Kaibab National Forest

Biological Assessment for Kaibab National Forest Land & Resource Management Plan

Coconino, Yavapai, and Mojave Counties, Arizona

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Introduction

The purpose of this Biological Assessment (BA) is to analyze the potential impacts of implementing the Proposed Programmatic Land and Resource Management Plan (Proposed Plan) for the Kaibab National Forest (KNF) in sufficient detail to determine to what extent the implementation of the Proposed Plan may affect any of the threatened, endangered, proposed, or candidate species listed below or their designated or proposed critical habitats (CH). This BA is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act ((ESA);16 U.S.C. 1536 (c)), and follows the standards established in the Forest Service's National Environment Policy Act (NEPA) and ESA guidance.

Biological Assessment

Objectives

The objectives of this BA are to

1. Analyze the potential impacts of the desired conditions (DC) in the KNF Proposed Plan that may affect federally, proposed, and candidate species and designated or proposed critical habitats, and
2. Determine the potential effects of the implementation of the proposed objectives, standards and guidelines described in the Proposed Plan on federally listed, proposed, and candidate species and designated or proposed critical habitats.

Species Addressed

All federally listed, proposed, and candidate species and designated and proposed critical habitats in the action area were identified and accepted in correspondence between the U.S. Fish and Wildlife Service (USFWS) and Forest Service (AESO/SE 22410-2009-I-0329; October 3, 2012).

In this BA, the 10 (j) nonessential experimental population will be treated as if proposed for listing. Therefore, a **Jeopardy** or **No Jeopardy** determination will be made for species treated as proposed, and a "**no effect**", "**may effect**, **not likely to adversely affect**" or "**may effect, and is likely to adversely affect**" will also be made for all other species. We are not requesting FWS concurrence on no effect determinations. There are no federal candidate species in the action area. Table 1 contains the list of species provided by the USFWS that have Federal status and are listed in the counties where the KNF has management activities or off forest indirect effects.

Table 1. Federally listed Threatened, Endangered, and candidate species, designated critical habitat and KNF occurrence.

Common Name	Scientific Name	Federal Status	Critical Habitat	KNF Occurrence
Mexican spotted owl	*Strix occidentalis lucida*	Threatened	CH in analysis area	Species occurs on the KNF; NKRD & WRD
California condor	*Gymnogyps californianus*	10(j) population; Endangered	No CH in analysis area	Species occurs within the 10(j) population area; all districts
Southwest willow	*Empidonax traillii extimus*	Endangered	No CH in analysis area	Species does not occur on KNF; little or no habitat

flycatcher				available on Kanab Creek
Apache trout	*Oncorhynchus apache*	Threatened	None designated	Species occurs on the NKRD
Loach minnow	*Tiaroga cobitis*	Endangered	No CH in analysis area	Species does not occur on KNF; potential downstream indirect effects on WRD
Spikedace	*Meda fulgida*	Endangered	No CH in analysis area	Species does not occur on KNF; potential downstream indirect effects on WRD
Black-footed ferret	*Mustela nigripes*	Endangered	None designated	Extirpated; has not occurred on the KNF in over 30+ years
Fickeisen plains cactus	*Pediocactus peeblesianus var. fickeisenias*	Proposed endangered	Proposed CH in analysis area	Species occurs on the NKRD

Consultation History

During the planning process that led up to the Proposed Plan, collaboration and consultation with USFWS was ongoing and occurred at meetings and through correspondence.

- On August 28, 2012, Bobbi Barrera, Ron Maes, Steven Plunkett (RO T&E Program Leaders), Chirre Keckler (Forest Biologist), Ariel Leonard and Marcos Roybal (Forest Planners), Stu Lovejoy Stewardship (Resource Staff Officer), met in Flagstaff with Arizona Ecological Service Office (AESO) William Austin, Shaula Hedwall, and Brenda Smith (USFWS biologists) to discuss the consultation process, development of a Consultation Agreement, potential species list, and habitat concerns for the plan revision consultation.
- On September 13, 2012, Chirre Keckler, Ariel Leonard, Marcos Roybal met in Flagstaff with William Austin and Brenda Smith to discuss potential additional language to the revised forest plan.
- On October 4, 2012, the KNF received a letter (AESO/SE 22410-2009-I-0329, dated October 3, 2012) with a list of species covered under ESA that occur in, or in the vicinity of, the project area. In addition, on 10/4/2012, Chirre Keckler received an email from William Austin noting that the current status was incorrect and critical habitat was not included for loach minnow and spikedace in the October 4, 2012 letter. The email will be used for the correct information on the status for these species.
- On November 13, 2012 the Consultation Agreement was signed by all parties.
- The draft Biological Assessment was sent to USFWS on November 13, 2012.
- USFWS send comments to the KNF on the draft Biological Assessment on December 11, 2012.
- On December 18, 2012 , Chirre Keckler, Ariel Leonard, Marco Roybal, Brenda Smith, William Austin, Bobbi Barrera, Ron Maes and Steven Plunkett meet to discuss the comments provided by the USFWS and what changes would be made to the Biological Assessment.

Action Area

Location

The action area addressed in this BA is the KNF and those adjacent lands that may be indirectly affected by the Proposed Plan.

The KNF covers 1.56 million acres and is broken up into three geographically separate Ranger Districts (Districts) in northern Arizona. The North Kaibab Ranger District (NKRD) is on the north side of Grand Canyon National Park and Tusayan Ranger District (TRD) is on the south side. The Williams Ranger District (WRD) lies further to the south (Figure 1). The KNF is mostly within Coconino County; however, there are also small areas of KNF in Mohave and Yavapai Counties (Figure 1). Of the 1.56 million acres of the KNF, 25,622 (1.7 %) are within Yavapai County and 4,646 acres (0.3%) are within Mojave County. In Mojave County most of this area is located within Kanab Creek Wilderness; the remainder of the KNF within the county is being recommended for wilderness designation.

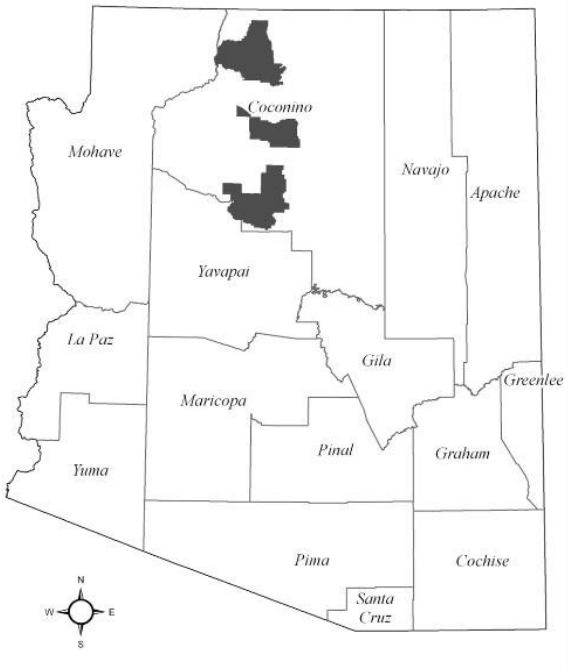

Figure 1. KNF and Arizona counties. Dark polygons indicate the 3 Districts. NKRD (north), TRD (central), and WRD (south).

Background

The KNF, along with the Coconino National Forest and Grand Canyon National Park are at higher elevations than the surrounding Mohave and Sonoran Deserts and the Great Basin. While the KNF shares the dry climate of the surrounding lands, most of it is forests or woodlands. The KNF has been described as a desert with trees, and is particularly adapted to the frequent wildland fires that are started by lightning from spring and summer thunderstorms.

While all three Districts share many of the same ecosystem components across the KNF, they have some subtle and marked differences. The high elevation Kaibab Plateau that makes up a large portion of the

North Kaibab Ranger District, the gently rolling lands of the Tusayan Ranger District, and the cinder cone scattered Williams Ranger District include wide variations in the landscape, vegetation, and wildlife.

Most of the KNF lies between 6,000 and 8,500 feet in elevation, with a few mountains reaching above 9,000 feet. Weather includes cold winters, mild summers, and considerable diurnal temperature changes. The growing season is short, with the average first freeze around September 21st, and last freeze around June 10th.

Water is a limited resource on the KNF. North Canyon Creek is the only perennial stream. It is about one and a half miles long and is located on the NKRD in North Canyon Wash, within the Saddle Mountain Wilderness. There are also seeps and springs; most notable are Big Springs, on the NKRD; and the similarly named Big Spring on the WRD. Much of the water available to wildlife and grazing animals is in the form of earthen stock tanks, artificial lakes, and ephemeral natural lakes (KNF 2008).

Due to the range of elevations and soil types on the KNF, there is a wide diversity of vegetation, but three major types dominate the landscape. Pinyon-juniper woodlands cover 40 percent of the KNF, followed by ponderosa pine (35%), and mixed conifer forests (8%). Spruce-fir, grasslands, sagebrush and Gambel oak shrublands, and desert communities also occur. Riparian and wetland vegetation is present in small but important areas.

Most of the vegetation types on the KNF are adapted to the frequent, low intensity fire that occurred periodically prior to Euro-American settlement. In fire adapted vegetation types, ecosystem function is dependent on this regular disturbance. As the area was settled, extensive livestock grazing consumed the abundant grasses, which had played an important role in carrying fire. Early settlers also suppressed fire to protect their livelihood and homes. Without fire, understory seedlings in pine and mixed conifer forests had unprecedented survival rates. White fir, Douglas-fir, and even Engelmann spruce seedlings became established under ponderosa pine stands. Juniper and pinyon seedlings invaded former grassland savannahs. The increase in tree density and resulting buildup of woody fuels led to unnaturally large and severe wildfires, insect outbreaks, and reduced biodiversity (KNF 2008).

Current Management Direction

The management of the KNF has been directed by the 1988 KNF Land Management Plan and all of its amendments. The Proposed Plan would replace the current Land Management Plan.

Description of the Proposed Plan

KNF Programmatic Land and Resource Management Plan

The National Forest Management Act of 1976 (NFMA) requires that land and resource management plans are to be revised on a 10 to 15-year cycle. The KNF is using the guidance of the 2012 Planning Rule transition language allowing use of the provisions of the 1982 Planning Rule, including the requirement to prepare an EIS, to complete the revised plan for the KNF.

Under the authority of The National Forest Management Act of 1976, the actions of long-range management of the KNF will be authorized by the USDA Forest Service Regional Forester of the Southwestern Region, located at 333 Broadway Blvd., SE Albuquerque, NM 87102. The management strategies provide a strategic–outcome oriented–programmatic framework for future activities and will be

implemented at the District level through the application of Desired Conditions, Objectives, Standards, and Guidelines.

Land and Resource Management Plans do not, however, make site-specific decisions about exactly how, when, and where these activities will be carried out. But, all site-specific activities must conform to the programmatic framework set up in the Plans, and they must meet site-specific NEPA and ESA requirements. This consultation on the programmatic direction of the Proposed Plan does not eliminate the requirement for project-specific biological analyses and the possible need for site-specific informal or formal ESA § 7 (a) (2) consultation with the USFWS.

The KNF analyzed the effects of the implementation of the Proposed Plan on the listed and proposed species in the action area. For the purpose of this consultation, the scope of the analyses is the 15-year period after the signing of the Forest Plan. If new species are listed or new information on a species warrants the need, the KNF will reinitiate consultation on the forest plan.

Appendix C of this document is a table of plan components that were considered in the analysis for effects to TEP species in the action area of the Proposed Plan. Applicable Desired Conditions, Objectives, Standards, and Guidelines are discussed in detail in the Species Assessment section of this BA.

Planning Process

The Proposed Plan makes the following types of decisions:

- Desired conditions, goals, and objectives express an aspiration and form the basis for projects, activities, and uses that occur under the forest plan.
- Suitability determinations, standards, and guidelines set requirements to limit or guide KNF uses or activities that are expected to occur under the forest plan.
- Management area and special designations, or recommendations for special designations, identify areas with differing desired conditions, uses, standards, and/or guidelines than that of the overall forestwide plan direction.
- Monitoring and evaluation requirements for forest plan implementation.

The Proposed Plan is strategic in nature and does not specifically authorize any on the ground projects or activities. Site specific decisions are made following project specific proposals and analyses, with additional opportunities for public involvement. Again, this programmatic consultation does not eliminate the requirement for project specific biological analyses and the possible need for site-specific informal or formal ESA § 7(a)(2) consultation.

Summary of the Analysis of the Management Situation

The management situation was analyzed in the 2009 Comprehensive Evaluation Report (CER: KNF 2009) and supplement to the CER in 2010 (KNF 2010). The CER evaluated the need for change in light of how management under the current plan (as amended) was affecting the conditions and trends related to sustainability. The CER integrated key findings from the ecological and the socio-economic sustainability reports. This integration displayed the key management needs for change, potential activities, and socioeconomic ecological interactions. The CER and supplemental CER together meet the content requirements of the Analysis of the Management Situation (AMS).

The CER/AMS and subsequent management reviews considered this information along with the Forest Service mission, KNF role and contributions, and anticipated demands. They identified four areas where there were priority needs for change in plan direction:

1. Modify stand structure and density of forested ecosystems toward reference conditions and restore historic fire regimes.

In ponderosa pine and mixed conifer vegetation types, fuels are far denser and more continuous across the landscape than reference conditions. When wildfires occur under current conditions, they are increasingly likely to kill the large and old trees, which take many years to replace. The multiple ecological, social, and economic benefits of restoring historic stand structure and reducing the risk of uncharacteristic fires are primary areas of focus.

2. Protect and regenerate aspen.

Protection and regeneration of aspen is a priority because of the important role aspen plays in providing local habitat diversity and scenery. Aspen stands are currently in decline throughout most of the Southwest. On the Williams Ranger District, most aspen stands are generally unhealthy because they are being overtopped by conifers, and there has been little to no recruitment of young trees due to lack of fire and ungulate browsing on aspen saplings.

3. Protect natural waters.

The KNF is one of the driest forests in the Nation. With the exception of one perennial stream that is less than 2 miles in length, most of the natural waters in the KNF are small springs and ephemeral wetlands. The current Forest Plan offers little guidance for managing these rare and ecologically important resources. Natural waters are centers of high biological diversity, have traditional cultural significance, and are popular recreation destinations.

4. Restore grasslands by reducing tree encroachment in grasslands and meadows.

There has been significant tree encroachment into grasslands over the past 100 years. This change has reduced the quantity and quality of available habitat for grassland associated species. The montane/subalpine grasslands on the North Kaibab Ranger District are at particular risk of loss because they are linear and, due to their shape, encroachment occurs more quickly.

Plan Concepts

Adaptive management is a system of management practices based on clearly identified intended outcomes and monitoring to determine if management actions are meeting those outcomes; and, if not, to facilitate management changes that will best ensure that those outcomes are met or re-evaluated. Adaptive management stems from the recognition that knowledge about natural resource systems is sometimes uncertain (36 CFR 220.3), particularly for dynamic issues such as climate change, invasive species, and disturbances that are not easily predicted.

Sustainability is meeting the needs of the present generation without compromising the ability of future generations to meet their needs. Sustainability is composed of desirable social, economic, and ecological conditions or trends interacting at varying spatial and temporal scales, embodying the principles of multiple use and sustained yield (FSM 2020.5).

Integration recognizes and identifies key relationships between various plan resources and activities. Plan components are integrated to address a variety of ecological and human needs. For example, desired conditions for ponderosa pine incorporate habitat needs for a variety of species, as well as the scenic components recreationists' desire. Interrelationships between parts of the plan are identified with crosswalks to show their systematic nature. In electronic versions of the plan, these crosswalks are hyperlinked (indicated by blue italicized text) to allow users to be easily redirected to the other relevant sections of the plan.

Resilience is the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedback (FSM 2020.5). Potential natural vegetation is the vegetation that would occur in the presence of natural disturbance processes such as frequent fire return intervals.

Natural variability references past conditions and processes that provide important context and guidance relevant to the environments and habitats in which native species evolved. Disturbance driven spatial and temporal variability is vital to ecological systems. Biologically appropriate disturbances provide for heterogeneous conditions and subsequent diversity, whereas "uncharacteristic disturbance" such as high-severity fire can have the effect of reducing diversity, increasing homogeneity, and resulting in states that may be permanently altered.

Climate change is addressed indirectly throughout this plan with desired conditions in the form of functional ecosystems and resilient landscapes. Climate change is addressed directly in management approaches and the monitoring plan where appropriate. (see climate change section below)

All lands is the concept that ecosystems transcend land ownership boundaries, thus, effective land and resource management requires cooperation and collaboration among the Forest Service, other land managing agencies, tribes, and private landowners. This plan was developed using an approach whereby plan components were developed considering the greater landscape and the KNF's ecological, social, and economic role.

Plan Components

The proposed plan includes "plan components" and "other content." Plan components are displayed in text boxes to distinguish them from other sections of the plan. Once approved, any substantive changes to plan components would require a plan amendment with appropriate analysis as required under the National Environmental Policy Act (NEPA). A change to "other content" may be made using an administrative correction process. Administrative corrections are used to make changes such as updates to data and maps, management approaches, and relevant background information, and to fix typographical errors. The public is notified of all administrative corrections of the plan.

Plan components (decisions) include: goals/desired conditions, objectives, standards, guidelines, suitability of uses, special areas, and monitoring. They were developed collaboratively with input from a variety of external and internal stakeholders with broad interdisciplinary representation. An interdisciplinary team refined the final form and organization of the plan to make it as understandable, useable, and integrated as possible.

Goals (Desired Conditions) describe the aspirational picture for the KNF. Goals, as required by the 1982 Planning Rule provisions, are articulated as "desired conditions" in this plan. They are the ecological and socioeconomic attributes toward which management of the land and resources of the plan area are directed. They are not commitments or final decisions approving projects or activities, rather they guide the development of projects and activities. They have been written to contain enough specificity to allow

for determining progress toward their achievement. Projects are designed to maintain or move toward desired conditions to be consistent with the plan over the long term. In some cases, goals/desired conditions may only be achievable over extended periods of time, even hundreds of years.

Objectives describe how the KNF intends to move toward the desired conditions. Objectives are concise projections of measurable, time specific intended outcomes. Objectives have been established for the work considered most important to address the needs for change and achieve desired conditions. They also provide metrics for evaluating accomplishments.

Standards are technical design constraints that must be followed when an action is being taken to make progress toward desired conditions. Standards differ from guidelines in that standards do not allow for any deviation without a plan amendment.

Guidelines are technical design criteria or constraints on project and activity decision-making that help to make progress toward desired conditions. A guideline allows for departure from its terms, so long as the intent of the guideline is met. Deviation from a guideline must be specified in the decision document with the supporting rationale. When deviation from a guideline does not meet the original intent, a plan amendment is required.

Special areas are lands within the National Forest System (NFS) that have designations by Congress or other delegated authority. "Special areas" are designated because of their unique or special characteristics. Examples include wilderness, research natural areas, botanical areas, and national recreation trails.

Monitoring is the part of the adaptive management strategy used to determine the degree to which on-the-ground management is maintaining or making progress toward desired conditions. The monitoring plan includes questions and performance measures designed to evaluate implementation and effectiveness, and inform adaptive management.

The "**other content**" in this plan includes background information, existing conditions, management approaches, and contextual information. Management approaches are not plan decisions, but they help clarify how plan direction may be applied. Management approaches include information and guidance for projects and activity decision-making to help achieve desired conditions and objectives.

Integrating Climate Change into Land and Resource Management Plans

Climate change is addressed as an integrated part of the Land and Resource Management Plan for the KNF, rather than as a standalone set of desired conditions. An example is the following desired condition: "The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, and severity of disturbances and components that provide resiliency to climate variability." Integration of climate-relevant desired conditions throughout the planning document helps to ensure climate change concerns are considered during project-level planning.

Desired conditions for the planning unit were developed considering potential climate effects to:

- Increased extreme weather related forest disturbances (floods, drought, wind-throw)
- Water stresses (groundwater, runoff, and timing), aquatic biota
- Wildfire risks
- Shifts in major vegetation types for the Southwest
- Threatened, endangered, and sensitive species

- Forest insects and disease
- Outdoor recreation
- Wildlife movement and biodiversity

No specific element of the monitoring plan was developed solely for monitoring climate change. However, the forest plan monitoring program incorporates provisions that should improve understanding of the relationships between key plan components and climate change. For example, an inventory of the aquatic ecosystems and information about water temperatures and waterflows associated with climate change can be useful for tracking variability within ecosystem condition and trends observed over a prescribed evaluation period. Monitoring the frequency and spatial extent of uncharacteristic wildfire occurrences and insect outbreaks would help the KNF assess how well management is mitigating for hotter, drier, and more fire-prone conditions, and whether existing management is promoting resilient ecosystems. Along similar lines, monitoring springs which are sensitive to variable precipitation and naturally more predisposed to the effects of prolonged drought, would help the KNF to prioritize protection and restoration focused on those ecosystems while gleaning information about endemic species levels and refugia. It may also be possible to discern climate change related patterns in habitat use through long-term monitoring of songbirds and their habitat.

As part of its 2010 to 2015 strategic plan, the Forest Service launched a "Roadmap for Responding to Climate Change". This comprehensive science-based plan emphasized a set of long and short-term approaches for managing climate change while providing the agency with a clear, common vision. This strategic plan should help the Forest Service better provide for sustainability over time with climate uncertainty. The roadmap focuses on three primary activity areas: (1) assessing current risks, vulnerabilities, policies, and gaps in knowledge; (2) engaging internal and external partners in seeking solutions; and (3) managing for resilience, in ecosystems as well as in human communities. A component of the strategic plan is a "Performance Scorecard" http://www.fs.fed.us/climatechange/pdf/Scorecard.pdf to be completed annually by each national forest or grassland. This scorecard has a series of questions focused on the above three activity areas which would allow each management unit to assess how well integration of climate change considerations is happening at the local scale. The scorecard assesses agency capacity, partnerships and education, adaptation, mitigation, and sustainable consumption. All forests are expected to be compliant with 7 of the 10 scorecard elements by 2015.

Southwestern ecosystems have evolved under a long and complex history of climate variability and change. Taking into consideration the number of mega-droughts and other climate related variation, through time, Southwestern systems have some built-in resilience. The Proposed Plan focuses on restoring and maintaining resilience in forest and grassland ecosystems. Risks of increased wildfire, insects and disease outbreaks, and invasive species represent ongoing, broad-scale management challenges. These issues are not new. However, climate change has the potential to increase and exacerbate the impacts of these ecosystem risks.

Because our understanding of climate change is rapidly evolving, management decisions that are robust to uncertain, while being both strategic and tactical in nature would likely be most effective at managing for climate change. Peterson et al. (in press) developed a guidebook for climate change response on national forests. It recommends the following strategies which incorporate both science and management: (1) become aware of basic climate change science and integrate that understanding with knowledge of the local resource conditions and issues (review); (2) evaluate sensitivity of natural resources to climate change (rank); (3) develop and implement options for adapting resources to climate change (resolve); and (4) monitor the effectiveness of on-the-ground management (observe) and adjust as needed.

Restoring and maintaining resilience would likely improve the potential for ecosystems to retain or return to desired conditions after being influenced by climate change related impacts and variability. Managing for resistance (e.g., maintenance thinning to prevent catastrophic fire, forest insect or disease pandemics) and resilience (e.g., noxious weed control) offer meaningful responses to climate change.

Prescribed fires are a management tool that can serve multiple purposes, from sustaining desired conditions for fire-adapted ecosystems and sustaining habitat for threatened and endangered species, to reducing fuel loads. Prescribed burning is also a management strategy that will be important for maintaining desired habitats in a changing climate with more natural disturbances. With projections of storms that are more frequent, and other more extreme weather events, and increased stress from forest pests in a warmer, drier climate, prescribed burning will continue to be an important management strategy for the future.

Although current programs and guidance are already in place to limit introduction of nonnative species, treat invasive species, and control insects and diseases, these efforts are likely to become more critical to maintaining desired conditions for healthy forests under a changing climate. Due to the fragmented land ownership patterns, success in reducing forest pests requires going beyond national forest boundaries, and continued collaboration with partners will be needed. In addition, management practices (such as prescribed selection cutting for age class diversity) that sustain healthy forests and provide adequate nutrients, soil productivity, and hydrologic function, promote resilience and reduce the potential for disturbance and damage.

The Wildlife Society with the Inkley et al. Report (2004) recommended several actions to help wildlife adapt to climate change and its potential effects on wildlife. These include: (1) managing for diverse conditions; (2) reducing nonclimate stressors on ecosystems; (3) reducing the risk of uncharacteristic high-intensity fires; (4) conducting medium and long-range planning; (5) ensuring ecosystem processes; and (6) employing monitoring and adaptive management, as well as controlling for invasive plant species. Finally, it will be important to set priorities by appropriately balancing sensitive and vulnerable species and systems with those that are resistant and resilient (NWF 2011).

On the KNF, existing collaborations between the AZGFD and Coconino County generally encourage the protection of open lands and the preservation of the land's natural character within local and regional contexts. These collaborative strategies should decrease the potential for future land fragmentation while improving the overall integrity of the landscape. This should also provide for more resilience with regard to climate change for those wildlife species that may need to adjust migration routes, foraging corridors, or breeding grounds.

By managing for resistant and resilient ecosystems, promoting landscape connectivity, and implementing concepts of adaptive management, land and resource management plans can provide the framework for responding to new information and changing conditions related to climate change that have the potential to increase impacts to ecosystem risks. The revised "Kaibab National Forest Land and Resource Management Plan" should provide clear management direction and include the necessary monitoring and mechanisms that would facilitate adaptation over time.

Forest Resources

Major Vegetation Community Types

The KNF contains 15 major vegetation communities. The identified boundaries for the vegetation communities are based on the potential natural vegetation type that would occur in the presence of natural disturbance processes such as fire.

Desired conditions are described at multiple scales where appropriate. Descriptions at various scales are sometimes necessary to provide adequate detail and guidance for the design of future projects and activities that will help achieve the desired conditions over time. The three scales used in this plan are fine scale, mid-scale, and landscape scale. For the mid- and landscape scales, features are averaged over the entire area within that scale. For example, in the mid-scale when basal area is stated, it is averaged over the 100 to 1000 acres. This means for areas smaller than the mid-scale, there will be areas with less basal areas and areas with higher basal area than what is shown within the mid-scale description. In addition when the amount of snags, down woody materials, and logs are stated in mid-scale, it is assumed that these amounts will not be on every acre but when the amounts are averaged over the entire scale will be equal to the description and will be well distributed across both the mid and landscape scale. This is what naturally occurs within ecosystems.

When using Proposed Plan to develop project specifications, it is important to keep in mind that all desired conditions at all scales are relevant regardless the size of the project. Smaller scale projects would consider larger scales in terms of how the project contributes to the mid or landscape scale unit; larger projects would consider the design features needed to ensure that the finer scale desired conditions are maintained or achieved at each fine scale unit and are well distributed. Consideration of scale is also important when evaluating progress toward desired conditions because the appropriate analysis is scale-dependent. For example, when desired conditions are specified at the landscape scale, they are averaged across areas > 10,000 acres and would appear less variable even though variability still exists at the smaller scale.

> **Fine scale** is a 10-acre area or less at which the distribution of individual trees (single, grouped, or aggregates of groups) is described. Fine-scale desired conditions provide the "view" that could be observed standing in one location on the ground. Fine-scale desired conditions contain desirable variation appropriate at smaller spatial scales. Between the 10-acre fine scale and 100-acre mid-scale this is made up of multiple fine scale areas that are combined up to the mid-scale size.
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> **Mid-scale** desired conditions are composed of assemblages of fine-scale units and include descriptions that are desirable when averaged across areas of 100- to 1,000-acre units. The mid-scale view is that which can observed when on a hill top or lookout. Between the mid-scale and 10,000-acre landscape scale this is made up of multiple mid-scale areas that are combined up to the landscape scale.
>
> **Landscape scale** is an assemblage of 10 or more mid-scale units, typically totaling more than 10,000 acres, composed of variable elevations, slopes, aspects, soils, plant associations, and disturbance processes. Landscape scale desired conditions provide the "big picture" overview with resolution that could be observed from an airplane, or from a zoomed out Google Earth view. The landscape scale is also appropriate for less common components that are not necessarily present on every mid-scale unit within the landscape.

Range of Values
Ranges of values presented in desired conditions account for natural or desired variation in the composition and structure within a community or resource area. Desired conditions may have a wide range due to spatial variability in soils, elevation, aspect, or social values. It may also be desirable to have different desired conditions within a particular vegetation community, such as a lower density of vegetation in the wildland-urban interface (WUI) than outside of the WUI to achieve the desired fire behavior within the proximity of property and human occupancy. Higher densities may be desired in other areas to meet habitat requirements for specific species.

Vegetation Structure
Vegetation structure includes both the vertical and horizontal dimensions. Horizontal structure may refer to patterns of trees or groups of trees and openings, as well as tree size and tree density. The vertical component can refer to the layers, appearance, and composition of vegetation between the forest floor and the top of the canopy. Several descriptive terms related to vegetation structure are used in desired condition statements and are defined in the glossary.

Species Accounts and Status of the Species in the Action Area

Direct Effects to all Species from Implementation of the Proposed Plan

The Proposed Plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carry out any project or activity. Because the land management plan does not authorize or mandate any site-specific activities or ground-disturbing actions, there can be no direct effects. However, there may be implications or longer term environmental consequences at the project level of managing the KNF under this programmatic framework which could result in effects to TEP species or their proposed or designated critical habitats.

After the Plan is finalized, all site-specific activities must conform to the programmatic framework set up in the Proposed Plan and they must meet any site-specific NEPA and ESA requirements.

Species with "No Effects" Determination

These species and CHs are not included or discussed further in this BA. USFWS concurrence is not being requested for "no effect" determinations.

Southwestern Willow Flycatcher
The southwestern willow flycatcher breeds in dense riparian habitats in southwestern North America, and winters in southern Mexico, Central America, and northern South America. This species does not occur on the KNF since we do not have the required habitat components such as dense riparian habitat on perennial waters. Kanab Creek historically might have contained potential habitat. However due to upstream diversion off forest, the stream only has small pools of perennial waters on very short sections of the steam nor does it contain dense riparian habitat. No southwestern willow flycatchers have been found on the KNF and there is no designated CH. There is **"No Effect"** to designated CH or to the species and it will not be considered further in this assessment.

Black-footed ferret
The black-footed ferret (BFF) depends almost exclusively on prairie dog colonies for food, shelter, and denning. Existing Gunnison's prairie dog colonies on the KNF are not currently large enough to support a reintroduction of the BFF. If BFF reintroduction is deemed appropriate for the KNF, a separate NEPA

document will be prepared for the reintroduction of ferrets. The BFF was extirpated from Arizona and was reintroduced in 1996. Approximately 20+ miles outside of the action area is an experimental non-essential population in the Aubrey Valley Experimental Population Area and a reintroduced population at Espee Ranch. Espee Ranch is the closest population to the KNF boundary.
In the Biological Opinion (BO) for the reintroduction on the Espee Ranch (USFWS 2007; AESO/SE 22410-2008-F0022), the BO noted that the Arizona Game and Fish Department (AGFD) intends to manage ferrets on prairie dog colonies wholly within the Espee Ranch, but they will work cooperatively with adjacent landowners as the need arises. If ferrets move off the Espee Ranch and the adjacent landowner wants the ferrets removed, the AGFD will attempt to recapture such ferrets. It also noted that the USFWS anticipated that all ferrets that move off the Espee Ranch lands will be lost due to natural causes (e.g., predation or starvation) or incidental take. In addition, due to the lack of habitat outside the Espee Ranch; USFWS expect most off-ranch loss to be due to natural causes. Ferret movement off the Espee Ranch is most likely to happen as the habitat within the ranch becomes occupied by ferrets. The AGFD will attempt to recapture these ferrets and relocate them to the Ranch or other suitable areas determined by the USFWS's National Black-Footed Ferret Coordinator (USFWS 2007). Based on these facts, it is determined that there is "**No Effect**" to black-footed ferret and it will not be considered further in this assessment.

If these species (Southwestern willow flycatcher or black footed ferret) occur on the KNF in the future, re-initiation of consultation will commence.

Species Assessment for which USFS Seeks Concurrence or Conference

From the species listed in the above table and narrative, the California condor (outside of 10j population area), Apache trout, loach minnow, spikedace, and Fickeisen plains cactus (proposed species) are the species where concurrence (or a conference report in the case of the Fickeisen plains cactus) is requested due to may effect, not likely to adversely affect determinations. The KNF would also request conferencing for the California condor (10j population) and Fickeisen plains cactus since it is a proposed species for no jeopardy determinations.

For estimating the environmental consequences at the programmatic plan level, the assumption has been made that resource management activities allowed under the Proposed Plan are reasonably foreseeable future actions that will achieve the desired conditions and objectives. The effects analysis of plan components are listed in the respective tables for each species and the plan components are described in Appendix C of this document. However, the specific location, design, and extent of such activities are generally not known at this time. Those decisions are made on a site-specific (project-by-project) basis. Therefore, the discussion here refers to the potential for consequences to occur, and in many cases are only estimates. The consequences analyses are useful on a forest-wide basis, but are not intended to be applied directly to specific locations on the KNF.

For most of the species, climate change may have a negative effect. How the KNF integrated climate change into the Proposed Plan is discussed on page 9 of this document. This information will not be repeated for the species that are likely to be impacted by climate change.

California Condor

Endangered Species Act Status:	Endangered (1967); 10(j) nonessential experimental population (1996)
10(j) Population Area:	10(j) population area on all 3 districts
Recovery Plan	April 1996 (third revision)
Critical Habitat:	Yes, 1976 (Only in California)
Effects Determination – 10(j) Species	**Not likely to jeopardize**
Effects Determination – Full listed Species	**May affect, not likely to adversely affect**

Life History

The following discussion is taken partially from the 1996 USFWS Federal Register Notice for the Establishment of a Nonessential Experimental Population of California Condors in Northern Arizona; Final Rule, the USFSW condor webpage http://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/CA_Condor/ (accessed 09/04/2012) and the 1996 Recovery Plan for the California Condor. These sources describe natural history of the California condor (condor). Portions of these sources are incorporated by reference into this document as summarized below.

The condor has three basic habitat needs: feeding habitat with adequate food, roosting sites, and adequate nesting sites. They are strict scavengers, and historically fed on the carcasses of deer, elk, and antelope. This species requires fairly open grassland habitat for feeding. This ensures easy takeoff and approach, and makes food finding easier for this species that apparently depends on sight rather than smell for locating its food. Condors spend much of their time roosting on cliffs or tall conifers many of which are traditional sites that are used year after year. A typical roost site has rock cliffs, dead conifer snags or both, and is located in an isolated or at least semi-secluded area. Condors nest in various types of caves, crevices, and potholes. Paired birds are observed courting as early as October, to finally lay their eggs between February and May. This juvenile dependency period may extend well into the following calendar year, precluding a new nesting cycle.

Breeding adults and younger immature condors stay near nesting areas yearlong, foraging for food (carcasses of livestock, deer, and occasionally other animals) in nearby grassland areas. Older immature condors and other non-breeding condors leave the vicinity of nest sites in March and April, and returning again in late Fall.

Distribution

The following discussion is taken partially from the 2012 Southwest Condor Working Group's report titled A Review of the Third Five Years of the California Condor Reintroduction Program in the Southwest and the USFWS condor webpage. The species report and webpage describe distribution and threats to the reintroduced population of the condor. Portions of the report and webpage are incorporated by reference into this BA as summarized below:

The historical distribution of the condor was along the Pacific coast from British Columbia, Canada, to Baja California and Norte, Mexico. By 1987, the range of the condor had been reduced to six counties

north of Los Angeles, California. At that time, all existing condors were removed from the wild for captive breeding. In 1992, captive condors were re-released into the wild in California on the Los Padres NF. Current condor distribution is limited to three major reintroduction sites which are geographically separated.

The condor recovery program in the Southwest includes northern Arizona and southern Utah and has been entered into by the FWS as a partnership among various Federal agencies [primarily: Bureau of Land Management (BLM); National Park Service (NPS); U.S. Forest Service (USFS)] and state agencies [Arizona Game and Fish Department (AGFD) and Utah Division of Wildlife Resources (UDWR)], and The Peregrine Fund (TPF), a private/nonprofit organization. The first condor release in northern Arizona occurred on 12 December 1996.

Condors have been known to fly widely, but now generally travel between two main areas, the Grand Canyon Ecoregion/Colorado River corridor in Arizona and the Kolob Terrace/Zion National Park (Zion NP) area in Utah. Condor activity in southwestern Utah has increased considerably during the reporting period (2007-11). Groups of condors now regularly reside in Utah from April through November. It is anticipate that breeding in the area will occur in coming years.

While remaining near the release site immediately after release, new releases took to the well-established condor primary range throughout its 112 km-radius, benefiting greatly from the presence of a seasoned condor flock. Heavy use of the Vermilion Cliffs release site by the majority of condors during the winter months followed by increasing use of the Colorado River corridor and South Rim of the Grand Canyon in early spring continued to be the norm.

Condors of the southwest population are known for long distance travel with the longest trips recording wide arching loops into eastern Nevada, southwestern Arizona, east along the Mogollon Rim to the New Mexico border, and north as far as Flaming Gorge Wyoming. However, the established flock, with multiple breeding pairs seasonally holding territories, seems to have held the new releases more tightly to the 112 km-radius of their primary range. For the Williams RD south of I40 (outside the 10(j) population area), rarely has a condor been documented using this area for flight or forage.

Although a condor may move between roost zones within the course of a day, comparing the logged roost locations from one year to the next has been most revealing. As condors became more and more self-sufficient, their patterns of seasonal movement have been more predictable. For example, as soon as domestic sheep, are moved into the high country of southern Utah in May or June, the condor population shifts its focus to take advantage of the tremendous source of carrion followed by the lure of remains of hunted carcasses on both the Kaibab Plateau and southern Utah during the months of November and December (Figure 2).

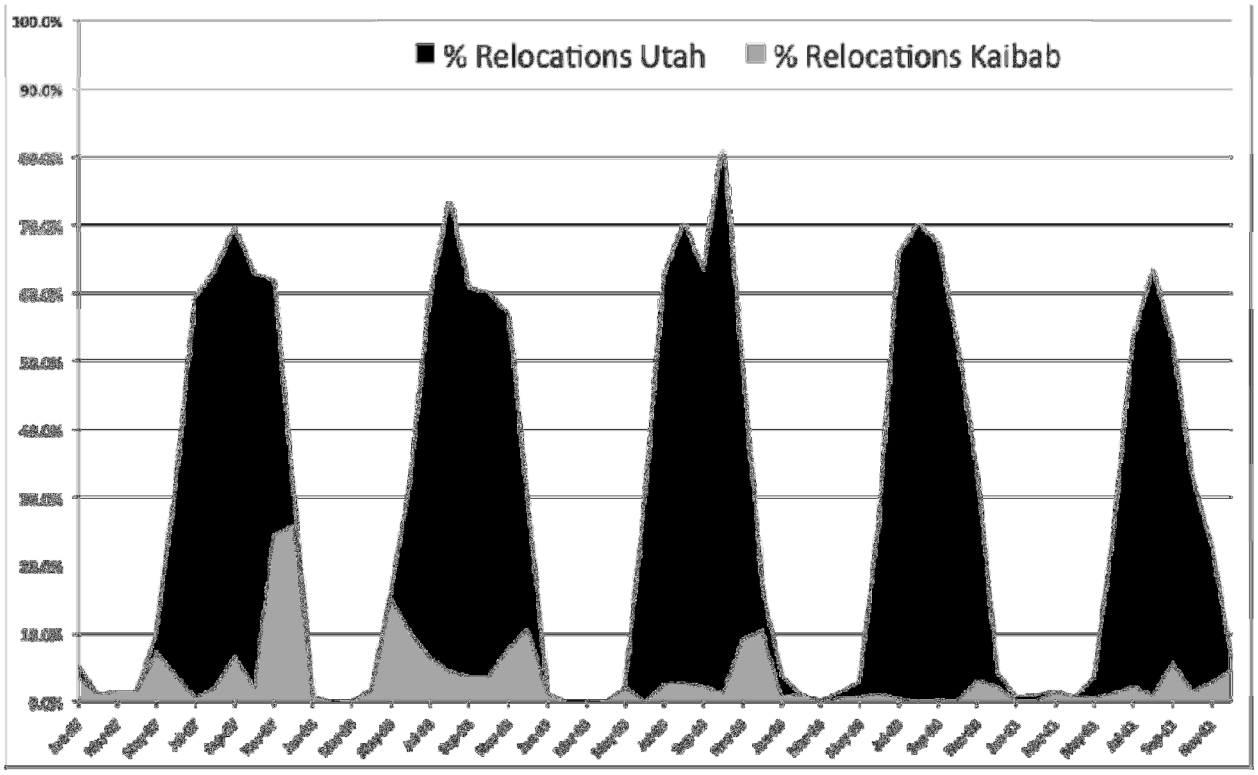

Figure 2. Comparison between two areas of range use (Utah vs. Kaibab Plateau) represented by monthly roosting relocations of free-ranging California condors.

Status of the Species (Range-wide and within the Action Area)

The condor was listed as endangered on March 11, 1967 (32 FR 4001). Critical habitat has only been designated in California (September 24, 1976 (41 FR 187)). The wild condor population declined steadily until 1987, when the last free-flying individuals were captured. During the 1980s, captive condor flocks were established, and the first successful captive breeding was accomplished in 1988. Captive-produced condors were first released back to the wild in early 1992.

Currently there are two condor release areas in the U.S., one in California and the second in Arizona. Condors were released as a non-essential, experimental population. Under this designation (referred to as the 10(j) rule) the protections for an endangered species are relaxed, providing greater flexibility for management of a reintroduction program. Although the release site is not on NFS lands, the non-essential experimental population area includes portions of the KNF and the Coconino NF. Condors may frequently use these areas for foraging and roosting, but nesting still appears to be limited to the Grand Canyon NP area. There have been two unsuccessful nesting attempts on the NKRD with the latest attempt in 2012. Condors may also forage on other NFs in Arizona including the Apache/Sitgreaves, Prescott, and Tonto. Any condors outside of the experimental population area are fully protected as endangered.

The nonessential experimental population status applies to condors in the Southwest only when they are within the geographic bounds of the designated 10(j) area, which is defined by: Interstate Highway 40 on the south, U.S. Highway 191 on the east (parallel to the New Mexico and Colorado state borders), Interstate Highway 70 on the north, and Interstate Highway 15 to U.S. Highway 93 near Las Vegas, Nevada on the west (Figure 3). For the portion of the KNF in the designated 10(j) area, the condor is considered as a proposed (for listing) species. For the KNF, all areas north of I40 are within the 10(j) area.

Figure 3. California condor nonessential experimental population [10(j)] area.

By 2006, the total number of free-flying condors in Arizona was 57 birds, including four produced in the wild. In 2008, there were an estimated 70 birds, including two hatched and fledged in the wild in 2008. By the end of 2011, a total of 134 condors had been released into the wild in the 10(j) area, and 15 chicks had been wild-hatched in northern Arizona. Sixty-nine of these birds had died, including eight of the wild-hatched chicks. There were a total of 74 free-flying condors in the southwest program by August 2012. Lead toxicity from non-proffered carcasses is the leading cause of condor mortality. Without eliminating or substantially reducing the amount of lead ammunition used within the California condor's range, and thus the high percentage of lead-poisoned condors, it is unlikely that the recovery program in northern Arizona will succeed at achieving a self-sustaining condor population (USFWS 2012b).

Condor population numbers as of 2012 are displayed in Table 2 below. These numbers will change as some condors are lost and when captive birds are released to the wild, until the website can be updated to show the changes.

Table 2. California condor population numbers range-wide as of 2012.

Total Population	414
Captive Population	181
Wild Population	233
Arizona Population	76
California Population	129
Baja Population	28

(The Peregrine Fund webpage accessed 09/26/2012 at http://www.peregrinefund.org/docs/pdf/project-data/2012-08-31-condor-population.pdf)

Current ESA § 7(a) (1) Conservation Actions on the KNF

The KNF is an active member of the Southwest Condor Workgroup and a cooperating partner on a MOU which includes representatives from other agencies and organizations. The North Kaibab wildlife biologist is the designated forest representative and participates regularly on conference calls and annual meetings. The purpose of the MOU is to establish a general framework for cooperation and participation among all cooperators to promote the recovery of the California condor. The MOU applies to the Southwest California condor reintroduction program and designated nonessential experimental population with three primary objectives:

- Support a long-term program to reestablish a viable self-sustaining population of California condors in the southwestern United States through the release of captive-reared individuals, and management of the wild population.
- Achieve recovery goals for this species as cited in the California Condor Recovery Plan (1996), following the current management recommendations established by the California Condor Recovery Team as authorized by the Fish and Wildlife Service, and implement recommendations of the California Condor 5-year review (2002).
- Address emerging issues through the Southwest Condor Working Group's representatives of the primary cooperators.

Public outreach and education is conducted in a variety of ways. The KNF maintains a Web link to The Peregrine Fund's California Condor Restoration website. This comprehensive website explains the goals of the restoration program, threats (e.g., health impacts posed by the use of lead ammunition and recommendations to reduce such impacts), and reintroduction and research efforts to date. It maintains a library of reports, presentations, and peer-reviewed literature relative to condors, as well as a contact list for key personnel and cooperating partners, which includes the KNF. Other outreach efforts include postings, signs and information cards distributed by Forest Service personnel explaining the harmful effects of lead ammunition to the public. In August 2012, the KNF entered into an agreement with Arizona Game and Fish Department providing $20,000 to help support the state's voluntary lead reduction program to help provide educational and outreach materials on reducing impacts of lead on the condor.

Through the special use permitting process, outfitter guides on the NKRD are urged to use non-lead ammunition for the hunts they provide to help reduce the risk to condors. These provisions include: within game management Units 12A and 12B, the Arizona Game and Fish Department offers non-lead rifle ammunition to big game hunters. It is recommended that hunters in these units consider using 100 percent copper bullets to reduce lead exposure to California condors. If the hunters choose to use lead ammunition, they are strongly encouraged to remove all shot animals and gut piles from the field. When this isn't possible, to hide them with rocks and brush, or remove all blood shot flesh.

The KNFt has worked with the USFWS to develop measures to minimize risk of harmful interactions with condors that could occur near project-related activities. These mitigation measures include:

- Project work sites will be cleaned up at the end of each day to avoid trash accumulation that may attract condors.
- If a condor shows up near project-related activities, a Forest Service wildlife biologist will be contacted immediately and any project-related activity likely to harm the condor will halt temporarily until the condor flies away or is driven away by permitted personnel.
- Project workers will be instructed to avoid any interaction with condors.
- The wildlife biologist will be notified if any project-related vehicle fluid leak or spill occurs that could result in condor poisoning.

The KNF incorporated significant alterations to the Navajo Transmission Line EIS for the portion of the line crossing the Tusayan Ranger District. The EIS calls for high-visibility wire to minimize avian collisions and a monitoring/adaptive management approach to retrofit the line if collisions exceed stated limits for a variety of birds, including California condors.

Finally, the KNF provides field, logistical, and funding support to The Peregrine Fund as needed during reintroduction and recovery actions. This includes providing equipment such as snowmobiles and personnel to help in the distribution of winter feed for condors, as well as maintaining numerous roads which provide the necessary access for condor monitoring. In 2009, the KNF entered into a Challenge Cost Share Agreement with the Peregrine Fund and provided critical and timely funding support for the NKRD release efforts that year. The purpose of that agreement was to study the movement and locations of condors on the KNF and adjacent lands. Objectives were focused on increasing production, refining release techniques, and monitoring released birds, while minimizing mortality factors to establish a self-sustaining population. Additional goals included continuing education and public awareness regarding the deleterious effects of lead on condors, the environment, and human health implications. The results of that work were written up in a final report (TPF 2010) that provides valuable insight on movement and foraging behavior across the Kaibab Plateau and adjacent areas.

Threats

Threats to the condor are taken from the 2012 Southwest Condor Working Group's report titled A Review of the Third Five Years of the California Condor Reintroduction Program in the Southwest (USFWS 2012b). Portions of the report are incorporated by reference into this BA as summarized below:

Eighteen fatalities in the first five-year period, 20 in the second five-year period, and 28 throughout the third five-year period for a total of 69 birds has been recovered for the southwest population. Circumstantial evidence suggests that two undiagnosed fatalities in the first five-year period were lead-caused. Predation and lead poisoning continued to be the prominent known mortality factors, but the birds in the "missing" and "unknown" mortality categories continued to increase. Of the 44 cases where diagnoses were possible since release began in 1996, 21 (48%) died of lead poisoning, 12 (27%) from predation, 3 (7%) from starvation, 3 (7%) from shooting, 2 (5%) from impaction, 2 (5%) from collisions, and 1 (2%) from infection. By applying the known rate of diagnosed fatalities identified as lead poisoned to the missing category (17 birds), it is reasonable to estimate that an additional 8 condors likely succumbed to lead poisoning. Further analysis of location data, age structure, and seasonally available lead at the time birds went missing is underway to better predict the likelihood of lead poisoning in this category.

Effects Analysis

As noted above, there has not been a successful nesting attempt on the KNF since the re-introduction of the condor in 1996. The KNF will continue to work with TPF to monitor nesting attempts in the future. The KNF is primarily used by condors for foraging and roosting.

As part of the viability risk analysis done for the Proposed Plan (see wildlife specialist report for description of the viability risk analysis), the results for the condor showed a low viability risk to the condor for habitat elements on the KNF. For the condor the habitat element analysis was cliffs and rocky features. This analysis was done only to show the risk to the species from KNF management activities to their habitat components and does not include risk to species from activities outside of the habitat elements or from actions that the KNF does not control. As shown above the highest risk to the condor is from lead poisoning from lead ammunition. Arizona Game and Fish Department regulates game harvest and use of lead ammunition, therefore, this is not a KNF management activity used to determine viability risk from the implementation of the Proposed Plan (see cumulative effect section).

Of the threats listed above the only one that is affected by KNF management actions is collisions (mainly with powerlines). There is also potential for disturbance to the condor from activities on the KNF and impacts to cliff habitat.

Plan Components

The Proposed Plan has components for resource areas that provides protection and conservation for listed species over the life of the Plan and help provide the 7(a)(1) conservation actions for the condor. Most desired conditions (DCs) would provide for 7(a)(1) conservation measures. Beside the Proposed Plan components, the KNF will continue to implement the 7(a)(1) actions described in the status of the species in the action area. The Proposed Plan components, which have the most effects to this species, are listed below. All DC, objectives, standards (STs), and guidelines (GDs) from resource areas are listed in Appendix C that provides some type of protection.

Indirect Effects

Table 3 shows which Proposed Plan components will reduce or eliminate potential threats to the condor from management activities.

Most of the standards and guidelines in the Proposed Plan will have a neutral or beneficial effect to the condor. The wildlife DC and GD provided guidance that species will be retained across their natural range and that specific habitat needs will be retained. The threatened, endangered, and sensitive species DC and GDs provided directions on the implementation of the condor approved recovery plan and protection of the species.

While some individual birds could be impacted by actions on the KNF, the potential impacts to the condor from management actions are minor. The Program which directly relates to power line collisions is Special Use (through easements for power lines). Other potential impacts to the condor arise from the Rangeland Management, Recreation, Engineering and Wildlife, Fish and Rare Plants (WFRP) Programs. DCs and GDs that provide protection for the condor are found in the Wildlife, Threatened, Endangered, and Sensitive Species, and Vegetation Management sections. The wildlife and TES sections provide guidance for the protection and recovery of the species. The vegetation section provides DCs and GDs for the retention of large trees and snags to ensure roost sites for condors.

Lands and Mineral Program

The Lands and Mineral programs could impact the condor through energy and transmission development and communication easements. Some rock blasting could occur under these programs. The DCs, ST and GDs to reduce these impacts are shown below. Utility corridor easements could have some impacts on the condor. These impacts are reduced by the DC, ST and GD for energy transmission and development, and communications/electronic sites and special uses GDs. These Plan components limit where and how new energy transmission lines and communications sites can be developed and emphasize co-location of developments and underground lines where possible. The Special Use DC limits the potential footprint of easements on the landscape by combining easement uses on the KNF whenever possible.

- **Cliffs and Rocky Features DC**: Cliff ledges provide cover and nesting habitat for wildlife such as the American peregrine falcon, California condor, snakes, bats, birds, and small mammals.
- **GD:**
  - Activities involving heavy machinery or blasting should minimize impacts to habitat associated with rocky features and cliffs.

    - Near known active raptor nest sites, temporary closures and use restrictions should be implemented for rock climbing and other potentially disruptive activities.
- **Special Uses GD:** Uses should be combined to the extent possible in light of technical and environmental constraints.
- **Communications and Electronic Sites GD**:
    - The number of communication and electronic sites should be the minimum that is consistent with appropriate public services that require the use of forest lands.
    - Environmental disturbance should be minimized by co-locating communications and electronic sites.
- **Energy Transmission and Development DC:**
    - Energy transmission and development on the forest meets the legal mandates to facilitate the transmission and development of energy resources in a manner that minimizes adverse impacts and does not detract from meeting other desired conditions applicable to the area.
    - Energy transmission lines are not visible (usually underground) across the landscape.
- **ST**: Major utility corridor development is confined to the area identified and mapped in the "West-wide Energy Corridor Programmatic EIS".
- **GD**:
    - Environmental disturbance should be minimized by co-locating pipelines, power lines, fiber optic lines, and associated infrastructure.
    - Existing energy corridors should be used to their capacity with compatible upgraded powerlines, before evaluating new routes.
    - When compatible with protection of heritage resources, the use of below-ground utilities should be optimized in order to avoid potential conflicts with wildlife, scenery, wildfire, and long-term vegetative management.

Recreation, Heritage, and Wilderness Programs

There is a small threat to the condor from rock climbing if it occurs within nesting or roosting areas. The DC and GD for cliffs and rocky features eliminates impacts by requiring the retention of nesting habitat in areas of known nest sites and require temporary closure and use restrictions around nest sites so not to disrupt nesting and roosting activities. These actions would be in place for the duration of the use in these areas for nesting or roosting. The most currently approved recovery plan would provide the guidance on spatial and temporal restrictions placed on these activities.

Annual visitation on the KNF is estimated to be less than 700,000 visits per year. The ST in the Special Use to not permit competitive OHV and motorized events will help reduce potential activities that could disturb the condor.

- **Cliffs and Rocky Features DC**:
    - Cliff ledges provide cover and nesting habitat for wildlife such as the American peregrine falcon, California condor, snakes, bats, birds, and small mammals.
    - Rock climbing and related recreational activities do not disrupt the life processes of rare or threatened species or diminish the function of specialized vegetation, such as mosses, lichens, and fleabanes.
- **GD:** Near known active raptor nest sites, temporary closures and use restrictions should be implemented for rock climbing and other potentially disruptive activities.
- **Special Uses ST**: Competitive OHV and motorized events are not permitted on the forest.

Rangeland Management Program

The DCs and GDs for range management would continue to provide water and foraging habitat for both wildlife and livestock. This would be beneficial to condors since they feed on both wild and domestic animals.

- **Livestock Grazing DC:** Grasses and forbs provide adequate forage for permitted livestock consistent with other desired conditions.
- **GD:** Livestock management should favor the development of native cool season grasses and forbs.

Forestry and Forest Health Program
The invasive weed program will help improve habitat for wildlife, including the prey species for the condor, across the KNF. The GD for handling herbicides/pesticide treatments for invasive species help prevent accidental poisoning of condor if they were to occur within areas that are being treated for invasive species.

- **Invasive Species GD:**
  - Treatment approaches should use Integrated Pest Management (IPM) practices to treat noxious and nonnative invasive species. IPM includes manual, biological, mechanical, and herbicide/pesticide treatments.
  - Pesticides should be properly labeled and stored as per the manufacturer's recommendations.

Engineering Program
The DC and GD in the transportation section of the plan will minimize the disturbance from off-road travel and the decommissioning of roads no longer in the transportation system. Only blasting that would occur under this program would be covered by the GD for blasting rocky features near nest or roost sites. This would eliminate this type of impact to the condor.

- **Transportation and Forest Access DC:** All designated routes open to wheeled motorized vehicles are shown on a motor vehicle use map (MVUM) that is readily available to the public.
- **ST:** Motor vehicle use off the designated system of roads, trails, and areas is prohibited, except as identified on the MVUMs and as authorized by law, permits, and orders in connection with resource management and public safety.
- **GD:**
  - Cross-country travel for game retrieval, parking, or dispersed camping is not allowed in areas with sensitive soils or sensitive vegetation.
  - Roads should not be located in meadows when they can be located in other areas.
  - Roads should be decommissioned when no longer needed.

WFRP Program
The WFRP Program performs activities to maintain or improve wildlife, fish, and rare plants habitats. In relation to the condor, this includes working with the TPF on determining where and when the condor is either nesting or roosting on the KNF, but also includes activities which enhance wildlife populations that are considered a prey base for condors. The DCs and GDs in the wildlife and threatened, endangered and sensitive species sections provide the direction to maintain habitat for wildlife species and help in the recovery of listed species.

- **Wildlife DC**:
  - Wildlife species are distributed throughout their potential natural range.
  - Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species.
  - Habitat configuration and availability allow wildlife populations to adjust their movements (e.g., seasonal migration, foraging, etc.) in response to climate change and promotes genetic flow between wildlife populations.
  - Human-wildlife conflicts are minimal.
- **Threatened, Endangered and Sensitive Species DC:** Threatened, endangered, and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation.
- **GD:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.

Table 3 is a summary of the threats to the condor relevant to KNF management and the plan components developed to help reduce or minimize these threats.

Table 3. Threats to the Condor and Effects Summary (Code numbers found in Appendix C)

Threats	Plan Component Code that alleviates or eliminates threat	Effects Analysis Summary
Loss of cliff habitat	G.1 and G.2	This DC and GD provides for the protection of cliff habitat from rock climbing and blasting in areas where condors are known to roost and/or nest on the KNF.
Potential poisoning from invasive species treatments	J.1	This GD provides the guidance to make sure that herbicides and pesticides are used in a way that would not affect non-target species. Also provides for proper labeling and storing of these poisons.
Development of communications sites or energy transmission	K.3, K.9-K.12	DCs, STs, and GDs listed from K.9-K.12 provide directions to minimize the potential of collision with communications and electronic sites, and energy development and transmission.
Disturbance from management activities	L.1, L.2, and L.4-L.11	The KNF would use the most current approved recovery plan to establish a limited operating period for activities that could potentially affect nesting condors during the breeding season. L.4, L.5 and L.9-L.11 provides DCs, STs and GDs for minimizing the impacts of disturbance from recreation activities. DCs, STs and GDs in L.6-L.8 minimize disturbance to the condor from off-road travel, transportation system and competitive motorized events.

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 assessment. 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.

As shown in the threats section above the biggest threat to the condor is lead poisoning. Although voluntary lead reduction efforts have significantly reduced the amount of lead available to condors in Arizona, the condor reintroduction program has yet to observe a corresponding reduction in condor lead exposure rates (USFWS 2012b). Although 80% to 90% of hunters in much of the Arizona portion of condor range have participated in the voluntary program since 2007, hunter participation rates in southern Utah's lead reduction program are significantly lower. Condor foraging in southern Utah has increased considerably since 2004. Additionally, foraging in Utah during the fall hunting season has risen consistently since 2005. This shift in condor movement provides a likely explanation for why lead exposure levels have remained essentially static throughout this reporting period rather than declining (USFWS 2012b).

The third five-year review (USFWS 2012b) notes that lead poisoning is the leading cause of condors and is affecting the southwest population from becoming reproductively self-sustaining population. While it was expected that deaths from lead and other sources of mortality would occur when the condors was released, it was noted these deaths would be compensated by natural and captive reproduction (USFWS 1996a). To date, this compensation has come primarily from captive reproduction. Any change to the

hunting regulations in the experimental population area in Arizona or Utah would require action by the states (USFWS 2012b). Cumulatively this is having a negative effect to the southwest condor population.

Determination of Effects (Species)

There is potential of some negative impacts to condor from the development of utility corridors, rock climbing or blasting. While the impacts to the condor could occur either within or outside of the 10(j) area, the condor is rarely found outside the 10(j) area on the KNF and has never been known to attempt nesting outside the 10(j) area. As noted in the Distribution section above, with the established flock of condor in the 10(j) area, this seems to hold both the established and newly released condors within the 112 m-radius of their primary range. It is unlikely that condor movement would occur outside the 10(j) area. Therefore impacts from KNF management would be insignificant and/or discountable affects to the condor outside of the 10(j) area due to the above stated plan components that will provide additional protection to the condor from these impacts.

By definition, a non-essential experimental population is not essential to the continued existence of the species. Therefore, no proposed action impacting an experimental, non-essential population so designated under ESA §10(j) could lead to a jeopardy determination for the entire species nor would the management activities cause any jeopardy to the species. Therefore, the proposed action of implementing the Proposed Plan is **Not Likely to Jeopardize** the continued existence of the non-essential, experimental population of the California condor. For the population outside of the 10(j) area, the KNF Proposed Plan **May Affect, but is Not Likely to Adversely Affect** the endangered California condor.

Apache trout

Endangered Species Act Status:	Threatened, 1975
Recovery Plan	Yes 1975: Revision, 1983 & 2009
Critical Habitat:	None designated
Effects Determination	**May affect, not likely to adversely affect**

Life History

The following discussion is taken partially from the 2010 USFWS 5-Year Review of Apache Trout, the USFSW Apache trout webpage http://www.fws.gov/southwest/es/arizona/ApacheTrout.htm (accessed 10/02/2012) and the 2009 Recovery Plan for the Apache Trout. The Apache trout webpage and recovery plan describe natural history of the Apache trout (trout). Portions of the webpage and recovery plan are incorporated by reference into this document as summarized below.

Apache trout now exist primarily in headwater areas upstream from natural and artificial barriers. This environment is subject to extreme variations in both temperature and flow. Studies of temperature tolerances of Apache trout found that critical upper limits were similar to data reported for other species of trout (~ 27° C [81oF]). Some streams studied had low pool-riffle ratios and stream widths greatly exceeded depths. The majority of the habitats containing Apache trout consisted of riffles and runs.

Trout spawning occurs from March through mid-June, and varies with stream elevation. Apache trout begin redd construction and spawning during receding flows in the spring, at approximately 8° C (46° F). Redds were constructed primarily at downstream ends of pools in wide varieties of substrates (0.85 mm

[0.03 in] to 32 mm [1.3 in] size), most frequently in water depths from 19 to 27 cm (7.5 to 11 in) in areas that received day-long illumination, with water velocities ranging between 1.42 to 3.11 cubic meters per second (cms) (50 to 110 cubic feet per second [cfs]) (Harper 1976). Spawning maturation is estimated to begin at 3 years of age, with eggs hatching in approximately 30 days after deposition, and emergence occurring about 60 days following deposition.

Juvenile fish were closely associated with cover such as surface turbulence, overhanging vegetation, and objects less than 150 mm (6 in) in diameter, while adults used cover less frequently. In general, juveniles preferred faster moving water than adults. Juveniles and adults used substrates in proportion to their availability. Nursery areas for fry were miniature pools in runs or shallow areas on the edges of pools. Current velocities in nursery areas were low (mean of 0.96 cm/sec [0.38 in/sec]), depths were shallow (mean 3.31 cm [1.3 in]), and substrates tended to be composed of fines.

The Apache trout is a largely opportunistic feeder that eats a variety of aquatic and terrestrial organisms, the utilization of which can vary with the season and fish size. The food habits of Apache trout varied with fish size; fish 6 to 9 cm (2 to 3 in) in length primarily fed on mayflies (Order *Ephemeroptera*), whereas fish 15 cm (6 in) and larger primarily consumed caddis flies. Fish 5 to 17 cm (2 to 7 in) in length captured from Mamie Creek on the ASNF exhibited similar feeding habits; however, mayflies were more prevalent in the diet of larger specimens.

Distribution

The following discussion is taken from the 2009 Recovery Plan for the Apache Trout. The Apache trout webpage and recovery plan describe natural history of the Apache trout. Portions of the webpage and recovery plan are incorporated by reference into this document as summarized below.

Distribution of Apache trout and Gila trout prior to European colonization is not known with certainty. The historical distribution of Apache trout was described as upper Salt River drainage (Black and White Rivers), San Francisco River drainage (Blue River), and headwaters of Little Colorado River, Arizona. The distribution of Apache trout in the Black, White, and Little Colorado River drainages is confirmed by present pure and hybrid populations and historical collections found in museum record. Native trout historically found in the Blue River and San Francisco River drainages are now considered to be Gila trout based on early collection records, current distribution of relict lineages of Gila trout, and the distribution of Gila x rainbow trout hybrids.

The amount of habitat occupied by Apache trout was thought to have dropped to less than 48 km (30 mi) by 1976. The present distribution of relict and replicated Apache trout recovery populations occur in 28 populations within its historical range in approximately 199 km (119 mi) of stream. At present, hatchery propagated Apache trout at the Williams Creek National Fish Hatchery and AGFD Silver Creek Fish Hatchery (are produced to stock streams and lakes on Tribal, State, and Federal lands for put-and-take and put-grow-take fisheries only; these waters do not count towards recovery.

There are several populations outside of the Apache trout historical range. Only two streams outside historical range have pure replicate populations: North Canyon Creek (KNF; Ord Creek stock) and Coleman Creek (ASNF; Soldier Creek stock). North Canyon Creek will be maintained as a refuge population of Apache trout and a source of fish for population establishment or augmentation. Coleman Creek supports pure Apache trout; however, it is now considered a candidate stream for Gila trout recovery. Fish from Coleman Creek will be used as a source population for establishing or augmenting other populations within the historical range of Apache trout. Once the fish are removed from Coleman Creek, the creek may be renovated and used for Gila trout recovery efforts.

Status of the Species (Range-wide and within the Action Area)

The following discussion is taken partially from the 2010 USFWS 5-Year Review of Apache Trout, the USFSW Apache trout webpage http://www.fws.gov/southwest/es/arizona/ApacheTrout.htm (accessed 10/02/2012) and the 2009 Recovery Plan for the Apache Trout. The Apache trout webpage and recovery plan describe natural history of the Apache trout (trout). Portions of the webpage and recovery plan are incorporated by reference into this document as summarized below.

Apache trout were recommended for inclusion on the Secretary of the Interior's list of rare and endangered species, and were officially listed as endangered by the I.U.C.N. (Red Data Book, IV-Pices) in 1969. The ESA was subsequently passed by Congress in 1973 (P.L. 93-205), and the Apache trout was protected as an endangered species. It was one of the first endangered species to be down listed to threatened status (USFWS 2010). As a result, Apache trout are currently listed as threatened, without critical habitat.

There are pure Apache trout currently present in 32 populations within their historic range (28 were identified in the 2009 recovery plan, five "new" populations [Marshall Butte, Sun, Moon, Rock, and Little Diamond creeks) were recently confirmed as pure by the University of Arizona, but there was also the loss of one new population in Bear Wallow Creek due to hybridization with rainbow trout as a result of barrier failure. However, three of the new populations may not fit the recovery plan criteria for self-sustaining at this time (Hayground, Lee Valley, and Stinky Creeks). These creeks will require further management actions and monitoring to determine if they can maintain a self-sustaining population of Apache trout.

The remaining pure populations continue to be self-sustaining. Ongoing management (mechanical removal and/or chemical treatments) and monitoring of these streams will be needed to identify, reduce, minimize, and/or eliminate potential risks to these populations.

There is one population on the KNF. North Canyon Creek was stocked with pure Apache trout in 1967. While this is outside of its historic range, this population was used as brood stock for a re-introduction project in 1996 and there is no plan to remove it from North Canyon Creek. The Apache trout in North Canyon are not considered to be part of the recovery populations. While the 2010 5-year review notes that there is five miles of habitat, the Apache trout is located currently within a two mile stretch of the creek and it is not likely that more of the stream will become habitat for the trout. The entire stretch of trout habitat is located within the Saddle Mountain wilderness and there are no non-native fish within the trout habitat. The surveys conducted on September 20, 2011 resulted in an estimated population of 128 fish.

Current ESA § 7(a) (1) Conservation Actions on the KNF

The KNF partners with personnel from Arizona Game and Fish Department in monitoring Apache trout and their habitat in North Canyon Creek.

In 2010, the KNF worked with Arizona Game and Fish Department to improve in-stream structures within the Apache trout habitat. The old check dams were old and failing, resulting in the loss of important pool habitat for the Apache trout population that was established in this stream. The new structures are providing the habitat structure required for the trout.

Trail maintenance near the trout habitat has reduced sedimentation into the creek. The trails are checked annually to make sure they are in good conditions.

The KNF assesses all wildfires that start in the proximity of the North Canyon watershed for potential impacts to the stream and the Apache trout.

Threats

The following discussion is taken partially from the 2010 USFWS 5-Year Review of Apache Trout, the USFSW Apache trout webpage http://www.fws.gov/southwest/es/arizona/ApacheTrout.htm (accessed 10/02/2012). The Apache trout webpage and recovery plan describe natural history of the Apache trout (trout). Portions of the webpage are incorporated by reference into this document as summarized below.

To date, certain threats to the species exist within the context of three of the five listing factors; although the severity of most has been reduced or eliminated through the ongoing recovery efforts. Overutilization for commercial, recreational, scientific, or educational purposes (Factor B), and the inadequacy of existing regulatory mechanisms (Factor D) are no longer considered a threat (see below), and threats related to disease (Factor C) are of minor concern at this point. Disease has not been considered a factor in the decline of Apache trout (although it could become a threat in the future) and was not identified as such at the time of listing. Still, populations of Apache trout are monitored for disease and/or causative agents, parasites, and pathogens and information regarding future threats from disease is included in fisheries management plans.

The original listing of the Apache trout stated that the decrease of the species' distribution and population levels occurred primarily because of habitat alterations and negative interactions with non-native salmonids. Land-use practices including logging, livestock grazing, reservoir construction, agriculture, and road construction caused damage to Apache trout habitat. These threats varied in intensity, complexity, and damage depending on location, but ultimately reduced the ability of Apache trout to effectively persist at all life stages throughout its historical range. Allotment Management Plans have been designed to reduce the deterioration of riparian and stream habitats, and the utilization of protection measures that isolate Apache trout with non-native salmonids (e.g. construction of artificial fish barriers). Periodically, these artificial barriers have been compromised, requiring chemical treatment and/or re-enforcement or re-structuring on the barriers.

Non-native salmonids such as rainbow trout, cutthroat trout, brown trout, and brook trout were introduced throughout the range of Apache trout for fishing recreation, and their introduction resulted in competition for resources or habitats, direct predation, and hybridization. On-going actions that have been implemented to ameliorate the effects include the removal of non-native trout from several recovery streams in order to re-establish pure Apache trout. Other aquatic nuisance species such as crayfish have become established in some Apache trout streams. In addition to non-native threats, there is the potential for natural and/or human induced impacts such as wildfire, post-fire flooding, drought, and barrier failures to impact Apache trout populations.

Effects Analysis

Because of the limited habit and the population being in only one small section of the stream, there would always be a high viability risk for the species on the KNF. The proposed KNF management would continue to provide for the viability of this population.

The trout habitat is located within Saddle Mountain Wilderness. There are no livestock grazing is authorized within this section of the wilderness. There is limited recreation use with the majority of the recreation use being day use and not overnight camping. While there is a trail along North Canyon Creek,

this is not a high use recreation area. The highest risk to the trout is a high-severity wildfire in the canyon.

Plan Components

The Proposed Plan has components for resource areas that provides protection and conservation for listed species over the life of the Plan and helps provide the 7(a)(1) conservation actions for the trout. Desired conditions provide the basis for most 7(a)(1) actions. Beside the Proposed Plan components, the KNF will continue to implement the current 7(a)(1) actions described above. The Proposed Plan components, which have the most effects to the species, are listed below. All DCs, objectives, STs, and GDs from resources areas are listed in Appendix C that provide some type of protection.

Indirect Effects

Table 4 shows which Proposed Plan components will reduce or eliminate potential threats to the trout from management activities. The potential impacts to the trout from management actions are minor. Below is a discussion of each resource areas.

As noted above the greatest risk to the trout is a high-severity wildfire in the North Canyon watershed. Appendix C shows how all DCs, objectives, STs and GDs across the resources areas help at the local and landscape scale to reduce the risk of uncharacteristic high intensity wildfires. KNF management actions to reduce this risk would occur outside the wilderness area.

Fuels Program

The management of fuels with prescribed fire is covered in the Wildland Fire Management section of the Proposed Plan. While the use of prescribed fires are not planned to occur within wilderness boundaries, there is potential for fuel reduction outside of the wilderness boundary. The DCs for wildland fire management for prescribed fires along with the DCs for all vegetation types are to have a low risk of uncharacteristic high intensity fire and associated loss of key ecosystem components.

The area south and west of North Canyon and outside of the Saddle Mountain Wilderness was identified as a high priority treatment area by the Kaibab Forest Health Focus (KFHF) as it has both high risk and high ecological values. The strategy identified in the KFHF was to address the needs of this area first and then move to other areas of high fire risk. There was limited agreement about appropriate treatment intensity and practices among stakeholders. There was agreement that to address these concerns, initial treatments in frequent fire mixed conifer that an experimental design approach would help to fill informational gaps and support adaptive learning in these areas. Within the next 15 years, the management actions to reduce the risk of fire to the Saddle Mountain Wilderness would likely occur on top of the plateau outside of the wilderness boundaries which would also reduce the risk of sediments into the North Canyon watershed.

The proposed vegetation management (fuel reduction) in the areas outside of the Saddle Mountain Wilderness to reduce the risk of wildfires would occur in areas outside the steeper slopes in North Canyon drainage. While there is potential of sediment movement from the reduction of fuels, the DCs in soil, watershed, and natural waters will provide guidance on the activities that would create sediments and help prevent the movement of large amount of sediments. DCs and GDs are designed to help keep soils in place, watersheds in good functioning conditions, which also help keep sediments in place, and natural waters DCs and GDs help provide the guidance to keep natural waters in health conditions, all of these things are beneficial to the trout. Best management practices (BMP) are implemented on project-by-project bases to prevent impacts to soils and the watershed. While the intent of the projects are to reduce

fuels, it is expected that project level mitigations would prevent sediments within the North Canyon watershed upstream from the fish habitat from increasing in North Canyon above background levels.

- **Soil DC:**
  - Soils provide for diverse native plant species. Vegetative ground cover is well distributed across the soil surface to promote nutrient cycling and water infiltration.
  - Accelerated soil loss is minimal, especially on sensitive or highly erodible sites.
  - Soils can readily absorb, store, and transmit water vertically and horizontally, accept, hold, release nutrients, and resist erosion.
  - Infiltration rates are good in TES soil units that are described as well drained and moderately well-drained.
  - Logs and other woody materials are distributed across the surface to maintain soil productivity.
- **Watershed DC:**
  - Vegetation conditions within watersheds contribute to downstream water quality and quantity. Surface runoff, sheet, rill, gully erosion and subsequent sedimentation into connecting waters downstream are minimal.
  - Flooding maintains normal stream characteristics (e.g., water transport, sediment, woody material) and dimensions (e.g., bankfull width, depth, slope, and sinuosity). Vertical down cutting and embeddedness are absent in drainages.
  - The fuels composition within watersheds does not put the watersheds at risk for uncharacteristic disturbance.
  - Water quality meets critical needs of aquatic species.
- **Natural Waters DC:**
  - Stream channel stability and aquatic habitats retain their inherent resilience to natural and other disturbances. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting.
  - Springs and ponds have the necessary soil, water, and vegetation attributes to be healthy and functioning. Water levels, flow patterns, groundwater recharge rates, and geochemistry are similar to reference conditions.
  - Within its capability, stream flow and water quality is adequate to maintain aquatic habitat and water sources for native and selected non-native wildlife.
  - The necessary physical and biological components, including cover, forage, water, microclimate, and nesting/breeding habitat, provide habitat for a diverse community of plant and wildlife species.
  - Riparian-dependent plant and animal species are self-sustaining and occur in natural patterns of abundance and distribution. Native macroinvertebrates are appropriately abundant and diverse.
  - Springs, streams, and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion.
- **GD:**
  - Spring source areas should be preferentially protected.
  - The impacts of management activities on springs, streams, and wetlands should be evaluated and minimized.

- **Wildland Fire Management DC:** (for prescribed fires)
  - Wildland fire maintains and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role.
  - Regular fire entry protects social, economic, and ecological values at risk from high-severity disturbance effects.
  - Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation community. Uncharacteristic high-severity fires rarely occur, and do not burn at the landscape scale.

Recreation, Heritage, and Wilderness Programs
There are limited recreation activities within the Saddle Mountain Wilderness. The area is used mostly by people who frequent the area during the day and then leave. Little to no overnight camping occurs in this area. There is a trail along North Canyon Creek; however, this trail has regular maintenance. The trail has been located within North Canyon for a long time and regular monitoring of the fish population has not shown any adverse effect to the habitat or fish from increase sediments into the stream from the trail. There is a ST for wilderness areas for 10 percent of wilderness trails to be inspected and maintained annually.

The DCs and GDs for soils, watershed, and natural waters (listed above) would benefit the trout by providing guidance for reducing the potential for un-natural sediment loads and would provide for healthy stream conditions. These factors would help maintain or improve habitat quality for the trout population but is not likely to increase the amount of stream habitat. This, along with the wilderness DC to retain the trout within North Canyon Creek, should ensure that the trout populations are not removed by management activities.

- **Wilderness DC**: A reproducing population of Apache trout is maintained in North Canyon Creek.
- **ST**: Inspect and maintain at least 10 percent of wilderness trails and signs annually.

Forestry and Forest Health Programs
In the non-native invasive species and natural waters DCs and GDs, there are provisions to help remove non-native fish if they are introduced into the North Canyon Creek. There are also no non-native plants such as tamarisk, in the watershed. There is a low probability of non-native fish occuring within the watershed.

- **Natural Waters DC:** Unwanted non-native species do not exert a detectable impact on aquatic and wetland ecosystems.
- **Non-Native Invasive Species DC:** Invasive species are contained and/or controlled so that they do not disrupt the structure or function of ecosystems.

Rangeland Management Program
There is no grazing of livestock neither within the area of the trout habitat nor within the area that would have downstream affects.

WFRP Program
The WFRP Program performs activities to maintain or improve wildlife, fish, and rare plants habitats. In the past the KNF has worked with AGFD to improve habitat structures within the stream for the Apache trout. There is no foreseeable additional work within the next 15 years on these stream structures. Due to the wilderness location, it is not expected that other wildlife habitat work would occur within the area that would affect trout habitat.

Table 4. Threats to the Apache trout and Effects Summary (Code numbers found in Appendix C)

Threats	Plan Component Code that alleviates or eliminates threat	Effects Analysis Summary
Risk from Wildfires	H.1-H.11, H.17, and H.20-H.23	These are plan components, DCs, objectives, STs and GDs developed to reduce the risk of uncharacteristic fires. The DCs in vegetation communities are designed to stated how fire should react if desired conditions vegetation conditions are meet. These activities would occur outside of the Saddle Mountain Wilderness.

Threats	Plan Component Code that alleviates or eliminates threat	Effects Analysis Summary
Loss of aquatic habitat	D.3-D.5, and D.7	These DCs, STs, and GDs provide the guidance to protect and restore aquatic habitat.
Sediments above background levels in aquatic habitats	E.2-E.9	DCs, STs, and GDs listed from E.2-E.4, E.6, E.8, and E.9 provide directions to maintain organic ground covers to provide for protection of soils. GD E.5 provides for erosion control after wildfires.
Invasive species within the aquatic system	I.2-I.5 and I.7	These DCs and GDs provide the direction for the prevention and removal of invasive species.

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 assessment. 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 ESA.

The State does allow for fishing of Apache trout within this population. While the area is not a popular fishing area due to the limited access, some fishing does occur. The States monitored the fish population annually and the population has been stable. There are no other State, tribal, local or private actions that are known to occur within North Canyon watershed where the trout occurs or upstream of the trout. The fishing of the trout has limited cumulative effects.

Determination of Effects (Species)

Generally the DCs, objectives, STs and GDs in the Proposed Plan are positive in maintaining water quality, watershed conditions, and riparian conditions. North Canyon is located in the Saddle Mountain Wilderness, and is therefore not impacted by road systems. There is potential for some sediment from trails and recreation activities although both of these are limited in nature. Overall, the Proposed Plan is sufficient, coupled with the fact that the occupied habitat is entirely in a wilderness area, to result in effects that are insignificant and discountable. Therefore, the implementation of the Proposed Plan **May Affect and is Not Likely to Adversely Affect** the Apache trout.

Loach Minnow and Spikedace

Due to the fact that the threats, plan components and effects are similar between the loach minnow and spikedace, both species will the discussed together outside of life history, distribution and statues of species.

Loach Minnow

Endangered Species Act Status: Endangered; 02/23/2012 uplisted

Recovery Plan Yes 1991

Critical Habitat:	CH; final 02/23/2012
Effects Determination – Species	**No Effect**
Effects Critical Habitat	**May affect, not likely to adversely affect**

Spikedace

Endangered Species Act Status:	Endangered; 02/23/2012 uplisted
Recovery Plan	Yes 1991
Critical Habitat:	CH; final 02/23/2012
Effects Determination – Species	**May affect, not likely to adversely affect**
Effects Critical Habitat	**May affect, not likely to adversely affect**

Loach Minnow

The following discussion in the life history, distribution, status of the species, and threats sections is taken partially from the USFWS 2012 Critical Habitat Designation and Endangered Status (Uplisting) Documentation and the USFSW Loach Minnow webpage http://www.fws.gov/southwest/es/arizona/Loach.htm (accessed 10/15/2012). Portions of the webpage and rule are incorporated by reference into this document as summarized below.

Life History

Loach minnow are found in small to large perennial streams and use shallow, turbulent riffles with primarily cobble substrate and swift currents. The loach minnow uses the spaces between, and in the lee (sheltered) side of, rocks for resting and spawning. It is rare or absent from habitats where fine sediments fill these interstitial spaces.

The first spawn of loach minnow generally occurs in their second year, primarily from March through May. Loach minnow may also spawn in autumn. Spawning occurs in the same riffles occupied by adults during the non-spawning season. Eggs incubated at 18-20°C (66.2-68ºF) hatched in five to six days. Longevity is typically 15 months to two years, although loach minnow can live as long as three years.

Loach minnow feed exclusively on aquatic insects. They are opportunistic benthic insectivores, feeding primarily on riffle-dwelling larval mayflies (*Emphemeroptera*), blackflies (*Simulidae*), and midges (*Chironomidae*). They actively seek their food on bottom substrates, rather than pursuing food items in the drift.

Distribution

The loach minnow is endemic to the Gila River basin of Arizona and New Mexico, and Sonora, Mexico. Its historic range included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila rivers. The species is believed to be extirpated from Mexico. During the last century, both the distribution and abundance of the loach minnow have been greatly reduced throughout its range. Extant populations are geographically isolated and inhabit the upstream reaches of their historic range.

Historically in Arizona, the loach minnow occupied up to 2,250 stream km (1,400 mi), but it is now found in less than 225 km (140 mi). The loach minnow is generally rare to uncommon where it is found in the following areas: Aravaipa Creek (Pinal and Graham counties); limited reaches of the White River (Gila County) and the North and East forks of the White River (Navajo County); Three Forks area of the Black River; throughout the Blue River; Campbell Blue Creek; sporadic in Eagle Creek; and in the San Francisco River between Clifton and the New Mexico border (Greenlee County).

In New Mexico, the loach minnow historically occupied about 330 stream km (205 mi); now it is found in about 258 stream km (160 mi). The loach minnow has become very rare in substantial portions of this remaining range. The species is extant in the upper Gila River, including the East, Middle, and West forks, the San Francisco and Tularosa rivers, and Dry Blue Creek. Recent biochemical work on this species indicates that there are substantial differences in genetic composition between the remnant loach minnow populations that occupy isolated fragments of the Gila River basin.

The loach minnow occurs in waters within the Apache-Sitgreaves, Coconino, Gila, Prescott, and Tonto NF boundaries. There are no occupied streams on the KNF nor has there ever been habitat on the KNF. Lands managed under the K NF are over 12 river miles from the Verde River where CH for loach minnow is designed.

Status of the Species (Range-wide and within the Action Area)

The status of loach minnow is declining range wide. In February 2012 the loach minnow was reclassified as endangered. During the last century, both the distribution and abundance of the loach minnow have been greatly reduced throughout the species' range. Competition and predation by non-native fish and habitat destruction have reduced the historic range of the loach minnow. Both historic and present landscapes surrounding loach minnow habitats have been impacted to varying degrees by domestic livestock grazing, mining, agriculture, timber harvest, recreation, development, or impoundments. These activities degrade loach minnow habitats by altering flow regimes, increasing watershed and channel erosion and thus sedimentation, and adding contaminants to streams and rivers. As a result, these activities may affect loach minnow through direct mortality, interference with reproduction, and reduction of invertebrate food supplies.

Competition with non-native fishes is often cited as a major factor in the decline of loach minnow. The effects of nonnative fish competition on the loach minnow can be classified as either interference or exploitive. Interference competition occurs when individuals directly affect others, such as by fighting, producing toxins, or preying upon them. Exploitive competition occurs when individuals affect others indirectly, such as through use of common resources. Channel catfish (*Ictalurus punctatus*) and flathead catfish (*Pylodictis olivaris*) frequent riffles occupied by loach minnow, especially at night when catfish move onto riffles to feed and may prey on loach minnow. In addition, largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui*), green sunfish (*Lepomis cyanellus*), and introduced trout (*Salmonidae*) may co-occur and prey on loach minnow. These non-native fish may also impact loach minnow populations through competition for food and space.

There are no occupied streams on the KNF. However, there is potential for some off-forest effects to historic habitat and designated critical habitat. There is no known loach minnow occupancy within the Verde River at this time (see Map 2 in Appendix A).

Spikedace

The following discussion in the life history, distribution, status of the species, threats sections is taken partially from the USFWS 2012 Critical Habitat Designation and Endangered Status (Uplisting) Documentation and the USFSW Spikedace webpage http://www.fws.gov/southwest/es/arizona/Spikedace.htm (accessed 10/15/2012). Portions of the webpage and rule are incorporated by reference into this document as summarized below.

Life History

Spikedace are found in moderate to large perennial streams, where they inhabit shallow riffles (those shallow portions of the stream with rougher, choppy water) with sand, gravel, and rubble substrates. Specific habitat for this species consists of shear zones where rapid flow borders slower flow; areas of sheet flow at the upper ends of midchannel sand or gravel bars; and eddies at downstream riffle edges. Recurrent flooding and a natural flow regime are very important in maintaining the habitat of spikedace and in helping maintain a competitive edge over invading nonnative aquatic species.

Spikedace can live up to 24 months, although few survive more than 13 months. Reproduction occurs primarily in one-year-old fish. Spawning extends from mid-March into June and occurs in shallow (less than 15 cm [5.9 in] deep) riffles with gravel and sand bottoms and moderate flow. By mid-May, most spawning has occurred, although in years of high water flows, spawning may continue into late May or early June.

Spikedace feed primarily on aquatic and terrestrial insects). In addition, it is reported that spikedace feed on food items in the drift including some fish fry. Diet composition is largely determined by type of habitat and time of year.

Distribution

The spikedace was once common throughout much of the Gila River basin, including the mainstem Gila River (upstream of Phoenix), and the subbasins of the Verde, Agua Fria, Salt, San Pedro, and San Francisco. Habitat destruction and competition and predation by nonnative aquatic species reduced its range and abundance. Spikedace are now restricted to portions of the upper Gila River (Grant, Catron, and Hidalgo Counties, New Mexico); Aravaipa Creek (Graham and Pinal Counties, Arizona); Eagle Creek (Graham and Greenlee Counties, Arizona); and the Verde River (Yavapai County, Arizona).

There are no occupied streams on the KNF nor has there ever been habitat on the KNF. Lands managed under the K NF are over 12 river miles from the Verde River where the spikedace occupy habitat and designed CH.

Status of the Species (Range-wide and within the Action Area)

The status of spikedace is declining range wide. In February 2012, the spikedace was reclassified as endangered. During the last century, both the distribution and abundance of the spikedace have been greatly reduced throughout the species' range. Competition and predation by non-native fish and habitat destruction have reduced the historic range of the spikedace. Both historic and present landscapes surrounding spikedace habitats have been impacted to varying degrees by domestic livestock grazing, mining, agriculture, timber harvest, recreation, development, or impoundments. These activities degrade spikedace habitats by altering flow regimes, increasing watershed and channel erosion and thus sedimentation, and adding contaminants to streams and rivers. As a result, these activities may affect spikedace through direct mortality, interference with reproduction, and reduction of invertebrate food supplies.

Competition with non-native fishes is often cited as a major factor in the decline of spikedace. The effects of nonnative fish competition on the loach minnow can be classified as either interference or exploitive. Interference competition occurs when individuals directly affect others, such as by fighting, producing toxins, or preying upon them. Exploitive competition occurs when individuals affect others indirectly, such as through use of common resources. Channel catfish (*Ictalurus punctatus*) and flathead catfish (*Pylodictis olivaris*) frequent riffles occupied by spikedace, especially at night when catfish move onto riffles to feed and may prey on loach minnow. In addition, largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui*), green sunfish (*Lepomis cyanellus*), and introduced trout (*Salmonidae*) may co-occur and prey on spikedace. These non-native fish may also impact spikedace populations through competition for food and space.

There are no occupied streams on the KNF. However, there is potential for some off-forest effects to occupied habitat of the spikedace and designated critical habitat. (see Map 3 in Appendix A).

Current ESA § 7(a)(1) Conservation Actions on the KNF
No conservation efforts have been undertaken due to the spikedace and loach minnow and designated CH for both species not being present on the KNF.

Threats

There are many threats to the spikedace and loach minnow, including habitat loss and modifications (Factor A) caused by historical and ongoing land uses such as water diversion and pumping, livestock grazing, and road construction. However, competition with, or predation by, nonnative species, such as channel and flathead catfish, green sunfish, and red shiner, is likely the largest remaining threat to the species (Factors C and E). In addition, recent research indicates that the combination of altered flow regimes and nonnative fishes together are causing declines in native fishes. Existing regulatory mechanisms (Factor D) have not proven adequate to halt the decline of either species or habitat losses since the time of their listing as threatened species. In addition, the warmer, drier, drought-like conditions predicted to occur due to climate change (Factor A) will further reduce available resources for the both species. Since 1994, although some recovery actions have occurred, the majority of the areas historically occupied by the loach minnow have experienced a shift from a predominance of native fishes to a predominance of nonnative fishes.

The biggest threat to the spikedace and loach minnow habitats from the KNF land base would be if a landscape scale high severity wildfire occurs. Effects of fire may be direct and immediate or indirect and sustained over time. Because spikedace are found in the lower elevation, higher-order streams, they are most likely affected by the indirect effects of fire (e.g., ash flows, increased water temperatures), not direct effects (e.g., drastic changes in pH, ammonium concentrations). Indirect effects of fire include ash and debris flows, increases in water temperature, increased nutrient inputs, and sedimentation, some of which can last for several years to more than a decade after the fire.

Effects Analysis

The historic range and habitat for the loach minnow and spikedace is found approximately 12 miles from the KNF boundary. There is potential for management activities to create sediments that could affect habitat within the Verde River drainage.

As part of the viability risk analysis done for the Proposed Plan results for the loach minnow and spikedace showed a low to moderate risk to both species for habitat elements that are found within Verde

River drainage on the KNF. These rating are based on keeping the cover types on the KNF in healthy conditions and reduce the risk of high severity wildfire. These conditions will reduce the potential of producing an un-natural high sediment movement.

Plan Components

The Proposed Plan has components for resource areas that provides protection and conservation for listed species over the life of the Plan and helps provide the 7(a)(1) conservation actions for the trout. The Proposed Plan components, which have the most effects to the two species, are listed below. All DCs, objectives, STs, and GDs from resources areas are listed in Appendix C that provide some type of protection.

Indirect Effects

Table 5 shows which Proposed Plan components will reduce or eliminate potential threats to the loach minnow and spikedace from management activities. However, due to the fact that there is no population of loach minnow in the Verde River at this time, while the Proposed Plan may impact critical habitat, it would not affect the loach minnow.

Forestry and Forest Health Programs

For ponderosa pine habitat the objective is to mechanically thin 11,000 to 19,000 acres annually, using a combination of group-selection cuts with matrix thinning and all-size free thinning. Treat an average of 13,000 to 55,000 acres annually, using a combination of prescribed fire and naturally ignited wildfires. This objective is across the whole KNF and only has a limited amount of acres within the Verde River drainage in any one year.

While there is potential of sediment movement from the above objective, the DCs in soil, watershed, and natural waters will help provide guidance on the activities that would create sediments and help prevent the movement of a large amount of sediments. BMPs are implemented on project-by-project bases to prevent impacts to soils and the watershed. The KNF occupies approximately 9% of the Verde River Watershed. Also due to the fact there are over 12 river miles from the KNF boundary to the Verde River, there is sufficient filtering of any potential indirect effects exists between the KNF and the Verde River.

- **Soil DC:**
  - Soils provide for diverse native plant species. Vegetative ground cover is well distributed across the soil surface to promote nutrient cycling and water infiltration.
  - Accelerated soil loss is minimal, especially on sensitive or highly erodible sites.
  - Soils can readily absorb, store, and transmit water vertically and horizontally, accept, hold, release nutrients, and resist erosion.
  - Infiltration rates are good in TES soil units that are described as well drained and moderately well-drained.
- **Watershed DC:**
  - Vegetation conditions within watersheds contribute to downstream water quality and quantity. Surface runoff, sheet, rill, gully erosion and subsequent sedimentation into connecting waters downstream are minimal.
  - Flooding maintains normal stream characteristics (e.g., water transport, sediment, woody material) and dimensions (e.g., bankfull width, depth, slope, and sinuosity). Vertical down cutting and embeddedness are absent in drainages.
  - The fuels composition within watersheds does not put the watersheds at risk for uncharacteristic disturbance.
  - Water quality meets or exceeds State of Arizona or Environmental Protection Agency water quality standards for designated uses. Water quality meets critical needs of aquatic species.
- **Soils and Watershed Management GD:**

- Projects should include design features to protect and improve watershed condition.
- In disturbed areas, erosion control measures should be implemented to improve soil conditions.

- **Natural Waters DC:**
  - Stream channel stability and aquatic habitats retain their inherent resilience to natural and other disturbances. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting.
  - Springs, streams, and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion.

Fuel Program

The DCs for wildland fire management for prescribed fires along with the DCs for all vegetation types are to have a low risk of uncharacteristic high intensity fire and associated loss of key ecosystem components. Appendix C shows how all DCs, objectives, STs and GDs across the resources are help at the local and landscape scale to reduce the risk of uncharacteristic high intensity wildfires.

- **Pinyon-Juniper Communities DC:** The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (including insects, diseases, and fire) and climate variability.
- **Ponderosa Pine Forest DC:**
  - *Fine-scale*: Fires generally burn as surface fires, but single-tree torching and isolated group torching is not uncommon.
  - *Mid-scale*: Fires burn primarily on the forest floor and typically do not spread between tree groups as crown fir.
  - *Landscape*:
    - The landscape is a functioning ecosystem that contains all its components, processes, and conditions associated with endemic levels of disturbances (e.g. fire, dwarf mistletoe, insects, diseases, lightning, drought, and wind).
    - Grasses and needle cast provide the fine flashy fuels needed to maintain the natural fire regime. Fire and other disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris loads, and nutrient cycling.
    - The risk of uncharacteristic high-severity fire and associated loss of key ecosystem components is low.
    - Frequent, low severity fires (Fire Regime I) occur across the entire landscape with a return interval of 0 to 35 years.
- **Vegetation Management in all Forested Communities GD:**
  - The location and layout of vegetation management activities should effectively disconnect large expanses of continuous predicted active crown fire and improve habitat connectivity.
  - Vegetation management prescriptions should provide for sufficient canopy breaks to limit crown fire spread between groups, allow for the redevelopment and maintenance of a robust understory, and mimic the spatial arrangement of the references conditions.
- **Grassland DC:** Disturbance processes are similar to reference conditions and play a primary role in the function of the ecosystem.
- **Wildland Fire Management DC:** (for prescribed fires)
  - Wildland fire maintains and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role.
  - Regular fire entry protects social, economic, and ecological values at risk from high-severity disturbance effects.
  - Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation community. Uncharacteristic high-severity fires rarely occur, and do not burn at the landscape scale.

Table 5. Threats to the Spikedace and Effects Summary (Code numbers found in Appendix C)

Threats	Plan Component Code that alleviates or eliminates threat	Effects Analysis Summary
Risk from Wildfires	H.1-H.26	These are plan components, DCs, objectives, STs and GDs developed to reduce the risk of uncharacteristic fires. The DCs in vegetation communities are designed to stated how fire should react if DCs vegetation conditions are meet.
Loss of aquatic habitat	D.1-D.6	These DCs, STs, and GDs provide the guidance to protect and restore aquatic habitat. By providing healthy aquatic habitat upstream from the Verde River, this will help protect fish populations and critical habitat PCEs downstream.
Sediments above background levels in aquatic habitats	E.1-E.17	DCs, STs, and GDs listed from E.2-E.4, E.6, E.8, and E.9 provide directions to maintain organic ground covers to provide for protection of soils. GD E.5 provides for erosion control after wildfires. DCs and GDs are designed to help keep soils in place, watersheds in good functioning conditions, which also help keep sediments in place, and natural waters DCs and GDs help provide the guidance to keep natural waters in health conditions, all of these things will reduce potential impacts from project or will be beneficial to the fish habitat and PCE.

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 assessment. 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.

Almost all of the watersheds associated with the KNF have private inholdings and areas outside of the KNF boundary. There is potential of activities that create sediment movement could occur on lands of other ownership, such as unpaved roads, grazing, mining, timber management, and fuel treatments that may result in reduced watershed conditions. Coconino and Yavapai Counties have implemented management plans that provide frameworks for managing land use, the natural environment, and conservation of natural resources.

The potential cumulative environmental consequences of the Proposed Plan when combined with the cumulative effects of activities on lands within the watershed boundaries is a mix of beneficial and adverse effects, with most of the adverse effects being short term and the beneficial effects being long term. The overall effects of the Proposed Plan are beneficial, as well as the overall effects of other land management agencies in the cumulative effects analysis area. Therefore, when combined, the net cumulative effect on soil and watershed resources is positive and therefore, would be net positive effect for the spikedace and loach minnow.

Determination of Effects (Species)

While there is potential of some management activities causing the movement of sediments into the Verde River drainage, the use of BMPs on project-by-project bases and the desired conditions in soil, watershed and natural waters resource areas would prevent large scale movement of sediments. In

addition, lands managed under the Proposed Plan are over 12 river miles to the Verde River where it is occupied by the spikedace. Due to the distance between lands managed by the KNF, the dryness of the drainages off the KNF and the guidelines for soils and watershed protections, indirect effects that may occur downstream are likely not measurable or distinguishable from other effects occurring from off-forest activities. Sufficient filtering of any potential indirect effects exists between the KNF and the Verde River to make any impact insignificant and/or discountable to the spikedace.

Overall guidance of the Proposed Plan is to protect resources while maintaining multiple use activities. The KNF Proposed Plan **May Affect, but is Not Likely to Adversely Affect** the spikedace. Since the loach minnow is no longer found in the Verde River, there is **no effect** to the loach minnow.

Critical Habitat

Critical habitat was designated for the spikedace and loach minnow in 2007 and modification to the existing designation occurred in February 2012. CH could be affected by activities within the Action Area of the KNF, however the highest risk to CH is if KNF does not do fuel reduction activities. There is no designated CH located on the KNF for either species.

The primary constituent elements for the loach minnow include permanent, flowing, unpolluted water; living areas for spikedace and loach minnow adults, juveniles, and larvae with appropriate flow regimes and substrates; spawning areas; low amounts of fine sediment and substrate embeddedness; riffle, run, and backwater components; low to moderate stream gradients; appropriate water temperatures; periodic natural flooding; an unregulated hydrograph, or, if flows are modified, a hydrograph that demonstrates an ability to support a native fish community; and, habitat devoid of non-native aquatic species detrimental to either species, or habitat where such nonnative species are at levels which allow persistence of the spikedace and loach minnow.

The only PCE that has a potential to be affected by KNF management is the low amounts of fine sediments and substrate embeddedness. Plan components E.1-E.17 (Appendix C) would all help maintain this PCE for the species. These DCs and GDs are designed to help keep soils in place, watersheds in good functioning conditions, which also help keep sediments in place, and natural waters DCs and GDs help provide the guidance to keep natural waters in healthy conditions, all of these things will reduce potential impacts from project or will be beneficial to the PCE. The other PCEs for these species will not be affected by the Proposed Plan revision.

- **E.1 Pinyon-Juniper Communities DC:** Plant litter (leaves, needles, etc.) and understory plant cover contributes to soil stabilization, prevents erosion, promotes nutrient cycling, improves water retention, and provides quality habitat and the microclimate conditions necessary for pinyon seed germination.
- **E.2 Ponderosa Pine DC:** *Landscape:* Organic ground cover and robust herbaceous vegetation provide protection for soil, and moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.
- **E.3 Frequent Fire Mixed Conifer DC**: *Landscape*: Organic ground cover and robust herbaceous vegetation provide protection for soil, and moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.
- **E.4 Mesic Mixed Conifer/Spruce-fir DC**: *Landscape*: Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.
- **E.5 Following Large Scale Disturbances GD**:
  - Recovery and restoration projects design should seek to establish a trajectory toward desired conditions for the affected vegetation type.
  - Erosion control should be implemented to protect significant resource values and infrastructure such as stream channels, roads, structures, and archeological or historic sites.

- Practices that restore nutrient cycling and stabilize soils (revegetation, mulching, lop and scatter, etc.) should be implemented.

- **E.6 Montane/Subalpine Grasslands DC:**
  - Montane and subalpine meadow vegetation has high soil productivity and biological diversity.
  - Vegetation and litter is sufficient to maintain and improve water infiltration, nutrient cycling, and soil productivity.
- **E.7 Wetland/Cienega DC:** Wetlands provide habitat consistent with their flood regime and flood potential. Wetlands infiltrate water, recycle nutrients, resist erosion, and function properly.
- **E.8 Soil DC**:
  - Soils provide for diverse native plant species. Vegetative ground cover is well distributed across the soil surface to promote nutrient cycling and water infiltration.
  - Accelerated soil loss is minimal, especially on sensitive or highly erodible sites.
  - Soils can readily absorb, store, and transmit water vertically and horizontally, accept, hold, release nutrients, and resist erosion.
  - Infiltration rates are good in TES soil units that are described as well drained and moderately well-drained. Infiltration rates are good in TES soil units that are described as well drained and moderately well-drained.
  - Logs and other woody materials are distributed across the surface to maintain soil productivity.
- **E.9 Watershed DC**:
  - Vegetation conditions within watersheds contribute to downstream water quality and quantity. Surface runoff, sheet, rill, gully erosion and subsequent sedimentation into connecting waters downstream is minimal.
  - Flooding maintains normal stream characteristics (e.g., water transport, sediment, woody material) and dimensions (e.g., bankfull width, depth, slope, and sinuosity). Vertical down cutting and embeddedness are absent in drainages.
  - Floodplains are functioning and lessen the impacts of floods on human safety, health, and welfare.
- **E.10 Soils and Watershed GD:** Projects should include design features to protect and improve watershed condition. In disturbed areas, erosion control measures should be implemented to improve soil conditions.
- **E.11 Natural Waters DC**:
  - Stream channel stability and aquatic habitats retain their inherent resilience to natural and other disturbances. Stream channel morphology reflects changes in the hydrological balance, runoff and sediment supply appropriate to the landscape setting.
  - Springs, streams, and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion.
- **E. 12 GD**: Access to natural waters should be restricted to designated trails and points of entry to mediate erosion and prevent trampling and inadvertent introduction of nonnative and undesirable biota and disease.
- **E. 13 Wildland Fire Management DC**: (Prescribed fires only)
  - Wildland fire maintains and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role.
  - Regular fire entry protects social, economic, and ecological values at risk from high-severity disturbance effects.
  - Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation community. Uncharacteristic high-severity fires rarely occur, and do not burn at the landscape scale.
- **E.14 Transportation System OBJ**: Within 10 years of Plan approval, obliterate 15 percent of non-system roads (unauthorized, unneeded, and decommissioned).
- **E.15 GD**: Cross-country travel for game retrieval, parking, or dispersed camping is not allowed in areas with sensitive soils or sensitive vegetation. Roads should be decommissioned when no longer needed.
- **E.16 Mineral and Mining Activities GD**:
  - Adverse surface impacts should be minimized through the appropriate administration of mining and mineral laws and regulations. Soil disturbance should be kept to a minimum.
  - Restoration and reclamation of surface disturbance associated with mining activities should be implemented to achieve 70 percent of ground cover (as compared to nearby undisturbed areas) with permanent native vegetation within 3 growing seasons.

- **E. 17 Bill Williams Mountain Management Area GD:** High-use roads within the municipal watershed should be maintained to prevent erosion and sedimentation.

Effects Analysis (Critical Habitat)

As noted in the effects sections for the species, there is potential of some sediment movement from KNF management activities, but the use of BMPs on project-by-project bases and the desired conditions in soil, watershed and natural waters resource areas would prevent large scale movement of sediments. Also due to the fact there are over 12 river miles from the KNF boundary to the Verde River, where the CH for the species exist, there is sufficient filtering of any potential indirect effects exists between the KNF and the Verde River.

The biggest threat to both species CH from within the KNF boundary is if a landscape scale high severity wildfire would occur. The implementation of DCs for wildland fire management along with the DCs for all vegetation types would promote a low risk of uncharacteristic high intensity fire and associated loss of key ecosystem components. Implementation of the ponderosa pine objectives would help reduce the risk in the Verde River drainage.

Determination of Effects (Critical Habitat)

Due to the distance between lands managed by the KNF and designated CH for the species and the DCs and GDs for soils and watershed protections, indirect effects that may occur downstream are likely not measurable or distinguishable from other effects occurring from off-forest activities. Overall the Proposed Plan is to protect resources while maintaining multiple use activities and the guidance provided in the Proposed Plan is sufficient, couple with the distance to CH, to result in effects that are insignificant and discountable. Based on the information provided above, the implementation of the Proposed Plan is **May Affect, but is Not Likely to Adversely Affect** the spikedace and loach minnow critical habitat.

Fickeisen Plains Cactus

Endangered Species Act Status:	Proposed Endangered; 10/3/2012
Recovery Plan	Not applicable
Critical Habitat:	Proposed CH; 10/3/2012
Effects Determination - Proposed	**Not likely to jeopardize**
Effects Determination – If listed	**May affect, not likely to adversely affect**
Effects Critical Habitat – Proposed	**Not likely to destroy or adversely modify proposed critical habitat**
Effects Critical Habitat – If listed	**May affect, not likely to adversely affect**

Life History

The Fickeisen plains cactus (FPC) is a small globose perennial succulent that is up to 6 cm (2.36 in) tall and 5.5 cm (2.17 in) in diameter. Its life span is unknown, but other small closely related cacti rarely live much more than 10 years. It flowers in April and sets fruit May-June. The FPC is a cold-adapted plant

that retracts into the soil during the winter (cold) and summer (dry) seasons, as well as during drought conditions. Plants may be completely buried underground or shrink down into the soil until the crown sits flushed with the soil surface (USFWS 2012c)

In one study, about 20% of the plants in three populations were found to be reproductive, but this count could be low due to the time of year the populations were sampled. The fruits and seeds have no special dispersal mechanisms. Rodents, birds, ants, and water are probably the dispersing agents. Nothing is known about germination or seedling establishment, but in one study about 11% of the plants in three populations were seedlings (Phillips et al. 1982).

Distribution

The FPC is a narrow endemic restricted to exposed layers of Kaibab limestone on the Colorado Plateau. The plant grows in gravelly limestone soils in desert scrub communities at elevations of 1,280 to 1,814 m (4,200 to 5,950 ft) (USFWS 2012c). It is found in widely scattered populations in northern Arizona in Coconino and Mojave counties. There are populations to the south and to the west of Cameron, in the House Rock Valley west of Marble Canyon and in extreme northwestern Arizona scattered in a band from Kaibab Creek westward to Dutchman Draw and the Grandstand areas (Arizona Game and Fish Department 1992). On the KNF, the species habitat is only found on the NKRD along the south rim of South Canyon on the west rim of the Marble Canyon and the south rim of Snake Gulch on the east rim of Kanab Creek Canyon (see Map 1, Appendix A).

Status of the Species (Range-wide and within the Action Area)

The following discussion is taken partially from the 2012 USFWS Proposed Rule list and the USFWS Fickeisen webpage http://www.fws.gov/southwest/es/arizona/Fickeisen.htm (accessed 10/09/2012). The FPC webpage describes the natural history and status of the plant. Portions of the webpage and proposed rule are incorporated by reference into this document as summarized below.

The FPC is found only on the Colorado Plateau in Coconino and Mohave Counties. The range of the FPC encompasses the Arizona Strip (i.e., the area north of the Colorado River to the Arizona-Utah border) from Mainstreet Valley in Mohave County to House Rock Valley in Coconino County, along the canyon rims of the Colorado River and Little Colorado River, to the area of Gray Mountain, and along the canyon rims of Cataract Canyon on the Coconino Plateau. The majority of the populations are small; some consisting of a few individuals. Populations are widely scattered over a broad range and separated by topography. There seems to be abundant suitable habitat that is unoccupied by the plant for reasons unknown.

The FPC is under the management of the BLM (Arizona Strip Field Office), NPS (Glen Canyon National Recreation Area), Navajo Nation, and USFS (KNF, North Kaibab RD). There are populations in ADOT highway right-of-way (Arizona Rare Plant Committee 2002), and on private lands. Very limited habitat and limited populations occur near the KNF boundary on the NKRD below the eastern and western edges of the Kaibab Plateau.

About 1,150 Fickeisen plains cacti among 33 populations have ever been documented rangewide from 1962 to 2011. However, 504 individuals among 6 populations have been recently documented and are a subset of the 1,150 individuals. This difference in the number of individuals does not necessarily represent a decline; survey information for the remaining 27 populations is absent, and therefore their status is unknown. Additionally, the increase in plant numbers in the Cataract Canyon population from 2007 to 2011 is due to better detection between years and not to greater abundance. Based on these six

documented populations, the breakout of the land ownership follows: BLM (26 percent), KNF(status unknown), State of Arizona (32 percent), the Navajo Nation (14 percent), and privately-owned lands (29 percent).

Current ESA § 7(a)(1) Conservation Actions on the KNF

The BLM, Arizona Strip Field Office, has established five monitoring plots (Arizona Game and Fish Department 1992) and monitored them yearly. Surveys have been conducted along the rim of Kanab Canyon (Hodgson 2011) and by FS personnel along the rims of Marble Canyon and south rim of South Canyon.

No livestock grazing allowed in area of South Canyon subunit.

No repair to water source at Buckhorn tank so livestock would not go in area of Snake Gulch subunit.

Threats

Management concerns for FPC are livestock grazing, nonnative, invasive species and predation by native small mammal predators, in combination with other natural or manmade factors, including natural environmental variability and climate conditions such as drought (USFWS 2012c).

Summary of Factors Affecting the Fickeisen Plains Cactus

The following discussion is taken from the 2012 USFWS Proposed Rule list (USFWS 2012c). Portions of the propose rule is incorporated by reference into this document as summarized below.

Factor A. The present or threatened destruction, modification, or curtailment of its habitat or Range
Based on the habitat characteristics described above, potential factors that may affect the habitat or range of the Fickeisen plains cactus are discussed in this section, including: (1) Livestock grazing; (2) nonnative, invasive species; (3) uranium mining; (4) road construction and maintenance; (5) ORV use and recreation; (6) commercial development; and (7) drought and climate change. It was determined that fire associated with nonnative, invasive plant species; uranium mining; road construction and road maintenance; ORV use; and commercial development are not threats to the FPC and its habitat. It was determined that direct loss of plants and habitat loss and modification due to the direct and indirect effects of livestock grazing; nonnative, invasive plant species; and drought and climate change are threats to the FPC.

Factor B. Overutilization for commercial, recreational, scientific, or educational purposes
Unauthorized collection is a potential threat for all species of cacti, but it is a specific and definite threat for the genus *Pediocactus*. Their small size, large attractive flower, and rarity make *Pediocactus* species in general highly sought by collectors, growers, or gardens. While unauthorized collection is a threat for some *Pediocactus* species and a potential threat for the FPC, based on the best available information, USFWS has no evidence suggesting that overutilization of the FPC for recreational, scientific, or educational purposes has occurred or is negatively affecting individuals or populations within the species' range.

Factor C. Disease or Predation
The USFWS does not consider disease to be a threat to the Fickeisen plains cactus. Small mammal herbivory on cactus species is known to occur during dry conditions when animals seek available moisture from the plant or available food from cactus fruit. Although there is a lack of clear evidence to

the scope of the impact that rodent predation has had on the FPC and its seeds, taken in conjunction with other habitat disturbances occurring across its range, low recruitment, and small population size, rodent predation is likely to rise to the level where it becomes a threat to the plant.

Factor D. The inadequacy of existing regulatory mechanisms
The legal and regulatory mechanisms that are in place appear to be adequate to protect the FPC.

Factor E. Other natural or manmade factors affecting its continued existence
The FPC is a rare, endemic cactus that is restricted to a particular soil type. Factors such as the small population size, low population density, the isolation of populations between occurrences, and a poor mechanism for seed dispersal renders this cactus vulnerable to extinction from human and natural disturbances.

Effects Analysis

The FPC grows in gravelly limestone soils in desert scrub communities. Most populations occur on the margins of canyon rims, on flat terraces or benches, or on the toe of well-drained hills with less than 20% slope (USFWS 2012c). Very little of this plant's total distribution is on NFS lands. The FPC occurs in limited areas on along the Kanab Creek canyon rim and Marble Canyon rim (see Map 1 in Appendix A). These are remote areas where the NF roads dead end at canyon rims. These areas are being managed for multiple uses, but the predominant uses are wildlife habitat, livestock grazing, and recreation. The areas provide critical winter range for most of the North Kaibab mule deer herd. The Snake Gulch population is within the Kana livestock allotment. Recreation includes big game hunting and access to Grand Canyon overlooks and trail heads.

As part of the viability risk analysis done for the Proposed Plan showed a very high viability risk to the Fickeisen plains cactus for desert community habitat element and moderate high for limestone soils on the KNF. Both of these rankings are due to the limited amount of habitat available on the KNF and the fact the KNF can do little to improve the habitat condition at this time and the rarity of the cactus on the KNF.

Plan Components

The Proposed Plan has components for resource areas that provides protection and conservation for listed and proposed species over the life of the Plan and helps provide the conservation actions for the FPC. These conservation actions would become conservation measures that would benefit the species under the 7(a)(1) section of ESA. Beside the Proposed Plan components, the KNF will continue to implement the current conservation actions described above. The Proposed Plan components, which have the most effects to the species, are listed below. The KNF developed DCs and GDs narrow endemic species to help provide addition protection to these rare species.

Indirect Effects

Table 6 shows which Proposed Plan components will reduce or eliminate potential threats to the FPC from management activities. The potential impacts to the FPC from management actions are minor. Below is a discussion of different resource areas.

Fuel Program
The GDs that state not to use fire as a management tool within desert communities or in areas below the rim of the Kanab Creek Wilderness will prevent burning in FPC habitat. This will prevent the plants from

being damaged from prescribed fires. In addition, the habitat at Willow Point is not conducive to fire since the area is open with little vegetation.

- **Desert Communities GD:** Fire should not be used as a vegetation management tool in desert communities.
- **Wilderness GD:** Wildfires should be suppressed below the rim of the Kanab Creek Wilderness.
- **Recommended Wilderness Area DC:** Wildfires should be suppressed in the recommended wilderness areas adjacent to Kanab Creek in the desert communities PNVT.

Rangeland Management Program

The DC and GD for constructed waters will help prevent any new water developments in areas that would attract ungulates, either wildlife or livestock, into the area with FPC occurrence or potential habitat. These plan components would eliminate the risk of trampling of plants from future development.

The FPC (Snake Gulch population) occurs in the Slide Pasture of the Central Winter Allotment that is also part of the Kane Ranch Allotment. While livestock tramping is listed as a treat to the FPC, the habitat type where the FPC occurs is not suitable for livestock for a number of reasons. The habitat type contains only occasional sagebrush and no understory grasses, making it undesirable for livestock. Furthermore, the nearest potential water source for the known occurrence is Buckhorn Tank, in a straight-line path over 2.5 miles away. The pipeline to the tank has not worked in 15 years, and the closest current water source is now Slide Tank, 5 miles away. In addition, there is no need to create openings in the area or conduct on-structural improvements since the habitat is wide open and not grazed. The Marble Canyon population is in an area where there is no livestock allotment.

- **Constructed Waters DC:** Constructed waters do not contribute to the spread of diseases, unwanted nonnative species, or unnatural patterns of wildlife distribution.
- **GD:** If new drinkers are necessary, they should be constructed in areas that reduce ungulate impact to sensitive vegetation or soils such as riparian, aspen, and wet meadow areas.

Forestry and Forest Health Program

On the KNF, cheatgrass is the only nonnative, invasive species known to exist in the FPC habitat. Cheatgrass is not expected to increase due to lack of available substrate and minimal habitat disturbance. There is concern that a wildfire could facilitate the spread of cheatgrass toward occupied FPC habitat (USFWS 2012c). The non-native invasive species DC and GDs provides the guidance to reduce the impacts from invasive plants, to treat as soon as possible to prevent spread, and that invasive plant treatment should not affect non-target plant species. The wilderness and recommended wilderness DCs and GDs also support the prevention of the spread of non-native invasive species. There has been an active partnership with many groups to treat cheatgrass on the west side of the North Kaibab Ranger Districts for many years and is still on going.

- **Non-Native Invasive Species DC:** Invasive species are contained and/or controlled so that they do not disrupt the structure or function of ecosystems.
- **GD:**
  - All ground disturbing projects should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species. New populations are detected early, monitored, and treated as soon as possible.
  - Treatment approaches should use integrated pest management (IPM) practices to treat noxious and nonnative invasive species. IPM includes manual, biological, mechanical, and herbicide/pesticide treatments.
  - Use of pesticides, herbicides, and biocontrol agents should minimize impacts on non-target flora and fauna.
- **Wilderness DC:** Wilderness areas have minimal to no nonnative, invasive species.
- **GD:** Nonnative, invasive species should be treated within wildernesses in order allow natural processes to predominate.

- **Recommended Wilderness Area DC:** Recommended wilderness areas have minimal to no nonnative, invasive species.
- **GD:** Nonnative, invasive species should be treated within recommended wildernesses in order allow natural processes to predominate.

Recreation, Heritage, and Wilderness Programs
The DC for cliffs and rocky features will help eliminate the potential risk to the plant from disturbance from rock climbing or related recreational activities. This DC would prohibit commercial rock climbing along the rim of the canyons where the FPC occurs or has potential habitat. The ST in transportation management will prevent the threat of off-road driving of OHVs into the FPC habitat. The population on the west side can only be approached by a non-maintained road, which will be closed with implementation of travel management decision, where shrubs are growing in the road itself. The site on the east side showed no sign that a human had ever been there: the closest overlook for the Grand Canyon is at the end of a remote road, approximately 1 km cross-country over rough terrain from the FPC. Since there are no roads in the occupied area, there is no risk from vehicles being able to pull 30 feet off the road for parking to crush FPC.

- **Cliffs and Rocky Features DC**: Rock climbing and related recreational activities do not disrupt the life processes of rare or threatened species or diminish the function of specialized vegetation, such as mosses, lichens, and fleabanes.
- **Transportation Management ST**: Motor vehicle use off the designated system of roads, trails, and areas is prohibited, except as identified on the MVUMs and as authorized by law, permits, and orders in connection with resource management and public safety.

Lands and Minerals Program
The areas of the North Kaibab and Tusayan Ranger Districts that were designated as part of the Grand Canyon Game Preserve are closed to locatable mineral entry and independent of the various alternatives being proposed for the forest plan. This area of "public domain lands" was designated as a game preserve in 1906 and was set aside from mineral entry as described in the 1872 General Mining Law. The remaining areas of the North Kaibab and Tusayan Ranger Districts were recently withdrawn from locatable mineral entry under the "Record of Decision for the Northern Arizona Withdrawal" (January 9, 2012). This withdrawal does affect the establishment of new mining claims on public domain lands within the TRD and specific portions of the NKRD, but would have no effect on the existing valid claims. There is no valid claims in the areas occupied or has potential habitat for the FPC. Since the plant occurs on limestone soils, there are no leasable minerals that occur within these areas. Mineral and mining activities would not affect the FPC.

Engineering Program
Road construction and maintenance is also listed as a threat to the FPC. However, there are no roads in the areas where the population occurs. Since there is no road, there is no need to do any road maintenance actions were the species occurs.

WFRP Program
The WFRP Program performs activities to maintain or improve wildlife, fish, and rare plants habitats. If the FPC is to become listed, the GD to integrate habitat management objectives and species protection measure from approved recovery plans in the threatened, endangered and sensitive species section would also apply to the FPC. This would benefit the FPC by helping to recovery the species and should help with future delisting of the species. Even if the FPC does not become listed the other GD provides guidance for project activities to maintain refugia and crucial life cycle needs for sensitive species.

The Proposed Plan articulates clear DCs for habitats and refugia for narrow endemics including a DC that locations and conditions of rare and narrow endemic species are known. These DCs and GD provide more direction for FPC protection. In the management approach section, there is a discussion about providing species specific information and management recommendations in a Kaibab endemic plant species guidebook (an internal document for the KNF employees) that would be maintained as a living document, updated with new information and locations as they become available. This guidebook is being designed to provide, in one document, a substantial amount of information on the species and its population biology, ecology, habitats, locations, and threats and effects of management actions. It will also provide management actions and opportunities which will be useful for project guidance.

- **Threatened, Endangered, and Sensitive Species DC:** Threatened, endangered, and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation.
- **GD:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.
- **Rare and Narrow Endemics DC:**
  - Habitat and refugia are present for narrow endemics or species with restricted distributions and/or declining populations.
  - Location and conditions of rare and narrow endemic species are known.
- **GD**: Project design should incorporate measures to protect and provide for rare and narrow endemic species where they are likely to occur.

Table 6. Threats to the Fickeisen Plains Cactus and Effects Summary (Code numbers found in Appendix C)

Threats	Plan Component Code that alleviates or eliminates threat	Effects Analysis Summary
Risk from Wildland Fires	I.1 and I.6	Provides direction not to use fire as a management tool in desert communities or below the rim of Kanab Canyon. These will help prevent accidental burning of FPC from prescribed fires.
Trampling of plants	K.1-K.3	These DCs, STs, and GDs provides the guidance not to construct waters where will move livestock and wildlife in areas that could affect the sensitive vegetation. This will prevent future development in areas that could cause trampling of FPC.
Invasive species displacing FPC from habitat	I.1, I.4-I.10	These DCs and GDs provide the direction for the prevention and removal of invasive species. The non-native invasive species DC and GDs provides the guidance to reduce the impacts from invasive plants, to treat as soon as possible to prevent spread, and invasive plant treatment should not affect non-target plant species. Also provide direction not to use fire as a management tool in desert communities.
Remove of habitat or FPC from recreation activities	G.1-G.2, K.4 – K.7	The DCs and GDs shown in G.1 and G.2 would protect the plant from rock climbing based recreation. The DCs, STs and GDs in K.4-K.7 provide directions for off road travel by motorized vehicles. These plan components would prevent the off-road travel in the FPC areas.

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 assessment. 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 FPC is protected under the Arizona Native Plant Law, which prohibits the collection of members of the genus Pediocactus in particular, and all members of the family Cactaceae (Phillips et al. 1982). The species is also protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); however, CITES does not regulate take or domestic trade.

There are several weed management areas (WMAs) that include the KNF and/or adjacent lands. The Arizona Strip WMA is adjacent to and includes the NKRD. The general aims of these WMAs are to facilitate communication among the members, and coordinate and implement weed treatments. Thus, the invasive species that are currently, or likely to become, of concern on the KNF are recognized over the broader landscape surrounding the KNF. Actions taken in coordination throughout these weed management areas would enhance the effectiveness of efforts of the KNF to control invasive plants on its own lands. The weed management areas have a positive effect on the effectiveness of weed prevention and treatments. Because invasive plants can spread rapidly over lands regardless of jurisdiction, the most effective way to prevent infestations is by prevention, early detection, and rapid effective treatment response to small new infestations wherever they occur.

Because this plan provides proactive protections for rare and endemic plant species through desired conditions, and standards and guidelines, the results of this plan, when added to the ongoing decisions and activities in the greater landscape, are local positive cumulative effects for these species.

Determination of Effects (Species)

There is potential of some negative impacts to the FPC from the activities described above. However, the desired conditions and guidelines would make any negative impacts insignificant and/or discountable to the FPC if it becomes listed. In addition, several of the plan components will provide additional protections or benefits to the FPC.

As a proposed species the Proposed Plan is **Not Likely to Jeopardize** the continued existence of the Fickeisen plains cactus. If the species becomes listed, the KNF Proposed Plan **May Affect, but is Not Likely to Adversely Affect** the Fickeisen plains cactus.

Proposed Critical Habitat within the Action Area

The following discussion is taken from the 2012 USFWS Proposed Rule list (USFWS 2012c). Portions of the proposed rule are incorporated by reference into this document as summarized below.

All of one Critical Habitat Unit (CHU) occurs within the boundary of the action area; Unit 4 (Snake Gulch) (see Map 1 of Appendix A). The unit consists of 945 ha (2,335 ac) on the North Kaibab Ranger District. The entire unit consists of federally owned land that is managed by the U.S. Forest Service. This unit is occupied at the time of listing and contains all of the primary constituent elements of the physical or biological features essential to the conservation of the FPC.

Based on USFWS current knowledge of the physical or biological features and habitat characteristics required to sustain the species' life-history processes, they determine that the primary constituent elements specific to the Fickeisen plains cactus are:

(i) Soils in northern Arizona on the Colorado Plateau that are:

a. Formed from alluvium, colluvium, or aeolian deposits;

b. Derived from limestone of the Harrisburg Member of the Kaibab Formation and Toroweap Formation;
c. Underlain with Coconino Sandstone, and sandstone and mudstone of the Moenkopi Formation;
d. At an elevation of 1,310 to 1,813 m (4,200 to 5,950 ft);
e. Are gravelly-loam, fine-textured, well drained, and shallow;
f. On terraces, benches, tops of mesas and plateaus, toe-slope of hills with a 0 to 20 percent slope;
g. Supportive of biological soil crusts;
h. Within the Plains and Great Basin Grassland and Great Basin Desert Scrub Vegetation communities;

(ii) Native vegetation in areas that have natural, generally intact surface and subsurface features that provide habitat and suitable nesting substrate for the cactus' pollinators and space for seed dispersal and germination; and

(iii) Provide for pollinator habitat with a radius of 1,000 m (3,280 ft; 777 acres) around each individual, reproducing Fickeisen plains cactus.

Effects Analysis (Critical Habitat)

The PCE for soils (i) will not be affected by the Proposed Plan. The PCEs for native vegetation and to provide for pollinator habitat have the potential to be impacted by management activities.

As noted in the proposed ruling for critical habitat (USFWS 2012c), the features essential to the conservation of the species may require special management considerations to address threats from nonnative, invasive species and long-term drought. Livestock grazing is permitted in this CHU, but is not considered a threat to the features essential to the conservation of the FPC (USFWS 2012c) due to lack of cattle using the area. Past monitoring has shown that livestock do not use the area adjacent to the FPC habitat due to the lack of forage. However, some grazing could occur in the more outer limits of the CHU. This could have some effects to the pollinator's habitat but is not expected to remove the pollinators from the area.

The desired conditions and guidelines for non-native invasive species and the guideline not to burn in desert communities will reduce the potential threat to FPC CH from invasive plants. Plan components F.1, F.2, G.2, I.1, I.4, I.5 I.7-I.10, K.3-K.7, K.13 and M.3-M.6 (Appendix C) would all help prevent the occurrence of non-native invasive species in the CHU and to maintain the two PCEs for native vegetation and pollinator habitat for the FPC.

- **F.1 Rare and Narrow Endemics DC:** Habitat and refugia are present for narrow endemics or species with restricted distributions and/or declining populations. Location and conditions of rare and narrow endemic species are known.
- **F.2 GD:** Project design should incorporate measures to protective and provide for rare and narrow endemic species where they are likely to occur.
- **G.2 Cliffs and Rocky Features GD**: Activities involving heavy machinery or blasting should minimize impacts to habitat associated with rocky features and cliffs. Where recreation activities have the potential to trample known populations of narrow and endemic plant species, signs should be posted educating the public to stay on designated trails and avoid impacts.
- **I.1 Desert Communities GD:** Fire should not be used as a vegetation management tool in desert communities.
- **I.4 Non-Native Invasive Species DC:** Invasive species are contained and/or controlled so that they do not disrupt the structure or function of ecosystems.

- **I.5 GD:**
    - All ground disturbing projects should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species. New populations are detected early, monitored, and treated as soon as possible.
    - Treatment approaches should use Integrated Pest Management (IPM) practices to treat noxious and nonnative invasive species. IPM includes manual, biological, mechanical, and herbicide/pesticide treatments.
    - Use of pesticides, herbicides, and biocontrol agents should minimize impacts on non-target flora and fauna.
- **I.7 Wilderness Areas DC:** Wilderness areas have minimal to no nonnative, invasive species.
- **I.8 GD:**
    - Wildfires should be suppressed in the desert communities of the Kanab Creek Wilderness.
    - Nonnative, invasive species should be treated within wilderness in order to allow natural processes to predominate.
- **I.9 Recommended Wilderness Areas DC:** Recommended wilderness areas have few to no nonnative, invasive species.
- **I.10 GD:**
    - Wildfires should be suppressed in the recommended wilderness areas to Kanab Creek in the desert communities PNVT.
    - Nonnative, invasive species should be treated within recommended wilderness in order to allow natural processes to predominate.

Determination of Effects (Critical Habitat)

Based on the information provided above, the implementation of the Proposed Plan is **Not Likely to Destroy or Adversely Modify proposed critical habitat** for the Fickeisen plains cactus. This is based on the fact that there could be some impact to pollinator habitat through grazing, but DCs and GDs for grazing, rare and endemic species, and threated, endangered and sensitive species, will make these impacts insignificant and/or discountable to the FPC. If critical habitat is designated, then implementing the Proposed Plan **May Affect, but is Not Likely to Adversely Affect** Fickeisen plains cactus critical habitat. With this BA we are requesting a conference report at this time.

Species Assessment for which USFS Seeks Formal Consultation

From the species listed in the table 1, the Mexican spotted owl is the species where formal consultation is requested.

For estimating the environmental consequences at the programmatic plan level, the assumption has been made that resource management activities allowed under the Proposed Plan are reasonably foreseeable future actions that will achieve the desired conditions and objectives. The effects analysis of plan components are listed in the respective tables for each species and the plan components are described in Appendix C of this document. However, the specific location, design, and extent of such activities are generally not known at the time. Those decisions are made on a site-specific (project-by-project) basis. Therefore, the discussion here refers to the potential for consequences to occur and is in many cases only estimates. The consequences analyses are useful on a forest-wide basis, but are not intended to be applied directly to specific locations on the KNF.

Climate change can have a negative effect to the MSO. How the KNF integrated climate change into the Proposed Plan is discussed on page 9 of this document. This information will not be repeated in this section.

Mexican Spotted Owl (MSO)

Endangered Species Act Status:	Threatened; 1993
Recovery Plan	Yes, 1995; revision due out in 2012
Critical Habitat:	CH; final 2004
Effects Determination – Species	**May affect, likely to adversely affect**
Effects Critical Habitat	**May affect, likely to adversely affect**

The following discussion in the life history, distribution, status of the species and threats sections is documents located on the USFWS MSO website http://www.fws.gov/southwest/es/arizona/MSO.htm (accessed 10/17/2012). 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 (USFWS 1993), in the Recovery Plan (USFWS 1995), and in the Revised Recovery Plan (USFWS 2012e). Also information from the 2012 Biological and Conference Opinion for the Continued Implementation of the Land and Resource Management Plan for the KNF (USFWS 2012) is included in the status of the species and threats. The information provided in these documents is incorporated by reference into this document as summarized below.

All acreages are based on GIS layers or VDDT modeling (see Appendix B). These acreages are only be used for this analysis.

Life History

Briefly, MSOs are nocturnal predators, which consume a variety of prey. They commonly eat small- and medium-sized rodents such as woodrats, mice, and voles, but they also consume bats, birds, reptiles, and arthropods. They inhabit forested habitats with uneven stand structure and unforested canyons with specific microclimates. Forests used by MSO are typically uneven-aged, multistoried, and have high canopy cover. Nest trees are typically large (> 24" DBH), although owls roost in both large and small trees. They form monogamous pairs, and if they attempt nesting, they generally lay their eggs in late March or early April. The nest is typically in a cavity, a platform, or occasionally a cave. Fledging of young occurs in late summer (July-August) with a majority dispersing from nesting area during September.

Distribution

The MSO occurs in forested mountains and canyonlands throughout the southwestern United States and Mexico. It ranges from Utah, Colorado, Arizona, New Mexico, and the western portions of Texas south into several states of Mexico. Although the MSO's entire range covers a broad area of the southwestern United States and Mexico, it does not occur uniformly throughout its range. Instead, the MSO occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Known MSO locations indicate 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 MSO occupies many habitat types scattered across a diverse landscape. In addition to this natural variability in habitat influencing MSO distribution, human activities also vary across the MSO's range. The combination of natural variability, human influences on owls, international boundaries, and logistics of implementation of the Recovery Plan necessitates subdivision of the MSO range into smaller management areas. The 2012 Recovery Plan subdivided the MSO's range into 11 "Ecological Management Units" (EMUs): six in the United States and five in Mexico. Within MSO range in the United States there is five EMUs: Colorado Plateau (CP), Southern Rocky Mountains (SRM), Upper Gila Mountains (UGM), Basin and Range-West (BRW), and Basin and Range-East (BRE).

On the KNF, MSO is found in the UGM EMU on the Williams RD and CP EMU on the North Kaibab RD. There is no MSO nesting/roosting habitat on the Tusayan RD.

Status of the Species Range-wide for Species and Critical Habitat

Overall, the status of the MSO and its designated CH has not changed significantly range-wide in the U.S. This means that the distribution of MSOs continues to cover the same area and CH is continuing to provide for the life history needs of the MSO throughout all of the EMUs located in the U.S (USFWS 2012d). There is no detailed information regarding the status of the MSO in Mexico, so no inferences regarding its overall status is available.

Wildland fire has resulted in the greatest loss of PACs and CH relative to other actions (e.g., such as forest management, livestock grazing, recreation, etc.) throughout the U.S. range of the MSO (USFWS 2012d). These wildland fire impacts have most impacted MSOs within the Upper Gila Mountains EMU (e.g., Rodeo-Chediski and Wallow Fires on the Apache-Sitgreaves NF) and Basin and Range West EMU (e.g., Horseshoe 2 Fire on the Coronado NF); but other EMUs have been impacted as well (Southern Rocky Mountains EMU, the Santa Fe NF by the Las Conchas Fire, CP EMU by the Warm Fire.

Status of the Species within the Action Area

The KNF is located on the western end of UGM EMU and the southern edge of the CP EMU and contains less than one percent of the known MSO PACs within Arizona and New Mexico NFs.

As of 2012, the KNF has identified six MSO PACs on the NF, all located on the Williams Ranger District within the UGM EMU. Habitat within MSO PACs on the KNF consists of mixed-conifer forests and canyon habitat (two PACs in Sycamore Canyon). In addition to protected habitat (PACs are also referred to as protected habitat within Revised Recovery Plan and this document), recovery habitat consists of ponderosa pine-Gambel oak on the Williams RD and mixed conifer forest throughout the analysis area. There is limited amount of mixed-conifer habitat on the Williams RD and most of that habitat is included as protected habitat or is found on slopes >40% or within wilderness boundaries. Within the CP EMU, MSO habitat on the North Kaibab RD is currently not occupied. However, the area does contain recovery habitat as defined in the Revised Recovery Plan. The MSO recovery habitat in the CP EMU on the KNF consists of high-elevation, mixed conifer forest.

It is estimated that there are approximately 4,485 acres of protected habitat within PACs and approximately 136,330 acres of recovery habitat on the KNF. Table 7 below breaks down the MSO habitat between the Williams and North Kaibab RD.

Table 7. Mexican Spotted Owl Habitat Acres on the KNF

Habitat Designation	Williams Rd	North Kaibab RD	Total Acres
Recovery Habitat	65,482	70,848	136,330
Protected Habitat	4,485	0	4,485
Totals	69,967	70,848	140,815

Of the 140,815 acre of habitat managed to support the MSO, only about 34% of the habitat is currently in conditions that has the habitat components that would support MSO nesting and roosting based on VDDT modeling done for the analysis for the Proposed Plan. The model was used to help determine areas that contained large trees and closed canopy. Based on VDDT modeling, it is estimated that there are approximately 13,142 acres of ponderosa pine/Gambel oak habitat on the Williams Ranger District and 35,123 acres of mixed conifer habitat, for a total of 48,265 acres of nesting and roosting habitat currently available.

Current ESA § 7(a)(1) Conservation Actions on the KNF

The KNF works with the Fish and Wildlife Service to establish PACs for Mexican spotted owls using criteria set forth in the Recovery Plan.

The KNF conducts fuels reduction projects which may benefit the Mexican spotted owl in the future. These projects focus on reducing the potential for stand-replacing, uncharacteristic wildfires that are a threat to the species while still maintaining or enhancing structural habitat features (e.g. large trees, snags and down woody materials). The KNF is an active partner in the Four Forest Restoration Initiative (4FRI).

The KNF monitors PACs and provides USFWS with monitoring and project survey results annually.

A new population and habitat monitoring approach was developed within the recently published Revised Recovery Plan (USFWS 2012e). The Forest Service has agreed to meet with the USFWS to discuss our future participation in the Recovery Plan monitoring in conjunction with them and other land management agencies. Initial discussions have taken place.

Threats

The threats listed below are taken from the Revised Recovery Plan for the MSO (USFWS 2012e) and current Biological Opinion for the KNF (USFWS 2012d).

Two primary reasons were cited for the original listing of the MSO in 1993: (1) historical alteration of its habitat as the result of even-aged timber-management practices; and, (2) the threat of these practices continuing as evidenced in existing LRMPs. The danger of stand-replacing fire was also cited as a looming threat at that time. Since publication of the first Recovery Plan (USFWS 1995), the USFWS has acquired new information on the biology, threats, and habitat needs of the MSO. Threats to its population in the U.S. have transitioned from commercial-based timber harvest to the risk of stand-replacing wildland fire. Recent forest management has moved from a commodity focus and now emphasizes sustainable ecological function and a return toward pre-settlement fire regimes, both of which have potential to benefit the MSO. Southwestern forests have experienced larger and more severe wildland

fires from 1995 to the present than prior to 1995. Climate variability combined with unhealthy forest conditions may also synergistically result in increased negative effects to habitat from fire. The intensification of natural drought cycles and the ensuing stress placed upon overstocked forested habitats could result in even larger and more severe fires in MSO habitat. Several fatality factors have been identified as particularly detrimental to the MSO, including predation, starvation, accidents, disease, and parasites.

Historical and current anthropogenic uses of MSO habitat include ungulate grazing, recreation, fuels reduction treatments, resource extraction, 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. Livestock and wild ungulate grazing is prevalent throughout Region 3 NF lands and is thought to have a negative effect on the availability of grass cover for prey species. Recreation impacts are increasing on all Forests, especially in meadow and riparian areas. There is anecdotal information and research that indicates that MSOs in heavily used recreation areas are much more erratic in their movement patterns and behavior. Fuels reduction treatments, though critical to reducing the risk of severe wildland fire, can have short-term adverse effects to MSOs through habitat modification and disturbance. As the human population grows in the southwestern United States, small communities within and adjacent to NFS lands are being developed. This trend may have detrimental effects to MSOs by further fragmenting habitat and increasing disturbance during the breeding season.

Effects Analysis

The MSO habitat is found on the Williams and North Kaibab Ranger Districts within the mixed conifer and pine-oak areas. These areas are being managed for multiple uses, but the predominant resource areas that could affect MSO and their habitat is vegetation management, fuel management, transportation, special uses, and recreation.

As part of the viability risk analysis done for the Proposed Plan there was a moderate viability risk to the MSO for ponderosa pine-oak, pine vertical and horizontal heterogeneity, snags and downed wood habitat elements and moderate-high ranking for frequent fire and mesic mixed conifer habitat elements on the KNF. The moderate-high ranking for these two habitat elements is due to the limited amount of habitat available on the forest and the rarity of the MSO on the KNF.

Plan Components

The Proposed Plan has components for resource areas that provides protection and conservation for listed species over the life of the Plan and helps provide the 7(a)(1) conservation actions for the MSO. DCs provide the basis for most of the 7(a)(1) conservation actions. In addition to the Proposed Plan components, the KNF will continue to implement the current 7(a)(1) actions described above. The Proposed Plan components, which have the most effects to the species, are listed below. All DCs, objectives, STs, and GDs from resources areas are listed in Appendix C that provide some type of protection.

Indirect Effects

Table 12 shows Proposed Plan components which will reduce or eliminate potential threats to the MSO from management activities. Of the six PACs on the KNF, three PACs are totally located within wilderness boundaries (Sycamore Canyon and Kendrick Wildernesses). The Kendrick PAC is mostly located within Kendrick Wilderness; however, approximately 200 acres are located outside the wilderness. For these four PACs, all areas within wilderness boundaries would not have any management activities occurring within in them due to restricted uses allowed within wilderness. For the 200 acres

outside of wilderness on the Kendrick PAC, this is within the 4FRI analysis and would likely be treated under that analysis. No other forest management activities would likely occur within those 200 acres over the next 15 years.

Forest Service activities which may affect MSO habitat are restoration activities, fuels reduction, fuelwood harvest, livestock grazing, recreation, lands, minerals and special uses. The only activities of these Resource Programs considered here are those which impact MSO habitat as discussed in the MSO Revised Recovery Plan (USFWS 2012e).

Forestry, Forest Health and Fuel Programs
The following table is a crosswalk between the 2012 Revised Recovery Plan (USFWS 2012e) and the Proposed Plan to show how the two compare. In general the KNF will follow the intent of the recovery plan and directions from the Proposed Plan. Most the MSO habitat components are met at the fine scale. For any management activities that occur within PACs and core areas and within recovery habitat, the KNF would follow the GD to integrate habitat management objectives and species protection measures from approved recovery plans.

Table 8. Crosswalk between 2012 Recovery Plan and Proposed Plan.

Recovery Plan	Proposed Plan	Comments
Table C.2 of the Recovery Plan (page 275-277) for nesting/roosting habitat		
Strive for a diversity of patch sizes with minimum contiguous patch size of 1 ha (2.5 ac) with larger patches near activity center; mix of sizes towards periphery. Forest type may dictate patch size (i.e., mixed conifer forests have larger and fewer patches than pine-oak forest). Strive for between patch heterogeneity.	**Ponderosa Pine (PP) and Frequent Fire MC DCs fine scale**: Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Tree groups are made up of clumps of various age classes and size classes that typically occur in areas less than one acre, but may be larger, such as on north-facing slopes. **Mid-scale:** The forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. **Mesic MC DC fine scale:** Mid-aged and older trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages, contributing to vertical and horizontal heterogeneity. **Mid-scale:** The size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary, but are frequently hundreds of acres; groups and patches of tens of acres or less are relatively common.	While the fine scale DCs for ponderosa pine and frequent fire MC note group sizes are typically less than one acre, this does not prevent the creation or maintaining of patches that are 2.5 or more acres within MSO nesting/roosting habitat or the creations of this habitat.
Horizontal and vertical habitat heterogeneity within patches, including tree species composition. Patches are contiguous and consist of trees of all	**PP and Frequent Fire MC DCs fine scale**: Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking. **Mid-scale:** The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present.	The Proposed Plan DC covers all ponderosa pine and mixed conifer stands on the KNF not just the MSO nesting/roosting habitat. The areas that are managed for

sizes, unevenly spaced, with interlocking crowns and high canopy cover	**Mesic MC DC fine scale:** Mid-aged and older trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages, contributing to vertical and horizontal heterogeneity.	nesting/roosting habitat would use the higher end of the ranges, such as having interlocking crowns.
Tree species diversity, especially with a mixture of hardwoods and shade-tolerant species	**PP DCs fine scale**: Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Large tree form oaks, snags, and partial snags with hollow boles or limbs are present. **Mid-scale:** Stands are dominated by ponderosa pine, but other native hardwood and conifer species occur. **Frequent Fire MC DCs fine scale**: Trees within groups are of similar or variable ages, often containing more than one species. **Mid-scale:** Where they naturally occur, groups or patches of aspen and all structural stages of oak are present. **Mesic MC DC fine scale:** Trees within groups can be of similar or variable species and ages, contributing to vertical and horizontal heterogeneity. **Aspen in PP and Frequent Fire MC DC:** In ponderosa pine and frequent fire mixed conifer vegetation types, the size, age, and spatial extent of aspen stands reflect reference conditions. **Aspen in Mesic MC DC:** Aspen occurs as a shifting mosaic across its range with new aspen clones establishing over time. **Vegetation Management GD:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale.	The intent of these DCs and GD is to provide for a variety of tree species diversity that historically existed on the forest.
Diverse composition of vigorous native herbaceous and shrub species	**PP and Frequent Fire MC DCs fine scale**: Interspaces between groups are variably shaped, are comprised of a native grass-forb-shrub mix, and may contain individual trees or snags. **PP DCs fine scale:** Where historically occurring, Gambel oak thickets with various diameter stems, and low growing, shrubby oak are present. **Mid-scale:** Interspaces with grass, forb, and shrub vegetation are variably shaped and typically range from 10 to 70 percent, with the more open conditions typically occurring on less productive sites.	Most of the vigorous native herbaceous and shrub species will occur in areas outside of the tree patches. Since MSO nesting/roosting habitat is fairly dense with higher canopy closures this will limit the herbaceous and shrubs within the tree groups. The larger tree groups and smaller

	Frequent Fire MC DCs mid-scale: Openings with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area. **Mesic MC DC mid-scale:** Grass, forb, and shrub-dominated openings created by disturbance may make up 10 to 100 percent of the mid-scale area, depending on the disturbance type. These openings provide areas for future regeneration. **Vegetation Management GD:** Vegetation management should favor the development of native understory species in areas where they have the potential to establish and grow. Seed and plants used for revegetation should originate from the same PNVT and general ecoregion as the project area.	openings will limit the amount of openings within an area and would tend to be on the lower end of the area available for interspaces openings at the mid-scale.
Opening sizes between 0.04 - 1 ha (0.1 - 2.5 ac). Openings within a forest are different than natural meadows. Small canopy gaps within forested patches provide for prey habitat diversity. Openings should be small in nest/roost patches, may be larger in rest of PAC.	**PP and Frequent Fire MC DCs fine scale**: Interspaces between groups are variably shaped, are comprised of a native grass-forb-shrub mix, and may contain individual trees or snags. **PP DCs Mid-scale:** Interspaces with grass, forb, and shrub vegetation are variably shaped and typically range from 10 to 70 percent, with the more open conditions typically occurring on less productive sites. **Frequent Fire MC DCs Mid-scale:** Openings with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area. **Mesic MC DC fine scale:** Small openings (gaps) are present as a result of past disturbances. **Mid-scale:** Grass, forb, and shrub-dominated openings created by disturbance may make up 10 to 100 percent of the mid-scale area, depending on the disturbance type. These openings provide areas for future regeneration.	There is no opening size shown in the DCs. During project design in nesting/roosting or to create this habitat, the opening size in the recovery plan would be the range that the NEPA team would use to design treatments in these areas. At the mid-scale the openings would be at the mid to lower end of the range of the area. The interspaces and opening in the Proposed Plan are the same as the opening discusses in the Recovery Plan.
Minimum canopy cover of 40% in pine-oak and 60% in mixed conifer	**PP DCs fine scale**: Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees per group. Where Gambel oak comprises more than 10% of the basal area, it is not uncommon for canopy cover to be greater than 40%. **Frequent Fire MC DCs fine scale**: Density is variable, with canopy ranging from zero to greater than 60 percent.	The Proposed Plan DC covers all ponderosa pine and mixed conifer stands on the KNF not just the MSO nesting/roosting habitat. The areas that are managed for nesting/roosting habitat would use the higher end of the ranges, such as having interlocking crowns. The Recovery Plan would provide the

		recommendation on percentage of canopy cover.
Diversity of tree sizes with goal of having trees ≥16" DBH contributing ≥50% of the stand BA	**PP and Frequent Fire MC DCs fine scale**: Tree groups are made up of clumps of various age classes and size classes. **PP DC Mid-scale:** The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with the greatest amount of basal area being contributed by larger trees. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (e.g., goshawk post-fledging family areas, Mexican spotted owl nesting/roosting habitat, drainages, and steep north-facing slopes). **Frequent Fire MC DCs mid-scale**: The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 30 to 100 feet per acre, with larger trees contributing the greatest percent of the total basal area. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest; these include goshawk post-fledging family areas (PFAs), Mexican spotted owl nesting/roosting habitat, and north-facing slopes. **Mesic MC DC mid-scale:** Density ranges from 20 to 250 square feet of basal area per acre, depending upon disturbance and seral stages of groups and patches.	The Proposed Plan DC covers all ponderosa pine and mixed conifer stands on the KNF not just the MSO nesting/roosting habitat. The areas that are managed for nesting/roosting habitat would use the higher end of the ranges for BA. There is nothing that prevents the KNF for managing for >50% of trees ≥16 in dbh. Mid-scale would average the BA areas across the mid-scale area. In other words this allows for stands within the fine scale with higher BA than shown for the mid-scale range.
Table C.1 of the Recovery Plan (page 275) for Recovery foraging/non-breeding habitat & Recovery nesting/roosting habitat		
Emphasize Large Hardwoods. Within pine-oak and other forest types where hardwoods are a component of owl habitat, emphasis should be placed on management that retains, and promotes the growth of additional, large hardwoods.	**PP DCs fine scale**: Large tree form oaks, snags, and partial snags with hollow boles or limbs are present. **Mid-scale:** Stands are dominated by ponderosa pine, but other native hardwood and conifer species occur. **Landscape scale:** Where it naturally occurs, Gambel oak is present with all structure classes represented. It is reproducing and maintaining or expanding its presence on suitable sites across the landscape. **Frequent Fire MC DCs fine scale**: Trees within groups are of similar or variable ages, often containing more than one species. **Mid-scale:** Where they naturally occur, groups or patches of aspen and all structural stages of oak are present. **Vegetation Management GD:** Project design and	These DCs all promote the retention and development of large hardwoods. The most common hardwoods on the KNF are Gambel oak and aspen.

	treatment prescriptions should generally not remove: Gambel oak >8 inches d.r.c.	
Retain Large Trees. Strive to retain (do not cut) all trees >61 cm (> 24 in) dbh, the average diameter of nest trees, unless overriding management situations require their removal to protect human safety and/or property or in situations where leaving large trees precludes reducing threats to owl habitat.	**Vegetation Management GD:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design and treatment prescriptions should generally not remove: Large, old ponderosa pine trees with reddish-yellow, wide platy bark, flattened tops, with moderate to full crowns and large drooping or knarled limbs (e.g. Thomson's age class 4, Dunning's tree class 5 and/or Keen's Tree Class 4, A and B.	The KNF would use the recovery plan recommendation on retention of trees > 24 in dbh. This is not in conflict with the GDs in vegetation management.
Retain Key Owl Habitat Elements. Design and implement management treatments so that most hardwoods, large snags (>46 cm [18 in] dbh), large downed logs (>46 cm [18 in] diameter at any point), trees (>46 cm [18 in] dbh) are retained, unless this conflicts with forest restoration and/or owl habitat enhancement goals.	Hardwoods are discussed above. **PP DCs mid-scale:** Snags 18 in diameter at d.b.h. or greater average 1 to 2 snags per acre. Snags and green snags of various sizes and forms are common. Downed logs (> 12 in diameter at mid-point, over 8 ft long) average 3 logs per acre within the forested area of the landscape. Coarse woody debris > 3 inches in diameter (including downed logs), ranges from 3 to 10 tons per acre. **Frequent Fire MC DCs mid-scale:** Snags and green snags, 18 in d.b.h. or greater average 3 per acre. Downed logs (> 12 in diameter at mid-point, over 8 ft long) average three per acre within the forested area of mid-scale units. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre. **PP and Frequent Fire MC DCs landscape scale:** Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **Mesic MC DC mid-scale:** The number of snags and downed logs (> 12 in diameter at mid-point, over 8 ft	As noted on page 269 of the recovery plan for recovery foraging and non-breeding habitat, treatments adequate to meet fuels and restoration management objectives in Recovery Habitats may result in the short-term loss of some habitat components in areas that could be occupied by spotted owls. When working in recovery nesting/roosting habitat the intent would be to retain these habitat features. There is no plan component that would prevent the KNF from retaining these features in nesting/roosting habitat. Snags and downed logs are averaged over the mid-scale. This does

	long) and coarse woody debris (> 3 inches diameter) vary by seral stage. Snags 18 in or greater at d.b.h. typically range from 1 to 5 snags per acre, with the lower range associated with early seral stages and the upper range associated with late seral stages. Coarse woody debris, including downed logs, vary by seral stage, with averages ranging from 5 to 20 tons per acre for early seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late seral stages. **Vegetation Management GD:** Project design should manage for replacement structural stages to assure continuous representation of old growth over time. Project design and treatment prescriptions should generally not remove: Large snags, partial snags, and trees (>18 inches d.b.h.) with broken tops, cavities, sloughing bark, lightning scars >4″ wide, and large stick nests (>18 inches in diameter).	not mean that they would be removed if more are located in one location. Snags are not usually removed unless they pose a safety hazard.

The recovery habitat that would likely have some kind of vegetation management or fuel reduction activities is the recovery habitat outside of wilderness or on slopes less than 40%. While some treatments could occur on slopes over 40% the only types of activities that usually occur on slopes over 40% is for wildlife habitat improvements or for fuel reductions. These areas are outside the KNF timber suitable base. As noted above thinning and prescribed fires do not occur within wilderness boundaries.

Table 9. Acres of Recovery and Protected Habitat on the KNF by Vegetation Type

	Pine-oak – Williams RD	Mixed Conifer – Williams RD	Mixed Conifer – North Kaibab	totals
Recovery outside of wilderness and slopes ≥40%	53,609	2,914	64,635	121,158
Recovery within wilderness	45	1,507	0	1,552
Recovery on slopes .≥ 40%	441	6,966	6,213	13,620
Protected habitat	50	4,435	0	4,485
Totals	54,145	15,822	70,848	140,815

For **ponderosa pine habitat, the objective** is to mechanically thin 11,000 to 19,000 acres annually, using a combination of group-selection cuts with matrix thinning and all-size free thinning. Treat an average of 13,000 to 55,000 acres annually, using a combination of prescribed fire and naturally ignited wildfires. This objective is across the whole KNF. Mechanically thinning would occur on approximately 2 to 3% of the ponderosa pine habitat annually and prescribed fire and wildfires would burn between 2 to 10% annually across the KNF.

The Proposed Plan emphasizes restoration of ponderosa pine forests because these forests are highly departed from desired conditions and were identified as a priority need for change. Projects in ponderosa pine are aimed at restoring forest structure and processes such as low-intensity fire, natural levels of disturbance watershed function, and nutrient cycling. Design features may increase diversity that was

historically present by promoting oak, aspen, openings, and understory production. While treatments strive to mimic the structure and patterns of reference conditions, they often also consider other DCs and objectives. As a result, reconstructed reference conditions are general guides, rather than rigid restoration prescriptions.

As noted above the only district that has pine-oak habitat that is considered either recovery or protected habitat for MSO is the Williams RD. Of the ponderosa pine habitat on the district, approximately 49,440 acres is considered MSO habitat (pine-oak), with the majority of the habitat considered recovery habitat (see table 8). The pine-oak MSO habitat is 10% of the KNF ponderosa pine cover type. The pine-oak MSO habitat is 77% of the MSO habitat on the district. Table 10 shows the maximum amount of acres of MSO pine-oak habitat that is expected to be treated in the next 15 years, there is potential for less acres to be treated. How much of pine-oak MSO habitat that is treated in any one year would vary but since the pine-oak MSO habitat is such a small percentage of the cover type across the KNF, it is not likely to impact a very high percentage of MSO pine-oak habitat in any one year.

Table 10. Pine-oak habitat on Williams RD and potential treated in 15 years. There will be an overlap of acres that are treated with both fire and mechanical thinning.

	Total Ponderosa Pine acres on KNF	Pine-oak MSO acres on WRD	Max. acres thinned in pine habitat across the KNF*	Max. acres thinned in pine-oak MSO habitat*	Max. acres burned in pine habitat across the KNF**	Max. acres burned in pine-oak MSO habitat**
MSO Habitat acres	541,000	54,145	285,000	28,500	825,000	82,500

*No mechanical thinning would occur within MSO habitat within wilderness boundaries. Acreage is based on percentage of pine-oak habitat on the KNF multiplied by the amount treated to determine the acreage of MSO that could potentially be treated. (285,000*10%=28,500 acres)
**Burning could occur more than once on the same acres for total acres more than what is shown for the cover type

When treatments occur within pine-oak habitat there is potential for some MSO habitat components to be removed. There is potential for loss of snags, logs, large trees and canopy closure within some of the MSO habitat due to either conflict with restoration needs and/or MSO habitat enhancement goals. As noted on page 269 of the Revised Recovery Plan (USFWS 2012e), treatments adequate to meet fuels and restoration management objectives in recovery habitats may result in the short-term loss of some habitat components in areas that could be occupied by spotted owls. Due to the limited amount of pine-oak outside of wilderness in PACs, approximately 10 acres, little to no treatments in pine-oak protected habitat would occur.

There is also the potential of loss of recovery habitat due to the GD in Vegetation management to use even aged silvicultural practices as a strategy for achieving the desired conditions over the long-term, such as bringing dwarf mistletoe infection levels to within a sustainable range. These treatments would not occur within recovery nesting and roosting habitat. This could cause a short-term loss of some habitat components in recovery foraging/non-breeding habitat. The intent is not to remove mistletoe from the system but to bring it back to endemic levels.

Recovery habitat in WUI has the highest likelihood of being negatively affected on the Williams RD. Based on GIS analysis, there is approximately 9,200 acres of MSO recovery habitat within WUI areas on the district, which is 15% of the MSO habitat on the district. Map 4 in Appendix A shows the location of recovery habitat within the WUI boundary. The WUI areas on the district have already been covered by

NEPA for treatments or have already been treated. The KNF will meet what is in the NEPA and consultation done for these areas. It is not likely that recovery habitat in WUI areas that does not currently meet the requirements for the MSO will become MSO habitat in the future under the Proposed Plan. If future treatments are done in WUI that are not currently covered by NEPA, the KNF would use the GD for following the intent of the recovery plan to protect any habitat that currently provides nesting/roosting habitat but would treat areas outside of this habitat to limit the amount of area that would be lost to a wildfire. The KNF would try to increase the amount of nesting/roosting habitat in areas outside of WUI areas.

In following the threatened, endangered, and sensitive species GD to incorporate the approved recovery plan for TE species, habitat that is currently meeting the nesting and roosting habitat structures as defined in the current approved recovery plan for the MSO would not be reduced below the threshold of those components. Based on the VDDT modeling done for ponderosa pine (see Appendix B), it is predicted there is currently approximately 13,140 acres of pine-oak that would meet the definition of nesting and roosting MSO habitat. In 15 years that number is predicted to increase to 14,600 acres, an increase of 1,460 acres of nesting and roosting habitat. This increase is based on treatment within existing pine-oak habitat and the growth of the stands within this time period.

Desired Conditions and Guidelines for vegetation management in pine-oak in Proposed Plan

- **Ponderosa Pine DC:**
  - *Fine scale*:
    - Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine.
    - Tree groups are made up of clumps of various age classes and size classes that typically occur in areas less than one acre, but may be larger, such as on north-facing slopes. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees.
    - Where historically occurring, Gambel oak thickets with various diameter stems, and low growing, shrubby oak are present. These thickets provide forage, cover, and habitat for species that depend on them such as small mammals, foliage nesting birds, deer, and elk. Gambel oak mast (acorns) provides food for wildlife species. Large tree form oaks, snags and partial snags with hollow boles or limbs are present.
    - Where Gambel oak comprises more than 10% of the basal area, it is not uncommon for canopy cover to be greater than 40%.
    - Isolated infestations of Southwest dwarf mistletoe may occur, but the degree of severity and amount of mortality varies among the infected trees. Witches' brooms may form on infected trees, providing habitat and food for wildlife and invertebrate species.
  - *Mid-scale*:
    - The more biologically productive sites contain more trees per group and more groups per areas. Basal area within forested areas generally ranges from 20 to 80 square feet per area, with the greatest amount of basal area being contributed by larger trees.
    - Forest conditions in some areas contain 10 to 20 % higher basal area in mid-aged to old tree groups than in the general forest (e.g., goshawk post-fledging family areas, Mexican spotted owl nesting/roosting habitat, drainages, and steep north-facing slopes).
    - Snags 18 inches diameter at breast height (d.b.h.) or greater average 1 to 2 snags per acre. Snags and green snags of various size and forms are common.
    - Downed logs (greater than 12 inches diameter at mid-point, and greater than 8 feet long) average 3 logs per acre within the forested area of the landscape. Coarse woody debris greater than 3 inches in diameter (including downed logs), ranges from 3 to 10 tons per acre.
  - *Landscape scale*:
    - The ponderosa pine forest is composed predominantly of vigorous trees, but declining trees are present. Snags, green snags, and coarse woody debris occur across the landscape.

        - Where it naturally occurs, Gambel oak is present with all age classes represented. It is reproducing and maintaining or expanding its presence on suitable sites across the landscape.
        - Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
        - Organic ground cover and robust herbaceous vegetation provide protection for soil and moisture infiltration, and contribute to plant and animal diversity and ecosystem function.
- **Vegetation Management in All Forested Communities GD:**
    - Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained.
    - Project design should manage for replacement structural stages to assure continuous representation of old growth over time.
    - Project design and treatment prescriptions should generally not remove:
        - Mature trees with large dwarf mistletoe induced witches' brooms suitable for wildlife nesting, caching, and denning, except where retaining such trees would prevent the desired development of uneven-aged conditions over time;
        - Large snags, partial snags and trees (> 18" dbh) with broken tops, cavities, sloughing bark, lightning scars > 4 inches wide, and large stick nests (> 18 inches in diameter); and
        - Gambel oak >8 inches d.r.c
    - The location and layout of vegetation management activities should effectively disconnect large expanses of continuous predicted active crown fire and improve habitat connectivity.
    - Vegetation management prescriptions should provide for sufficient canopy breaks to limit crown fire spread between groups, allow for the redevelopment and maintenance of a robust understory, and mimic the spatial arrangement of the reference conditions.
    - Vegetation management activities in mixed conifer forests should incorporate experimental design features and monitoring to accelerate learning and adaptive management.
    - Vegetation management should favor the development of native understory species in areas where they have the potential to establish and grow.
    - Even aged silvicultural practices may be used as a strategy for achieving the desired conditions over the long term, such as bringing dwarf mistletoe infection levels to within a sustainable range, or old tree retention.
- **Threatened, Endangered, and Sensitive Species DC:** Threatened, endangered, and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation.
- **GD:**
    - Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.
    - Forest activities should not disturb Mexican spotted owls in any individual Protected Activity Center for more than three consecutive breeding seasons.
- **Forestry and Forest Products DC**: A sustainable supply of wood is available to support a wood harvesting and utilization industry of a size and diversity that can effectively and efficiently restore and maintain the desired conditions for ponderosa pine and frequent fire mixed conifer communities.
- **Forestry and Forest Products GD:**
    - Timber harvest activities should be carried out in a manner consistent with maintaining or making progress toward the desired conditions in this plan.
    - Harvesting systems should be selected based on their ability to meet desired conditions and not on their ability to provide the greatest dollar return.
    - On lands classified as not suited for timber production, timber harvesting should only be used for making progress toward desired conditions or for salvage, sanitation, public health, or safety.
- **Wildland Fire Management DC: (**prescribed fire only)
    - Wildland fire maintains and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role.

    - Regular fire entry protects social, economic, and ecological values at risk from high-severity disturbance effects.
    - Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation community. Uncharacteristic high-severity fires rarely occur, and do not burn at the landscape scale.
- **GD:** If current or anticipated fire behavior and fire effects exceed the desired fire behavior and effects, protection objectives should be developed for wildfires, or a more conservative prescription window should be produced for prescribed burns.
- **WUI Areas DC:**
    - When WUI intersects vegetation types with a mixed or high-severity fire regime, characteristic ecosystem function is modified to promote low intensity surface fires.
    - The desired tree basal area in the WUI is on the lower end of the range given in the vegetation community desired conditions.
    - Ladder fuels are nearly absent.
    - Logs and snags, which often pose fire control problems, are present in the WUI, but at the lower end of the range given in the vegetation community desired conditions.
    - Dead and down fuel load is between 1 and 5 tons per acre. This light fuel load is desirable even in vegetation types with higher reference fuel loads, such as mesic mixed conifer, to provide improved fire protection to human developments deemed to have special significance.
    - Openings between tree groups are of sufficient size to discourage isolated group torching from spreading as a crown fire to other groups.
    - Openings with grass/forb/shrub vegetation occupy the mid to upper end of the percentage range in the desired conditions. Trees within groups may be more widely spaced with less interlocking of the crowns than desirable in adjacent forest lands.
- **Bill Williams Mountain Management Area DC:** Bill Williams Mountain provided quality habitat for Arizona bugbane, Mexican spotted owls, and culturally important plants.

For **frequent fire mixed conifer habitat, the objective** is to reduce the potential for active crown fire and restore frequent fire mixed conifer communities: Burn an average of 1,000 to 13,000 acres annually, using prescribed fire and/or naturally ignited wildfires. The KNF would mechanically thin 1,200 to 2,100 acres annually. There are no objectives developed for mesic mixed conifer. While this does not mean there would be no projects within mesic mixed conifer, since there is no objective for treatments little work would be done in the vegetation type. Mesic mixed conifer treatments project design will use the desired conditions shown in for mesic mixed conifer in the proposed plan and the GD in threatened, endangered and sensitive species to use current recovery plan to help design projects. Most of the discussion for mixed conifer will focus on frequent fire mixed conifer.

The area south and west (outside) of North Canyon in the Saddle Mountain Wilderness was identified as a high priority treatment area by the Kaibab Forest Health Focus (KFHF) as it has both high risk and high ecological values. The strategy identified in the KFHF was to address the needs of this area first and then move to other areas of high fire risk. Fire-only treatments may be appropriate for some areas with open canopies and low fuel loads, but mechanical fuel reduction is needed in many frequent fire mixed conifer areas before fire can be safely reintroduced. There was an agreement with the groups in the KFHF initial treatments in frequent fire mixed conifer would be done with an experimental design approach that would help to fill informational gaps and support adaptive learning in these areas.

Initial treatments in frequent fire mixed conifer are to be smaller in size and with an experimental design approach. Only 1 to 2% of the habitat would be mechanically treated annually. While the range of burning treatments is between 1 to 12% annually, treatments with prescribed burns have been shown to be costly, with narrow windows of opportunity. The ability to manage naturally ignited wildfires to achieve resource benefits has been very limited, and much remains to be learned. The number of acres treated each year is likely to increase over the plan period, as new information becomes available about practices and treatment effects, and as adaptive management is implemented. Additionally, as fuel loading is

reduced on more acres, there will be an increased ability to let fire play its natural role. Table 11 shows the maximum amount of acres of MSO mixed conifer habitat that is expected to be treated in the next 15 years.

Table 11. Mixed Conifer (MC) habitat and potential treatment in 15 years. There will be an overlap of acres that are treated with both fire and mechanical thinning.

	Total MC acres on KNF	MC acres on WRD	MC acres on NKRD	Max. acres thinned*	Max. acres thinned on WRD	Max acres thinned on NKRD	Max. acres burned**	Max acres burned on WRD	Max. acres burned on NKRD
MSO habitat acres	86,670	15,822	70,848	31,500	4,152	27,348	75,000	11,815	73,185

*No mechanical thinning would occur within MSO habitat within wilderness boundaries.
**Burning could occur more than once on the same acres for total acres more than what is shown for the cover type. Burn acres were estimated by using the low end of the range for 10 years and high end for 5 years. No prescribed burning would occur within wilderness boundaries.

When treatments occur within frequent fire mixed conifer habitat there is potential that some MSO habitat components to be removed. The proposed treatments could affect habitat components in the Bill William PAC and Sitgreaves PAC if treatment is done within the mixed conifer stands associated with these PACs. The Bill Williams area is already in the process of being analyzed for potential treatment and it is not clear if this NEPA will be completed before the implementation of the Proposed Plan or will be done under the current plan. There is potential for the removal of snags, down logs and large trees from treatments within the Mixed Conifer type. Until projects are designed it is not known how much habitat might be negatively affected in the short term. In the long-term the treatments should be beneficial to the MSO and help move more habitat toward meeting the conditions for nesting and roosting habitat.

The areas with the highest likelihood of being negatively affected are recovery habitats within the WUI. Based on GIS analysis (Map 5 in Appendix A), there is approximately 970 acres of mixed conifer MSO habitat within WUI areas on the North Kaibab RD and 500 of WUI area on the Williams RD is within frequent fire mixed conifer habitat. As discussed above in pine-oak habitat, all of the WUI areas have been already been cover by NEPA. Also as discussed above, it is not likely that recovery habitat not meeting MSO needs would be developed within the WUI areas in the future, however, areas that currently meet the MSO needs would be retain during future treatments over the next 15 years.

For habitat that is currently meeting the nesting and roosting habitat structures as defined in the current approved recovery plan for the MSO, most of these stands would not be reduced below the threshold of those components. This is following the threatened, endangered, and sensitive species GD to incorporate the approved recovery plan for TE species. Based on the VDDT modeling done for mixed conifer (see Appendix B), it is predicted there is currently approximately 35,123 acres of mixed conifer (29,425 acres frequent fire and 5,698 acres of mesic) that would meet the definition of nesting and roosting MSO habitat. In 15 years that number is predicted to decrease to 34,484 acres, a decrease of 639 acres of nesting and roosting habitat. This decrease is mostly in the frequent fire mixed conifer (535 acres) but also occurs within the mesic mixed conifer (104 acres). While the VDDT model shows a decline in mix conifer nest/roost habitat, the model likely overstated the amount of habitat loss. Most of the loss of habitat in the model is due to the potential for wildfires within closed canopy systems. If any of the habitat lost is due to thinning/logging of stands, this would not likely occur due to the guideline to meet the intent of the MSO Recover Plan to retain these habitats and desired conditions for mix conifer stands.

Desired Conditions and Guidelines for vegetation management in mixed conifer type in Proposed Plan. (The vegetation management in all forested communities GDs, threatened, endangered and sensitive species DC and GDs, forestry and forest produces DC and GDs, wildland fire management DCs (for prescribed fires) and GD, WUI areas DCs and GD and Bill Williams Mountain Management area DC are the same as the plan component used for project designed in pine-oak and will not be repeated here.

- **Frequent Fire Mixed Conifer DC:**
  - *Fine scale*:
    - Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages, often containing more than one species. Crowns of trees within mid-aged and old groups are interlockling or nearly interlocking. Tree groups are typically less than 1 acre size and consist of 2 to 50 trees per group, but are sometimes larger, such as on north facing slopes.
    - Openings between clumps and groups are variably shaped, are comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups.
    - Density is variable, with canopy ranging from zero to greater than 60 percent.
    - Dwarf mistletoe infections may be present on ponderosa pine and Douglas-fir, and rarely on other tree species, but the degree of infection severity and amount of mortality vary among infected trees. Witch's brooms may be present with these infestations, providing habitat for wildlife.
  - *Mid-scale*:
    - The frequent fire mixed conifer forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. Forest appearance is variable, but generally uneven-aged and open; occasional patches of even-aged structure are present.
    - The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 30 to 100 feet per acre, with larger trees contributing the greatest percent of the total basal area.
    - Forest conditions in some areas contain 10 to 20 % higher basal area in mid-aged to old tree group than in the general forest; these include goshawk post-fledging family areas (PFAs), Mexican spotted owl nesting/roosting habitat, and north-facing slopes.
    - Openings with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area.
    - The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages.
    - Where they naturally occur, groups or patches of aspen and all structural stages of oak are present. Occasionally small patches (generally less than 50 acres) of even-aged forest structure are present. Disturbances sustain the overall variation in age and structural distribution.
    - Snags and green snags, 18 inches d.b.h. or greater average 3 per acre. Downed logs (greater than12 inches diameter at mid-point and greater than 8 feet long) average 3 per acre within the forested area of the landscape. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre.
  - *Landscape scale*:
    - Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
    - Denser tree conditions exist in some locations such as north-facing slopes, canyons, and drainage bottoms.
    - Where they occur naturally, groups of aspen and all structural stages of oak are present.
    - The frequent fire mixed conifer forest community is composed predominantly of vigorous trees, but declining trees are present and snags, top killed, lightning- and fire-scarred trees, and coarse woody debris (greater than 3-inch diameter) are well-distributed throughout the landscape.

        - Dwarf-mistletoe is present and infects ponderosa pine and Douglas-fir, but occurs at endemics levels, which allows for the establishment and sustainability of the desired, uneven-aged forest structure over time.
- **Mesic Fire Mixed Conifer DC**:
    - *Fine scale*:
        - Mid-aged and older trees are typically variably-spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages, contributing to vertical and horizontal heterogeneity.
        - Dwarf mistletoe infections may be present on Douglas-fir or spruce and rarely on other tree species, but the degree of infection severity and amount of mortality vary among infected trees. Witch's brooms may be present with these infestations, providing habitat for wildlife.
    - *Mid-scale*:
        - Forest conditions in some areas contain higher basal area than the general forest; examples include goshawk post family fledgling areas, Mexican spotted owl nesting/roosting habitat, and north-facing slopes.
        - Density ranges from 20 to 250 square feet of basal area per acre, depending upon disturbance and seral stages of groups and patches.
        - The number of snags and downed logs (> 12-inch diameter at mid-point, greater than 8 feet long) and coarse woody debris (> 3-inch diameter) vary by seral stage. Snags 18 inches or greater at d.b.h. typically range from 1 to 5 snags per acre, with the lower range associated with early seral stages and the upper range associated with late seral stages.
        - Coarse woody debris varies by seral stage, but ranges from 5 to 20 tons per acre for early seral, 20 to 40 tons per acre in mid seral, and greater than 80 tons per acre in late seral areas.
    - *Landscape scale*:
        - The vegetation community is a mosaic of structural and seral stages ranging from young trees through old and is composed of multiple species. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation similar to reference conditions.
        - The forest landscape is a functioning ecosystem that contains all components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, wind, snow, and fire), including snags, downed logs, and old trees.
        - The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, and severity of disturbances and climate variability.
        - Dwarf mistletoe infestations may be present in stands that are composed of Douglas-fir or spruce and rarely in other tree species. Witch's brooms may be scattered throughout the infestations providing structural diversity in the stand and improved foraging and nesting habitat for wildlife species such as small mammals (e.g. tree squirrels), and raptors (e.g. goshawks, spotted owls).
        - Old growth generally occurs over large areas as stands or forests where old growth is concentrated. Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

Fuelwood collection has remained relatively constant on the KNF. The preferred wood is juniper, oak and aspen. The GDs for personal firewood collection does allow for collection of conifer dead and down logs, standing dead conifers < 12 inches DBH or 15 feet tall and standing dead oak less than 8 inches dbh. These GDs would allow for some removal of habitat components for the MSO. However the removal of fuelwood is usually limited to areas near roads and not too far from private land and does not occur everywhere on the KNF.

- **Forestry and Forest Products DC**: Wood products (e.g., wood pellets for home and industrial heating, oriented strand board, animal bedding, wood moulding, pallets, structural lumber, firewood, post and poles, biomass for electricity) and other products (e.g., Christmas trees, boughs, wildflowers, mushrooms, grasses, seeds, nuts, cones, etc.) are available to businesses and individuals in a manner that is consistent with other desired conditions on a sustainable basis within the capacity of the land.

- **Personal Firewood Collections GD**: The following should be permitted for personal use firewood Gathering:
  - Dead and downed ponderosa pine, Douglas-fir and spruce, juniper, pinyon pine, Gambel oak, or aspen.
  - Standing dead:
    - Ponderosa pine, Douglas-fir or spruce less than 12 inches d.b.h. or less than 15 feet in total height
    - Juniper without green foliage
    - Pinyon pine less than 12 inches diameter at root collar (d.r.c.) or less than 12 feet in height
    - Gambel oak less than 8 inches d.r.c.
    - Aspen less than 12 inches d.b.h.
  - Live trees specifically designated by the Forest Service.

Engineering Program

There is a transportation system **objective** to grade surfaces and clean culverts and ditches on 100 miles of open National Forest System roads each year. There is potential for disturbance to the MSO during the breeding season from maintenance and use of the KNF transportation system. However, the transportation system **objective** of within 10 years of plan approval, obliterate 15% of non-system roads (unauthorized, decommissioned, etc.), would help reduce this potential in the long-term. There is some potential of new and temporary road construction to help support the restoration activities. The guidelines to follow the intent of the approved recovery plan and transportation and KNF access plan components should help avoid and minimize the effects of these new roads at the site specific level. It is not anticipated that any new or temporary roads will be constructed within PACs.

- **Transportation and Forest Access DC**:
  - Forest roads, bridges, and trails provide safe, legal, and reasonable access for recreation opportunities and resource management.
  - Resource impacts from roads and trails are balanced with the benefits of having the road or trail available for use.
  - All designated routes open to wheeled motorized vehicles are shown on a motor vehicle use map (MVUM) that is readily available to the public.
  - The inventoried roadless areas are free from activities that would alter their roadless character.
- **Transportation GD:**
  - Motorized uses in semiprimitive nonmotorized areas should be restricted, except for necessary minimal administrative activities, permitted activities, and emergency access. needs.
  - Construction of permanent roads or temporary roads in semiprimitive nonmotorized areas should be avoided unless required by a valid permitted activity. If authorized, roads should be constructed and maintained at the lowest maintenance level needed for the intended use.
  - Roads should be decommissioned when no longer needed.

Recreation Program

Recreation activities have the potential to impact MSO both by removal of habitat and disturbance during the breeding season from activities. The special use ST, transportations and forest access STs, and Bill Williams Mountain Area plan components will reduce the impacts to MSO from recreation activities such as the prohibition of cross country OHV travel, no competitive motorized events, and no expansion of the ski area.

- **Recreation and Scenery DC:**
  - A wide spectrum of high-quality recreations settings exist. Users have access to a variety of developed and dispersed opportunities.
  - The forest provides sustainable recreation consistent with public demand. Use levels are compatible with other resource values.

    - Opportunities for off-highway vehicle (OHV) riding and driving for pleasure are available on the designated system of NFS roads and motorized trails. OHV use is compatible with nonmotorized recreation.
- **GD:**
    - Any new motorized trailheads should be located in front-country areas, incorporate or convert existing roads, protect open space, and protect natural and cultural resources.
    - Group uses should be concentrated in front-country areas.
    - Resource impacts should be reduced in front and back-country areas by directing camping to existing dispersed and designated campsites. New campsites are designated only when necessary to further reduce resource damage.
- **Transportation and Forest Access ST:** Motor vehicle use off the designated system of roads, trails, and areas is prohibited, except as identified on the MVUMs and as authorized by law, permits, and orders in connection with resource management and public safety.
- **Special Uses ST:** Competitive OHV and motorized events are not permitted on the forest.
- **Bill Williams Mountain Management Area DC:** Bill Williams Mountain provided quality habitat for Arizona bugbane, Mexican spotted owls, and culturally important plants.
- **GD:** The existing term permit for the Elk Ridge Ski Area on Bill Williams Mountain should be restricted to the existing permit area.

Rangeland Management Program

Livestock has the potential for removing habitat for MSO prey species. The DC for livestock grazing to be consistent with other DCs, along with the DCs and GDs for ponderosa pine, mixed conifer, montane meadows, and wildlife that would promote understory and grassland to help improve habitat conditions for prey species across the KNF. The DCs and GDs for livestock grazing and for montane meadows would help maintain habitat for prey species on allotments. The DCs in the ponderosa pine and frequent fire mixed conifer forest floors with grasses and needle cast to provide the fine flashy fuels needed to maintain the natural fire regime. Grazing would be conducted in these vegetation types to meet these DCs.

- **Ponderosa Pine DC:**
    - *Fine scale*: The interspaces between groups are variably shaped, are comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups.
    - *Mid-scale*: Interspaces with grass, forb, and shrub vegetation are variably shaped and typically range from 10 to 70 percent, with the more open conditions typically occurring on less productive sites.
    - *Landscape scale*:
        - Organic ground cover and robust herbaceous vegetation provide protection for soil and moisture infiltration, and contribute to plant and animal diversity and ecosystem function.
        - Grasses and needle cast provide the fine flashy fuels needed to maintain the natural fire regime. Fire and other disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris loads, and nutrient cycling.
- **Frequent Fire Mixed Conifer DC:**
    - *Fine scale*: Interspaces between groups are variably shaped, are comprised of a native grass-forb-shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups.
    - *Mid-scale*: Openings with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area.
    - *Landscape scale*:
        - Organic ground cover and herbaceous vegetation provide protection for soil and moisture infiltration, and contribute to plant and animal diversity and ecosystem function.
        - Grasses and needle cast provide the fine flashy fuels needed to maintain the natural fire regime. Fire and other disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.
- **Mesic Mixed Conifer DC:**

- *Mid-scale*: Grass, forb, and shrub-dominated openings created by disturbance may make up 10 to 100 percent of the mid-scale area, depending on the disturbance type. These openings provide areas for future regeneration.
- *Landscape scale*: Organic ground cover and herbaceous vegetation provide protection for soil and moisture infiltration, and contribute to plant diversity and ecosystem function.

- **Montana/Subalpine Meadows DC:**
  - Montane and subalpine meadow vegetation has high soil productivity and biological diversity. Native species occur in natural patterns of abundance, composition, and distribution. Vegetation is healthy and at least stable.
  - Vegetation and litter are sufficient to maintain and improve water infiltration, nutrient cycling, and soil productivity.
- **Livestock Grazing DC:**
  - There are opportunities to engage in ranching activities and graze livestock on NFS lands, which contribute to the social, economic, cultural, and stability of rural communities.
  - Grasses and forbs provide adequate forage for permitted livestock
  - Livestock use is consistent with other desired conditions.
- **GD:**
  - Livestock management should favor the development of native cool season grasses and forbs.
  - Annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.).
  - Livestock use in and around wetlands should be evaluated on an allotment specific basis. Mitigation measures such as deferment and fencing (full or partial) should be implemented as needed to minimize potential livestock effects.
  - Post-fire grazing should not be authorized until Forest Service range staff confirms range readiness.

Lands and Minerals Program

Mineral extraction, powerlines and communication sites can cause the removal of habitat and/or disturbance to the MSO during the breeding season. The DCs and GDs for these activities would help reduce or eliminate these impacts within MSO habitats by restricting or prohibiting surface use in MSO habitat and concentrated uses to the extent possible would limit the amount of habitat that will be affected by development of these facilities. The DC and GD are for mineral and mining activities would apply to any new leases.

- **Special Uses GD:** Uses should be combined to the extent possible in light of technical and environmental constraints.
- **Communications and Electronic Sites GD**:
  - The number of communication and electronic sites should be the minimum that is consistent with appropriate public services that require the use of forest lands.
  - Environmental disturbance should be minimized by co-locating communications and electronic sites.
- **Energy Transmission and Development DC:**
  - Energy transmission and development on the forest meets the legal mandates to facilitate the transmission and development of energy resources in a manner that minimizes adverse impacts and does not detract from meeting other desired conditions applicable to the area.
  - Energy transmission lines are not visible (usually underground) across the landscape.
- **ST**: Major utility corridor development is confined to the area identified and mapped in the "West-wide Energy Corridor Programmatic EIS".
- **GD**:
  - Environmental disturbance should be minimized by co-locating pipelines, power lines, fiber optic lines, and associated infrastructure.
  - Existing energy corridors should be used to their capacity with compatible upgraded powerlines, before evaluating new routes.

- When compatible with protection of heritage resources, the use of below-ground utilities should be optimized in order to avoid potential conflicts with wildlife, scenery, wildfire, and long-term vegetative management.

- **Mineral and Mining Activities DC:** Mineral and mining activities meet the legal mandates to facilitate the development of minerals on the forest in a manner that minimizes adverse impacts to surface and groundwater resources, and that do not detract from meeting other desired conditions applicable to the area.
- **GD:** Surface use should be restricted or prohibited in areas with habitat for threatened, endangered, and sensitive plant and animal species, and for heritage resources nominated or listed on the National Register of Historic Places. Use and occupancy should be restricted yearlong in areas supporting populations of threatened, endangered, and sensitive plant species

WFRP Program

The WFRP Program performs activities to maintain or improve wildlife, fish, and rare plants habitats. The GD to integrate habitat management objectives and species protection measure from approved recovery plans in the threatened, endangered and sensitive species section would apply to the MSO. This would benefit the MSO by helping to recover the species and should help with future delisting of the species.

- **Wildlife DC**:
  - Wildlife species are distributed throughout their potential natural range.
  - Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species.
  - Species with specific habitat needs such as snags, logs, large trees, interlocking canopy, and cavities are provided for.
  - Habitat configuration and availability allow wildlife populations to adjust their movements (e.g., seasonal migration, foraging, etc.) in response to climate change and promotes genetic flow between wildlife populations.
  - Human-wildlife conflicts are minimal.
- **Threatened, Endangered, and Sensitive Species DC:** Threatened, endangered, and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation.
- **GD:**
  - Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.
  - Forest activities should not disturb Mexican spotted owls in any individual Protected Activity Center for more than three consecutive breeding seasons.

High-severity Wildfires

The highest current threat to the MSO is stand-replacing wildland fires. The Proposed Plan highest priority is to reduce the risk of uncharacteristic fires and to restore the structure, species composition and function of forested ecosystems. Appendix C shows how the Proposed Plan components are designed to reduce the threat of high-severity wildfire through the implementation of the plan.

Table 12. Threats to the MSO and Effects Summary (Code numbers found in Appendix C)

Threats	Plan Component Code that alleviates or eliminates threat	Effects Analysis Summary
Loss of important habitat components (large trees,	A.1-A.12, M.1-M.4 and M.9	These plan components are designed to provide large trees, snags, logs, down wood materials within habitat that are used by the MSO. While the GD in vegetation management to use even aged silvicultural practices for achieving the DCs over the long term, such as bringing dwarf mistletoe infection levels to within sustainable

Threats	Plan Component Code that alleviates or eliminates threat	Effects Analysis Summary
snags, logs, mistletoe		range, or old tree retention, would remove some mistletoe, the intent is not to removal mistletoe from the KNF but to keep it at an endemic level across the landscape.
Loss of multi layered canopy, interlocking canopy and old growth	B.1-B.8, M.2-M.4 and M.9	The DCs, and GDs provide the guidance on maintaining and developing the multi layered canopy and interlocking canopies. It also provides guidance on maintaining and development of old growth structures within the ponderosa pine and mixed conifer stands.
Loss of understory dependent prey species	C.1 – C.15, M.7 and M.8	The development of understory vegetation in ponderosa pine and mixed conifer habitat would be promoted using these DCs and GDs. C.1-C.7. The DCs and GDs of C.8-C.15 provided for the maintenance of the understory vegetation components and for grasses in montane meadows.
Development of facilities, roads, communication sites, energy transportation and mineral and mining developments	K.3-K.14, M.5, and M.6	DCs and GDs listed from K.4-K.7 provide directions to minimize the impacts of the KNF transportation system. DCs, STs, and GDs listed from K.8-K.7 provide directions to minimize the impacts of communications and electronic sites and energy development and transmission. K.13 requires that surface uses from mineral and mining activities should be restricted or prohibited in TES habitats. And K.14 does not allow for the expansion of the Elk Ridge Ski area which is located on Bill Williams Mountain.
Disturbance from management activities	L.1, L.2, and L.4-L.11	The KNF would use the most current approved recovery plan to establish limited operating period for activities that could potentially affect nesting MSO during the breeding season. L.4, L.5 and L.9-L.11 provides DCs, STs and GDs for minimizing the impacts of disturbance from recreation activities. DCs, STs and GSs in L.6-L.8 minimize impacts from off-road travel, transportation system and competitive motorized events. To limit the amount of harassment to any one PAC the GD to not disturb any individual PAC more than 3 consecutive breeding season was developed using the recommendation from the Biological Opinion for current Forest Plan.
Risk of large scale wildfire	H.1-H.6	These are plan components, DC, objectives, STs and GDs developed to reduce the risk of uncharacteristic fires. The DCs in vegetation communities are designed to stated how fire should react if DCs vegetation conditions are met.

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 assessment. 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.

There are private inholdings within the KNF boundary. There is the potential for activities that create disturbance or removal of MSO habitat components on private lands, such as roads, grazing, mining, recreation activities, and fuel treatments. Coconino and Yavapai Counties have implemented management plans that provide frameworks for managing land use, the natural environment, and conservation of natural resources.

There is no other State, tribal or local government actions that are expected to occur within the action area. The potential cumulative environmental consequences of the Proposed Plan when combined with the cumulative effects of activities on private lands is a mix of beneficial and adverse effects, with most of the adverse effects being short term and the beneficial effects being long term. The overall effects of the Proposed Plan are beneficial, as well as the overall effects of other land management agencies in the cumulative effects analysis area. Therefore, when combined, the net cumulative effect is positive for the MSO.

Determination of Effects (Species)

Generally the desired conditions, objectives, standards and guidelines in the Proposed Plan are positive for the MSO. There is potential for short term impacts from the Forestry and Forest Health, Fuel, and Engineering Programs. The implementation of the Proposed Plan has the potential for short term effects to two PACS. The forest expects the level of take to be similar to the take issued in the March 2012 Biological Opinion (USFWS 2012d). The implementation of the Proposed Plan **May Affect, and is Likely to Adversely Affect,** the Mexican spotted owl**.**

Critical Habitat within the Action Area

Within the designated boundaries, CH includes only those areas defined as protected habitats and recovery habitats in the 1995 Recovery Plan (USFWS 1995). Since MSO habitat can include both canyon and forested areas, primary constituent elements (PCE) were identified in both areas. The PCEs identified for the MSO within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the MSO's habitat needs for nesting, roosting, foraging, and dispersing are:

- 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 to 45 percent of which are large trees with diameter at breast height ((dbh) 4.5 ft above ground)) 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.
- 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.

Critical Habitat Units (CHU) are found on North Kaibab and Williams Rangers Districts. There is one unit in Colorado Plateau (CP-10) and three units in Upper Gila Mountain (UGM-13, UGM-15, and UGM-17). Table 13 describes the CHU acreage and how much of each unit is located on the forest. The table is displaying all the area within the units and the amount of critical habitat on the forest within the units. Within the CHUs boundaries, only areas that fit the definition of restricted or protected habitat as defined in the Recovery Plan (USFWS 1995) for the MSO are considered as critical habitat. It is estimated there is approximately 127,630 acres of critical habitat within the units. Figure 4 shows the locations of the units.

Table 13. MSO Critical Habitat Units on the KNF

CHU Name	District	CH acreage on the KNF	Total CHU acreage	CHU Acreage on KNF	% CHU on Forest
CP-10	North Kaibab	70,350	918,847	230,710	25
UGM-13	Williams	52,060	253,341	127,050	50
UGM-15	Williams	2,390	22,531	17,810	79
UGM-17	Williams	2,830	10,914	10,914	100
	Total acres	**127,630**	**1,205,633**	**386,484**	**32**

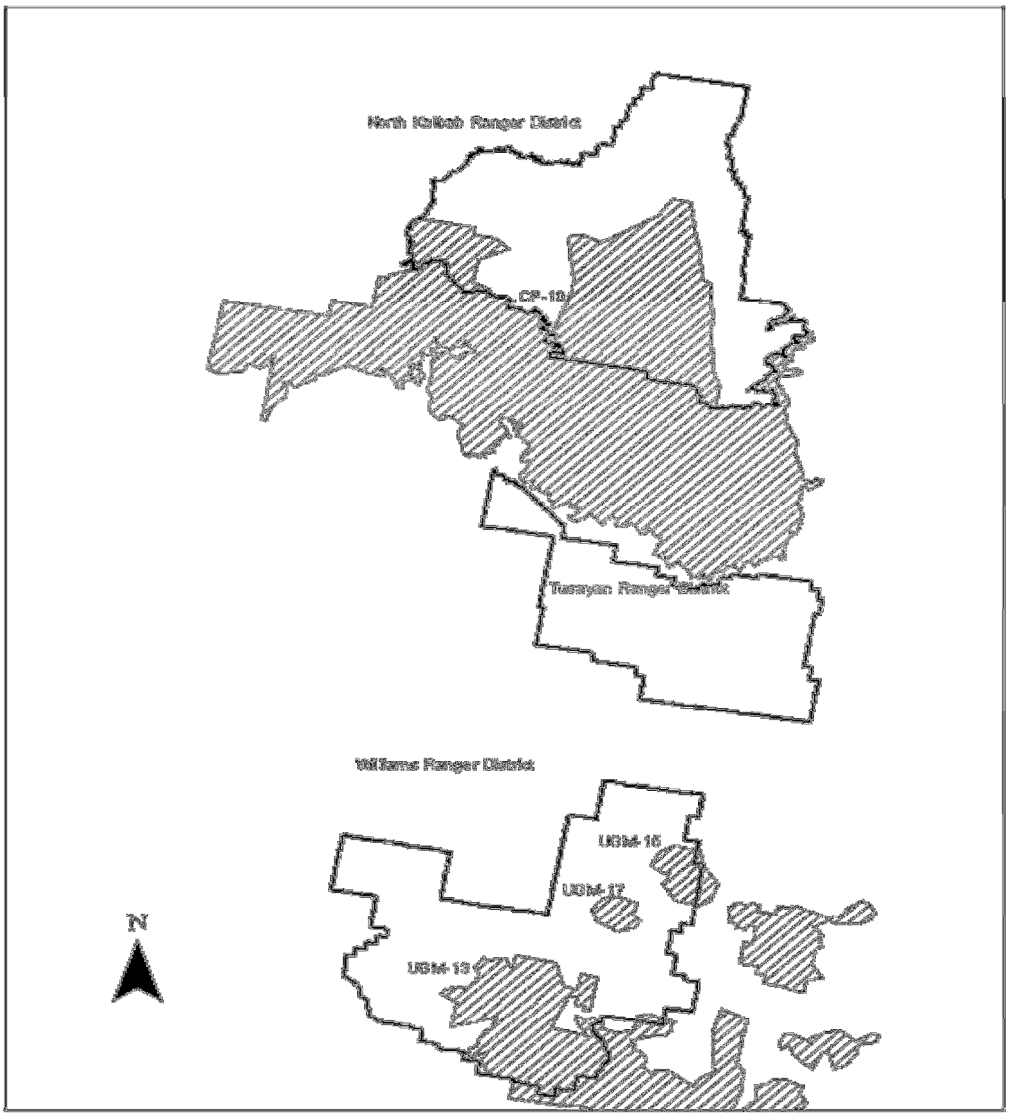

Figure 4. Map of Critical Habitat Units on the KNF

Effects Analysis (Critical Habitat)

In our analysis of the effects of the action on CH, the forest considered whether or not the implementation of the Proposed Plan will result removal of CH. To determine this, we analyze whether the Proposed

Plan describes a reduction in PCEs that were the basis for determining the habitat to be critical. Appendix C provides the crosswalk for plan components.

PCE: 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 diameter-at-breast height (dbh) of 12 inches or more.

Effect: Actions that may be implemented under the proposed plan are expected to retain the range of tree species (i.e., conifers and hardwoods associated with MSO habitat) and will not reduce the range of tree sizes needed to create the diverse forest and multi-layered forest canopy preferred by MSOs. Removal of trees and various trees species may also occur during implementation of the transportation program (creation, maintenance of roads); but these effects should be small in extent and intensity. Some loss of trees, of all types and dbh size classes, will occur from actions such as hazard tree removal, prescribed fire, and forest thinning. However, actions implemented under the Proposed Plan are expected to maintain a range of tree species and sizes needed to maintain this PCE in PACs and recovery habitat across the NF. Plan components A.1-A.6 provide the DCs that in general state that for ponderosa pine (including pine-oak stands) and mixed conifer vegetation that trees groups are made up of clumps of various age and size classes. The size of the patch would vary depending on vegetation type but typically would be larger on north-facing slopes. These plan components also state that the greatest amount of basal area being contributed by larger trees. Plan component M.1 includes DCs describing Gambel oak all age classes. Vegetation management described in A.8 for all forest types provides guidance during treatment development to maintain trees by species across broad age and diameter classes and that the largest and oldest trees are usually retained.

- **A.1 Ponderosa Pine DC:**
  - *Fine-scale:*
    - Tree groups are made up of clumps of various age classes and size classes that typically occur in areas less than one acre, but may be larger, such as on north-facing slopes.
    - Large tree form oaks, snags and partial snags with hollow boles or limbs are present. Isolated infestations of dwarf mistletoe may occur, but the degree of severity and amount of mortality varies among the infected trees.
  - *Mid-scale*:
    - The ponderosa pine forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present.
    - The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with the greatest amount of basal area being contributed by larger trees.
  - *Landscape*:
    - The ponderosa pine forest vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Groups of old trees are mixed with groups of younger trees.
    - The ponderosa pine forest is composed predominantly of vigorous trees, but declining trees are present.
    - Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
    - The landscape is a functioning ecosystem that contains all its components, processes, and conditions associated with endemic levels of disturbances (e.g. fire, dwarf mistletoe, insects, diseases, lightning, drought, and wind).

- **A.2 Frequent Fire Mixed Conifer DC:**
  - *Fine-scale*: Trees within groups are of similar or variable ages, often containing more than one species.
  - *Mid-scale*:
    - The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 30 to 100 feet per acre, with larger trees contributing the greatest percent of the total basal area.
    - Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest; these include goshawk post-fledging family areas (PFAs), Mexican spotted owl nesting/roosting habitat, and north-facing slopes.
    - The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages. Disturbances sustain the overall variation in age and structural distribution.
  - *Landscape*:
    - At the landscape scale, the frequent fire mixed conifer forest community is a mosaic of forest conditions composed of structural stages ranging from young to old trees.
    - Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
    - The frequent fire mixed conifer forest community is composed predominantly of vigorous trees, but declining trees are present and snags, top killed, lightning and fire scarred trees, and coarse woody debris (greater than 3 inch diameter) are well-distributed throughout the landscape.
    - The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, and severity of disturbances and to climate variability. The landscape is a functioning ecosystem that contains all components, processes, and conditions that result from endemic levels of disturbances (e.g., fire, insects, diseases, and wind), including old-growth trees.
- **A.3 Mesic Mixed Conifer/Spruce-Fir DC:**
  - *Fine-scale*: Mid-aged and older trees are typically variably-spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages contributing to vertical and horizontal heterogeneity.
  - *Mid-scale*: Forest conditions in some areas contain higher basal area than the general forest; examples include goshawk post-family fledgling areas, Mexican spotted owl nesting and roosting habitat, and north-facing slopes.
  - *Landscape*:
    - The vegetation community is a mosaic of structural and seral stages ranging from young trees through old and is composed of multiple species.
    - The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation similar to reference conditions. The landscape is composed predominantly of vigorous trees, but older declining trees are a component and provide for snags, top killed, lightning scarred trees, and coarse woody debris.
    - The forest landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, wind, snow, and fire), including snags, downed logs, and old trees.
    - Old growth generally occurs over large areas as stands or forests where old growth is concentrated. Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- **A. 4 Aspen (General) DC:** Aspen is successfully regenerating and recruiting into older and larger size classes.
- **A.5 Aspen within Ponderosa Pine and Frequent Fire Mixed Conifer Forests DC:** In ponderosa pine and frequent fire mixed conifer vegetation types, the size, age and spatial extent of aspen stands reflect reference condition.

- **A.6 Aspen within Mesic Mixed Conifer / Spruce-Fir Forests DC:** The size, age, and spatial extent of aspen stands reflect large-scale disturbance patterns and processes.
- **A. 8 Vegetation Management in all Forested Communities GD:**
  - Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained.
  - `Project design should manage for replacement structural stages to assure continuous representation of old growth over time.
  - Project design and treatment prescriptions should generally not remove:
    - Large, old ponderosa pine trees with reddish yellow wide platy bark, flattened tops, with moderate to full crowns and large drooping or knarled limbs (e.g. Thompson's age class 4, Dunning's tree class 5 and/or Keen's tree class 4, A and B).
    - Mature trees with large dwarf mistletoe induced witches brooms suitable for wildlife nesting, caching, and denning, except where retaining such trees would prevent the desired development of uneven aged conditions over time.
    - Gambel oak >8 inches d.r.c.
- **M.1 Ponderosa Pine DC:**
  - *Fine-scale:* Where historically occurring, Gambel thickets with various diameter stems, and low-growing, shrubby oak are present. These thickets provide forage, cover, and habitat for species that depend on them such as small mammals, foliage-nesting birds, deer and elk. Gambel oak mast (acorns) provides food for wildlife species.
  - *Landscape:* Where it naturally occurs, Gambel oak is present with all age classes represented. It is reproducing and maintaining or expanding its presence on suitable sites across the landscape.

Plan components A.10-A.11 and M.2-M.4 contain the DCs and GDs for threatened, endangered and sensitive species, and Forest Products that provides guidance and directions that wildlife and especially listed species habitat is provided for them across the KNF. The KNF would use these DCs and GDs to provide the direction to create and maintain MSO habitat using the Revised Recovery Plan for the recommended management actions for the recovery of the owl. Plan component M.9 contains the DC which describes providing quality habitat for MSO in the Bill Williams Mountain Management Area. All of these plan components shown in this section would all help maintain or create the stand structure to meet this PCE.

- **A.10 Wildlife DC:** Species with specific habitat needs such as snags, logs, large trees, interlocking canopy, and cavities are provided for.
- **A.11 Threatened, Endangered, and Sensitive Species GD:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.
- **M.2 Wildlife DC:**
  - Wildlife species are distributed throughout their potential natural range.
  - Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species.
  - Habitat configuration and availability allow wildlife populations to adjust their movements (e.g., seasonal migration, foraging, etc.) in response to climate change and promotes genetic flow between wildlife populations.
- **M.3 Threatened, Endangered, and Sensitive Species DC:** Threatened, endangered, and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation.
- **M.4 Forestry and Forest Products GD:** Timber harvest activities should be carried out in a manner consistent with maintaining or making progress toward the desired conditions in this plan.

- **M.9 Bill Williams Mountain Management Area DC:** Bill Williams Mountain provides quality habitat for Arizona Bugbane, Mexican spotted owls, and culturally important plants.

***PCE*:** A shade canopy created by the tree branches covering 40 percent or more of the ground.

Effect: The KNF expects that tree shade canopy will be reduced following hazard tree removal, thinning, and burning treatments implemented under the Proposed Plan to help implement desired conditions for fire adapted systems. However, we do not expect reduction of canopy cover in MSO forested habitat to be reduced below 40 percent except in a few area. It is expected that some small reduction in existing canopy cover (5 to 10 percent) may actually aid in increasing understory herbaceous vegetation and forb production, which will benefit MSO prey species. Plan components B.1 - B.3 for ponderosa pine and mixed conifers show that within tree groups, crowns of trees within mid-aged and old groups are interlocking or nearly interlocking at the fine scale. Also in B.1 the DC attribute for pine-oak stands that meet the MSO habitat definition, it is common to have patches at +40% canopy closures. B.2 includes the DC attribute that density is variable, with canopy ranging from zero to > 60% with frequent fire mixed conifer.

- **B.1 Ponderosa Pine DC**:
  - *Fine-scale:*
    - Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine.
    - Tree groups are made up of clumps of various age classes and size classes that typically occur in areas less than one acre, but may be larger, such as on north-facing slopes. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees.
    - Where Gambel oak comprises more than 10% of the basal area, it is not uncommon for canopy cover to be greater than 40%.
  - *Mid-scale:*
    - The ponderosa pine forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present. Stands are dominated by ponderosa pine, but other native hardwood and conifer species occur.
    - The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with the greatest amount of basal area being contributed by larger trees.
    - Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (e.g. goshawk post-fledging family areas, Mexican spotted owl nesting/roosting habitat, drainages, and steep north facing slopes).
  - *Landscape:*
    - The ponderosa pine forest vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. The forest is generally uneven-aged and open. Groups of old trees are mixed with groups of younger trees. Denser tree conditions exist in some locations such as north facing slopes, canyons, and drainage bottoms.
    - Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- **B.2 Frequent Fire Mixed Conifer DC:**
  - *Fine-scale:*
    - Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking. Tree

groups are typically less than 1 acre size and consist of 2 to 50 trees per group, but are sometimes larger, such as on north facing slopes.
        - Density is variable, with canopy ranging from zero to greater than 60 percent.
    - *Mid-scale:*
        - The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 30 to 100 feet per acre, with larger trees contributing the greatest percent of the total basal area.
        - Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree group than in the general forest; these include goshawk post-fledging family areas (PFAs), Mexican spotted owl nesting/roosting habitat, and north facing slopes.
        - The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages.
    - *Landscape:*
        - At the landscape scale, the frequent fire mixed conifer forest community is a mosaic of forest conditions composed of structural stages ranging from young to old trees.
        - Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
        - Forest appearance is variable but generally uneven-aged and open; occasional patches of even-aged structure are present. The forest arrangement is in small clumps and groups of trees interspersed within variably sized openings of native grass/forb/shrub vegetation associations similar to reference conditions. Size, shape, number of trees per group, and number of groups per area are variable across the landscape.
        - Denser tree conditions exist in some locations such as north facing slopes, canyons, and drainage bottoms.
- **B.3 Mesic Mixed Conifer/Spruce-Fir DC:**
    - *Fine-scale:* Mid-aged and older forests trees are typically variably-spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages, contributing to vertical and horizontal heterogeneity.
    - *Mid-scale:*
        - The size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary, but are frequently hundreds of acres; groups and patches of tens of acres or less are relatively common.
        - Forest conditions in some areas contain higher basal area than the general forest; examples include goshawk post family fledgling areas, Mexican spotted owl nesting/roosting habitat, and north facing slopes.
        - Density ranges from 20 to 250 square feet of basal area per acres, depending upon disturbance and seral stages of groups and patches.
    - *Landscape:*
        - The vegetation community type is a mosaic of structural and seral stages ranging from young trees through old and is composed of multiple species. The landscape arrangement is an assemblage of variably-sized and aged groups and patches of trees and other vegetation similar to reference conditions.
        - Old growth generally occurs over large areas as stands or forests where old growth is concentrated. Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

Plan components A.10-A.12 and M.2-M.4 contain the DCs and GDs for threatened, endangered and sensitive species, and Forest Products that provides guidance and directions that wildlife and especially listed species habitat is provided for them across the KNF. The KNF would use these DCs and GDs to provide the direction to create and maintain MSO habitat using the Revised Recovery Plan for the

recommended management actions for the recovery of the owl. Plan component M.9 contains the DC which describes providing quality habitat for MSO in the Bill Williams Mountain Management Area. All of these plan components shown in this section would all help maintain or create the stand structure to meet this PCE.
(see PCE for range of tree diversity list of plan components)

PCE: Large, dead trees (snags) with a dbh of at least 12 inches.

Effect: Large snags would most likely be reduced following proposed prescribed burning and hazard tree removal actions conducted under the Proposed Plan to move conditions toward the desired conditions for fire adapted systems. Some snags will be created through prescribed burning, which could benefit the MSO. However, snags currently used by MSOs for nesting are typically very old, large dbh, highly decayed snags with cavities. These snags are rare and are not typically created through fire disturbance, but by decay fungi and insects. However, the desired conditions in A.1-A.3 and A.10 are designed to increase the amount of large trees over the action area. The DCs also provides the goal for maintaining snags 18 inches DBH at 1 to 2 trees per acre in ponderosa pine and 3 trees per acre in frequent fire mixed conifer. Snags with smaller dbhs may be retained, but the DC places emphasis on the larger snags since the KNF has less of this component available. In general snags are usually not removed unless they pose a safety hazard or are lost during prescribed fires. There are also guidelines in the vegetation management (A.8) and for maintaining large snags during prescribed fires burning (A.9).

- **A.1 Ponderosa Pine DC:**
  - *Fine-scale***:** Large tree form oaks, snags and partial snags with hollow boles or limbs are present.
  - *Mid-scale*: Snags 18 inches diameter at breast height (d.b.h.) or greater average 1 to 2 snags per acre. Snags and green snags of variable size and form are common.
  - *Landscape*:
    - Snags, green snags, and coarse woody debris are well-distributed throughout the landscape.
    - Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
    - The landscape is a functioning ecosystem that contains all its components, processes, and conditions associated with endemic levels of disturbances (e.g. fire, dwarf mistletoe, insects, diseases, lightning, drought, and wind).
- **A.2 Frequent Fire Mixed Conifer DC:**
  - *Mid-scale*: Snags and green snags, 18 inches d.b.h. or greater average 3 per acre.
  - *Landscape*:
    - Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
    - The frequent fire mixed conifer forest community is composed predominantly of vigorous trees, but declining trees are present and snags, top killed, lightning and fire scarred trees, and coarse woody debris (greater than 3 inch diameter) are well-distributed throughout the landscape.
    - The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, and severity of disturbances and to climate variability. The landscape is a functioning ecosystem that contains all components, processes, and conditions that result from endemic levels of disturbances (e.g., fire, insects, diseases, and wind), including old-growth trees.
    - Dwarf-mistletoe is present and infects ponderosa pine and Douglas-fir, but occurs at endemics levels, which allows for the establishment and sustainability of the desired uneven aged forest structure over time.
- **A.3 Mesic Mixed Conifer/Spruce-Fir DC:**
  - *Fine-scale*: Dwarf mistletoe infections may be present on Douglas-fir or spruce and rarely on other tree species, but the degree of infection severity and amount of mortality varies among infected trees.

- *Mid-scale*: The number of snags and downed logs (greater than 12 inch diameter at mid-point, over 8 feet long) and coarse woody debris (greater than 3 inch diameter) vary by seral stage. Snags 18 inches or greater at d.b.h. typically range from 1 to 5 snags per acre, with the lower range associated with early seral stages and the upper range associated with late seral stages.
- *Landscape*:
  - The landscape is composed predominantly of vigorous trees, but older declining trees are a component and provide for snags, top killed, lightning scarred trees, and coarse woody debris.
  - The forest landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, wind, snow, and fire), including snags, downed logs, and old trees.
  - Dwarf mistletoe infestations may be present in stands that are composed of Douglas-fir or spruce and rarely in other tree species. Infestation size, degree of severity, and amount of mortality would vary amongst the infested stands.
  - Old growth generally occurs over large areas as stands or forests where old growth is concentrated. Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

- **A.8 Vegetation Management in all Forested Communities GD:** Project design and treatment prescriptions should generally not remove: Large snags, partial snags and trees (>18inches dbh) with broken tops, cavities, sloughing bark, lightning scars >4" wide, and large stick nests (>18inches in diameter).
- **A. 9 Activities Following Large Scale Disturbances GD:** Some snags and coarse woody debris should be retained to provide for wildlife habitat, soil stabilization, and other resource benefits. Some clumps of large (18 inches d.b.h.) standing dead trees should be retained. Snag retention should be balanced with desired fuel levels over time.
- **A.10 Wildlife DC:** Species with specific habitat needs such as snags, logs, large trees, interlocking canopy, and cavities are provided for.

Plan components A.10-A.12 and M.2-M.4 contain the DCs and GDs for threatened, endangered and sensitive species, and Forest Products that provides guidance and directions that wildlife and especially listed species habitat is provided for them across the KNF. The KNF would use these DCs and GDs to provide the direction to create and maintain MSO habitat using the Revised Recovery Plan for the recommended management actions for the recovery of the owl. Plan component M.9 contains the DC which describes providing quality habitat for MSO in the Bill Williams Mountain Management Area. All of these plan components shown in this section would all help maintain or create the stand structure to meet this PCE.
(see PCE for range of tree diversity list of plan components)

PCE: High volumes of fallen trees and other woody debris.

Effect: Fallen trees and woody debris would likely be reduced by the proposed burning treatments (broadcast, piling, and maintenance burning) as part of meeting the desired conditions for ponderosa pine, frequent fire mixed conifer, WUI, and wildland fire management. This loss of large logs would result in short-term adverse effects to this PCE and could result in localized impacts to prey species habitat. Plan components A.1-A.3 contain the DCs attributes describing the general state for coarse woody debris greater than 3 inches ranging from 3 to 10 tons/acre in ponderosa pine, 5 to 15 tons/acre in frequent fire mixed conifer and 5 to 35 tons/acre for mesic mixed conifer. The amount of down woody debris would vary depending on seral stages of the stands. These DC also describes retention of large logs as part of the down woody debris. Across the action area, it is likely that hazard tree removal and prescribed burning will also create fallen trees and woody debris as trees are felled (i.e., cut) and left on the ground or are die post-burn and fall.

- **A.1 Ponderosa Pine DC**:

- *Mid-scale*: Downed logs (greater than12 inches diameter at mid-point, and greater than 8 feet long) average 3 logs per acre within the forested area of the landscape. Coarse woody debris greater than 3 inches in diameter (including downed logs), ranges from 3 to 10 tons per acre.
- *Landscape*:
  - Snags, green snags, and coarse woody debris are well-distributed throughout the landscape.
  - Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
  - The landscape is a functioning ecosystem that contains all its components, processes, and conditions associated with endemic levels of disturbances (e.g. fire, dwarf mistletoe, insects, diseases, lightning, drought, and wind).

- **A.2 Frequent Fire Mixed Conifer DC**:
  - *Mid-scale*: Downed logs (greater than12 inches diameter at mid-point and greater than 8 feet long) average 3 per acre within the forested area. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre.
  - *Landscape*:
  - Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
  - The frequent fire mixed conifer forest community is composed predominantly of vigorous trees, but declining trees are present and snags, top killed, lightning and fire scarred trees, and coarse woody debris (greater than 3 inch diameter) are well-distributed throughout the landscape.
- **A.3 Mesic Mixed Conifer/Spruce-Fir DC**:
  - *Mid-scale*:
    - The number of snags and downed logs (greater than 12 inch diameter at mid-point, over 8 feet long) and coarse woody debris (greater than 3 inch diameter) vary by seral stage. Coarse woody debris varies by seral stage but ranges from 5 to 20 tons per acre for early seral; 20 to 40 tons per acre for mid-seral; and greater than 35 tons per acre in late seral areas.
    - Fire and other disturbances maintain overall desired tree density, structure, species composition, coarse woody debris, and nutrient cycling.
  - Landscape:
    - The landscape is composed predominantly of vigorous trees, but older declining trees are a component and provide for snags, top killed, lightning scarred trees, and coarse woody debris.
    - The forest landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, wind, snow, and fire), including snags, downed logs, and old trees.
    - Old growth generally occurs over large areas as stands or forests where old growth is concentrated. Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

Plan components A.10-A.12 and M.2-M.4 contain the DCs and GDs for threatened, endangered and sensitive species, and Forest Products that provides guidance and directions that wildlife and especially listed species habitat is provided for them across the KNF. The KNF would use these DCs and GDs to provide the direction to create and maintain MSO habitat using the Revised Recovery Plan for the recommended management actions for the recovery of the owl. Plan component M.9 contains the DC which describes providing quality habitat for MSO in the Bill Williams Mountain Management Area. All of these plan components shown in this section would all help maintain or create the stand structure to meet this PCE.
(see PCE for range of tree diversity list of plan components)

***PCE*:** A wide range of tree and plant species, including hardwoods.

Effect: This PCE will likely be positively affected by the actions taken as part of meeting the desired conditions for ponderosa pine, frequent fire mixed conifer, and wildland fire management. Plant species richness would likely increase following thinning and/or burning treatments that result in small, localized canopy gaps. The DCs in C.1 and C.3 describes interspaces between groups as comprised of native grass-forb-shrub mix which would help provide for prey species. The DCs for ponderosa pine and mixed conifer (A.1 and A.2) also note that trees are of species that are historically found within these habitat types. The ponderosa pine desired conditions (A.1) and guidelines for vegetation management (A.8) also provide for maintaining and improving conditions for Gambel oak. Plan component A.8 provides the GD in vegetation management that should favor the development of native understory species. These plan components will all help to maintain or create the stand structure to meet this PCE.

- **A.1 Ponderosa Pine DC:**
  - *Fine-scale:*
    - Trees within groups are of similar or variable ages and may contain species other than ponderosa pine.
    - Where historically occurring, Gambel oak thickets with various diameter stems, and low growing, shrubby oak are present. These thickets provide forage, cover, and habitat for species that depend on them such as small mammals, foliage nesting birds, deer, and elk. Gambel oak mast (acorns) provides food for wildlife species. Large tree form oaks, snags, and partial snags with hollow boles or limbs are present.
  - *Mid-scale*:
    - The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present. Stands are dominated by ponderosa pine, but other native hardwood and conifer species occur.
    - The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with the greatest amount of basal area being contributed by larger trees.
  - *Landscape*:
    - The ponderosa pine forest vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Groups of old trees are mixed with groups of younger trees.
    - Where it naturally occurs, Gambel oak is present with all structure classes represented. It is reproducing and maintaining or expanding its presence on suitable sites across the landscape.
    - Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
    - The landscape is a functioning ecosystem that contains all its components, processes, and conditions associated with endemic levels of disturbances (e.g. fire, dwarf mistletoe, insects, diseases, lightning, drought, and wind).
- **A.2 Frequent Fire Mixed Conifer DC:**
  - *Fine-scale*: Trees within groups are of similar or variable ages, often containing more than one species.
  - *Mid-scale*:
    - The frequent fire mixed conifer forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. Forest appearance is variable, but generally uneven-aged and open; occasional patches of even-aged structure are present.
    - Where they naturally occur, groups or patches of aspen and all structural stages of oak are present.
  - *Landscape*: At the landscape scale, the frequent fire mixed conifer forest community is a mosaic of forest conditions composed of structural stages ranging from young to old trees.

- **A.8 Vegetation Management in all Forested Communities GD**:
  - Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale.
  - Project design and treatment prescriptions should generally not remove: Gambel oak >8 inches d.r.c.
  - Vegetation management should favor the development of native understory species in areas where they have the potential to establish and grow.
  - Seed and plants used for revegetation should originate from the same PNVT and general ecoregion (i.e. southern Colorado Plateau) as the project area.
- **C.1 Ponderosa Pine DC**:
  - *Fine-scale:*
    - Trees typically occur in irregularly shaped groups and are variably-spaced with some tight clumps.
    - The interspaces between groups are variably shaped, are comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups.
  - *Mid-scale:*
    - Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with the greatest amount of basal area being contributed by larger trees.
    - Interspaces with grass/forb/shrub vegetation are variably shaped and typically range from 10 percent to 70 percent, with the more open conditions typically occurring on less productive sites.
  - *Landscape:*
    - The forest is generally uneven-aged and open.
    - Organic ground cover and robust herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.
- **C.3 Frequent Fire Mixed Conifer DC:**
  - *Fine-scale:*
    - Trees typically occur in irregularly shaped groups and are variably-spaced with some tight clumps.
    - Interspaces between groups are variably shaped, are comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups.
  - *Mid-scale*:
    - Basal area within forested areas generally ranges from 30 to 100 square feet per acre, with larger trees contributing the greatest percent of the total basal area.
    - Openings with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area.
  - *Landscape:*
    - The forest arrangement is in small clumps and groups of trees interspersed within variably sized openings of native grass/forb/shrub vegetation associations similar to reference conditions.
    - Organic ground cover and robust herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.

PCE: Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

Effect*:* Short-term decrease in plant cover will result from prescribed burning conducted during fire management. The KNF expects long-term increases in residual plant cover because treatments would provide conditions suitable for increased herbaceous plant growth by removing a thick layer of dead plant debris within treated areas. The mosaic effect created by burned and unburned areas and by opening up small patches of forest habitat within MSO habitat is also expected to increase herbaceous plant species diversity and, in turn, assist in the production and maintenance of the MSO prey base. The combination of low-intensity prescribed burns during restoration projects is likely to result in short-term adverse effects to the MSO with regard to modifying prey habitat within treatment areas.

The DC and objectives for ponderosa pine (C.1 & C.2), frequent fire mixed conifer (C.3 & C.4) and mesic mixed conifer (C.5) provides the direction for creating openings and having native plant species within these openings. This will provide the ability for plants to maintain fruit and seed production and regeneration. The desired conditions and guidelines for livestock grazing (C.13 & C.14), montane meadows (C.8), soils (C.9) and wildlife (C.10) will help maintain residual plant cover across the action area.

- **C.1 Ponderosa Pine DC**:
  - *Fine-scale:*
    - Trees typically occur in irregularly shaped groups and are variably-spaced with some tight clumps.
    - The interspaces between groups are variably shaped, are comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups.
  - *Mid-scale:*
    - Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with the greatest amount of basal area being contributed by larger trees.
    - Interspaces with grass/forb/shrub vegetation are variably shaped and typically range from 10 percent to 70 percent, with the more open conditions typically occurring on less productive sites.
  - *Landscape:* The forest is generally uneven-aged and open.
- **C.2 OBJ:** Mechanically thin 11,000 to 19,000 acres annually, using a combination of group-selection cuts with matrix thinning and all-size free thinning. Treat an average of 13,000 to 55,000 acres annually, using a combination of prescribed fire and naturally ignited wildfires.
- **C.3 Frequent Fire Mixed Conifer DC:**
  - *Fine-scale:*
    - Trees typically occur in irregularly shaped groups and are variably-spaced with some tight clumps.
    - Interspaces between groups are variably shaped, are comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups.
  - *Mid-scale*:
    - Basal area within forested areas generally ranges from 30 to 100 square feet per acre, with larger trees contributing the greatest percent of the total basal area.
    - Openings with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area.
  - *Landscape:* The forest arrangement is in small clumps and groups of trees interspersed within variably sized openings of native grass/forb/shrub vegetation associations similar to reference conditions.
- **C.4 OBJ**: Burn an average of 1,000 to 13,000 acres annually, using prescribed fire and/or naturally ignited wildfires. Mechanically thin 1,200 to 2,100 acres annually.
- **C.5 Mesic Mixed Conifer/Spruce-fir DC:** *Mid-scale:* Grass, forb, and shrub dominated openings created by disturbance may make up 10 to 100 percent of the mid-scale area, depending on the disturbance type. These openings provide areas for future regeneration.
- **C.8 Montane/Subalpine grassland DC:** Montane and subalpine meadow vegetation has high soil productivity and biological diversity. Native species occur in natural patterns of abundance, composition, and distribution. Vegetation is healthy and at least stable.
- **C.9 Soil DC:** Soils provide for diverse native plant species. Vegetative ground cover is well-distributed across the soil surface to promote nutrient cycling and water infiltration.
- **C.10 Wildlife DC:** Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites.
- **C.13 Livestock Grazing DC**: Grasses and forbs provide adequate forage for permitted livestock consistent with other desired conditions.
- **C.14 GD:**
  - Livestock management should favor the development of native cool season grasses and forbs.
  - Annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g. forage production, weeds, fawning habitat, soils, etc.).

- Post-fire grazing should not be authorized until Forest Service range staff confirms range readiness.

Determination of Effects (Critical Habitat)

There is potential for some PCE to be affected during the implementation of activities authorized under the Proposed Plan, these include reduction of some areas below 40% shade canopy cover, loss of large snags and removal of high volumes of down wood. While these impacts are assumed to be short-term effects and only affect a small percentage of the critical habitat on the KNF, the proposed action **May Affect, and is Likely to Adversely Affect,** the Mexican spotted owl critical habitat.

Prepared by: _____ Date: 1/23/13

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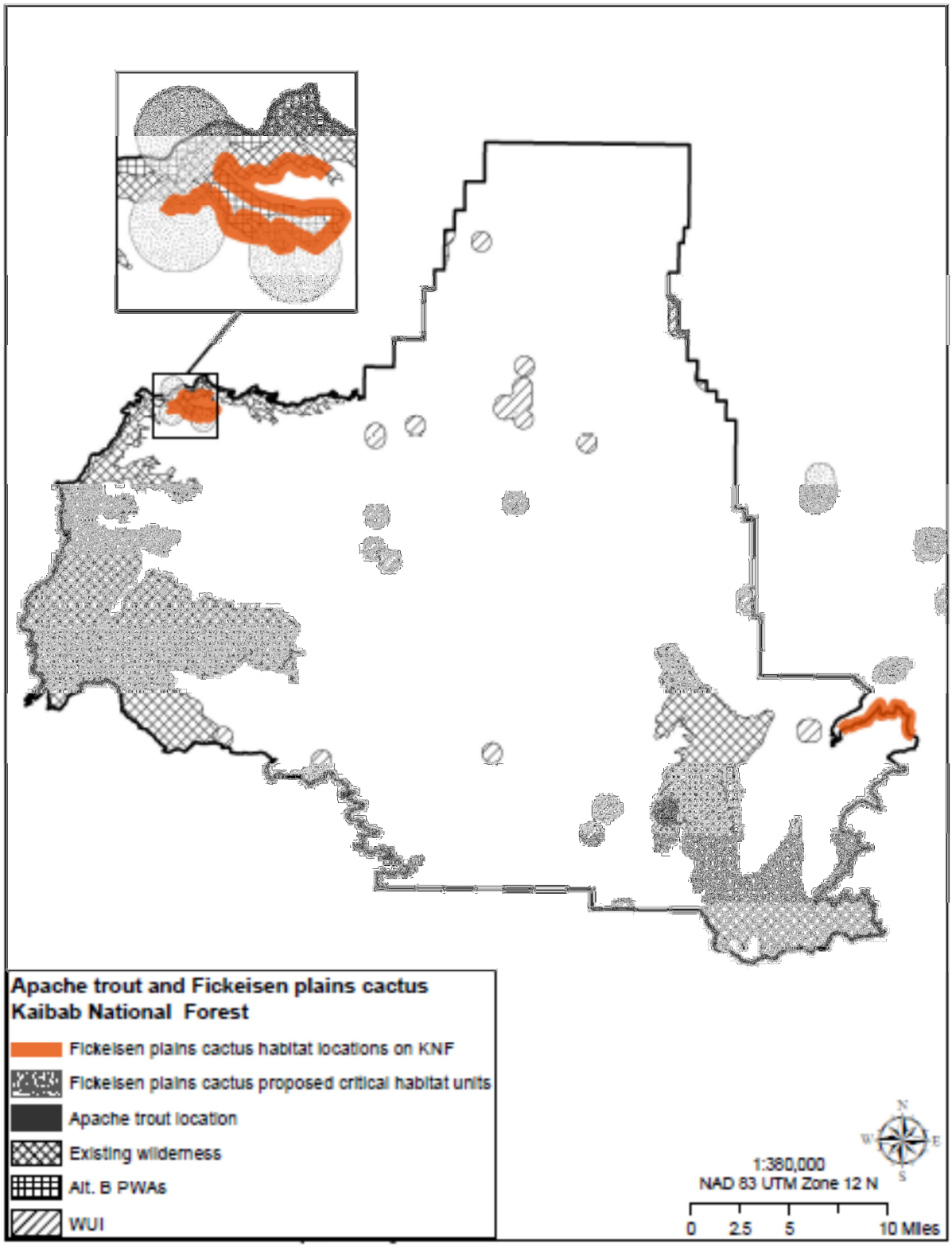
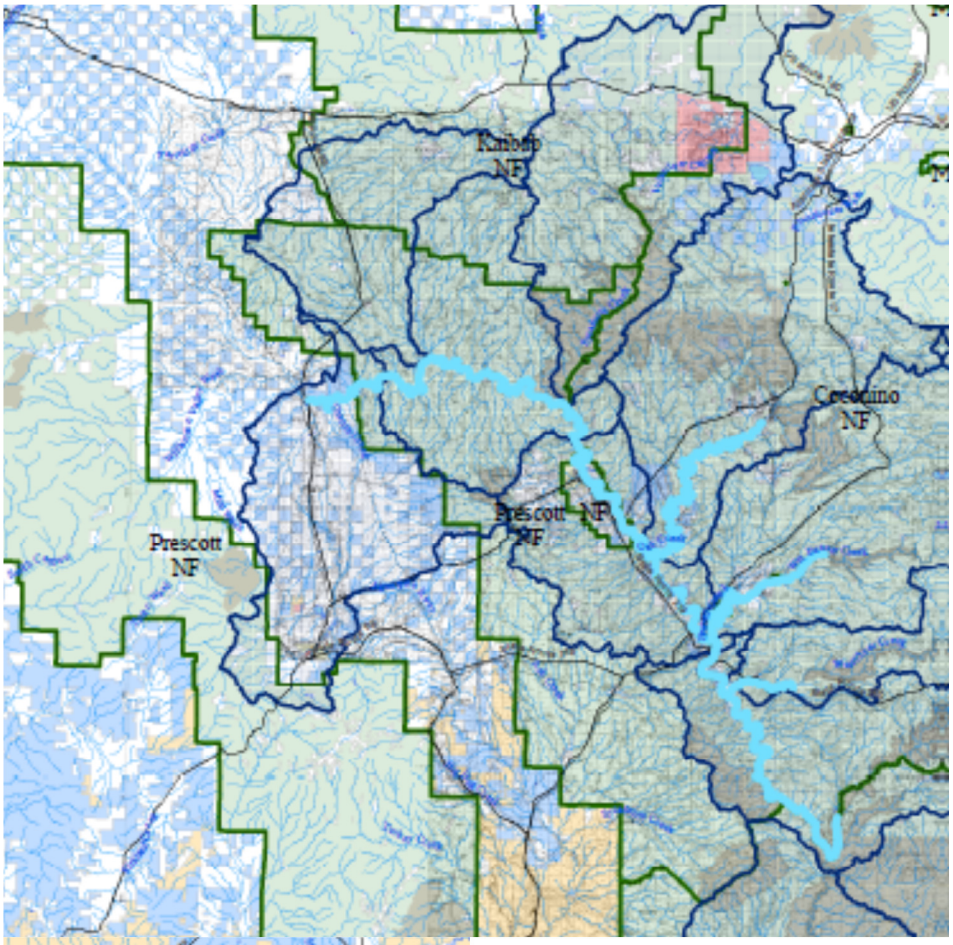
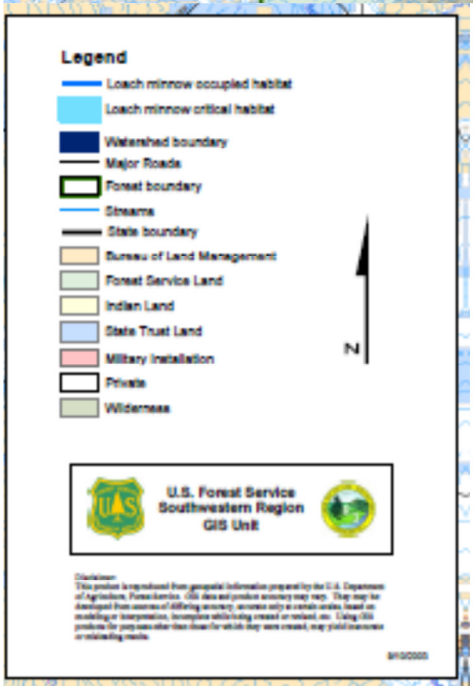
APPENDIX A – MAPS

MAP 1 – GENERAL LOCATIONS APACHE TROUT AND FICKEISEN PLAINS CACTUS

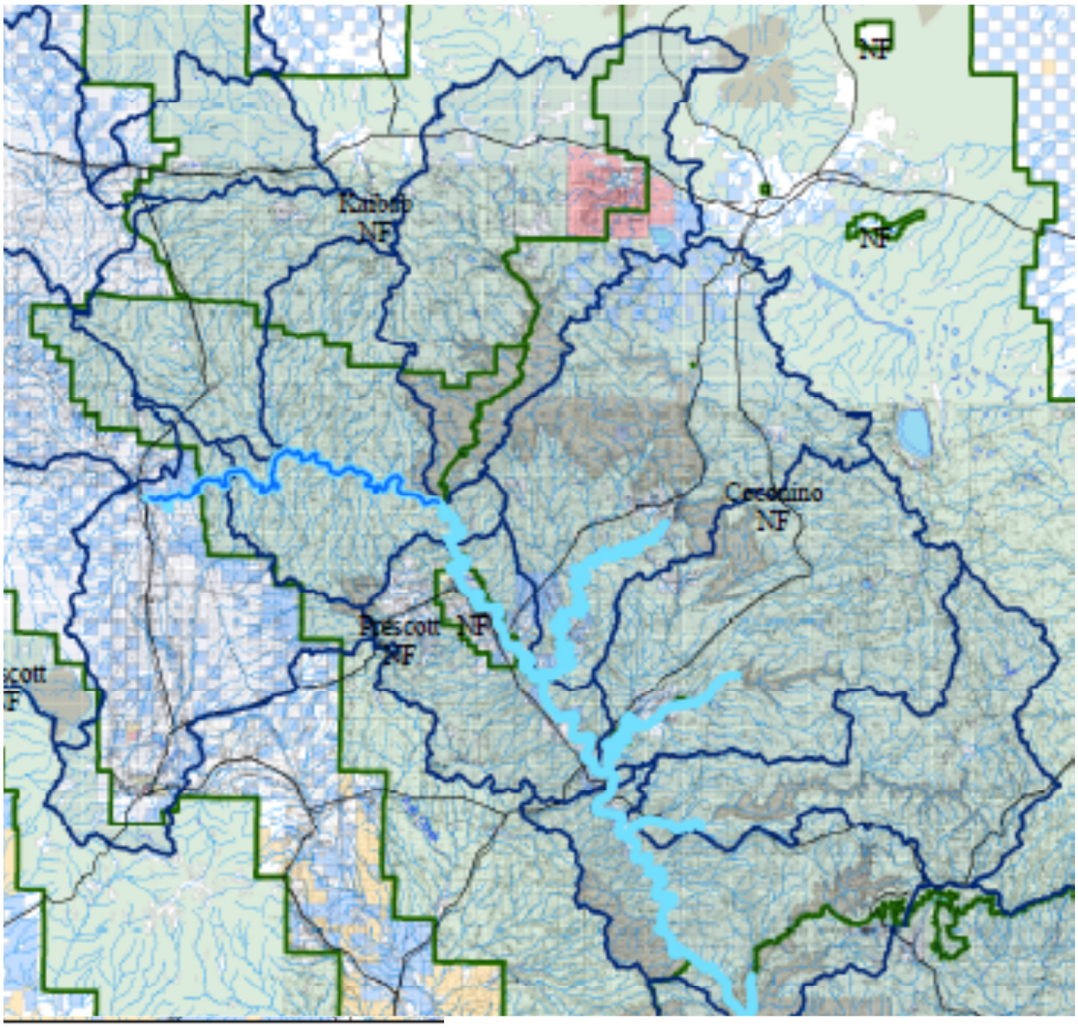


MAP 2 – LOACH MINNOW CRITICAL/OCCUPIED HABITAT

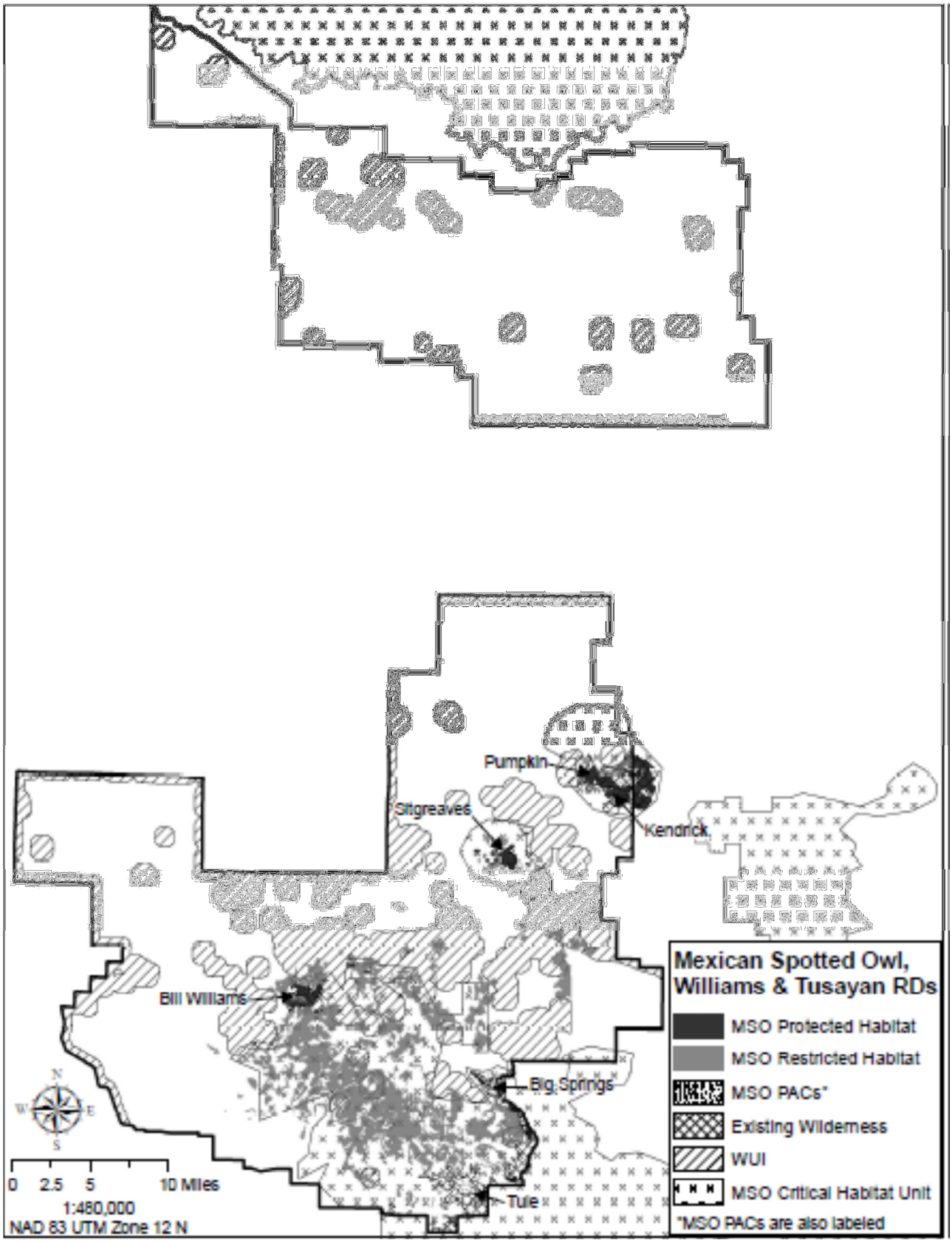




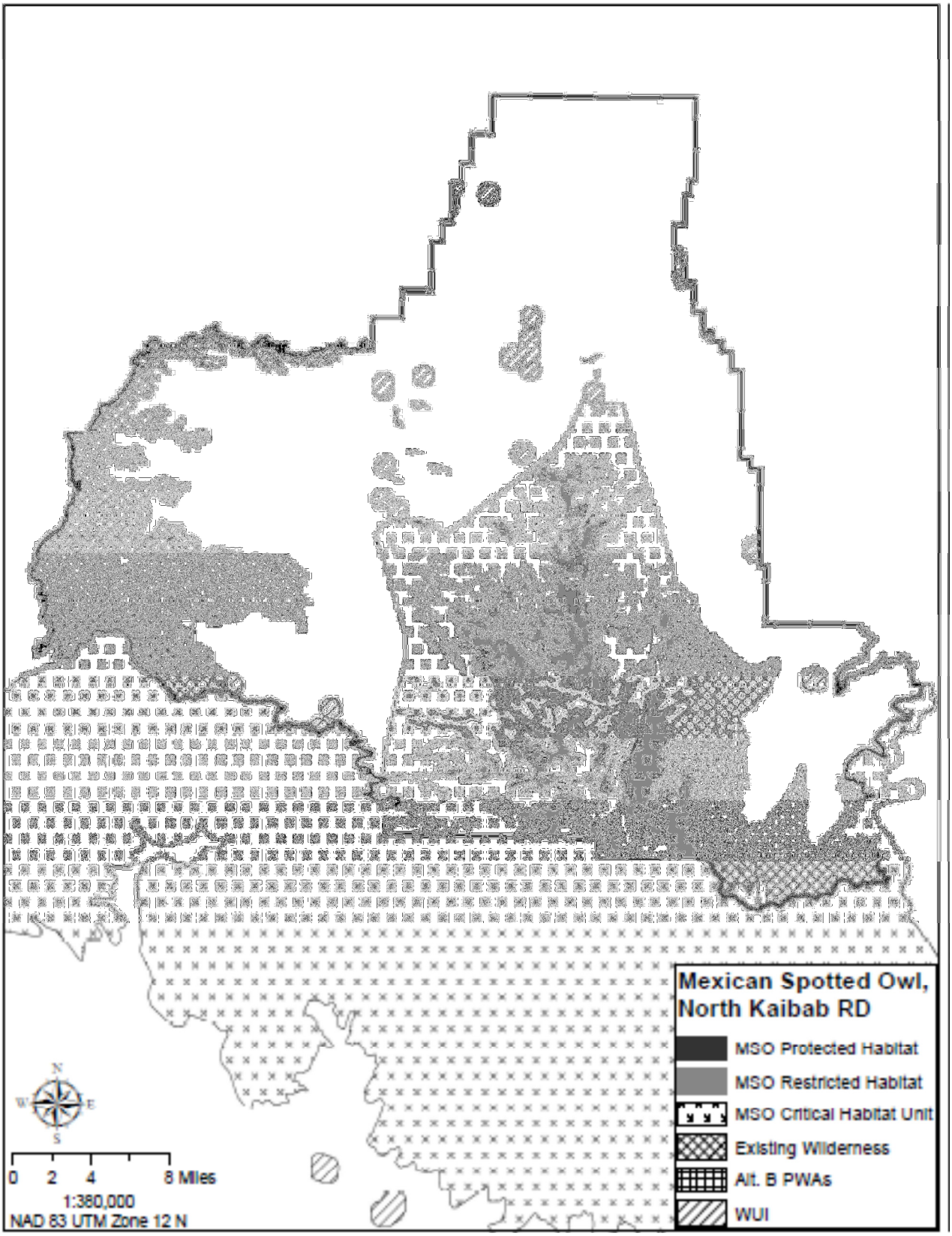
MAP 3 SPIKEDACE CRITICAL/OCCUPIED HABITAT



MAP 4 MSO HABITATS AND CRITICAL HABITAT UNITS ON SOUTH ZONE



MAP 5 MSO HABITATS AND CRITICAL HABITAT UNITS ON NORTH KAIBAB RD



APPENDIX B – VDDT MODEL FOR VEGETATION ACRES

The VDDT model puts the current vegetation into different states to describe what is available on the forest and then the model predicts how the vegetation will change over time. The VDDT model was run at the mid-scale level (100 – 1000 acres). The percentage of canopy cover averages interspaces (openings) and tree cover over the entire mid-scale areas. This means for areas smaller than the mid-scale, there will be areas with less canopy closure and areas with higher canopy closure than what is shown within the state description. The same theory is applies to the diameter class, that it would be an average over the mid-scale area.

Table 1. VDDT states and definitions

State	Definition
A	Grass, forb, shrubland; <10% canopy cover
B	Seeding/sapling, open; <10% canopy cover
C	Small trees, open; 10-30% canopy cover; 5-10" diameter class
D	Medium trees, open, single story; 10-30% canopy cover; 10-20" diameter class
E	Very large trees, open, single story; 10-30% canopy cover; 20+" diameter class
F	Seeding/sapling, closed; >30% canopy closure; 0-5" diameter class
G	Small trees, closed; >30% canopy closure; 5-10" diameter class
H	Medium trees, closed, single-story; >30% canopy closure; 10-20" diameter class
I	Very large trees, closed, single-story; >30% canopy closure; 20+" diameter class
J	Medium trees, open, multi-story; 10-30% canopy closure; 10-20" diameter class
K	Very large trees, open, multi-story; 10-30% canopy closure; 20+" diameter class
L	Medium trees, closed, multi-story; >30% canopy closure; 10-20" diameter class
M	Very large trees, closed, multi-story; >30% canopy closure; 20+" diameter class
N	Uncharacteristic wildfire; <10% canopy cover

To determine the effects to species that are depended on ponderosa pine or mixed conifer, the forest first define which states would provide habitat for these species. For the Mexican spotted owl it was determined that states K, L and M which are associated with large trees in multi-story stands and >40% canopy cover would be used. The current amount of habitat was first determined. This was done by selecting by vegetation type (e.i. ponderosa pine) and then the tab for "Initial Conditions". The percentage for each state was then converted into acres. To determine how the vegetation would change under each alternative, the biologist used the predicted amount of the states in 15 years. This was done for each vegetation type by selecting for each alternative the "Forest-wide Totals" tab and then using the Average Percent of Acres in Each State in Each Decade to determine percentage amount. By using decade 1.5, this gives us the percentage for year 15. The percentages were than convert to acreages.

For the spotted owl there is a need to include further assumptions:

The Mexican spotted owl only uses ponderosa pine/Gambel oak habitat within the pine type. However, the VDDT model lumps this habitat type in with all ponderosa pine. Base on the GIS layer for the Williams Ranger District of recovery habitat there is approximately 49,440 acres of the ponderosa pine is considered to be ponderosa pine/oak currently on the district. This is 9% of the ponderosa habitat on the forest. Therefore to estimate the amount of change in this habitat, the selected states in ponderosa pine were multiply by 9%.

Table 2. - VDDT modeling used for Species Dependent on Mixed Conifer Habitat – Current VS. 15 years

Mixed conifer - total acres on PNVT 127719 (acreage includes Dry and mesic MC:/107000 +20719)

States	Current	Current Acres	Alt. A	Alt. A acres	Alt. B	Alt. B acres	Alt. C	Alt. C acres	Alt. D	Alt. D acres
A	6%	7,804	0%	0	1%	1,660	1%	1,277	1%	1,788
B	1%	1,277	1%	1,277	1%	1,660	1%	1,277	2%	2,554
C	7%	8,429	0%	0	1%	1,660	1%	1,277	1%	1,788
D	1%	1,405	5%	6,386	8%	10,218	6%	7,663	7%	8,940
E	5%	6,322	5%	6,386	8%	10,218	16%	20,435	15%	19,158
F	0.21%	268	17%	21,712	16%	20,435	17%	21,712	17%	21,712
G	8%	10,141	8%	10,218	6%	7,663	7%	8,940	7%	8,940
H	32%	40,806	18%	22,989	12%	15,326	13%	16,603	12%	15,326
I	0.14%	179	4%	5,109	2%	2,682	3%	3,193	2%	2,554
J	0.50%	639	3%	3,832	6%	7,663	3%	3,193	4%	5,109
K	0.50%	639	4%	5,109	11%	14,049	5%	6,386	5%	6,386
L	17%	21,712	15%	19,158	10%	12,772	11%	14,049	10%	12,772
M	10%	12,772	9%	11,495	6%	7,663	6%	7,663	5%	6,386
N	12%	15,326	11%	14,049	11%	14,049	11%	14,049	11%	14,305
	100%	127,719	100%	127,719	100%	127,719	100%	127,719	100%	127,719

Single story open	0-10" (B,C)	Single story open	10-20" (D)	Single story open	20+" (E)	Multi story open	0-20" (J)	Multi story open	20+" (K)	>10% trees (A,N)	
current	9,707	current	1,405	current	6,322	current	639	current	639	current	23,130
Alt A	1,277	Alt A	6,386	Alt A	6,386	Alt A	3,832	Alt A	5,109	Alt A	14,049
Alt B	3,321	Alt B	10,218	Alt B	10,218	Alt B	7,663	Alt B	14,049	Alt B	15,709
Alt C	2,554	Alt C	7,663	Alt C	20,435	Alt C	3,193	Alt C	6,386	Alt C	15,326
AltD	4,342	AltD	8,940	AltD	19,158	AltD	5,109	AltD	6,386	AltD	16,093

Mult story close	0-10" (F,G)	Single story close	10-20" (H)	Single story closed	20+" (I)	Mult story close	10-20" (L)	Multi story open	20+" (M)
current	10,409	current	40,806	current	179	current	21,712	current	12,772
Alt A	31,930	Alt A	22,989	Alt A	5,109	Alt A	19,158	Alt A	11,495
Alt B	28,098	Alt B	15,326	Alt B	2,682	Alt B	12,772	Alt B	7,663
Alt C	30,653	Alt C	16,603	Alt C	3,193	Alt C	14,049	Alt C	7,663
AltD	30,653	AltD	15,326	AltD	2,554	AltD	12,772	AltD	6,386

MSO habitat (K,L,M)

Current	35,123
Alt A	35,761
Alt B	34,484
Alt C	28,098
Alt D	25,544

Dry Mixed conifer - total acres on PNVT 107000

States	Current	Current Acres	Alt. A	Alt. A acres	Alt. B	Alt. B acres	Alt. C	Alt. C acres	Alt. D	Alt. D acres
A	6%	6,538	0%	0	1%	1,391	1%	1,070	1%	1,498
B	1%	1,070	1%	1,070	1%	1,391	1%	1,070	2%	2,140
C	7%	7,062	0%	0	1%	1,391	1%	1,070	1%	1,498
D	1%	1,177	5%	5,350	8%	8,560	6%	6,420	7%	7,490
E	5%	5,297	5%	5,350	8%	8,560	16%	17,120	15%	16,050
F	0.21%	225	17%	18,190	16%	17,120	17%	18,190	17%	18,190
G	8%	8,496	8%	8,560	6%	6,420	7%	7,490	7%	7,490
H	32%	34,187	18%	19,260	12%	12,840	13%	13,910	12%	12,840
I	0.14%	150	4%	4,280	2%	2,247	3%	2,675	2%	2,140
J	0.50%	535	3%	3,210	6%	6,420	3%	2,675	4%	4,280
K	0.50%	535	4%	4,280	11%	11,770	5%	5,350	5%	5,350
L	17%	18,190	15%	16,050	10%	10,700	11%	11,770	10%	10,700
M	10%	10,700	9%	9,630	6%	6,420	6%	6,420	5%	5,350
N	12%	12,840	11%	11,770	11%	11,770	11%	11,770	11%	11,984
	100	107,000	100	107,000	100	107,000	100	107,000	100	107,000

Single story open	0-10" (B,C)	Single story open	10-20" (D)	Single story open	20+" (E)	Multi story open	0-20" (J)	Multi story open	20+" (K)	>10% trees (A,N)	
current	8,132	current	1,177	current	5,297	current	535	current	535	current	19,378
Alt A	1,070	Alt A	5,350	Alt A	5,350	Alt A	3,210	Alt A	4,280	Alt A	11,770
Alt B	2,782	Alt B	8,560	Alt B	8,560	Alt B	6,420	Alt B	11,770	Alt B	13,161
Alt C	2,140	Alt C	6,420	Alt C	17,120	Alt C	2,675	Alt C	5,350	Alt C	12,840
AltD	3,638	AltD	7,490	AltD	16,050	AltD	4,280	AltD	5,350	AltD	13,482

Mult story close	0-10" (F,G)	Single story close	10-20" (H)	Single story closed	20+" (I)	Mult story close	10-20" (L)	Multi story open	20+" (M)
current	8,721	current	34,187	current	150	current	18,190	current	10,700
Alt A	26,750	Alt A	19,260	Alt A	4,280	Alt A	16,050	Alt A	9,630
Alt B	23,540	Alt B	12,840	Alt B	2,247	Alt B	10,700	Alt B	6,420
Alt C	25,680	Alt C	13,910	Alt C	2,675	Alt C	11,770	Alt C	6,420
AltD	25,680	AltD	12,840	AltD	2,140	AltD	10,700	AltD	5,350

MSO habitat (K,LM)

current	29,425
Alt A	29,960
Alt B	28,890
Alt C	23,540
AltD	21,400

Mesic Mixed conifer - total acres on PNVT 20719

States	Current	Current Acres	Alt. A	Alt. A acres	Alt. B	Alt. B acres	Alt. C	Alt. C acres	Alt. D	Alt. D acres
A	6%	1,266	0%	0	1%	269	1%	207	1%	290
B	1%	207	1%	207	1%	269	1%	207	2%	414
C	7%	1,367	0%	0	1%	269	1%	207	1%	290
D	1%	228	5%	1,036	8%	1,658	6%	1,243	7%	1,450
E	5%	1,026	5%	1,036	8%	1,658	16%	3,315	15%	3,108
F	0.21%	44	17%	3,522	16%	3,315	17%	3,522	17%	3,522
G	8%	1,645	8%	1,658	6%	1,243	7%	1,450	7%	1,450
H	32%	6,620	18%	3,729	12%	2,486	13%	2,693	12%	2,486
I	0.14%	29	4%	829	2%	435	3%	518	2%	414
J	0.50%	104	3%	622	6%	1,243	3%	518	4%	829
K	0.50%	104	4%	829	11%	2,279	5%	1,036	5%	1,036
L	17%	3,522	15%	3,108	10%	2,072	11%	2,279	10%	2,072
M	10%	2,072	9%	1,865	6%	1,243	6%	1,243	5%	1,036
N	12%	2,486	11%	2,279	11%	2,279	11%	2,279	11%	2,321
	100%	20,719	100%	20,719	100%	20,719	100%	20,719	100%	20,719

Single story open	0-10" (B,C)	Single story open	10-20" (D)	Single story open	20+" (E)	Multi story open	0-20" (J)	Multi story open	20+" (K)	>10% trees (A,N)	
current	1,575	current	228	current	1,026	current	104	current	104	current	3,752
Alt A	207	Alt A	1,036	Alt A	1,036	Alt A	622	Alt A	829	Alt A	2,279
Alt B	539	Alt B	1,658	Alt B	1,658	Alt B	1,243	Alt B	2,279	Alt B	2,548
Alt C	414	Alt C	1,243	Alt C	3,315	Alt C	518	Alt C	1,036	Alt C	2,486
AltD	704	AltD	1,450	AltD	3,108	AltD	829	AltD	1,036	AltD	2,611

Mult story close	0-10" (F,G)	Single story close	10-20" (H)	Single story closed	20+" (I)	Mult story close	10-20" (L)	Multi story open	20+" (M)
current	1,689	current	6,620	current	29	current	3,522	current	2,072
Alt A	5,180	Alt A	3,729	Alt A	829	Alt A	3,108	Alt A	1,865
Alt B	4,558	Alt B	2,486	Alt B	435	Alt B	2,072	Alt B	1,243
Alt C	4,973	Alt C	2,693	Alt C	518	Alt C	2,279	Alt C	1,243
AltD	4,973	AltD	2,486	AltD	414	AltD	2,072	AltD	1,036

MSO habitat (K,L,M)

current	5,698
Alt A	5,801
Alt B	5,594
Alt C	4,558
AltD	4,144

Table 3. - VDDT modeling used for Species Dependent on Ponderosa Pine Habitat – Current VS. 15 years

Ponderosa Pine - VDDT - total acres on forest 540817

States	Current	Current Acres	Alt. A	Alt. A acres	Alt. B	Alt. B acres	Alt. C	Alt. C acres	Alt. D	Alt. D acres
A	9%	48,674	4%	21,633	5%	27,041	5%	27,041	5%	27,041
B	1%	4,867	3%	16,225	3%	16,225	3%	16,225	3%	16,225
C	4%	21,633	3%	16,225	4%	21,633	3%	16,225	3%	16,225
D	8%	43,265	10%	54,082	8%	43,265	12%	64,898	14%	75,714
E	3%	16,225	12%	64,898	11%	59,490	14%	75,714	18%	97,347
F	1%	5,408	4%	21,633	4%	21,633	4%	21,633	4%	21,633
G	8%	43,265	8%	43,265	8%	43,265	7%	37,857	7%	37,857
H	25%	135,204	15%	81,123	10%	54,082	13%	70,306	10%	54,082
I	5%	27,582	3%	16,225	2%	10,816	2%	10,816	2%	10,816
J	7%	37,857	9%	48,674	13%	70,306	10%	54,082	8%	43,265
K	2%	10,816	5%	27,041	14%	75,714	8%	43,265	5%	27,041
L	22%	118,980	18%	97,347	13%	70,306	14%	75,714	17%	91,939
M	3%	16,225	4%	21,633	3%	16,225	3%	16,225	2%	10,816
N	2%	10,816	2%	10,816	2%	10,816	2%	10,816	2%	10,816
	100%	540,817	100%	540,817	100%	540,817	100%	540,817	100%	540,817

Single story open	0-10" (B,C)	Single story open	10-20" (D)	Single story open	20+" (E)	Multi story open	10-20" (J)	Multi story open	20+" (K)	>10% trees (A,N)	
current	26,500	current	43,265	current	16,225	current	37,857	current	10,816	current	59,490
Alt A	32,449	Alt A	54,082	Alt A	64,898	Alt A	48,674	Alt A	27,041	Alt A	32,449
Alt B	37,857	Alt B	43,265	Alt B	59,490	Alt B	70,306	Alt B	75,714	Alt B	37,857
Alt C	32,449	Alt C	64,898	Alt C	75,714	Alt C	54,082	Alt C	43,265	Alt C	37,857
AltD	32,449	AltD	75,714	AltD	97,347	AltD	43,265	AltD	27,041	AltD	37,857

Mult story close	0-10" (F,G)	Single story close	10-20" (H)	Single story closed	20+" (I)	Mult story close	10-20" (L)	Multi story open	20+" (M)
current	48,674	current	135,204	current	27,582	current	118,980	current	16,225
Alt A	64,898	Alt A	81,123	Alt A	16,225	Alt A	97,347	Alt A	21,633
Alt B	64,898	Alt B	54,082	Alt B	10,816	Alt B	70,306	Alt B	16,225
Alt C	59,490	Alt C	70,306	Alt C	10,816	Alt C	75,714	Alt C	16,225
AltD	59,490	AltD	54,082	AltD	10,816	AltD	91,939	AltD	10,816

MSO habitat (K,L,M)

(9% of PP meets PP/oak)

current	13,142
Alt A	13,142
Alt B	14,602
Alt C	12,168
AltD	11,682

APPENDIX C – CROSSWALK BETWEEN SPECIES HABITAT/THREATS AND PLAN COMPONENTS

This table is a cross walk used to show plan components that are meeting species specific habitat needs. Detailed information on individual species contained within groups can be found in the Species Diversity Report, version 1.2.5.

DC = Desired Conditions, OBJ = Objectives, ST = Standards, GD = Guidelines

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
Important habitat components Mexican spotted owl,	large trees and snags, cavities, downed logs, woody debris, mistletoe broom	Logging, wildfire, forest treatments such as prescribed fire and thinning, fuelwood collection, pile burning	A.1	**Ponderosa Pine DC**: *Fine-scale:* Tree groups are made up of clumps of various age classes and size classes that typically occur in areas less than one acre, but may be larger, such as on north-facing slopes. Large tree form oaks, snags and partial snags with hollow boles or limbs are present. Isolated infestations of dwarf mistletoe may occur, but the degree of severity and amount of mortality varies among the infected trees. Isolated infestations of Southwestern dwarf mistletoe may occur, but the degree of severity and amount of mortality varies among the infected trees. Witches' brooms may form on infected trees, providing habitat and food for wildlife and invertebrate species. *Mid-scale:* The ponderosa pine forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present. The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with the greatest amount of basal area being contributed by larger trees. Snags 18 inches diameter at breast height (d.b.h.) or greater average 1 to 2 snags per acre. Snags and green snags of variable size and form are common. Downed logs (greater than12 inches diameter at mid-point, and greater than 8 feet long) average 3 logs per acre within the forested area of the landscape. Coarse woody debris greater than 3 inches in diameter (including downed logs), ranges from 3 to 10 tons per acre. *Landscape:* The ponderosa pine forest vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Groups of old trees are mixed with groups of younger trees. The ponderosa pine forest is composed predominantly of vigorous trees, but declining trees are present. Snags, green snags, and coarse woody debris are well-distributed throughout the landscape. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). The landscape is a functioning ecosystem that contains all its components, processes, and conditions associated with endemic levels of disturbances (e.g. fire, dwarf mistletoe, insects, diseases, lightning, drought, and wind). A.2 **Frequent Fire Mixed Conifer DC**: *Fine-scale:* Trees within groups are of similar or variable ages, often containing more than one species. Dwarf mistletoe infections may be present on ponderosa pine and Douglas-fir, and rarely on other tree species, but the degree of infection severity and rate of mortality varies among infected trees. Witches brooms may be present with these infestations, providing habitat for wildlife. *Mid-*

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
				scale: The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 30 to 100 feet per acre, with larger trees contributing the greatest percent of the total basal area. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest; these include goshawk post-fledging family areas (PFAs), Mexican spotted owl nesting/roosting habitat, and north-facing slopes. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages. Disturbances sustain the overall variation in age and structural distribution. Snags and green snags, 18 inches d.b.h. or greater average 3 per acre. Downed logs (greater than12 inches diameter at mid-point and greater than 8 feet long) average 3 per acre within the forested area. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre. *Landscape:* At the landscape scale, the frequent fire mixed conifer forest community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). The frequent fire mixed conifer forest community is composed predominantly of vigorous trees, but declining trees are present and snags, top killed, lightning and fire scarred trees, and coarse woody debris (greater than 3 inch diameter) are well-distributed throughout the landscape. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, and severity of disturbances and to climate variability. The landscape is a functioning ecosystem that contains all components, processes, and conditions that result from endemic levels of disturbances (e.g., fire, insects, diseases, and wind), including old-growth trees. Dwarf-mistletoe is present and infects ponderosa pine and Douglas-fir, but occurs at endemics levels, which allows for the establishment and sustainability of the desired uneven aged forest structure over time.
			A.3	**Mesic Mixed Conifer/Spruce-Fir DC**: *Fine-scale:* Mid-aged and older trees are typically variably-spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages contributing to vertical and horizontal heterogeneity. Dwarf mistletoe infections may be present on Douglas-fir or spruce and rarely on other tree species, but the degree of infection severity and amount of mortality varies among infected trees. Witch's brooms may be present with these infestations, providing habitat for wildlife. *Mid-scale:* The number of snags and downed logs (greater than 12 inch diameter at mid-point, over 8 feet long) and coarse woody debris (greater than 3 inch diameter) vary by seral stage. Snags 18 inches or greater at d.b.h. typically range from 1 to 5 snags per acre, with the lower range associated with early seral stages and the upper range associated with late seral stages. Coarse woody debris varies by seral stage but ranges from 5 to 20 tons per acre for early seral; 20 to 40 tons per acre for mid-seral; and greater than 35 tons per acre in late seral areas. Fire and other disturbances maintain overall desired tree density, structure, species composition, coarse woody debris, and nutrient cycling. *Landscape:* The vegetation community is a mosaic of structural and seral stages ranging from young trees through old and

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
				is composed of multiple species. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation similar to reference conditions. The landscape is composed predominantly of vigorous trees, but older declining trees are a component and provide for snags, top killed, lightning scarred trees, and coarse woody debris. The forest landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, wind, snow, and fire), including snags, downed logs, and old trees. Dwarf mistletoe infestations may be present in stands that are composed of Douglas-fir or spruce and rarely in other tree species. Infestation size, degree of severity, and amount of mortality would vary amongst the infested stands. Witch's brooms may be scattered throughout the infestations providing structural diversity in the stand and improved foraging and nesting habitat for wildlife species such as small mammals (e.g. tree squirrels), and raptors (e.g. goshawks, spotted owls). Old growth generally occurs over large areas as stands or forests where old growth is concentrated. Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
			A.4	**Aspen (General) DC**: Aspen is successfully regenerating and recruiting into older and larger size classes.
			A.5	**Aspen within Ponderosa Pine and Frequent Fire Mixed Conifer Forests DC**: In ponderosa pine and frequent fire mixed conifer vegetation types, the size, age and spatial extent of aspen stands reflect reference condition.
			A.6	**Aspen within Mesic Mixed Conifer / Spruce-Fir Forests DC**: Downed aspen and woody debris are scattered across the landscape and provide habitat for a variety of wildlife species (e.g. small mammals, reptiles, amphibians, and birds) while contributing to efficient nutrient cycling. The size, age, and spatial extent of aspen stands reflect large-scale disturbance patterns and processes.
			A.7	**Aspen GD**: Aspen trees 10 inches or greater d.b.h. (both live and dead) should be protected during project activities, except where they may pose a risk to fences lines or regeneration efforts.
			A.8	**Vegetation Management in all Forested Communities GD:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design should manage for replacement structural stages to assure continuous representation of old growth over time. Project design and treatment prescriptions should generally not remove: 1) Large, old ponderosa pine trees with reddish yellow wide platy bark, flattened tops, with moderate to full crowns and large drooping or knarled limbs (e.g. Thompson's age class 4, Dunning's tree class 5 and/or Keen's tree class 4, A and B). 2) Mature trees with large dwarf mistletoe induced witches brooms suitable for wildlife nesting, caching, and

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
				denning, except where retaining such trees would prevent the desired development of uneven aged conditions over time. 3) Large snags, partial snags and trees (>18inches dbh) with broken tops, cavities, sloughing bark, lightning scars >4" wide, and large stick nests (>18inches in diameter). & 4) Gambel oak >8 inches d.r.c.
			A.9	**Activities Following Large Scale Disturbances GD**: Recovery and restoration project design should seek to establish a trajectory toward the desired conditions for the affected vegetation type. Some snags and coarse woody debris should be retained to provide for wildlife habitat, soil stabilization, and other resource benefits. Some clumps of large (18 inches d.b.h.) standing dead trees should be retained. Snag retention should be balanced with desired fuel levels over time.
			A.10	**Wildlife DC**: Species with specific habitat needs such as snags, logs, large trees, interlocking canopy, and cavities are provided for.
			A.11	**Threatened, Endangered, and Sensitive Species GD**: Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.
Multi layered canopy, interlocking canopy and old growth Mexican spotted owl	Interlocking canopy, old growth and denser stands	Logging, Fire (natural and prescribed)	B.1	**Ponderosa Pine DC**: *Fine-scale:* Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Tree groups are made up of clumps of various age classes and size classes that typically occur in areas less than one acre, but may be larger, such as on north-facing slopes. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees. Where Gambel oak comprises more than 10% of the basal area, it is not uncommon for canopy cover to be greater than 40%. *Mid-scale:* The ponderosa pine forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present. Stands are dominated by ponderosa pine, but other native hardwood and conifer species occur. The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with the greatest amount of basal area being contributed by larger trees. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (e.g. goshawk post-fledging family areas, Mexican spotted owl nesting/roosting habitat, drainages, and steep north facing slopes). *Landscape:* The ponderosa pine forest vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. The forest is generally uneven-aged and open. Groups of old trees are mixed with groups of younger trees. Denser tree conditions exist in some locations such as north facing slopes, canyons, and drainage bottoms. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
				landscape over time as a result of succession and disturbance (tree growth and mortality).
			B.2	**Frequent Fire Mixed Conifer DC**: *Fine-scale:* Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking. Tree groups are typically less than 1 acre size and consist of 2 to 50 trees per group, but are sometimes larger, such as on north facing slopes. Density is variable, with canopy ranging from zero to greater than 60 percent. *Mid-scale:* The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 30 to 100 feet per acre, with larger trees contributing the greatest percent of the total basal area. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree group than in the general forest; these include goshawk post-fledging family areas (PFAs), Mexican spotted owl nesting/roosting habitat, and north facing slopes. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages. *Landscape:* At the landscape scale, the frequent fire mixed conifer forest community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Forest appearance is variable but generally uneven-aged and open; occasional patches of even-aged structure are present. The forest arrangement is in small clumps and groups of trees interspersed within variably sized openings of native grass/forb/shrub vegetation associations similar to reference conditions. Size, shape, number of trees per group, and number of groups per area are variable across the landscape. Denser tree conditions exist in some locations such as north facing slopes, canyons, and drainage bottoms.
			B.3	**Mesic Mixed Conifer/Spruce-Fir DC**: *Fine-scale:* Mid-aged and older forests trees are typically variably-spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages, contributing to vertical and horizontal heterogeneity. *Mid-scale:* The size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary, but are frequently hundreds of acres; groups and patches of tens of acres or less are relatively common. Forest conditions in some areas contain higher basal area than the general forest; examples include goshawk post family fledgling areas, Mexican spotted owl nesting/roosting habitat, and north facing slopes. Density ranges from 20 to 250 square feet of basal area per acres, depending upon disturbance and seral stages of groups and patches. *Landscape:* The vegetation community type is a mosaic of structural and seral stages ranging from young trees through old and is composed of multiple species. The landscape arrangement is an assemblage of variably-sized and aged groups and patches of trees and other vegetation similar to reference conditions. Old growth generally occurs over large areas as stands or forests where old growth is concentrated. Old growth includes old trees, dead trees (snags), downed wood (coarse

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
				woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
			B.4	**Aspen (General) DC**: Aspen is successfully regenerating and recruiting into older and larger size classes. Size classes have a natural distribution, with the greatest number of stems in the smallest classes.
			B.5	**Aspen within Ponderosa Pine and Frequent Fire Mixed Conifer Forests DC**: In ponderosa pine and frequent fire mixed conifer vegetation types, the size, age and spatial extent of aspen stands reflect reference condition.
			B.6	**Vegetation Management in All Forested Communities GD**: Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design should manage for replacement structural stages to assure continuous representation of old growth over time. On suitable timberlands, projects should retain somewhat higher frequencies of trees across broad diameter classes to allow for future tree harvest. Vegetation management activities in mixed conifer forests should incorporate experimental design features and monitoring to accelerate learning and adaptive management.
			B.7	**Wildlife DC:** Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species.
			B.8	**Threatened, Endangered, and Sensitive Species GD**: Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.
Understory dependent Prey species for the MSO	Native grasses and shrubs/ underbrush	Pile burning, non-native plant invasion	C.1	**Ponderosa Pine DC** *Fine-scale:* Trees typically occur in irregularly shaped groups and are variably-spaced with some tight clumps. The interspaces between groups are variably shaped, are comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups. *Mid-scale:* Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with the greatest amount of basal area being contributed by larger trees. Interspaces with grass/forb/shrub vegetation are variably shaped and typically range from 10 percent to 70 percent, with the more open conditions typically occurring on less productive sites. *Landscape:* The forest is generally uneven-aged and open. Organic ground cover and robust herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.
			C.2	**OBJ:** Mechanically thin 11,000 to 19,000 acres annually, using a combination of group-selection cuts with matrix thinning and all-size free thinning. Treat an average of 13,000 to 55,000 acres annually, using a

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
				combination of prescribed fire and naturally ignited wildfires.
			C.3	**Frequent Fire Mixed Conifer DC**: *Fine-scale:* Trees typically occur in irregularly shaped groups and are variably-spaced with some tight clumps. Interspaces between groups are variably shaped, are comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups. *Mid-scale*: Basal area within forested areas generally ranges from 30 to 100 square feet per acre, with larger trees contributing the greatest percent of the total basal area. Openings with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area. *Landscape:* The forest arrangement is in small clumps and groups of trees interspersed within variably sized openings of native grass/forb/shrub vegetation associations similar to reference conditions. Organic ground cover and robust herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.
			C.4	**OBJ:** Burn an average of 1,000 to 13,000 acres annually, using prescribed fire and/or naturally ignited wildfires. Mechanically thin 1,200 to 2,100 acres annually.
			C.5	**Mesic Mixed Conifer/Spruce-fir DC**: *Fine-scale:* Small openings (gaps) are present as a result of past disturbances. *Mid-scale:* Density ranges from 20 to 250 square feet of basal area per acre, depending upon disturbance and seral stages of groups and patches. Grass, forb, and shrub dominated openings created by disturbance may make up 10 to 100 percent of the mid-scale area, depending on the disturbance type. These openings provide areas for future regeneration. *Landscape:* Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.
			C.6	**Aspen (General) DC**: Understory vegetation consists of shrubby or herbaceous species, providing forage and cover for wildlife and habitat for invertebrates such as pollinators.
			C.7	**Vegetation Management in All Forested Communities GD**: Vegetation management prescriptions should provide for sufficient canopy breaks to limit crown fire spread between groups, allow for the redevelopment and maintenance of a robust understory, and mimic the spatial arrangement of the references conditions. Trees established after 1890 should generally not be retained in areas where biophysical conditions would have supported stable openings over time. Vegetation management activities should meet or exceed goals for scenic beauty (scenic integrity objectives) by creating natural patterns, structure and composition of trees, shrubs, grasses and other plants. Vegetation treatments should favor the development of native understory species in areas where they have the potential to establish and grow. Seed and plants used for revegetation should originate from genetically local sources or from the regionally adapted area if local sources are not available.

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
			C.8	**Montane/Subalpine grassland DC**: Montane and subalpine meadow vegetation has high soil productivity and biological diversity. Native species occur in natural patterns of abundance, composition, and distribution. Vegetation is healthy and at least stable.
			C.9	**Soil DC:** Soils provide for diverse native plant species. Vegetative ground cover is well-distributed across the soil surface to promote nutrient cycling and water infiltration.
			C.10	**Wildlife DC**: Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites.
			C.11	**Non-Native Invasive Species DC**: Invasive species are contained and controlled so that they do not disrupt the structure or function of ecosystems.
			C.12	**GD**: All ground disturbing projects should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species. New populations are detected early, monitored, and treated as soon as possible. Use of pesticides, herbicides, and biocontrol agents should minimize impacts on non-target flora and fauna.
			C.13	**Livestock Grazing DC**: Grasses and forbs provide adequate forage for permitted livestock consistent with other desired conditions.
			C.14	**GD:** Livestock management should favor the development of native cool season grasses and forbs. Annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g. forage production, weeds, fawning habitat, soils, etc.). Post-fire grazing should not be authorized until Forest Service range staff confirms range readiness.
			C.15	**Mineral and Mining GD**: Restoration and reclamation of surface disturbance associated with mineral activities should be implemented to achieve 70 percent of ground cover (as compared to nearby undisturbed areas) with permanent native vegetation within three growing seasons.
Water dependent (wetlands, seeps/springs, waters)	Lowering or depletion of the water table, edge vegetation, connectivit	Wetland drainage, spring capping, flood scouring, overgrazing, trampling	D.1	**Wetland/Cienega DC:** Wetlands provide habitat consistent with their flood regime and flood potential. Plant and animal species that require wetland habitats have healthy populations within the natural constraints of the particular wetland community. Wetlands infiltrate water, recycle nutrients, resist erosion, and function properly.
spikedace, Apache trout,			D.2	**OBJ:** Restore native vegetation and natural water flow patterns on at least 6 acres of wetlands within 5 years of plan approval.

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
& loach minnow	y/stopover habitat for migrating birds		D.3	**Watershed DC:** Vegetation conditions within watersheds contribute to downstream water quality and quantity. Flood plains are functioning and lessen the impacts of floods on human safety, health, and welfare. Water quality meets critical needs of aquatic species.
			D.4	**Natural Waters DC:** Stream channel stability and aquatic habitats retain their inherent resilience to natural and other disturbances. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting. Springs and ponds have the necessary soil, water, and vegetation attributes to be healthy and functioning. Water levels, flow patterns, groundwater recharge rates, and geochemistry are similar to reference conditions. Within its capability, stream flow and water quality is adequate to maintain aquatic habitat and water sources for native and selected nonnative wildlife. The necessary physical and biological components, including cover, forage, water, microclimate, and nesting/breeding habitat, provide habitat for a diverse community of plant and wildlife species. Riparian dependent plant and animal species are self-sustaining and occur in natural patterns of abundance and distribution. Native macroinvertebrates are appropriately abundant and diverse. Unwanted nonnative species do not exert a detectable impact on aquatic and wetland ecosystems. Hydrophytes and emergent vegetation exist in patterns of natural abundance in wetlands and springs in levels that reflect climatic conditions. Overhanging vegetation and floating plants such as water lilies exist where they naturally occur.
			D.5	**GD:** Access to natural waters should be restricted to designated trails and points of entry to mediate erosion and prevent trampling and inadvertent introduction of nonnative and undesirable biota and disease. Diversions of water sources that recharge wetlands should be assessed and appropriate actions should be identified to mitigate or minimize effects. Spring source areas should be preferentially protected. Water rights for springs should be secured where there are no existing water rights or claims. The impacts of management activities on springs, streams, and wetlands should be evaluated and minimized.
			D.6	**Livestock Grazing GD:** Livestock use in and around wetlands should be evaluated on an allotment-specific basis. Mitigation measures such as deferment and fencing (full or partial) should be implemented as needed to minimize potential livestock effects.
			D.7	**Wilderness DC:** A reproducing population of Apache Trout is maintained in North Canyon Creek.
Species effect by sediments in natural waters Spikedace, Apache trout,	Loss of habitat function, increase in sediments above background	Erosion, unmanaged grazing	E.1	**Pinyon-Juniper Communities DC:** Plant litter (leaves, needles, etc.) and understory plant cover contributes to soil stabilization, prevents erosion, promotes nutrient cycling, improves water retention, and provides quality habitat and the microclimate conditions necessary for pinyon seed germination.
			E.2	**Ponderosa Pine DC:** *Landscape:* Organic ground cover and robust herbaceous vegetation provide protection for soil, and moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
& loach minnow	level		E.3	**Frequent Fire Mixed Conifer DC:** *Landscape:* Organic ground cover and robust herbaceous vegetation provide protection for soil, and moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.
			E.4	**Mesic Mixed Conifer/Spruce-fir DC:** *Landscape:* Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.
			E.5	**Following Large Scale Disturbances GD:** Recovery and restoration projects design should seek to establish a trajectory toward desired conditions for the affected vegetation type. Erosion control should be implemented to protect significant resource values and infrastructure such as stream channels, roads, structures, and archeological or historic sites. Practices that restore nutrient cycling and stabilize soils (revegetation, mulching, lop and scatter, etc.) should be implemented.
			E.6	**Montane/Subalpine Grasslands DC:** Montane and subalpine meadow vegetation has high soil productivity and biological diversity. Vegetation and litter is sufficient to maintain and improve water infiltration, nutrient cycling, and soil productivity.
			E.7	**Wetland/Cienega DC:** Wetlands provide habitat consistent with their flood regime and flood potential. Wetlands infiltrate water, recycle nutrients, resist erosion, and function properly.
			E.8	**Soil DC:** Soils provide for diverse native plant species. Vegetative ground cover is well distributed across the soil surface to promote nutrient cycling and water infiltration. Accelerated soil loss is minimal, especially on sensitive or highly erodible sites. Soils can readily absorb, store, and transmit water vertically and horizontally, accept, hold, release nutrients, and resist erosion. Infiltration rates are good in TES soil units that are described as well drained and moderately well-drained. Infiltration rates are good in TES soil units that are described as well drained and moderately well-drained. Logs and other woody materials are distributed across the surface to maintain soil productivity.
			E.9	**Watershed DC:** Vegetation conditions within watersheds contribute to downstream water quality and quantity. Surface runoff, sheet, rill, gully erosion and subsequent sedimentation into connecting waters downstream is minimal. Flooding maintains normal stream characteristics (e.g., water transport, sediment, woody material) and dimensions (e.g., bankfull width, depth, slope, sinuosity). Vertical down cutting and embeddedness are absent in drainages. Floodplains are functioning and lessen the impacts of floods on human safety, health, and welfare.

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
			E.10	**Soils and Watershed GD:** Projects should include design features to protect and improve watershed condition. In disturbed areas, erosion control measures should be implemented to improve soil conditions.
			E.11	**Natural Waters DC:** Stream channel stability and aquatic habitats retain their inherent resilience to natural and other disturbances. Stream channel morphology reflects changes in the hydrological balance, runoff and sediment supply appropriate to the landscape setting. Springs, streams, and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion.
			E.12	**GD:** Access to natural waters should be restricted to designated trails and points of entry to mediate erosion and prevent trampling and inadvertent introduction of nonnative and undesirable biota and disease.
			E.13	**Wildland Fire Management DC:** Wildland fire maintains and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role. Regular fire entry protects social, economic, and ecological values at risk from high-severity disturbance effects. Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation community. Uncharacteristic high-severity fires rarely occur, and do not burn at the landscape scale.
			E.14	**Transportation System OBJ:** Within 10 years of Plan approval, obliterate 15 percent of non-system roads (unauthorized, unneeded, and decommissioned).
			E.15	**GD:** Cross-country travel for game retrieval, parking, or dispersed camping is not allowed in areas with sensitive soils or sensitive vegetation. Roads should be decommissioned when no longer needed.
			E.16	**Mineral and Mining Activities GD:** Adverse surface impacts should be minimized through the appropriate administration of mining and mineral laws and regulations. Soil disturbance should be kept to a minimum. Restoration and reclamation of surface disturbance associated with mining activities should be implemented to achieve 70 percent of ground cover (as compared to nearby undisturbed areas) with permanent native vegetation within 3 growing seasons.
			E.17	**Bill Williams Mountain Management Area GD:** High-use roads within the municipal watershed should be maintained to prevent erosion and sedimentation.

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
Rare endemics/restricted distributions Fickeisen plains cactus	Direct loss of vegetation, change in species composition and micro site conditions	Collecting, trampling, misidentification and accidental eradication, unmanaged livestock grazing and excessive wildlife herbivore	F.1 F.2	**Rare and Narrow Endemics DC:** Habitat and refugia are present for narrow endemics or species with restricted distributions and/or declining populations. Location and conditions of rare and narrow endemic species are known. **GD:** Project design should incorporate measures to protective and provide for rare and narrow endemic species where they are likely to occur.
Rock/cave and other abiotic dependent California condor and Fickeisen plains cactus	Rocks (canyons, caves, and cliffs)	Rock collection, cliff blasting, recreational rock climbing/caving, mining/mineral activities.	G.1 G.2	**Cliffs and Rocky Features DC:** Cliff ledges provide cover and nesting habitat for wildlife such as the American peregrine falcon, California condor, snakes, bats, birds, and small mammals. Rock climbing and related recreational activities do not disrupt the life processes of rare or threatened species or diminish the function of specialized vegetation, such as mosses, lichens, and fleabanes. **GD:** Activities involving heavy machinery or blasting should minimize impacts to habitat associated with rocky features and cliffs. Near known active raptor nest sites, temporary closures and use restrictions should be implemented for rock climbing and other potentially disruptive activities. Where recreation activities have the potential to trample known populations of narrow and endemic plant species, signs should be posted educating the public to stay on designated trails and avoid impacts.
Risk of Large scale Wildfire All species	loss of habitat components on a large scale and increase sedimentation of in streams	Fire behaving unnaturally within the system	H.1 H.2 H.3 H.4	**Pinyon-Juniper Communities DC:** The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (including insects, diseases, and fire) and climate variability. **Pinyon-Juniper Grasslands DC:** The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (including insects, diseases, and fire) and climate variability. Fires are typically low-severity with a 0 to 35 year return interval (Fire Regime I). **Pinyon-Juniper Sagebrush DC:** The composition, structure, and function of vegetation conditions are resilient to the frequency, extent and severity of disturbances including insects, diseases, fire, and climate variability. Fires are mixed to high severity and have fire return interval of 35 to more than 200 years (Fire Regimes III and IV). **Pinyon-Juniper (Persistent) Woodlands DC:** Disturbances rarely affect the composition, structure, and function. Fire disturbance is infrequent and variable due to lack of continuous ground cover.

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			H.5	**Ponderosa Pine Forest DC:** *Fine-scale*: Fires generally burn as surface fires, but single-tree torching and isolated group torching is not uncommon. *Mid-scale*: Disturbances sustain the overall variation in age and structural distribution. Fires primarily burn on the forest floor and typically do not spread between tree groups as crown fire. *Landscape:* The landscape is a functioning ecosystem that contains all its components, processes, and conditions associated with endemic levels of disturbances (e.g. fire, dwarf mistletoe, insects, diseases, lightning, drought, and wind). Grasses and needle cast provide the fine flashy fuels needed to maintain the natural fire regime. Fire and other disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris loads, and nutrient cycling. The risk of uncharacteristic high- severity fire and associated loss of key ecosystem components is low. Frequent, low severity fires (Fire Regime I) occur across the entire landscape with a return interval of 0 to 35 years.
			H.6	**OBJ:** Mechanically thin 11,000 to 19,000 acres annually, using a combination of group-selection cuts with matrix thinning and all-size free thinning. Treat an average of 13,000 to 55,000 acres annually, using a combination of prescribed fire and naturally ignited wildfires.
			H.7	**Frequent Fire Mixed Conifer DC:** *Fine-scale*: Fires generally burn as surface fires, but single tree torching and isolated group torching occasionally occurs. *Mid-scale*: Fires primarily burn on the forest floor and typically do not spread between tree groups as crown fire. *Landscape:* The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, and severity of disturbances and to climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g. fire, insects, diseases, and wind), including old growth trees. Grasses and needle cast provide the fine flashy fuels needed to maintain the natural fire regime. Fire and other disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. Frequent, low severity fires (Fire Regime I) occur across the entire landscape with a return interval of 0 to 35 years.
			H.8	**OBJ:** Burn an average of 1,000 to 13,000 acres annually, using prescribed fire and/or naturally ignited wildfires. Mechanically thin 1,200 to 2,100 acres annually.
			H.9	**Mesic Mixed Conifer/Spruce-Fir DC:** *Fine-scale*: Due to the presence of ladder fuels, fires usually burn either with low intensity, smoldering combustion, or transition rapidly in the canopy as passive or active crown fire. *Mid-scale*: During moister conditions, fires exhibit smoldering low-intensity surface fires with single-tree and isolated group torching. Under drier conditions, fires exhibit passive to active crown fire behavior with conifer tree mortality up to 100 percent across mid-scale patches (100 to 1,000 acres). High-severity fires generally do not result in areas of mortality exceeding 1,000 acres. Other smaller disturbances occur more frequently. Fire and other disturbances maintain overall desired tree density, structure, species

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				composition, coarse woody debris, and nutrient cycling. Fire severity is mixed or high, with a fire return interval of 35 to over 200 years (Fire Regimes III, IV, and V). *Landscape:* The forest landscape is a functioning ecosystem that contains all components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, wind, snow, and fire), including snags, downed logs, and old trees. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances and climate variability. Mixed severity fire (Fire Regime III) is characteristic at the lower elevations of this type. High severity fires (Fire Regime IV & V) are more common at the higher elevations.
			H.10	**Aspen (General) DC:** Fire intervals are similar to reference conditions and maintain aspen.
			H.11	**Vegetation Management in all Forested Communities GD:** The location and layout of vegetation management activities should effectively disconnect large expanses of continuous predicted active crown fire and improve habitat connectivity. Vegetation management prescriptions should provide for sufficient canopy breaks to limit crown fire spread between groups, allow for the redevelopment and maintenance of a robust understory, and mimic the spatial arrangement of the references conditions.
			H.12	**Sagebrush Shrublands GD:** Management activities should be designed to mimic the historic disturbance.
			H.13	**Grasslands DC:** Disturbance processes are similar to reference conditions and play a primary role in the function of the ecosystem.
			H.14	**Desert Communities DC:** Density of juniper and other shrubby species is maintained at levels which promote natural fire regimes and long fire return intervals. Fire occurrence is low and infrequent.
			H.15	**Gambel Oak Shrublands DC:** Low intensity fire occurs regularly with intervals of < 25 years.
			H.16	**Cottonwood-Willow Riparian Forest DC:** Fire is limited or absent in this system.
			H.17	**Watersheds DC:** The fuels composition within watersheds does not put the watersheds at risk for uncharacteristic disturbance.
			H.18	**Livestock Grazing GD:** As grazing permits are waived back to the forest, they should be evaluated for conversion to forage reserves to improve flexibility for restoring fire-adapted ecosystems and in response to other range management needs.
			H.19	**Forestry and Forest Products DC:** A sustainable supply of wood is available to support a wood harvesting and utilization industry of a size and diversity that can effectively and efficiently restore and maintain the

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
				desired conditions for ponderosa pine and frequent fire mixed conifer communities.
			H.20	**Wildland Fire Management DC:** Wildland fire maintains, and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role. Regular fire entry protects social, economic, and ecological values at risk from high-severity disturbance effects. Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation community. Uncharacteristic high-severity fires rarely occur, and do not burn at the landscape scale. Wildland fire is understood, both internally and by the public, as a necessary natural disturbance process integral to the sustainability of the forest's fire adapted vegetation communities.
			H.21	**ST:** Managers will use a decision support process to guide and document wildfire management decisions.
			H.22	**GD:** Decision documents for wildland fires that progress past initial attack should include interdisciplinary input to assess site specific values at risk and develop project or incident objectives and courses of action to enhance or protect those values. Decision documents for wildland fires should include objectives to minimize fire-created openings to those within the reference range of variability for the vegetation community. Associated courses of action to address those objectives should also be developed. If current or anticipated fire behavior and fire effects exceed the desired fire behavior and effects, protection objectives should be developed, or a more conservative prescription window produced. Strategies and tactics to mitigate those effects should be implemented on active wildland fires.
			H.23	**Wilderness DC:** Natural processes are maintained within the wildernesses. Fires function in their natural ecological role.
			H.24	**Recommended Wilderness DC:** Natural processes are maintained within the wildernesses. Fires function in their natural ecological role.
			H.25	**Garland Prairie DC:** Lightning fires are able burn naturally within the area.
			H.26	**Bill Williams Mountain Management Area OBJ:** Implement a project to improve the health and sustainability of forested conditions on and surrounding Bill Williams Mountain within 5 years of Plan approval.
Invasive Species Interactions, e.g. but not limited to	Competition for resources (food, space,	Introduction of non-native species; loss of habitat component	I.1	**Desert Communities GD:** Fire should not be used as a vegetation management tool in desert communities.
			I.2	**Natural Waters DC:** Unwanted nonnative species do not exert a detectable impact on aquatic and wetland ecosystems.

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noxious weeds, crayfish and bullfrogs Apache trout, Fickeisen plains cactus	water), and/or hybridizations which can lead to direct mortality and decreases in populations within the planning area,		I.3	**GD:** Access to natural waters should be restricted to designated trails and points of entry to mediate erosion prevent trampling and inadvertent introduction of nonnative and undesirable biota and disease.
			I.4	**Non-Native Invasive Species DC:** Invasive species are contained and/or controlled so that they do not disrupt the structure or function of ecosystems.
			I.5	**GD:** All ground disturbing projects should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species. New populations are detected early, monitored, and treated as soon as possible. Treatment approaches should use Integrated Pest Management (IPM) practices to treat noxious and nonnative invasive species. IPM includes manual, biological, mechanical, and herbicide/pesticide treatments. Use of pesticides, herbicides, and biocontrol agents should minimize impacts on non-target flora and fauna.
			I.6	**Wildland Fire Management GD:** Decision documents for managing fire should evaluate the risk of cheatgrass invasion. When there is a moderate to high risk (e.g. lower elevation areas), mitigation measures should be implemented and/or fire should be excluded if adequate treatments are not available or if they are cost prohibitive.
			I.7	**Wilderness Areas DC:** Wilderness areas have minimal to no nonnative, invasive species.
			I.8	**GD:** Wildfires should be suppressed in the desert communities of the Kanab Creek Wilderness. Nonnative, invasive species should be treated within wilderness in order to allow natural processes to predominate.
			I.9	**Recommended Wilderness Areas DC:** Recommended wilderness areas have few to no nonnative, invasive species.
			I.10	**GD:** Wildfires should be suppressed in the recommended wilderness areas to Kanab Creek in the desert communities PNVT. Nonnative, invasive species should be treated within recommended wilderness in order to allow natural processes to predominate.
Poisoning/Pesticide Use California condor	Unintentional poisoning of species or miss use of herbicide or pesticide	Non-target species poisoning	J.1	**Invasive Species GD:** Treatment approaches should use Integrated Pest Management (IPM) practices to treat noxious and non native invasive species. IPM includes manual, biological, mechanical, and herbicide/pesticide treatments. Pesticides should be properly labeled and stored as per the manufacturer's recommendations.

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Development (facilities, roads, fences) California condor, Mexican spotted owl, and Fickeisen plains cactus	Human structures such as fences, buildings and bridges, electrical power lines, demolition of existing structures	Potential removal of habitat components, creating barrier to movement	K.1	**Constructed Waters DC:** Constructed waters do not contribute to the spread of diseases, unwanted nonnative species, or unnatural patterns of wildlife distribution.
			K.2	**GD:** If new drinkers are necessary, they should be constructed in areas that reduce ungulate impact to sensitive vegetation or soils such as riparian, aspen, and wet meadow areas.
			K.3	**Threatened, Endangered, and Sensitive Species GD**: Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.
			K.4	**Recreation and Scenery DC:** Opportunities for off-highway vehicle (OHV) riding and driving for pleasure are available on the designated system of NFS roads and motorized trails.
			K.5	**Transportation and Forest Access DC:** All designated routes open to wheeled motorized vehicles are shown on a motor vehicle use map (MVUM) that is readily available to the public.
			K.6	**ST:** Motor vehicle use off the designated system of roads, trails, and areas is prohibited, except as identified on the MVUMs and as authorized by law, permits, and orders in connection with resource management and public safety.
			K.7	**GD:** Cross-country travel for game retrieval, parking, or dispersed camping is not allowed in areas with sensitive soils or sensitive vegetation. Roads should not be located in meadows when they can be located in other areas. Roads should be decommissioned when no longer needed.
			K.8	**Special Uses GD:** Uses should be combined to the extent possible in light of technical and environmental constraints.
			K.9	**Communications and Electronic Sites GD:** The number of communication and electronic sites should be the minimum that is consistent with appropriate public services that require the use of forest lands. Environmental disturbance should be minimized by co-locating communications and electronic sites.
			K.10	**Energy Transmission and Development DC:** Energy transmission and development on the forest meets the legal mandates to facilitate the transmission and development of energy resources in a manner that minimizes adverse impacts and does not detract from meeting other desired conditions applicable to the area. Joint use of rights-of-way are provided to concentrate uses to the extent possible. Energy transmission lines are not visible (usually underground) across the landscape.

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			K.11	**ST:** Major utility corridor development is confined to the area identified and mapped in the "West-wide Energy Corridor Programmatic EIS".
			K.12	**GD:** Environmental disturbance should be minimized by co-locating pipelines, power lines, fiber optic lines, and associated infrastructure. Existing energy corridors should be used to their capacity with compatible upgraded powerlines, before evaluating new routes. When compatible with protection of heritage resources, the use of below-ground utilities should be optimized in order to avoid potential conflicts with wildlife, scenery, wildfire, and long-term vegetative management.
			K.13	**Mineral and Mining Activities GD:** Adverse surface impacts should be minimized through the appropriate administration of mining and mineral laws and regulations. Soil disturbance should be kept to a minimum. Surface use should be restricted or prohibited in areas with habitat for threatened, endangered, and sensitive plants and animal species, and for heritage resources nominated or listed on the National Register of Historic Places. Use and occupancy should be restricted yearlong in areas supporting populations of threatened, endangered, and sensitive plant species.
			K.14	**Bill Williams Mountain Management Area GD:** The existing term permit for the Elk Ridge Ski Area on Bill Williams Mountain should be restricted to the existing established permit area.
Disturbance to wildlife from management activities California condor and Mexican spotted owl	Potential disturbance to species during breeding season	Timber harvest, recreation activities, fuel reduction activities, road building, mineral collections	L.1	**Wildlife DC:** Human-wildlife conflicts are minimal.
			L.2	**Threatened, Endangered, and Sensitive Species GD**: Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.
			L.3	**Cliffs and Rocky Features GD:** Near known active raptor nest sites, temporary closures and use restrictions should be implemented for rock climbing and other potentially disruptive activities.
			L.4	**Recreation and Scenery DC:** Recreation use levels are compatible with other resource values including scenery, cultural, soil, vegetation, water, wildlife. The biological, cultural, recreational, and scenic environment is sustained and enhanced for present and future generations.
			L.5	**GD:** Group uses should be concentrated in frontcountry areas. Resource impacts should be reduced in front and backcountry by directing camping to existing dispersed campsites or establishing new designated campsites. Pack-it-in pack-it-out practices should be used in all Forest Service managed facilities and dispersed sites not managed under permit.
			L.6	**Transportation Management ST:** Motor vehicle use off the designated system of roads, trails, and areas is

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
				prohibited, except as identified on the MVUMs and as authorized by law, permits, and orders in connection with resource management and public safety.
			L.7	**GD:** Construction of permanent roads or temporary roads in semi-primitive non-motorized areas should be avoided unless required by a valid permitted activity. If authorized, roads should be constructed and maintained at the lowest maintenance level needed for the intended use. Roads should be decommissioned when no longer needed.
			L.8	**Special Uses ST:** Competitive OHV and motorized events are not permitted on the forest.
			L.9	**Wilderness Areas DC:** Wilderness provides opportunities for primitive and unconfined nonmotorized and nonmechanized recreation and contiguous wildlife habitat. Human encounters are only with individuals or small parties, are infrequent, and opportunities for solitude are common.
			L.10	**ST:** Group size in Wilderness is limited to 12 people. Competitive events are not permitted in wilderness areas. Establishment geocaches will not be permitted in wilderness areas.
			L.11	**Recommended Wilderness Areas DC:** The recommended wilderness provides opportunities for primitive and unconfined nonmotorized and nonmechanized recreation and contiguous wildlife habitat. Human encounters are only with individuals or small parties, are infrequent, and opportunities for solitude are common.
Providing additional protection for all species	Loss of habitat component;	Logging, fuel management, recreation	M.1	**Ponderosa Pine DC:** *Fine-scale:* Where historically occurring, Gambel thickets with various diameter stems, and low-growing, shrubby oak are present. These thickets provide forage, cover, and habitat for species that depend on them such as small mammals, foliage-nesting birds, deer and elk. Gambel oak mast (acorns) provides food for wildlife species. *Landscape:* Where it naturally occurs, Gambel oak is present with all age classes represented. It is reproducing and maintaining or expanding its presence on suitable sites across the landscape.
			M.2	**Wildlife DC:** Wildlife species are distributed throughout their potential natural range. Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species. Habitat configuration and availability allow wildlife populations to adjust their movements (e.g., seasonal migration, foraging, etc.) in response to climate change and promotes genetic flow between wildlife populations.
			M.3	**Threatened, Endangered, and Sensitive Species DC:** Threatened, endangered, and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation.

Species or Species Group	Characteristic at risk	Potential Management Threats	Code	Plan Components which address risks to species viability
			M.4	**Forestry and Forest Products GD:** Timber harvest activities should be carried out in a manner consistent with maintaining or making progress toward the desired conditions in this plan.
			M.5	**Mineral and Mining Activities DC:** Mineral and mining activities meet the legal mandates to facilitate the development of minerals on the forest in a manner that minimizes adverse impacts to surface and groundwater resources, and that do not detract from meeting other desired conditions applicable to the area.
			M.6	**GD:** Surface use should be restricted or prohibited in areas with habitat for threatened, endangered and sensitive plant and animal species, and for heritage resources nominated or posted to the National Register. Use and occupancy should be restricted yearlong in areas supporting populations of threatened, endangered and sensitive plant species.
			M.7	**Wild and Free Roaming Burro Territory DC:** A biologically sound and genetically viable burro population is in balance with native wildlife, permitted livestock, and other resource values.
			M.8	**GD:** Population control measures should be implemented to maintain genetic diversity and desired resource conditions in the area.
			M.9	**Bill Williams Mountain Management Area DC:** Bill Williams Mountain provides quality habitat for Arizona Bugbane, Mexican spotted owls, and culturally important plants.