with the project’s desired conditions of moving towards a sustainable and resilient forest at the landscape scale.</p>	<p>Definitions and direction from the revised Recovery Plan, pp. 8, 386.</p> <p>For examples of how the project would be designed to meet the guideline, see the final (post objection) 4FRI FEIS Appendix D, pp. 9-13 and final (post objection) Appendix C, pp. 31-35.</p>
Survey all potential spotted owl areas including protected, restricted, and other forest and woodland types within an analysis area plus the area 1/2 mile beyond the perimeter of the treatment area (Tonto NF Forest Plan, page 40-2).	<p>Standard: The survey area shall include all areas where owls or their habitat might be affected by management actions. If an area is relatively large, it can be subdivided into manageable subunits to achieve the best survey results. In general, the survey area shall include the survey area and a 0.5-mile area from its exterior boundaries.</p> <p>Standard: Within the project area, all areas that contain forested recovery habitat, riparian forest, and canyon habitat, or might support owls will be surveyed as defined in the current recovery plan.</p>	<p>Direction from the revised Recovery Plan, p. 301.</p> <p>Survey protocol will be included as a wildlife design feature and be described in the methodology section of the wildlife report (see pp. 16 to 28 and appendix 11). Also see the final (2015 post objection) FEIS final (post objection) Appendix C, design feature #W2, p.31.</p>
Establish a protected activity center at all Mexican spotted owl sites located during surveys and all management territories established since 1989 (Tonto NF Forest Plan, page 40-2).	<p>Standard: A 600-acre activity center will be established using boundaries of known habitat polygons and/or topographic boundaries, such as ridgelines, as appropriate. The boundary should enclose the best possible Mexican spotted owl habitat, configured into as compact a unit as possible, with the nest or activity center located near the center. This should include as much roost/nest habitat as is reasonable, supplemented by foraging habitat where appropriate</p>	<p>Direction from the revised Recovery Plan, pp. 258, 317.</p> <p>The project would be stratified using the forest vegetation simulator (FVS) to determine potential habitat. Coordination with the Tonto NF (and other forests within the analysis) will determine if they have potential recovery habitat acres/boundary and determine what best available</p>

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		<p>information to use for this analysis. In the first analysis 4FRI created a project-specific layer that was accepted by the forests because it had involved the FWS and all forest biologists. This strategy allowed the forests to pick the best nesting/roosting habitat and provided the 4FRI analysis a landscape approach for evaluating existing and desired conditions within MSO habitat.</p> <p>A query that identifies what is currently habitat will occur. All stands that have 110 BA and greater in ponderosa pine and stands that have greater than 20 BA for Gambel oak will be identified. For mixed conifer the query would use the minimum desired conditions displayed in table C3 in the revised Recovery Plan. A layer will be developed to determine nest/roost habitat at the landscape scale and forest by forest.</p> <p>The actual size of PACs will be part of the consultation process with the FWS. In the first 4FRI analysis there were some PACs that were well above 600 acres.</p>
<p>Allow no timber harvest except for firewood and fire risk abatement in established protected activity centers. For protected activity centers destroyed by fire, windstorm, or other natural disaster, salvage timber harvest or declassification may be allowed after evaluation on a case-by-case basis in consultation with US Fish and Wildlife Service (Tonto NF Forest Plan, page 40-2).</p>	<p>Standard: The project will be designed to meet or move towards the percent basal area by size class and the minimum density of large trees thresholds displayed in table 1 (derived from the revised Recovery Plan table C. 2).</p> <p>Guideline: Management should sustain or enhance desired conditions for the owl, including fire-risk reduction, as well as monitoring owl response.</p> <p>Guideline: Protection of PACs may require active management in forested habitat to reduce fuel loads and fuel continuity in areas adjacent to and within these areas</p>	<p>The edit reflects direction from the revised Recovery Plan, pp. 8, 258 and 262.</p> <p>Treatments would be designed to reduce the potential for high severity fire while retaining desired habitat structural components. For an example, see the 4FRI FEIS, post-objection Appendix D, Implementation Plan, pp. 9 to 13, pp. 74-91.</p> <p>In the first EIS the wildlife analysis</p>

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	<p>to reduce potential for high severity and stand-replacement fires. Treatments should be located strategically and informed by fire behavior modeling across the landscape (3 forests).</p> <p>Guideline: Selective cutting treatments in some PACs may be needed to achieve objectives, To determine which PACs may benefit from prescribed cutting treatments a landscape-scale analysis should be used to determine where the needs of fire risk reduction and habitat enhancement are greatest. Within the remaining PAC acreage (500+ ac), combinations of prescribed cutting and fire treatments may be used to reduce fire hazard while striving to maintain or improve habitat conditions for the owl and its prey.</p>	<p>determined that the risk of fire within MSO PACs was not the issue when compared to fire severity. Light (intensity) cutting treatments followed by prescribed fire decreased the potential for severe fire effects by raising canopy base heights and reducing fuels.</p> <p>At the landscape scale treating habitat around PACs meets the need of strategic location. The first priority is to treat habitat outside of PACs. The next priority is to treat (as needed) within the PACs. For an example of designing treatments to meet MSO habitat thresholds (revised Recovery Plan, Table C.2.), see the FEIS final (post objection) appendix D, pp. 9 to 13, 74-91.</p> <p>Treating up to 20% of the total PAC area (external to the core) within the UGM EMU to meet ecological restoration and fuels-reduction objectives (if the appropriate monitoring is conducted (revised Recovery Plan, p. 3)) will be discussed with the FWS as part of consultation. This direction applies to the entire management unit and is much larger than this specific project.</p>
<p>Allow no timber harvest except for fire risk abatement in mixed conifer and pine-oak forests on slopes greater than 40 percent where timber harvest has not occurred in the last 20 years (Tonto NF Forest Plan, page 40-2).</p>	<p>Delete</p>	<p>The revised Recovery Plan removed steep slopes from automatic inclusion as protected areas (see Appendix C and p. 3). Additional direction has been added for steep canyons.</p>
<p>Limit human activity in protected activity centers during the breeding season (Tonto NF Forest Plan, page 40-2).</p>	<p>Guideline: Limit human activity in protected activity centers during the breeding season. Management activities should be deferred from the nest/roost core during the breeding</p>	<p>Direction from the revised Recovery Plan, Appendix D, p. 262 In the first 4FRI analysis (post objection</p>

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	season (1 Mar - 31 Aug), except where non-breeding is confirmed or inferred that year per the accepted survey protocol in the current recovery plan.	resolution process, appendix E) PACs will be treated in 3 years if no owls are detected, i.e., if birds are present no treatment will occur. This guideline differs in that the birds could be there and treatments could occur if they are not nesting.
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 U.S. Fish and Wildlife Service to resolve the conflict (Tonto NF Forest Plan, page 40-2).	Standard: In protected and recovery habitat 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 U.S. Fish and Wildlife Service to resolve the conflict..	The edit reflects habitat definitions in the revised Recovery Plan.
Monitor changes in owl populations and habitat needed for delisting (Tonto NF Forest Plan, page 40-2).	Standard: The project will comply with the biological opinion that has been developed in consultation with the U.S. Fish and Wildlife Service and will begin with the 4FRI monitoring plan designed for the Upper Gila Mountain Ecological Management Unit.	The edit acknowledges using monitoring (4FRI FEIS, final (post-objection) Appendix E) from the first 4FRI analysis.
A. General Guidelines		
Conduct surveys following Region 3 survey protocol (Tonto NF Forest Plan, p. 40-2).	Standard: Conduct surveys according to the current recovery plan.	
Breeding season is March 1 to August 31 (Tonto NF Forest Plan, p. 40-2).	No change	
B. Protected Area Guidelines		
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 (Tonto NF Forest Plan, page 40-2).	Guideline: Protected Activity Centers (PACs) should encompass a minimum of 600 acres surrounding the core areas which is the nest site, a roost grove commonly used during the breeding season in absence of a verified nest site, or the best roosting/nesting habitat if both nesting and roosting information are lacking (revised Recovery Plan, pp. 8, 339). Should any deviations in PAC acreage occur due to site specific conditions, address during consultation with	

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	the US FWS.	
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 (Tonto NF Forest Plan, page 40-3).	Delete	Deleted because it was previously addressed.
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 nesting and roosting habitat (Tonto NF Forest Plan, page 40-3).	Delete	See previous guideline on PAC size.
Protected activity center boundaries should not overlap (Tonto NF Forest Plan, page 40-3).	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 (Tonto NF Forest Plan, page 40-3).	Standard: Submit protected activity center maps and descriptions to the US FWS for comment in a timely manner after completion of surveys.	
Road or trail building in protected activity centers should be avoided but maybe permitted on a case-by-case basis for pressing management reasons (Tonto NF Forest Plan, page 40-3).	Guideline: Road or trail maintenance, repair, and building in PACs should be undertaken during the non-breeding season (1 Sep - 28 Feb) to minimize disturbance to owls unless non-breeding is inferred or confirmed that year per the accepted survey protocol (Appendix D). The construction of new roads in PACs will be minimized.	Reflects direction in revised Recovery Plan (p. 261).
Generally allow continuation of the level of recreation activities that was occurring prior to listing (Tonto NF Forest Plan, page 40-3).	No Change	Not applicable
Require bird guides to apply for and obtain a special use permit. A condition of the permit shall be that they obtain a subpermit 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 (Tonto NF Forest Plan, page 40-3).	No Change	Not applicable

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<p>Harvest firewood 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:</p> <ul style="list-style-type: none"> • Retain key forest species such as oak. • Retain key habitat components such as snags and large downed logs <p>Harvest conifers less than 9 inches in diameter only within those protected activity centers treated to abate fire risk as described below (Tonto NF Forest Plan, p. 40-3).</p>	<p>No change</p>	<p>Not applicable</p>
<p>Treat Fuel Accumulations to abate fire risk:</p> <ul style="list-style-type: none"> • Select for treatment 10 percent of the protected activity centers where nest sites are known in each recovery unit having high fire risk conditions. Also select another 10 percent 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 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. 	<p>Standard: The project will comply with the biological opinion that has been developed in consultation with the U.S. Fish and Wildlife Service and will begin with the 4FRI monitoring plan designed within the Upper Gila Mountain Ecological Management Unit.</p> <p>Guideline: Within PACS, combinations of thinning trees up to 17.9 inches d.b.h., mechanical fuel treatment and prescribed fire should be used to abate fire risk to owl nest/roost habitats and improve habitat structure in select protected activity center outside the 100-acre core area. Low intensity prescribed fire should be used within select 100-acre core areas to eliminate the need for fire line construction.</p>	<p>Treatment in PACs will be highly dependent on site-specific information which is currently being consolidated. PAC treatments are likely to be modified if monitoring from the first 4FRI analysis indicates a need to adjust or defer treatments.</p>

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<ul style="list-style-type: none"> • Use combinations of thinning trees less than 9 inches in diameter, mechanical fuel treatment and prescribed fire 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 nonselected 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). 		

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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): No seasonal restrictions apply (Tonto NF Forest Plan, p. 40-4).	Delete	Slopes that are 40 percent or greater in mixed conifer and pine oak is categorized as recovery habitat. The revised Recovery Plan removed steep slopes from automatic inclusion as protected areas (Appendix C and p. 3).
<p>Treat fuel accumulations to abate fire risk:</p> <ul style="list-style-type: none"> • Use combinations of thinning trees less than 9 inches in diameter, mechanical fuel removal, and prescribed fire. • Retain woody debris larger than 12 inches in diameter, snags, clumps of broadleafed 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 nonselected 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 occur within all steep slopes treated for fire risk abatement. (See monitoring guidelines) 	Delete	Specific steep slope desired conditions and design features will be developed.
<i>Reserved Lands (Wilderness, Research Natural Areas, Wild and Scenic Rivers, and Congressionally Recognized Wilderness Study Areas):</i> Allow prescribed fire where appropriate (Tonto NF Forest Plan, p. 40-4).	No Change	

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C. Restricted Area Guidelines (Mixed conifer, pine-oak, riparian forests and rocky canyons) (Tonto NF Forest Plan, p. 40-4)	C. Recovery Area Guidelines (Mixed conifer, pine-oak, riparian forests and rocky canyons)	
<p>Mixed Conifer and Pine-oak Forests (See glossary definition): 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.</p> <p>The following table displays the minimum percentage of restricted area which should be managed to have nest/roost characteristics. The minimum mixed conifer restricted area includes 10% at 170 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 of restricted areas shows that there is a surplus of restricted area acres simultaneously meeting the threshold values.</p> <p>Management should be designed to 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. (TNF Forest Plan, page 40-4 to 40-6).</p>	<p>Desired Condition: Mixed Conifer and Pine-oak Forests (see glossary definition) have a sustained level of owl nesting and roosting habitat that is well distributed across the landscape. Replacement owl nesting and roosting habitat is available and there are diverse stand conditions across the landscape that ensure habitat for a diversity of prey species.</p> <p>Standard: Treatments are allowed within Recovery Habitat stands identified as meeting nest/roost conditions, as long as stand conditions remain at or above the values given in table 1 (which is derived from the revised Recovery Plan Table C.3). This approach allows for treatments to reduce fire risks, lessen insect or disease problems, maintain seral species, or meet other ecosystem objectives.</p> <p>Guideline: The percentages of area in table 1 are the minimum levels for MSO recovery habitat. If a deficit occurs, additional stands should be identified and managed in alignment with table 1. Even if the proportion of the planning area that meets nest/roost conditions is greater than the percentages in table 1 no stands should be lowered below these conditions until assessments at larger spatial scales (e.g., landscape, subregion, and region) demonstrate that desired conditions occur in recommended amounts at these larger scales. Using watersheds in allocating percentages of area to manage for nest/roost conditions should reduce the potential for creating excessively fragmented nesting habitat.</p> <p>Guideline: Emphasize attainment of nest/roost conditions as quickly as reasonably possible. Identify and assign stands that will reach these conditions soonest to satisfy area</p>	<p>See revised Recovery Plan, Appendix C, p. 267. Note: The table has been modified to contain only information pertinent to the Tonto NF.</p> <p>See the final (post objection) 4FRI FEIS Appendix D (implementation plan) for an example of designing treatments in recovery habitat to address the minimum larger trees per acre (pp. 10-12). In the first analysis thinning in target habitat (now considered recovery habitat) was light but designed to increase tree growth/diameter rates as soon as possible/practicable.</p> <p>Also see the final (post-objection) 4FRI FEIS Appendix D (implementation plan) for examples of designing treatments in restricted (now recovery habitat) to promote heterogeneity (p. 12).</p>

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	<p>requirements in table 1.</p> <p>Guideline: Trees \geq18 inches dbh in stands designated as recovery nest/roost habitat should not be removed unless there are compelling safety reasons to do so or if it can be demonstrated that removal of those trees will not be detrimental to owl habitat.</p> <p>Guideline: Natural variation, such as irregular tree spacing and various stand/patch/group/clump sizes, should be incorporated into management prescriptions. Strive for heterogeneity both within and between stands.</p>	
<p>Attempt to mimic natural disturbance patterns by incorporating natural variation, such as irregular tree spacing and various patch sizes, into management prescriptions (TNF Forest Plan, page 40-5).</p>	<p>Guideline: Design treatments to mimic natural disturbance patterns and natural landscape heterogeneity. Allow natural canopy gap processes to occur, or mimic those processes by designing treatments to produce horizontal variation in stand structure.</p>	
<p>Maintain all species of native trees in the landscape including early seral species (TNF Forest Plan, page 40-5).</p>	<p>Guideline: Maintain all species of native vegetation on the landscape, including early seral species. Allow for variation in existing stand structures and provide for species diversity (revised recovery plan, p. 268)</p>	
<p>Allow natural canopy gap processes to occur, thus producing horizontal variation in stand structure (TNF Forest Plan, page 40-5).</p>	<p>Delete</p>	<p>Deleted because it has been combined into a previous guideline.</p>
<p>Emphasize uneven-aged management systems. However, both even-aged and uneven-aged systems may be used where appropriate to provide variation in existing stand structure and species diversity. Existing stand conditions will determine which system is appropriate (TNF Forest Plan, page 40-5).</p>	<p>Desired Condition: Patches of even-aged forest structure are present, but infrequent. Disturbances sustain the overall variation in age and structural distribution.</p> <p>Guideline: Incorporate natural variation, such as irregular tree spacing and various stand/patch/group/clump sizes, into management prescriptions. Strive for heterogeneity both within and between stands. Address analysis questions from Box C 5 in the current recovery plan before wide-scale</p>	<p>Reflects direction in revised Recovery Plan (p. 268).</p>

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Extend rotation ages for even-aged stands to greater than 200 years. Silvicultural prescriptions should explicitly state when vegetative manipulation will cease until rotation age is reached (TNF Forest Plan, page 40-6).	Delete	Deleted because the desired condition is to manage for an uneven-aged forest structure.
Save all trees greater than 24 inches d.b.h. In pine-oak forests, retain existing large oaks and promote growth of additional large oaks (TNF Forest Plan, page 40-5).	<p>Guideline: Strive to retain (do not cut) trees greater than 24 inches.</p> <p>Guideline: Within pine-oak and other forest types where hardwoods are a component of owl habitat, retains and promotes the growth of additional, large hardwoods.</p>	Language reflects direction in revised Recovery Plan (p. 269).
In pine-oak forests, retain existing large oaks and promote growth of additional large oaks (TNF Forest Plan, page 40-5).	Delete	Deleted because the direction is addressed in a previous guideline.
Encourage prescribed and prescribed natural fire to reduce hazardous fuel accumulation. Thinning from below may be desirable or necessary before burning to reduce ladder fuels and the risk of crown fire (TNF Forest Plan, page 40-6).	No Change	
Retain substantive amounts of key habitat components: <ul style="list-style-type: none"> • Snags 18 inches in diameter and larger • Down logs over 12 inches midpoint diameter Hardwoods for retention, recruitment, and replacement of large hardwoods (Tonto NF Forest Plan, p. 40-6)	<p>Table 1 provides the minimum desired conditions for basal and standing live trees in ponderosa pine and mixed conifer. Follow forest plan guidelines for snags, down logs and coarse woody debris in ponderosa pine and mixed conifers.</p>	Language reflects direction in revised Recovery Plan, Table C3 (p. 278).
No corresponding language	<p>Forested Recovery Foraging/Non-breeding Habitat</p> <p>Guideline: Within pine-oak and other forest types where hardwoods are a component of owl habitat, treatments should retain and promote the growth of additional, large hardwoods.</p> <p>Guideline: Strive to retain (do not cut) all trees > 24 inch dbh,</p>	

Current Tonto NF Forest Plan Direction	Draft Forest Plan Amendment: Desired Condition, Standard and Guideline Language	Crosswalk and/or Comments
	<p>the average diameter of nest trees, unless overriding management situations require their removal to protect human safety and/or property (e.g., the removal of hazard trees along roads, in campgrounds, and along power lines), or in situations where leaving large trees precludes reducing threats to owl habitat (e.g., creating a fuel break). To the extent practical, fuel breaks should be designed to avoid the removal of larger trees (trees over 18 inch dbh).</p> <p>Guideline: Design and implement management treatments so that most hardwoods, large snags >18 inch dbh, large downed logs >18 inch diameter at any point, trees > 18 inch dbh are retained, unless this conflicts with forest restoration and/or owl habitat enhancement goals.</p> <p>Guideline: Design treatments needed to meet fuels and restoration management objectives in recovery habitats to minimize short-term losses of habitat components in areas that could be occupied by spotted owls.</p>	
<p>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, streambanks, and channels should be prevented (Tonto NF Forest Plan p. 40-6).</p>	<p>Background and Description: Riparian Recovery Habitat consists of riparian forests outside of PACs that could frequently be used by owls for foraging, roosting, daily movements, dispersal, and potentially for nesting. Riparian Recovery Habitat is considered to be a key habitat for owl recovery.</p> <p>Desired Condition: Riparian recovery habitat is managed for PFC and attains the highest ecological status and potential natural community structure (i.e., mid- to late-seral conditions) possible within the capability and potential of the site. Attaining goals that are dependent on site potential, benefits owl habitat by regenerating riparian tree cover and benefits its prey species by providing dense ground cover for small mammals).</p> <p>Guideline: Treatments should provide a diversity of age and</p>	<p>Edits reflect direction in the revised Recovery Plan, see pp. 270-275.</p>

Current Tonto NF Forest Plan Direction	Draft Forest Plan Amendment: Desired Condition, Standard and Guideline Language	Crosswalk and/or Comments
	<p>size classes of native riparian trees and shrubs along with a diverse understory of native riparian herbaceous species to provide potential roost/nest sites for owls and cover for owl prey species.</p> <p>Guideline: Construction activities (e.g., road or trail building) in recovery riparian areas should be avoided except on a case-specific basis where pressing management needs can be demonstrated.</p> <p>Guideline: Effects of tree removal should be minimized by eliminating removal where possible or by restricting removal so that habitat components (e.g., large trees, snags, and large downed logs) are conserved.</p> <p>Guideline: Thinning trees and shrubs should be encouraged where such thinning restores properly functioning condition and improves the habitat or protects it against stand-replacing fire.</p>	
<p>Domestic Livestock Grazing (Tonto NF Forest Plan p. 40-6)</p>	<p>No change</p>	<p>Not applicable</p>
<p>Old-Growth - Except where otherwise noted, implement forest plan old growth standards and guidelines to maintain and promote development of owl habitat (Tonto NF Forest Plan, p. 40-6).</p>	<p>No change</p>	<p>No change in MSO section (see goshawk portion of amendment for proposed changes)</p>
<p>D. Other Forest and Woodland Types – Apply ecosystem approaches to manage for landscape diversity mimicking natural disturbance patterns, incorporating natural variation in stand conditions and retaining special features such as snags and large trees, utilizing appropriate fires, and retention of existing old growth in accordance with forest plan old growth standards and guidelines (Tonto</p>	<p>No change</p>	

Current Tonto NF Forest Plan Direction	Draft Forest Plan Amendment: Desired Condition, Standard and Guideline Language	Crosswalk and/or Comments
NF Forest Plan, p. 40-6).		
E. Guidelines for Specific Recovery Units Upper Gila Mountains: No special additional guidelines apply (Tonto NF Forest Plan, p. 40-6)	No Change	
F. Monitoring Guidelines		
Monitoring and evaluation should be collaboratively planned and coordinated with involvement from each national forest, U.S. Fish and Wildlife Service Ecological Services Field Office, U.S. Fish and Wildlife Service Regional Office, FS Regional Office, Rocky Mountain Research Station, recovery team, and recovery unit working groups (Tonto National Forest Plan, p. 40-7).	The project will comply with the biological opinion that has been developed in consultation with the U.S. Fish and Wildlife Service and will begin with the 4FRI monitoring plan designed for UGM EMU as found in Appendix E of the Four-Forest Restoration Initiative Coconino and Kaibab NFs Record of Decision (April, 2015). Note: The monitoring plan is attached to this amendment for reference.	
Population monitoring should be a collaborative effort with participation of all appropriate resource agencies. (Tonto National Forest plan, page 40-7).	See previous standard.	
Habitat monitoring of gross habitat changes should be a collaborative effort of all appropriate resource agencies. (Tonto National Forest plan, page 40-7).	See previous standard.	
Habitat monitoring of treatment effects (pre- and post-treatment) should be done by the agency conducting the treatment. (Tonto NF Forest Plan, p. 40-7).	See previous standard.	
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, U.S. Fish and Wildlife Service Ecological Services field offices, and the U.S. Fish and Wildlife Service Regional Office (Tonto National Forest plan, page 40-7).	See previous standard.	
Rangewide: Track gross changes in acres of owl habitat resulting from natural and human-caused disturbances.	See previous standard.	

Current Tonto NF Forest Plan Direction	Draft Forest Plan Amendment: Desired Condition, Standard and Guideline Language	Crosswalk and/or Comments
<p>Acreage changes in vegetation composition, structure, and density should be tracked, evaluated, and reported. Remote sensing techniques should provide an adequate level of accuracy.</p> <p>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 (Tonto National Forest Plan, page 40-7).</p>		
<p>Upper Gila Mountain, Basin and Range East, and Basin and Range West Recovery Units: Assist the recovery team and recovery unit working groups to establish sampling units consisting of 19 to 39 square mile quadrats randomly allocated to habitat strata. Quadrats should be defined based on ecological boundaries such as ridge lines and watersheds. Quadrat boundaries should not traverse owl territories. Twenty percent of the quadrats will be replaced each year at random.</p> <p>Using the sample quadrats, monitor the number of territorial individuals and pairs per quadrat; reproduction; apparent survival; recruitment; and age structure. Track population density both per quadrat and habitat stratum (Tonto National Forest Plan, p. 40-7).</p>	<p>Standard: The project will comply with the biological opinion that has been developed in consultation with the U.S. Fish and Wildlife Service and will begin with the 4FRI monitoring plan designed for UGM EMU as found in Attachment 1 of Appendix E of the Four-Forest Restoration Initiative Coconino and Kaibab NFs Record of Decision (April, 2015).</p>	<p>For larger scale analyses, the FS is following recovery plan population monitoring methodology as coordinated through the Southwestern Office and RMBO.</p> <p>Note: The monitoring plan is attached to this amendment for reference.</p>

Table 1. Minimum Desired Conditions for the Upper Gila Mountain Ecological Management Unit (UGM EMU)

UGM EMU Forest Type	% of Area	% BA by Size Class		Minimum Tree BA	Minimum Density of Large Trees (trees per acre)
		12 18 inch	>18 inch		
Mixed Conifer	25	>30	>30	120	12
Pine-Oak	10	>30	>30	110	12

Attachment 1 of Appendix E in the Record of Decision for the Four-Forest Restoration Initiative, Coconino and Kaibab National Forests

Prepared by: Shaula Hedwall, U.S. Fish and Wildlife Service and the 4FRI Core Team

As part of the Four Forest Restoration Initiative Project (4FRI), fuels reduction and prescribed burning activities will occur within Mexican spotted owl protected activity centers (PACs). By definition, PACs are occupied habitat. The effects of treatments to owls and nesting/roosting habitat are not fully known. The Mexican spotted owl Recovery Team felt that PACs can be afforded substantial protection by emphasizing fuels reduction and forest restoration in surrounding areas outside of PACs and nesting and roosting habitat. They also stated that this by no means advocates for a “hands-off” approach in PAC habitat, recognizing that in some cases protection of PAC habitat requires management actions. Some PACs could benefit from well-designed treatments. The Mexican spotted owl Recovery Plan, First Revision (USDI FWS 2012) provides guidance for these treatments and emphasizes the need for monitoring and feedback loops for adaptive management. Well-designed monitoring could provide valuable information on the effects of activities on owls and their habitat. In the long-term, properly designed treatments are known to create habitat conditions that are recognized as not only improving nesting and foraging opportunities, but also reducing the risk of habitat loss to unmanaged wildfires. However, in order to understand the short-term effects of thinning and burning on Mexican spotted owls and their habitat, the Forest Service (FS) and the U.S. Fish and Wildlife Service (FWS) worked together to develop a monitoring plan that focuses on the years immediately before, during and after treatment.

During project analysis, the FS and the U.S. Fish and Wildlife Service collaboratively reviewed 117 PACs in the general 4FRI area. Forest conditions were individually evaluated within each PAC in terms of their potential to support resident Mexican spotted owls and their prey. PAC assessments included dominant forest type (e.g., pine-oak, mixed conifer), habitat structure, available demographic data (based on ongoing occupancy surveys or past research), topographic attributes (e.g., aspect and slope), human access, designated wilderness boundaries, recent and ongoing projects affecting PAC habitat, fire history, status of current habitat and, ultimately, whether mechanical treatments could potentially move the forest towards desired conditions described in the Recovery Plan. It was agreed that no mechanical treatments would occur in core areas.

Once the status of each PAC was determined, potential mechanical treatments were considered in terms of whether they could:

1. Decrease the amount of time needed to increase tree height and diameter;
2. Decrease overall tree density while maintaining overall canopy cover, and
3. Reduce the threat of surface fires becoming crown fires and increase canopy base height to improve flight zone (i.e., improve owl foraging ability).

PACs were not considered for treatment if they were treated in previous projects (n = 32), habitat was not suitable for 4FRI treatments (PACs occurred in habitats outside the scope of 4FRI such as mixed conifer, designated wilderness, or canyon habitat; n = 20), habitat had been previously burned (n = 10), habitat conditions inside PACs were such that treatment was not necessary (n = 11), the balance of conditions inside and outside PACs were such that treating outside the PACs would be adequate and active management would not be necessary inside the PACs (n = 24), or there simply was not enough

information available to identify a need for treatment (n = 2). Because historical fire return intervals have not been met across most of this landscape, prescribed fire was recommended for all PACs, including a recommendation for using prescribed fire in core areas.

Ultimately, we concluded that 99 of the 117 PACs assessed did not need mechanical treatments. Most of the remaining 18 PACs selected for mechanical treatment are not only believed to have among the lowest quality habitat (in terms of number/density of large trees, canopy cover and other predictors of owl nesting and roosting sites), but also have the greatest potential for long-term improvement if mechanical treatments are implemented.

The U.S. Fish and Wildlife Service and the FS completed field reconnaissance of a subset of PACs chosen for treatments (see the 4FRI Wildlife Specialist Report for more detail). The U.S. Fish and Wildlife Service also reviewed field observations for most of the other PACs proposed for both mechanical thinning and prescribed fire. Vegetation simulation modeling was done to develop potential treatments tailored to individual stand conditions within each PAC. Modeling indicated mechanical treatments could move 10,741 of 35,566 acres (31 percent of total PAC acres) onto a trajectory that better meets the above criteria for habitat within the 18 PACs (see the 4FRI Silviculture report).

While existing occupancy data for these 18 PACs is not comprehensive, there is strong evidence from other PACs supporting the assertion that occupancy rate declines as habitat quality declines. In other words, some of the PACs with low habitat quality are likely to be only intermittently occupied, if at all. There is an acknowledged risk that measuring the effects of treatment on Mexican spotted owl PACs of marginal quality may be confounded by intermittent occupancy prior to treatment. A short-term absence of occupancy post-treatment could be indistinguishable from pre-treatment use if occupancy was originally intermittent. It is, nevertheless, valuable to monitor short-term impacts of treatments in low quality habitat as these are the areas in greatest need of treatment. Additionally, the results may be leveraged with those of other related monitoring efforts to better describe broader trends and there is potential that this effort could set-up long-term monitoring efforts that better address changes to forest structure and the resulting effects to Mexican spotted owls.

The proposed monitoring plan would pair treated and reference PACs within the project area to compare occupancy, reproductive success, and habitat changes. There will be two groups of study PACs. The first group will consist of PACs receiving thinning and burning treatments and corresponding paired reference PACs (Group 1) and the second group of PACs will consist of PACs receiving prescribed fire-only treatments and their corresponding paired reference PACs (Group 2). Criteria for pairing selected treatment and reference PACs will include the following:

- Both treatment and reference PACs must be currently occupied by a pair of spotted owls. It is recognized that this may be problematic due to the potential for inconsistent occupancy in some of the PACs.
- Both treatment and reference PACs should consist of similar habitat (e.g., percentage of pine-oak, etc.).
- Both treatment and reference PACs should have similar environmental conditions (e.g., fire history, management history, etc.).
- Treatment and reference PACs should not have other confounding factors (e.g., heavy recreation, multiple land managers, etc.)
- Treatments in selected PACs should ideally occur across the majority of their spatial extent to maximize the ability to detect cause and effect.

- Reference PACS may come from a pool of PACs including those not proposed for any treatment or PACs where treatment has been deferred in order to maintain an “untreated” condition during the monitoring period. In order to achieve maximum similarity, reference PACs may also be selected from PACs outside of the 4FRI project area.
- PACs may be stratified by treatment type, year of treatment, etc.

Guiding Question:

- How do planned thinning and fire treatments affect habitat in the short-term and do the resulting changes affect short-term occupancy and reproductive success in treated versus untreated PACs?

Identified Response Variables:

- Owl occupancy (the percent of PACs occupied before and after treatments).
- Owl reproductive success (ideally the number of fledglings observed per adequately checked pair before and after treatments).
- Habitat change (post-treatment changes for key variables selected from Table C.2 (USDI FWS 2012, pp. 276-277) showing description of desired conditions [DCs]) in forest cover types typically used by Mexican spotted owls for nesting and roosting.

Planned Treatments:

- Treatments will likely be variable in spatial extent and intensity (intensity measured by degree of change in key habitat variables related to desired conditions [see Table C.1]).

General Study Design Approach:

- Monitoring will contrast a set of reference PACs to a set of treatment PACs for each PAC treatment group. As stated above, reference PACs will match the environmental conditions as closely as possible in PACs where treatments are proposed. Treatment PACs will be prioritized for management actions soon after the initiation of the 4FRI. If reference PACs are selected from PACs with assigned treatments, then those treatments will not occur until the monitoring period has concluded in the corresponding paired treatment PAC.
 - ◆ Group 1 PACs are proposed to have both thinning and prescribed fire treatments and will be drawn from those PACs listed in Table 5 of the biological opinion or as described above. All 18 PACs in Group 1 will be monitored prior to treatment implementation as described below. Initially only 4 treatment PACs and at least 4 reference PACs will be selected for comparison. Treatment of the remaining 14 PACs will be contingent upon the monitoring results from this initial phase of Group 1 PAC treatments. These first treatment PACs and the reference PACs used for comparison in Group 1 will be collaboratively identified by the FS and U.S. Fish and Wildlife Service after occupancy is determined; however, initial priority will be given to PACs that are dominated by stands proposed for 9 inch DBH cutting limits. Within Group 1 PACs, trees up to 17.9 inches DBH may be cut as indicated in the EIS and consultation package; however, trees over 14 inches DBH will not be removed. These select trees between 14 – 17.9 inches DBH may be felled and left onsite as logs, converted into snags, or burned. Coarse woody debris/ surface fuels in treated PACs will be retained at levels of 5 – 7 tons/acre in compliance with forest plans

and the biological opinion. All treated stands in Group 1 PACs will be marked by hand and marking will be coordinated with the U.S. Fish and Wildlife Service.

Pending FWS approval and to the extent possible, all MSO residing in Group 1 treatment and reference PACs will be banded with unique color-coded leg bands to allow for individual identification and monitoring before, during, and after treatments have been implemented. In the event that any of the Group 1 PACs are surveyed for MSO occupancy for 3 consecutive seasons and no MSO are detected, treatment within those PACs may commence to retain and improve MSO habitat components (in addition to the initial 4 PACs discussed above). Monitoring protocol for these PACs will remain consistent with the occupied PACs. If any of the Group 1 PACs being monitored burn at mixed or high severity, the monitoring will continue for at least 3 consecutive seasons, after which, monitoring may cease.

- ◆ Group 2 PACs are proposed to have prescribed fire-only treatments and will be drawn from those listed in Table 6 of the biological opinion or as described above. Six treatment PACs and 6 paired reference PACs will be selected for Group 2 comparisons. Final treatment PACs and reference PACs will be collaboratively identified by the FS and U.S. Fish and Wildlife Service after occupancy is determined.
- ◆ Within the Group 1 and Group 2 PACs selected for comparison, surveys for occupancy and reproductive success will be conducted for at least 2 seasons before treatment. Occupancy and reproduction surveys will continue to be conducted in consecutive years post-treatment starting with the year of mechanical treatment and continuing until 2 years post-prescribed fire treatments. We expect this will require 3-6 visits per PAC per year. We estimate that Group 1 PACs will be surveyed for 8-10 years, depending on the number of year that pass between the mechanical treatment and the prescribed fire treatment, while Group 2 PACs will be surveyed for an estimated 5-8 years. The timing of prescribed fire treatments depend on a number of factors including, available fuel load, fuel moisture, weather, and available resources.

Within Group 1 and Group 2 PACs, vegetation data will be collected prior to treatment, then 1 year post-mechanical treatment and 2 years post-fire treatment for a total of 3 visits per PAC.

Vegetation and spotted owl survey protocols will remain consistent across treatments groups and throughout the monitoring period. Combined, this effort could require anywhere from 981 to 2,133 PAC visits.

In the event that a mixed- or high-severity fire burns in any of the 117 PACs within the analysis area, MSO occupancy monitoring will be initiated and will continue for at least three consecutive years in all burned PACs, after which, monitoring may cease. However, no more than 6 PACs affected by mixed- or high-severity fire will be monitored during any given year. If the Multi-Party Monitoring Board elects to monitor more than occupancy, there may be reductions in sample size to offset increasing expenses. If the number of PACs burned as described exceeds the number to be monitored then there will be a preference to continue monitoring PACs for which baseline (pre-burn) data exist.

Sampling Considerations:

- Sample response variables have been selected to allow estimation of the short-term effects of treatment on occupancy, reproductive success, and habitat desired conditions.
- Mexican spotted owl data will come from standard survey protocols and should ideally yield determinations of occupancy and reproductive success
- Vegetation data will come from nested variable radius and fixed plot surveys, large diameter woody debris transects and spatial analysis of 1-meter resolution aerial photography. These methods should yield measures of tree species diversity, basal area, large tree frequency (more than 12 inches and more than 18 inches d.b.h.), canopy cover and horizontal structural diversity. We have a protocol developed for monitoring conducted on the Flagstaff Watershed Protection Project with U.S. Fish and Wildlife Service and ERI that could be used or modified.

Potential Analytic Approaches:

- Simple treatment effect stratified by treatment type and geographic area/cover type. Two-sample tests, ANOVA, regression-based approaches, power dependent on sample size and variability.
- Subsequent analyses only if treatment effects are apparent – gradient analysis, AIC based model selection if sample size permits use of treatment /habitat covariates.

Quality Control / Assurance / Evaluation

The original monitoring plan was a result of agreements reached with the U.S. Fish and Wildlife Service during the consultation process for the 4FRI. During the objection resolution process, the original plan was expanded by increasing the number of monitored PACs and proposing additional methods for tracking MSO.

The FS and U.S. Fish and Wildlife Service will coordinate and plan monitoring work cooperatively.

A written annual report with survey results will be submitted to U.S. Fish and Wildlife Service and will be made publically available. This information will be presented to the stakeholder group on an annual basis.

The FS will continue to work closely with the U.S. Fish and Wildlife Service to provide input and feedback both informally and formally through the ongoing consultation process. The Multi-Party Monitoring Board will independently evaluate monitoring outcomes and other relevant science to develop and provide recommendations regarding future treatments in MSO PACs.

Insofar as the Forest Service receives its budget on an annual basis and cannot guarantee future budgets, each fiscal year, the FS will provide the Multi-Party Monitoring Board assurances that sufficient funding is available to complete scheduled MSO monitoring activities.

Future Research

There is mutual recognition of the need to evaluate the impacts of vegetation treatments on Mexican Spotted Owl (MSO) and its habitat at a broad scale. There is also a mutual understanding that the desired evaluation is beyond the scope of a single project such as the Four Forest Restoration Initiative. We have agreed to convene a working group that will design such a study. We anticipate that this effort will bring together subject matter experts, including representatives of the Forest Service, the U.S. Fish and Wildlife

Service, the Rocky Mountain Research Station and other research stations, and the MSO Recovery Team, in cooperation with the Center for Biological Diversity and other stakeholders as appropriate.

The primary objective of the first meeting will be to bring forward the key questions related to characterizing the effects of vegetation treatments on MSO and its habitat and to identify the resources needed to rigorously evaluate these effects at the appropriate scale. The group will review the best available science and develop a consistent monitoring approach across multiple administrative units, expanding upon existing monitoring efforts where appropriate.