

# **Supplemental Wildlife Viability Report**

## **Forest Plan Revision DEIS**

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**for:**

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# Preface

The information in this specialist report reflects analysis that was completed prior to and in conjunction with the completion of the Draft Environmental Impact Statement (DEIS) for the revision of the 1987 Coconino National Forest Land Management Plan (the Plan). The primary purpose of specialist reports associated with the DEIS is to provide detailed information to assist in the preparation of the DEIS. As the DEIS was prepared, review-driven edits to the broader DEIS resulted in modifications to some of the information contained in some of the specialist reports. As a result, some reports no longer contain information and analysis that was updated through an interdisciplinary review process and is included in the DEIS in its entirety. This specialist report retains the additional information on the environmental consequences that was not included in the summarized information in the DEIS. However, analysis and information for this resource that is included in its entirety in the DEIS is not duplicated in this report. Efforts have been made to ensure that the retained information in the specialist reports is consistent with the DEIS. If inconsistencies exist between specialist reports and the DEIS, the DEIS should be regarded as the most current, accurate source of analysis.

## Contents

Introduction .....	1
Relevant Laws, Regulations, and Policy that Apply .....	1
Methodology and Analysis Process.....	2
Assumptions .....	3
Other Habitat Features and Considerations .....	4
Federally Listed Species .....	10
Chiricahua Leopard Frog and Proposed Critical Habitat (Table 1).....	10
California condor (Table 1) .....	12
Mexican spotted owl and Critical Habitat (Table 1) .....	12
Southwestern willow flycatcher and proposed critical habitat (Table 1) .....	15
Yuma clapper rail (Table 1) .....	16
Black-footed ferret (Table 1).....	17
Regional Forester’s Sensitive Species .....	19
Arizona toad (Table 2).....	19
Lowland leopard frog (Table 2) .....	20
Northern leopard frog (Table 2) .....	20
Abert’s towhee (Table 2).....	21
American peregrine falcon (Table 2).....	21
Bald eagle (Table 2) .....	22
Clark’s grebe (Table 2).....	23
Common black hawk (Table 2) .....	23
Ferruginous hawk (Table 2) .....	23
Northern goshawk (Table 2).....	23
Western burrowing owl (Table 2) .....	24
Western yellow-billed cuckoo (Table 2) .....	24
Four-spotted skipperling (Table 2).....	25
Nitocris fritillary (Table 2) .....	26
Nokomis fritillary (Table 2) .....	26
Allen’s lappet-browed bat (Table 2).....	26
Greater western mastiff bat (Table 2).....	27
Spotted bat (Table 2) .....	27
Pale Townsend’s big-eared bat (Table 2).....	28
Western red bat (Table 2).....	28
Dwarf shrew (Table 2).....	29
Long-tailed vole (Table 2).....	29
Merriam’s shrew (Table 2).....	30
Navajo Mogollon vole (Table 2) .....	30
Plains harvest mouse (Table 2).....	31
Southwestern river otter (Table 2).....	31
Wupatki Arizona pocket mouse (Table 2).....	32
Narrow-headed garter snake (Table 2) .....	32
Northern Mexican gartersnake (Table 2).....	33
Reticulate Gila monster (Table 2) .....	33
Other planning species .....	34
Evening grosbeak (Table 3).....	34
Golden Eagle (Table 3) .....	35
Golden-crowned Kinglet (Table 3).....	36
MacGillivray’s Warbler (Table 3).....	37

Pinyon jay (Table 3) .....	38
Swainson's thrush (Table 3).....	38
Three-toed woodpecker (Table 3) .....	39
Alberta arctic (Table 3) .....	40
Beaver (Table 3).....	40
Gunnison's prairie dog (Table 3).....	41
Pronghorn (Table 3) .....	43
Southwestern myotis (Table 3).....	44
Miscellaneous.....	44
Connectivity .....	44
Wild sheep .....	50
Supplemental Environmental Consequences and Cumulative Effects .....	50
Irreversible and Irretrievable Commitment of Resources .....	51
Unavoidable Adverse Impacts.....	52
References Cited .....	53
Glossary.....	63
Appendix A: PNVF Descriptions.....	65
Appendix B: Priority bird species not brought forward .....	68
Appendix C: ROS class by PNVF by alternative.....	72

## Tables

Table 1: Conservation Status, F-Rank, and F-Rank rationale for Federally Listed Species .....	7
Table 2: F-Rank and F-Rank rationale for Southwestern Region Sensitive Species.....	8
Table 3: F-Rank and F-Rank rationale for Other Forest Planning Species .....	10
Table 4: Departure and trends for Mexican spotted owl habitat- existing condition .....	13
Table 5: Acres of PFAs classified as not suitable for recreational shooting in alternative C.....	24
Table 6: Acres of Western yellow-billed cuckoo habitat designated as not suitable for recreational shooting in alternative C.....	25
Table 7: Estimated acres of habitat for Merriam's shrew .....	30
Table 8: Known and potential golden eagle nests for the Coconino National Forest .....	36
Table 9: Suitable habitat for beavers on Coconino NF .....	41
Table 10: Language in Alt A that pertains to connectivity and cover .....	46

## Introduction

This supplemental specialist report discloses information related to the viability of 49 terrestrial wildlife species. It describes the affected environment for the species being considered and provides supplemental information to the DEIS. Supplemental reports related to the viability of aquatic species and plants are in two separate reports. This document focuses on the viability analysis for 49 terrestrial wildlife species.

## Relevant Laws, Regulations, and Policy that Apply

All alternatives are designed to guide the Coconino NF's management activities in meeting all applicable Federal and State laws, regulations, and policies.

- National Forest Management Act of 1976 (16 U.S.C. 1601-1614). National Forest Management Act (NFMA) regulations, adopted in 1982, require that habitat be managed to support viable populations of native and desirable non-native vertebrates within the planning area (36 CFR 219.9). USDA regulation 9500-004, adopted in 1983, reinforces the NFMA viability regulation by requiring that habitats on national forests be managed to support viable populations of native and desired non-native plants, fish, and wildlife. For planning purposes, a viable population shall be regarded as one that has the estimated numbers and distribution of reproductive individuals to ensure its continued existence is well distributed in the planning area (36 CFR 219.19). Also, the 1982 planning provisions require that "Forest planning shall provide for diversity of plant and animal communities and tree species consistent with the over-all multiple-use objectives of the planning area" (36 CFR 219.26).
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544).
- The Fish and Wildlife Service has new regulations (Federal Register 74:46835-46879; 11 September 2009) that allow permits to take eagles under the Bald and Golden Eagle Protection Act (Eagle Act) (50 CFR 22.26). The regulations provide for individual and programmatic permits that are consistent with the goal of stable or increasing eagle breeding populations.
- Forest Service Manual (FSM) 2600 guides management of wildlife, fish, and rare plants on Forest Service lands. Six chapters provide guidance for (1) Cooperative Relations, (2) Habitat Planning and Evaluation, (3) Management of Wildlife and Fish, (4) Stocking and Harvesting, (5), Animal Damage Management, and (6) Threatened, Endangered, and Sensitive Plants and Animals.
- The Fish and Wildlife Service has regulations (Federal Register 74:46835-46879; 11 September 2009) that allow permits to take eagles under the Bald and Golden Eagle Protection Act (Eagle Act) (50 CFR 22.26). The regulations provide for individual and programmatic permits that are consistent with the goal of stable or increasing eagle breeding populations.
- National Environmental Policy Act, 1969
- To comply with the Migratory Bird Treaty Act of 1918 (as amended), the forest used Executive Order 13186 (2001) and the MOU with U.S. Fish and Wildlife Service pursuant to this Executive Order.
- Executive Order 13189 (2001) - Responsibilities of Federal Agencies To Protect Migratory Birds. "Species of concern" refers to those species listed in the periodic report "Migratory Nongame Birds of Management Concern in the United States," priority migratory bird species as documented by established plans (such as Bird Conservation Regions in the North American Bird Conservation Initiative or Partners in Flight physiographic areas), and those species listed in 50 C.F.R. 17.11.
- Executive Order 11644 (1972) – Use of off-road vehicles on the public lands
- Executive Order 11989 (1972) – Special protection of the public lands
- Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701-1784)

- Forest and Rangeland Renewable Resources Planning Act (RPA), 1974 (as amended)

## Methodology and Analysis Process

Appendix C of the DEIS describes methods and assumptions used in this analysis in more detail.

Evaluation of bats and migratory birds focused on breeding populations, unless otherwise indicated. This does not mean that foraging, wintering, and migrating populations were not considered but that viability evaluation makes the most sense when viewed in terms of the relative stability of breeding populations.

## Types of Data and Data Sources

There is a requirement for the forest to use best available science during analysis to inform the planning process. Information was compiled on the life history, distribution, abundance, and threats for each species and was updated periodically. Various literature sources, national databases and data management systems were used to develop descriptions of the natural history, status, threats, and recovery efforts for each species as well as their distribution. These sources included peer-reviewed literature, FWS Federal Register publications (mostly those relating to listings or critical habitat designations), recovery plans, Natural Heritage Program reports, various internet web sites, agency reports, and other miscellaneous information. These sources are cited throughout this document and appear in the Literature Cited section of this document. Personal communications were often made with species experts or with biologists who have the most up-to-date information about species, critical habitats, and management activities in their areas of responsibility. These personal communications may have been telephone calls, e-mail messages, notes, or letters. They are cited in the body of the document and records of personal communications are maintained in the Project Record for Forest Plan revision. Wildlife biologists also attended scientific conferences and workshops. Specialist reports from other resources were also used.

Arizona's State Wildlife Action Plan (SWAP) (Arizona Game and Fish Department 2012a) was used to help inform species status. This action plan identifies species of greatest conservation need (SGCN) in terms of each species conservation need and vulnerability or risk level in the state of Arizona and for those species for which the Department has statutory responsibility (all vertebrate species, crustaceans and molluscs). The list excludes plants, insects, causal and accidental bird sightings, feral and pet trade species. It includes species that depend on Arizona habitats for survival and most sport fish (nonnative species actively managed by the Department). The Department developed vulnerability criteria to look at abundance and distribution of the species; population stability (demographic status and declining status) and population risk (fragmentation status and concentration status). Species determined to be 'at risk', that is vulnerable in some criteria) were added to the SGCN list. That list was further prioritized into three tiers. Tier 1A contains those species for which the Department has entered into an agreement or has legal or other contractual obligations, or warrants the protection of a closed season. Tier 1B represents the remainder of the vulnerable species. Tier 1C contains those species for which insufficient information is available to fully assess the vulnerabilities and therefore need to be watched for signs of stress.

Private lands within or surrounding the Forest may contribute to, or hinder, maintenance of species viability on national forest land, but are not relied upon to meet the regulatory requirements. For this reason, habitat abundance was assessed based on conditions found on national forest land. Habitat distribution, however, was assessed considering the condition of intermixed ownerships and conditions, which may affect the interactions of species among suitable habitat patches on national forest lands.

Numerous sources of information were used. NatureServe was relied on heavily. It is an international network of biological inventories, known as natural heritage programs or conservation data centers, operating in all 50 U.S. states, Canada, Latin America, and the Caribbean. NatureServe provided detailed

local information on plants, animals, and ecosystems. The objective scientific information about species and ecosystems developed by NatureServe was used to make informed decisions about species.

Arizona Breeding Bird Atlas information was also used intensively (Corman and Wise-Gervais 2005). This atlas is the result of a comprehensive statewide survey whose results serve as a baseline data and a central source for Arizona breeding birds.

### Adjusted species list and habitat relationships

The species list used in the Ecological Sustainability Report has been modified based on more recent information. NatureServe conservation status ranks and the Arizona Game and Fish Department's State Wildlife Action Plan (SWAP) list were re-checked to see if any updates since 2009 would result in changes to the list. A summary of the SWAP list review is located in the project record. Coconino NF biologists provided additional site specific information regarding species habitat relationships that resulted in changes in primary PNVs for individual species and adding ephemeral and intermittent riparian drainages as an important habitat element for certain species. Under an agreement with the forest, the Museum of Northern Arizona summarized new and hard-to-find invertebrate information from literature and experts in the field. Information from this agreement also modified the species list. Changes in the species list are listed in Appendix C in the DEIS.

### Assumptions

- The forest will implement site-specific management actions to move towards desired conditions in the forest plan. It is understood that funding and constraints other than forest plan direction will control the actual extent and intensity of these site-specific management actions, but this cannot be predicted in a forest-level analysis.
- Standards and guidelines will be followed when selecting, planning, and executing site-specific management actions. If a site-specific action does not follow the standards and guidelines, the action would either be modified or the forest plan must be amended (either project specific or full forest plan amendment) before the action can be allowed.
- The land management plan provides a programmatic framework for future site-specific actions.
- Land management plans do not have direct effects. They do not authorize or mandate any site-specific projects or activities (including ground-disturbing actions).
- Land management plans may have implications, or environmental consequences, of managing the forests under a programmatic framework.
- The plan decisions (desired conditions, standards, guidelines, management areas, monitoring) will be followed when planning or implementing site-specific projects and activities.
- Law, policy, and regulations will be followed when planning or implementing site-specific projects and activities.
- Monitoring identified in the Monitoring Chapter will occur and the land management plan will be amended, as needed.
- We will be funded similar to past budget levels (past 5 years).
- The planning timeframe is 15 years; other timeframes may be analyzed depending on the resource (usually a discussion of anticipated trends into the future).
- The kinds of resource-management activities allowed under the prescriptions are reasonably foreseeable future actions to achieve the goals and objectives. However, the specific location, design,



and extent of such activities are generally not known at the time. The decisions are made on a site-specific (project-by-project) basis. Therefore, the discussions should refer to the potential for the effect to occur and are usually only estimates. The effects analyses are to be useful for comparing and evaluating alternatives on a forest-wide basis. It is not intended to be applied directly to specific locations on the Forest.

- The point in time for which the most progress is expected to be made toward achieving desired conditions in fire adapted ecosystems which is still relevant to this analysis is considered to be 50 years. That is, the greatest percentage of the landscape (which is considered temporally relevant to this analysis) would be in the desired state at that time mark. This is also a reasonable scale at which the positive effects to most wildlife populations might be realized. While the life of the forest plan is considered to be 15 years, it should set a trajectory for continued habitat improvement into the feasible future. Additional information on desired conditions in fire adapted ecosystems and detailed information on predicted outcomes for the proposed action and alternatives can be found in the Vegetation and Fire Specialist Report (2011).
- Habitat conditions similar to that which supported associated species during reference conditions would likely contribute to their maintenance in the future, and that the further a habitat departs from those conditions, the lower the likelihood that it is sustainable, and the greater the risk to viability of associated species. We assumed that in pre-European times (around 1876) all the lands within the now-Coconino National Forest boundary were properly functioning and arranged on the landscape within the capacity of the land to support them without modifications such as communities, dams, roads, groundwater pumping etc.
- Grassland PNVTs in other ownership are generally developed because they tend to be relatively flat with relatively deeper soils. This facilitates access and development.

## Other Habitat Features and Considerations

### Rocky outcrops, cliffs, and canyons, talus slopes

Rocky outcrops and cliffs are characterized by exposed rock, shallow soils and sparse vegetation. A cliff is a very steep vertical or overhanging face of rock. Cliff and canyon sites used by wildlife are often inaccessible. Sites used vary by species but may provide specific favorable microclimates. There are over 50 caves on the forest.

Activities such as rock climbing, construction, mineral activities, and vandalism can alter or remove habitat. Habitat may be altered enough to prevent plant establishment or destroy plants. Disturbances are localized and not landscape wide.

### Caves

Caving can modify surface features, temperature and humidity levels in caves modifying the micro-environment for roosting or hibernating bats, possibly making the cave unsuitable or less suitable for occupancy. It can potentially spread disease such as White-Nose Syndrome. White Nose Syndrome (WNS) is a condition associated with the deaths of over a million bats in the U.S. and Canada since its discovery in the winter of 2006-2007 in New York State. A fungus, *Geomyces destructans*, is considered the primary causal agent of WNS. This fungus thrives in cold and humid conditions of caves and mines, which provide prime hibernating habitat for many bat species. It is suspected that the fungus is spreading through bat to bat, bat to cave, and/or human transmission into cave environments.

## Snags

Ganey and Vojta (2007) modeled trends in snag density in ponderosa pine and mixed conifer vegetation on the Coconino and Kaibab National Forests over a 30-yr time horizon. These plots covered the entire elevational gradient occupied by these forest types and a wide range of stand conditions in both forest types. The models predicted that over this period:

- overall snag densities would increase in both forest types,
- densities of large snags would increase in both forest types,
- despite these increases, densities of large snags would remain below target densities in both forest types, and
- species composition and decay-class distributions would change only slightly in both forest types. In mixed conifer, the model predicted a 5 and 3 percent proportional decrease in ponderosa pine and white fir snags and a modest increase in Gambel oak and quaking aspen snags. In ponderosa pine forest, the model predicted an approximate 2.5 percent decrease in ponderosa pine snags and corresponding increase in other snags, mainly Gambel oak.

Wildfires can incinerate snags or create new ones by killing trees and uncharacteristic fire is a threat. Chambers and Mast (2005) studied snags on the forest and reported that most snags were standing 3 years post-wildfire but 59% of the snags were standing 7 years post-fire. These were large straight snags in clumps.

Recent drought has created a pulse of snags on the forest. Ganey and Vojta (2011) studied tree mortality in ponderosa pine and mixed conifer on the Coconino and Kaibab NF from 1997-2007, including a period of severe drought. Mortality was attributed to forest insects, mediated by drought. The number of trees dying from 2002 to 2007 was more than 200% greater than the number dying from 1997 to 2002 in mixed-conifer forest and 74% greater in ponderosa pine forest. Extent of mortality was spatially variable in both forest types. Proportions of trees dying were greatest in the largest size classes, particularly in mixed-conifer forest, where mortality in the largest size class exceeded 22% from 2002 to 2007. Mortality in mixed-conifer forest was particularly pronounced for quaking aspen (85%) and white fir (28%), the least drought tolerant species present.

## Coarse woody debris

Logs and stumps provide important sources of coarse woody debris (CWD). These structures help sustain populations of numerous fungi, lichens, vascular plants, and animals and provide burrowing, foraging and perch sites for wildlife (Ganey and Vojta 2010). The forest does not have any standardized data to determine current downed wood levels on the forest. In addition, there is an inherent spatial variability in downed wood across the landscape. Ganey and Vojta (2010) looked at coarse woody debris (CWD) in mixed-conifer and ponderosa pine forests on the Coconino and Kaibab National Forests. The study found CWD was well distributed across the landscape in both forest types. They suspected that disruption of surface fires in the study area has resulted in a more continuous distribution of forest fuels than occurred under historical conditions. Most mixed-conifer plots met or exceeded USFS guidelines for retention of large logs. In contrast, large logs were sparse and patchily distributed in ponderosa pine forest with half the plots lacking large logs entirely. This is believed to be due to the fact that data represent a wide range of successional stages and large trees were not always present in the stand to produce large logs. Relative contributions of logs and stumps to CWD varied between forest types. Stumps contributed over 65% of CWD density and 15% of CWD volume in ponderosa pine forest. Stumps appeared less important in mixed-conifer forest but still contributed 31% of CWD density.

Coarse woody debris is threatened by fire suppression because interrupted fire return intervals may have made it more continuous than how they occurred historically. Fire may result in more extensive loss of CWD because of this, or disproportionate loss of certain size classes or types. This would result in disrupted nutrient cycling and influence soil productivity and condition and ultimately understory vegetation vigor, diversity, and abundance. The understory, as well as the CWD, provides food and cover for birds, insects, and small mammals.

### Ephemeral and intermittent water courses

Ephemeral water courses flow short-term in response to storm events. Intermittent water courses flow seasonally usually in response to snowmelt and may contain perennial pools. Water courses include their associated drainages and floodplains. The types of riparian vegetation associated with intermittent drainages are cottonwood willow riparian, mixed broadleaf deciduous riparian and montane willow riparian. The vegetation in ephemeral drainages is not as diverse as perennial systems but supports different vegetative species than in the adjacent uplands.

Stream courses are vulnerable to sedimentation and excessive flooding as an indirect effect of uncharacteristic fire in their watersheds. As stated under primary habitat threats above, this could affect aquatic species as well as the stream landforms and processes. This could negatively affect the species associated with the riparian forest pnvts.

### Springs

Springs are ecosystems in which ground water reaches the earth's surface through subsurface structural, geochemical, and geomorphic environments. Springs can support an array of aquatic, wetland, and terrestrial species. According to Stevens and Meretsky (eds.) (2008), there are over 4,800 named springs in Arizona, with over 200 of those on the Coconino. Springs types vary based on water flow, water persistence, water quality, how it comes out of the ground (geomorphic characteristics) etc. Types on the Coconino include seeps, hanging gardens such as in West Fork of Oak Creek, and large springs such as Fossil Springs.

Developed springs remove water from the site and reduce the extent of wetlands and riparian vegetation. Several springs have been observed and documented to be at risk or are nonfunctional riparian areas due to ungulate grazing, infrastructure such as pipes and troughs that divert flows, soil and vegetation trampling and compaction due to recreational activity.

Springs are at risk from dewatering as a result of groundwater pumping and reduced water from shifts in vegetation structure in the areas that affects the spring's aquifer.

### Habitat connectivity

Contiguous blocks of habitat provide movement corridors for breeding, foraging and migrating. Connectivity is important for both terrestrial and aquatic species. It connects adjacent habitat and promotes healthy movement of species between foraging and wintering grounds, up and down streams, as well as genetic flow between populations. Connectivity can occur at different spatial scales and among similar and different habitat patches. It is reduced by habitat fragmentation which can be caused by natural (e.g. wildfire) or unnatural processes (e.g. human development, roads) or can be a natural feature of topography, such as in canyons. An animal's ability to move between optimal habitats is important in evaluating how well it responds to such disturbances over time. Prior to 1876, we assume there were no real barriers to animal movement in northern Arizona. Since that time, Arizona has experienced phenomenal population growth. The inter-related development of structures including roads, railroads, fences, canals, and more recently development from wind and solar energy has affected movement

corridors and dispersal potential for many species, particularly wide ranging animals. Connectivity has also been affected by changes in vegetation; this includes encroachment of trees in and between grassland areas, or loss of movement corridors entirely as a result of uncharacteristic wildfire.

## Human Structures

Archaeological sites, bridges and buildings are used by roosting bats because they provide protection or microclimate needed for roosting, hibernation, or raising their young. Obviously there are more bridges and buildings now than historically but not all provide the low disturbance and microclimate characteristics for successful use. Some bats in the Verde Valley roost in relatively closed (existing walls and ceiling) ruins. Ruins are protected by law. According to forest archaeologists, piñon juniper vegetation has the highest density of archaeology sites. The main threat to roosts and bats in all three of these structures is disturbance.

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) under authority of the Endangered Species Act (ESA) of 1973, as amended. Pursuant to Section 7 (2) (a) of the ESA, a Biological Assessment will be prepared to assess the effects of implementing the selected alternative for the revised forest plan on endangered or threatened species and ensure that proposed actions in the selected alternative would not jeopardize the continued existence of listed species. All federally listed, proposed, and candidate species and designated and proposed critical habitats that the USFWS has identified in its Southwest Region Threatened/Endangered species list were considered in this analysis.

Table 1, table 2, and table 3 show the terrestrial wildlife species addressed in this report, their Forest rank (F- Ranks), and rationale for the F- Rank classification.

**Table 1: Conservation Status, F-Rank, and F-Rank rationale for Federally Listed Species**

Name/Status	F Rank	F Rank Rationale
Chiricahua leopard Frog <i>Rana chiricahuensis</i> <b>Threatened</b>	F1	Very rare on the forest within its habitat
California condor <i>Gymnogyps californianus</i> <b>Experimental non-essential</b>	FN	Two sightings on forest. Has occurred on forest but no breeding population.
Mexican spotted owl <i>Strix occidentalis lucida</i> <b>Threatened</b>	F2	Rare on the forest in its habitat. It requires cool microsites for nesting in cliff, canyon, mixed conifer, and ponderosa pine – Gambel oak environments.
Southwestern willow flycatcher <i>Empidonax traillii extimus</i> <b>Endangered</b>	F1	Very rare on the forest within its habitat Breeding populations on private land adjacent to forest, none on FS lands. Unoccupied suitable nesting habitat on forest. Only single males during breeding season on forest.
Yuma clapper rail <i>Rallus longirostris yumanensis</i> <b>Endangered</b>	FP	Documented adjacent to but not on the forest. Possibly could occur on the Coconino NF. Potentially suitable nesting habitats on sections of the Verde River are not surveyed.
Black-footed ferret <i>Mustela nigripes</i> <b>Endangered</b>	FH	Last confirmed record on forest ~ 40 years ago. Limited surveys conducted, none forestwide. No known extant populations.
Mexican Gray Wolf <i>Canis lupus baileyi</i> <b>Experimental non-essential</b>	FN	Two sightings on forest. Occurs on the forest but no breeding population documented.

**Table 2: F-Rank and F-Rank rationale for Southwestern Region Sensitive Species**

Name	F-Rank	F-Rank Rationale
Arizona toad <i>Bufo microscaphus</i>	FH	Potential habitat on forest, no known current occurrences, historical locations only.
Lowland leopard frog <i>Rana yavapaiensis</i>	F1	Very rare on the forest within its habitat. One known extant population in Fossil Creek. Most other habitat is unsuitable and unoccupied because bullfrogs, crayfish, and nonnative fish.
Northern leopard frog} <i>Rana pipiens</i>	F2	Rare on the forest in its habitat. Known from several sites in one area.
Abert's towhee <i>Pipilo aberti</i>	F3	Uncommon in the forest in its habitat.
American peregrine falcon <i>Falco peregrinus anatum</i>	F4	Common on the forest within its habitat
Bald eagle <i>Haliaeetus leucocephalus</i>	F3	11 known winter roosts, 27 potential winter roosts, 6 known nests. 16-26% of eagles counted during statewide mid-winter surveys are on the Coconino.
Clark's grebe <i>Aechmophorus clarkia</i>	F3	Uncommon in the forest in its habitat. Confirmed nesting Mormon Lake (Corman and Wise-Gervais 2005). Sightings at Kinnikinick Lake and Upper Lake Mary. Mormon Lake is precipitation-influenced and periodically dries up. The other lakes are dammed.
Common black hawk <i>Buteogallus anthracinus</i>	F4	Common on the forest within its habitat
Ferruginous hawk <i>Buteo regalis</i>	F3	Uncommon in the forest in its habitat. It is an uncommon winter transient
Northern goshawk <i>Accipiter gentilis</i>	F3	Uncommon in the forest in its habitat.
Western burrowing owl <i>Athene cucularia hypugaea</i>	FP	Confirmed nesting near Flagstaff during the Breed Bird Surveys (Corman and Wise-Gervais 2005) but no known documented occurrences. Potentially could occur on forest
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i> <b>Also Candidate for listing</b>	F2	Rare on the forest in its habitat. About 58% (18) of suitable sites in the Verde Valley were occupied in 2004 and 2005. Of these, confirmed nesting at 4 sites & possible nesting at 5 sites .Majority of habitat on forest is not surveyed.
Four-spotted skipperling <i>Piruna polingii</i>	F3	NatureServe (2011) ranked this species as globally vulnerable, and vulnerable to apparently secure in Arizona, primarily due to limited distribution. It can be locally common in Arizona (Stevens and Ledbetter 2012).
Nitocris fritillary <i>Speyeria nokomis nitocris</i>	F3	Uncommon in the forest in its habitat.
Nokomis fritillary <i>Speyeria nokomis nokomis</i>	FO	Occurs off forest (Stevens and Ledbetter 2012)

**Table 2: F-Rank and F-Rank rationale for Southwestern Region Sensitive Species**

Name	F-Rank	F-Rank Rationale
Allen's Lappet-Browed Bat <i>Idionycteris phyllotis</i>	F3	Uncommon in the forest in its habitat Breeding populations on the forest.
Dwarf shrew <i>Sorex nanus</i>	F2	Rare on the forest in its habitat
Greater Western Mastiff Bat <i>Eumops perotis californicus</i>	FN	Occurs on forest, but no breeding population is documented on Coconino. One record from the forest.
Long- Tailed Vole <i>Microtus longicaudus</i>	F3	Uncommon in the forest in its habitat
Merriam's shrew <i>Sorex merriami leucogengys</i>	F3	Uncommon in the forest in its habitat
Navajo Mogollon Vole <i>Microtus mogollensis navaho</i>	F3	Uncommon in the forest in its habitat. Known from San Francisco Peaks, Schultz Pass, north of Walnut Canyon, Beaver Creek Watershed, Hart Prairie, Flagstaff near N. West St., Lindberg Springs.
Pale Townsend's Big-Eared Bat <i>Corynorhinus townsendii pallescens</i>	F3	Uncommon in the forest in its habitat. Archaeological sites, sinkholes and cracks and crevices in cliffs. Male-only roosts, maternity roosts, hibernacula on or near forest.
Plains Harvest Mouse <i>Reithrodontomys montanus</i>	F2	Rare on the forest in its habitat
Southwestern River Otter <i>Lutra canadensis sonora</i>	FH	Most likely extirpated on forest.
Spotted bat <i>Euderma maculatum</i>	FN	Occurs on the forest but no breeding population or roosts are documented. One record of a bat from the forest.
Western Red Bat <i>Lasiurus blossevillei</i>	F3	Uncommon in the forest in its habitat.
Wupatki Arizona Pocket Mouse <i>Perognathus amplus cineris</i>	F2	Rare on the forest in its habitat
Narrow-headed gartersnake <i>Thamnophis rufipunctatus</i>	F1	Very rare on the forest within its habitat. Known from only a few sites. In Oak Creek, the upper 1/3 is good but the lower 2/3 has declining population. Very infrequent observations outside the canyon. Few sighted on upper Verde River @ Sycamore Creek. 1 individual at Fossil Creek confluence with Verde River.
Northern Mexican gartersnake <i>Thamnophis eques</i> Also a candidate for listing	F1	Very rare on the forest within its habitat. Few known occupied sites
Reticulate gila monster <i>Heloderma suspectum suspectum</i>	F3	Uncommon in its habitat – about 20 sightings on forest.

**Table 3: F-Rank and F-Rank rationale for Other Forest Planning Species**

Name	F-Rank	F-Rank Rationale
Evening grosbeak <i>Coccothraustes vespertinus</i>	F3	Uncommon in the forest in its habitat. Migratory and breeding. Coconino one of few places in Arizona where it breeds.
Golden eagle <i>Aquila chrysaetos</i>	F3	Uncommon in the forest in its habitat
Golden-crowned Kinglet <i>Regulus satrapa</i>	F3	Uncommon in the forest in its habitat
McGillivray's Warbler <i>Oporonis tolmiei</i>	F4	Common on the forest within its habitat including sites: Hart Prairie, East Rio de Flag, Picture Canyon, Mormon Lake, Double Springs, the Arboretum, San Francisco Peaks, Oak Creek Canyon.
Piñon jay <i>Gymnorhinus cyanocephalus</i>	F4	Common on the forest within its habitat
Swainson's thrush <i>Catharus ustulatus</i>	F1	Very rare on the forest within its habitat
Three-toed woodpecker <i>Picoides dorsalis</i>	F3	Uncommon in the forest in its habitat. Sightings from Little Elden Spring, San Francisco Peaks, Mt. Elden, Kendrick Peak
Alberta arctic <i>Oeneis alberta daura</i>	F2/F3	Rare and uncommon on forest.
Beaver <i>Castor canadensis</i>	F3	Uncommon in the forest in its habitat
Gunnison's prairie dog <i>Cynomys gunnisoni</i>	F3	Uncommon in the forest in its habitat
Pronghorn antelope <i>Antilocapra americana</i>	F3	Uncommon in the forest in its habitat. Highways and communities in Verde Valley have fragmented and reduced available habitat.
Southwestern myotis <i>Myotis auriculus</i>	F3	Uncommon in the forest in its habitat

## Federally Listed Species

### Chiricahua Leopard Frog and Proposed Critical Habitat (Table 1)

**Natural history:** Leopard frogs as a group are habitat generalists, breeding in slack waters in a variety of natural and man-made aquatic systems. Eggs and larvae are entirely aquatic and adults are primarily aquatic. Eggs are laid mainly from February into October with most masses found in warmer months. Egg masses are attached to submerged vegetation. Hatching time ranges between 8-14 days depending on water temperature. Tadpoles have a long larval period, from 3-9 months, and may overwinter. They are mainly herbivorous and aquatic. After metamorphosis, the frogs eat a variety of invertebrates and small vertebrates and are generally inactive between November and February. Males can reach sexual maturity at 2.1 to 2.2 inches, which they can attain in less than a year. They may live as long as 10 years in the wild. They presumably experience very high mortality in the egg and early tadpole stages, high mortality

when the tadpole turns into a juvenile frog then relatively low mortality when they are adults. They avoid predation by hopping to water. Frogs may re-colonize suitable habitat that is within 1 mile overland of occupied habitat; within 3 miles along an ephemeral or intermittent drainage from occupied habitat or within 5 miles along a perennial stream from occupied habitat (Forest Service 2011.) Predators include fish, non-native bullfrogs, gartersnakes, crayfish, aquatic insects, and many mammals. Diet includes primarily invertebrates such as beetles, true bugs, and flies, as well as fish and snails. Amphibians are known to have limited dispersal and colonization abilities due to physiological constraints, limited movements, and high site fidelity however they can disperse to avoid competition, predation, or unfavorable conditions.

**Distribution:** The Chiricahua leopard frog is found in central, east-central, and southeastern Arizona and in west-central and southwestern New Mexico; in Mexico, the species is found in northern Sonora, the Sierra Madre Occidental of Chihuahua, and northern Durango (USDI Fish and Wildlife Service 2012a).

Two distinct areas of occupation for the Chiricahua leopard frog exist: the first includes the northern montane populations along the southern edge of the Colorado Plateau in central and eastern Arizona and west-central New Mexico, and the second includes the southern populations located in the mountains and valleys south of the Gila River in southeastern Arizona, southwestern New Mexico, and Mexico along the eastern slopes of the Sierra Madre Occidental.

Populations in the current range are often small and isolated and it has apparently disappeared from some drainages and mountain ranges (USDI Fish and Wildlife Service 2012b).

**Habitat:** This frog historically occurred in cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 feet and occur (recently and presently) between 5,020 and 5,780 feet on the forest. It is now often restricted to springs, livestock tanks, and streams in the upper portions of watersheds where non-native predators either have yet to invade or habitats are marginal for them. High quality habitat can be summarized as permanent water with aquatic heterogeneity such as, undercut banks, overhanging terrestrial vegetation, and abundant aquatic vegetation (BISON-M 2012). Ephemeral and intermittent riparian water courses with perennial pools are important for movement between suitable habitats.

**Species status:** The Chiricahua leopard frog was listed as threatened in 2002 67 FR 40790, June 13, 2002) with critical habitat (77 FR 16324, March 20, 2012). . The frog was listed with a special rule under § 4(d) of the ESA to exempt all non-federal land livestock tank maintenance and operation from take as prohibited in § 9 of the ESA (U. S. Fish and Wildlife Service 2002a).

A 2011 status review concluded that species threats still occur, and in Recovery Unit 5, criteria for delisting have not yet been met (USDI Fish and Wildlife Service 2011). These criteria include establishment of metapopulations, isolated robust populations; protection and management of habitats for persistence of these metapopulations and connectivity between them. In addition frogs in this Recovery Unit continue to be threatened by bullfrogs, crayfish, non-native fishes, chytridiomycosis, wildfire, and drought. From a population standpoint, according to the 2011 5-year status review, there is no evidence of decline in Arizona and the data suggests at least modest increases.

**Risk factors:** The final listing rule (USDI Fish and Wildlife Service 2002a) describes primary threats to the species and habitat. Disease (chytrid fungus) has probably played a significant role in decline or local extirpation of populations. The fungus does not have an airborne spore, so it must spread via other means. The fungus can exist in water or mud and thus could be spread by wet or muddy boots, vehicles, cattle, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms.



In addition there is an increased chance of extirpation or extinction resulting from small numbers of populations and individuals.

### **California condor (Table 1)**

Natural history: The California condor is a long-lived species with low reproductive rates, generally laying one egg every other year. It is a scavenger, historically feeding on carcasses of deer, elk, and antelope. The young require extensive parental care (USDI Fish and Wildlife Service 1996)

Distribution: Historically widespread in California, Oregon, Arizona, and Mexico, declined to extirpation in the wild by the 1980s; captive breeding increased the number of individuals and allowed releases; reintroduction efforts are in progress in California, Arizona, and Baja California, with limited breeding and fledging success. Reintroduction of captive-bred condors in Arizona began in 1996 at the Vermillion Cliffs National Monument Release Site, not on Forest Service lands.

There have been two reports of condors on the forest, one north of Flagstaff, and another condor roosted one night near Sedona, Arizona as it made a large loop back north.

Habitat: Condors nest in various types of rock formations including crevices, overhung ledges, potholes, caves. They rarely nest in cavities in sequoia trees.

Status of the species: Condors were reintroduced under Section 10(j) of the Endangered Species Act as an experimental nonessential population (USDI Fish and Wildlife Service 1996b). This experimental population area was designated to accommodate future movements and expansions of reintroduced condors (USDI Fish and Wildlife Service 1996), including foraging and roosting. The designated experimental population area is located in Arizona, Utah, and Nevada, and is bounded by Interstate 40 to the south, Highway 93 and Highway 15 to the west, Highway 70 to the north, and Highway 191 to the east (USDI Fish and Wildlife Service 1996). The Coconino National Forest north of I-40 is within the designated experimental population area. Any condors outside of the experimental population area are fully protected as endangered.

This species is highly regulated, endangered, and has a very high viability risk. Based on its wide ranging habits, distance from the forest, and history of forest visits, it could use any ecosystem on the forest and is unlikely to be affected by management activities on the forest. The forest service does not manage lead ammunition, a major threat and trash ingestion is more likely in areas where the condors feed and congregate. The forest will coordinate with the U.S. Fish and Wildlife Service and Arizona Game and Fish Department as needed regarding the designated experimental population area and appropriate actions to support condor recovery.

Risk factors: The largest factor in the decline of condors has been excessive mortality of adults due to ingestion of lead shot, and shooting. Collisions with power lines have been a mortality factor for birds released since 1992 (USDI Fish and Wildlife Service 2002b, 2012c)

### **Mexican spotted owl and Critical Habitat (Table 1)**

Natural history: These nocturnal predators commonly eat small and medium sized rodents such as woodrats, deer mice, brush mice and Mexican voles (Block and others 2005). They are 'perch and pounce' predators that locate prey from an elevated perch by sight or sound, then pounce on the prey and capture it with their talons. They nest in caves, in stick nests built by other birds, in tree cavities, and on debris platforms in trees. The breeding season is March 1 to August 31. Courtship begins in March, egg laying occurs in late March to early April. Females normally lay one to three eggs. Females incubate the eggs for about 30 days. Eggs usually hatch in early May and the young are brooded by the female almost

constantly for the first few weeks, then the female begins to leave the chicks unattended for up to several hours while she hunts. Owlets fledge in early to mid-June about 4-5 weeks after hatching and are dependent on their parents for food early in the fledgling period. Dispersal usually occurs from mid-September to early October. They are sporadic breeders that is, most of the population nests successfully in good years and only a small proportion of the population nests successfully in poor years.

**Distribution:** This subspecies occurs in Arizona, New Mexico, Colorado, Utah and Mexico. Its range in the United States is subdivided into five Ecological Management Units (EMUs). EMUs are based on natural variability of habitat, human influences on owls, international boundaries, and the logistics of implementing Recovery Plan direction. The Coconino NF lies within the Upper Gila Mountains (UGM) EMU. The Upper Gila Mountain EMU consists of steep mountains and deep entrenched river drainages, dissecting high plateaus. It is bisected by the Mogollon Rim, a prominent fault, and a portion of which is on the Coconino NF.

**Habitat:** On the Coconino National forest, the Mexican spotted owl (MSO) occupies mixed conifer and ponderosa pine/Gambel oak vegetation types, usually characterized by high canopy closure, high stem density, multi-layered canopies within the stand, numerous snag, and downed woody debris. They also occupy canyons that provide cool microsites, diverse vegetation of a variety of age classes, and a relatively complex topography. Primary habitats on the forest are Mixed Conifer with Frequent Fire (MCFF), Mixed Conifer with Aspen (MCA) and the ponderosa pine/Gambel oak subtype of Ponderosa Pine (pine/oak) PNVTs.

Based on mid-scale information, there are about 403,461 acres of MSO habitat on the forest (pine oak [estimated to be 40% of the Ponderosa Pine PNVNT] plus MCFF plus MCA). Major land uses include fuels reduction, ecological restoration, timber and fuelwood harvest, livestock production, and recreation.

Table 4 shows the departure and trend for MSO habitat relative to reference conditions for vegetation, fire, and soil. Departure was assessed as Low (0-33 percent), Moderate (34-66 percent), or High (greater than 66 percent). We assume that departure and trends and effects for Ponderosa Pine are proportional in the 40% of the landscape we are assuming is representative of ponderosa pine/Gambel oak sub type.

**Table 4: Departure and trends for Mexican spotted owl habitat- existing condition**

PNVT	Existing Acres	Existing Departure (%) and Trend		
		Vegetation	Fire	Soils
Ponderosa Pine- Gambel Oak	316,759	High (79), Away	High (VCC III)	Low (1), Static
Mixed Conifer with Frequent Fire	49,619	Moderate (64), Away	High (VCC III)	Low (0), Static
Mixed Conifer with Aspen	37,083	Moderate (62), Away	High (VCC III)	Low (0), Static
Total:	403,461			

As a consequence of the vegetation departures, there is increased tree density, more continuous tree canopy, and increased fuel loading and continuity in owl habitat. In pine/oak and Mixed Conifer with Frequent Fire, there has been a significant shift to closed canopy medium aged forest and reduced understory species cover and diversity. There is more even-aged structure than in reference conditions in

pine/oak habitat which is not beneficial for MSO because they prefer uneven-aged structure. In the mixed conifer types there have been shifts to more shade tolerant species.

High departures for vegetation condition classes are shown for fire. See the DEIS for Forest Plan Revision (2013) for further information about vegetation condition class. Fire return intervals for these PNVTs are substantially departed from historic frequencies as is potential fire severity. Pine oak and Mixed Conifer with Frequent Fire PNVTs are characterized by low severity fires at 0-35 year intervals and the estimated current fire return intervals are between 130 and 344 years. Mixed Conifer with Aspen PNVT is characterized by mixed severity at 35-200 year intervals. The current vegetation structure does not reflect the characteristic fire regime.

Some of these characteristics have a beneficial aspect for MSO but it's the proportion and continuity of these characteristics across the landscape that pose an increased risk of large, uncharacteristic, and high severity fires to MSO and its habitat on the forest. For example, high tree density and tree cover, and shade intolerant trees contribute to a cool micro climate favored by this subspecies. Higher fuel loadings (that is, downed logs and coarse woody debris) provide structure and habitat for prey species. However, the collective continuity of dense trees, canopy and high amounts of fuels substantially increase the potential for uncharacteristic fire, vulnerability to insect and disease outbreaks, and competitive stress. These conditions also reduce age class diversity which is important for the sustainability of large trees across the landscape, an important element of MSO habitat. These conditions also reduce openings in the forest, sunlight and water reaching the ground, and subsequently, the amount and vigor of understory vegetation on which owl prey species depend.

Soil in MSO habitat is in mainly satisfactory condition which means that soil function is being sustained and soil is functioning properly and normally.

Species status: Listed as threatened under the Endangered Species Act: April 15, 1993 (Federal Register Vol. 58, No. 49 pp. 14248-14271)

Based on 2011 data, there are 190 occupied or formerly occupied sites (protected activity centers) that occur wholly or partly on the forest. There are 118,341 acres of protected activity centers. Protected activity centers are established at all MSO known and historical sites and are at least 600 acres in size and encompass known nests, roosts, and the best available habitat in the area. Over 90 percent of the suitable MSO habitat on the forest has been surveyed. Unsurveyed habitat probably occurs in remote wilderness or in marginal potential habitat. Surveys were done to Southwestern Region protocol; however some surveys are becoming outdated.

Risk factors: Primary threats are stand-replacing wildland fire and even-aged timber harvest under a shelterwood harvest regime, loss of lower and middle-elevation riparian habitat; loss of habitat due to recreation developments although grazing, recreation, and other land uses were also mentioned as possible factors influencing the MSO population in the Recovery Plan (USDI Fish and Wildlife Service 2012d). It is also associated with cliffs and canyons. Activities including rock climbing, caving, construction, mineral activities, and vandalism can alter or remove habitat. Human activities that result in disturbance can disrupt sensitive life stages such as breeding. Activities include but are not limited to dispersed recreation, construction, vegetative treatments, and vandalism.

Critical Habitat: Critical habitat is designated by the U.S. Fish and Wildlife Service to provide for the survival and recovery of listed species. Approximately 8.6 million acres of critical habitat was designated on Federal lands in Arizona, Colorado, New Mexico, and Utah (69 FR 53182) (USDI Fish and Wildlife Service 2004). In Arizona, 3,228,145 acres were designated on National Forest System lands. All or a portion of six critical habitat units occur within the Coconino National Forest, totally 575,100 acres In

determining which areas to propose as critical habitat, the FWS is required to consider those physical and biological features (primary constituent elements) that are essential to conservation of the species and that may require special management considerations or protection.

All areas within critical habitat unit boundaries are defined as critical habitat. However, Federal actions within critical habitat boundaries do not trigger Endangered Species Act section 7 consultation with the U.S. Fish and Wildlife Service unless actions may affect the MSO and at least one of the primary constituent elements.

### **Southwestern willow flycatcher and proposed critical habitat (Table 1)**

Natural History: Nesting southwestern willow flycatchers nest in dense riparian thickets in the southwestern United States and winter in southern Mexico, Central America, and northern South America. They nest in areas where perennial flow, surface water, or saturated soil is present from April through September. In most riverine situations, associated channels are wide and shallow with a well-defined floodplain and a broad valley. Streams are slightly entrenched with well-defined meanders and riffle/pool bed features. Quiet water dominates, as in backwaters, pools, beaver ponds, or non-riffle stream stretches. This flycatcher nests and lays 3-4 eggs in late May and early June. Fledging is in early July. Usually there is only one brood per year but multiple clutches are not uncommon. This neotropical migrant spends about three to four months on their breeding grounds and the remainder of the year is spent on their wintering grounds or on migration.

Distribution: Historical breeding range included southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and extreme northwestern Mexico. The current range is similar to historical range but the quantity of suitable habitat within the range is much reduced. Its distribution follows that of its riparian habitat: relatively small, isolated, widely dispersed locations in a large arid region. This flycatcher's winter range includes southern Mexico, Central America, and probably South America. In Arizona, investigations after 1990 suggest that SWWF persist, probably in substantially reduced numbers, in portions of thirteen major watersheds including the Tonto Creek and Verde River systems. There were three sites along the Verde River identified in the Gila Recovery Unit. The Verde River borders the forest. The sites are: Camp Verde, Tavaschi Marsh, and Tuzigoot Bridge. As of 2002, within this Recovery Unit, about half of the known territories were on government-managed lands; the largest populations were on sections of the upper Gila River and lower San Pedro River and inflows into Roosevelt Lake. Remaining sites were small. About 58% of SWWF territories were in native-dominated habitats, however SWWF in this Recovery Unit make extensive use of exotic or exotic-dominated habitats (primarily tamarisk (USDI Fish and Wildlife Service 2002). Breeding birds no longer occur at Tavaschi Marsh and Tuzigoot Bridge (USDA Forest Service 2011b).

There is no known occupied habitat. There are no known nesting willow flycatchers on the Coconino National Forest although there are known populations of nesting willow flycatchers at various sites on private land along the Verde River.

Habitat: Suitable and potential habitat for southwestern willow flycatchers mainly occurs below the Mogollon Rim along various perennial streams in the Verde Valley including, the Verde River, Sheepshead Spring, Dry Beaver Creek, Beaver Creek, West Clear Creek, and Fossil Creek. Some suitable/potential habitat occurs above the Rim.

The flycatcher breeds in patchy to dense riparian habitats along streams or other wetlands, near or adjacent to surface water or underlain by saturated soil. In most cases dense vegetation occurs within the first 10-13 feet above ground. Dense patches are often interspersed with small openings, open water or shorter/sparser vegetation, creating a mosaic that is not uniformly dense. Almost always, slow-moving or

still surface water and/or saturated soil are present at or near breeding sites during wet or non-drought years. Vegetation may be native or a mixed native-exotic.

Species Status: Listed as endangered by U.S. Fish and Wildlife in 1995 (USDI Fish and Wildlife Service 1995).

Risk factors: Threats are primarily nest parasitism, disturbance, loss or degradation of riparian habitat. Activities that physically modify hydrology, structure or composition of springs including, but not limited to, recreation, construction or maintenance activities, spring related projects, and herbivory, which can decrease habitat quality and waterflows. Nest parasitism from brown-headed cowbirds which associate with livestock reduces survival of the host species' young. The Forest Service has control and authority over grazing permitted by the Forest Service, but not over livestock grazing that occurs on lands in other ownership. Loss and modification of riparian habitat can occur via dams and reservoirs, diversions and groundwater pumping, channelization and bank stabilization, phreatophyte control, livestock grazing, recreation, fire, agricultural development, and urbanization. Fire is an imminent threat to occupied and potential southwestern willow flycatcher breeding habitat. Although fires occurred to some extent in some of these habitats historically, many native riparian plants are neither fire-adapted nor fire-regenerated. Thus, fires in riparian habitats are typically catastrophic, causing immediate and drastic changes in riparian plant density and species composition. Busch (1995) documented that the current frequency and size of fires in riparian habitats on two regulated rivers (Colorado and Bill Williams) is greater than historical levels because reduced floods have allowed buildup of fuels, and because of the expansion and dominance of the highly-flammable tamarisk. Tamarisk and arrowweed (*Tessaria sericea*) recover more rapidly from fire than do cottonwood and willow. In recent years riparian wildfires destroyed occupied southwestern willow flycatcher sites on the Rio Grande in New Mexico, the San Pedro and Gila rivers in Arizona, and in the Escalante Wildlife Area in Colorado.

Development, dams, fencing, major transportation corridors, and road construction and maintenance can fragment habitat which can alter seasonal movements, dispersal, gene flow, and can improve brown-headed cowbird habitat, a nest parasite of this species.

Breeding flycatchers have been monitored at Tuzigoot bridge and Tavaschi Marsh (both extirpated sites), and Superior (AKA Camp Verde site). Other sites on private land where flycatchers have been detected but not monitored include private land downstream of the Hwy 260/West Clear Creek bridge (single flycatcher detected in 1997) and three other sites along the Verde on private land between White bridge and the West Clear Creek confluence (of these, only the section 7 site has documented breeding flycatchers).

Critical Habitat: Revised critical habitat was designated by U.S. Fish and Wildlife Service in 2013 (USDI Fish and Wildlife Service 2013). A portion of the stream segments designated as critical habitat occurs on the forest. The lateral extent of a stream segment includes the riparian areas and streams within the 100 year flood plain.

## **Yuma clapper rail (Table 1)**

Natural history: This is one of seven subspecies of *Rallus longirostris*. They feed on crayfish, small fish, clams, isopods, and insects (USDI Fish and Wildlife Service 1983).

Distribution: Historically, the Yuma clapper rail occurred in the southern portion of the Colorado River from Yuma, Arizona southward. Construction of dams along the Colorado and other rivers allowed the formation of large silt deposits, which in turn developed into cattail marshes (U.S. Fish and Wildlife Service 1983).

Vagrant birds occur at Roosevelt Lake on the Salt River on the Tonto National Forest and birds have been observed adjacent to the Coconino National Forest at Tavasci Marsh on private land and near Tuzigoot National Monument during the winter and late summer. Surveys on the forest at Stehr Lake were negative and since then this lake has been drained and re-contoured in conjunction with the decommissioning of the Child's/Irving hydropower operation.

There are no known Yuma clapper rails nesting on Coconino NF lands.

Habitat: The Yuma Clapper Rail lives and nests in freshwater marshes containing dense cattail and bulrush stands, at least 15.7 feet in height. Rails require large patches (at least 1 acre) of cattails. Patches of this size have not been detected.

Status of species: Federally listed as endangered (USDI Fish and Wildlife Service 1967).

Risk factors: Limiting factors for this species are the availability of suitable marsh habitat and food (USDI Fish and Wildlife Service 1983).

Species effects: This species does not currently occur in analysis area and has not occurred in the past; surveys for potential habitat to date have been negative; the main population is in southwestern Arizona. The species is unlikely to be affected by management on the forest. As described in the beginning of this section, plan language in all alternatives support maintaining the viability of threatened, endangered, sensitive and candidate species, and improve habitat for these and other species should the species occur here.

## **Black-footed ferret (Table 1)**

Natural History: Black-footed ferrets rely on prairie dogs for food, shelter, and denning. It mates in March and April and a typical litter of 3-4 kits is born May through June. The kits stay below ground for about 2 months at which point their mothers move the litter to various burrows within their home range. By 90 days, kits are nearly full size and are able to kill prairie dogs (USDI Fish and Wildlife Service 2010b).

Distribution: Historically black-footed ferrets ranged from Canada to Mexico in western North America. Currently it occurs at 16 reintroduction sites in 8 states, Canada and Mexico. It is extirpated from all its range in Arizona. Ferrets are extirpated from virtually all of its range including Arizona because of prairie dogs and predator control programs. Substantial numbers of prairie dogs were poisoned in the 1930's and prairie dogs have been able to re-establish in areas poisoned decades ago. The ferret evidently was not able to survive this severe reduction in prairie dog numbers (Belitsky 1993 *in* Arizona Game and Fish Department 2001). One historic location of black-footed ferrets comes from 12 miles west of Winona, close to Flagstaff (Cockrum 1960). There are also historic records from 7 miles NE of Williams and in Government Prairie near Parks, Arizona (Cockrum 1960).

There are no known existing ferrets or records of the endangered black-footed ferrets on the Coconino National Forest. There have been numerous surveys for Gunnison's prairie dogs and a few for black-footed ferrets but with negative results for the black-footed ferret.

Habitat: Black-footed ferrets are associated with Great Basin Grassland, Montane Subalpine Grassland, and Pinyon Juniper with Grass PNVs. These are the pnvts that contain the forest's prairie dog colonies.

Species status: Listed as endangered in 1967 across its entire range, with the exception of several reintroduced populations designated as experimental (USDI Fish and Wildlife Service 1967, 1996).

Risk factors: The loss or decline of Gunnison prairie dog populations due to disease and human activities. Gunnison prairie dogs occur on the Coconino (see write-up in 'Other Planning Species below'). The forest manages prairie dog habitat to promote healthy populations and an Interagency Management Plan for Gunnison's Prairie Dogs in Arizona has been prepared (Underwood 2007) however bubonic plague has severely reduced many colonies. If black-footed ferret reintroduction is deemed appropriate for the forest, the forest will coordinate with the U.S. Fish and Wildlife Service and Arizona Game and Fish Department as needed.

### **Mexican Gray Wolf (Table 1)**

Natural history: Mexican gray wolves were extirpated from the wild before their natural history and ecological role could be described and studied.

Wolf packs usually live within a specific territory that they defend to the exclusion of other wolves and often nonspecifics, such as coyotes. Territories range in size from 84.5 km<sup>2</sup> (50 mi<sup>2</sup>) to greater than 1,609 km<sup>2</sup> (1,000 mi<sup>2</sup>) and is dependent on how much prey is available and the prey's seasonal movements. Their ability to travel over large areas to seek out vulnerable prey, and their social structure makes wolves good hunters. Mexican wolves use elk as their primary prey source (Arizona Game and Fish Department 2012b).

Distribution: Mexican gray wolves are the southernmost occurring, rarest, and most genetically distinct gray wolf in North America. They historically occurred in the mountainous regions of the Southwest from throughout portions of southern Arizona, New Mexico, and Texas into central Mexico. Mexican gray wolves were extirpated in the United States by aggressive predator control programs (Brown 1983).

On the Coconino, wolves were reported to be fairly common, if not particularly numerous, in the vicinity of the San Francisco Peaks in the mid-1800's (Davis 1982). Hoffmeister (1986) lists one gray wolf specimen from Kendrick Peak in 1913. Additionally, Cockrum (1960) lists an additional specimen examined from nearby Williams, Arizona, on the Kaibab National Forest. In 1942, the last reported wolf from north of the Mogollon Rim and northern Arizona was trapped near Limestone Point about 40 miles southwest of Winslow (Brown 1983). This location was on the Coconino or nearby Apache-Sitgreaves National Forest.

Wolves have ventured onto the Coconino National Forest at least twice. A report prepared as a result of a 5-year review of the reintroduction program shows maps of two separate dispersal movements of wolves to areas within the Coconino National Forest boundary (Interagency Field Team 2005).

Habitat: Wolves are habitat generalists and typically only require adequate prey to survive. Because of the wide-ranging nature of wolves and the lack of specific vegetative habitat requirements, most of the forested areas of the Coconino NF probably provided suitable habitat. There are an estimated 1,264,270 acres of potentially suitable habitat on the forest. Prey and water availability were probably the most important factors in determining distribution and habitat use by wolves.

Status of the species: On January 12, 1998, the FWS published an ESA §10(j) rule on the Mexican gray wolf that provided for the designation of specific populations of listed species in the United States as "as experimental populations" (USDI Fish and Wildlife Service 1998). Under §10(j), a population of a listed species re-established outside its current range but within its probable historic range may be designated as an experimental population. Non-essential, experimental populations located outside of National Wildlife Refuges or National Park lands are treated as if they are proposed for listing. This means that under §7 of the ESA, Federal agencies are under obligation to Conference with the FWS on their proposed actions to insure that they are not likely to jeopardize the continued existence of the species. The reintroduced

Mexican gray wolf population has been designated a non-essential, experimental population, providing for greater management flexibility to address the concerns of local residents on the Apache-Sitgreaves and Gila National Forests.

This rule designated primary recovery zones, secondary zones, and an experimental population area. All of the Coconino National Forest south of I-40 is within the experimental population area, but outside of the recovery zones. This means that under the Final Rule, wolves will only be reestablished in the recovery areas; wolves will not be allowed to establish territories on public lands wholly outside the designated wolf recovery areas. Wolves that occasionally make forays onto public lands outside of recovery areas will not routinely be captured and returned, but any wolves that cause livestock depredation and/or establish territories will be captured and returned to the designated recovery area(s) (USDI Fish and Wildlife Service 1998).

Two proposed rules were published in the Federal Register in 2013 that would affect the status of Mexican wolves on the Coconino if the rules become final. The first rule proposes that the Mexican wolf (*Canis lupus baileyi*) would remain classified as an endangered subspecies rangewide whereas the species (*Canis lupus*) would be delisted (USDI Fish and Wildlife Service 2013b). The second rule proposes that the boundaries of the Mexican Wolf Experimental Population Area be adjusted north to Interstate 40 (this includes the forest), west to the Arizona state line, east to the eastern border of New Mexico, and south to the Mexican border. This means that if this proposed rule becomes final, wolves would be allowed to occupy the Mexican Wolf Experimental Population Area and would be managed to reduced conflicts (USDI Fish and Wildlife Service 2013c).

Risk factors: Mexican gray wolves are heavily regulated by U.S. Fish and Wildlife Service and Arizona Game and Fish Department ([http://www.azgfd.gov/w\\_c/es/wolf\\_reintroduction.shtml](http://www.azgfd.gov/w_c/es/wolf_reintroduction.shtml)). Human-caused mortality is the primary cause of death of Mexican gray wolves in this population (USDI Fish and Wildlife Service 2012). Law enforcement is the responsible entity and law enforcement jurisdiction varies depending on the individual violation. The forest will coordinate with U.S. Fish and Wildlife Service and Arizona Game and Fish Department regarding the Experimental Population Area or other appropriate actions relating to wolf recovery.

## Regional Forester's Sensitive Species

The Regional Forester's sensitive species program is an initiative to conserve and recover plant and animal species according to policy (FSM 2670). Sensitive species are those plant and animal species identified by the regional forester for which population viability is a concern. The forest improves habitat and restores ecosystems for sensitive species through habitat treatments and management practices. The suitable habitat estimates for each species are based on the vegetation types, inclusions, or stream habitat that are estimated to meet the life history of the species.

### Arizona toad (Table 2)

Natural history: They breed in gently flowing waters generally with well-developed riparian vegetation and feed on insects and snails. More than 90% of its breeding range is within Arizona.

Distribution: There are no known Arizona toads on the forest. Historically they were found on East Clear Creek and the Verde River. Sullivan 1991 and Sullivan and Richardson (1993) in AZGFD Heritage Data Management System (Arizona Game and Fish Department 2002a) reported that Arizona toads could potentially occur along the Verde River from West Clear Creek to the East Verde confluences. Other authors state that the Arizona toad has been replaced by the native Woodhouse's toad at Alamo Lake, Lake Pleasant, the Verde Valley, and Fort Mohave (lower Colorado River) (Brennan 2008).



Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). Arizona Game and Fish Department considers this species to be at risk and it is classified as a Tier 1 B species that is endemic to Arizona (Arizona Game and Fish Department 2012a).

### **Lowland leopard frog (Table 2)**

Natural history: The lowland leopard frog prefers permanent stream pools, springs, stock tanks, and side channels of major rivers from sea level to 4,800 feet in elevation but more commonly under 3,300 feet.

Distribution: Arizona Game and Fish Department considers this an endemic subspecies because >90% of the global species' breeding range is within Arizona.

According to Forest Service records, there is one occupied site at Fossil Creek. Currently, lowland leopard frogs are known to occur in Spring Creek but only on the private land parcel, Josephine Tunnel (private land), Page Springs Fish Hatchery (state land), possibly in Oak Creek Canyon (only tadpoles observed), and Soda Springs (private land). Historic records for lowland leopard frogs are from Spring Creek, Verde River, Josephine Tunnel (private land), Oak Creek including the Canyon, and Fossil Creek. Unsurveyed, but suitable locations below the rim are numerous and include perennial streams (Walker Creek, Red Tank Draw), various springs (Russell, Holly), and numerous earthen livestock tanks below the rim.

Habitat: Potential suitable habitat: 15,997 acres not including springs and drainages. This is the sum of the PNVTs.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). It is classified as an at-risk species (Tier 1A) in the State Wildlife Action Plan (Arizona Game and Fish Department 2012a).

### **Northern leopard frog (Table 2)**

Natural history: This leopard frog is generally restricted to permanent waters, but is also found in semi-permanent and seasonal waters. Following metamorphoses, Northern leopard frogs disperse away from their natal wetlands, and can move up to 800 meters in 2 to 3 days and have a tendency to move to the edges of permanent bodies of water. Mass emigrations can follow heavy rains. During dispersal, juvenile frogs can be found in upland forests, meadows and temporary water sources, whereas adult frogs remain closer to original water sources. Northern leopard frogs typically hibernate in ponds and lakes where they may sit on the bottom under rocks or logs, or in depressions in silty substrates. They may bury themselves in the mud or may aggregate over underwater springheads. They are intolerant of freezing and low oxygen levels.

Distribution: The northern leopard frog occurs in the northeastern quarter of Arizona, usually in montane streams and wetlands that have aquatic vegetation, and also in wet meadows at higher elevations. There are 147 estimated occupied sites in constructed and natural waters between Mormon Lake and the Mogollon Rim on the Coconino NF.

Habitat: They occupy stock tanks or constructed waters on the forest. Potential suitable habitat: 9,879 acres not including springs, drainages, or constructed waters.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). It is classified as an at-risk species (Tier 1A) in the State Wildlife Action Plan (Arizona Game and Fish Department 2012a).

Arizona Game and Fish Department considers this species to be substantially to severely declining. Arizona populations are considered at the margins of the species distribution. They have low birth rates or

high death rates with no anticipated worsening of these rates in the next 10 years (Arizona Game and Fish Department 2012a).

### **Abert's towhee (Table 2)**

Natural history: Abert's towhees nest low in trees or shrubs near watercourses and forage on the ground for insects.

Distribution: Arizona has 80-90% of entire range for this species.

Habitat: They are associated with Cottonwood Willow Riparian Forest PNVT and ephemeral and intermittent drainages adjacent to mesquite. They like dense understory, thickets of shrubs and vines, and mistletoe clumps. Occupied habitat was considered to be at least the existing number of acres associated with states C and D (USDA Forest Service 2009) in Cottonwood Willow Riparian Forest PNVT, not including ephemeral and intermittent drainages or mesquite. Suitable habitat is estimated to be at least 1,378 acres, not including the drainages or mesquite, which is the number of acres in states C and D in reference condition. In existing condition, states C and D are assumed to be 36% of 2,507 acres in the PNVT.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). Abert's towhees are rare and uncommon in the appropriate habitat within their range. They are classified as a Tier 1B species according to the State Wildlife Action Plan (Arizona Game and Fish Department 2012a). The primary criteria that classified them as a vulnerable SGCN species is that they are end, there is insufficient information to determine whether or not they have a declining status.

Their population trend is variable but is increasing in some areas like the Verde River and the lower reaches of Oak Creek (USDA Forest Service 2011b).

Risk factors: the primary threats to this towhee are those associated with the habitat.

### **American peregrine falcon (Table 2)**

Distribution: It is a permanent resident on the Coconino National Forest. There are a total of 28 known nesting pairs of peregrine falcons that occur on the Coconino, some of which overlap with other forests or state parks.

Natural history and Habitat: Peregrines use a wide range of elevations in Arizona (400 to 9,000 feet) and wide range of habitats. The essential habitat for peregrine falcon includes rock cliffs for nesting, for vantage points to look for prey, and a foraging area with sufficient abundance of prey. Suitable nesting sites on rock cliffs have a mean height of 200 to 300 feet. The subspecies *anatum* breeds on steep sheer cliffs overlooking woodlands, riparian areas or other habitats supporting avian prey species in abundance. Topographic relief in cliffs and canyons is used for nesting and as vantage points to look for prey.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). In addition to being found in greater numbers than in the 1950's and 1960's, Arizona's peregrines are being found in areas that formerly would have been considered marginal. This suggests that populations may have reached levels saturating the optimal habitat available, and new breeding pairs are forced to breed in sub-optimal areas (Arizona Game and Fish Department 2002b).

Risk factors: Threats: at high levels, pesticide accumulations can cause reproductive failure (none on forest). Disturbance from activities such as rock climbing and recreational shooting at individual nest sites can disrupt breeding cause nest failure or fewer young.

## Bald eagle (Table 2)

Natural history: The Forest provides important wintering habitat for Arizona eagles. Wintering eagles arrive in the fall, usually late October or early November, and leave in early to mid-April. Numbers of eagles peak in February and March. They feed on fish, waterfowl, terrestrial vertebrates, and carrion. Eagles are often seen perched in trees or snags near water or next to roadways where they feed on road-killed animals. However, bald eagles are highly mobile in the winter, and can fly great distances in search of aquatic or terrestrial prey, and suitable nighttime roosting habitat. Wintering eagles occupy most habitat types and elevations, but are most frequently seen within ponderosa pine, pinyon-juniper, and grassland habitats, often near water.

The Tower's, Ladder's, and Lake Mary breeding areas are protected by a seasonal closure that restricts all entry during the breeding season (December 1 through June 30). The Oak Creek breeding area is protected from disturbance by the closure of nearby roads to motorized vehicles. The Beaver breeding area is The Beaver eagle breeding area has issues with OHV activities. A series of social roads extending from D.W. Lane across from the Camp Verde High School south and east to the country north of Highway 260 near FR9207, allows motorcycles and ATVs to travel within close proximity to the Beaver nesting pair, causing adult eagles to flush, circle, and call (USDA Forest Service 2011b).

Distribution: Bald eagles on the Coconino National Forest are primarily winter visitors. National bald eagle winter surveys have been ongoing since 1979. From 1995 through 2010, an average of 299 individuals has been counted on standardized routes during the annual midwinter survey in Arizona (McCarty and Jacobson 2010). On the Forest, small to moderate-sized groups (typically 2-48) of bald eagles roost at night in clumps of large trees in protected locations such as drainages and hillsides (Grubb and Kennedy 1982, Dargan 1991). Eagles typically roost in ponderosa pine stands that are variable in size (less than an acre to 43 acres), are often on north or northeast-facing slopes, and are close to daytime foraging areas. Roost trees are large live or dead ponderosa pine trees averaging 28 inches diameter at breast height that occur in groups and are much larger than other trees in roost stands (Dargan 1991 in USDA Forest Service 2011b).

The other breeding area (Lake Mary) occurs above the Rim near Lake Mary.

There are currently 38 mapped eagle roosts, all in the Ponderosa Pine PNV. Eleven are confirmed roosts, and 27 are potential roosts.

Habitat: Bald eagles in central Arizona prefer to nest on cliffs or in tall trees (USDI Fish and Wildlife Service 1982). They mainly forage on waterfowl and fish found along major streams and lakes, however, they do hunt in the uplands and forage on various mammal species, especially in the winter. Wintering eagles are associated with Ponderosa Pine pnv because they roost in snags and large ponderosa pine trees.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). The U.S. Fish and Wildlife Service removed the bald eagle (*Haliaeetus leucocephalus*) in the lower 48 States of the United States from the Federal List of Endangered and Threatened Wildlife, as of August 8, 2007. Effective March 6, 2008, and based on a court order, the FWS then listed bald eagles within the Sonoran Desert area of central Arizona as threatened (FR Vol. 73, No. 85, May 1, USDI Fish and Wildlife Service 2008a). The court's order temporarily reinstated the listing of the bald eagle as a threatened species in the specified area, pending the outcome of the court-order status review of bald eagles, and the 12-month petition finding. On September 30, 2010, the court ruled to dissolve the injunction, and the bald eagle is no longer a listed species.

## Clark's grebe (Table 2)

Natural history: Clark's grebes nest in colonies among tall plants growing in water on edge of large areas of open water. Their diet is fishes and aquatic invertebrates.

Distribution: There is confirmed nesting at Mormon Lake, southeast of Flagstaff (Corman and Wise-Gervais 2005). This lake may not have water every year. There are also sightings at Kinnikinick Lake and Upper Lake Mary according to Northern Arizona Audubon Society. All the lakes are precipitation-influenced and periodically dry up.

Habitat: Clark's grebe uses marshes, lakes, and bays for nesting. In migration and winter they also utilize sheltered seacoasts and less frequently utilize rivers.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

Risk factors: Species specific threats include disturbance to nesting colonies which could result in failed reproduction or fewer young. They are also vulnerable to ecosystem related threats that reduce nesting habitat height or density making them more vulnerable to predators or disturbance. Ecosystem related threats include drought or localized grazing. Some human disturbance can disrupt breeding and raising young that could result in failed reproduction or fewer young.

## Common black hawk (Table 2)

See DEIS.

## Ferruginous hawk (Table 2)

Natural history: These hawks need diverse early successional states of grasslands, low canopy cover, and herbaceous ground cover to support their prey. Prairie dog towns can be wintering sites as they provide a concentrated prey source.

Distribution: Ferruginous hawks migrate and winter on the Coconino NF. There is no documented nesting (Corman and Wise-Gervais 2005). The current distribution of breeding birds is restricted to grasslands in northern and northeastern Arizona. Ferruginous hawks range more widely in winter and are found throughout the state, often in agricultural areas and other open habitats (Latta et al. 1999).

Habitat: Ferruginous hawk habitat is comprised of open country, grasslands, shrublands, the periphery of pinyon-juniper and other woodland, and desert.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

## Northern goshawk (Table 2)

Natural history: The goshawk preys on large to medium sized birds and mammals which it captures on the ground. The breeding season is March 1 to September 30.

Distribution: There are 86 goshawk post fledgling family areas (PFAs) on the Coconino National Forest, with an additional 3 PFAs that are shared with other forests.

Habitat: On the Coconino, ponderosa pine, mixed conifer above the Mogollon Rim is considered to be goshawk habitat, including any associated pine or mixed conifer stringers that may extend below the rim.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). There was a concern that populations and reproduction of the goshawk were declining in the western United States. These declines

may be associated with forest changes caused by timber harvesting; but fire suppression, livestock grazing, drought, and toxic chemicals may also be involved (Reynolds et al. 1992). “Management Recommendations for the Northern Goshawk in the Southwestern United States” (RM-217) was published in 1992. Many of the recommendations were incorporated into all forest plans in the Southwest Region with the 1996 forest plan revisions. After reviewing several petitions requesting listing, the FWS determined that listing was not warranted at this time (USDI Fish and Wildlife Service 1998).

## Environmental consequences

Alternative C: There would be a total of 11,138 acres of reduced disturbance in northern goshawk post fledgling areas due to classifying some areas as not suitable for recreational (non-hunting) shooting. This is displayed in table 5

**Table 5: Acres of PFAs classified as not suitable for recreational shooting in alternative C**

Area	Acres of PFAs	WHMAs only
Anderson Mesa WHMA	1,540	1,540
East Clear Creek WHMA	1,313	1,313
Flagstaff Neighborwoods MA (special areas within)	24	0
Hospital Ridge WHMA	670	670
Jack's Canyon WHMA	1,267	1267
Long Valley MA	2,286	0
Pine Belt MA (special areas within)	52	0
Pine Grove WHMA	799	799
Second Chance WHMA	754	754
Walnut Canyon MA	2,433	0
<b>Grand Total</b>	<b>11,138</b>	<b>6,343</b>

## Western burrowing owl (Table 2)

Natural history: They are also known to use artificial burrows. These owls also need perches, such as mounds and fence posts. They primarily eat insects and small mammals, but are known to take other small-sized species.

Habitat: They are associated with Great Basin Grassland, Montane Subalpine Grassland, and Pinyon Juniper with Grass PNVTs.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

## Western yellow-billed cuckoo (Table 2)

Natural history: Dense understory foliage is important in nest-site selection. Cuckoos nesting in the Verde Watershed appear to favor cottonwood willow habitat with adjacent stands of mesquite. In one study, all occupied sites had adjacent mesquite and 92% had at least 5 ha (12 acres) of mesquite.

Distribution: Historically, cuckoos were widespread and locally common in Arizona (USDI Fish and Wildlife Service 2001). The loss of substantial amount of low elevation riparian habitats in Arizona has likely resulted in concurrent declines in cuckoos (USDI Fish and Wildlife Service 2001b).

Habitat: This cuckoo is associated with Cottonwood Willow Riparian, Mixed Broadleaf Deciduous Riparian pnvts and mesquite bosques.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

## Environmental Consequences

### Alternative C

**Table 6: Acres of Western yellow-billed cuckoo habitat designated as not suitable for recreational shooting in alternative C**

Management Areas	Mixed Broadleaf Deciduous Riparian Forest	Montane Willow Riparian Forest	Grand Total	WHMA totals	Remainder
Anderson Mesa WHMA	21	237	274	21	
East Clear Creek WHMA		665	665		
Hospital Ridge WHMA		103	103		
Jack's Canyon WHMA		93	259		
Knoll Lake WHMA		4	4		
Limestone Pasture WHMA		23	23		
Long Valley MA	34	477	510		34
Pine Grove WHMA		16	16		
Special areas within San Francisco Peaks MA (not habitat due to elevation)		35	35		
Sedona Neighborwoods MA	327		327		327
Special areas within Sedona-Oak Creek MA		116	116		
Special areas within Verde Valley MA	28		28		28
Walnut Canyon MA		70	70		
<b>Grand Total</b>	<b>410</b>	<b>1,839</b>	<b>2,431</b>	<b>21</b>	<b>389</b>

## Four-spotted skipperling (Table 2)

Natural history and habitat: It requires lushly-vegetated streams and riparian zones with abundant grasses and wildflowers. Adults nectar at dogbane (*Apocynum*), wild geranium (*Geranium*), and various milkweeds (*Asclepias*). The larvae feed on grasses.

Distribution: The species is primarily found along the Mogollon Rim in central Arizona but populations also occur in southeastern Arizona in the Huachuca and Chiricahua Mountains, in central New Mexico, the Davis Mountain in west Texas, and southward into the mountains of Sonora, Mexico. Populations exist along the Mogollon Rim between 6905-7875 feet. On the forest, it is known from Kehl Springs Campground and East Clear Creek and at the Tonto Creek Fish Hatchery, just off the southeast border of the forest. Most well-watered creeks along the Mogollon Rim likely harbor colonies of this species (Stevens and Ledbetter 2012).

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

Risk factors: Its threats are equivalent to those of its habitat. There is no evidence that population dynamics or viability are threatened regionally and over-collecting does not appear to be a threat (Stevens and Ledbetter 2012). It can be locally abundant in Arizona (NatureServe Explorer accessed September 1, 2011).

### **Nitocris fritillary (Table 2)**

Natural history: The eggs are laid on *Viola* leaves.

Distribution: *Nitocris fritillary* is confined to the southwest, spottily through Arizona. They occur just above the east central portion of the Mogollon Rim. It has been reported from Kehl Springs Campground on the forest.

Habitat: This species needs lush vegetation in meadow areas around springs and cienegas. It is associated with wet meadows associated with Wetland Cienega pnt and springs.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

Risk factors: Its habitat threats are those associated with its PNVTs and with springs. There appear to be few impending threats to this species on the Mogollon Rim and the species still appears to be relatively common in its range (Steven and Ledbetter 2012).

### **Nokomis fritillary (Table 2)**

Natural history: Eggs are laid singly on *Viola* leaves. Adults take nectar at a variety of flowers, including thistles.

Distribution: This subspecies is confined to the Four Corners area, occurring in northeastern Arizona, northwestern New Mexico, southeastern Utah, and southwestern Colorado. They have been reported from the Chuska Mountains in northeastern AZ, and from eastern Colorado and southwestern Colorado, and northwestern New Mexico. It has not been reported in or near Coconino National Forest, or in Coconino County. Its similarity to *S. n. nitocris* (*Nitocris fritillary*) renders suspect any observational reports of it in the forest (Stevens and Ledbetter 2012).

Habitat: It uses similar habitats as the *Nitocris fritillary*.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

Risk factors: Primary threats would be those associated with the habitat if it occurred on the forest.

### **Allen's lappet-browed bat (Table 2)**

Natural history: Allen's lappet-browed bats have been found in a variety of habitats in Arizona and can roost 12 km from where they water (Solvesky and Chambers 2009). The sexes segregate in the summer with the females at higher elevations and males in lower elevation (Pinyon Juniper). They forage in wide variety of habitats and like most bats rely on a variety of water sources from streams to earthen stock tanks for watering and feeding.

Distribution: On the forest, maternity roosts are located in large tall ponderosa pine snags with exfoliating bark (Rabe et al 1998, Solvesky and Chambers 2009) and bachelor roosts have been located in cliffs (Solvesky and Chambers 2009). Models that predicted the probability of snag use a maternity roost indicated that this species selected taller snags closer to forest roads (Solvesky and Chambers 2009).

Snag maternity roosts are ephemeral. Of 11 maternity snag roosts located in 1993 and 1995 on the forest (Rabe et al 1998), all but one had fallen or no longer had exfoliating bark capable of supporting a maternity colony. The one still functioned as a roost.

Habitat: They are associated with Ponderosa pine, Mixed Conifer with Aspen, and Mixed Conifer with Frequent Fire PNVTs, and caves.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

### **Greater western mastiff bat (Table 2)**

Natural history: Greater western mastiff bats are habitat generalists and these strong fliers use multiple PNVTs for foraging. A radio tracking study by Corbett and others (2008) yielded roost and foraging site information from an area in far northern Arizona. Maternity roosts were located in cracks or crevices in upper portions of vertical cliffs and faced south or southeast. Near the Vermillion Cliffs in northern Arizona, this species flew from capture site (large ponds) to roosts an average of 12.1  $\pm$  3.0 km away. Maximum distance from roost averaged 25.3  $\pm$  4.9 km. Roosts were remote and difficult to access but foraging areas and drinking ponds are more accessible. One individual used a summer activity area of 29,590 ha and they can fly an estimated 61 km/hr.

Distribution: Range for this bat includes all Arizona counties, except Yavapai, Navajo, Apache and Santa Cruz. This species is mainly on the North Kaibab in Arizona. There was one specimen collected after death near Flagstaff in 1992. There are no roost locations known to occur on or near the Coconino National Forest. Subsequent surveys and anabat recordings have not detected this species.

Habitat: This big bat uses big cliffs, a big foraging area, and big ponds. Physical habitat is cliffs, canyons, crevices at an elevation range of 240-8,475 feet.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

Risk factors: The primary threats to this species would be disturbance or habitat modifications associated with cliffs.

### **Spotted bat (Table 2)**

Natural history: Rabe and others (1998) radio tracked spotted bats captured over ponds in subalpine meadows on the North Kaibab Ranger District in northern Arizona. They found that spotted bats roost singly or in small groups in crevices in cliffs, are territorial, and can forage long distances over multiple pnvts. Spotted bats feed on a variety of noctuid, geometrid, and lasiocampid moths (Painter and others 2009).

Distribution: Historic records suggest that the spotted bat was widely distributed but quite rare over its range, although it may have been locally abundant at certain sites. The historic range of the spotted bat includes Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Wyoming, Texas, Canada and Mexico. It was reported in northwest Arizona in 1974 from Mojave County, and suspected before that (Poché 1975). One spotted bat has been reported from the Flagstaff area (S. MacVean pers.comm). There are no roost locations known to occur on the Forest and it may be an unlikely resident (Chambers pers. comm). If it does occur, this species is a habitat generalist and could forage across the entire Forest.

Habitat: It is associated with cliffs.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).



Risk factors: It is assumed that if it did occur on the forest that there would be few management related threats to roost sites because roosts tend to be in remote inaccessible areas according to the references cited above.

### **Pale Townsend's big-eared bat (Table 2)**

Natural history: Pale Townsend's big-eared bats are associated with caves (including fissures and sinkholes) and archaeological sites. They use a wide variety of pnvts for foraging.

Distribution: The pale Townsend's big-eared bat is found statewide and throughout the western U.S and south into Mexico. A 2007 bat roost inventory and monitoring project compiled, located and inventoried bat roosts in Arizona Game and Fish Region 2 and identified current and potential threats and management needs (Solvesky and Chambers 2007). All of the Coconino National Forest was included within the Region 2 boundaries. Pale Townsend's big-eared bat possible maternity roosts were documented at Crucifixion Cave on the Mormon Lake District (now part of the Flagstaff District), Willard's storage roost on the Red Rock District and Jaw Bone Cave on the Peaks District (now part of the Flagstaff District). Other roosts with Townsend's bats include Devil's Dining Room sinkhole, Nolan sinkhole, and Beasley Flats caves on the Red Rock Ranger District. Two areas, documented to be used by Townsend's big-eared and other bats, having roads leading to the entrances were identified as priority for closure to reduce potential for disturbance to bats using these areas. Doney Fissure with 0.9 miles of road within one-quarter mile of the fissure and Slate Lake with 0.64 miles of road within one-quarter mile of the cave. Townsend's big-eared bats were not documented using ephemeral trees/snags as roosts on the Coconino although pregnant females have been captured in ponderosa pine/Gambel oak vegetation in late June (Morrell and others 1999) and they likely do based on their documented use in other areas they inhabit.

Habitat: Cliffs, caves, archaeological sites

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). Range wide habitat includes caves, mines, lava tubes and abandoned buildings. Range wide, the population is apparently secure although is thought to be declining due to loss of habitat in caves and mines.

Risk factors: They are threatened by disturbance of maternity roosts and potentially disease (White Nose Syndrome).

### **Western red bat (Table 2)**

Natural history: Red bats typically roost singly in dense clumps of foliage of trees or shrubs in riparian or other wooded areas but forage in adjacent uplands.

Distribution: In Arizona, the western red bat is thought to be a summer resident (Hoffmeister 1986). It occurs in widely scattered locations statewide, except in deserts, primarily along riparian corridors among oaks, sycamores, walnuts, and cottonwoods at elevations between 2,400 and 7,200 feet. They also have been taken in pine-fir forest in the Sierra Anchas. Hoffmeister (1986) reports some records of red bats breeding in Arizona from southeastern Arizona. Outside the forest, they have been reported from Bright Angel Creek in Grand Canyon National Park, and in Santa Cruz and Cochise Counties in southeastern Arizona (Hoffmeister 1986). It is reported from the Kachina Village area on the Flagstaff Ranger District (Chambers 2008 pers.comm.)

Habitat: Its primary habitat is deciduous trees in Cottonwood Willow Riparian, Mixed Broadleaf Deciduous Riparian, Montane Willow Riparian, and Ponderosa Pine pnvts.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

Risk factors: Its primary threats are related to ecological conditions that threaten the persistence of deciduous trees in the above pnvts.

### **Dwarf shrew (Table 2)**

Distribution: Merriam 'discovered' this shrew in 1895 (in Berna 1990). It is known from Montana, Wyoming, South Dakota, Colorado, Utah, New Mexico, and Arizona. The first AZ specimen was in 1937 on the Kaibab Plateau in Grand Canyon National Park near Swamp Point, then by Ruffner and Carothers in 1975 near Kanabownits Spring, then by Hoffmeister in 1955 near the Kaibab Lodge (Berna 1990). All three locations were in subalpine conifer forest containing blue spruce, Engelmann spruce, Douglas-fir, *Abies lasiocarpa* and *Abies concolor*, and aspen. Also extensive grassy meadows. He also noted collections from spruce-fir near Hannagan Meadows in the White Mountains and the Inner Basin near Flagstaff (on the forest) by Marshall and Weisenberger in 1971 from rocky talus, subalpine meadows, and spruce fir. Berna collected them in ponderosa pine habitat, with a few aspen, near Fracas Lake on the North Kaibab R.D. (1990) however most locations for this species in the west are from subalpine locations.

Habitat: This species is associated with the subalpine portion of Montane subalpine grasslands, Alpine tundra and Spruce fir pnvts, and talus slopes. This habitat is located on the San Francisco Peaks within wilderness. The one known occupied area is in the Inner Basin on the San Francisco Peaks.

There is an estimated 17,337 acres of suitable habitat on the forest. This represents 13,946 acres of Spruce Fir PNVT, 929 acres of Alpine tundra PNVT, and 2,462 acres of subalpine grassland (a portion of the Montane subalpine grassland PNVT).

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

Risk factors: No known threats. Its threats are equivalent to habitat threats.

### **Long-tailed vole (Table 2)**

Natural history and habitat: On the forest, long-tailed vole habitat can be found in Alpine-Tundra, and in openings in Mixed Conifer with Aspen, Mixed Conifer with Frequent Fire, Montane Subalpine Grassland, and Spruce-Fir PNVTS in the vicinity of San Francisco Mountain. They live in meadows, grassy valleys, grassy clearings in forests, and rocky slopes near or in coniferous forests and can occur up to about ½ mile from water (Hoffmeister 1986). Herbaceous vegetation and cover is important.

To estimate suitable habitat, we used Interstate-40 as the southernmost extent of their habitat, Highway 89 north as the easternmost extent and went to the forest boundary to the north and west, counting open states in the applicable PNVT acreages. This included all of Alpine tundra PNVT, states A, B, C, and G in Spruce fir PNVT; states A, B, G, H, I in Mixed conifer with aspen; states A, B, F, C, D, E, J, K in Ponderosa Pine; states A, B, C in Montane subalpine grassland; and states that represent grass, forb shrub, seedlings and saplings (open and closed) and medium to very large trees open canopy in Mixed conifer with frequent fire PNVT.

Distribution: Most of the species range is outside Arizona (Bowers et al 2004). But within Arizona the range includes Coconino, Apache-Sitgreaves, Coronado, and Kaibab Forests. Hoffmeister (1986) reports long-tailed vole collections on the forest on San Francisco Mountain between 8,000 and 11,500 feet, at Little Spring, in a crater at 9000 feet near San Francisco Mountain, the slopes of Agassiz Peak, Doyle Saddle and Deerwater Ranch at 8,500 feet.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007)

Risk factors: Their primary threats are those associated with their habitat.

### Merriam's shrew (Table 2)

Natural history: They inhabit cool, grassy places near coniferous forest; dry places often near water but not along streams with good herbaceous cover.

Distribution: The range of this species is distributed throughout the west (14 states, British Columbia, and the Navajo Nation). In Arizona, the distribution of Merriam's shrew occurs primarily along the Mogollon Rim as well as the White Mountains and South Rim of the Grand Canyon (Hoffmeister 1986). Brown (1967) reported this shrew from arid portions of plains and foothills and short grass prairie in his work in the Central Rockies.

Habitat: It is associated with openings in Ponderosa Pine, Pinyon juniper with Grass, and Montane Subalpine (montane portion only) Grassland PNVTS. It is primarily associated with openings in ponderosa pine, although has been found in a juniper push near Williams where there was ample grass. Rocks and coarse woody debris provide cover. It is often associated with the Mexican vole (*Microtus mexicanus*). It is associated with herbaceous understory in ponderosa pine, piñon juniper grassland and the montane portion of montane subalpine grasslands.

The understory needed by this species is represented by the proportions in table 7.

**Table 7: Estimated acres of habitat for Merriam's shrew**

PNVT		Calculation of open states	Total acres
Montane subalpine grassland	State B	67% x 23,429 PNVt acres – 2,462 (subalpine portion of this PNVt would not be habitat)	21,967
Pinyon juniper grassland	State A	20% x 261,432 PNVt acres	52,286
Ponderosa pine		30.7% x 791,897 PNVt acres	243,112
<b>Grand total</b>			<b>317,365</b>

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). It is globally secure (G5) and ranked as vulnerable in AZ (S3)(NatureServe 2013a).

Risk factors: Their primary threats are those associated with their habitat.

### Navajo Mogollon vole (Table 2)

Natural history: These are the most xeric adapted of the southwestern voles (Frey and LaRue 1993) and they rely on herbaceous species and shrubs for cover. They eat C3 plants such as clustered field sedge, western wheat grass, Arizona fescue, Kentucky bluegrass, not C4 plants like blue grama, deer muhly and spike muhly.

Distribution: Hoffmeister (1986) has delineated the range for this vole from Navajo Mountain southward to the western part of the Mogollon Plateau from near Mormon Lake westward to the vicinity of Williams. Locations have been reported from 3,800 to 9,700 feet in elevation with a number of locations around the San Francisco Peaks area and also in Garland and Government prairies on the Kaibab National Forest (Ganey and Chambers 2011).

Habitat: They are associated with openings and dry grassy areas in Ponderosa Pine, Mixed Conifer with Frequent Fire, Mixed Conifer with Aspen, and Pinyon Juniper Woodland PNVTs. In a study on the nearby Kaibab National Forest, voles were positively associated with shrub cover and the combined cover of live and dead vegetation. They were negatively associated with bare ground (Ganey and Chambers 2011).

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). Hoffmeister (1986) recognized the Navajo Mogollon vole as *Microtus mexicanus mogollonensis*, however Frey and LaRue (1993) recognize *Microtus mexicanus* as distinct from *Microtus mogollonensis*. The taxonomy of this subspecies is questionable.

Risk factors: Their threats are those associated with habitat.

## Plains harvest mouse (Table 2)

Natural history and habitat: They live in xeric conditions with mesquite, creosote bush, tumbleweeds, some grass and usually in desert scrub or chaparral. Often found in association with western harvest mice. Large numbers have not been collected at any location. Plains harvest mouse may be found in desert scrub, chaparral, and semi-desert grasslands and are known to occur in the Verde Valley. They feed on insects, grains, and plants. In their range they occupy a variety of habitats including well developed grasslands, weedy situations, old hayfields, highway medians, cultivated fields (wheat, sorghum) and grazed riparian woodland. They may nest in grass on or above ground, in underground burrow, beneath rock in stony pasture, under log or discarded lumber, or in can or other object on or near ground (Wilkins 1986 in NatureServe 2013b).

Distribution: This species is known from the Dakotas to Texas Missouri River west and south to the Rockies, and from western South Dakota south to southeastern Arizona, Mexico (Sonora, Chihuahua, and Durango), and Texas (NatureServe 2013b). In Arizona, their range includes Chino, Skull, and Verde Valley, Santa Rosa Wash, and southeastern corner of Arizona (Hoffmeister 1986). He reports that areas around Camp Verde and Duncan are the northern extent of their range. Collections on the forest are from the Camp Verde area.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). They are ranked as G5 (globally secure) and S3 (vulnerable) in Arizona (NatureServe 2013b).

Risk factors: Their primary threats are those related to habitat.

## Southwestern river otter (Table 2)

Natural history: The Southwestern river otter requires permanent flowing water or ponds, overhanging bank vegetation, and haul-out sites suitable for leaving and entering water.

Distribution: The Southwestern river otter is historic to the Verde River, Wet Beaver Creek, Oak Creek, and other major tributaries in the Verde Valley. Evidence suggests that a few populations persisted at least into the 1960's and maybe to the present. In 1981 and 1982, Arizona Game and Fish Department introduced a Louisiana subspecies (*L. c. lataxina*) into Fossil Creek and the Verde River near the Fossil Creek and East Verde confluences. This introduced species is successfully reproducing and will cause genetic swamping of the native form. It is unlikely that any native forms still exist and thus the native form may not be viable. Otters now occur all along the Verde River, up Oak Creek as far as Red Rock State Park, and in Sycamore Canyon, Wet Beaver, West Clear, and Fossil Creek.

Habitat: It is associated with perennial streams associated with Cottonwood Willow Riparian Forest and Mixed Broadleaf Deciduous Forest PNVTs.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

Risk factors: Their primary threats, associated with Forest Service management, are those related to habitat.

### **Wupatki Arizona pocket mouse (Table 2)**

Natural history: This subspecies is not distinguishable from *P. a. ammodytes* by external or cranial characteristics but is geographically isolated from other *P. amplus* subspecies. The Wupatki pocket mouse diet is comprised primarily of forb seeds (Rieck 2013). It is most commonly associated with Merriam's kangaroo rat. In a recent study, Wupatki Arizona pocket mice had a higher probability of occurring in ungrazed versus grazed habitats and in non-grassland vegetation/soil types (dense shrub/deep cinders) between 1,450 to 1,550 meters (Rieck 2013).

Distribution: This subspecies range is from Navajo Spring/Echo Cliffs at the north to the Little Colorado River south of Wupatki National Monument. This subspecies is known from the Wupatki area on the Flagstaff Ranger District. The majority of records are from the Navajo Nation and Wupatki National Monument.

Habitat: Habitat for this pocket mouse is similar to *P. a. ammodytes* and is found within a small portion of the Great Basin/Colorado Plateau grassland and steppe. Suitable habitat is approximately 13,000 acres according to Arizona Game and Fish Department.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007).

Risk factors: Its primary threats are habitat related. It has very limited distribution.

### **Narrow-headed garter snake (Table 2)**

Natural history: The narrow-headed garter snake is the most aquatic of the garter snakes, seldom found far from quiet, rocky pools in large streams and rivers.

Distribution: It is primarily a Mexican species, but occurs in various areas along the Mogollon Rim. On the Coconino National Forest, narrow-headed garter snakes are currently known in about 15 miles of stream (from Oak Creek Canyon and a few sightings from the Verde River), although historic records exist for above the rim in the Happy Jack area. Population numbers in Oak Creek Canyon have decreased significantly, particularly in the lower 1/3 of the canyon and absent entirely downstream of the canyon, since the late 1980s. Historically, this species likely occurred throughout perennial riparian areas in the Verde Valley.

Status: Southwestern Region 3 Sensitive species (USDA Forest Service 2007). It is classified as an at-risk species (Tier 1A) in the State Wildlife Action Plan (Arizona Game and Fish Department 2012a). Arizona Game and Fish Department considers this species to be substantially to severely declining; with small existing populations that are disjunct from each other with low birth rates or high death rates (Arizona Game and Fish Department 2012a).

Risk factors: Primary threats to this species are invasive exotic aquatic species and their overall rarity. In addition, populations are separated by human-created barriers to dispersal so populations are small and isolated from one another (Arizona Game and Fish Department 2012a).

## Northern Mexican gartersnake (Table 2)

**Natural history:** This garter snake is most closely linked to shallow slow-moving or impounded waters, though it also occurs in other aquatic environments. The Mexican gartersnake's diet consists of leopard frogs, toads, tadpoles, various native fishes and lizards and small rodents which are taken during occasional terrestrial forays.

**Distribution:** Its distribution in the United States has been reduced by close to 90% and it occurs in fragmented populations within the middle/upper Verde River drainage on the Coconino NF, middle/lower Tonto Creek, and the upper Santa Cruz River, as well in isolated wetland habitats in southeastern Arizona (U.S. Fish and Wildlife Service 2010a). It is usually found in or near streams and ponds in canyons up to 6,200 feet in elevation.

On the Coconino, they have been sighted along the Verde River and several of its tributaries, especially Oak Creek near the Bubbling Ponds and Page Springs fish hatcheries, and in some wetland and upland habitat located on the Bubbling Ponds Fish Hatchery grounds. Historically they were found below the Mogollon Rim throughout all the tributaries of the Verde River. There are no records on the forest above the Mogollon Rim.

**Habitat:** They are associated with perennial streams near Cottonwood Willow Riparian Forest, Mixed Broadleaf Riparian, and Wetland Cienega PNVTs. Ephemeral and intermittent riparian water courses with perennial pools are important for movement between suitable habitats.

**Status:** Southwestern Region 3 Sensitive species (USDA Forest Service 2007). It is classified as an at-risk species (Tier 1A) in the State Wildlife Action Plan (Arizona Game and Fish Department 2012a). The Mexican garter snake is a candidate for listing under the Endangered Species Act. Arizona Game and Fish Department considers this species to be substantially to severely declining; with small existing populations that are disjunct from each other with low birth rates or high death rates (Arizona Game and Fish Department 2012a).

**Risk factors:** Primary threats to this species are invasive exotic aquatic species such as sportfish, bullfrogs, and crayfish and their overall rarity and fragmentation. Degradation and elimination of its habitat and native prey base are significant threats where nonnative species co-occur. Competition and predation by nonnative species result in direct mortality or reduced reproductive capacity. Fragmentation of habitat separates populations from suitable habitat and from each other and hinders movements. This can decrease the genetic diversity of populations, movement of young into suitable habitat, and increases vulnerability to predators. Activities that physically modify hydrology, structure or composition of springs including, but not limited to, recreation, construction or maintenance activities, spring related projects, and herbivory, which can degrade its habitat and reduce waterflows. Nonnative or invasive aquatic species eat, compete with, and hybridize with native aquatic species. Development, dams, fencing, major transportation corridors, and road construction and maintenance can fragment habitat which can alter seasonal movements, dispersal, gene flow, and predator-prey relationships.

## Reticulate Gila monster (Table 2)

**Natural history:** This large reptile spends the majority of the year under ground. It hibernates from November to January-February. It eats infrequently (5-10 times per year) primarily on reptile and bird eggs although it also occasionally consumes small birds, mammals, frogs, lizards, insects, and carrion.

**Distribution:** The majority of the breeding populations of the species are within Arizona. According to forest records, the Reticulate Gila monster is known to occur throughout the Verde Valley except for the Sedona and immediate surrounding red rock country. There have been a dozen or so sightings in the

following locales; Bell Crossing in Wet Beaver Creek wilderness, Montezuma Castle (National Park Service lands), Verde Valley School, Red Tank Draw, Beaver Creek Ranger Station, White Hills of Middle Verde, Clear Creek campground, Fossil Creek, Fossil Creek road, and Cornville (USDA Forest Service 2011). There are an estimated 7,680 acres of habitat that incorporates the sightings.

**Habitat:** They are known to occur in shrubby, grassy, and succulent desert with access to moisture and occasionally oak woodland and canyon bottoms or arroyos with permanent or intermittent streams. They use rocky bajadas, hillsides, mountainous terrain with rocky shelters and foothills. The species is associated with Desert Communities, Interior Chaparral, Cottonwood Willow Riparian Forest, Semi-Desert Grassland, and Pinyon Juniper Evergreen Shrub PNVTs. Ephemeral drainages are important for movement between suitable habitats. There are an estimated 470,044 acres of suitable habitat. This is the sum of the acres of the associated PNVTs.

**Status:** Southwestern Region 3 Sensitive species (USDA Forest Service 2007). Although the State Wildlife Action Plan does not list this subspecies, the species is identified as at-risk (Tier 1A) (Arizona Game and Fish Department 2012a).

**Risk factors:** The primary threats to the species are associated with its habitat. Populations are large but fragmentation of habitat is separating the populations from each other in some areas of the state. Fragmentation has to do with the extent populations are separated by human-created barriers to dispersal (Arizona Game and Fish Department 2012a).

Primary threats under the control and authority of the forest service are those associated with its habitat including fragmentation. Threats outside the control and authority of the forest service are collection and harvest (authority under Arizona Game and Fish Department), and activities on lands in other ownership such as development and transportation corridors which generally result in loss of and fragmented habitat which tends to isolate populations from each other, and increased interaction with people and vehicles which can result in loss of individuals.

## Other planning species

### Evening grosbeak (Table 3)

**Natural history:** Evening grosbeaks breed in low densities and are very local nesters (Corman and Wise-Gervais 2005).

**Distribution:** Arizona is at the southern edge of its range, breeding from southern Canada to Arizona, New Mexico, and California in the West. They are uncommon and erratic summer residents in areas including between the San Francisco Peaks, Kendrick Mountain, and Flagstaff. They are generally uncommon and local and during breeding bird surveys and in Arizona were found to be absent from several areas where they were formerly located (Corman and Wise-Gervais 2005). They have been observed at Elden Springs, Schultz Pass, and Flagstaff area bird feeders.

**Habitat:** This migratory bird is associated with the deciduous component in Mixed Conifer Frequent Fire and Mixed Conifer with Aspen pnvts. Evening grosbeaks are dependent on deciduous trees such as aspen, big tooth maple, and Gambel oak.

There is an estimated 2,881 acres of potential suitable habitat on the forest. This was determined by summing the open state acres (in which there would be more deciduous trees) of these two PNVTs in a circle that includes the San Francisco Peaks and Kendrick Mountain.

Status: This species has a global rank of G5 because it has a large range, is fairly common and has stable populations. Its state rank is S3 (NatureServe 2013c). Evening grosbeaks are a Tier 1B species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a) primarily due to a declining status in the state.

Risk factors: Primary threats under the control and authority of the forest service are those associated with its habitat.

### **Golden Eagle (Table 3)**

Natural history: In Arizona, golden eagles are permanent residents and nest from arid desert scrub to open conifer forest often near cliffs and canyons, and large open areas for foraging. Eakle and Grubb (1986) identified a total of 38 prey items representing 12 species in golden eagle diets in central Arizona. Mammals made up 78.9%, birds 18.4% and reptiles 2.6%. The majority of remains were black-tailed Jackrabbit (*Lepus californicus*) and Rock Squirrel (*Spermophilus variegatus*) indicating their importance to nesting eagles in central Arizona.

Distribution: Golden eagles have a widespread distribution in the northern hemisphere. Breeding bird surveyors noted gold eagles throughout their previously described range (Corman and Wise-Gervais 2005). Known nests are described in table 8.

Habitat: They are primarily associated with cliffs for breeding. Large trees and snags (ponderosa pine) are used for nesting occasionally.

Status: Golden eagles are a Tier 1B species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a) primarily due to their declining status in the state and concerns about their demographic status. They are categorized as having a demographically poor situation, that is, unusually low birth rates or high death rates combined with small or declining population size. Demographic rates are affected by known stressors likely causing a worsening situation in parts of Arizona.

They are ranked globally secure and apparently secure in Arizona (G5 S4) according to NatureServe 2013d).

All golden and bald eagles, regardless of status, are protected under the Bald and Golden Eagle Protection Act (Eagle Act). This analysis determines if take is likely to occur with implementation of the action alternatives. Take is defined in the Eagle Act as to "...pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest or disturb." Disturb is further defined "...to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." U.S. Fish and Wildlife Service is the regulatory authority for this Act.

For golden eagles, the FWS has issued a report titled *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance* (Pagel et. al 2010).

Risk factors: Although the Arizona Breeding Bird Atlas did not note outstanding threats to golden eagles in Arizona, urban encroachment and increased recreational activity may soon affect some local breeding areas (Corman and Wise-Gervais 2005). However Arizona Game and Fish Department noted demographic challenges (see Status). Electrocution on transmission lines have been noted (NatureServe



2013d) as have impacts from wind turbines (Arnett and others 2007). They are cautious of humans and golden eagles are sparse or absent where human disturbance is frequent.

**Table 8: Known and potential golden eagle nests for the Coconino National Forest**

Status	Name	Comments
Confirmed	Black Mountain Canyon	
Confirmed	Boynton Canyon	Within Red Rock Secret Mtn. Wilderness.
Confirmed	Colton Crater	0.3 miles from Forest boundary.
Confirmed	Mount Elden Sandy Seep	
Confirmed	North of Lost Mountain	Within Red Rock Secret Mountain Wilderness.
Confirmed	Red Mountain	Cliff nest.
Confirmed	Red Mountain	Alternate nest site at Red Mountain.
Confirmed	Secret Mountain	At the edge of Munds Mountain Wilderness.
Confirmed	Upper Lake Mary South	Tree nest.
Confirmed	Upper Lake Mary North	Alternate tree nest at Upper Lake Mary.
Confirmed	Walnut Canyon	Within Walnut Canyon National Monument.
Potential	Bear Sign Canyon	No data or information on this site.
Potential	Dry Lake	Not confirmed. Could be a roost site.
Potential	Indian Point, Oak Creek Canyon	Eagles seen often in area.
Potential	Lee Mtn.	No data or information on this site. Within Munds Mountain Wilderness.
Potential	O'Leary	Golden eagles often seen in area.
Potential	Padre Canyon	Non-FS land. 0.4 mi from Forest boundary.
Potential	San Francisco Wash	No data or information on this site. Digitized point appears to be in bottom of wash, road on top.
Potential	Walker Creek	Reported to FS, not confirmed
Potential	Woody Mountain	No data or information on this site.

### Golden-crowned Kinglet (Table 3)

**Natural history:** This migratory bird can produce 2 broods per year with 8-9 eggs per clutch. Commonly associates with chickadees, brown creepers, and downy woodpeckers during the non-breeding season. Feeds on insects and insect eggs and drinks tree sap. They forage among tree branches and glean from foliage and bark. Arizona breeding bird atlases found this species breeding between 7000 to 10,000 feet in elevation (Corman and Wise-Gervais 2005).

**Distribution:** Surveys for the Arizona Breeding Bird Atlas found this bird throughout their previously described range with the highest densities in White Mountains and San Francisco Peaks areas (Corman and Wise-Gervais 2005).

**Habitat:** They are associated with Spruce-fir, Mixed conifer with frequent fire, and Mixed conifer with aspen PNVTs. These insectivorous birds occur in cool and often moist mature spruce fir forests with closed canopies. They occur at edges of clearings and prefer dense old growth trees. They also nest in cool montane or snowmelt drainages frequently containing various pines, firs, maple, oak and aspen. There are an estimated 100,648 acres of occupied and suitable habitat on the forest. This is the sum of the PNVTs.

Status: This is a priority migratory bird species for spruce fir.

Corman and Wise-Gervais (2005) reported golden-crowned kinglets throughout their previously described range in Arizona, suggesting some population stability; but the relative abundance of birds is unknown in the state.

According to NatureServe (2013e), North American Breeding Bird Survey data showed regional variation in population trends. The short-term trend is relatively stable (10% change) range-wide. Between 1966 and 1994, these surveys documented a 2.7 percent annual decline in the western part of its range (only California, Oregon, and Washington were significant) while there were significant increases in the eastern part of its range during the same time period. This data suggests significant declines in western Golden-crowned kinglet numbers attributable to habitat loss due to fire and timber harvesting activities.

This species has a global rank of G5 because it is widespread and its range is expanding. Its state rank is S3 (NatureServe 2013e). Golden-crowned kinglets are a Tier 1C species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a). This means that its status is unknown because there are no data with which to assess vulnerability status.

Risk factors: Their primary threats are those associated with their habitat. Habitat changes such severe winters in the northern part of its range, forest thinning, and spruce die-off may reduce local populations (NatureServe 2013e).

### **MacGillivray's Warbler (Table 3)**

Natural history: Some authorities refer to this species as *Geothlypis tolmiei*. This insectivorous warbler forages close to the ground in dense vegetation. It gleans foliage and branches, and probes ground litter. Young may take sap from sapsucker wells in willows. It nests in low (0.6-1.5 meters off the ground) shrubby habitat, often in cut-over or burned areas. On the Mogollon Rim, Arizona, a nest predation rate of 49% was reported in snowmelt drainages of mixed pine-oak woodland (NatureServe 2013f).

Insectivorous passerines migrating through Arizona use riparian habitats in higher densities than adjacent non-riparian habitats. They were observed in both xeric mesquite shrubland and in riparian forest with *Populus* and *Salix* dominated overstory (NatureServe 2013f).

Distribution: Breeding range extends from southeastern Alaska and southern Yukon southward through western Canada and western United States, mainly in mountains, to southern California, southeastern Arizona, and southern New Mexico, and east to the Black Hills of South Dakota; also southeastern Coahuila and Nuevo Leon. The species is less common and populations are more disjunct toward the southern limits of its range. Winter range is primarily along the Pacific slope and highlands from northern Mexico through Panama as well as southern Baja California (NatureServe 2013f).

Habitat: This warbler occurs in patches of dense and brushy deciduous riparian areas at higher elevations such as Montane Willow Riparian and, Gallery Coniferous Riparian PNVTs as well as areas that support aspen and maple in Mixed Conifer with Frequent Fire and Mixed Conifer with Aspen. Majority of their activities occur in the shrub layer. Along the Mogollon Rim, they have nested in young big tooth maple and white fir. They have also nested in Douglas fir saplings, and thickets of raspberry, gooseberry, or young Gambel's oak. They have also nested in the San Francisco Peaks area and Oak Creek tributaries such as West Fork.

Status: This species has a global rank of G5 because it has a large breeding range in western North America and a large population size. Apparently it is undergoing a slow, long-term decline likely due to habitat degradation. Breeding Bird Surveys indicate a significant survey-wide decline of 28 percent from 1966 to 2007. Based on Breeding Bird Survey data, mapped trends for 1966-2003 indicated that most

areas of decline were in British Colombia, Washington, Oregon, northern California, and New Mexico, whereas most increases were in interior regions and southern California. Its state rank is S4 (apparently secure) (NatureServe 2013f).

McGillivray's are a Tier 1B species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a) primarily due to a declining status in the state.

Risk factors: They are at the southern end of their breeding distribution in Arizona, New Mexico, and southern California where nesting is patchy and local. Localized extinctions of this warbler have been documented on the Mogollon Rim. This is possibly due to a combination of factors leading to a decline in low deciduous vegetation such as maple, oak, and aspen. These factors may include a recent decline in winter precipitation, heavy elk browsing, and local fire suppression resulting in a lack of early successional vegetation (T. Martin in Corman and Wise-Gervais 2005). Their primary threats are those associated with their habitat.

### **Pinyon jay (Table 3)**

Natural history: Pinyon jays rely on pinyon trees for seed and wander irregularly and erratically for food. They nest in ponderosa pine, pinyon, and juniper trees in colonies when and where adequate pine seeds are available. Nesting success is often low due to predation or severe weather. It does not migrate but may move altitudinally in search of food. They eat pinyon and other pine seeds, grain, and insects. May eat bird eggs and hatchlings. They communally cache large numbers of seeds.

Distribution: Pinyon jays are a resident in Nevada, Utah, Montana, Wyoming, New Mexico, Arizona and California with disjunct populations in Oregon, Baja California, South Dakota and Nebraska. The distribution of pinyon jays parallels the distribution of Colorado pinyon pine.

Habitat: Primary habitat is pinyon juniper and less frequently in pine. They are associated with all three Pinyon juniper pnt types: Pinyon Juniper Evergreen Shrub, Pinyon Juniper Grassland, and Pinyon Juniper Woodland (persistent). In PJES, we assumed that states C and D (medium to very large trees) would provide pinyon nuts and nesting habitat for this species. States C and D are 44 percent of existing PNVN acreage of 263,835 acres or 116,087 acres in this PNVN. For the 261,432 acres Pinyon Juniper with Grass PNVN, 5 percent of the medium to very large trees states (open and closed canopy) were assumed to be occupied nesting habitat which equals 13,072. All Pinyon Juniper Woodland (persistent) acreage (75,393 acres) was added because most of it is large old trees due to the long fire return interval for a total of 204,552 acres of occupied and suitable habitat.

Status: This species has a global rank of G5 (secure) because it has a large range, is fairly common and has stable populations. Its state rank is S4 (apparently secure) (NatureServe 2013g).

Pinyon jays are a Tier 1B species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a) primarily due to a declining status in the state.

Risk factors: Their primary threats are those associated with their habitat. The recent extensive loss of pinyon pines on the forest due to drought and subsequent bark beetle infestations will undoubtedly also negatively affect populations (Corman and Wise-Gervais 2005).

### **Swainson's thrush (Table 3)**

Natural history: The Coconino NF is one of the few places in Arizona where the species breeds. Predators are presumed accipiters and falcons. Main foods are berries and insects (Arizona Game and Fish Department 2001b). Breeding habitat includes dense vegetation in coniferous forests, thickets of

willow and aspen forests (NatureServe 2013h). Nests are usually in small trees, close to the trunk, often 2 meters or less above the ground. Primarily a migratory species in Arizona.

Distribution: The Swainson's thrush breeds in numerous locations in North America and winters mostly in Mexico and northern South America.

Habitat: They are associated with Mixed Conifer with Aspen and Spruce-fir pnvts. They occur in corkbark fir forests on the San Francisco Peaks, need dense clumps of trees, and can occupy dense spruce fir where forest openings occur and aspen forests. They prefer edges that have dense ground and understory vegetation. They nest in shrubs, low in coniferous trees or thickets of deciduous shrubs or conifer saplings. In general, canopy closure and tree density are high in forests occupied by these thrushes. Occupied breeding locations in Arizona, are typically cooler and wetter than the surrounding areas often inhabited by Hermit thrushes (Corman and Wise-Gervais 2005).

Status: This is a priority migratory bird species for spruce-fir. This species has a global rank of G5 because it has a wide nesting range in North America and a large population size. It has experienced a slow rate of decline over the past several decades primarily due to habitat loss, degradation, and fragmentation in breeding range and winter range. This trend is significant only in Canada. Its state rank is S1 (critically imperiled) (NatureServe 2013h).

Swainson's thrushes are a Tier 1B species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a) primarily due to a disjunct status in the state. This means that there is 1 to few populations in Arizona separated by large relative distance from larger core distribution of the species outside of Arizona.

Risk factors: Threats are those related to habitat: uncharacteristic fire or activities that remove herbaceous layer (habitat for food) and dense tree clumps.

### **Three-toed woodpecker (Table 3)**

Natural history: They are primary cavity nesters, preferring snags over live trees. Species is well known for moving into disturbed forests 1-2 years after being ravaged by fire, disease or insects. They will remain to nest in higher densities for several years while food remains abundant. They have a large home range.

Distribution: It ranges from northern Alaska across Canada and south to eastern Nevada, central Arizona, and southern New Mexico (NatureServe 2013i). It is a local resident and has limited distribution in Arizona, where it is at near the southernmost extent of their range. In Arizona, these woodpecker populations appear to be fairly stable with no obvious loss in distribution in the state. The Coconino is one of the few places in the state where they breed. They are threatened by activities that reduce or remove dead and dying trees such as fire suppression and salvage logging. Temporary increases in populations could occur in response to widespread wildfires (Corman and Wise-Gervais 2005).

Habitat: They reach their highest abundance in forests dominated by Engelmann spruce, blue spruce, and subalpine fir (Spruce-Fir pnv) and also use mixed conifer pnvts and conifer drainages. There is an estimated 100,646 acres of suitable and occupied habitat on the forest which is the sum of the PNVts.

Status: This species has a global rank of G5 (secure) because it has an extensive Holarctic distribution with numerous occurrences, but it is uncommon in most areas. Its state rank is S3 (vulnerable) (NatureServe 2013i).

Three-toed woodpeckers are a Tier 1C species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a). This means that its status is unknown because there are no data with which to assess vulnerability status.

Risk factors: Its primary threats are habitat related, such as fire suppression.

### **Alberta arctic (Table 3)**

Natural history: Its larvae eat various species of grasses.

Distribution: There are isolated populations of this butterfly on the San Francisco Peaks and Schultz Pass area, and in the White Mountains and its main range is in the Canadian prairies (Stevens and Ledbetter 2012).

Habitat: It occupies extensive moist grasslands, wet meadows and aspen forests between 8,000 and 9,500 feet in elevation.

Status: It is G3 (globally vulnerable) and is ranked S3S4 (vulnerable to apparently secure) in the state.

Risk factors: There are no known species –specific threats. Its habitat is threatened by water diversion of springs (many of the mid-elevation grasslands associated with springs on the San Francisco Peaks have been eliminated) and fire suppression which along with drought and elk browsing as limited aspen recruitment and herbaceous production.

### **Beaver (Table 3)**

Natural history: This large rodent is considered a keystone species that profoundly affects aquatic and riparian ecosystems. Changes that occur with beaver activity include:

- Storage of precipitation and reduced discharge variability,
- Increased depth and surface area of water,
- Increase in open canopy
- Reduction of riparian deciduous trees
- Enhancement or degradation of fish habitat,
- Habitat enhancement for species dependent on wetlands or dead trees,
- Increased plankton productivity and an increase in aquatic insects,
- Increased trapping of sediment and decreased turbidity downstream,
- Enhancement of beaver food plants such as willow and alder,
- Increase in carbon and nutrients in the channel, and
- Increased resistance of ecosystem to perturbation (NatureServe 2013j).

Food shortage is probably the major factor affecting colony longevity. Typically a colony is a family group. Humans are the only significant predators in most areas. Tularemia, a bacteria disease, has caused large die-offs in some regions. Favored food plants include aspen, willow, cottonwood, alder, birch, and pine.

**Distribution:** Found throughout most of North America except in arctic tundra, peninsular Florida and much of the desert area of the Southwest.

**Habitat:** They are associated with Cottonwood Willow Riparian, Mixed Broadleaf Deciduous Riparian, and Montane Willow Riparian Forest PNVTs associated with streams. There is an estimated 719 acres of occupied habitat and 1,438 acres (101 miles) of suitable habitat on the forest (table 9). About 50% of suitable habitat is estimated to be occupied.

**Table 9: Suitable habitat for beavers on Coconino NF<sup>1</sup>**

Stream	Miles perennial stream	Acres of riparian	Estimated acres of suitable and rationale
Verde	35.16	422	422 – they've been documented in all reaches of the Verde
Sycamore	5.1	61	36 – at least 3 miles has sufficient riparian veg
Clear Creek	33.9	407	264 – only the lower 2/3rds of Clear Creek has vegetation capable of supporting beaver
Fossil	13.7	164	164
Wet Beaver	16	192	192
Oak	22.1	264	264 – they've been document all up and down Oak Creek, even numerous locations in the canyon
Red Tank Draw	3.5	42	12 – only the lowest mile is suitable.
Walker Creek	2.2	26.4	12 – only the upper mile is suitable
Spring Creek	2.0	24	24
Dry Beaver Creek	1	12	12 – this is around the Stagestop area
West Fork Oak Creek	6.0	72	36 – only the lower 3 miles has the vegetation needed to support beaver
Total	101.16		1,438

**Status:** This species has a global rank of G5 because it has a large range in North America, is common and has expanding populations. Its state rank is S4 (apparently secure) (NatureServe 2013j).

Beavers are a Tier 1B species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a) primarily due to a disjunct status in the state. This means there are 1 to few populations in Arizona separated by large relative distance from larger core distribution of the species outside of Arizona. It is also a Tier 1B species because within Arizona, fragmentation has resulted in populations that are small and isolated from one another.

**Risk factors:** Primary threats are associated with its habitat.

### **Gunnison's prairie dog (Table 3)**

**Natural history:** Prairie dogs are semi-fossorial animals that need well drained, deep soils on generally flat slopes to dig their burrows (Wagner and Drickamer 2003, in Underwood 2007). They are adapted to living in arid, nutrient limiting environments with pronounced changes in moisture patterns and temperature extremes. They feed on grasses, sedges, forbs, and seeds. The quantity and quality of

<sup>1</sup> From Janie Agyagos, Wildlife Staff on the Red Rock Ranger District, 12/31/2012.

vegetation is important for survival and reproduction. Total groundcover within colonies documented in several studies ranged from 39-74 percent (Underwood 2007). They stay below ground during the coldest parts of winter and aestivate when metabolically stressed. In northern Arizona, activity occurs mostly March through October (NatureServe 2013k).

Prairie dogs are considered to be a keystone, or 'strongly interactive' species (Soulé in Underwood 2007). Prairie dogs alter grasslands by modifying vegetation structure and composition, soil structure, nitrogen concentration in plant shoots, and landscape configuration. They create a mosaic of different patch structures within the grassland matrix at the landscape level and maintain grassland ecosystems by preventing encroachment of woody species (Underwood 2007).

A wide variety of wildlife uses some attribute of prairie dog colonies. Black-footed ferrets feed almost exclusively on prairie dogs. Golden eagles and ferruginous hawks also feed on them. Prairie dog burrows are used for shelter by burrowing owls (also nesting cavities), black-footed ferrets, and many species of snakes, lizards, amphibians, and insects.

Distribution: Gunnison's prairie dogs range from central Colorado to central Arizona including a small portion of southeastern Utah and much of northwestern half of New Mexico. Occupied habitat in the state is thought to have increased from 50,000 acres in 1987-1994 to 108,353 acres in 2006-2007. Prairie dogs are thought to shift across the landscape but persist in the same general geographic area.

Hoffmeister (1986) provided historical reports from the early 1900's of high population numbers of Gunnison's prairie dogs, especially between Flagstaff and Seligman, Arizona. However, their numbers became greatly reduced until the 1960's (Hoffmeister 1986).

There are between about 2,900 acres (Underwood 2007) and 7,294 acres (Forest GIS layer) of prairie dogs colonies within lands managed by the Coconino NF. Ruffner (1980) visited and described 11 Gunnison's prairie dog colonies on the Peaks and Mormon Lakes Ranger Districts on the Coconino. These colonies varied in size from 8 - 306 acres, with a mean of approximately 84.6 acres (Ruffner 1980). Twenty-four additional colonies were identified within the Forest boundary, but were abandoned, not on Forest Service lands, not located, or not visited (Ruffner 1980). Most of these colonies were within or near-by Flagstaff's city limits. In 1998, mapping of GPD colonies on public lands was conducted on the Peaks and Mormon Lake Ranger Districts (now Flagstaff District) on the Coconino NF. Twenty-one active colonies and 2 abandoned areas were located totaling 2,899 acres.

Habitat: On the forest, it is primarily associated with the montane portion of Montane Subalpine Grassland, Great Basin Grassland, and Pinyon Juniper Grassland pnvts

Status: This species has a global rank of G5 (secure) and state rank of S4 (apparently secure) (NatureServe 2013k).

Gunnison's prairie dogs are a Tier 1B species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a) primarily due to a disjunct status in the state. This means there are 1 to few populations in Arizona separated by large relative distance from larger core distribution of the species outside of Arizona. They are also considered a Tier 1B species because of their concentration status. That means they are a colonial species that is found in a limited number of groups at high concentration for all, much, or a critical portion of their life cycle.

Risk factors: Its threats are equivalent to habitat threats. Prairie dog populations can fluctuate in response to weather, and sylvatic plague, its primary threat in Arizona. The primary factor limiting Gunnison's

prairie dog population densities is sylvatic plague, a flea –transmitted disease caused by an introduced non-native bacterium (Underwood 2007).

Estimates of GPD measured from 1996-2001 in Aubrey Valley, AZ show year-to year fluctuation, not from plague. Higher prairie dog numbers tended to occur following mild winters and above average rainfall; lower numbers tended to occur during droughts. Plague outbreaks can occur over discrete areas in both space and time, thus GPD populations may be expanding in some areas in Arizona while at the same time, populations in other portions of its range may be contracting. There is evidence of recolonization after plague outbreaks although the effect of this on long term viability is unknown (Underwood 2007).

Activities under the control and authority of the forest service that are stressors to prairie dog populations and activities to reduce the stress include:

- Habitat degradation/shrub invasions – restore natural fire regimes to reduce invasion of woody species; address invasive plants although GPD can use habitat with nonnative plant species to a certain degree.
- Habitat fragmentation/barriers – protect important habitat and wildlife corridors.
- Drought – adjust livestock management practices during droughts to ensure sufficient forage for wildlife.
- Consumptive use of biological resources e.g. ungulate grazing- protect sensitive habitats from excessive grazing; minimize habitat degradation while maintaining stock ponds where appropriate. Poor rangeland management has caused a decline in occupied habitat and population densities for Utah prairie dogs but well managed grazing has been found to benefit black-tailed prairie dogs. Some of the largest colonies in the state are actively grazed.

### **Pronghorn (Table 3)**

Natural history: Breeds late July to early October in the south. Births occur earlier in south part of range than north. Young are weaned by 4 months but follow mother during first winter. Some breeding can begin at 1 year. They usually occur in small bands. Large winter herds disperse in spring forming separate bachelor and female-kid groups in spring and summer. Males associate with females in late summer and early fall. High mortality of the young is common, mainly due to predation. Move seasonally between summer and winter habitat. The need for free water varies with the succulence of the vegetation.

Distribution: Merriam and Stejneger (1890) reported that pronghorn inhabited the cedar and pine belt and were seen frequently in parks in the ponderosa pine and occasionally in pine forests away from openings. During his expedition, they were observed near Partridge Spring and within a mile of Little Spring on the San Francisco Peaks. He noted their abundance had decreased due to killing by white men and Indians. Early accounts infer there were thousands around San Francisco Mountain and Bill Williams.

Habitat: They inhabit grassy areas with scattered shrubs with rolling or dissected hills and feed on forbs, grasses, and shrubs.

Status: This species has a global rank of G5 (secure) because it has a large range in western North America, is common in several regions, and is generally well managed as a game species with sustainable populations. Its state rank is S5 (secure) (NatureServe 2013l).



In the Verde Valley, highways and communities have fragmented and reduced available Semi-desert grassland habitat so that the population there is a small percentage of what it was historically (Agyagos pers. comm.). The population on Anderson Mesa has fluctuated widely over the years from an apparent high of 3,000 to 414 (Hoffmeister 1986). This population has been influenced by several droughts, severe winters, and coyote predation of fawns. A great deal of effort from Arizona Game and Fish Department, the Anderson Springs and BarTBar ranches, the Arizona Wildlife Federation, Rocky Mountain Elk Foundation, Arizona Antelope Society, the forest, and others has gone into habitat improvements and trying to understand the ecological dynamics of this population.

Pronghorn are a Tier 1B species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a) primarily due to their demographic status in the state. This means they are considered to have a demographically poor situation. This is defined as unusually low birth rates or high death rates combined with small or declining population size. Demographic rates are affected by known stressors likely causing a worsening situation in parts of Arizona.

Risk factors: Some types of fences and some locations of fences can be barriers to movement. For example, hogwire fences or fences with a bottom height that do not allow pronghorn to pass underneath can impede movements into suitable habitat or increase vulnerability to predators. Fences located too close to other barriers (such as railroad tracks and busy highways) may discourage pronghorn from accessing suitable habitat and may influence genetic interchange between populations.

### Southwestern myotis (Table 3)

Natural history: The female bats produce one young that is born usually in June or early July. It is insectivorous, eating primarily moths (Arizona Game and Fish Department 2003) apparently when sympatric with *Myotis evotis*. In allopatry, both species feed on moths and beetles (Bogan et al 2005). There is some evidence for seasonal migration in Arizona. Females are pregnant in early to mid-June and give birth to a single young in late June and early July (Bogan et al 2005). They are known to roost in caves, mines and buildings (Bogan et al 2005) and live and dead Gambel oak (Rabe et al 1998).

Distribution: Its range includes the southwestern United States to Jalisco and Veracruz, Mexico. The winter range is not known (NatureServe 2013m).

Habitat: Ponderosa pine (Gambel oak subtype) and caves. Medium to large snags or boles in live oak trees are used as roosts (Rabe et al 1998, Morrell et al. 1999, Bernardos et al. 2004).

Status: This species has a global rank of G5 (secure) and a state rank is S3 (vulnerable) (NatureServe 2013m).

Southwestern myotis are a Tier 1C species according to Arizona Game and Fish Department's State Wildlife Action Plan (2012a). This means that its status is unknown because there are no data with which to assess vulnerability status.

Risk factors: They are threatened by disturbance of maternity roosts in caves as well as disease (White Nose Syndrome)(Bogan et al 2005).

## Miscellaneous

### Connectivity

The forest planning species for which habitat fragmentation or lack of connectivity is a particular concern are: Chiricahua leopard frog, lowland leopard frog, northern leopard frog, Southwestern willow

flycatcher, Western yellow-billed cuckoo, Arizona toad, reticulate Gila monster, Abert's towhee, common black hawks, beaver, and pronghorn. Other species affected by fragmentation include wide ranging species such as mountain lions, Mexican gray wolves, Southwestern river otters, and big game species such as elk, mule deer, white-tailed deer, turkey, and bear.

Threats: fragmentation resulting from human infrastructure

Alternative A language that relates to connectivity is shown in table 10. Alternative A lacks a strategic or comprehensive approach to connectivity of terrestrial and aquatic landscapes. Plan language is tactical (fences) and spatially specific (applicable only in certain management areas). The FLEA and Sedona Amendments come closest to describing the function and intent of connected habitats. Although fragmentation is recognized as a concern, this language lacks a strategic vision of unfragmented landscapes and promotes connectivity on only a portion of the forest. For example, forestwide standards and guidelines promote installation of "antelope passes, let-down fences, electric fences, or elk jumps wherever necessary to improve wildlife travelways." Management area 3 (ponderosa pine and mixed conifer <40% slope) and Management area 7 (pinyon juniper < 40% slope) have standards and guidelines that in MA 3 "Emphasize maintaining some thermal cover in known travelways and bedding areas. Emphasize maintaining some hiding cover adjacent to dependable water and key openings, along known travelways, and in pine stringers" and in MA 7: Emphasize cover management in travelways, bedding areas, reproductive areas, and adjacent to dependable waters and key openings". MA 10: Maintain a seral grassland state on pinyon-juniper lands where type conversions have occurred in the past, with the exception that corridors of cover for wildlife habitat, determined through environmental analysis, may be allowed to develop through regrowth of pinyon-juniper.

The FLEA area-wide direction: Maintain wildlife travelways to help animals travel between summer and winter ranges, feeding and nesting areas, maternity areas, and dispersal areas. Travelways help ensure genetic mixing necessary for healthy populations. Also: Distribute wildlife cover where needed within the FMAZ 1U without accruing unacceptable wildfire threat to nearby neighborhoods. Wherever possible, projects should retain cover conditions within wildlife travelways, MSO protected activity centers (PAC's), along canyon rims, and on steeper slopes: Management area 27 in the Sedona-Oak Creek area, "MA 27 objectives: Acquire certain private parcels to reduce habitat fragmentation and otherwise improve antelope and grassland species habitat". This represents only a portion of the forest. It lacks language regarding connected open areas. And as stated below..... only partially addresses fragmentation issues (in drainages); and doesn't state as clearly the importance of drainages to wildlife species.

**Table 10: Language in Alt A that pertains to connectivity and cover**

Replacement p. 69, par 2	Forest-wide, Range, Reconstruction of Range Structural Improvements	Interior fences in an allotment are generally three wire fences with the bottom wire smooth and conform to the above height restrictions. Install antelope passes, let-down fences, electric fences, or elk jumps wherever necessary to improve wildlife travelways.
Replacement p. 124, par 2	Management Area 3, Ponderosa Pine Mixed Conifer Less Than 40% Slope, Wildlife Cover	Managed for at least 30 percent cover in 10K blocks. Of this total at least one third is in thermal cover, one third is in hiding cover, and the remaining one third is in either thermal or hiding cover. Emphasize maintaining some hiding cover in known travelways and bedding areas. Emphasize maintaining some hiding cover adjacent to dependable water and key openings, along known travelways, and in pine stringers.
Replacement p. 124-1, par 2	Management Area 3, Ponderosa Pine Mixed Conifer Less Than 40% Slope, Standards and Guidelines, Wildlife Cover	Protect and manage to include hiding and thermal cover known fawning and calving areas and defer logging activities from May 15 to June 30 in these areas.
Replacement p. 125, par 1	Management Area 3, Ponderosa Pine Mixed Conifer Less Than 40% Slope, Standards and Guidelines, Wildlife Cover	The following table lists basal area (BA) and growing stock level (GSL) which experience has shown will full meet hiding and thermal cover requirements in even aged ponderosa pine and mixed conifer when there are no cover effects from topographic features or other species (see table in current plan). The presence of more than one size class may reduce the amount of BA/GSL required to provide effective cover. Before determining that cover must be obtained by managing stands in suitable lands in suitable lands for these BA/GSL's, conduct field examinations to evaluate cover distribution needs to determine whether other factors contributing to effective cover are present.
Replacement p. 126, pars 1,3, 4, 5 (Also replacement p. 204, par 2)	Management Area 3, Ponderosa Pine Mixed Conifer Less Than 40% Slope, Standards and Guidelines, Wildlife Cover	In key mixed conifer bear habitat, manage for at least 30 percent of the mixed conifer to meet hiding cover needs. Give priority for cover management in drainage bottoms, heads of drainages, and isolated pockets of mixed conifer. Defer logging activities from April 15 to June 30 in known bear maternity areas. Leave scattered patches of untreated slash within ½ mile of dependable water in actual or potential turkey nesting areas. Patches are at least ¼ acres in size and cover at least 10 percent and not more than 20 percent of the harvest area. Retain and/or develop an average of at least four turkey roost tree groups per section in identified key turkey winter range.

**Table 10: Language in Alt A that pertains to connectivity and cover**

Page 133, pars 1,2 , (Also replacement p. 204, par 1)	Management Area 3, Ponderosa Pine Mixed Conifer Less Than 40% Slope, Standards and Guidelines, Wildlife Cover, Pine Stringers Silvicultural Prescriptions and Mixed Conifer Stringers in Ponderosa Pine Silvicultural Prescription	Pine stringers are noncontiguous, narrow communities of predominantly ponderosa pine that extend into the pinyon-juniper woodland below the normal elevational distribution of ponderosa pine. Manage pine stringers to emphasize wildlife habitat needs by maintain turkey roosts and big game cover except where environmental analysis indicates otherwise. Mixed conifer stringers, primarily Douglas-fir, are noncontiguous, narrow communities that extend into the ponderosa pine. Manage the mixed conifer stringers to emphasize wildlife needs by maintain big game cover except where environmental analysis indicates otherwise.
Replacement p. 148, par 6 # 2	Management Area 7, Pinyon-Juniper Woodland, Less Than 40 Percent Slope, Management Emphasis	... Old growth, cover and snags are generally provided on slopes greater than 15 percent. However, exceptions will occur if dispersion requirements for habitat components are not met on these steep slopes. Where necessary to meet 10K block requirements or specific habitat needs, one or more of these components can be obtained through management emphasis on the gentler slopes.
Replacement p. 151, par 3	Management Area 7, Pinyon-Juniper Woodland, Less Than 40 Percent Slope, Range Forage Improvement	...Slash may be crushed where it adversely affects livestock and/or wildlife movement.
P. 152, par 3, # 3, 4	Management Area 7, Pinyon-Juniper Woodland, Less Than 40 Percent Slope, Silvicultural Prescription	Cover corridors are laid out to connect treated areas or breaks in terrain to provide interconnecting cover corridors. Known or suspected routes of game travel are used to lay out cover corridors. Corridors are managed to create at least 60 percent crown cover, and are at least 8 chains wide. Use steep, rocky or otherwise unmanaged areas useable by game to satisfy wildlife cover requirements to the extent possible (MA 8). Cover requirements are considered on a 10K Block basis.
P. 153, # 7-8	Management Area 7, Pinyon-Juniper Woodland, Less Than 40 Percent Slope	Emphasized cover management in travelways, bedding areas, reproductive areas, and adjacent to dependable waters and key openings. Cover is managed to provide at least 60 percent crown cover and at least 8 chains wide. Manage for hiding and thermal cover in known fawning and calving areas.
Replacement p. 164, par 5	Grassland and Sparse Pinyon-Juniper Above the Rim, MA 10, Standards and Guidelines, Range Forage Improvement Maintenance	Maintain a seral grassland state on pinyon-juniper lands where type conversions have occurred in the past, with the exception that corridors of cover for wildlife habitat, determined through environmental analysis, may be allowed to develop through regrowth of pinyon-juniper.
P. 174, par 6	Riparian and Open Water, MA 12, Standards and Guidelines, Nonstructural Wildlife Habitat Improvements	Maintain or improve nesting cover and waterfowl forage on existing waterfowl islands and shorelines. In conjunction with construction of waterfowl islands seed herbaceous species unpalatable to large herbivores.

**Table 10: Language in Alt A that pertains to connectivity and cover**

New Page 206-4, par 7	Highway Corridor 180, Management Area 20, Standards and Guidelines, Wildlife Cover	On-the-ground design of the recovery area and adjacent stands will include maintenance of large animal movement to and from areas on either side of the highway. Factors such as density of trees, location of right-of-way fence and topography will be considered.
New Page 206-11, par 3	Sedona/Oak Creek Ecosystem, Savannah, MA 27, Management Emphasis, Plants, Wildlife, Soil, Air and Water, Objectives	Maintain adequate plant cover/security for wildlife habitat needs.
P. 206-50, par 6, 8 #3	Sedona/Oak Creek Ecosystem, Savannah, MA 27, Management Emphasis, Plants, Wildlife, Soil, Air and Water, Objectives	Acquire certain private parcels to reduce habitat fragmentation and otherwise improve antelope and grassland species habitat. Develop conditions that provide adequate cover/security for animal shelter and foraging;
P. 206-51, par 3	Sedona/Oak Creek Ecosystem, Savannah, MA 27, Management Emphasis, Plants, Wildlife, Soil, Air and Water, Guidelines	To minimize restriction of antelope movement, locate fences one eighth mile from roads if road right-of-way fencing is required. Remove fences that are no longer needed; use smooth-bottom wires and meet the wildlife standards as stated in FSH 2670 and 2240 for all existing or new fences.
P. 206-51, par 4	Sedona/Oak Creek Ecosystem, Savannah, MA 27, Management Emphasis, Plants, Wildlife, Soil, Air and Water, Guidelines	Locate roads to maintain adequate cover for animal shelter and foraging between roads, especially in locations with high road densities.
New p. 206-73, par 1	FLEA Area-Wide Goals, Objectives, Standards and Guidelines	Maintain wildlife travelways to help animals travel between summer and winter ranges, feeding and nesting areas, maternity areas, and dispersal areas. Travelways help ensure genetic mixing necessary for healthy populations
New p. 206-76, pars3- 4	FLEA Area-Wide Goals, Objectives, Standards and Guidelines	Within the Urban/Rural Influence Zone, and in the Wildland Urban Interface (1U) as depicted on the Fire Management Analysis Zones map, do not apply the hiding and thermal cover guideline that requires 30 percent cover within a 10K Block. Distribute wildlife cover where needed within the FMAZ 1U without accruing unacceptable wildfire threat to nearby neighborhoods. Wherever possible, projects should retain cover conditions within wildlife travelways, MSO protected activity centers (PAC's), along canyon rims, and on steeper slopes.
New p. 206-76, par 5	FLEA Area-Wide Goals, Objectives, Standards and Guidelines	In the absence of steep slopes or MSO PACs site-specific projects could retain a maximum of 15 percent cover condition to maintain a wildlife travelway through a section. Projects do not have to retain cover conditions of 15 percent, if a give section poses a high fire hazard to nearby neighborhoods.

**Table 10: Language in Alt A that pertains to connectivity and cover**

New p. 206-103, par 6	FLEA, Schultz Management Area, MA 36, Management Emphasis	In the Mtn. Elden/Dry Lake Hills areas, people should be mostly on the trail system, leaving undisturbed patches of habitat in between. Wildlife habitat will be somewhat fragmented because of the extent of the trail system, but topography and dense mixed conifer vegetation reduce some of the effects.
New p. 206-105, par 7	FLEA, Schultz Management Area, MA 36, Guidelines, Wildlife	Within the Semi-primitive Non-motorized ROS settings maintain large tracts of unfragmented habitat for disturbance sensitive species, such as turkey and bear.
New p. 206-107, par 5	FLEA, Walnut Canyon Management Areas- MA 37, Description	...Despite increasing numbers of people in the greater Flagstaff area, this MA maintains large tracts of unfragmented habitat for disturbance-sensitive species such as owls, turkey, and bear primarily south of Walnut Canyon.
New p. 206-111, par 5	FLEA, Walnut Canyon Management Areas- MA 37, Guidelines, Wildlife	In the Primitive, Semi-primitive Non-motorized, and Semi-primitive Motorized ROS settings maintain large tracts of unfragmented habitat for turkey and bear.
New p. 206-113, par 4	FLEA, West Management Areas- MA 38, Description	...There is a mix of disturbance sensitive and other wildlife species in the MA, and a wildlife travelway near A-1 Mountain provides wildlife access to the San Francisco Mountain and areas south.
New p. 206-114, pars 1 and 2	FLEA, West Management Areas- MA 38, Management Emphasis	..... Maintain wildlife travelways within Urban/Rural Influence Zone, along the Highway 89A corridor, and in areas outside of the Urban/Rural Influence Zone.
New p. 206-114, par 5	FLEA, West Management Areas- MA 38, Management Emphasis	Along Woody Ridge there are large tracts of unfragmented habitat and remote recreation opportunities including Semi-Primitive Motorized and Semi-primitive Non-motorized ROS settings with Roaded Natural corridors. The challenge here will be to maintain remote characteristics as new residential development occurs on the west side of Flagstaff. Maintain Woody Ridge as a Semi-primitive Non-motorized ROS setting with walk-in hunting opportunities.
New p. 206-116, par 6	FLEA, West Management Areas- MA 38, Wildlife	In the Fort Valley and A-1 Mountain areas, maintain the wildlife travelway that connects A-1 Mountain, Observatory Mesa, and the slopes of the San Francisco Mountain.
New p. 206-116, par 7	FLEA, West Management Areas- MA 38, Wildlife	Lands west of A-1 Mountain in Semi-primitive Non-motorized ROS setting maintain large tracts of unfragmented habitat for turkey and bear.

- ◆ Habitat fragmentation issues are often a result of action in other jurisdictions in which the forest service has little authority. Alternatives B, C, and D address this through management approaches to work with entities to address linkage issues. Alternative A lacks this language specificity.
- ◆ All alternatives promote fence design that does not impede animal movements.
- ◆ The connectivity language in Alternatives B, C, and D is beneficial for and helps maintain the viability of Chiricahua leopard frog, Lowland leopard frog, Northern leopard frog, Southwestern

willow flycatcher, Western yellow-billed cuckoo, Arizona toad, Reticulate Gila monster, Abert's towhee, Common black hawks, Beaver, Pronghorn and Mountain lions and does not cause a trend towards listing.

## Wild sheep

The risk of disease transmission from domestic sheep or goats to wild sheep is widely recognized. There is demonstrated transmission of *Mannheimia haemolytica* from domestic to wild sheep (Lawrence et al (2010 in Wild Sheep Working Group [2012])). This mucous-dwelling bacterium causes a potentially fatal pneumonia in big horn sheep. Big horn sheep are more susceptible to the disease than domestic sheep.

On the Coconino, domestic sheep graze the Mooney Mountain allotment and the Woody Mountain allotments. They are trailed along the Beaverhead-Grief Hill Driveway. On the forest, the driveway runs northeast from a point on the Verde River between Cottonwood and Camp Verde then crosses to the east side of Interstate 17 a little bit north of the Coconino/Yavapai County line near Cedar Tank Canyon. It continues north till just south of the community of Mountaineer where it veers west, north west; crosses Interstate 17 again south of the community of Kachina Village; continues south of Rogers Lake and crosses over to the Kaibab National forest in the vicinity of Volunteer Canyon and Mooney Mountain.

There is a population of Rocky Mountain big horn sheep in the vicinity of the West Clear Creek wilderness.

This is not addressed in alternative A. Alternatives B, C, and D contain language to reduce the possibility of contact between domestic and wild sheep.

## Supplemental Environmental Consequences and Cumulative Effects

The land management plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carryout any project or activity. Because the land management plan does not authorize or mandate any site-specific projects or activities (including ground-disturbing actions), there can be no direct effects. However, there may be implications, or long-term environmental consequences, of managing the forests under this programmatic framework.

## **Irreversible and Irretrievable Commitment of Resources**

The land management 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 ground disturbing actions, none of the alternatives cause an irreversible or irretrievable commitment of resources.



## Unavoidable Adverse Impacts

The land management plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carryout any project or activity. Before any ground-disturbing actions take place, they must be authorized in a subsequent environmental analysis. Therefore, none of the alternatives cause unavoidable adverse impacts. Mechanisms are in place to monitor and use adaptive management principles in order to help alleviate any unanticipated impacts that need to be addressed singularly or cumulatively.

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## Glossary

**Habitat elements:** Habitat elements are primary habitats or primary habitat features such as a pnvt, spring, or ephemeral drainage.

**Plan components:**

- ♦ **Desired conditions** (or goals) set forth the desired social, economic, and ecological goals of the Coconino NF. They attempt to paint a picture of what we (the public and the Forest Service) desire the forests to look like or the goods and services we desire them to provide. Desired conditions are generally expressed in broad, general terms, however, more specificity may be added to clarify the intent. They are timeless in that there is no specific date by which they are to be completed. Desired conditions may only be achievable over a long time frame (several hundred years). In some cases, a desired condition matches the current condition, so the goal is to maintain the existing condition.
- ♦ **Desired conditions** are the focus of the revised plan; management of the Coconino NF's resources will be directed toward achieving the desired conditions. Desired conditions are the basis for the other plan components and describe the framework for future projects and activities. They are aspirations and are not commitments or final decisions approving projects. Projects and site-specific activities must be consistent with desired conditions. Variance at the project-level requires a plan amendment.
- ♦ **Objectives** are concise, time-specific statements of measurable anticipated results that respond to desired conditions. Activities specified in objectives are intended to help make progress towards achieving desired conditions and represent just some of the outcomes or actions expected to accomplish movement towards desired conditions. Not every action or objective the Coconino NF may do is identified in the plan, just the primary ones.
- ♦ **Standards** are constraints upon project and activity design. A standard is an absolute requirement to be met in the design of projects and activities. A project or activity is consistent with a standard when its design is in accord with the explicit provisions of the standard; variance from a standard is not allowed except by plan amendment.
- ♦ **Guidelines** are sideboards that guide management activities and provide specifications that a project or activity would adopt unless there is a compelling or defensible reason to vary from the guideline. Deviation from the explicit provisions of the guideline is permitted without a plan amendment, as long as the intent of a guideline is met. Deviation from the explicit provisions of a guideline, if it is meeting the intent of the guideline, must be documented in the project record. Projects that deviate from the guideline's intent must be accompanied by a plan amendment that would allow for the deviation.
- ♦ **Suitability** describes the appropriateness of applying certain resource management practices to a particular area of land. A unit of land may be suitable for a variety of individual or combined management practices. Where current management is not consistent with suitability determinations in this plan, future decisions should adjust activities to be consistent with suitability determinations and associated desired conditions stated in this plan.
- ♦ **Management areas** are lands that have management direction that is more specific than forestwide and include lands with designations as Special Areas by Congress or another delegated authority. Special areas are identified because of their unique or special characteristics. Examples include: wilderness areas, research natural areas, scenic byways, and national recreation trails.

- ♦ **Monitoring** is 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 inform implementation and effectiveness of plan decisions. It helps ensure that the plan remains adaptive, in that new knowledge and information can be analyzed and the plan changed.

**Potential Natural Vegetation Types (PNVTs):** PNVTs represent the land's potential vegetation under natural disturbance or biological regimes, minus human induced change. For example, ponderosa pine is a pnvt.

**State Wildlife Action Plan or SWAP:** An Arizona Game and Fish Department plan that is a central repository for information related to vertebrates of Arizona, crustaceans and molluscs that the Department has jurisdiction over. The Department has identified species in most need of conservation actions at the state level, also called species of greatest conservation need (SGCN). At risk species are vulnerable in one criteria and are prioritized into three tiers 1A, 1B, 1C. Tier 1A contains those species for which the Department has an agreement or other obligation, or warrants the protection of a closed season. Tier 1B represents the remainder of the vulnerable species. Tier 1C contains species for which insufficient information is available to fully assess vulnerabilities. Vulnerability criteria include extirpated from Arizona, Federal or State status, Declining status, Disjunct status, Demographic status, Concentration status, Fragmentation status, and Distribution status. These are fully explained on their website.

## Appendix A: PNVT Descriptions

Habitat Element	Description																								
Desert communities	Desert grasses, desert shrubs, succulent species and some herbaceous cover. Native species. Fire return interval is 200 years+. Arid. Ranges from 2,700 to 4,000 feet in elevation. Generally old alluvial, Pliocene lakebed deposits developed from limestone, sandstone and clays, intermixed with volcanic ash layers. Occurs in creosote dominated alluvial positions and on old stream terraces adjacent to Cottonwood Willow Riparian Forest. Some areas barren with abundant sand, rock, gravel, scree or talus. Vegetation includes desert scrub, grasses and some succulents. Dominated by creosote bush and mesquite and may include, cat claw acacia, triangle leaf bursage, saltbush and others.																								
Interior chaparral	Interior Chaparral is found at the lower elevations mostly in the Verde River basin. Estimated 50,741 forest acres (3% of forest). It is located where low-elevation Semi-Desert landscapes transition into Piñon Juniper Evergreen Shrub. Vegetation includes turbinella oak, mountain mahogany, manzanita, desert ceanothus, silk tassel, Stansbury cliffrose, and sumac.																								
Cottonwood willow riparian	Patchily distributed along the lower elevation reaches (2,800 – 3,600 feet) of perennial streams including the Verde River, Lower Oak Creek, Wet Beaver Creek, Fossil Creek and West Clear Creek. Also found along other perennial and intermittent tributaries.. Dominant vegetation: Fremont cottonwood, willows. Various grasses and forbs. In general, occurs along stream channel and associated higher stream terraces, which support a mix of riparian and upland vegetation, including mesquite and desert willow.																								
Mixed broadleaf deciduous riparian	Found between 3,600 and 5,800 feet in elevation, it is patchily distributed across the Forest and includes higher elevation portions of West Clear Creek and Oak Creek and associated tributaries. Consists of a vegetation mix of riparian woodlands and shrublands with various dominant species, depending on site specific characteristics. Vegetation can include Arizona sycamore, thinleaf alder, willow, Arizona cypress, conifers, box elder, narrowleaf or Fremont cottonwoods, velvet ash and often contains oaks and conifers from adjacent uplands.																								
Montane Willow Riparian	Montane Willow Riparian Forest is located mainly from 5,500 to 7,800 feet in elevation along perennial and seasonally intermittent streams, seeps and isolated springs at higher elevations. Trees include Bebb's willow, narrowleaf cottonwood, Arizona walnut, velvet ash, cherry and Arizona alder and dominant shrubs include red osier dogwood, willows, and woods rose.																								
Gallery coniferous riparian forest	Canyon bottom forest contains woody species similar to conifer and woodland forests adjoining streams. Greater than 10% cover of trees and shrubs.																								
Wetland cienega	<div>Perennial and/or ephemeral springs or headwater streams with pools of standing water. For wetlands, hydrophyllic plants are present.</div> <table><tr><th>Wetland Type</th><th>Flooding Regime</th><th>Plant Species Occupying Deepest Zone</th><th>Flooding Frequency</th></tr><tr><td>Reservoir/lakes , open water</td><td>Permanent water</td><td>submergent vegetation; bare soil</td><td>every year</td></tr><tr><td>Semi-permanent</td><td>6-12 months</td><td>Hardstem bulrush, Cattail; submerged aquatics</td><td>&gt;7 of 10 years</td></tr><tr><td>Seasonal</td><td>3-6 months</td><td>Manna grass, spikerush, sedges.</td><td>&lt;7 of 10 years</td></tr><tr><td>Temporary</td><td>1-2 months</td><td>Alpine timothy, Foxtail barley</td><td>3 of 10 years</td></tr><tr><td>Ephemeral</td><td>2-6 weeks</td><td>bare soil, dock, western wheat grass, deergrass</td><td>3-10 years</td></tr></table>	Wetland Type	Flooding Regime	Plant Species Occupying Deepest Zone	Flooding Frequency	Reservoir/lakes , open water	Permanent water	submergent vegetation; bare soil	every year	Semi-permanent	6-12 months	Hardstem bulrush, Cattail; submerged aquatics	>7 of 10 years	Seasonal	3-6 months	Manna grass, spikerush, sedges.	<7 of 10 years	Temporary	1-2 months	Alpine timothy, Foxtail barley	3 of 10 years	Ephemeral	2-6 weeks	bare soil, dock, western wheat grass, deergrass	3-10 years
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Grasslands general	Grass/forb/shrub cover is typically above 25%. Tree cover ranges from 0% to 9%, depending upon specific site conditions.																								

## Appendix A: PNVT Descriptions

Habitat Element	Description
Semi-desert grasslands	Grasses with tree and shrub cover <10 percent. Current vegetation is dominated by perennial bunchgrasses, shrubs and trees. Forbs may include various buckwheat species. Shrubs may also be present and abundance and species composition varies, but may include crucifixion thorn, velvet mesquite, cat claw mimosa and turbinella oak. Trees may include Utah juniper and red berried juniper
Great Basin Grassland	Grasses, forbs, shrubs with tree and shrub cover less than 10%. Natural disturbances include freeze-thaw action due to high soil clay content in some soils. Vegetation height and cover support fire on a 1 to 35 year return interval depending on suitable soils and surrounding PNVTs.
Montane and subalpine grasslands	Grasses, forbs with tree and shrub cover less than 10%. Small to large openings within forested stands; circular or long and linear. Estimated 23,429 acres or 1.3% of forest. The montane portion is an estimated 20,967 acres or about 1% and the subalpine portion is an estimated 2,462 acres or about 0.3%.
Pinyon-juniper communities (general).	A shifting mosaic of woodland trees interspersed with openings across the landscape. Tree basal area is variable, but has at least 10% cover.
Pinyon-juniper with grass	Open woodlands, often with junipers in clumps, with a grassy understory – deeper soils, fire return interval of 1-35 years. Includes juniper grasslands. May be interspersed with mollisol soils. Over 10% cover trees and shrubs. Estimated 261,432 acres or 14.2% of forest.
Pinyon-juniper evergreen shrub.	Mosaic of different age-class patches, with fire return interval of 35 to >200 years, includes sagebrush and may have coarse-textured, gravelly, or lithic soil characteristics. Generally moderate frequency and mixed severity fire compared to other PJ types. Over 10% cover trees and shrubs. Over 10% cover trees and shrubs. Estimated 263,835 acres on forest or 14.4%.
Pinyon-juniper woodlands (persistent)	Mosaic of patches of woodlands within PJ matrix; rocky soils. Infrequent fire. Contains piñon, juniper, sometimes Gambel oak, shrubs, grasses and forbs. Over 10% cover trees and shrubs.
Ponderosa pine -bunchgrass	A subset of the PonderosaPine PNVT. Over 10% cover trees and shrubs. Mid- and late-successional ponderosa pine forests with various-sized patches of younger regenerating trees. Frequent fires (0-35 years) with low severity. Aspen exists in smaller stands within a larger forest matrix dominated by ponderosa pine vegetation on north facing slopes and other cool moist microsites. Conifers may be present in aspen stands in varying amounts depending on succession. About 60 percent of this is estimated to be ponderosa pine-bunchgrass subtype..
Ponderosa pine – Gambel oak	A subset of the Ponderosa pine PNVT. Over 10% cover trees and shrubs. Mid- and late-successional pine-oak forests with various-sized patches of younger regenerating trees. Fire return interval (0-35 years) with low severity fires. Aspen exists in smaller stands within a larger forest matrix dominated by ponderosa pine vegetation on north facing slopes and other cool moist microsites. The size, age and spatial extent of aspen stands reflect its distribution from disturbance. Conifers may be present in aspen stands in varying amounts depending on succession. All ages of Gambel oak are present as are a variety of growth forms, from shrubby thickets to large mature trees. About forty percent of the Ponderosa Pine PNVT is estimated to be ponderosa pine-Gambel oak subtype.
Mixed conifer frequent fire	Over 10% cover trees and shrubs. Mid- and late-successional mixed-conifer forests. Generally more open, warmer and drier than mixed conifer with aspen. Aspen exists in smaller stands within a larger forest matrix dominated by mixed conifer vegetation in suitable sites. Understory variable – herbaceous to shrubs
Mixed conifer with aspen	Over 10% cover trees and shrubs. Mid- and late-successional mixed-conifer stands have more closed conditions due to infrequent disturbances. Mesic environment. Aspen is early seral component generally above 8,000 feet. Mixed severity at 35-200 years frequency. Conifers may be present in aspen stands in varying amounts depending on succession. Understory variable ranging from shrubs to herbaceous layer

## Appendix A: PNVT Descriptions

Habitat Element	Description
Spruce fir	Over 10% cover trees and shrubs. The Spruce Fir PNVT ranges from 8,200 -11,850 feet in elevation and is located mainly on the San Francisco Peaks. These sub-alpine conifer forests are dominated by Engelmann spruce, sub-alpine fir or cork bark fir. Douglas-fir with mixed conifer, quaking aspen and bristlecone pine may be present in this system for long periods without regeneration (USDA Forest Service 1995). Fire return interval at lower elevation is 35-200 years and 200 years+ at higher elevations. Punctuated by subalpine meadows.
Alpine Tundra	Alpine Tundra on the Coconino National Forest begins around 10,600 feet in elevation and continues to the top of Humphrey's Peak, the highest point in Arizona. This PNVT is typically barren with sparse vegetation including grasses, forbs, lichens and low shrubs. Dominant forbs include avens and sandwort. Alpine Tundra is made of three species associations: meadows, talus slopes and boulder fields.



## Appendix B: Priority bird species not brought forward

This section provides the rationale for priority bird species that were initially considered but not brought forward for further viability analysis. Reasons that these birds were not brought forward for further analysis were because independent sources such as NatureServe or the Arizona Breeding Bird Atlas indicated that species was secure or apparently secure in spite of potential challenges to their habitat; their occurrence within their range was stable or increasing; the majority of the species range is off the Coconino NF; species does not breed on the forest or species is irruptive.

Olive-sided flycatcher: Partners in Flight priority species for Mixed Conifer. Breed throughout Canada and most of Alaska, to northern California. Nest in higher mountain ranges in West to northern Baja California and central AZ and New Mexico. Breed in East as well. Fairly common nesting species in AZ. During Breeding Bird Surveys, most commonly encountered in the San Francisco Mountains and White Mountains. It is possible that the range wide decline for this species may be associated with the winter range for this neotropical migrant because it responds positively to landscapes altered by fire or timber harvesting practices. NatureServe (2013n) considers the species to be apparently secure in AZ (G4S4). Uncommon summer resident to transient on Forest according to Northern AZ Audubon.

Pine grosbeak: Partners in Flight priority species for Spruce-fir. Species is distributed widely across the western US and Canada. NatureServe ranks it as G5S1 (globally secure although NatureServe lists this as critically imperiled in AZ (NatureServe 2013o). They are not known to breed on the forest. The occasional occurrences are considered to be wandering birds or irruptive winter visitors, mainly occurring between November and April. Not reported on Northern AZ Audubon sightings in northern Arizona. <http://www.nazaudubon.com/sightings/> accessed October 2011.

Flammulated owl: Priority bird species for ponderosa pine from Birds of Conservation Concern (2008). Species is considered to be abundant. This neotropical migrant breeds patchily throughout western North America from southern British Columbia and Montana, through the Intermountain West, and Southwest, to southern Mexico. Considered most abundant owl in ponderosa pine-dominated mountain ranges throughout AZ. Few owls were detected during the Breeding Bird Atlas period undoubtedly because of the timing of the Breeding Bird atlas surveys. NatureServe (2013p) considers its breeding status to be apparently secure in AZ and globally (G4S4). High APIF breeding score, and identified as a species of conservation concern by Partners in Flight & Fish and Wildlife Service.

Grace's Warbler: Priority bird species for ponderosa pine from Birds of Conservation Concern (2008). Species is considered a common summer resident and secure within AZ and status and distribution has changed little in AZ during the past 40 years. Northern populations are migratory and species breeds from southern Nevada, southern Utah, and southwestern Colorado, south through the highlands and western Mexico to northern Nicaragua. According to Breeding Bird surveys, the status and distribution of the species has changed little in AZ since 1964. Species is considered globally secure (G5) and secure in AZ (S5) according to NatureServe (2013q). Population trend in Arizona is unknown.

Lewis's woodpecker: Priority bird species for ponderosa pine from Birds of Conservation Concern (2008). Breed locally in western US from southwestern British Columbia and Montana south to central CA, AZ and NM. Historically considered a fairly common but local resident of open transition zone parks in San Francisco Mountains area and in certain areas in White Mountains. Breeding Bird surveys documented this species nesting along the South Rim of Grand Canyon south to Happy Jack, in the White Mountains but absent on the North Rim of the Grand Canyon where previously had nested. NatureServe (2013r) classifies the AZ breeding range as apparently secure (G4S4). Closely associated with open ponderosa pine, recently burned forests, aspen and riparian woodlands.

Olive warbler: Priority bird species for ponderosa pine from Birds of Conservation Concern (2008). Most populations in AZ are considered likely stable or locally slightly increasing and a steady northern range expansion appears to be continuing. Species is a resident from central AZ and southeastern NM south to Nicaragua, but a part if not most of AZ's population migrates south of the state for the winter. Early accounts suggested species was a fairly common summer resident to the southeastern mountain ranges and north along Mogollon Rim to Payson. By the early 80's the range had expanded northward, including a single record from the San Francisco Mountains where they were previously absent. Breeding Bird surveys indicated that the species was fairly common in known range, plus records supporting northward expansion. Likely more common along the entire Mogollon Rim region than BB Atlas data suggests. Breeding status of the species is apparently secure in AZ according to NatureServe (G5S4)(2013s). Olive Warblers are listed as a priority bird species by Partners in Flight for the Mogollon Rim physiographic area, which contains the highest percentage of the Olive Warbler population in the United States and they have a high APIF score.

Purple martin: Priority bird species for ponderosa pine from Partners in Flight. One subspecies in AZ nests in saguaro associations of south central AZ and the other subspecies (*arboricola*) nests throughout open forested areas above and below the Mogollon Rim. NatureServe only ranks the *arboricola* subspecies and the species. It is secure globally (G5) however breeding status in AZ is considered imperiled to vulnerable (G5S2S3B) according to NatureServe (2013t, 2013u). Most of the breeding range for the species is in the eastern US and is considered secure to apparently secure. West of the Rockies, populations are much more scattered, nesting very locally from British Columbia south to Baja and from Utah and western CO, south to central AZ. Breeding Bird surveys found purple martins nesting in disjunct populations throughout much of their previously described distribution in AZ. They were not re-located in the Mt. Trumbull Region, or South Rim of the Grand Canyon, among other areas although none of these were on the Coconino. Rare transient to uncommon summer resident (Northern AZ Audubon 1999, 2005). Found in Pipo. High APIF scores.

Grasshopper sparrow: Priority bird species for high elevation grassland from Partners in Flight and Birds of Conservation Concern 2008). We analyzed Arizona grasshopper sparrow, *Ammodramus savannarum ammodramus*, and the grasshopper sparrow, *Ammodramus savannarum*. The species and subspecies are mainly out of range (Corman and Wise-Gervais 2005). There are 3 reports of grasshopper sparrows on the Northern Arizona Audubon website – two August sightings (2003 and 2005) at Kachina Wetlands (possibly early migration) and one in February 2003 at Lake Montezuma. The Breeding Bird Atlas shows that most of the sightings are in the broad expansive grasslands of southeastern Arizona with a small population persisting in Chino Valley near the Prescott National Forest (Corman and Wise-Gervais 2005). NatureServe reports the global status as secure (G5) and state status as imperiled to critically imperiled (S1S2)(2013v) for the subspecies and vulnerable in the state for the species (NatureServe 2013w). We also looked at the Western grasshopper sparrow, subspecies *perpallidus*. NatureServe (2013x) ranked this subspecies as imperiled in Arizona however NatureServe did not provide range maps to distinguish its distribution from the species or other subspecies. This was the subspecies detected in Chino Valley by Breeding Bird atlasers (Corman and Wise-Gervais 2005).

Swainson's hawk: Priority bird species for high elevation grassland from Partners in Flight. This long distance migrant ranges from Canada to Argentina and is considered a migrant on the Coconino. No known breeding on the forest. It has low APIF scores. Encountered through out most of their historic breeding range in Arizona which is primarily in the southeastern part of AZ with scattered locations in Seligman and the Kaibab Plateau. NatureServe considers AZ breeding status as vulnerable (S3) and the global status as secure (G5)(NatureServe 2013y). The Northern Arizona Audubon website reports them from the south rim of the Grand Canyon (migrating) and north rim (breeding), the White Mountains,

Joseph City, Garland Prairie (September), south of Meteor Crater (breeding), Mt. Elden (April and May sightings), Cornville (August).

Black-throated Gray Warbler: Priority bird species for piñon juniper from Partners in Flight. Species is considered a common summer resident in appropriate habitat throughout AZ and is fairly widespread. Natureserve considers the species secure in the State (G5S5)(NatureServe 2013z). Species breeds in western North America and occurs from southwestern British Columbia south to northern Baja California, from southern Idaho south to the highlands of northern Sonora. Uncommon summer resident according to Northern AZ Audubon lists. The species requires mature pinyon trees in pinyon-juniper habitats. Recent drought and insect impacts have resulted in some losses of the pinyon component in pinyon-juniper woodlands on the Forest. Also found in Ponderosa pine, gambel oak.

Gray Flycatcher: Priority bird species for piñon juniper from Partners in Flight. Species is considered a common summer resident in AZ and there appears to be an overall range increase. Species breeds as far north as southern British Columbia and south primarily throughout the Great Basin Region to AZ and New Mexico. Breeding Bird surveys documented birds in historic range and extended the known range into several areas of the state. Considered secure within its breeding range in AZ by Natureserve (G5S5) (NatureServe 2013aa). Uncommon transient according to Northern AZ Audubon. Importance of AZ is moderate. Drought has affected habitat on the Forest. APIF priority species for pinyon-juniper; PIF Landbird Conservation Plan priority species for the Mogollon Rim and Colorado Plateau regions. Populations in Arizona have possibly increased in distribution, but overall APIF score is high.

Gray vireo: Priority bird species for piñon juniper from Partners in Flight. AZ contains a significant proportion of Gray Vireo's breeding range and there has been recent habitat loss for this primarily juniper dependent species. Species nests from southern Utah and western Colorado, south to southern Nevada, Arizona and New Mexico. Species has been described as a fairly common nesting species in northwestern and central AZ. AZ's contribution to the species is high and the Forest's contribution to the species appears to be moderate. Breeding status is apparently secure in AZ according to Natureserve (G4S4) (NatureServe 2013bb) in spite of drought and subsequent bark beetle die offs that have recently killed areas of habitat for this primarily juniper dependent species. Uncommon summer resident according to Northern AZ Audubon lists.

Sage sparrow: Priority bird species for desert riparian (Desert Communities, Semi-desert Grassland, Cottonwood Willow Riparian, Mixed Broadleaf Riparian) from Birds of Conservation Concern 2008. This species is considered a short distance migrant; lack of breeding records on the forest; and little habitat on the forest. Species has patchy distribution which likely reflects irregular distribution of habitat. Range includes Washington to Baja California and sagebrush habitats in the intermountain west including northeastern Arizona. Locations include Page, House Rock Valley, and just south of South Rim of Grand Canyon, Pecks Lake/Tavasci Marsh (Oct. 2009) and Mormon Crossing (August 2007) according to Northern Arizona Audubon sightings (accessed October 2011). NatureServe ranks this species as G5S4 – globally secure and apparently secure in AZ (NatureServe 2013cc).

Black-chinned sparrow: Priority bird species for chaparral according to Partners in Flight. Species is fairly common throughout historical range in Arizona; more widespread than previously thought and is apparently expanding on the Arizona Strip; populations are stable and secure in the state. Uncommon summer and rare winter visitor on Forest (Northern AZ Audubon lists). Common in interior chaparral. It is ranked as G5S5 (secure) by NatureServe (2013dd).

Virginia's warbler: Priority bird species for chaparral according to Partners in Flight. Species occurs throughout Intermountain west primarily from Nevada, southern Idaho and Wyoming south to southern AZ. Considered common summer residents that occur regularly in Mogollon Rim Region. Breeding

status is secure in AZ according to Natureserve (2013ee). Susceptible to management activities that remove shrubby brushy understory in pj or mid elevation oak woodlands. Associated with Mixed con, pipo, mixed broadleaf deciduous, montane willow riparian, pj evergreen shrub, interior chaparral. Fairly common summer resident and transient according to Northern AZ Audubon lists.

Red-faced warbler: Priority bird species for high elevation riparian (MBDR, MWR) from Partners in Flight. High APIF score, abundant habitat on the Forests, and distribution restricted to north central AZ, w central N Mexico and Durango Mexico. Relatively abundant and known to nest on Forest. Expanding range in AZ as well as found in former range. Apparently secure in AZ (G5S4) (NatureServe 2013ff). Use mixed conifer and mixed broad leaf riparian forests.

Bell's vireo: Priority bird species for low elevation riparian for Birds of Conservation Concern (2008). A common and widespread summer resident of southeastern and central AZ. Apparently secure in AZ for both the subspecies and species (G5T4S4 )(NatureServe 2013gg, NatureServe2013hh ). Breeds on Forest. Common summer resident according to Northern AZ Audubon lists. Although Bell's vireo numbers have recently declined in parts of their range, overall AZ numbers appear to be stable or slightly increasing. Range California to Minnesota excepting Pacific NW, Intermountain north. Stable in Arizona except for Lower Colorado. Status in Partners in Flight Landbird Conservation Plan: species of continental importance in Southwestern Avifaunal Biome (BCRs 20, 33-36).High APIF score of 25.

Elf owl: Priority bird species for desert riparian for Birds of Conservation Concern 2008. Species range does not include the Forest. One record from Chino Valley. NatureServe ranks it as G5S5 (NatureServe2013ii). Arizona Breeding Bird Atlas documents locations in the southern parts of the state.

Bendire's thrasher: Priority bird species for desert riparian for Birds of Conservation Concern 2008. There are a few records on the forest for this mostly desert species. Majority of the species records is in southern part of the state. More widespread in AZ than any other thrasher. Considered apparently secure in Arizona (G4G5S4)(NatureServe2013jj). Rare summer resident in Verde Valley (Northern AZ Audubon), Uses semi-desert grasslands and desert communities.

Greater Pewee: Priority bird species for ponderosa pine from Birds of Conservation Concern 2008. During the Arizona Breeding Bird surveys, this primarily Mexican species was most commonly encountered in southeastern mountain ranges and were less common and more locally distributed to the north. They were found sparingly north to the southern slope of the Mogollon Rim but were not detected above it. Compared to historical records, the distribution and abundance of Greater Pewee has apparently changed little other than possibly expanding to several mountain ranges in west-central Arizona (Corman and Wise-Gervais 2005). NatureServe (2013kk) ranks it as a G5S4 (globally secure and apparently secure in the state).

Band-tailed pigeon: Priority bird species for piñon juniper for Partners in Flight. NatureServe (2013ll) ranks it as a G4S5 (globally apparently secure and secure in the state). During the Arizona Breeding Bird surveys, this relatively widespread and migratory species was confirmed above and below the Mogollon Rim, northwest to Williams and the San Francisco Peaks area. Declines have been noted in the Mule Mountains in southeastern Arizona and on the South Rim of the Grand Canyon Arizona (Corman and Wise-Gervais 2005).

Crissal thrasher: Priority bird species for desert riparian from Birds of Conservation Concern 2008. NatureServe (2013mm) ranks it as a G5S5 (globally secure and secure in the state). Arizona Breeding Bird atlasers found crissal thrashers to be more widespread in Arizona than previous literature suggests (Corman and Wise-Gervais 2005).

## Appendix C: ROS class by PNVT by alternative

PNVT	Alternative	P (includes wilderness ROS classes)	SPNM	SPM	Subtotal Primitive	RN	R	U	Non- forest	Total	Compared to A shift from less primitive to more primitive	Compared to A shift from more primitive to less primitive
CWRF	Alt. A	258	275	717	1250	736	478	0	43	2,484	-	-
CWRF	Alt. B	265	485	406	1,156	954	397	0	0	2,506	-	94
CWRF	Alt. C	668	159	339	1,166	943	397	0	0	2,506	-	84
CWRF	Alt. D	258	491	406	1,155	954	397	0	0	2,506	-	95
MBDR	Alt. A	1,469	262	648	2,379	1,000	232	0	0	3,611	-	-
MBDR	Alt. B	1,517	384	648	2,549	822	233	0	0	3,604	170	-
MBDR	Alt. C	1,796	191	590	2,577	793	233	0	0	3,604	198	-
MBDR	Alt. D	1,468	403	648	2,519	852	233	0	0	3,604	140	-
MWR	Alt. A	482	518	725	1,243	2,065	0	0	39	3,347	-	-
MWR	Alt. B	482	1,665	967	2,632	711	3	0	0	3,346	1,389	-
MWR	Alt. C	1,201	1,331	579	1,910	715	3	0	0	2,628	667	-
MWR	Alt. D	482	1665	967	2,632	711	3	0	0	3,346	1,389	-
GCRF	Alt. A	16	118	64	198	3	0	0	0	201	-	-
GCRF	Alt. B	16	121	61	198	3	0	0	0	201	-	0
GCRF	Alt. C	16	161	16	193	7	0	0	0	200	-	5
GCRF	Alt. D	16	121	61	198	3	0	0	0	201	-	5
W/C	Alt. A	0	69	2,186	2,255	7,384	230	0	10	9,869	-	-
W/C	Alt. B	0	6,343	1,570	7,913	1,735	230	0	0	9,878	5,658	-
W/C	Alt. C	0	7,036	972	8,008	1,642	230	0	0	9,878	5,753	-
W/C	Alt. D	0	6,343	1,570	7,913	1,735	230	0	0	9,878	5,658	-