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In Reply Refer To:

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02-21-03-F-0144  
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July 14, 2005

Mr. M. Stephen Best  
District Ranger  
Williams Ranger District  
742 South Clover Road  
Williams, Arizona 86046-9122

RE: Biological Opinion for the City Project and the Twin Prescribed Burn Project

Dear Mr. Best:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). At issue are impacts that may result from both the City Project and Twin Prescribed Burn Project on the Williams Ranger District (District) in Coconino County, Arizona. Because we received requests for formal consultation on the projects simultaneously from the same administrative unit, the projects are located in the same general area, and the projects involve the same MSO Protected Activity Center (PAC), we address the effects of the two projects together in this one biological opinion.

This biological opinion is based on information provided in biological evaluations (BEs), supplements to the BEs, meetings, telephone conversations, email messages, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, the type of actions and their effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

### **CONSULTATION HISTORY**

Table 1 is a summary of the consultation history for the two projects. All tables are included at the end of this document.

## **BIOLOGICAL OPINION**

### **DESCRIPTION OF THE PROPOSED ACTION**

Although the City Project and the Twin Prescribed Burn Project have similar purposes [fuels reduction in the wildland urban interface (WUI)], some treatments and conservation measures differ for each project. The following descriptions summarize the objectives, location, treatments, and conservation measures for each project.

#### **City Project**

Most of the information in this section is from the BE and supplements (Bennetsen 2005a and Bennetsen pers. comm. 2005). The City Project is intended to improve forest health and sustainability and to reduce the risk of intense wildfires in a 12,308-acre area that borders private properties along the southern and western edges of the community of Williams, Arizona. Most of the City Project area is within the wildland-urban interface (WUI) zone; 3,260 acres are in the intensive WUI zone (0.125 mile from private property) and 7,500 acres are within the extensive urban interface zone (from the intensive zone to 1 mile from private property on the south and west and to 0.5 mile from private property on the north and east). The project will reduce tree densities and fuel loadings throughout most of the 12,308-acre area through a combination of treatments, as described below.

Approximately 938 acres of National Forest Service land within the City Project area are being proposed for a land exchange with private interests under the Yavapai Ranch Land Exchange. The exchange is being proposed under a separate analysis apart from the City Project. If the exchange occurs, it would affect the City Project by eliminating some acreage that is currently planned for treatment. It would also change the boundaries of the wildland-urban interface zones, potentially changing the types of treatments proposed near those areas.

Portions of the Clover High Project Area are included within the proposed City Project. The Clover High Project underwent section 7 consultation at a regional programmatic level (Biological Opinion R2/ES-TE CL 04-005; April 10, 2001). The regional consultation covered the Clover High Project Area for the MSO; the measures developed in the programmatic consultation will be adhered to within the Clover High Project Area. The Clover High Project Area, along with others included in the regional programmatic wildland urban interface consultation, was exempted from MSO critical habitat designation in the final critical habitat rule (August 31, 2004). However, the Forest Service included portions of the Clover High Project Area within the consultation for the City Project. Although MSO critical habitat does not exist within the Clover High area, any effects that occur to the MSO in that area have been included and addressed in this consultation.

#### *Mechanical Fuels Reduction*

Mechanical fuels reduction treatments are planned for 8,667 acres of the City Project on the Williams Ranger District.

### Thinning Treatments

Thinning treatments will include 4,918 acres of commercial thinning of sawtimber [involving trees 9 inches and greater in diameter-at-breast height (dbh)], 1,339 acres of commercial thinning of roundwood (involving trees 5-9 inches dbh), and 2,366 acres of noncommercial thinning. Thinning treatments will be from below; larger trees will generally be favored for retention over smaller trees. In some cases, where there are deficits in certain size classes of trees, groups of smaller trees may be favored over groups of larger trees (i.e., vigorous pine seedlings and saplings may be favored over pine trees 5-16 inches dbh to develop younger vegetative replacement size classes). Larger mistletoe-infected trees may also be selected for felling or girdling over a smaller non-infected tree. Spacing of trees retained will be irregular and not evenly-spaced. Mistletoe-infected ponderosa pine are often favored for felling but are often retained in the larger size classes. No felling of any yellow pine is proposed. Where they occur, Ponderosa pine, Douglas fir, white fir, and alligator juniper trees would be thinned in most sites proposed for thinning. In a few selected sites, smaller Gambel oak [generally 9 inches or less in diameter at root crown (drc)] would be thinned to reduce fuel loadings. All tree species that exist prior to treatment would be represented in the site after treatment. Where recent dead standing pine exist at levels that pose a fire risk (e.g., high numbers of snags/acre in locations near private property), dead pine up to 16 inches dbh may be felled.

The proposed action would create approximately 600 acres of regeneration areas within thinning sites. The regeneration areas would be 0.25 to 2 acres in size and up to 4 acres if necessary to address dwarf mistletoe problem areas. Regeneration areas would be created in selected sites and would cover 10 percent of the area within the sites. Those areas would be thinned very heavily in order to release vigorous smaller trees and promote new tree generation. The purpose of the treatment is to develop groups of trees in a younger age class in order to increase tree size and age class diversity over time in accordance with the Kaibab National Forest Land Management Plan (Forest Plan). The treatments would also promote the production of grasses, forbs, and shrubs in open groups throughout denser sites. When the regeneration opening size is greater than one acre in size, a minimum of 3 to 5 reserve trees would be retained per group. The reserve trees would generally be the largest trees available.

Cover areas would be retained in thinning sites that are identified as critical wildlife travel routes designated by the Arizona Game and Fish Department. Cover areas are small groups that would be left unthinned. They would be 0.1 to 1.0 acre in size and would be distributed over 10 to 20 percent of the sites adjacent to the travel routes. The groups are intended to provide hiding cover near travel routes.

Stands within the wildland-urban interface intensive zone that are proposed for thinning treatments would be thinned down to an average of 30 to 60 trees per acre. Regeneration areas are not needed in the intensive zone because the stands would be open enough to promote some replacement tree regeneration. Ponderosa pine sites that are proposed for thinning treatments in the extensive zone and other areas outside the extensive zone would be thinned down to an average of 50 to 80 trees per acre. Woodland sites would be thinned to 30 to 60 trees per acre to move the sites closer to conditions that existed historically. This tree density is higher than reference conditions indicate on the site, and would move conditions towards those indicated to promote goshawk foraging habitat. Intended overall tree density and diameter distribution

within the ponderosa pine forest are specified in the *Kaibab National Forest Land Management Plan* (Kaibab Forest Plan) as amended in June 1996, and interpreted further in the *Kaibab National Forest Implementation and Interpretation of Management Recommendations for the Northern Goshawk, Version 2.0*.

Higher tree densities would also be left in goshawk post-fledging family areas. Thinning prescriptions within ponderosa pine outside the intensive zone would generally retain groups of larger trees (12 inches dbh or larger) with higher canopy cover (40 percent or greater) over at least 60 percent of each site to be thinned.

Higher tree densities will be retained in MSO target/threshold sites. Thinning prescriptions in MSO target sites were modeled to move the site as quickly as possible toward minimum threshold conditions specified in the Kaibab Forest Plan. MSO pine-oak target/threshold sites are identified in the district database and cover 10 percent of the total MSO restricted pine-oak habitat on the Williams Ranger District. All mixed conifer sites will be managed as MSO target/threshold sites for the City Project.

Many of the commercial sites to be thinned would either be followed by, or receive a simultaneous, noncommercial thin. Sawtimber thins (4,918 acres) are more likely to have commercial volume than other thins. Roundwood thins (1,339 acres) would remove a large number of 5 to 9 inch dbh trees that may or may not be commercial, depending on available wood product markets.

#### Savannah Restoration Treatments

There will be 41 acres of savannah restoration. This treatment will not occur in MSO habitat (see Table 3).

#### Aspen Restoration Treatments

A treatment of three acres of aspen restoration was originally included in the proposed action in the BE. A one-acre treatment in the Bill Williams PAC has been deleted from the project. The other treatments are located outside of MSO habitat. That treatment has subsequently been deleted from the project (Bennetsen pers. comm. 2005).

#### *Burn Treatments*

#### Activity Fuels Treatments

Activity fuels treatments would follow mechanical fuels reduction treatments to reduce the amount of woody debris created by the felling of trees. Though pre-existing fuels will also be treated, most existing logs 12 inches or greater in diameter will be retained on site under all activity fuels treatments. The treatments will reduce the immediate fire risk and prepare the areas for future prescribed burning. Methods of preparing fuels are described in Bennetsen (2005a) and include various methods of removing, piling, or scattering slash and subsequently burning the slash piles.

### Prescribed Underburn

A prescribed underburn is proposed for the entire City Project area. Approximately 2,300 acres are proposed for an initial underburn with no vegetative treatments. Another 963 acres are proposed for initial underburning with the possibility of noncommercial (or pre-commercial) thinning once the results of the initial underburn are assessed. The rest of the project area is proposed for both prescribed burning and vegetative treatments.

The initial prescribed burn for areas proposed for both vegetative treatments and prescribed burning may be implemented either prior to or following vegetative treatments. The sequence of treatments is left open due to: 1) unknown future timber markets; 2) unknown levels of future funding; and 3) unknown fuel moisture conditions should the preceding variables lend themselves to prescribed burning. This flexibility in the timing of treatments would allow the District to more easily adapt to changing markets and funding levels. A strategy, developed over time, would utilize available funding and react to changing situations in an ongoing manner, while the project is being implemented.

Maintenance or re-entry burns would occur on a 3- to 7-year schedule following initial burning in order to maintain an effective fuelbreak and further reduce the risk of stand-replacement wildfires. The original National Environmental Policy Act analysis would be re-evaluated to determine if there are any significant issues or changes to the project area for any re-entry or maintenance burning that is scheduled later than 7 years after the initial project implementation date. For analysis under the Act, the District proposes continuing the cycle of maintenance burns for 15 years from the start of implementation, after which further project implementation would be re-evaluated in coordination with the FWS. If there are no significant issues and conditions are not markedly different, the re-evaluation would be documented and filed in the original project record, and the maintenance burning could occur.

On steep slopes around High School Hill, Wounded Ranger Knoll, and Reneke Knoll, a series of two burns would be implemented on an interval of 2 to 3 years and would be conducted prior to mechanical treatment. The initial burn would be a low-intensity burn to remove small ladder fuels and naturally accumulated fuels. The second burn would be more intense to remove additional ladder fuels and fuels generated by the initial burn. Each entry would be evaluated to ensure that objectives are being met and successive burns or treatments are meeting fuels reduction and vegetation management goals. Upon completion of the first two burns, maintenance burns would be implemented on a 3- to 7-year schedule, as described above.

### *Road System*

No new permanent road construction is being proposed under the City Project. If commercial sawtimber and roundwood are sold and hauled from the area on log trucks, roads used to access commercial sites will be maintained and/or improved to reduce erosion problems. Some temporary roads may be used to access timber. Those temporary roads would be closed or obliterated after use. Also, any currently closed roads that may need to be re-opened would be closed after implementation. Increased log truck traffic will occur on local area roads used to access timber.

## **Twin Prescribed Burn Project**

Most of the information in this section is from the BE (Bennetsen 2005b). The Twin Prescribed Burn Project area contains approximately 14,855 acres that border private properties and the southwestern base of Bill Williams Mountain and extends to the southwest. Most of the project area is within the wildland-urban interface (WUI) zone, as defined by Forest Service Region 3 (Forest Service Manual 5100, Chapter 5140, R3 Supplement No. 5100-2000-2, December 22, 2000). The definition includes areas of resident human populations at imminent risk from wildfire as well as areas of special significance. The proposed action is associated with a municipal watershed that, if destroyed by fire, would result in hardship to the City of Williams and surrounding communities. The aforementioned WUI definition includes the watershed and the continuous slopes and fuels that lead directly to the watershed. The proposed action is intended to reduce the risk of uncharacteristically intense stand-replacing wildfires, prevent the spread of wildfire onto private property and into the City of Williams watershed, and to provide for firefighter and public safety in wildfire situations within the project area. The proposed action includes pre-treatment and underburn of areas that were burned in previous prescribed burns (1995-2001) and introduction of prescribed fire to adjacent untreated areas.

Aerial ignition may be used to ignite prescribed fire throughout the 14,855-acre project area to improve firefighter safety, for smoke management, and to increase cost effectiveness. When and where aerial ignition is preferred, a plastic sphere dispenser will be used to drop ignition devices from a helicopter.

The initial prescribed underburning of the project area would occur over a five- to seven-year period following the date of a signed decision document. In order to maintain an effective fuelbreak and further reduce the risk of stand-replacing wildfires, maintenance or “re-entry” burns may occur within a 10-year period following the decision date. Prior to implementation of maintenance burns, the Environmental Assessment for National Environmental Policy Act compliance for the Twin Project would be re-evaluated to determine if additional significant issues have arisen or significant changes have occurred in the project area. If there are no significant issues and conditions are not markedly different, the original decision would be validated and the maintenance burning would proceed.

There are no timber sales or commercial thinning operations included in this proposed action. No new road construction, road closures, or road obliterations are being considered as part of the proposed action. The following treatments were developed to meet the project objectives for four areas:

### *Area A: Maintenance Burning (7,500 acres)*

This area would be treated with maintenance burns, or reburning of areas that had prescribed fire treatments between 1995-2001. Most of the fuel load in this area consists of 4- to 8-inch diameter logs. In order to maintain the fuelbreak created by the earlier burns, the area will be treated through broadcast burning or pile burning. All burning will be conducted under prescription parameters identified in the prescribed burn plan. The intent of the proposed burn in this area would be to alter forest conditions so that severe fire behavior and potentially damaging fire effects are significantly reduced as soon as possible.

Area B: Initial Prescribed Burning (7,400 acres)

Fire treatments are proposed on this area of the forest that has not received previous burn treatments. Most of this area has not experienced fire in the last 100 years. Initial and re-entry burning will be conducted under the prescription parameters identified in the burn plan. The intent of the treatment in Area B would be to alter forest conditions, as soon as possible, so that severe fire behavior and potentially damaging fire effects are significantly reduced.

Area C: Fireline Preparation/Tree Thinning (355 acres)

Prior to prescribed burning, the project boundary adjacent to the slopes of Bill Williams Mountain, the Bill Williams powerline transmission corridor within the project area, and the private property boundaries near Hat Ranch, Quarter Circle XX Ranch, and Benham Ranch would receive fireline preparation up to 130 feet from the control lines. This treatment would reduce the risk of escape during prescribed burning activities, and improve protection of the areas. The intent of the treatment in the area is to reduce and rearrange forest fuels to decrease fire intensity and rate of spread near critical areas. The treatment would decrease the risk of escape and increase protection of uphill and downwind critical areas from fire. Fireline preparation would be accomplished using chainsaws and hand tools. Preparation would involve thinning trees and treating slash to the following specifications:

- Thin all ponderosa pine and fir trees less than 9 inches in diameter at breast height (dbh).
- Prune all trees greater than 9 inches dbh up to 6 feet in height.
- Material created by the treatments would be piled and subsequently burned when conditions are appropriate. Hand piling would occur along handlines, and dozer piling would occur along dozer lines.

Some areas along the north and east project boundaries may also receive the preparatory treatment where the risk of escape can be reduced through treatment. Due to limited resources, not all of Area C on the map may receive the treatment. Several factors would be considered when prioritizing areas for fireline preparation including fuel loading, jackpot conditions, ladder fuels, resistance to control, topography, aspect, prevailing winds, and spotting potential.

Area D: Intensive Treatment Zone (2,700 acres)

Within the intensive treatment zone, all available fuels will be ignited where possible, especially logs and snags, which are sources of intense heat and could spot across control lines. The intent of the treatment in this area is to reduce the risk of future fire behavior problems, as soon as possible. In order to provide increased protection to private lands, improve firefighter safety, and reduce the risk of fire escape during project implementation, some wildlife mitigation measures relating to snag and down log protection would not apply within 660 feet of private property boundaries, or within 660 feet of the north and east project boundaries.

Safety Zones (27 acres)

Safety zones would be constructed in 11 locations in order to provide safe areas for firefighters to retreat in the unlikely event that fire threatens them. Safety zones are generally areas up to 272 feet by 400 feet (2.5 acres) where dead fuels and live trees up to 9 inches dbh are removed, and trees greater than 9 inches dbh are pruned up to 6 feet in height. Vegetation material that is cut or pruned will be piled and burned. Patches of ponderosa pine regeneration that are at least 30 by 30 feet may be retained where practical.

### **Conservation Measures**

Conservation measures are steps taken to minimize potential negative impacts that may occur due to implementation of the proposed action and to protect key habitat features. Conservation measures were included for both projects (Bennetsen 2005a and b). Although some of the measures differ for the two projects, they are combined in this section. Differences in the measures for the two projects are noted. Use of the term “avoid” in the measures means that the described actions will not occur (Bennetsen pers. comm. 2005).

#### *General Wildlife and Habitat*

As noted, these measures may not apply in intensive treatment zones (Twin Project Area D and within 0.125 mile of private property boundary in City Project Area) when greater fuel reduction is needed to adequately reduce risk.

- Except within intensive treatment zones, all snags greater than 18 inches dbh and greater than 30 feet tall, or greater than 9 inches dbh with a cavity will be protected by a) avoidance of direct hand ignition, b) burning under cooler prescriptions, and/or c) removing debris down to mineral soil for a distance of one to two feet away from their bases prior to ignition.
- Except within intensive treatment zones, direct hand ignition of down logs that are greater than 12 inches in midpoint diameter and 8 feet long will be avoided. Note that it is possible that aerial ignitions could cause direct ignition through the random dispensing of spheres. When possible, burning, especially aerial ignitions, will be done when logs have higher fuel-moisture contents.
- Remove woody material and deep accumulations (i.e., greater than 6 inches deep) of needlecast from the bases of large yellow ponderosa pines (greater than 18 inches dbh) and large oak (greater than 10 inches drc for City and greater than 16 inches drc for Twin) prior to prescribed burning. Avoid direct ignition of all large yellow ponderosa pines and large oaks.
- Openings created by prescribed burning will be less than 4 acres in size and 200 feet in width, to the greatest extent practical. Exceptions may occur outside the intensive treatment zone where prescriptions are aimed at more moderate-intensity burns.

- The FS will attempt to mimic natural disturbance patterns by incorporating natural variation, such as irregular tree spacing, horizontal variation, and various patch sizes into management prescriptions.
- The FS will sustain a mosaic of vegetative densities (overstory and understory), age classes, and species composition across the landscape.
- A few large-diameter (greater than 18 inch dbh) snags or dying trees may become safety hazards along roads or powerlines as a result of the project. Snags or trees that need to be felled will be left on the ground as logs to provide habitat for wildlife species except within Area D. The logs may be moved away from roads and trails as necessary to minimize visual/aesthetic impacts.
- To promote the closure and rehabilitation of Bixler Saddle Road south of Bixler Tank, and to improve a wildlife water source, the tank is recommended for cleaning and lining with bentonite. Repairs will be made if funding is available.

### *Mexican Spotted Owl*

#### General Measures for All Protected and Restricted Habitat

- The FS will remove heavy accumulations of needlecast (greater than 6 inches depth) from the base of trees of any species with greater than 24 inches dbh (City Project) prior to prescribed burning and from the bases of large ponderosa pines (greater than 18 inches dbh) (Twin Project). Direct hand ignition of trees will be avoided (City only).
- Test applications with retardant spray will also be conducted in selected areas outside protected MSO habitat (i.e., outside of PACs and protected steep slope habitat) where first entry aerial ignition burning is planned. If these applications are successful, retardant spray may be used in addition to, or instead of, material removal outside of protected MSO habitat.
- To monitor and report on the success of management activities in promoting maintenance and development of MSO key habitat components, pre- and post-treatment monitoring will be conducted within the protected and restricted MSO habitat within the Twin project site. A streamlined monitoring protocol (Protocol A) specified in the *Region 3, 1998 Protocols for Implementation and Effectiveness Monitoring: Mexican Spotted Owl Microhabitat*, which were based upon the *Microhabitat Monitoring Protocol for the Mexican Spotted Owl* (U.S. Department of Agriculture; April 24, 1998) will be used.

#### Additional Measures for the Bill Williams Protected Activity Center (PAC)

- The FS will use combinations of thinning trees less than 9 inches in diameter, mechanical fuel treatment, and prescribed fire to abate fire risk.
- The FS will avoid road building.

- Clumps of broadleaved woody vegetation (i.e., shrubs) and hardwood trees larger than 10 inches in diameter at the root collar (drc) will be retained within the PAC to the greatest extent practicable (except within 660 feet of the wildland-urban interface and/or north and east project boundaries where greater fuel reduction is needed to adequately reduce risk). To achieve this, the following measures will be taken within the proposed burn area within the PAC: a) direct hand ignition of these features will be avoided, and b) burning will be conducted during conditions with relatively high fuel-moisture content.
- Project-related activities (e.g., pre-burn preparation, prescribed burning, post-burn follow-up, project-related vehicle use of Bixler Saddle Road) will be prohibited within the MSO PAC within the project site during the MSO breeding season, March 1 to August 31. Project-related vehicle use of Bixler Saddle Road within the MSO PAC will occur outside of the MSO breeding season (i.e., use will occur between September 1 through February 28) as necessary to help ensure safe project implementation.

#### Additional Measures for Protected Steep Slope Habitat

- Clumps of broadleaved woody vegetation (i.e., shrubs) and hardwood trees larger than 10 inches drc will be retained within protected steep slope MSO habitat to the greatest extent practicable (except within 660 feet of the wildland-urban interface, and/or north and east project boundaries where greater fuel reduction is needed to adequately reduce risk). To achieve this, the following measures will be taken within these protected areas in the project site: a) direct hand ignition of these features will be avoided; and b) burning will be conducted during conditions with relatively high fuel-moisture content.

#### *Prescribed Burning*

- Prescribed burning will be initiated when weather conditions are favorable for adequate control of fire, and when smoke-management conditions are not likely to produce significant adverse impacts to smoke-sensitive areas. A burn plan will be developed to ensure safety of fire personnel, the public, and private property. Included in the burn plan will be measures to meet Arizona Department of Environmental Quality Standards.
- The FS will conduct intra-agency pre-burn coordination and, where applicable, notify appropriate media organizations, city, county and state agencies, internal Forest Service personnel, local businesses, forest permit holders, adjacent landowners, and other members of the public prior to prescribed burning.

Additional conservation measures to protect northern goshawks and turkey, reduce effects from noxious weeds and livestock grazing following prescribed burning, and to protect the watershed and soils are described in the BEs (Bennetsen 2005a and b).

## **STATUS OF THE SPECIES**

### *Mexican Spotted Owl*

The MSO was listed as a threatened species in 1993 (USDI 1993). The primary threats to the

species were cited as even-aged timber harvest and catastrophic wildfire, although grazing, recreation, and other land uses were also mentioned as possible factors influencing the MSO population. The FWS appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (USDI 1995).

A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (USDI 1993) and in the Recovery Plan (USDI 1995). The information provided in those documents is included herein by reference. Although the MSOs entire range covers a broad area of the southwestern United States and Mexico, the MSO does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, uneven-aged forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

The U.S. range of the MSO has been divided into six recovery units (RU), as discussed in the Recovery Plan. The primary administrator of lands supporting the MSO in the United States is the Forest Service. Most owls have been found within Forest Service Region 3 (including 11 National Forests in Arizona and New Mexico). According to the Recovery Plan, 91 percent of MSO known to exist in the United States between 1990 and 1993 occurred on lands administered by the Forest Service.

The Upper Gila Mountains RU, in which the proposed action is located, is a relatively narrow band bounded on the north by the Colorado Plateau RU and to the south by the Basin and Range-West RU. The southern boundary of this RU includes the drainages below the Mogollon Rim in central and eastern Arizona. The eastern boundary extends to the Black, Mimbres, San Mateo, and Magdalena mountain ranges of New Mexico. The northern and western boundaries extend to the San Francisco Peaks and Bill Williams Mountain north and west of Flagstaff, Arizona. This is a topographically complex area consisting of steep foothills and high plateaus dissected by deep, forested drainages. This RU can be considered a "transition zone" because it is an interface between two major biotic regions: the Colorado Plateau and Basin and Range Provinces (Wilson 1969). The Kaibab, Coconino, Apache-Sitgreaves, Tonto, Cibola, and Gila National Forests administer most habitat within this RU.

Historical and current anthropogenic uses of MSO habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (e.g., timber, oil, gas), and development. These activities have the potential to reduce the quality of MSO nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season.

Currently, high-intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico and are probably the greatest threat to MSO within the Upper Gila Mountains RU (USDI 1995). As throughout the West, fire intensity and size have been increasing within this geographic area. Table 2 shows several high-intensity fires that have had a large influence on MSO habitat in this RU in the last decade. Obviously the information in Table 2 is not a comprehensive analysis of fires in the Upper Gila Mountains RU or the effects to MSO. However, the information does illustrate the influence that stand-replacing fire has on

current and future MSO habitat in this RU. This list of fires alone estimates that approximately 11% of the PAC habitat within the RU suffered high-to moderate-intensity, stand-replacing fire in the last seven years.

Fuel accumulations and forests overstocked with trees place MSO habitat at risk with respect to stand-replacing fires. Unmanaged and unplanned conversion of large areas of forests or woodlands to early seral conditions by wildfire can disrupt management goals to maintain existing and to provide for future MSO habitat. Characteristics of many MSO nest and roost sites place them at high fire risk. Some nest/roost locations at special topographic locations (such as steep-walled canyons or isolated places) may be fire refugia, however. Taking cue from these, one promising management tactic is to isolate nest/roost sites from the adjoining high-risk forest by reducing flammability and fire spread in a buffer around the site. This must be done, of course, without compromising the site itself as nest/roost habitat. Given the present conditions of southwestern forests, extreme fire years could result in landscape level, stand-replacing fires throughout large portions of the owl's range. Because the resulting damage to MSO habitat would be irreparable in the foreseeable future, efforts to limit large-scale severe fires are of utmost importance for owl conservation.

The Forest Service Region 3 most recently reported a total of approximately 980 protected activity centers (PACs) established on National Forest lands in Arizona and New Mexico (USDA Forest Service, Southwestern Region, December 19, 2002). Based on this number of MSO sites, total numbers in the United States may range from 980 individuals, assuming each known site was occupied by a single MSO, to 1,960 individuals, assuming each known site was occupied by a pair of MSOs. The Forest Service Region 3 data are the most current compiled information available to us; however, survey efforts in areas other than National Forest System lands have resulted in additional sites being located in all Recovery Units.

Researchers studied MSO population dynamics on one study site in Arizona ( $n = 63$  territories) and one study site in New Mexico ( $n = 47$  territories) from 1991 through 2002. The Final Report, titled "Temporal and Spatial Variation in the Demographic Rates of Two Mexican Spotted Owl Populations," (*in press*) found that the Arizona population was stable (mean  $\Lambda$  from 1993 to 2000 = 0.995; 95% Confidence Interval = 0.836, 1.155) while the New Mexico population declined at an annual rate of about 6% (mean  $\Lambda$  from 1993 to 2000 = 0.937; 95% Confidence Interval = 0.895, 0.979). The study concludes that spotted owl populations could experience great (>20%) fluctuations in numbers from year to year due to the high annual variation in recruitment. However, due to the high annual variation in recruitment, the MSO is then likely very vulnerable to actions that impact adult survival (e.g., habitat alteration, drought, etc.) during years of low recruitment.

Since the owl was listed, we have completed or have in draft form a total of 152 formal consultations for the MSO. These formal consultations have identified incidences of anticipated incidental take of MSO in 337 PACs. The form of this incidental take is almost entirely harm or harassment. These consultations have primarily dealt with actions proposed by the Forest Service, Region 3. However, in addition to actions proposed by the Forest Service, Region 3, we have also reviewed the impacts of actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, National Park

Service, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management ignited fires), livestock grazing, recreation activities, utility corridors, military and sightseeing overflights, and other activities. Only two of these projects (release of site-specific owl location information and existing forest plans) have resulted in biological opinions that the proposed action would likely jeopardize the continued existence of the MSO.

In 1996, we issued a biological opinion on Forest Service Region 3's adoption of the Recovery Plan recommendations through an amendment of their Forest Plans. In this non-jeopardy biological opinion, we anticipated that approximately 151 PACs would be affected by activities that would result in incidental take of MSOs, with approximately 91 of those PACs located in the Upper Gila Mountains RU. In addition, on January 17, 2003, we completed a reinitiation of the 1996 Forest Plan Amendments biological opinion, which anticipated the additional incidental take of five MSO PACs in Region 3 due to the rate of implementation of the grazing standards and guidelines, for a total of 156 PACs. Consultation on individual actions under these biological opinions resulted in the harm and harassment of approximately 243 PACs. Region 3 of the Forest Service reinitiated consultation on the Forest Plans on April 8, 2004. On June 10, 2005, the FWS issued a revised biological opinion on the amended Forest Plans. We anticipated that while the Forests continue to operate under the existing Land Resource Management Plans, take is reasonably certain to occur to an additional 10 percent of the known PACs on Forest Service lands. We expect that continuing operations under the plans will result in harm to 49 PACs and harassment to another 49 PACs. To date, consultation on individual actions under the amended Forest Plans, as accounted for under the June 10, 2005, biological opinion has resulted in 4 PACs adversely affected (3 PACs harassed and 1 PAC harmed), with 4 of those in the Upper Gila Mountains RU.

#### *Mexican Spotted Owl Critical Habitat*

The final MSO critical habitat rule (USDI 2004) designated approximately 8.6 million acres of critical habitat in Arizona, Colorado, New Mexico, and Utah, mostly on Federal lands (USDI 2004). Within this larger area, proposed critical habitat is limited to areas that meet the definition of protected and restricted habitat, as described in the Recovery Plan. Protected habitat includes all known owl sites and all areas within mixed conifer or pine-oak habitat with slopes greater than 40 percent where timber harvest has not occurred in the past 20 years. Restricted habitat includes mixed conifer forest, pine-oak forest, and riparian areas outside of protected habitat.

The primary constituent elements for proposed MSO critical habitat were determined from studies of their habitat requirements and information provided in the Recovery Plan (USDI 1995). Since owl habitat can include both canyon and forested areas, primary constituent elements were identified in both areas. The primary constituent elements which occur for the MSO within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the MSOs habitat needs for nesting, roosting, foraging, and dispersing are in areas defined by the following features for forest structure and prey species habitat:

- A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 percent to 45 percent of which are large trees with dbh of 12 inches or more;
- A shade canopy created by the tree branches covering 40 percent or more of the ground; and,
- Large, dead trees (snags) with a dbh of at least 12 inches.

Primary constituent elements related to the maintenance of adequate prey species include:

- High volumes of fallen trees and other woody debris;
- A wide range of tree and plant species, including hardwoods; and
- Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

The forest habitat attributes listed above usually are present with increasing forest age, but their occurrence may vary by location, past forest management practices or natural disturbance events, forest-type productivity, and plant succession. These characteristics may also be observed in younger stands, especially when the stands contain remnant large trees or patches of large trees. Certain forest management practices may also enhance tree growth and mature stand characteristics where the older, larger trees are allowed to persist.

There are 13 critical habitat units located in the Upper Gila Mountains RU totaling 3.1 million acres, although not all of those acres meet the definition of critical habitat.

## **ENVIRONMENTAL BASELINE**

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

### **A. STATUS OF THE SPECIES WITHIN THE ACTION AREA**

#### **Mexican Spotted Owl and Habitat**

##### *City Project*

The City Project area is predominantly ponderosa pine and ponderosa pine-Gambel oak, with some scattered alligator juniper (Bennetsen 2005a). There are also some mixed conifer sites on the slopes of Bill Williams Mountain and other surrounding hills. Those sites have Douglas fir and white fir mixed in with ponderosa pine and/or Gambel oak. There are also some woodland

and true meadow sites in the project area. Most of the forested sites have high densities of trees. Much of the City Project Area landscape is dominated by trees of the same 60- to 100-year old age class.

The City Project area includes restricted, target/threshold, and protected MSO habitat. The amount of the various MSO habitat categories that will be affected by the different treatment types are summarized in Table 3. There is no MSO habitat at threshold conditions within the project area. The average existing key habitat components for the various MSO habitat categories within the City Project area are summarized in Tables 4 and 5.

### *Twin Project*

Data on existing conditions are derived from pre-treatment MSO microhabitat monitoring (Bennetsen 2005b). Pre-treatment MSO microhabitat monitoring for the Twin Project was completed in 2003. Post-treatment microhabitat monitoring will be conducted according to protocol. Data on predicted conditions are derived from experience and literature, previous fire effects monitoring, and fire model simulations maintained by the Kaibab National Forest zone fuels program manager and zone silviculturist.

The northern portion of the project area is ponderosa pine forest and the southern third of the area is a transitional pinyon-juniper woodland. Some Douglas fir, white fir, southwestern white pine, and aspen occur on the northern aspects and upper slopes.

The number of acres of each of the MSO habitat classes that will be affected by the proposed action are summarized in Table 6. The existing key habitat components for the various MSO habitat categories within the Twin Project area are summarized in Table 7. No MSO habitat currently meets threshold conditions within the project area.

### **Bill Williams PAC**

Both projects include a portion of the Bill Williams PAC. The PAC had various delineations since it was first established and is currently 1,015 acres in size. The scattered pattern of non-nesting owl locations across Bill Williams Mountain is one of the factors that influenced the various delineations and size of the PAC. The designated 100-acre core area is based on limited owl location data, including a juvenile MSO location; there are no definitive nesting locations. The City Project BE states that “the potential for MSO to occupy habitat within the project area in the future exists along the base of Bill Williams Mountain where the Bill Williams PAC is located, though no MSO have been detected in the PAC since 1993 and protocol surveys conducted in this area during 2000, 2001, and 2004 all yielded negative results.”

Protocol inventory surveys were conducted in the Bill Williams PAC during 2003, 2004, and 2005 (S. Best, pers. comm. 2005). Habitat within the City Project boundary was surveyed near the PAC in 2004 and 2005. The Twin Project area was surveyed in 2003 and 2004. In addition, protocol inventory surveys were completed for the entire PAC as part of the Bill Williams ski area expansion project proposal in 1997. The area was incidentally surveyed for all years in the past decade when protocol inventory surveys were not completed (except 1995). During these

surveys, no MSO were detected. The District estimates that nearly 90 percent of the 1,015-acre PAC has been surveyed to inventory protocol since 2003.

Most protected and restricted MSO habitat within the project areas were surveyed to protocol for the MSO during 2003 and all such habitat was surveyed to protocol during 2004. Additional survey points were added and surveyed during 2004 as a result of field reconnaissance in the summer of 2003 that identified additional stands of pine-oak habitat within the City Project area. A second year of protocol MSO surveys are planned for the spring of 2005 for those additional survey points. All MSO habitat within the Clover High Project Area, which is included within the City Project area, was surveyed to protocol during 2001-2002, and again during 2004. No MSO were detected as a result of these surveys.

Supplemental information we received on PAC monitoring only indicated that occupancy and reproduction monitoring of the Bill Williams PAC was conducted in 2003 (B. Bennetsen, pers. comm. 2005). The project descriptions do not provide a schedule of future monitoring of the PAC for occupancy/reproduction in relation to the proposed action, or for MSO inventory surveys in non-PAC habitat over the life of the multi-year proposed action.

### **Mexican Spotted Owl Critical Habitat**

Three MSO critical habitat units (UGM-13, 15, and 17) occur on the south zone of the Kaibab National Forest. The BE indicated that a total of 3,070 acres of MSO critical habitat exist within the City project area and 4,413 acres are within the Twin Project area. However, 405 acres of that total is within the Clover High Project area which was not designated as MSO critical habitat (Bennetsen pers. comm. 2005). Thus, for the purposes of addressing effects to MSO critical habitat in the City Project, there are 2,665 acres of critical habitat in the project area.

## **B. FACTORS AFFECTING THE SPECIES' ENVIRONMENT WITHIN THE ACTION AREA**

### **Mexican Spotted Owl and Mexican Spotted Owl Critical Habitat**

The Twin Prescribed Burn project area includes approximately 7,500 acres that were treated with prescribed fire between 1995 and 2001 (Bennetsen 2005b). Those treatments significantly reduced forest floor duff and litter depths. Burn intensities varied over the project. Mortality of the large overstory trees was low, but in some areas there were higher levels of mortality of smaller-diameter trees. The areas of higher mortality helped meet project objectives by reducing stand densities and creating forest openings. However, many of the fire-killed trees have fallen and are now 4- to 8-inch diameter logs. The fuel load in the area ranges from 2 tons/acre to about 15 tons/acre, with most of the higher fuel loads made up of the 4- to 8-inch diameter logs. Approximately 7,400 acres of the project area have not been previously treated, and most of that acreage has not experienced fire in the last 100 years. Existing live and dead fuel loads are unnaturally high.

Below-average precipitation over the last decade has resulted in an increase in bark beetle activity in some parts of the Williams Ranger District. Bark beetles have killed groups of ponderosa and pinyon pine within the Twin project area. Currently, bark beetle mortality within

the project area is estimated to be less than 100 acres, although it is likely that there will be an increase in infestation and mortality over the next few years (Bennetsen 2005b). Mortality of beetle-killed trees has contributed to the high fuel levels in portions of the planning area.

Factors affecting the species' environment within the action area include, but are not limited to wildfire and fire suppression, prescribed fire, wildland fire use fire, grazing, noxious weeds and control, forest insects and control, facility and corridor management, recreation, and private land development. We are aware of several actions (Table 8) involving MSO and/or MSO critical habitat planned for and/or implemented on the south zone of the Kaibab National Forest.

## **EFFECTS OF THE ACTION**

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

### **Mexican spotted owl**

The Recovery Plan encourages land management agencies to conduct fuels reduction projects within MSO PACs and provides guidelines for those actions that will aid in reducing fuels, but still maintain habitat and minimize effects to MSO. These actions may protect owl habitat over the long-term by reducing the likelihood of severe crown fire; however, in the short-term, fuels reduction treatments can adversely affect owls directly or indirectly by affecting owl habitat components (e.g., multi-storied canopy cover, dense canopy cover, snags, downed logs, woody debris, etc.) and use of habitat for nesting, roosting, and foraging.

The effects of fire include both negative and beneficial effects on MSO habitat. Beneficial effects include increased response of herbaceous vegetation after a fire. Negative effects include the loss of MSO prey habitat components such as herbaceous cover, down logs, and snags. The effects of fire on the prey base of the MSO are complex and are dependent on the variations in fire characteristics and in prey habitat. Fire intensity, size, and behavior are influenced by numerous factors such as vegetative type, moisture, fuel loads, weather, season, and topography. Fire can effectively alter vegetation structure and composition thereby affecting small mammal habitat. The initial effects of fire are likely to be detrimental to rodent populations, as cover and plant forage species would be reduced.

Population responses by small mammals to fire-induced changes in habitat vary. For example, deer mouse populations might increase immediately following fire and then decrease through time (Ward and Block 1995). Campbell et al. (1977) noted that populations of peromyscid mice decreased immediately following fire in an Arizona ponderosa pine forest that removed one-fourth (moderately burned) to two-thirds (severely burned) of the basal area; populations then returned to pre-fire numbers two years following the burn. Further, no differences were found in rodent populations between moderately and severely burned areas. They concluded that the

effects of the fire that they studied were short-term, and the short-term positive numerical responses of mice were attributed to an increase in forage, particularly grasses and forbs after the fire (Ward and Block 1995). Small mammal diversity and densities are typically depressed for one to three years after a fire (Wright and Bailey 1982). Biswell et al. (1973) suggested that rodent populations would be less affected during fall fires, because at that time of year rodents have accumulated seed caches that will mitigate loss of food resources. Predation of surviving rodents that are part of the diet of the MSO may increase immediately after the fire. In one study in northern California, radio-collared northern spotted owls spent considerable time in burned-over areas. This activity was assumed to be due to easy capture of prey (Patton and Gordon 1995).

The net effect of prescribed fires on MSO foraging is unclear: a fire that removes the tree canopy would likely render a portion of the area unusable for foraging by owls; but if the spatial extent of crown loss is limited, a mosaic is created that could provide a diversity of prey for the owl and may actually be beneficial (Ward and Block 1995). Although owl prey species evolved in ecosystems where fire is a natural process, fire has been excluded from most southwestern ecosystems during the 20<sup>th</sup> century resulting in systems where fire behavior may deviate substantially from natural conditions. Effects of fire on small mammals under present environmental conditions are unclear (Ward and Block 1995).

The effects from fuels reduction projects can adversely affect MSO directly or indirectly by affecting habitat components such as canopy cover and snags, which may reduce or negate the use of this habitat for nesting and roosting. MSO habitat tends to be characterized by high basal area, canopy cover, and in pine-oak habitat, higher densities of Gambel oak (USDI 1995). Research conducted on the Coconino National Forest found that MSO do not roost in stands with basal area <60 square feet/acre or stands with <25% canopy cover (Ganey et al. 2003). In addition, 75% of MSO in the study used stands with >40% canopy cover (Ganey et al. 2003). Therefore, the reduction of basal area and canopy cover may result in the loss of this habitat for nesting and roosting. Owl nest areas also tend to be significantly cooler than random sites (Ganey 2004). Cooler temperatures are influenced by microclimatic features (e.g., north facing steeper slopes, drainages, etc.), but are also influenced by canopy cover. Reduced canopy cover allows for more sunlight penetration into forest stands, thus potentially increasing temperatures within the stand and reducing its potential use by roosting MSO. In forested habitats, MSO typically use snags or large, naturally occurring platforms (such as Douglas fir dwarf mistletoe witches' brooms) for nesting. Large snags are relatively rare throughout the project area (Bennetsen 2005a and b). Mechanical thinning and prescribed burning can remove this habitat component (Randall Parker and Miller 2000), which may result in a loss of nesting habitat.

In summary, the proposed activities may change the structure of MSO prey species' habitat, affecting the abundance and composition of prey species. Although treatments, especially prescribed burning, may have adverse effects to prey species and their habitat in the short term, the proposed treatments may increase the diversity of vegetative conditions that in turn provide for a diverse prey base.

*City Project*

Summaries of the predicted loss of MSO key habitat components from mechanical and burn treatments of the City Project are in Tables 9 and 10, respectively. Predicted key habitat components retained after implementation of all treatments are in Table 11. The data in the tables are averages of losses over the entire extent of the project area. Thus, the losses in some MSO habitat locations could be lower or higher than those reported in the tables.

Thinning will reduce several key components of MSO habitat on 5,032 acres. The various thinning treatments will result in a reduced proportion of hardwood trees greater than 5 inches drc in MSO target/threshold habitat and hardwood trees between 5 and 9 inches drc in MSO protected habitat. Basal area will be reduced in all categories of MSO habitat. Large snags, which are currently rare in MSO restricted habitat, will be reduced, especially in the high fire risk intensive treatment zone.

Burn treatments will result in reductions of several key habitat components on the 5,840 acres of MSO habitat that will receive the treatments. Reductions of snags, large logs, and hardwood trees in all MSO habitat categories will result. The thinning and burning will result in a loss of potential nesting habitat (snags) and prey habitat (large logs and hardwoods) within the City Project boundary.

Eighteen (16 mixed conifer and 2 pine-oak) stands in the project area are considered to be MSO target/threshold habitat stands. Threshold conditions do not occur in any of these stands; all of these stands will be treated. Bennetsen (2005a) provided information on existing tree size classes in the mixed conifer stands. Specific data on post-treatment conditions in these stands were not provided, but the BE states that prescriptions were designed to move the sites towards threshold conditions identified in the Forest Plan as quickly as possible.

*Twin Prescribed Burn Project*

The predicted loss of MSO key habitat components from prescribed burning (Areas A and B) and prescribed burning with mechanical treatments (Area D) are summarized in Tables 12 and 13, respectively. The predicted loss estimates have been adjusted for the conservation measures and aerial ignition that are part of the proposed action (Bennetsen 2005b). Predicted remaining key habitat components after implementation of the treatments are summarized in Tables 14 and 15. The data in the tables are averages of losses over the entire extent of the project area. Thus, the actual losses and remaining key habitat components could be lower or higher than those reported in the tables in some MSO habitat locations.

Prescribed burning will result in reductions of several key habitat components on the 4,896 acres of MSO habitat that will receive the treatments. Prescribed burning (Areas A and B) will result in reductions of snags (18 percent), logs (48 percent), hardwood trees (38 percent), and basal area (21-26 percent) on 3,764 acres of MSO habitat. Prescribed burning and intensive mechanical treatments (Area D) will result in reductions of snags (38 percent), logs (58 percent), hardwood trees (43 percent), and basal area (21-26 percent) on 1,132 acres of MSO habitat. A small loss of very large trees may also occur as a result of both treatments. The loss of these components of MSO habitat will reduce nesting and roosting habitat in the project area.

Six stands in the project area are considered to be MSO target/threshold habitat (Tables 16 and 17). Threshold conditions do not occur in any of those stands (Bennetsen pers. comm. 2005). In general, the stands currently lack sufficient percent stand density index (SDI) of trees greater than 24" dbh, total BA, and number of trees greater than 18 inches dbh per acre to meet target conditions. All of the stands will be treated, and, in general, total basal area will be further reduced by the treatments. The Forest plans to remove flammable material from the base of large trees and oaks prior to treatment but anticipates a small loss of large trees due to prescribed burning.

### **Bill Williams PAC**

Both the City and Twin projects include treatments in the Bill Williams PAC. Project actions will not be conducted in the PAC during the MSO breeding season, and the proposed 1-acre aspen restoration treatment (Unit 00150900117) described in the City BE will not be conducted (Bennetsen, pers. comm. 2005). However, the Twin Project treatment areas are adjacent to the 100-acre core area.

#### *City Project*

Approximately 132 acres of the approximately 1,015-acre PAC will receive mechanical treatments in four units. No trees greater than 24 inches dbh will be felled or girdled in the treatment units, no snags or 18- to 24-inch dbh trees will be lost due to mechanical treatments, and no trees greater than 9 inches dbh will be cut in the PAC. Stand data supplemental to the BE (Bennetsen pers. comm. 2005) allow for some examination of effects in each treatment unit. Approximately 100 percent of the 5- to 9-inch dbh hardwoods will be removed in a 9-acre roundwood treatment unit (Unit 0015090004), reducing the basal area (BA) of the unit from 148 to 102 square feet/acre. Approximately 63 percent of the 5- to 9-inch dbh hardwoods will be removed in a 54-acre roundwood treatment unit (Unit 0015090012), reducing the BA of the unit from 272 to 206 square feet/acre. At least 34 percent of the 5- to 9-inch dbh hardwood trees will be removed in a 45-acre precommercial thinning treatment unit (Unit 0015090017), reducing the BA of the unit from 128 to 105 square feet/acre. Based on information provided for a 24-acre roundwood treatment unit (Unit 0015090018), 63 to 100 percent of 5- to 9-inch dbh hardwoods will be removed from that treatment unit (Bennetsen, pers. comm. 2005), reducing the BA of the unit from 148 to 118 square feet/acre.

Each of the four treatment units in the PAC will also be prescribed burned. The estimated average loss (see Tables 9, 10, and 11) of MSO key habitat components in the 132 acres of the PAC due to burning will include 48 percent of large logs, 33 percent of hardwood trees greater than 5 inches drc, 18 percent of large snags, 3 percent of trees 18 to 24 inches dbh, and 2 percent of trees greater than 24 inches dbh. In addition, basal area will be further reduced by 10 percent.

The total loss of MSO key habitat components in the 132 acres of the four units due to the two treatment regimes is summarized in Table 18. The table is based on a combination of the specific supplemental stand information that was provided for the mechanical treatments and the average information in Tables 9, 10, and 11. The treatment units in the PAC will sustain losses of hardwoods, logs, snags, and basal area.

*Twin Prescribed Burn Project*

The Twin project will treat an additional 175 acres of the PAC. Prescribed burning in Areas A and B will occur in 138 acres of the PAC. Prescribed burning and intensive mechanical treatments in Area D will occur in 37 acres of the PAC immediately adjacent to the 100-acre core area.

The anticipated loss of key habitat components of the PAC are summarized in Tables 12, 13, 14, and 15. The 138 acres that will be treated with prescribed burning (Areas A and B) will sustain losses of already rare snags (18 percent loss) and logs (48 percent), hardwoods (38 percent), and basal area (26 percent). The 37 acres (immediately adjacent to the 100-acre nest area) that will be treated with prescribed burning and intensive mechanical treatments (Area D) will sustain large losses of already rare snags (38 percent) and logs (58 percent), hardwoods (43 percent), and basal area (26 percent).

Three hundred and seven acres (30 percent) of the approximately 1,015-acre Bill Williams PAC will be affected by the proposed actions. Already rare snags, large logs, and hardwoods will be lost due to the treatments proposed for the PAC. While a reduced proportion of each component will remain after treatment, key habitat components will be removed by the treatments. The 175 acres of PAC treatments within the Twin Prescribed Burn project will occur immediately adjacent to the designated 100-acre core area of the Bill Williams PAC. The proposed actions do not include a plan or schedule to conduct PAC monitoring over the life of the projects.

*Summary*

Reductions in key habitat components within MSO habitat of both projects will reduce site suitability and result in reduced potential for occupation of these areas in the future and changes to site microclimate or other important habitat characteristics for MSO (Bennetsen 2005b). Reductions in logs and snags from the proposed action will reduce foraging habitat quality for the MSO by reducing prey species habitat and thus abundance of prey species that use these features within this treatment area. These combined effects on restricted, target/threshold, and protected habitat will alter breeding or foraging success or survival of MSO occupying these areas in the future. The effects will also limit and otherwise influence where MSO may attempt to nest in the future.

**Mexican spotted owl critical habitat (City and Twin Prescribed Burn projects)**

Approximately 2,665 acres (see the Status Of The Species Within The Action Area section above) of MSO critical habitat in critical habitat unit UGM-13 is within the City Project area. Because the BE did not indicate where the treatment units are in relation to critical habitat, we do not know how much of the critical habitat will be directly affected by mechanical treatments. We based our analysis on the assumption that up to 2,665 acres of MSO critical habitat may be affected by the mechanical treatments. Because the BE states that the entire City Project area will be treated with prescribed fire, up to 2,665 acres of MSO critical habitat will be affected by that treatment.

Approximately 4,413 acres (see the Status Of The Species Within The Action Area section above) of MSO critical habitat in critical habitat unit UGM-13 is within the Twin Project area and will be treated with prescribed burns. The BE did not indicate how much MSO critical habitat is in Areas A and B, and in Area D. However, based on the information in Table 6, we conducted our analysis assuming that approximately 1,080 acres of critical habitat is in Area D with the remainder in Areas A and B.

Six primary constituent elements (PCEs) of MSO critical habitat are relevant to the proposed action, including three related to forest structure and three related to maintenance of adequate prey species (Bennetsen 2005a and b). This action will not occur in canyon or riparian habitat. A summary of the effects of the proposed action on the six primary constituent elements as reported in the BE is in Table 19. The data that were provided for addressing effects to the species are also useful in addressing effects to critical habitat (see species effects sections above).

A range of tree species; including mixed conifer and pine-oak forest types, composed of different tree sizes reflecting different ages of trees, 30-45 percent of which are large trees with a 12 inch or greater dbh. According to the information provided in the project BEs, large trees in MSO critical habitat in the project area are relatively rare and the habitat does not currently have 30-45 percent of its trees larger than 12 inches dbh. Based on the treatment acres in MSO habitat provided in Tables 3 and 6, trees greater than 12 inches dbh will be removed from critical habitat as a result of the projects. Even though the expected loss of large trees is relatively small when considered on a per acre basis, this loss of large trees would take the critical habitat further away from the percentage of large trees in this PCE.

A shade canopy created by tree branches covering 40 percent or more of the ground. We do not have specific information regarding canopy cover in MSO critical habitat in the project area. Although there is not a direct relationship between basal area and canopy cover, the relatively high proportion of loss of basal area suggests that canopy coverage will be reduced in critical habitat within the project areas. Reduction in canopy cover will reduce the suitability of the area for roosting and nesting as a decrease in canopy cover can change the microclimate within stands and increase predation risk.

Large dead trees (snags) with a 12 inch or greater dbh. Although some snags will be retained in MSO critical habitat, this PCE will be reduced. Reduction of the PCE will result in a reduction in MSO nesting and prey habitat.

High volumes of fallen trees and other woody debris. Although some large logs will be retained in MSO critical habitat, this PCE will be reduced. Reduction of the PCE will result in loss of prey habitat.

A wide range of tree and plant species, including hardwoods. Based on the overall project descriptions, a range of tree and plant species is likely to be retained in MSO critical habitat.

Adequate levels of residual plant cover to maintain fruits, seeds, and allow plant regeneration. Based on the overall project descriptions, adequate levels are likely to be retained in MSO critical habitat.

There is potential for fire escape from prescribed fire treatments which could result in longer-term destruction of primary constituent elements (Bennetsen 2005a). Specific prescriptions and other measures will be developed and included in burn plans to minimize this potential. Effects of escaped fire are not reasonably certain to occur and cannot be quantified; they are not considered in this project review. Effects from escaped fire, in the event it occurs, may be subject to future section 7 review where appropriate.

## **CUMULATIVE EFFECTS**

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The majority of the land within the project boundaries is of Federal ownership. However, relevant actions that are likely to continue to occur in the project areas include recreation resulting from increased tourism, and private land fuels reduction and development. The former may result in disturbance, and the latter may result in habitat degradation effects to the MSO. The extent of the possible effects is unknown but is expected to be relatively minor.

## **CONCLUSION**

After reviewing the current status of the MSO and MSO critical habitat, the environmental baseline for the action area, the effects of the proposed actions and the cumulative effects, it is the FWS's biological opinion that the City Project and the Twin Prescribed Burn Project are not likely to jeopardize the continued existence of the MSO, and are not likely to destroy or adversely modify designated MSO critical habitat. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service* (No. 03-35279) to complete the following analysis with respect to critical habitat.

We present our conclusions for the following reasons:

1. Although key components of MSO habitat will be adversely affected by the proposed actions, the scope of the projects are limited to a small area within the Upper Gila Mountains Recovery Unit. Specifically, the proposed action will adversely affect one designated MSO PAC and 10,736 acres of the more than 3.1 million acres of MSO habitat in the Recovery Unit.
2. Although primary constituent elements of MSO critical habitat will be adversely affected to a significant degree by the proposed actions, the scope of the projects are limited to a small area of the critical habitat unit. Specifically, the proposed action will adversely affect approximately 7,078 acres of the 238,092 acres of critical habitat in critical habitat unit UGM-13.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

### **INCIDENTAL TAKE STATEMENT**

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

### **AMOUNT OR EXTENT OF TAKE**

For the purpose of consideration of incidental take of MSO from the proposed action under consultation, incidental take can be anticipated as either direct mortality of individual birds, or the alteration of habitat that affects the behavior (i.e., breeding or foraging) of birds to such a degree that the birds are considered lost as viable members of the population and thus "taken." They may fail to breed, fail to successfully rear young, raise less fit young, or desert the area because of disturbance or because habitat no longer meets the owl's needs.

We anticipate that one pair of MSO will be taken as a result of the proposed action. Although no MSO have been detected in the PAC since 1993, we are unaware of changes in the PAC that would have rendered it unsuitable for spotted owl occupancy or re-occupancy during the life of the projects. Thus, we believe that MSO are reasonably certain to be present in the Bill Williams PAC.

Thirty percent of the Bill Williams PAC will sustain loss of key habitat components including snags, large logs, and hardwoods, resulting in habitat degradation that is likely to result in less habitat available within the PAC that provides the microclimate and physical habitat characteristics (large logs, snags, hardwoods, canopy cover) needed for nesting and roosting habitat. Incidental take is expected to be in the form of harm due to the reduction and loss of MSO nesting and roosting habitat, which creates a likelihood that injury will result due to reduced reproductive capability.

## EFFECT OF THE TAKE

In this biological opinion we have determined that this level of anticipated take is not likely to result in jeopardy to the species.

## REASONABLE AND PRUDENT MEASURES WITH TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measure and outline reporting/monitoring requirements. The terms and conditions are non-discretionary.

The following reasonable and prudent measure and terms and conditions are necessary and appropriate to minimize take of MSO.

1. The Forest Service will monitor incidental take resulting from the proposed action and report the findings to us.
  - A. Occupancy and reproduction monitoring, as described in the current MSO survey protocol, of the project area and ½ mile boundary within the Bill Williams PAC will occur one year prior to spring or one season prior to fall prescribed burns within or adjacent to the PAC over the life of the proposed actions.
  - B. The results of the monitoring will be provided to us by December 31 of the year the monitoring was conducted.

## **Disposition of Dead or Injured Listed Species**

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 2450 W. Broadway Rd, Suite 113, Mesa, Arizona, 85202, telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

## **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

We recommend that the Forest Service directly include our Flagstaff Suboffice in the design and development of any future projects within the Bill Williams PAC, as well as other projects that affect other MSO habitat in the District.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

### **REINITIATION NOTICE**

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The FWS appreciates the Forest Service's efforts to identify and minimize effects to listed species from this project. For further information please contact Bill Austin (x102) or Brenda Smith (x101) at (928) 226-0614.

Sincerely,

/s/ Steven L. Spangle  
Field Supervisor

cc: Field Supervisor, Fish and Wildlife Service, Albuquerque NM  
Forest Supervisor, Kaibab National Forest, Williams AZ  
Shaula Hedwall, Fish and Wildlife Service, Flagstaff AZ

Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix AZ

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## TABLES

Table 1. Consultation history for the City Project.

<i>Date</i>	<i>Event</i>
February 10, 2003	We received separate requests for a species list for the City Project and the Twin Prescribed Burn Project.
February 24, 2003	We issued separate species list letters for the City Project and the Twin Prescribed Burn Project.
October 3 and 6, 2003	We received an invitation to attend an October 7, 2003, interdisciplinary team meeting/field trip for the City Project. We responded that, due to a schedule conflict, we would not be able to attend the October 7 meeting/field trip.
July 6, 2004	We received a scoping letter requesting comments on a proposed action for the Twin Prescribed Burn Project.
August 2, 2004	We issued a comment letter on the Twin Prescribed Burn Project.
January 21, 2005	We received a request for formal consultation on the effects of the Twin Prescribed Burn on the Mexican spotted owl and its critical habitat.
January 24, 2005	We received a request for a formal consultation on the effects of the City Project on Mexican spotted owl critical habitat, along with a request for concurrence with a determination of effect that the project is not likely adversely affect the Mexican spotted owl.
February 17, 2005	In an email message, we outlined several issues regarding the proposed action and BE, including our inability to concur with the not likely to adversely affect determination for the City Project, and recommended scheduling a meeting to discuss those issues.
February 22 to 28, 2005	We discussed the issues regarding both projects in telephone conference calls and received additional information regarding the projects.
March 18, 2005	We received an email message requesting formal consultation on the Mexican spotted owl.
April 11, 2005	We issued separate letters initiating formal consultation on the two projects.
	We issued a draft biological opinion for review.

Table 2. Some recent influential fires within the Upper Gila Mountains Recovery Unit, approximate acres burned, number of PACs affected, and PAC acres burned.

<i>Fire Name</i>	<i>Year</i>	<i>Total Acres Burned</i>	<i># PACs Burned</i>	<i># PAC Acres Burned</i>
Rhett Prescribed Natural Fire	1995	20,938	7	3,698
Pot	1996	5,834	4	1,225
Hochderffer	1996	16,580	1	190
BS Canyon	1998	7,000	13	4,046
Pumpkin	2000	13,158	4	1,486
Rodeo-Chediski	2002	462,384	55	~33,000
TOTAL		525,894	84	~43,645

Table 3. Acres of MSO habitat, not including designated critical habitat, within the treatments of the City Project. (MC = mixed conifer cover type, PO = pine-oak cover type, PAC = Protected Activity Center, Steep = steep slope protected habitat). Adapted from Bennetsen (2005a).

<i>Treatment</i>	<i>Protected</i>	<i>Target/Threshold</i>	<i>Restricted Other</i>	<i>Total Habitat</i>
Commercial Thinning of Sawtimber, 9"+ DBH <sup>a</sup>	0	175 (MC)	2,389 (PO)	2,564
Commercial Thinning of Roundwood, 5-9" DBH <sup>a</sup>	86 (MC in PAC)	71 (MC)	705 (PO)	862
Noncommercial Thinning <sup>a</sup>	45 (MC in PAC) 38 (MC in Steep)	212 (MC) 34 (PO)	1,277 (PO)	1,606
Savannah Restoration <sup>a</sup>	0	0	0	0
Broadcast Burn Only <sup>b</sup>	53 (MC in Steep)	12 (MC) 4 (PO)	408 (PO)	477
Broadcast Burn First <sup>c</sup>	0	0	328 (PO)	328
<b>Total</b>	<b>225</b>	<b>508</b>	<b>5,107</b>	<b>5,840</b>

<sup>a</sup> Broadcast burning is proposed in almost all areas where mechanical treatments are proposed.

<sup>b</sup> This area will only receive a broadcast burn and will not have mechanical treatments.

<sup>c</sup> This area will have a broadcast burn and then will be assessed to see if there are further thinning needs. If there are further thinning needs, a noncommercial thin will follow the burn.

Table 4. Existing key habitat components within MSO habitat classes in the City Project area. From Bennetsen (2005a).

<i>MSO Habitat Class</i>	<i>Snags &gt; 12" /acre<sup>a</sup></i>	<i>Logs &gt; 12" /acre</i>	<i>Trees &gt; 24" /acre</i>	<i>Trees &gt; 18-24" /acre</i>	<i>Hardwood trees &gt; 5"/acre</i>	<i>Total BA (trees &gt; 5")</i>	<i>No. of sites</i>
Protected	12.8	1.7 <sup>b</sup>	2.9	5.4	53.8	145	7
Target Threshold	1.5	1.7	2.0	8.9	44.7	132	16
Restricted Other	2.8 <sup>c</sup>	0.8	1.2	5.1	55.5	126	127
All MSO Habitat	3.2	0.8	1.4	5.4	54.6	127	150

<sup>a</sup> Recent surveys with many snags bring snag averages up. Older large plots (1/2 to 1 ac) in MSO habitat average 1.0 snags/ac, suggesting there are more snags from recent bark beetle mortality.

<sup>b</sup> No log data are available within Protected habitat, but the estimate for Target Threshold should be similar.

<sup>c</sup> Average drops to 1.6 when one 178-acre site with 21 snags per acre, is dropped. Average may be higher than shown as a result of snag creation from recent bark beetle mortality that is not reflected in older exams.

Table 5. Existing additional vegetation variables within MSO target/threshold stands of the City Project. From Bennetsen (2005a).

<i>MSO Habitat Class</i>	<i>Trees 12-17.9"/acre</i>	<i>Trees 5-11.9"/acre</i>	<i>Trees 1-4.9"/acre</i>	<i>No. of sites</i>
Target Threshold	35.0	128.3	189.9	16

Table 6. Acres of MSO habitat within the treatments of the Twin Prescribed Burn Project. (PAC = Protected Activity Center, Steep = steep slope protected habitat). Adapted from Bennetsen (2005b).

<i>Treatment</i>	<i>Protected</i>	<i>Target/ Threshold</i>	<i>Restricted Other</i>	<i>Total Habitat</i>
Prescribed Burning (Areas A & B)	138 (PAC) 43 (Steep)	92	3,491	3,764
Prescribed Burning and Intensive Fuels Treatments (Area D)	37 (PAC) 2 (Steep)	48	1,045	1,132
Total	220	140	4,536	4,896

Table 7. Existing key habitat components within MSO habitat categories in the Twin Prescribed Burn Project area. From Bennetsen (2005b).

<i>MSO Habitat Class</i>	<i>Snags &gt; 12"</i> <i>/acre<sup>a</sup></i>	<i>Logs &gt; 12"</i> <i>/acre</i>	<i>Trees &gt; 24"</i> <i>/acre</i>	<i>Trees 18-24"</i> <i>/acre</i>	<i>Hardwood trees &gt; 5"/acre</i>	<i>Total BA (trees &gt; 5")</i>
Protected	2.66	2.16	4.21	4.47	132.30	124.5
Target Threshold	0.55	0.78	2.83	10.68	60.69	124.0
Restricted Other	0.99	1.15	1.35	4.98	46.52	103.6

Table 8. Recent Forest Service projects on the south zone involving MSO and/or MSO critical habitat. From U.S. and Wildlife Service (2005).

<i>Project</i>	<i>Conclusion</i>
Pumpkin Fire 2-21-00-F-326	Adverse effects to MSO were addressed in a biological opinion
Morgan Wildland Fire Use 2-21-04-F-432	Adverse effects to MSO were addressed in a biological opinion
Trick Fire 2-21-02-I-454	The Forest Service determined the action would not affect the MSO
Homestead/Davenport Allotment Management Plans 2-21-02-I-545	We concurred that the project was not likely to adversely affect the MSO
Reissuance of Grazing Permit for Davenport, Hat, Moritz Lake, and Spitz Hill allotments 2-21-04-I-241	We concurred that the project was not likely to adversely affect the MSO
Grazing Allotments and MSO Critical Habitat on the Williams Ranger District 2-21-04-I-372	We concurred that the project was not likely to adversely affect MSO critical habitat
Tule Allotment Management Plan 2-21-03-I-368	We concurred that the project was not likely to adversely affect the MSO
Chalender and Sitgreaves Grazing Allotments 2-21-03-I-342	We concurred that the project was not likely to adversely affect the MSO
Herbicide Treatment Along Public Roads on National Forest Lands in Arizona 2-21-02-I-208	We concurred that the project was not likely to adversely affect the MSO
Campground Bark Beetle Outbreak Sanitation and Prevention 2-21-04-I-247	We concurred that the project was not likely to adversely affect the MSO
Bill Williams Mountain Electronic Site 2-21-04-I-165	We concurred that the project was not likely to adversely affect the MSO
Emergency Consultation on Removal of Imminent Danger Trees in APS Powerlines on Kaibab National Forest 2-21-04-I-246	Ongoing

Table 9. Predicted loss of key habitat components after mechanical treatments of the City Project. From Bennetsen (2005a).

<i>MSO Habitat Class</i>	<i>Snags &gt;12"</i> <i>/acre<sup>a</sup></i>	<i>Logs &gt;12"</i> <i>/acre<sup>b</sup></i>	<i>Trees &gt;24"</i> <i>/acre</i>	<i>Trees 18-24"</i> <i>/acre</i>	<i>Hardwood trees &gt;5"</i> <i>/acre</i>	<i>Total BA (trees &gt;5")</i>
Protected	0	0	0	0	18.4 (34.2%) <sup>d</sup>	29 (20.0%) <sup>d</sup>
Target Threshold	0	0	0	0.1 (1.1%)	8.1 (18.1%)	49 (37.1%)
Restricted Other	0.4 (14.3%) <sup>c</sup>	0	0	0.3 (5.9%)	3.2 (5.8%)	60 (47.6%)
All MSO Habitat	0.4 (12.5%)	0	0	0.2 (3.7%)	4.2 (7.7%)	58 (45.7%)

<sup>a</sup> Girdling of mistletoe-infected pine will create a few additional snags. This is not reflected in these numbers.

<sup>b</sup> A few additional logs will be created in noncommercial treatments where trees >12" in diameter are felled. Although many of these will be piled and burned, some will be left on the ground in lopping areas. These created logs are not reflected in the above numbers.

<sup>c</sup> Snags will be reduced in high fire risk areas within the intensive zone, where high levels of recent bark beetle mortality or safety concerns exist.

<sup>d</sup> No trees >9" would be cut in Protected habitat. Predicted loss is from thinning of trees between 5 and 9".

Table 10. Predicted loss of key habitat components after burn treatments (pile burning and prescribed burning) of the City Project.<sup>a</sup> From Bennetsen (2005a).

<i>MSO Habitat Class</i>	<i>Snags &gt;12"</i> <i>/acre</i>	<i>Logs &gt;12"</i> <i>/acre</i>	<i>Trees &gt;24"</i> <i>/acre</i>	<i>Trees 18-24"</i> <i>/acre</i>	<i>Hardwood trees &gt;5"</i> <i>/acre</i>	<i>Total BA (trees &gt;5")</i>
Protected	2.3 (18%)	0.8 (48%)	0.06 (2%)	0.2 (3%)	11.7 (33%)	12 (10%)
Target Threshold	0.3 (18%)	0.8 (48%)	0.06 (2%)	0.3 (3%)	12.1 (33%)	8 (10%)
Restricted Other	0.4 (18%)	0.4 (48%)	0.02 (2%)	0.1 (3%)	17.3 (33%)	7 (10%)
All MSO Habitat	0.5 (18%)	0.4 (48%)	0.03 (2%)	0.2 (3%)	16.6 (33%)	7 (10%)

<sup>a</sup> Predicted losses are averages based on previous burn plots, past experience, and forest vegetation simulator generated loss rates. All estimates are predicted averages and may vary by  $\pm 5\%$ .

Table 11. Key habitat components after implementation of all treatments of the City Project. From Bennetsen (2005a).

<i>MSO Habitat Class</i>	<i>Snags &gt;12" /acre</i>	<i>Logs &gt;12" /acre</i>	<i>Trees &gt;24" /acre</i>	<i>Trees 18-24" /acre</i>	<i>Hardwood trees &gt;5" /acre</i>	<i>Total BA (trees &gt;5")</i>
Protected	10.5	0.9	2.8	5.2	23.7	104
Target Threshold	1.2	0.9	1.9	8.5	24.5	75
Restricted Other	2.0	0.4	1.2	4.7	35.0	59
All MSO Habitat	2.3	0.4	1.4	5.0	33.8	62

Table 12. Predicted loss of key habitat components from prescribed burning (Areas A and B) of the Twin Prescribed Burn Project.<sup>a</sup> From Bennetsen (2005b).

<i>MSO Habitat Class</i>	<i>Snags &gt;12" /acre</i>	<i>Logs &gt;12" /acre</i>	<i>Trees &gt;24" /acre</i>	<i>Trees 18-24" /acre</i>	<i>Hardwood trees &gt;5" /acre</i>	<i>Total BA (trees &gt;5")</i>
Protected	0.48 (18%)	1.04 (48%)	0.13 (3%)	0.18 (4%)	50.27 (38%)	32.4 (26%)
Target Threshold	0.10 (18%)	0.37 (48%)	0.06 (2%)	0.32 (3%)	23.06 (38%)	26 (21%)
Restricted Other	0.18 (18%)	0.55 (48%)	0.03 (2%)	0.15 (3%)	17.68 (38%)	21.8 (21%)

<sup>a</sup>Predicted losses are averages based on previous burn plots, past experience and literature (Randall-Parker and Miller 2002), and forest vegetation simulator generated loss rates. All estimates are predicted averages and may vary by  $\pm 5\%$ .

Table 13. Predicted loss of key habitat components from prescribed burning and intensive fuels treatments (Area D) of the Twin Prescribed Burn Project.<sup>a</sup> From Bennetsen (2005b).

<i>MSO Habitat Class</i>	<i>Snags &gt;12" /acre</i>	<i>Logs &gt;12" /acre</i>	<i>Trees &gt;24" /acre</i>	<i>Trees 18-24" /acre</i>	<i>Hardwood trees &gt;5" /acre</i>	<i>Total BA (trees &gt;5")</i>
Protected	1.01 (38%)	1.25 (58%)	0.13 (3%)	0.18 (4%)	56.89 (43%)	32.4 (26%)
Target Threshold	0.21 (38%)	0.45 (58%)	0.06 (2%)	0.32 (3%)	26.10 (43%)	26 (21%)
Restricted Other	0.38 (38%)	0.67 (58%)	0.03 (2%)	0.15 (3%)	20.00 (43%)	21.8 (21%)

<sup>a</sup>Predicted losses are averages based on previous burn plots, past experience and literature (Randall-Parker and Miller 2002), and forest vegetation simulator generated loss rates. All estimates are predicted averages and may vary by  $\pm 5\%$ .

Table 14. Key habitat components remaining after prescribed burning (Areas A and B) of the Twin Prescribed Burn Project. From Bennetsen (2005b).

<i>MSO Habitat Class</i>	<i>Snags &gt; 12" /acre</i>	<i>Logs &gt; 12" /acre</i>	<i>Trees &gt; 24" /acre</i>	<i>Trees 18-24" /acre</i>	<i>Hardwood trees &gt; 5" /acre</i>	<i>Total BA (trees &gt; 5")</i>
Protected	2.18	1.12	4.08	4.29	82.03	92.1
Target Threshold	0.45	0.41	2.77	10.36	37.63	98
Restricted Other	0.81	0.60	1.32	4.83	28.84	81.8

Table 15. Key habitat components remaining after prescribed burning and intensive fuels treatments (Area D) of the Twin Prescribed Burn Project. From Bennetsen (2005b).

<i>MSO Habitat Class</i>	<i>Snags &gt; 12" /acre</i>	<i>Logs &gt; 12" /acre</i>	<i>Trees &gt; 24" /acre</i>	<i>Trees 18-24" /acre</i>	<i>Hardwood trees &gt; 5" /acre</i>	<i>Total BA (trees &gt; 5")</i>
Protected	1.65	0.91	4.08	4.29	75.41	92.1
Target Threshold	0.34	0.33	2.77	10.36	34.59	98
Restricted Other	0.61	0.48	1.32	4.83	26.52	81.8

Table 16. Existing attributes of target/threshold stands prior to treatment (SDI = stand density index) in the Twin Prescribed Burn Project. From Bennetsen (pers. comm. 2005).

<i>Stand Number</i>	<i>% SDI 12-18"</i>	<i>% SDI 18-24"</i>	<i>% SDI &gt; 24"</i>	<i>Total BA</i>	<i>Trees &gt; 18" /acre</i>
0307010015170004	54	39	7	60	12
0307010015170013	52	45	0	161	33
0307010015170036	11	66	9	125	40
0307010015270035	36	16	0	100	8
0307010015270036	45	0	6	100	1
0307010015270051	24	21	0	100	12

Table 17. Residual attributes of target/threshold stands after treatment (SDI = stand density index) in the Twin Prescribed Burn Project. From Bennetsen (pers. comm. 2005).

<i>Stand Number</i>	<i>% SDI 12-18"</i>	<i>% SDI 18-24"</i>	<i>% SDI &gt;24"</i>	<i>Total BA</i>	<i>Trees &gt;18" /acre</i>
0307010015170004	52	38	7	47	11
0307010015170013	50	44	0	127	31
0307010015170036	11	64	9	99	38
0307010015270035	35	16	0	79	8
0307010015270036	43	0	6	79	1
0307010015270051	23	20	0	87	11

Table 18. Anticipated total loss of MSO key habitat components in the Bill Williams PAC due to the vegetative and prescribed burning treatments of the City Project. Based on data from Bennetsen (2005a) and supplemental stand information.

<i>Unit/ Treatment</i>	<i>Size Acres</i>	<i>Logs &gt;12"</i>	<i>Hardwood trees 5-9"</i>	<i>Snags &gt;12"</i>	<i>Trees 18- 24"</i>	<i>Trees &gt; 24"</i>	<i>Basal Area Square Feet/Acre</i>
0015090004 Roundwood	9	48%	100% (206/259)	18%	3%	2%	38% (148 - 46 - 10% = 92)
0015090012 Roundwood	54	48%	99% (5097/3219 + 33%)	18%	3%	2%	32% (272 - 66 - 10% = 186)
0015090017 Pre- Commercial Thin	45	48%	67% (no stand data; from tables)	18%	3%	2%	26% (128 - 23 - 10% = 95)
0015090018 Roundwood	24	48%	99-100% (no stand data; same as other roundwood units)	18%	3%	2%	28% (148 - 30 - 10% = 107)

Table 19. Predicted effects of the City and Twin Prescribed Burn projects on primary constituent elements of MSO critical habitat. From Bennetsen (2005a and b).

<i>Range of tree species, composed of different tree sizes/ages, 30-45% <math>\geq</math> 12 inches DBH</i>	<i>Shade canopy from tree branches covering &gt;40% of the ground</i>	<i>Large dead trees (snags) <math>\geq</math> 12 inches DBH</i>	<i>High volumes of fallen trees and other woody debris</i>	<i>Wide range of tree and plant species, including hardwoods</i>	<i>Adequate levels of residual plant cover to maintain fruits, seeds, and allow plant regeneration</i>
<p>Slight loss of large diameter trees from Rx fire:</p> <p><i>City</i> (3<math>\pm</math>5% in 18-24" and 2<math>\pm</math>5% in 24+" and from vegetative treatments (3.7% in 18-24" and 0% in 24+"))</p> <p><i>Twin</i> (4<math>\pm</math>5% in 18-24" and 3<math>\pm</math>5% in 24+" in Protected; 3<math>\pm</math>5% in 18-24" and 2<math>\pm</math>5% in 24+" in Target Threshold and Restricted Other)</p> <p><i>Twin</i> Loss of small diameter trees from Rx fire and maintenance burns</p>	<p><i>City</i> Reduced canopy closure from vegetative treatments and Rx fire</p> <p><i>Twin</i> Reduced canopy closure from Rx fire</p>	<p><i>City</i> Loss of snags from Rx fire (18%) and vegetative treatments (12.5%; due to need to protect private land from fire risk)</p> <p><i>Twin</i> Loss of snags from Rx fire (18% in Areas A &amp; B; 38% in Area D)</p>	<p><i>City</i> Reduced volumes of fallen trees and other woody debris from Rx fire (48% in &gt;12")</p> <p><i>Twin</i> Reduced volumes of fallen trees and other woody debris from Rx fire (48% in &gt;12")</p>	<p>Tree and plant species richness will increase from Rx fire and reduced ponderosa pine tree densities</p> <p><i>City</i> Abundance of hardwood trees &gt;5" will decrease from Rx fire (33%) and vegetative treatments (7.7%)</p> <p><i>Twin</i> Abundance of hardwood trees &gt;5" will decrease from Rx fire (38% in Areas A and B; 43% in Area D)</p>	<p>Short-term decrease in plant cover from Rx fire</p> <p>Long-term increase in residual plant cover from Rx fire and reduced tree densities</p>