

Chapter 9:
Ecological & Biological Diversity of the Prescott National Forest
In
Ecological and Biological Diversity of National Forests in Region 3

Bruce Vander Lee, Ruth Smith, and Joanna Bate
The Nature Conservancy



SAVING THE LAST GREAT PLACES ON EARTH

Table of Contents

Introduction.....	9-5
Results	9-6
I. Potential Natural Vegetation Types within the Prescott National Forest.....	9-6
II. Distribution and Condition of Grasslands.....	9-11
III. Riparian and Freshwater Systems and Species.....	9-14
IV. Plant and Animal Species Richness	9-19
V. Ecoregional Assessment Conservation Areas and Conservation Targets	9-30
Discussion.....	9-34
Systems Diversity	9-34
Grasslands.....	9-34
Riparian and Aquatic Species and Systems	9-36
Species Richness and Conservation Status	9-37
Relevance to Forest Planning.....	9-38
References.....	9-40

List of Tables

- Table 9-1.** Approximate area (in acres) and percent of total area of each potential natural vegetation type on the Prescott National Forest. Areas were calculated using data from the Southwest Regional Gap Analysis Project (SWReGAP). SWReGAP land cover types were aggregated and cross-walked to potential natural vegetation types. See Chapter 2 for more details on methods utilized.9-8
- Table 9-2.** Proportions of potential natural vegetation types on Prescott National Forest relative to all National Forests in Region 3 and all major landowners in Arizona and New Mexico. Major landowners include: Bureau of Land Management, Department of Defense, National Park Service, private, state trust, tribal, US Fish and Wildlife Service, USDA Region 3 Forest Service, and other (which includes Bureau of Reclamation, non-federal parks, Valles Caldera National Preserve, county lands, Department of Energy, USDA Research, state Game and Fish, and unnamed lands).....9-10
- Table 9-3.** Acres of low elevation grasslands (<5000 ft) in three condition types occurring on three ranger districts on the Prescott National Forest in Arizona (data from Schussman and Gori 2004, Gori and Enquist 2003).....9-12
- Table 9-4.** Number of stream miles with occurrences of 10 native fishes on three ranger districts on the Prescott National Forest in Arizona based on the Arizona Freshwater Assessment (Turner and List, *In Press*).9-15
- Table 9-5.** Approximate number of perennial stream miles, number of stream miles with occurrences (1975 to present) of one or more native fish species, and number of native fish species with occurrences on three ranger districts on the Prescott National Forest in Arizona based on the Arizona Freshwater Assessment (Turner and List, *In Prep*).9-15
- Table 9-6.** Stream systems, number of native fish species with occurrences, and the total stream reach length with native fish occurrences for 15 stream systems with native fishes on the Prescott National Forest in Arizona.9-18
- Table 9-7.** According to review by Prescott National Forest staff, stream systems and the total stream reach length with native fish occurrences on the Prescott National Forest in Arizona. To facilitate analyses of changing fish distributions, additional documentation of fish occurrences will be sought from the US Forest Service in an effort to update the Arizona Freshwater Assessment.9-18
- Table 9-8.** Number of species by taxa on the Prescott that have special state status in Arizona. In the state of Arizona, wildlife of conservation concern is assigned the status of Wildlife of Special Concern (WSC) by the Arizona Game and Fish Department. Plants in Arizona are assigned to conservation status categories (HS = highly safeguarded, SR = salvage restricted) by the Arizona Department of Agriculture9-21
- Table 9-9.** Number of species, by taxon, that inhabit the Prescott National Forest with the various global rankings assigned by NatureServe. Seven species are not included in this

table because they were not assigned global ranks. G1 = critically imperiled; G2 = imperiled; G3 = vulnerable; G4 = apparently secure; G5 = secure; TNR = not ranked; TU = unrankable; T = infraspecific taxon (subspecies or varieties).9-22

Table 9-10. Number of species, by taxon, that inhabit the Prescott National Forest with national rankings assigned by NatureServe. Seven species are not included because they do not have an assigned rank. N1 = critically imperiled; N2 = imperiled; N3 = vulnerable; N4 = apparently secure; N5 = secure; NNA = not applicable; NNR = not ranked.....9-23

Table 9-11. Number of species per taxon currently inhabiting the Prescott National Forest that are assigned to the various subnational rankings by the Arizona Natural Heritage. Thirteen of the 364 species were not assigned a subnational conservation rank by Arizona Natural Heritage. S1 = critically imperiled; S2 = imperiled; S3 = vulnerable; S4 = apparently secure; S5 = secure; SNA = not applicable; SNR = not ranked.9-23

Table 9-12. U.S. Fish and Wildlife Service Birds of Conservation Concern on the National Priority List that inhabit the Prescott National Forest.....9-24

Table 9-13. Bird species on the Partners in Flight Watch list that inhabit the Prescott National Forest.....9-25

Table 9-14. Endangered, threatened, and candidate species designated under the Federal Endangered Species Act of 1973 that currently inhabit the Prescott National Forest. The table includes common names that are recognized by NatureServe. For NatureServe scientific names, see Appendix 9-A.9-27

Table 9-15. List of potential species-of-concern that inhabit the Prescott National Forest. According to the published Forest Service draft directives (FSH 1909.12 Chapter 40), species are considered potential species-of concern if they have a NatureServe global conservation rank of G1, G2, G3, T1, T2, or T3 and are not federally listed as endangered or threatened species. Candidate or proposed species for federal listing may be considered for species-of-concern status. Note: Scientific and common names are those recognized by NatureServe unless in bold.9-27

Table 9-16. Conservation areas (N=8) that overlap three ranger districts on the Prescott National Forest in Arizona.9-32

Table 9-17. Extent of overlap between ecoregional conservation areas and three ranger districts on the Prescott National Forest in Arizona.9-32

Table 9-18. Number of conservation targets associated with aquatic/riparian and terrestrial habitats for eight conservation areas that overlap the Prescott National Forest in Arizona..9-32

Table 9-19. Overlap between conservation areas and wilderness and roadless areas on the Prescott National Forest in Arizona.9-33

List of Figures

- Figure 9-1.** Distribution of potential natural vegetation types on the Prescott National Forest. This map was created using data from the Southwest Regional Gap Analysis Project (SWReGAP; U.S. Geological Survey National Gap Analysis Program, 2004). SWReGAP vegetation types were aggregated and cross-walked to potential natural vegetation types. See Chapter 2 for more information regarding methods used. SWReGAP data have not been accuracy tested and are based on satellite imagery. Therefore, SWReGAP may not be appropriate at fine spatial scales.9-7
- Figure 9-2.** Percent area of cover of each potential natural vegetation type that occurs on the Prescott National Forest in relation to all Region 3 National Forests. Analysis was conducted using data from the Southwest Regional Gap Analysis Project (SWReGAP). See Chapter 2 for information regarding the limitations of SWReGAP.9-9
- Figure 9-3.** Grassland types, based on condition, on three ranger districts on the Prescott National Forest in Arizona (from Schussman and Gori 2004, Gori and Enquist 2003).9-13
- Figure 9-4.** Number of stream miles with varying number of native fish species with occurrences from 1975 to present (Turner and List, *In Press*) for three ranger districts on the Prescott National Forest in Arizona.9-16
- Figure 9-5.** Perennial stream reaches with varying numbers of native fish species with occurrences on three ranger districts on the Prescott National Forest in Arizona.9-17
- Figure 9-6.** Number of species, by taxa, that inhabit the Prescott National Forest based on data from the R3 Species Database. The R3 Species Database includes all known terrestrial and aquatic vertebrates, along with invertebrates and plants of management concern that inhabit Region 3 Forests. For this analysis, non-native aquatic vertebrates were not considered. Due to the limitations of the R3 Species Database (see Chapter 2 for a complete description of the database), the numbers reported in these results are conservative.9-20
- Figure 9-7.** The number of potential species-of-interest, by taxon, that inhabit the Prescott National Forest. Species were considered potential species-of-interest if they fell into one or more of the following categories: special state conservation status (WSC, HS, and SR in Arizona); listed as a priority species in the AZ State Comprehensive Wildlife Conservation Strategies; on the U.S. Fish and Wildlife Service Birds of Conservation Concern National Priority list; and NatureServe national or subnational conservation rank of N1, N2, S1 or S2. These are the criteria listed in the published Forest Service directives (FSH 1909.12 Chapter 40) for determining species-of-interest. Species that are federally listed as endangered or threatened, or that were determined to be potential species-of concern were not included as potential species-of-interest.9-29
- Figure 9-8.** Conservation areas (N=8) that overlap the Prescott National Forest in Arizona. 9-319-31
- Figure 9-9.** Number of conservation targets, by type, that occur on eight conservation areas overlapping the Prescott National Forest in Arizona.9-33

Introduction

The Prescott Forest is one of 11 National Forests of the U.S. Forest Service (USFS) Southwestern Region (Region 3) and comprises approximately 7% of the total area of Region 3 Forests, not including the Cibola National Grasslands. This Forest encompasses approximately 1,255,500 acres (508,083 hectares) in central Arizona and includes a number of mountain ranges as well as the headwaters of the Verde River. Elevation on the Forest ranges from approximately 3,500 ft (1,067 m) to nearly 8,000 ft (2,438 m) on Mount Union.

A large elevation gradient exists on the Prescott National Forest, which leads to a diverse range of vegetation systems and wildlife communities. Vegetation ranges from Sonoran desert communities in the lower elevations of the Forest, up through interior chaparral and pinyon-juniper woodlands to ponderosa pine forests at higher elevations. A relatively small area of mixed conifer is also present at higher elevations in the Bradshaw Mountains. The Forest includes the headwaters and significant portions of the Verde River, one of the most valuable aquatic and riparian systems in the Southwest. This river system, along with others in the area, is of critical conservation concern because of the diverse communities they support, many of which are imperiled in the Southwest.

The goal of this chapter is to synthesize information from existing regional-scale assessments to identify important ecological and biological values that occur on the Prescott National Forest and highlight information that may be pertinent to forest planning. Information from five assessments was synthesized for the Prescott National Forest, including:

- Distribution and extent of potential natural vegetation types (PNVTs)
- Distribution and condition of grassland systems
- Distribution of native fish species
- Plant and animal species richness and their conservation statuses
- Conservation areas and targets associated with Ecoregional Assessments

These types of information may be useful within the forest planning process for evaluating the suitability of current management activities and land management designations, identifying ecological characteristics that may be considered in developing desired conditions, and identifying species that may need special consideration because of continuing threats to their existence. Detailed descriptions of these datasets and the methods used to analyze them are available in Chapter 2. A summary and analysis of these assessments and comparisons of the Prescott National Forest to other major landowners in the Southwest (Arizona and New Mexico) and National Forests in Region 3 is provided in Chapter 3.

Results

I. Potential Natural Vegetation Types within the Prescott National Forest

Data from the Southwest Regional Gap Analysis Project (SWReGAP; USGS National Gap Analysis Program 2004) were used to characterize the extent of potential natural vegetation types (PNVTs) on the Prescott National Forest. PNVTs represent the climax vegetation type that would dominate a site under natural disturbance regimes and biological processes. PNVTs were used to summarize vegetation for this analysis because of their relevance to the characterizations of historic range of variability and vegetation models being developed for PNVTs in preparation for forest planning. For this analysis, the extent and proportion of each PNVT on the Prescott were summarized, as well as the proportion of each PNVT within Region 3 that occurs on the Prescott National Forest. More detailed information on the data and methods used in this analysis can be found in Chapter 2, and information comparing PNVTs on the Prescott to other major landowners in the Southwest and National Forests within Region 3 is available in Chapter 3.

Fourteen PNVTs were identified on the Prescott National Forest (Figure 9-1). However, six PNVTs dominate the landscape and comprise 97.5% of the Forest. These six PNVTs include Madrean encinal woodlands (29.5%), interior chaparral (29.3%), semi-desert grasslands (11.7%), pinyon-juniper (11.0%), Madrean pine-oak (8.2%), and ponderosa pine (7.8%). The remaining eight PNVTs cover approximately 2.5% of the Prescott National Forest (Table 9-1).

It is important to note that these results are based on SWReGAP, which may not be appropriate for fine-spatial scale analyses. Thus, small patches of vegetation, such as mixed conifer forest on the Bradshaw Mountains, were not detected (see Chapter 2 for more information regarding the limitations of SWReGAP). In addition, the methodologies used to derive these results involved aggregating SWReGAP cover types and cross-walking these aggregated systems to PNVTs (see Chapter 2). This enabled the variety of vegetation systems within Region 3 lands to be condensed to coarse PNVTs for these analyses. Thus, specific PNVT characteristics may differ from Forest to Forest. Furthermore, the results in these analyses likely differ from that of other vegetation system analyses and maps, such as the General Ecosystem Surveys and Terrestrial Ecosystem Surveys.

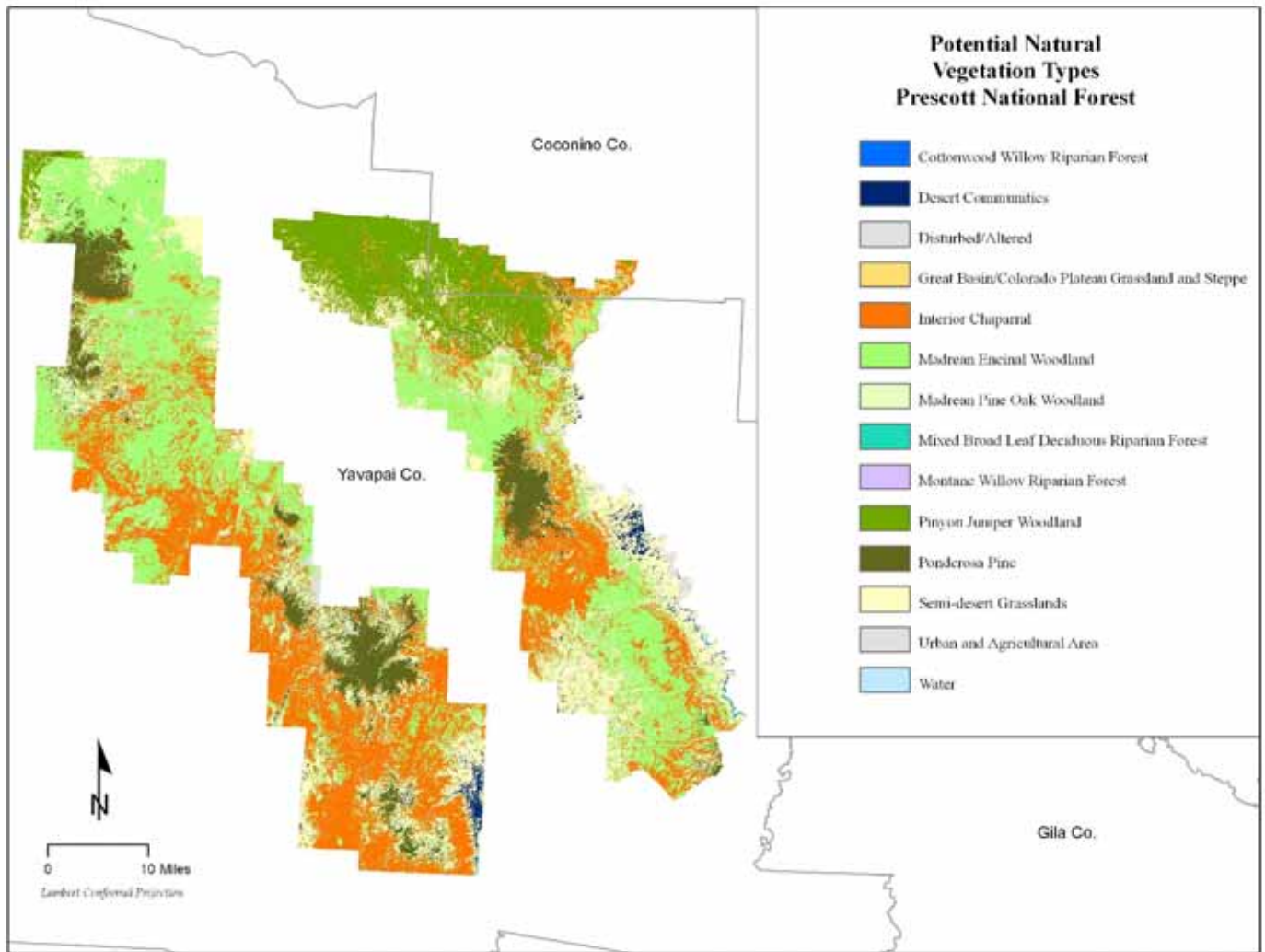


Figure 9-1. Distribution of potential natural vegetation types on the Prescott National Forest. This map was created using data from the Southwest Regional Gap Analysis Project (SWReGAP; U.S. Geological Survey National Gap Analysis Program, 2004). SWReGAP vegetation types were aggregated and cross-walked to potential natural vegetation types. See Chapter 2 for more information regarding methods used. SWReGAP data have not been accuracy tested and are based on satellite imagery. Therefore, SWReGAP may not be appropriate at fine spatial scales.

Table 9-1. Approximate area (in acres) and percent of total area of each potential natural vegetation type on the Prescott National Forest. Areas were calculated using data from the Southwest Regional Gap Analysis Project (SWReGAP). SWReGAP land cover types were aggregated and cross-walked to potential natural vegetation types. See Chapter 2 for more details on methods utilized.

Potential Natural Vegetation Type	Total Area (acres)	Percent of Total Area
Cottonwood Willow Riparian Forest	200	<0.1
Desert Communities	10,100	0.8
Disturbed/Altered (quarries and mines)	500	<0.1
Great Basin/ Colorado Plateau Grassland and Steppe	13,900	1.1
Interior Chaparral	368,400	29.3
Madrean Encinal Woodland	370,200	29.5
Madrean Pine-Oak Woodland	103,500	8.2
Mixed Broadleaf Deciduous Riparian Forest	400	<0.1
Montane Willow Riparian Forest	3,300	0.3
Pinyon-juniper Woodland	138,400	11.0
Ponderosa Pine	98,400	7.8
Semi-desert Grassland	146,500	11.7
Urban and Agricultural Area	1,600	0.1
Water	100	<0.1
Total	1,255,500	

Within Region 3, large proportions of certain PNVTs are found on the Prescott National Forest. For example, approximately 27% of interior chaparral on Region 3 Forest lands can be found on the Prescott National Forest. Furthermore, the Prescott manages 14% of Madrean encinal woodlands and 12% of Madrean pine-oak woodlands on Region 3 National Forests (Figure 9-2; Table 9-2). Additionally, the Prescott National Forest manages approximately 12% of all interior chaparral found in Arizona and New Mexico combined. Chapter 3 provides more information regarding the area of each PNVT on the Prescott National Forest relative to other landowners in the Southwest.

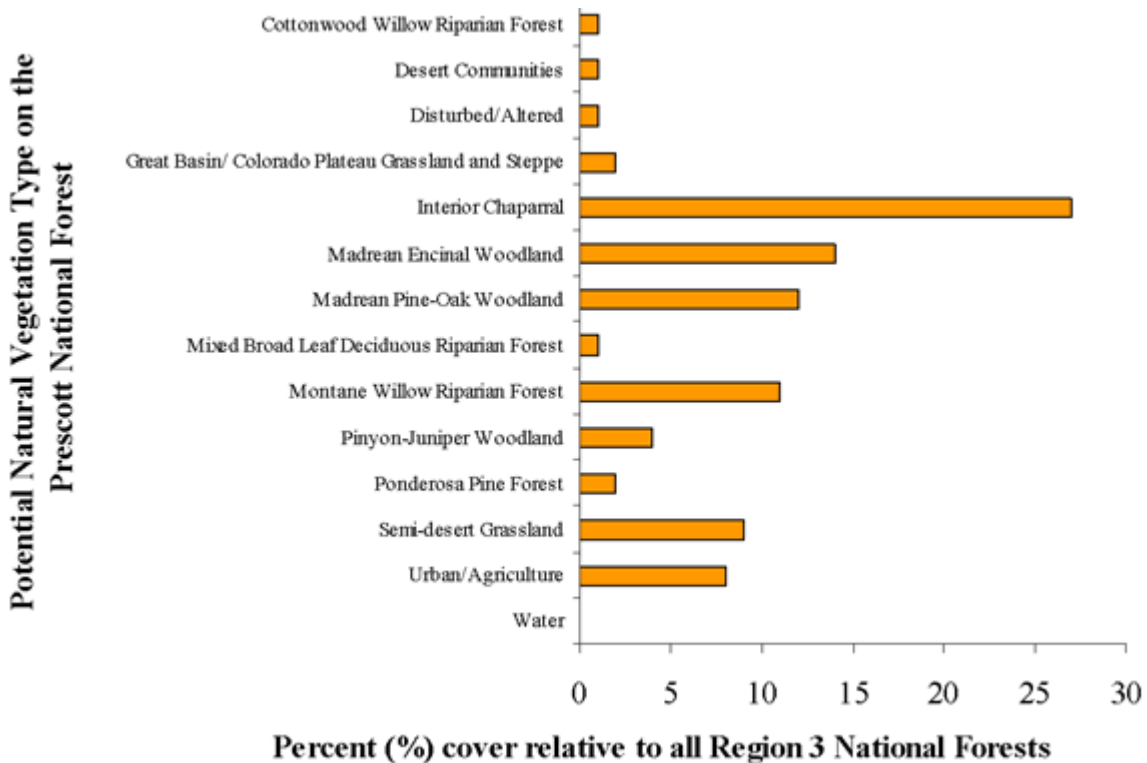


Figure 9-2. Percent area of cover of each potential natural vegetation type that occurs on the Prescott National Forest in relation to all Region 3 National Forests. Analysis was conducted using data from the Southwest Regional Gap Analysis Project (SWReGAP). See Chapter 2 for information regarding the limitations of SWReGAP.

The Prescott National Forest also manages relatively large proportion of certain PNVTs relative to all major landowners in Arizona and New Mexico. For example, 12% of all interior chaparral in the Southwest is found on the Prescott (Table 9-2).

Table 9-2. Proportions of potential natural vegetation types on Prescott National Forest relative to all National Forests in Region 3 and all major landowners in Arizona and New Mexico. Major landowners include: Bureau of Land Management, Department of Defense, National Park Service, private, state trust, tribal, US Fish and Wildlife Service, USDA Region 3 Forest Service, and other (which includes Bureau of Reclamation, non-federal parks, Valles Caldera National Preserve, county lands, Department of Energy, USDA Research, state Game and Fish, and unnamed lands).

Potential Natural Vegetation Type	Prescott relative to all of Region 3 Forests	Prescott relative to all major landowners in Arizona and New Mexico
Cottonwood Willow Riparian Forest	1%	0%
Desert Communities	1%	0%
Disturbed/Altered	1%	0%
Great Basin/ Colorado Plateau Grassland and Steppe	2%	0%
Interior Chaparral	27%	12%
Madrean Encinal Woodland	14%	6%
Madrean Pine-Oak Woodland	12%	7%
Mixed Broad Leaf Deciduous Riparian Forest	1%	0%
Montane Willow Riparian Forest	11%	3%
Pinyon-Juniper Woodland	4%	1%
Ponderosa Pine Forest	2%	1%
Semi-desert Grassland	9%	1%
Urban/Agriculture	8%	0%
Water	0%	0%

II. Distribution and Condition of Grasslands

The Arizona Statewide Grassland Assessment (Schussman and Gori 2004, Gori and Enquist 2003; available at <http://www.azconservation.org>) was used to identify the extent, distribution, and condition of historic and current low-elevation (<5000 ft) grasslands on the Prescott National Forest. This statewide assessment (which also includes the portions of southwest New Mexico and Mexico that are within the Apache-Highlands Ecoregion; Figure 2-1 in Chapter 2) was developed through a combination of expert-based mapping and intensive, quantitative field sampling to verify and improve accuracy. Grassland condition was assessed and assigned to condition classes based on native/non-native grass dominance and cover, shrub cover, and erosion severity. For the purposes of this analysis, condition classes were aggregated into five grassland condition types (Table 2-1 in Chapter 2): open native, restorable native, non-native, former, and transitional grasslands. Here, the term native refers to species composition. More detailed information on the data and methods used in this analysis can be found in Chapter 2, and information comparing the extent and distribution of grasslands on the Prescott to other major landowners and National Forests within Region 3 is available in Chapter 3.

The Arizona Grassland Assessment identified approximately 330,200 acres of extant and historic grasslands on the Prescott National Forest (Table 9-3), representing 23.4% of the Forest. Overall, the Prescott National Forest manages 17.5% of all grasslands, 38.4% of open native grasslands, 13.1% of restorable grasslands, 13.8% of former grasslands, and 1.5% of non-native grasslands that occur on National Forests in Arizona. The majority of grasslands on the Prescott are in open native (45.6%) and restorable native (43.0%) condition, with the remainder in former grassland condition (10.3%) or non-native condition (0.7%; Table 9-3).

The largest proportions of identified grasslands occur on the Chino Valley (50.0%) and Verde (44.7%) Ranger Districts (Table 9-3). On the Chino Valley District, approximately one-third of grasslands are in open native condition, while two-thirds were identified as being in restorable native condition, meaning that they have been encroached by shrubs and woody species, but have the potential to be restored to open native condition. The Verde District includes a large contiguous block of open native grasslands (61.3%). It also includes grasslands in restorable native condition (14.8%) and a relatively large block of former grasslands which have become shrub invaded, and have likely undergone a type conversion with little potential to be restored to open native grassland condition.

Table 9-3. Acres of low elevation grasslands (<5000 ft) in three condition types occurring on three ranger districts on the Prescott National Forest in Arizona (data from Schussman and Gori 2004, Gori and Enquist 2003).

District	Grassland Condition Type									
	Open Native		Restorable Native		Former		Non-Native		Total	
	Acres	% ^A	Acres	% ^A	Acres	% ^A	Acres	% ^A	Acres	% ^B
Bradshaw	0	0.0	15,200	86.4	0	0.0	2,400	13.6	17,600	5.3
Chino										
Valley	60,300	36.5	104,800	63.5						

Figure 9-3. Grassland types, based on condition, on three ranger districts on the Prescott National Forest in Arizona (from Schussman and Gori 2004, Gori and Enquist 2003).

III. Riparian and Freshwater Systems and Species

The Arizona Statewide Freshwater Assessment (Turner and List, *In Press*; available at www.azconservation.org) was used to summarize the occurrence and distribution of stream reaches with native fishes across major landowners and National Forests in Arizona. This assessment was developed for use in regional planning and includes occurrence information (1975 to present) for 33 native fish species (Table 2-2 in Chapter 2) in streams across all of Arizona. This information was used to identify and summarize the occurrences of each native fish species on stream reaches within the Prescott National Forest and to summarize the number of native fish species with occurrences on stream reaches on the Forest. More detailed information on the data and methods used in this analysis can be found in Chapter 2, and information comparing the extent of native fish occurrences on the Prescott to other landowners in the Southwest and National Forests within Region 3 is available in Chapter 3.

According to the Arizona Freshwater assessment, 10 native fish species have occurrences on one or more stream reaches on the Prescott National Forest (Table 9-4; see Table 2-2 for scientific names). Together, these 10 species have occurrences on approximately 107 miles (82.9%) of the 129 miles of perennial streams that exist on the Prescott (Table 9-4). Overall, the Prescott accounts for 6.9% of the perennial streams and 8.4% of the stream reaches with native fish occurrences that exist on National Forests in Arizona.

The longfin dace and desert sucker have the largest distributions on the Prescott National Forest, while the Gila chub and Gila topminnow have the smallest. Within National Forests in Arizona, a large proportion of the stream reaches with occurrences of spikedace (58.1%), Colorado pikeminnow (34.9%), and razorback sucker (25.3%) occur on the Prescott (Table 9-4). Olden and Poff (2005) characterized the temporal trends in native fish distributions within the Lower Colorado River Basin, including all ten native fish species on the Prescott. Eight of these 10 (80.0%) native fish species have undergone declines in distribution across the basin, with the remaining two showing slight increases (Table 9-4).

According to the Arizona Freshwater Assessment, the Verde and Chino Valley Ranger Districts have the longest lengths of stream reaches with native fish occurrences (Table 9-5). They also have significant reaches with six or more native fish species (Figure 9-4). Fifteen streams on the Prescott National Forest have native fish occurrences (Table 9-6, Figure 9-5). The Verde River is obviously an important aquatic system within the Prescott National Forest and Region 3, with approximately 55 miles of occupied habitat and with occurrences of as many as eight species within a reach. Cherry Creek and Hassayampa River also have significant reaches with native fish occurrences. Within National Forests in Arizona, nearly 20% of stream reaches with occurrences of six or more species occur on the Prescott National Forest.

A review by the Prescott National Forest staff noted differences in current presence and distribution of native fishes on the Forest from that of the Arizona Freshwater Assessment. These differences are primarily due to the dynamic nature of native fish distributions in the Southwest (Olden and Poff 2005), and may be useful in understanding recent changes in native

fish distributions on the Prescott National Forest. For example, according to the review, the Gila topminnow does not inhabit the Forest, while spikedace and speckled dace are rare to nonexistent. Also noted was that the Colorado pikeminnow and razorback sucker are stocked fishes and both currently occupy 15 stream miles on the Verde Ranger District and do not inhabit the Chino Valley Ranger District. Also, longfin dace is presumed rare to non-existent on the Chino Valley and Verde Ranger Districts. Finally, it was noted that the Hassayampa River on the Prescott does not have viable native fish habitat due to water quality problems associated with mining. In addition, the staff provided differing numbers of total stream reach length occupied by native fishes on the Forest, which is provided in Table 9-7. These changes are important from a conservation management perspective. To facilitate analyses of changing fish distributions, additional documentation of fish occurrences will be sought from the USFS to update the Arizona Freshwater Assessment.

Table 9-4. Number of stream miles with occurrences of 10 native fishes on three ranger districts on the Prescott National Forest in Arizona based on the Arizona Freshwater Assessment (Turner and List, *In Press*).

Species	Ranger District			Total	% of AZ Forests ^A	% Change in Distribution ^B
	Bradshaw	Chino Valley	Verde			
Colorado Pikeminnow		15	22	37	34.9	-100.0
Desert Sucker	14	34	43	91	11.3	-13.5
Gila Chub			5	5	2.8	-15.9
Gila Topminnow	2			2	2.1	-36.8
Longfin Dace	14	33	49	96	13.0	11.4
Razorback Sucker		33	34	67	25.3	-49.7
Roundtail Chub		33	34	67	12.2	-6.2
Sonora Sucker		34	34	68	9.3	8.2
Speckled Dace		40	24	64	7.5	-16.5
Spikedace		33	3	36	58.1	-45.9

^APercent of all stream reaches with occurrences on National Forests

^BBased on Olden and Poff (2005) from the Lower Colorado River basin

Table 9-5. Approximate number of perennial stream miles, number of stream miles with occurrences (1975 to present) of one or more native fish species, and number of native fish species with occurrences on three ranger districts on the Prescott National Forest in Arizona based on the Arizona Freshwater Assessment (Turner and List, *In Prep*).

Ranger District	Perennial Flow (Miles)	Occupied Habitat (Miles)	Number of Native Fish Species
Bradshaw	26	16	3
Chino Valley	46	41	8
Verde	57	50	9
Total	129	107	10 ^A

^ATotal number of native fish species with occurrences on the Prescott National Forest. Several species occur on multiple ranger districts.

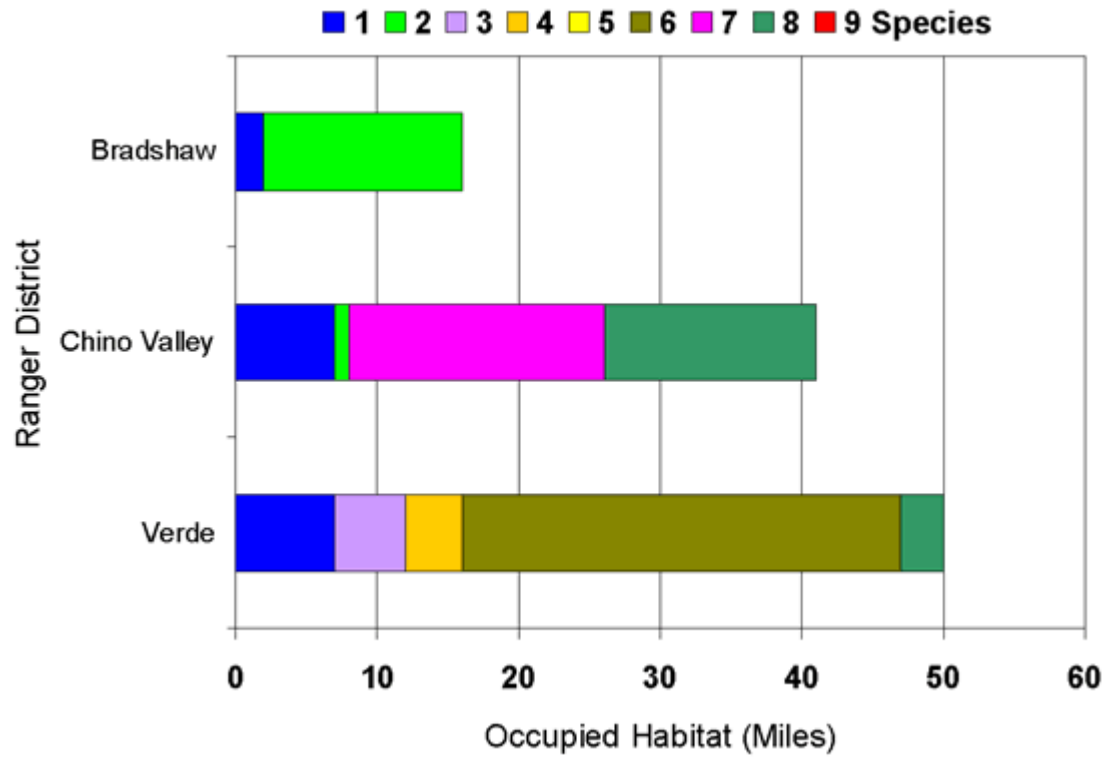


Figure 9-4. Number of stream miles with varying number of native fish species with occurrences from 1975 to present (Turner and List, *In Press*) for three ranger districts on the Prescott National Forest in Arizona.

Figure 9-5. Perennial stream reaches with varying numbers of native fish species with occurrences on three ranger districts on the Prescott National Forest in Arizona.

Table 9-6. Stream systems, number of native fish species with occurrences, and the total stream reach length with native fish occurrences for 15 stream systems with native fishes on the Prescott National Forest in Arizona.

Stream Name ^A	Occupied Habitat (miles)	Number of Native Fish Species ^B
Apache Creek A	4	1
Ash Creek E	2	3
Blind Indian Creek	2	2
Castle Creek C	0	1
Cherry Creek A	12	6
Cienega Creek D	6	1
Hassayampa River	12	2
Hitt Wash	3	1
Horner Gulch	0	2
Little Ash Creek	3	3
Little Sycamore Creek	1	4
Minnehaha 1	2	1
Sycamore Creek D	1	2
Sycamore Creek F	4	4
Verde River	55	8

^ALetters following stream names differentiate multiple streams with identical names within Arizona.

^BThe maximum number of species with occurrences within a reach. Portions of the stream system may have fewer species.

Table 9-7. According to review by Prescott National Forest staff, stream systems and the total stream reach length with native fish occurrences on the Prescott National Forest in Arizona. To facilitate analyses of changing fish distributions, additional documentation of fish occurrences will be sought from the US Forest Service in an effort to update the Arizona Freshwater Assessment.

Stream Name ^A	Occupied Habitat (miles)
Apache Creek A	A few hundred yards
Ash Creek E	Dry
Blind Indian Creek	Perennial interrupted
Castle Creek C	0
Cherry Creek A	0
Cienega Creek D	Perennial interrupted for 1 mile
Hitt Wash	
Horner Gulch	300 feet
Little Ash Creek	2 – 2.5 miles
Little Sycamore Creek	600 feet
Minnehaha 1	A few yards
Sycamore Creek F	4
Verde River	44
Dry Creek on Verde Road*	0.5 mile

^A Letters following stream names differentiate multiple streams with identical names within Arizona.

*Dry Creek was not included in the Arizona Freshwater Assessment. According to the review by Prescott National Forest staff, longfin dace is found within this reach

IV. Plant and Animal Species Richness

The R3 Species Database was used to determine plant and animal species richness on the Prescott National Forest and to characterize the conservation status of these species. The R3 Species Database was created by combining several existing datasets into a single database that provides updated and consistent attributes for species that occur on Region 3 Forests, including taxonomy, NatureServe conservation status rankings, state and federal endangered species listings, and other pertinent conservation status rankings. The database includes all terrestrial and aquatic vertebrate species, along with plant and invertebrate species that may be of conservation concern that are known to inhabit the Prescott National Forest. However, for these analyses, non-native aquatic vertebrate species were not included. More detailed information on the data and methods used for analysis in this section of the report can be found in Chapter 2. The complete list of species used in this analysis and their conservation status attributes is provided in Appendix 9-A. For aquatic species, the results in this section of the report differ slightly from those in the Riparian and Freshwater Systems and Species section because of the different datasets utilized.

Species Richness — According to the R3 Species Database, the Prescott National Forest contains at least 364 species of plants and animals (Figure 9-6), which is a conservative estimate. The dataset used for this analysis only includes organisms that are known to inhabit the Forest, including terrestrial vertebrate species, native aquatic vertebrate species, and plant and invertebrate species of management concern. It is also important to note that the number and type of species inhabiting the Prescott National Forest likely changes over time.

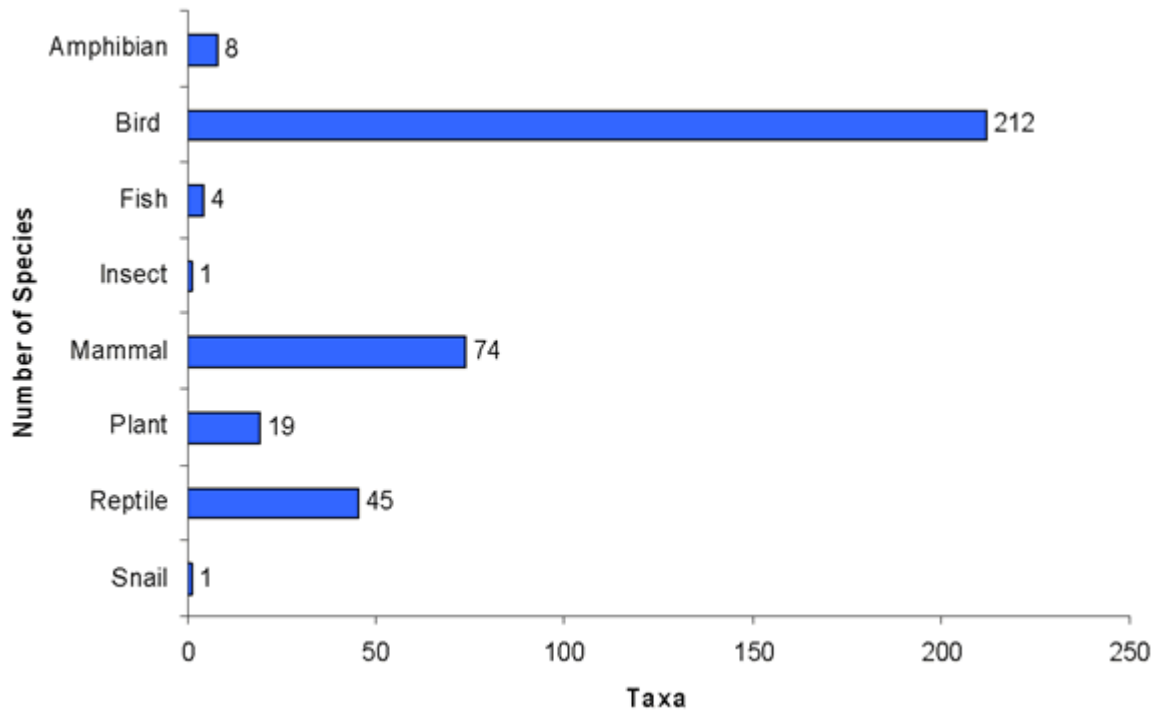


Figure 9-6. Number of species, by taxa, that inhabit the Prescott National Forest based on data from the R3 Species Database. The R3 Species Database includes all known terrestrial and aquatic vertebrates, along with invertebrates and plants of management concern that inhabit Region 3 Forests. For this analysis, non-native aquatic vertebrates were not considered. Due to the limitations of the R3 Species Database (see Chapter 2 for a complete description of the database), the numbers reported in these results are conservative.

Federally listed endangered, threatened, and candidate species — The U.S. Fish and Wildlife Service determines those species that have federal status as endangered or threatened under the Federal Endangered Species Act of 1973. The agency also lists species as candidate species when there is sufficient information to support a proposal for the endangered or threatened status. Currently, the Prescott manages seven species that are federally listed as either endangered or threatened (Table 9-14), and one species that is a candidate species, Western Yellow-Billed Cuckoo (*Coccyzus americanus occidentalis*).

Arizona state conservation status —The Arizona Game and Fish Department designates wildlife species whose occurrence is or may be at risk in the state the status of ‘Wildlife of Special Concern’ (WSC). The Arizona Department of Agriculture assigns special state status to plants of conservation concern as highly safeguarded (HS), salvage restricted (SR), export restricted (ER), salvage assessed (SA), or harvest restricted (HR). Currently, there are 24 animals and five plant species with special Arizona state conservation status. Table 9-8 provides a breakdown of those species with state conservation status by taxonomic groupings. Appendix 9-A lists all known terrestrial vertebrates, native aquatic vertebrates, and plants and invertebrates of management concern that inhabit the Prescott and identifies those with state conservation status.

Table 9-8. Number of species by taxa on the Prescott that have special state status in Arizona. In the state of Arizona, wildlife of conservation concern is assigned the status of Wildlife of Special Concern (WSC) by the Arizona Game and Fish Department. Plants in Arizona are assigned to conservation status categories (HS = highly safeguarded, SR = salvage restricted) by the Arizona Department of Agriculture

Taxa	HS	SR	WSC	Total
Amphibian	0	0	1	1
Bird	0	0	15	15
Fish	0	0	2	2
Mammal	0	0	3	3
Plant	1	4	0	5
Reptile	0	0	3	3
Total	1	4	24	29

NatureServe global conservation status rankings — Seven species (1.9%) of 364 were not included in this analysis because they were not assigned NatureServe global conservation ranks. Results indicate 320 species (87.9%) were ranked as G4/T4 or G5/T5 species (Table 9-9). These are species whose populations are considered ‘apparently secure’ or ‘secure’, respectively. Thirty-five species (9.6%) were ranked with a global conservation status of G1, G2, G3, T1, T2 or T3, that warrants conservation concern. The remaining two species were not ranked or unrankable.

Table 9-9. Number of species, by taxon, that inhabit the Prescott National Forest with the various global rankings assigned by NatureServe. Seven species are not included in this table because they were not assigned global ranks. G1 = critically imperiled; G2 = imperiled; G3 = vulnerable; G4 = apparently secure; G5 = secure; TNR = not ranked; TU = unrankable; T = infraspecific taxon (subspecies or varieties).

Global Ranking	Amphibian	Bird	Fish	Insect	Mammal	Plant	Reptile	Snail	Total
G1	0	0	0	0	0	1	0	1	2
G2	0	0	1	0	0	4	0	0	5
G3	1	2	3	0	1	9	2	0	18
G4	1	12	0	0	8	0	2	0	23
G5	6	188	0	0	54	0	36	0	284
T1	0	1	0	0	0	1	0	0	2
T2	0	1	0	0	0	2	0	0	3
T3	0	2	0	1	0	1	1	0	5
T4	0	2	0	0	1	0	3	0	6
T5	0	2	0	0	4	0	1	0	7
TNR	0	1	0	0	0	0	0	0	1
TU	0	1	0	0	0	0	0	0	1

National conservation status rankings (N-ranks) — Forty species (11.2%) were ranked with a national conservation status of N1, N2, or N3, indicating conservation concern at the national level (Table 9-10). Three hundred ten species on the Forest (86.8%) were ranked as N4 or N5 species, whose populations are considered ‘apparently secure’ or ‘secure’, respectively. Seven species were not considered rankable by NatureServe, and seven species were not assigned a NatureServe national rank.

Table 9-10. Number of species, by taxon, that inhabit the Prescott National Forest with national rankings assigned by NatureServe. Seven species are not included because they do not have an assigned rank. N1 = critically imperiled; N2 = imperiled; N3 = vulnerable; N4 = apparently secure; N5 = secure; NNA = not applicable; NNR = not ranked.

Rank	Amphibian	Bird	Fish	Insect	Mammal	Plant	Reptile	Snail	Total
N1	0	1	0	0	0	2	0	1	4
N2	0	0	1	0	0	6	1	0	8
N3	1	6	3	1	6	9	2	0	28
N4	1	22	0	0	7	0	7	0	37
N5	6	178	0	0	54	0	35	0	273
NNA	0	3	0	0	1	0	0	0	4
NNR	0	2	0	0	0	1	0	0	3

NatureServe subnational conservation status ranking. — Of the 364 species analyzed for the Prescott National Forest, 347 (96.4%) had assigned subnational conservation status ranks (S-ranks) in the state of Arizona (Table 9-11). Of these, 239 (68.9%) were considered secure or apparently secure (S5 and S4, respectively). Eighty-six species (24.8%) had rankings that merit conservation concern on a state or more local scale (S1, S2, or S3). The remaining 25 species (7.4%) were assigned SNA or SNR rankings. See Appendix 9-A for the complete list of species that are known to inhabit the Prescott and their associated S-ranks.

Table 9-11. Number of species per taxon currently inhabiting the Prescott National Forest that are assigned to the various subnational rankings by the Arizona Natural Heritage. Thirteen of the 364 species were not assigned a subnational conservation rank by Arizona Natural Heritage. S1 = critically imperiled; S2 = imperiled; S3 = vulnerable; S4 = apparently secure; S5 = secure; SNA = not applicable; SNR = not ranked.

Rank	Amphibian	Bird	Insect	Fish	Mammal	Plant	Reptile	Snail	Total
S1	0	16	0	0	1	2	0	1	20
S2	0	10	0	2	2	6	2	0	22
S3	1	18	1	2	12	7	3	0	44
S4	1	34	0	0	14	0	7	0	56
S5	5	113	0	0	35	0	30	0	183

Rank	Amphibian	Bird	Insect	Fish	Mammal	Plant	Reptile	Snail	Total
SNA	1	11	0	0	2	0	1	0	15
SNR	0	5	0	0	1	3	2	0	11

Birds of Conservation Concern — According to the R3 Species Database, the Prescott National Forest is home to at least 212 birds, of which 17 (8.0%) are listed by the U.S. Fish and Wildlife Service as a Bird of Conservation Concern on the National Priority List (Table 9-12). Currently, the U.S. Fish and Wildlife Service lists 131 species of Birds of Conservation Concern, of which 13.0% inhabit the Prescott National Forest. Four of these species also have special conservation status under the state of Arizona (as WSC), while six of the 17 species are also listed on the Partners in Flight Watch List (Table 9-13).

Table 9-12. U.S. Fish and Wildlife Service Birds of Conservation Concern on the National Priority List that inhabit the Prescott National Forest.

<p>Diurnal Raptors American peregrine falcon* Common black hawk* Ferruginous hawk* Northern harrier</p>	<p>Mimids – Catbirds, Mockingbirds, Thrashers Crissal thrasher</p>
<p>Cuckoos and Allies Western yellow-billed cuckoo*</p>	<p>Wood Warblers Black-throated gray warbler Grace's warbler† Red-faced warbler†</p>
<p>Owls Flammulated owl†</p>	<p>Emberizine Sparrows and Allies Sage sparrow Black-chinned sparrow† Lark bunting</p>
<p>Woodpeckers Lewis's woodpecker†</p>	
<p>Shrikes and Vireos Arizona bell's vireo Gray vireo† Loggerhead shrike</p>	<p>* = Arizona Game and Fish Wildlife of Special Concern (WSC) † = Partners in Flight Watch List</p>

Partners in Flight Watch List — Currently, Partners in Flight lists 100 species on their Watch List, of which 20 (20.0%) can be found on the Prescott National Forest (Table 9-133). This comprises approximately 9.4% of the 212 bird species that inhabit the Prescott. Six of these species overlap with the U.S. Fish and Wildlife Service Birds of Conservation Concern National Priority list and one also has the designation of Wildlife of Special Concern (WSC) in the state of Arizona.

Table 9-13. Bird species on the Partners in Flight Watch list that inhabit the Prescott National Forest.

Diurnal Raptors	Shrikes and Vireos
Swainson's hawk	Gray vireo*
Eagles and Hawks	Towhees, Kinglets, and Allies

Potential Species-List for Forest Planning

The R3 Species Database was used to identify species that are potential species-of-concern and species-of-interest as defined in the USFS planning directives. For the purposes of this analysis, the definitions used to categorize species were similar, but not identical, to the definitions provided in the directives.

1. Threatened and Endangered Species
 - a. Listed as a threatened or endangered species under the Federal Endangered Species Act.
2. Species-of-concern were defined as species that fall in one or more of the following categories:
 - a. NatureServe G/T-rank of 1, 2, or 3
 - b. Proposed or candidate species under the Federal Endangered Species Act
 - c. Recently (<5 years) de-listed under the Federal Endangered Species Act
 - d. Has been petitioned for federal listing and for which a positive “90-day finding” has been made
3. Species-of-interest were defined as species that fall in one or more of the following categories:
 - a. NatureServe N-rank or S-rank of 1 or 2 in Arizona
 - b. Listed as wildlife of special concern (WSC) in Arizona
 - c. Identified as a priority species in the Arizona Comprehensive Wildlife Conservation Strategy
 - d. On the U.S. Fish and Wildlife Service Birds of Conservation Concern National Priority List

In particular, the directives provide further criteria that can be used in considering species-of-interest, such as trends, rarity, ranges, and public interest. However, this information was not available in the R3 Species Database and is beyond the scope of this analysis.

Extirpated Species — Some species are known to have inhabited the Prescott National Forest, but have since been extirpated. While the cause of extirpation for each species may not be fully understood, it is well accepted that major threats to species’ existence can include loss or alteration of habitat, competition and/or predation by non-native species and poaching. Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) are known to have existed historically on the Prescott National Forest, but are now considered extirpated. These species are not considered in the species diversity analysis for the Prescott National Forest.

Threatened and Endangered Species – Six species from three taxa that occur on the Forest are listed by the U.S. Fish and Wildlife Service as endangered or threatened under the Endangered Species Act (Table 9-14).

Table 9-14. Endangered, threatened, and candidate species designated under the Federal Endangered Species Act of 1973 that currently inhabit the Prescott National Forest. The table includes common names that are recognized by NatureServe. For NatureServe scientific names, see Appendix 9-A.

Taxa	Endangered	Threatened
Bird	Southwest willow flycatcher	Bald Eagle Mexican spotted owl
Fish	Gila chub	Sonora chub
Reptile	Desert Tortoise	

Potential species-of-concern — The Prescott National Forest is home to at least 31 potential species-of-concern across seven distinct taxonomic groups (Table 9-15). This number is less than the total number of G1-G3/T1–T3 species noted above, because it does not include species that are listed as endangered or threatened by the US Fish and Wildlife Service, as guided by the directives (FSH 1909.12 Chapter 40). The R3 Species Database, which does not incorporate all species inhabiting the Prescott National Forest, was used to derive these results. Therefore, it is likely that some species may be absent from these results.

Table 9-15. List of potential species-of-concern that inhabit the Prescott National Forest. According to the published Forest Service draft directives (FSH 1909.12 Chapter 40), species are considered potential species-of-concern if they have a NatureServe global conservation rank of G1, G2, G3, T1, T2, or T3 and are not federally listed as endangered or threatened species. Candidate or proposed species for federal listing may be considered for species-of-concern status. Note: Scientific and common names are those recognized by NatureServe unless in bold.

Taxa	Scientific Name	Common Name
Amphibian	<i>Bufo microscaphus</i>	Arizona Toad
Bird	<i>Carduelis lawrencei</i>	Lawrence's Goldfinch
Bird	<i>Pipilo aberti</i>	Abert's Towhee
Bird	<i>Coccyzus americanus occidentalis</i>	Western Yellow-Billed Cuckoo
Bird	<i>Falco peregrinus anatum</i>	American Peregrine Falcon
Fish	<i>Catostomus clarki</i>	Desert Sucker
Fish	<i>Catostomus insignis</i>	Sonora Sucker
Insect	<i>Cicindela oregona maricopa</i>	Maricopa Tiger Beetle
Mammal	<i>Myotis occultus</i>	Occult Little Brn. Myotis Bat
Plant	<i>Lesquerella kaibabensis</i>	Kaibab Bladderpod
Plant	<i>Agave delamateri</i>	Tonto Basin Agave

Taxa	Scientific Name	Common Name
Plant	<i>Eriogonum ripleyi</i>	Ripley's Wild Buckwheat
Plant	<i>Penstemon nudiflorus</i>	Flagstaff Beardtongue
Plant	<i>Phlox amabilis</i>	Arizona Phlox
Plant	<i>Arenaria aberrans</i>	Mt. Dellenbaugh Sandwort
Plant	<i>Astragalus rusbyi</i>	Rusby's Milkvetch
Plant	<i>Desmodium metcalfei</i>	Metcalfe's Tick-Trefoil
Plant	<i>Erigeron saxatilis</i>	Rock Fleabane
Plant	<i>Hedeoma diffusa</i>	Flagstaff Pennyroyal
Plant	<i>Heuchera eastwoodiae</i>	Senator Mine Allum-Root
Plant	<i>Penstemon ophianthus</i>	Arizona Beardtongue
Plant	<i>Polygala rusbyi</i>	Rusby's Milkwort
Plant	<i>Talinum validulum</i>	Western Flame Flower
Plant	<i>Lupinus latifolius ssp. leucanthus</i>	Broadleaf Lupine
Plant	<i>Asclepias uncialis ssp. uncialis</i>	Greene Milkweed
Plant	<i>Eriogonum ericifolium var. ericifolium</i>	Heathleaf Wild Buckwheat
Plant	<i>Salvia dorrii ssp. mearnsii</i>	Mearns Sage
Reptile	<i>Thamnophis rufipunctatus</i>	Narrowhead Garter Snake
Reptile	<i>Xantusia arizonae</i>	Arizona Night Lizard
Reptile	<i>Thamnophis eques megalops</i>	Mexican Garter Snake
Snail	<i>Pyrgulopsis glandulosa</i>	Verde Rim Springsnail

Potential species-of-interest — Species were considered potential species-of-interest if they fell into one or more of the following categories: special state conservation status (WSC, HS, and SR in Arizona); listed as a priority species in the AZ State Comprehensive Wildlife Conservation Strategies; on the U.S. Fish and Wildlife Service Birds of Conservation Concern National Priority list; and NatureServe national or subnational conservation rank of N1, N2, S1 or S2. These criteria for determining species-of-interest are published in the Forest Service directives (FSH 1909.12 Chapter 40). Species that are federally listed as endangered or threatened, or that were determined to be potential species-of concern were not included as potential species-of interest.

At least 224 potential species-of-interest representing four taxonomic groups currently inhabit the Prescott National Forest (Figure 9-7). Birds comprise the largest proportion (approximately 76%) of potential species-of-interest. Mammals comprise 18% of the total, reptiles comprise 4%, and amphibians make-up approximately 1%. Appendix 9-A lists all known terrestrial vertebrates, native aquatic vertebrates, and plants and invertebrate species of management concern on the Prescott National Forest and identifies those considered as potential species-of interest.

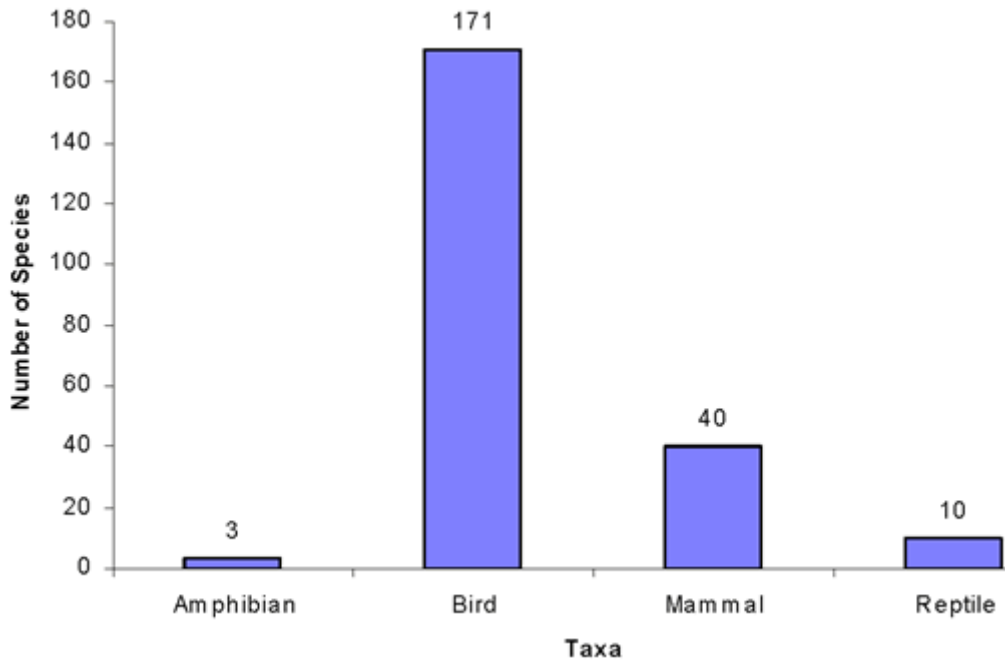


Figure 9-7. The number of potential species-of-interest, by taxon, that inhabit the Prescott National Forest. Species were considered potential species-of-interest if they fell into one or more of the following categories: special state conservation status (WSC, HS, and SR in Arizona); listed as a priority species in the AZ State Comprehensive Wildlife Conservation Strategies; on the U.S. Fish and Wildlife Service Birds of Conservation Concern National Priority list; and NatureServe national or subnational conservation rank of N1, N2, S1 or S2. These are the criteria listed in the published Forest Service directives (FSH 1909.12 Chapter 40) for determining species-of-interest. Species that are federally listed as endangered or threatened, or that were determined to be potential species-of-concern were not included as potential species-of-interest.

V. Ecoregional Assessment Conservation Areas and Conservation Targets

Ecoregional assessments are science-based efforts to identify the minimum set of areas (conservation areas) on the landscape that are necessary to maintain the biological diversity of the ecoregion. The ecoregional assessment process includes the identification of conservation targets (including species, ecological systems, and important biological features) that represent the biological diversity within the ecoregion. Conservation goals (including distribution, size and minimum number of viable occurrences) are established for each conservation target within the ecoregion. An iterative process is used to identify a suite of conservation areas that most efficiently meets the conservation goals for all conservation targets within the ecoregion. A more detailed explanation of the ecoregional assessment process is provided in Chapter 2. For this report, the results of these ecoregional analyses were used to identify the extent and distribution of overlap between conservation areas and ranger districts, roadless areas, and wilderness areas on the Prescott National Forest. The conservation targets associated with each overlapping conservation area were also identified.

Eight individual conservation areas from ecoregional assessments overlap the Prescott National Forest (Figure 9-8, Table 9-166), totaling 625,800 acres, or 44.4% of the Forest. Conservation area overlap on individual districts ranged from 56.9% on the Verde District to 26.8% on the Bradshaw Ranger District (Table 9-177). Overall, 26.4% of the total area of these eight conservation areas overlaps the Prescott National Forest. Large portions of the Bradshaw Mountains (100.0%) and Hassayampa River/ Blind Indian Creek conservation areas (69.7%) overlap the Prescott National Forest (Table 9-166).

Over three-quarters (77.8%) of the area of the Prescott National Forest overlapped by conservation areas does not have specific land use designations (Table 9-199), while approximately 13.0% of the overlap area is wilderness area and 9.2% is roadless area. A higher percentage of wilderness areas (74.0%) is overlapped by conservation areas than are roadless areas (41.4%) or areas with no designations (41.9%).

Conservation targets were summarized for all eight conservation areas that overlap the Prescott National Forest. A total of 87 conservation targets occur within these conservation areas (Figure 9-9). Of these, 17 (19.5%) are coarse filter targets (ecological systems, communities or features), while 70 (80.5%) are individual species. Forty (46.0%) targets are associated with riparian and aquatic systems, while 47 (54.0%) are associated with terrestrial habitats (Table 9-188). A complete listing of all conservation targets by taxonomic group for the Prescott is provided in Appendix 9-B and conservation targets for each conservation area are provided in Appendix 9-C.

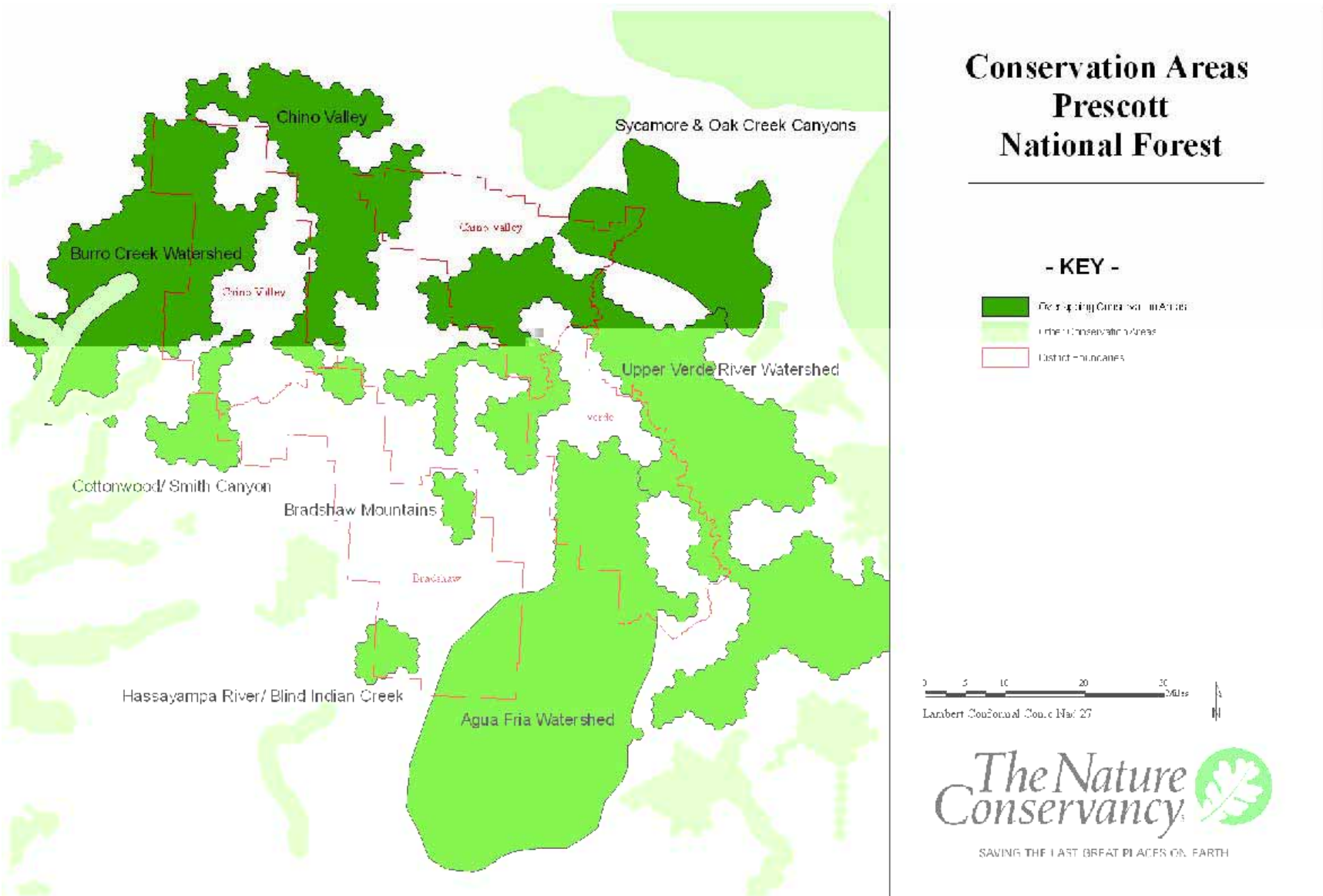


Figure 9-8. Conservation areas (N=8) that overlap the Prescott National Forest in Arizona. 9-31

Table 9-16. Conservation areas (N=8) that overlap three ranger districts on the Prescott National Forest in Arizona.

Conservation Area	Ranger Districts ^A	Overlap (Acres)	% of Conservation Area
Agua Fria Watershed	B,V	189,400	28.5
Bradshaw Mountains	B	19,800	100.0
Burro Creek Watershed	CV	131,800	39.2
Chino Valley	B, CV	58,500	21.1
Cottonwood/ Smith Canyon	B, CV	19,600	32.4
Hassayampa River/ Blind Indian Creek	B	19,800	69.7
Sycamore & Oak Creek Canyons	CV	20,700	10.0
Upper Verde River Watershed	CV, V	166,200	21.5

^A B = Bradshaw, CV= Chino Valley, V= Verde

Table 9-17. Extent of overlap between ecoregional conservation areas and three ranger districts on the Prescott National Forest in Arizona.

District	Number of Conservation Areas	Overlap (Acres)	Percent of District
Bradshaw	5	117,100	26.8%
Chino Valley	5	322,700	50.0%
Verde	2	186,000	56.9%
Prescott N.F Total	8 ^A	625,800	44.4%

^A Several conservation areas overlap more than one ranger district

Table 9-18. Number of conservation targets associated with aquatic/riparian and terrestrial habitats for eight conservation areas that overlap the Prescott National Forest in Arizona.

Conservation Area	Habitat		Total
	Aquatic/ Riparian	Terrestrial	
Agua Fria Watershed	20	20	40
Bradshaw Mountains	1	8	9
Burro Creek Watershed	13	14	27
Chino Valley	3	11	14
Cottonwood/ Smith Canyon	7	8	15
Hassayampa River/ Blind Indian Creek	8	3	11
Sycamore & Oak Creek Canyons	7	17	24
Upper Verde River Watershed	35	29	64

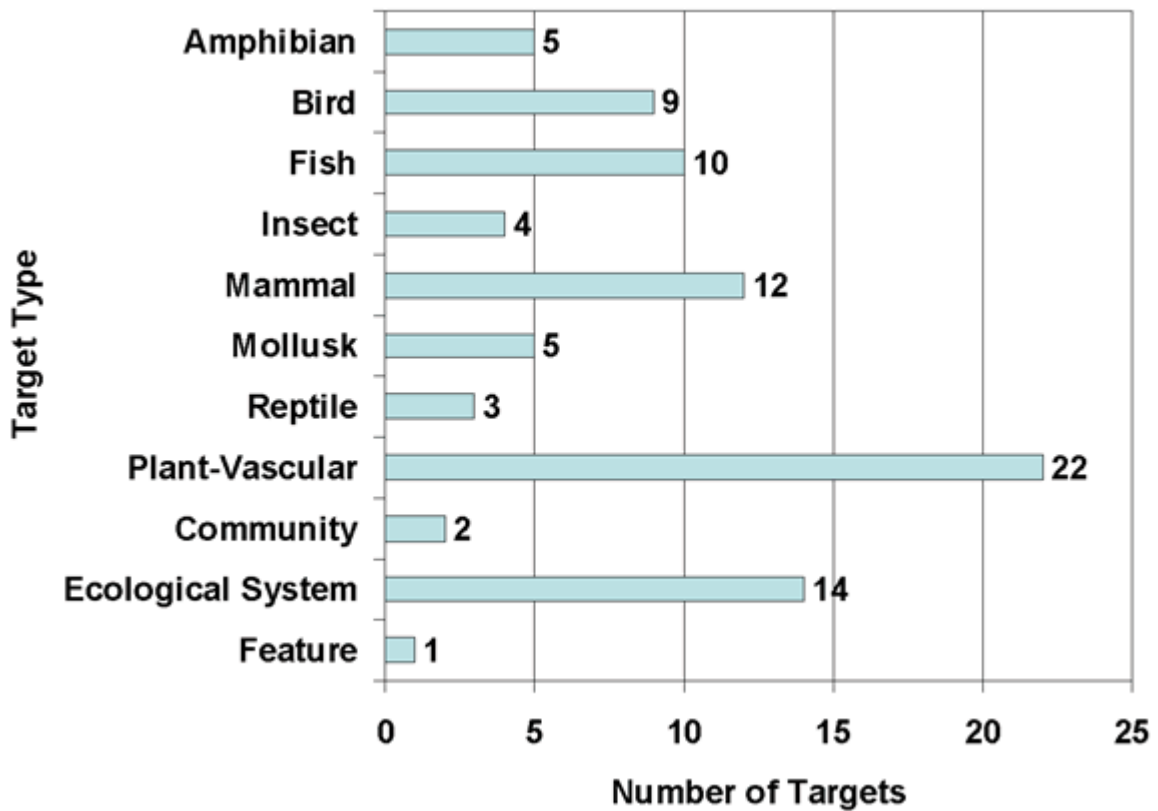


Figure 9-9. Number of conservation targets, by type, that occur on eight conservation areas overlapping the Prescott National Forest in Arizona.

Table 9-19. Overlap between conservation areas and wilderness and roadless areas on the Prescott National Forest in Arizona.

Designation	Acres within Conservation Areas	% of Conservation Areas	% of Designated Areas
Wilderness Areas	81,300	13.0	74.0
Roadless Areas	57,700	9.2	41.4
No Designation	486,100	77.8	41.9

Discussion

Systems Diversity

Six PNVTs dominate the landscape on the Prescott National Forest, including Madrean encinal woodlands (29.5%), interior chaparral (29.3%), semi-desert grasslands (11.7%), pinyon-juniper (11.0%), Madrean pine-oak (8.2%), and ponderosa pine (7.8%). In total, they comprise approximately 1,224,112 acres or 97.5% of the Forest. Most of these systems are unique to the Southwest or western North America, support a host of distinct organisms that depend primarily on these vegetation systems for their survival, and face a variety of conservation threats.

The Madrean encinal woodlands comprise the largest proportion of the Prescott. This system is restricted to the extreme southwestern United States (Arizona, New Mexico and Texas), where it is considered at its northern distributional limit. Unique assemblages of vegetation of both tropical and sub-tropical origins make up this system, which supports unique biota of both northern and southern origins. Maintaining these unique assemblages of plant and animal species is critical for sustaining biodiversity in the Southwest and for Region 3 Forests. Currently, Region 3 Forests manage the largest portion (42%) of Madrean encinal woodlands of all landowners in Arizona and New Mexico, and the Prescott is responsible for approximately 14% of this system within Region 3 National Forest lands.

Interior chaparral covers the second largest area in total on the Prescott. In the Southwest, interior chaparral is an important transition zone between low-elevation desert landscapes and higher elevation wooded evergreens. This PNVT hosts a variety of plant assemblages, mostly dominated by shrubs that are unique to southwestern United States and provide important habitat for a myriad of species. The Prescott is responsible for managing approximately 27% of all interior chaparral found on Region 3 National Forests and approximately 12% of this system throughout Arizona and New Mexico.

Pinyon-juniper woodlands encompass the third largest area on the Forest. These woodlands are unique to southwestern United States (primarily found in Arizona, Colorado, New Mexico, Nevada, and Utah), and also support a host of distinct organisms. For example, pinyon-juniper woodland provides habitat for the pinyon jay (*Gymnorhinus cyanocephalus*), that depends primarily on this vegetation type for its existence. Currently, the health of pinyon-juniper woodlands faces threats across Region 3 Forest Service lands, primarily due to the combined interactions of drought, bark beetle invasions, and altered fire regimes. Such threats to the system also endanger the existence of the species that depend upon the health of the pinyon-juniper woodlands.

Grasslands

Grasslands in the Southwest typically maintain high levels of diversity for both plants

and animals. In part, this is a result of the blending of several biogeographical regions (Parmenter and others 1995) and the resultant mixing of species from northern and southern regions. Also, southwestern grasslands tend to lie adjacent to other habitat types and along with grassland-specialist species, are used by generalist species from adjacent habitats (Parmenter and Van Devender 1995). Notably high diversity of many widespread animal groups, including invertebrates (grasshoppers, termites, and ants) and vertebrates (rodents) are associated with southwestern grasslands. The richness of these species found on southwestern grasslands is tied to the species composition, habitat structure, and productivity of the plant community (Arenz and Joern 1996, Lawton 1983).

Changes in the structure and function of grassland systems have been noted as the primary cause of the loss of native diversity within grasslands (Stacy 1995). Finch (2004) identified and summarized the major threats to grassland biodiversity as the loss of natural fire cycles, overgrazing by livestock, prairie dog eradication, exotic grasses, shrub encroachment, erosion, and habitat fragmentation. The Arizona Statewide Grasslands Assessment documented several of these factors as threats to grasslands on the Prescott National Forest. In particular, over 50% of grasslands on the Prescott are shrub invaded to some degree (restorable native or former grassland conditions). Increases in shrub cover within grasslands can significantly affect species richness. While the diversity of some groups, such as birds, may actually increase due to increased vertical structure associated with shrubs or trees (Knopf and Scott 1990) these changes are generally associated with increases in habitat generalists and a sharp decline in grassland specialists (Knopf 1992).

According to resource staff on the Prescott, much of the restorable native grassland areas highlighted in the assessment, particularly in the Chino Valley Ranger District area, are the result of extensive type conversion efforts conducted by the National Forest Service throughout the 20th century. Thus, it is thought that some of these grasslands may have a true edaphic potential similar to the neighboring pinyon-juniper woodlands.

A key characteristic of restorable native grasslands is their restoration potential. The potential to restore shrub-invaded grasslands is affected by a complex web of interacting physical and biological factors that include climate, topography, grazing, introduced/invasive species, and fire. Shrub cover can be reduced with prescribed burns when sufficient fuels are present to carry a fire of adequate intensity (Gori and Backer 2005). Often, the fuels required to allow fires of adequate intensity to achieve this goal are lacking, and areas must be rested from grazing to allow fuels to accumulate. The number of growing seasons of rest needed to accumulate these fuels varies from site to site. Schussman and Gori (2004) estimated that 44% of sites in Arizona could be burned with three growing seasons or less of rest, while the remainder of grasslands would need longer periods of rest. It is also important to note that burning of grasslands sometimes can result in the introduction of non-native grasses.

According to the Arizona Grasslands Assessment, approximately 11% of grasslands on the Prescott National Forest have exceeded a threshold of 35% shrub cover have likely undergone a type conversion from grassland to shrubland, though some of the grasslands

may have a true edaphic potential of the surrounding pinyon-juniper woodlands. This transition can result in a likely permanent loss of grassland systems and the species that depend on them. Even given long periods (50 years) of grazing rest, it is unlikely that these former grasslands can be restored to open native conditions (Hennessey and others 1983). While increases in perennial grass cover may occur (Valone and others. 2002) at certain sites based upon soil type, erosion and shrub species composition, it is unlikely that these sites will accumulate sufficient fine fuels to carry a fire intense enough to reduce shrub cover and restore open grassland conditions.

Over 17% of the grasslands that occur on Region 3 National Forests in Arizona are found on the Prescott National Forests. The Verde Ranger District, in particular, has a large contiguous area of open native grasslands. The Verde and Chino Valley Ranger Districts also have significant areas of grasslands that are shrub invaded, but have substantial potential for restoration. As noted by Finch (2004), maintaining grasslands at sufficient scales is vital for supporting grassland-dependent species, as habitat fragmentation has detrimental effects on grassland biodiversity. These grassland areas provide a valuable opportunity to manage grasslands on the Forest, and to partner with adjacent landowners, to restore grassland function and structure at sufficient scales to ensure the sustainability of species that are dependant on this system.

Riparian and Aquatic Species and Systems

Aquatic and Riparian systems are an important component of the diversity that exists on the Prescott National Forest. According to Arizona Freshwater Assessment, the Prescott has over 8% of all occupied stream miles within Region 3 National Forests in Arizona and a high proportion (36%) of stream reaches with 6 or more species. The Verde River system, in particular, is an extremely important component of the aquatic diversity that exists on the Prescott National Forest.

Based on Olden and Poff (2005), it is evident that native fish distributions within the Lower Colorado watershed and throughout the Southwest are dynamic, with the distribution of most native fishes declining. Interestingly, Olden and Poff (2005) found a significant relationship between distributional declines and probability of local extirpation for native fish species. According to Olden and Poff (2005), eight of 10 native fish species on the Prescott have declining distributions. The declines in distributions for these species suggest an increased probability of extirpation from the Forest. The Freshwater Assessment clearly identifies areas on the Prescott with occurrences of these native fish. Within a forest planning context, it may be important to consider the uses and activities that occur within these areas to assess their compatibility with maintaining the distribution and populations of native fish on the Prescott National Forest.

The causes of declines in native fish species are many and have varied over time and space. Demands placed upon the region's limited water supplies are increasing as Arizona's population continues to grow, suggesting that activities occurring outside

Forest boundaries could play an increasing role in the status of resources USFS is responsible for managing in a sustainable manner. Regional assessment data summarized here demonstrate the important role USFS plays in managing native fish habitat. Changes documented in native fish distribution combined with increasing pressure on limited water supplies indicate that native fish, watershed, and groundwater management may be an important focal area for comprehensive evaluation in forest plan revisions.

Species Richness and Conservation Status

The Prescott National Forest manages numerous species across many taxonomic groups. According to the R3 Species Database, at least 364 species of plants and animals inhabit Prescott. For reasons discussed above, this number is likely conservative. Many of these 364 species are of federal, state or global conservation concern.

For example, the Forest is home to three federally endangered species, three threatened species, and one candidate species; 29 plants and animals with special Arizona state conservation status; 35 species ranked with a global conservation status that warrants conservation concern (G1G3/T1-T3); 86 species with an S-rank that merits conservation concern on a state or more local scale (S1, S2, or S3); 31 potential species-of-concern; 224 potential species-of-interest; 17 species listed by the U.S. Fish and Wildlife Service as a Bird of Conservation Concern; and 20 species on the Partners in Flight Watch List. All but one species, cactus mouse (*Peromyscus eremicus*), on the Region 3 Sensitive Species list are identified by categories defined in the directives. Many species are on more than one agency or organization conservation list (See Appendix 9-A).

A major threat for many species identified as being of conservation concern is the degradation and loss of habitat. Maintaining healthy vegetation systems that support these species should be an important component in sustaining viable populations of species of conservation concern on the Prescott National Forest. The assessments in this report provide important information on the systems and locations on the Prescott that are important for maintaining system and species diversity. For instance, the analysis of PNVTs highlighted the important vegetation systems that occur on the Prescott, which include Madrean encinal, interior chaparral, semi-desert grasslands, pinyon-juniper, Madrean pine-oak, and ponderosa pine. In addition, conservation areas, identified through ecoregional assessments, identify and delineate areas on the landscape that provide the greatest opportunity for sustaining these systems and species.

Approximately 45% of the Prescott National Forest is overlapped by ecoregional conservation areas and every ranger district is overlapped by at least one conservation area. These conservation areas include 87 conservation targets, including 70 individual species. The specific locations where conservation areas overlap the Prescott highlight important places for the conservation of ecosystem and species diversity on the Forest and within the region. These areas of overlap represent the most viable locations on the Prescott for sustaining this suite of species, ecological systems, and biological processes that are represented by the conservation targets associated with each conservation area.

that overlaps the Prescott National Forest.

Relevance to Forest Planning

This analysis of existing regional assessment information identifies important biological and ecological characteristics of the Prescott National Forest. This information serves as an important baseline for addressing the ecological sustainability component of the forest plan process under the new National Forest Management Act planning regulations, both in terms of ecosystem and species diversity. It may also be useful in understanding the current condition of ecological resources on the Prescott, identifying ecological characteristics that may be useful in defining desired future conditions, and identifying changes in management necessary to sustain biodiversity. For example, the analysis of ecosystem data demonstrates the variety of systems that occur on the Prescott, and identifies systems (and their associated species diversity) for which the Prescott has disproportionate responsibility within the context of Region 3, such as Madrean encinal woodlands and interior chaparral. This analysis also demonstrates the importance of grasslands on the Prescott within a landscape context. The restoration of grasslands on the Prescott to open native grassland condition, including the ecological functions that support them, will help promote the large-scale sustainability of these important grassland areas within the Southwest.

Along with ecosystems, these results demonstrate the diversity of species that occur on the Prescott. The identification of a suite of potential species-of-concern and species-of-interest suggests that there are many species whose viability may need to be addressed beyond just providing for healthy ecosystems. The specific needs of these species, as well as their distribution at National Forest and regional scales, may need to be considered to sustain them.

Ecoregional assessments provide a strategic, regional perspective on maintaining biodiversity at large, ecoregional scales that may be useful in forest planning. The suite of conservation areas identified in the ecoregional assessments represents the minimum area on the landscape needed to maintain the region's biodiversity and may serve as priority areas for considering the impacts of management on ecological sustainability. Used within a forest planning context, consideration of conservation areas incorporates, by default, a regional perspective on ecological sustainability and demonstrates consideration of sustainability issues at scales beyond its boundaries.

Within the forest planning framework, it may be useful to evaluate currently allowable land uses and activities within conservation areas and determine associated impacts to biodiversity. A synthesis of conservation area overlap with wilderness and roadless areas on the Prescott demonstrates the wide variety of current management emphases and activities that occur within conservation areas. The largest proportion of conservation area overlap falls on areas with no special designations, although significant areas also overlap wilderness and roadless areas. It is apparent that achieving biodiversity sustainability on the Prescott cannot be accomplished entirely within existing designated

special areas, and must be accomplished within the varied uses and activities that occur on the Forest. For forest planning purposes, it may be useful to determine the compatibility of forest management and uses within conservation areas with desired biodiversity goals, and identify changes that may be needed to achieve sustainability within these areas.

It is important to note that conservation areas do not imply the need for special protections or blanket restriction of activities. Rather, conservation areas can be viewed as priority areas, based on the large scale perspective of ecoregional assessments, for assessing the impacts of ongoing or planned uses and activities in regards to their compatibility with sustaining biodiversity at regional scales. To aid in these planning efforts, each conservation area has associated with it a suite of conservation targets (species, vegetation communities, and ecological systems, and features) that are representative of the biodiversity in that area. Evaluation of the environmental and ecological needs of these conservation targets, including both the habitats and ecological processes that support them, as well as identifying threats to their sustainability can be used to assess the compatibility of ongoing or planned uses or activities in these areas.

For example, the Hassayampa River/ Blind Indian Creek conservation area encompasses 28,400 acres, of which 19,800 acres (69.7%) fall on the Bradshaw Ranger District of the Prescott National Forest. Eleven conservation targets, including eight individual species, and three ecological systems (see Appendix 9-C), are associated with the Hassayampa River/ Blind Indian Creek conservation area. These targets can be used as a tool to assess the compatibility of current or planned activities within the conservation area with sustainability goals. For example, it may be useful to evaluate current conditions of interior chaparral, montane riparian woodlands, and Sonoran desert scrub conservation targets within this conservation area relative to the historic range of variability and, if necessary, identify potential changes in management that may move these systems to within historic ranges. Similarly, by identifying the ecological needs of species conservation targets and threats to their sustainability, the compatibility of current activities can be assessed. Many (72.3%) of the conservation targets within this conservation area are associated with streams and riparian woodlands (e.g. longfin dace, Yavapai leopard frog, western yellow-billed cuckoo). These species are threatened by agricultural, industrial, and recreational development in these areas, stream alteration, and improper range management. It may be useful to evaluate management prescriptions within the conservation area and if necessary, identify changes in allowed activities or uses that may reduce or mitigate these threats.

References

- Arenz, C.L. and Joern, A. 1996. Prairie legacies -- invertebrates. Pages 91-109. In: F.B. Samson and F.L. Knopf, eds. *Prairie conservation: preserving North America's most endangered ecosystem*. Washington, DC: Island Press.
- Finch, Deborah M., Editor. 2004. *Assessment of grassland ecosystem conditions in the Southwestern United States. Volume 1. Gen. Tech. Rep. RMRS-GTR-135-vol. 1.* Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. p.167.
- Gori, D. F. and Backer, D. 2005. Watershed Improvement Using Prescribed Burns as a Way to Restore Aquatic Habitat for Native Fish. Pages 403-406. In: Gottfried, Gerald J.; Gebow, Brooke S.; Eskew, Lane G.; and Edminster, Carleton B., compilers. 2005. *Connecting mountain islands and desert seas: biodiversity and management of the Madrean Archipelago II*. 2004 May 11-15; Tucson, AZ. Proceedings RMRS-P-36. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 631 p.
- Gori, D.F., and C.A.F. Enquist. 2003. An assessment of the spatial extent and condition of grasslands in central and southern Arizona, southwestern New Mexico, and Northern Mexico. Prepared by The Nature Conservancy, Arizona Chapter. 28 pp.
- Hennessy, J.T., Gibbens, R.P., Tromble, J.M., and Cardenas, M. 1983. Vegetation changes from 1935 to 1980 in mesquite dunelands and former grasslands of southern New Mexico. *Journal of Range Management* 36: 370-374.
- Lawton, J.H. 1983. Plant architecture and the diversity of phytophagous insects. *Annual Review of Entomology*. 28: 23-29.
- Knopf, F.L. 1992. Faunal mixing, faunal integrity, and the biopolitical template for diversity conservation. *Transactions of the North American Wildlife and Natural Resources Conference*. 57: 330-342.
- Knopf, F.L. and Scott, M. L. 1990. Altered flows and created landscapes in the Platte River Headwaters, 1840-1990. Pages 47-70. In: J.M. Sweeney, ed. *Management of Dynamic Ecosystems*. West Lafayette: North Central Section, Wildlife Society.
- Olden, J.D. and Poff, N.L. 2005. Long-term trends of native and non-native fish faunas in the American Southwest. *Animal Biodiversity and Conservation* 28: 75-89.
- Parmenter, R. R., Brantley, S. L., Brown, J. H., Crawford, C. S., Lightfoot, D. C. and Yates, T.
- L. 1995. Diversity of animal communities on southwestern rangelands: species patterns, habitat relationships, land management. Pages 50-71. In: N.E. West, ed. *Biodiversity on Rangelands*. Logan: Utah State University, College of Natural Resources.
- Parmenter, R.R. and Van Devender T.R. . 1995. Diversity, spatial variability, and

- functional roles of vertebrates in the desert grassland. Pages 196-229. In: M.P. McClaran and T.R. Van Devender, eds. The desert grassland. Tucson: University of Arizona Press.
- Schussman, H. and Gori D.F. 2004. An ecological assessment of the Bureau of Land Management's Current Fire Management Plans: Materials and Recommendations for future fire planning. The Nature Conservancy, Tucson, Arizona.
- Stacey, P.B. 1995. Diversity of rangeland bird populations. Pages 33-41. In: N.E. West, ed. Biodiversity on Rangelands. Logan: Utah State University, College of Natural Resources.
- Turner, D.S. and List, M. In Press. Habitat Mapping and Conservation Analysis to Identify Critical Streams for Arizona's Native Fish. Aquatic Conservation: Marine and Freshwater Ecosystems.
- U.S. Geological Survey National Gap Analysis Program. 2004. Provisional Digital Land Cover Map for the Southwestern United States. Version 1.0. RS/GIS Laboratory, College of Natural Resources, Utah State University.
- Valone, T.J. ,Meyer, M., Brown, J.H. and Chew R. M. 2002. Timescale of perennial grass recovery in desertified arid grasslands following livestock removal. Conservation Biology 16: 995-1002.