

**Chapter 11:**  
**Ecological & Biological Diversity of the Gila National Forest,**  
**In**  
**Ecological and Biological Diversity of National Forests in Region 3**

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SAVING THE LAST GREAT PLACES ON EARTH

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## Introduction

The Gila National Forest is one of 11 National Forests of the U.S. Forest Service (USFS) Southwestern Region (Region 3) and is the largest Forest (in acreage) in Region 3. It comprises approximately 15% of the total area of Region 3 Forests. This Forest encompasses approximately 3,385,897 acres (1,370,272 hectares) in south-western New Mexico and includes several mountain ranges as well as the headwaters of the Gila and San Francisco Rivers. Elevation on the Forest ranges from approximately 4,200 ft. (1,281 m) to nearly 10,900 ft. (3,325 m). The Gila National Forest shares its western boundary with the Apache-Sitgreaves National Forest.

The wide range of elevations within the Gila National Forest provides suitable conditions for a diverse set of vegetation systems and wildlife communities. Vegetation ranges from desert communities through pinyon-juniper woodlands in the lower elevations of the Forest, to ponderosa pine and aspen forests at higher elevations. The Forest also includes the headwaters and significant portions of the Gila 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 it supports, 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 Gila National Forest and highlight information that may be pertinent to forest planning. Information from three assessments was synthesized for the Forest, including:

- Distribution and extent of potential natural vegetation types (PNVTs)
- Plant and animal species richness and their conservation statuses (not included in this draft)
- 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 Gila National Forest to other major landowners in the Southwest (Arizona and New Mexico) and National Forests in Region 3 is provided in Chapter 3. It is important to note that the information in this chapter has not been reviewed by Gila National Forest Staff.

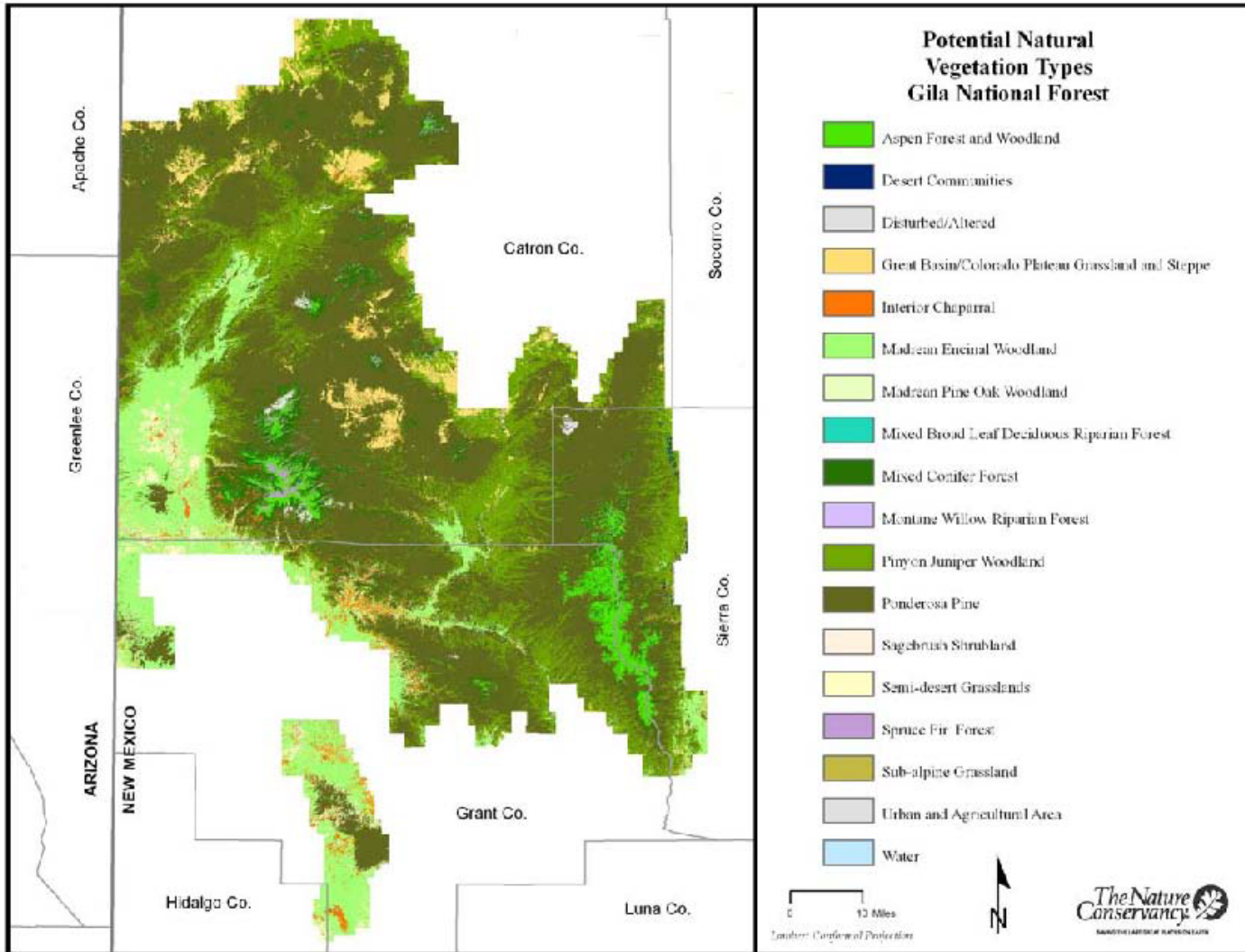
## Results

### *I. Potential Natural Vegetation Types within the Gila 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 Gila 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 Gila National Forest were summarized, as well as the proportion of each PNVT within Region 3 that occurs on the Gila. More detailed information on the data and methods used in this analysis can be found in Chapter 2, and information comparing PNVTs on the Gila to other major landowners in the Southwest, including National Forests within Region 3, is available in Chapter 3.

Eighteen PNVTs can be found on the Gila National Forest (Figure 11-1). Three PNVTs dominate the landscape and encompass 83.5% (2,729,400 acres) of the entire Forest (Table 111). These PNVTs include ponderosa pine (53.7%), pinyon-juniper (17.7%), and Madrean encinal woodland (12.1%). Mixed conifer was the fourth most abundant PNVT (4.8%), followed by Great Basin/Colorado Plateau grassland and steppe (3.6%), and aspen forest and woodland (2.8%). The remaining 12 PNVTs comprise the remaining 5.3% of the Forest.

These results are based on data from the SWReGAP, which has not been accuracy tested. Furthermore, SWReGAP data is based on satellite imagery that may not be appropriate at small spatial scales. For example, it is likely that the small portion of Great Basin/Colorado Plateau grassland and steppe identified in this analysis is an artifact of inaccuracies in the SWReGAP data and/or the methods used to cross-walk SWReGAP cover types to PNVTs.



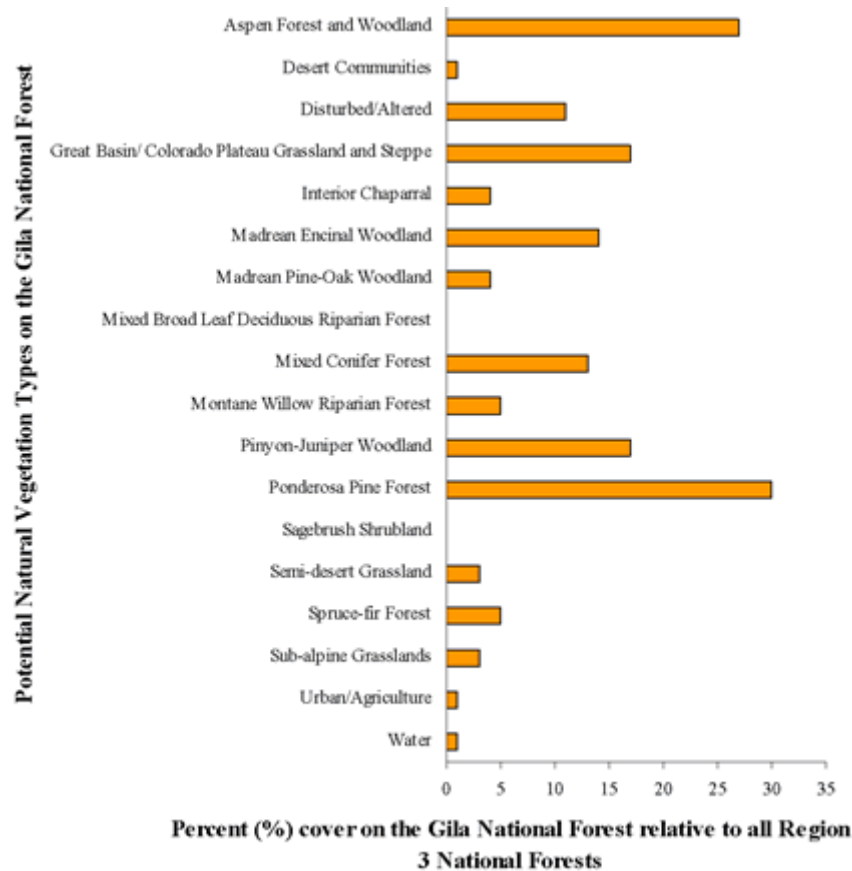
**Figure 11-1.** Distribution of potential natural vegetation types on the Gila National Forest. Map was created using data from the Southwest Regional Gap Analysis Project (SWReGAP; U.S. Geological Survey National Gap Analysis Program, 2004). SWReGAP vegetation types were aggregated and converted to 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 11-1.** Approximate area (in acres) and percent of total area of each potential natural vegetation type on the Gila National Forest. Areas were calculated using data from the Southwest Regional Gap Analysis Project (SWReGAP). SWReGAP land cover types were aggregated and converted to potential natural vegetation types. See Chapter 2 for more details on methods utilized.

<b>Potential Natural Vegetation Type</b>	<b>Total Area (acres)</b>	<b>Percent of Total Area (%)</b>
Aspen Forest and Woodland	90,300	2.8
Desert Communities	4,700	0.1
Disturbed/Altered (quarries and mines)	9,200	0.3
Great Basin/ Colorado Plateau Grassland and Steppe	115,900	3.6
Interior Chaparral	48,800	1.5
Madrean Encinal Woodland	396,500	<b>12.1</b>
Madrean Pine-Oak Woodland	32,100	1.0
Mixed Broadleaf Deciduous Riparian Forest	200	<0.1
Mixed Conifer Forest	157,200	4.8
Montane Willow Riparian Forest	1,500	0.1
Pinyon-juniper Woodland	578,300	<b>17.7</b>
Ponderosa Pine	1,754,600	<b>53.7</b>
Sagebrush Shrubland	200	<0.1
Semi-desert Grassland	47,900	1.5
Spruce-fir Forest	17,900	0.6
Sub-alpine Grassland	10,200	0.3
Urban and Agricultural Area	200	<0.1
Water	300	<0.1
<b>Total</b>	<b>3,266,000</b>	

The Gila National Forest is responsible for managing substantial proportions of several PNVTs within Region 3 National Forests (Figure 11-2). For example, 30% of ponderosa forest, 27% of aspen forest and woodland, 27% of aspen forest and woodland, 17% of pinyon-juniper woodland, 17% of Great Basin/Colorado Plateau grasslands and steppe, 14% of Madrean encinal woodland, and 13% of mixed conifer forests within Region 3 are found on the Gila National Forest. Furthermore, relative to all major landowners in Arizona and New Mexico, the Gila National Forest manages 19% of all ponderosa pine forests and 17% of all aspen forest and woodlands within these two states.

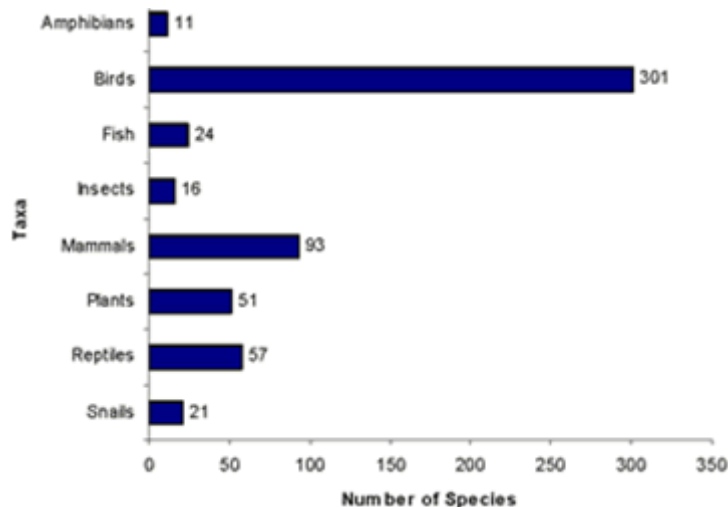


**Figure 11-2.** Percent area of cover of each potential natural vegetation type that occurs on the Gila National Forest in relation to all Region 3 National Forests combined. Analysis was conducted using data from the Southwest Regional Gap Analysis Project (SWReGAP). See Chapter 2 for information regarding the limitations of SWReGAP.

## II. Plant and Animal Species Richness

The R3 Species Database was used to determine plant and animal species richness on the Gila 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 Forest, 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, and plant and invertebrate species that may be of conservation concern. Non-native aquatic vertebrate species were not included in this analysis. 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 11-A.

*Species Richness* — Results indicate that the Gila National Forest contains at least 574 species of plants and animals (Figure 11-3). This number is conservative, as 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. This does not include seven species known to be extirpated on the Forest. It is also important to note that the number and type of species inhabiting the Gila National Forest likely changes over time.



**Figure 11-3.** Number of species, by taxon, that inhabit the Gila National Forest based on data from the R3 Species Database. The R3 Species Database includes all known terrestrial and aquatic vertebrates, but only known invertebrates and plants of management concern that inhabit Region 3 Forest. For this analysis, of the aquatic vertebrates, only natives were included. 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 likely conservative.

## *Threatened and Endangered Species Listings*

*Federal listing under the Endangered Species Act* — The U.S. Fish and Wildlife Service determines those species that have federal status as endangered or threatened. 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 Gila is responsible for managing four federally listed endangered species and seven threatened species. Also, three candidate species and two species under 90-day finding occur on the Forest. Refer to Appendix 11-A for a list of threatened and endangered species.

*New Mexico state conservation status* — Twenty-eight species that are designated by the New Mexico Game and Fish Department as threatened or endangered occur on the Gila National Forest. Refer to Appendix 11-A for a complete list of those species. Currently, there are eight animal and two plant species designated by the state as endangered and 18 animal species that are listed as threatened on the Forest. Birds comprise the largest (35.7%) and fish comprise the next largest (21.4%) proportions of these species.

## *NatureServe Conservation Status Rankings*

*Global conservation status rankings (G-ranks)* — Nine species (1.6%) of 574 were not included in this analysis because they were not assigned NatureServe global conservation ranks. Results indicate 89 species (15.8%) were ranked with a global conservation status of G1, G2, G3, T1, T2 or T3, that warrants conservation concern. Four hundred seventy-one species (83.3% of subtotal) were ranked as G4/T4 or G5/T5 species (Table 11-2). These are species whose populations are considered ‘apparently secure’ or ‘secure’, respectively. The remaining species were not ranked or unrankable.

*National conservation status rankings (N-ranks)* — Of the 574 species analyzed for the Gila National Forest, 565 (98.4%) had assigned national conservation status ranks (N-ranks) (Table). Of these, 91 species (16.1%) had rankings that merit conservation concern on a national scale (N1, N2, or N3). Four hundred forty-four (78.6%) were considered secure or apparently secure (N5 and N4, respectively). The remaining 27 species (4.8%) were assigned NNA or NNR rankings. Two species were ranked as possibly extirpated (NH): Mogollon Duck and Mexican Wolf, and one species was ranked as presumed extirpated (NX): Bluish Fritillary. See Appendix 11-A for the complete list of species that are known to inhabit the Forest and their associated N-ranks.

*Subnational conservation status rankings (S-ranks)* — Of the 574 species analyzed for the Gila National Forest, 539 (93.9%) had assigned subnational conservation status ranks (S-ranks) in the state of New Mexico (Table 11-4). Of these, 338 (62.7%) were considered secure or apparently secure (S5 and S4, respectively). One-hundred and forty-five species (26.9%) had rankings that merit conservation concern on a state or more local scale (S1, S2, or S3). The remaining 53 species (9.8%) were assigned SNA or SNR rankings. Three species were assigned SH rankings, meaning they are possibly extirpated in New Mexico. See Appendix 7-A for the complete list of species that are known to inhabit the Gila and their associated S-ranks.

**Table 11-2.** Number of species, by taxon, that inhabit the Gila National Forest with the various global rankings assigned by NatureServe. Nine 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	3	1	0	4	0	8	<b>16</b>
G2	0	0	3	1	0	8	0	1	<b>13</b>
G3	1	1	6	4	1	20	1	0	<b>34</b>
G4	2	19	1	4	11	9	5	0	<b>51</b>
G5	7	269	11	1	70	2	42	1	<b>403</b>
GH	0	0	0	0	0	1	0	0	<b>1</b>
GNR	0	0	0	0	0	1	0	0	<b>1</b>
T1	0	1	0	1	1	1	0	7	<b>11</b>
T2	0	1	0	1	0	1	0	2	<b>5</b>
T3	0	2	0	2	0	4	1	1	<b>10</b>
T4	1	2	0	0	2	0	4	0	<b>9</b>
T5	0	2	0	0	2	0	4	0	<b>8</b>
TNR	0	1	0	0	0	0	0	0	<b>1</b>
TU	0	2	0	0	0	0	0	0	<b>2</b>

**Table 11-3.** Number of species, by taxon, that inhabit the Gila National Forest with the various national rankings assigned by NatureServe. Nine species do not have an assigned national rank. N1 = critically imperiled; N2 = imperiled; N3 = vulnerable; N4 = apparently secure; N5 = secure; NH = possibly extirpated; NNA = not applicable; NNR = not ranked; NX = presumed extirpated.

National Ranking	Amphibian	Bird	Fish	Insect	Mammal	Plant	Reptile	Snail	Total
N1	0	1	3	2	0	5	0	15	<b>27</b>
N2	0	0	3	2	0	8	1	3	<b>20</b>
N3	1	7	6	5	5	16	3	1	<b>44</b>
N4	3	38	1	5	14	3	10	0	<b>74</b>
N5	7	246	10	2	66	0	43	1	<b>373</b>
NH	0	0	0	0	1	1	0	0	<b>2</b>
NNA	0	6	1	0	1	1	0	0	<b>9</b>
NNR	0	2	0	0	0	16	0	0	<b>18</b>
NNX	0	0	0	1	0	0	0	0	<b>1</b>

**Table 11-4.** Number of species per taxon currently inhabiting the Gila National Forest that are assigned to the various subnational rankings by New Mexico Natural Heritage. Thirty-five of the 575 species were not assigned a subnational conservation rank by New Mexico Natural Heritage. S1 = critically imperiled; S2 = imperiled; S3 = vulnerable; S4 = apparently secure; S5 = secure; SH = possibly extirpated; SNA = not applicable; SNR = not ranked.

State Ranking	Amphibian	Bird	Fish	Insect	Mammal	Plant	Reptile	Snail	Total
S1	2	14	4	1	0	3	0	11	<b>35</b>
S2	0	16	6	0	11	13	3	1	<b>50</b>
S3	1	24	3	0	10	13	8	1	<b>60</b>
S4	1	131	0	0	24	0	10	0	<b>166</b>
S5	5	1-01	1	0	35	0	30	0	<b>172</b>
SH	0	0	0	0	0	3	0	0	<b>3</b>
SNA	1	5	8	0	1	1	0	0	<b>16</b>
SNR	0	0	0	13	1	16	0	7	<b>37</b>

### *Other Conservation Rankings*

*Birds of Conservation Concern* —According to the R3 Species Database, the Gila National Forest is home to at least 301 birds, of which 24 (8.0%) are listed by the U.S. Fish and Wildlife Service as a Bird of Conservation Concern (Table 11-5). In all, the U.S. Fish and Wildlife Service lists 131 species of Birds of Conservation Concern, and 18.3% of these inhabit the Gila National Forest. Three of these species also are listed as threatened species under the state of New Mexico.

*Partners in Flight Watch List* — Of the 100 bird species currently on the Partners in Flight Watch Lists, 26 (26%) can be found on the Gila National Forest (Table 11-5). This comprises approximately 8.6% of the known 301 bird species that inhabit the Forest. Eight of these species overlap with the U.S. Fish and Wildlife Service Birds of Conservation Concern list, and two are also state listed threatened species.

**Table 11-5.** Bird species on the Partners in Flight Watch list (P) and the U.S. Fish and Wildlife Service Birds of Conservation Concern (CC) list that inhabit the Gila National Forest.

<p><b>Diurnal Raptors</b>            American peregrine falcon* (CC)            Common black hawk* (CC)            Ferruginous hawk* (CC)            Northern harrier (CC)            Swainson’s hawk (P)</p> <p><b>Shorebirds</b>            Long-billed curlew (CC)            Reddish Egret (CC)            Wilson’s Phalarope (CC)</p> <p><b>Cuckoos and Allies</b>            Western yellow-billed cuckoo* (CC)</p> <p><b>Upland Game Birds</b>            Blue Grouse (P)            Montezuma quail (P)            Scaled quail (P)</p> <p><b>Pigeons and Doves</b>            Band-tailed pigeon (P)</p> <p><b>Owls</b>            Burrowing owl (CC)  <b>Elf owl</b>  <b>Flammulated owl</b>            Short-eared owl (P)</p> <p><b>Goatsuckers and Swifts</b>            Black swift (P)            White-throated swift (P)</p> <p><b>Hummingbirds</b>            Calliope hummingbird (P)            Rufous hummingbird (P)</p>	<p><b>Woodpeckers</b>            Lewis’s woodpecker</p> <p><b>Tyrant Flycatchers</b>            Greater pewee (CC)            Olive-sided flycatcher (P)            Willow flycatcher* (P)</p> <p><b>Shrikes and Vireos</b>  <b>Bell’s vireo</b>  <b>Gray vireo</b>            Loggerhead shrike (CC)            Jays, Crows, and Allies            Pinyon jay (P)</p> <p><b>Mimids – Catbirds, Mockingbirds, Thrashers</b>            Crissal thrasher (CC)</p> <p><b>Wood Warblers</b>            Black-throated gray warbler (CC)            Grace’s warbler            Hermit warbler (P)            Olive warbler (CC)            Red-faced warbler            Virginia warbler (P)</p> <p><b>Emberizine Sparrows and Allies</b>            Abert’s towhee (P)            Black-chinned sparrow            Brewer’s sparrow (P)            Harris’s sparrow (P)            Lark bunting (CC)            Sage sparrow (CC)</p>
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\* = AZ G&F Wildlife of Special Concern (WSC)

**Species in bold** appear on both lists



## *Potential Species Lists for Forest Planning*

The R3 Species Database was used to identify species that might potentially be considered as species-of-concern and species-of-interest as defined in the USFS planning directives. For the purposes of this analysis, the following 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 Global Rank (G/T-rank) of three or less
  - b. Proposed or candidate species under the Federal Endangered Species Act
  - c. Recently (<5 years) delisted 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 of N1/N2, or S-rank of S1/S2 in New Mexico
  - b. Listed as threatened or endangered species in New Mexico
  - c. Identified as priority species in the New Mexico 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 Gila 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. Beautiful shiner (*Cyprinella formosa*), Rio Grande Cutthroat Trout (*Oncorhynchus clarkii virginalis*), Gila topminnow (*Poeciliopsis occidentalis occidentalis*), River otter (*Lontra canadensis*), Meadow vole (*Microtus pennsylvanicus modestus*), Black-footed ferret (*Mustela nigripes*), and Desert bighorn sheep (*Ovis canadensis mexicana*) are known to have existed historically on the Gila National Forest, but are now considered extirpated. These species are not considered in the species diversity analysis for the Gila National Forest.

*Threatened and Endangered Species* – Eleven species from four 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. 11-11).

**Table 11-6.** Endangered and threatened species designated under the Federal Endangered Species Act of 1973 that currently inhabit the Gila National Forest. The table includes common names that are recognized by NatureServe.

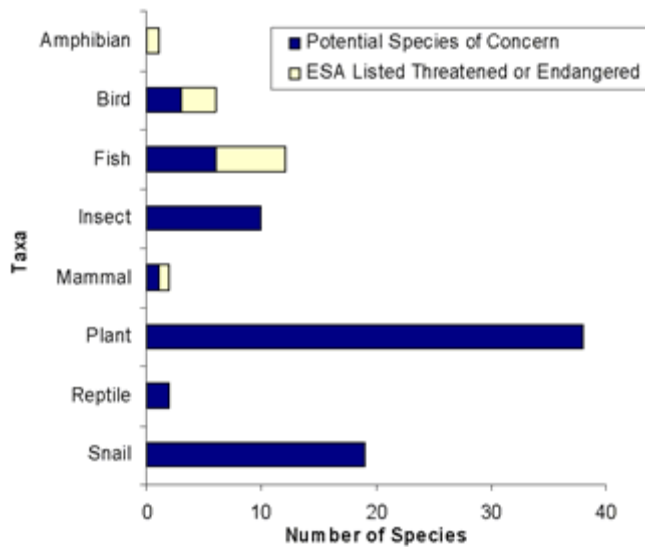
<b>Taxa</b>	<b>Endangered</b>	<b>Threatened</b>
<b>Amphibian</b>		Chiricahua Leopard Frog
<b>Bird</b>	Southwestern Willow Flycatcher	Bald Eagle Mexican Spotted Owl
<b>Fish</b>	Gila Chub Gila Trout	Chihuahua Chub Loach Minnow Roundtail Chub Spikedace
<b>Mammal</b>	Mexican Wolf	

*Potential species-of-concern* —The Gila National Forest are home to at least 79 potential species-of-concern across seven distinct taxonomic groups (Table 11-7). Plants comprise the largest proportion of potential species-of-concern, approximately 48%; snails represent approximately 24%, insects 13%, fish 8%, birds 4%, reptiles 2%, and mammals 1% of the total. The R3 Species Database, which may not be comprehensive for the Gila National Forest, was used to derive these results. Therefore, some species may be absent from these results. When combining both potential species-of-concern and ESA listed threatened and endangered species, plants comprise the largest proportion of species (42%), and snails and fish follow with the next largest proportions (21% and 13% respectively; Figure 11-7).

**Table 11-7.** Potential species-of-concern on the Gila National Forest. Potential species-of-concern include species with NatureServe global ranks (G/T-rank) of three or less, species that are listed as candidate or proposed under the Federal Endangered Species Act (ESA), have been recently delisted under ESA, or species which have been petitioned for listing under ESA and for which a positive '90 day finding' has been made. Names are from NatureServe unless in bold.

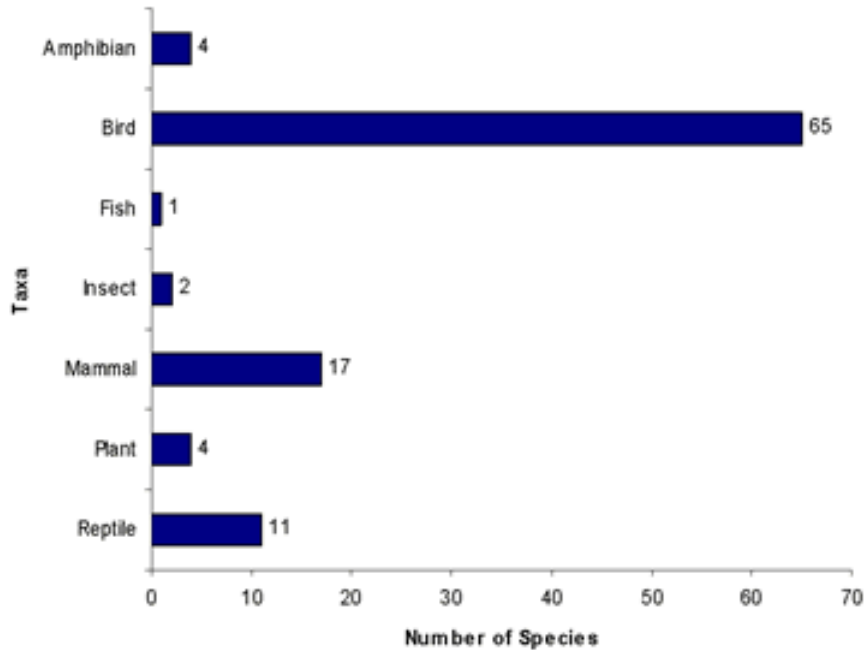
Taxa Scientific Name	Common Name	G/T-rank	ESA Status	Recently Delisted
<b>Birds</b>				
<i>Coccyzus americanus occidentalis</i>	Western Yellow-Billed Cuckoo	T2	Candidate	
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	T3		X
<i>Pipilo aberti</i>	Abert's Towhee	G3		
<b>Fish</b>				
<i>Catostomus clarki</i>	Desert Sucker	G3		
<i>Catostomus insignis</i>	Sonora Sucker	G3		
<i>Catostomus plebeius</i>	Rio Grande Sucker	G3		
<i>Gila nigra</i>	Headwater Chub	G1	90-day	
<i>Gila pandora</i>	Rio Grande Chub	G3		
<i>Ictalurus sp. 1</i>	Chihuahua Catfish	G1		
<b>Insects</b>				
<i>Atrytonopsis deva</i>	Deva Skipper	G3		
<i>Erpetogomphus heterodon</i>	Dashed Ringtail	G3		
<i>Lachlania dencyannae</i>	A Mayfly	G1		
<i>Leucrocota petersi</i>	A Mayfly	G2		
<i>Limenitis archippus obsoleta</i>	Arizona Viceroy	T3		
<i>Ophiogomphus arizonicus</i>	Arizona Snaketail	G3		
<i>Piruna polingii</i>	Four-Spotted Skipperling	G3		
<i>Speyeria nokomis coeruleascens</i>	Bluish Fritillary	T2		
<i>Speyeria nokomis nitocris</i>	Nitocris Fritillary	T3		
<i>Speyeria nokomis nokomis</i>	Nokomis Fritillary	T1		
<b>Mammals</b>				
<i>Idionycteris phyllotis</i>	Allen's Big-Eared Bat	G3		
<b>Plants</b>				
<i>Adenophyllum wrightii</i>	Wright's Dogweed	G1		
<i>Ageratina lemmonii</i>	Lemmon's Thorough-wort	G3		
<i>Arabis tricornuta</i>	Rincon Mountain Rockcress	G1		
<i>Asclepias uncialis ssp. uncialis</i>	Greene Milkweed	T2		
<i>Brickellia floribunda</i>	Chihuahuan Desert Brickell-Bush	G3		
<i>Brickellia rusbyi</i>	Stinking Brickell-Bush	G3		
<i>Brickellia squamulosa</i>	Mule Mountain Brickell Brush	G3		
<i>Crataegus wootoniana</i>	Wooton's Hawthorn	G2		
<i>Desmodium metcalfei</i>	Metcalfe's Tick-Trefoil	G3		
<i>Draba mogollonica</i>	Mogollon whitlowgrass	G3		
<i>Erigeron hessii</i>	Hess's Fleabane	G1		
<i>Erigeron scopulinus</i>	Winn Falls Fleabane	G3		
<i>Grindelia arizonica var. neomexicana</i>		T3		
<i>Hieracium fendleri var. mogollense</i>	Yellow Hawkweed	T3		
<i>Hieracium rusbyi</i>	Rusby's Hawkweed	G2		
<i>Hymenopappus biennis</i>	Biennial Woolly-white	G3		
<i>Hymenopappus mexicanus</i>	Mexican Woolly-white	G3		

Taxa Scientific Name	Common Name	G/T- rank	ESA Status	Recently Delisted
<i>Hymenoxys rusbyi</i>	Ruby's Bitterweed	G3		
<i>Lesquerella gooddingii</i>	Goodding's bladderpod	G3		
<i>Ligusticum porteri</i>	Porter's Lovage	G3		
<i>Machaeranthera blephariphylla</i>	Texas Tansy-aster	G3		
<i>Packera cardamine</i>	Bitter Cress Groundsel	G3		
<i>Packera cynthioides</i>	White Mountain Groundsel	G3		
<i>Packera neomexicana</i> var. <i>metcalfei</i>	Metcalfe's Groundsel	T3		
<i>Packera quaerens</i>	New Mexico Groundsel	G2		
<i>Penstemon linarioides</i> ssp. <i>maguirei</i>	Maguire's Penstemon	T1		
<i>Penstemon metcalfei</i>	Metcalfe's Bush Beardtongue	G2		
<i>Pteryxia davidsonii</i>	Davidson's Wavewing	G2		
<i>Rumex orthoneurus</i>	Bloomer's Dock	G3		
<i>Scrophularia macrantha</i>	Mimbres Figwort	G2		
<i>Senecio bigelovii</i> var. <i>bigelovii</i>	Nodding Ragwort	T3		
<i>Silene wrightii</i>	Wright's Catchfly	G3		
<i>Stachys rothrockii</i>	Rothrock's Hedge-nettle	G3		
<i>Stellaria porsildii</i>	Porsild's Starwort	G1		
<i>Talinum humile</i>	Pinos Altos Mountains Flame Flower	G2		
<i>Trifolium neurophyllum</i>	Mogollon Clover	G2		
<i>Viguiera triloba</i>	Gray's Zaluzania	G3		
<i>Zigadenus mogollonensis</i>	Mogollon Death Camas	G3		
<b>Reptiles</b>				
<i>Thamnophis eques megalops</i>	Mexican Garter Snake	T3	90-day	
<i>Thamnophis rufipunctatus</i>	Narrowhead Garter Snake	G3		
<b>Snails</b>				
<i>Ashmunella binneyi</i>	Silver Creek Woodlandsnail	G1		
<i>Ashmunella cockerelli argenticola</i>		T1		
<i>Ashmunella cockerelli cockerelli</i>	Black Range Woodlandsnail	T1		
<i>Ashmunella cockerelli perobtusa</i>		T1		
<i>Ashmunella danielsi</i>	Whitewater Creek Woodlandsnail	G1		
<i>Ashmunella mendax</i>	Iron Creek Woodlandsnail	G1		
<i>Ashmunella tetrodon inermis</i>		T2		
<i>Ashmunella tetrodon mutator</i>		T1		
<i>Ashmunella tetrodon tetrodon</i>	Dry Creek Woodlandsnail	T3		
<i>Holospira cockerelli</i>	Cockerell Holospira	G1		
<i>Oreohelix confragosa</i>	Pinos Altos Mountainsnail	G1		
<i>Oreohelix metcalfei acutidiscus</i>		T1		
<i>Oreohelix metcalfei hermosensis</i>		T1		
<i>Oreohelix metcalfei metcalfei</i>		T1		
<i>Oreohelix metcalfei radiata</i>		T2		
<i>Oreohelix pilsbryi</i>	Mineral Creek Mountainsnail	G1		
<i>Oreohelix swopei</i>	Morgan Creek Mountainsnail	G1		
<i>Pyrgulopsis gilae</i>	Gila Springsnail	G2	Candidate	
<i>Pyrgulopsis thermalis</i>	New Mexico Hotspring Snail	G1	Candidate	



**Figure 11-4.** The number of potential species-of-concern (in blue) and federally listed endangered and threatened species (in yellow) by taxon that currently inhabit the Gila National Forest. Potential species-of-concern include species with NatureServe global ranks (G/T-rank) of three or less, species that are listed as candidate or proposed under the Federal Endangered Species Act (ESA), have been recently delisted under ESA, or species which have been petitioned for listing under ESA and for which a positive ‘90 day finding’ has been made.

*Potential species-of-interest* —At least 104 potential species-of-interest representing seven taxonomic groups currently inhabit the Gila National Forest (Figure 11-5). Birds comprise the largest proportion (approximately 63%) of potential species-of-interest. Mammals comprise 16% of the total, while reptiles make up 11%, plants and amphibians, 4% each, insects 2%, and fish 1%. Appendix 11-A lists all known terrestrial vertebrates, native aquatic vertebrates, and plants and invertebrate species of management concern on the Gila National Forest and identifies those determined as potential species-of-interest.



**Figure 11-5.** The number of potential species-of-interest, by taxon, that currently inhabits the Gila National Forest. Species were considered potential species-of-interest if they fell into one or more of the following categories: state listed threatened or endangered species in New Mexico; on the U.S. Fish and Wildlife Service Birds of Conservation Concern National Priority list; listed as priority species in the NM State Comprehensive Wildlife Conservation Strategy; and NatureServe national or subnational conservation rank of N1, N2, S1 or S2. These are the criteria listed in the published Forest Service draft directives (70 Fed. Reg.14637) for determining species-of-interest. Species that were listed as federally endangered or threatened, or that were determined to be potential species-of concern were not included as potential species-of-interest.

*Summary* – Over one-third (33.7%) of all species on the Gila National Forest were identified as falling within categories defined by the USFS planning directives (Table 11-8). While 13.7% were identified as potential species-of-concern, approximately 18.1% were identified as potential species-of-interest. Notably, one-quarter (25.0%) of all fish that inhabit the Gila National Forest are federally listed threatened or endangered, and another 25.0% are identified as potential species-of-concern. Also, at least three-quarters of all insects (75.0%), plants (82.3%), and snails (86.4%) that inhabit the Gila National Forest fall in categories defined by the USFS planning directives. In addition to the criteria used to define these categories, the R3 Species Database includes additional conservation status information, such as species listed on the Region 3 Sensitive Species List and animals on the state Comprehensive Wildlife Conservation Strategy list. All but five species on the Region 3 Sensitive Species List that inhabit Gila National Forest were captured within the categories defined by the directives. Those species include Orange giant skipper (*Agathymus neumoegeni*), Hoary skimmer (*Libellula nodisticta*), Pima orange tip (*Anthocharis pima*), Cactus mouse (*Peromyscus eremicus*), and Forked spurge (*Euphorbia bifurcate*).

**Table 11-8.** Number of species identified as endangered or threatened, species-of-concern, species-of-interest, or no category for the Gila National Forest based on information in the R3 Species Database.

Taxa	Endangered and Threatened		Potential Species of Concern		Special Interest		No Category		Total
	#	%	#	%	#	%	#	%	
Amphibian	1	9.1	0	0.0	4	36.4	6	54.5	<b>11</b>
Bird	3	1.0	3	1.0	65	21.6	230	76.4	<b>301</b>
Fish	6	25.0	6	25.0	1	4.2	11	45.8	<b>34</b>
Insect	0	0.0	10	62.5	2	12.5	4	25.0	<b>16</b>
Mammal	1	1.1	1	1.1	17	18.3	74	79.6	<b>93</b>
Plant	0	0.0	38	74.5	4	7.8	9	17.6	<b>51</b>
Reptile	0	0.0	2	3.5	11	19.3	44	77.2	<b>57</b>
Snail	0	0.0	19	86.4	0	0.0	3	13.6	<b>22</b>
Total	11	1.9	79	13.7	104	19/1	381	66.3	<b>575</b>

### III. 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 Gila National Forest. The conservation targets associated with each overlapping conservation area are also identified.

Ten individual conservation areas from ecoregional assessments overlap the Gila National Forest (Figure 11-6, Table 11-9), totaling 1,037,100 acres, or 30.7% of the Forest. Conservation area overlap on individual districts ranged from 54.8% on the Wilderness District to 4.0% on the Quemado Ranger District (Table 11-10). Overall, 43.9% of the total area of these ten conservation areas overlaps the Gila National Forest. For many of the conservation areas, a large proportion of the conservation area overlaps the Gila, (Table 11-9), demonstrating the Gila has the primary responsibility for managing these areas to sustain the biodiversity within them.

Approximately three quarters of the area of the Gila National Forest overlapped by conservation areas is designated wilderness area (50.9%) or inventoried roadless area (23.6%), while approximately 25% overlap areas without these designations (Table 11-12). Approximately two-thirds of all wilderness areas and one-third of inventoried roadless areas on the forest are overlapped by conservation areas. Approximately 14% of the remainder of the forest is overlapped.

Conservation targets were summarized for all ten conservation areas that overlap the Gila National Forest. A total of 134 conservation targets occur within these conservation areas (Figure 11-7). Of these, 37 (27.6%) are coarse filter targets (ecological systems, communities or features), while 97 (72.4%) are individual species. Fifty-nine (44.0%) targets are associated with riparian and aquatic systems, while 75 (56.0%) are associated with terrestrial habitats (Table 11-11). A complete listing of all conservation targets by taxonomic group for the Gila is provided in Appendix 11-B and conservation targets for each conservation area are provided in Appendix 11-C.



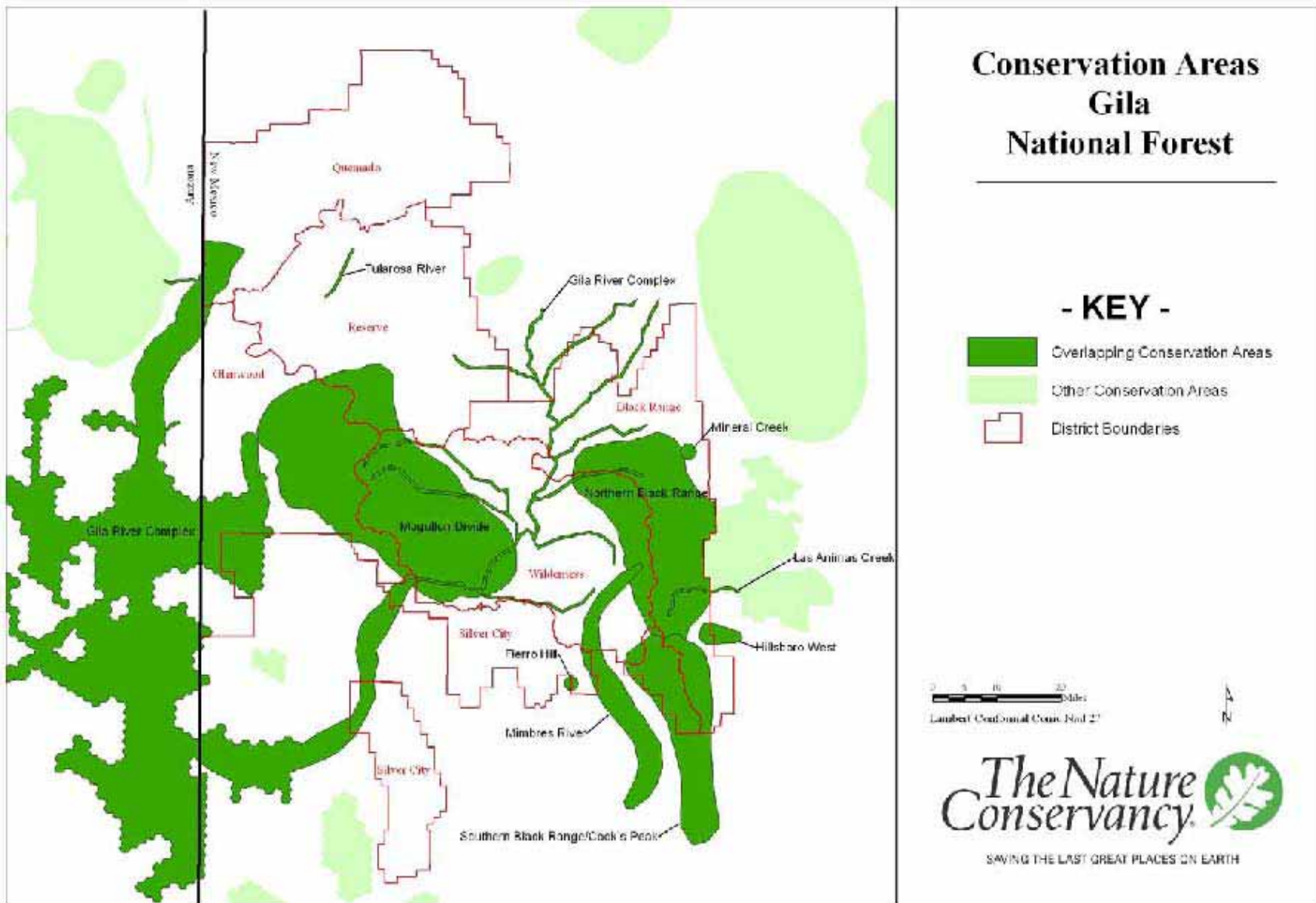


Figure 11-6. Conservation areas (N=10) that overlap six ranger districts on the Gila National Forest in New Mexico.

**Table 11-9.** Conservation areas (N=10) that overlap six ranger districts on the Gila National Forest in New Mexico.

Conservation Area	Ranger Districts <sup>A</sup>	Overlap (Acres)	% of Conservation Area
Fierro Hill	SC	1,100	50.0
Gila River Complex	BR,G,R, SC,W	170,300	12.5
Hillsboro West	BR	3,500	34.7
Las Animas Creek	BR	2,400	66.7
Mimbres River	SC,W	25,100	30.0
Mineral Creek	BR	3,100	100.0
Mogollon Divide	G,R,SC,W	480,200	99.8
Northern Black Range	BR,SC,W	261,900	99.9
Southern Black Range/Cook's Peak	BR,SC,W	87,000	57.5
Tularosa River	R	2,300	100.0

<sup>A</sup> BR = Black Range, G = Glenwood, Q = Quemado, R = Reserve, SC = Silver City, W = Wilderness

**Table 11-10.** Extent of overlap between ecoregional conservation areas and six ranger districts on the Gila National Forest in New Mexico.

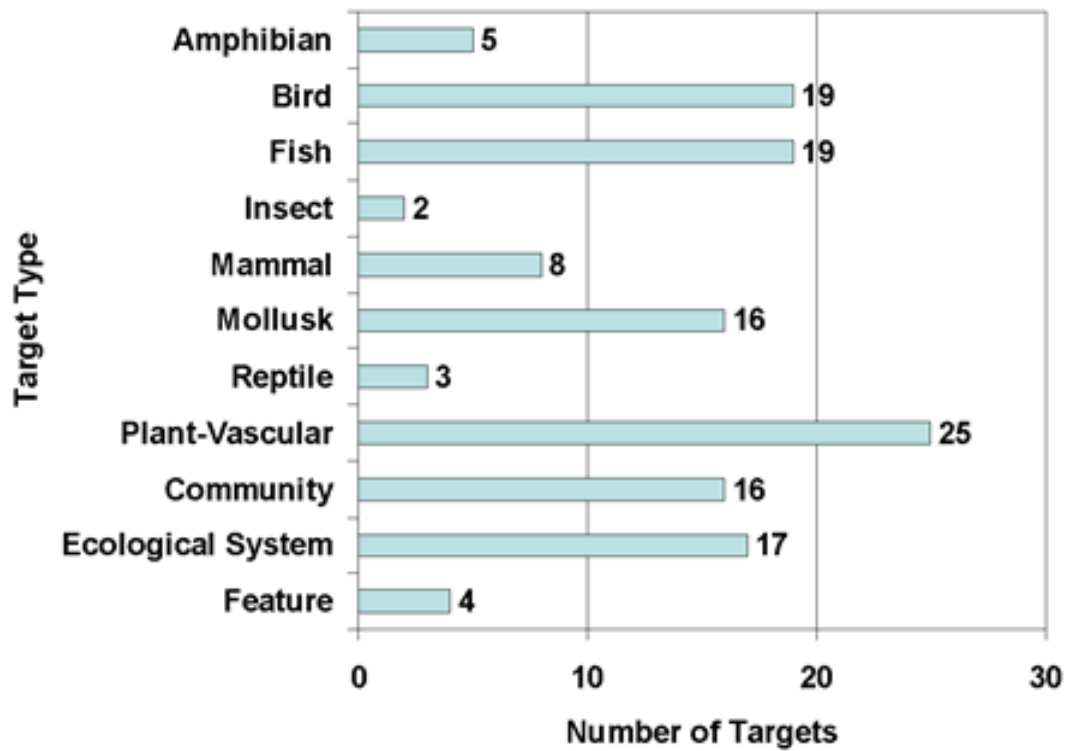
District	Number of Conservation Areas	Overlap (Acres)	Percent of District
Black Range	6	245,200	44.0
Glenwood	2	269,200	51.6
Quemado	1	24,100	4.0
Reserve	3	53,300	8.6
Silver City	6	73,500	18.3
Wilderness	5	371,800	54.8
Gila N.F Total	10 <sup>A</sup>	1,037,100	30.7

<sup>A</sup> Several conservation areas overlap more than one district

**Table 11-11.** Number of conservation targets associated with aquatic/riparian and terrestrial habitats for seven conservation areas that overlap the Gila National Forest in New Mexico.

Conservation Area	Habitat Habitat		Total
	Aquatic/ Riparian	Terrestrial	
Fierro Hill	0	4	4
Gila River Complex	65	53	118
Hillsboro West	0	1	1
Las Animas Creek	1	2	3
Mimbres River	9	7	16
Mineral Creek	0	2	2
Mogollon Divide	18	54	72
Northern Black Range	5	21	26
Southern Black Range/Cook's Peak	0	9	9
Tularosa River	4	0	4





**Figure 11-7.** Number of conservation targets, by type, that occur on 10 conservation areas that overlap the Gila National Forest in New Mexico.

**Table 11-12.** Overlap between conservation areas and areas with special designations on the Gila National Forest in New Mexico.

Designation	Acres within Conservation Areas	% of Conservation Areas	% of Designated Areas
Wilderness Areas	528,000	50.9	66.8
Roadless Areas	244,700	23.6	33.5
No Designation	264,400	25.5	14.2

## Discussion

### *Systems Diversity*

According to analysis of SWReGap data, three PNVTs dominate the Gila National Forest: ponderosa pine forests, pinyon-juniper woodlands, and madrean encinal woodlands. Together, they comprise approximately 2,729,400 acres or 83.5% of the Forest. All three systems are biologically important to the Region, support a host of distinct organisms, and face a variety of conservation threats.

For example, ponderosa pine forests are primarily restricted to western North America. Abert's squirrel (*Sciurus aberti*) is one example of a species dependent upon this system. Some species that utilize ponderosa pine forests are of state or federal conservation concern, such as the Northern goshawk (*Accipiter gentilis*) and the Mexican spotted owl (*Strix occidentalis lucida*), respectively. The Gila National Forest manages 30% of the ponderosa pine on Region 3 lands, and therefore, has a unique opportunity to use current scientific knowledge to guide management that will ensure the health of this system and abate threats like catastrophic fires.

Pinyon-juniper woodlands, which encompass the second largest area on the Gila National Forest, are unique to the 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 critical habitat for the pinyon jay (*Gymnorhinus cyanocephalus*). In return, the pinyon jay plays an important role for dispersing seeds for this system. 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 species like the pinyon jay and others that depend upon the health of this system. The Gila manages approximately 17% of all pinyon-juniper woodlands within Region 3 Forest Service lands.

Madrean encinal woodlands are also restricted to extreme southwestern United States (southern Arizona, New Mexico and Texas), where it is considered at its most 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 National Forests. Currently, Region 3 Forests manage the largest portion (42%) of Madrean encinal woodlands relative to other major landowners in Arizona and New Mexico, and the Gila National Forest is responsible for approximately 14% of this system within Region 3 lands.

### *Species Richness and Conservation Status*

The R3 Species Database includes conservation status information for 574 species that inhabit the Gila National Forest. Because the database is not comprehensive for plants and invertebrates, this does not represent the overall diversity of the Forest. However, the database

does serve as a useful tool for identifying species that might, because of their conservation status, need to be addressed within forest planning. For example, the Gila manages 14 federally endangered, threatened, or candidate species. Furthermore, the Gila manages 28 species listed by the state of New Mexico as threatened or endangered; 89 species with NatureServe global rankings that warrant conservation concern; 91 species with NatureServe national rankings that warrant conservation concern; and 145 species with NatureServe state rankings that warrant conservation concern.

Seventy-nine potential species-of-concern were identified. Species-of-concern are those for which ‘management actions may be necessary to prevent listing under the Endangered Species Act’ according to forest planning directives. An additional 104 species were identified as potential species-of-interest, which, according to the directives, are species for which ‘management actions may be necessary or desirable to achieve ecological or other multiple-use objectives.’ Overall, over one-third (33.7%) of all species that are known to inhabit Gila National Forest were identified as species that might need to be considered within Forest planning.

As habitat loss and degradation is a major threat for many species of conservation concern, maintaining healthy vegetation systems that support these species should be an important component in sustaining viable species populations on the Gila National Forest. The assessments in this report provide important information on the systems and locations on the Gila that are important for maintaining system and species diversity. For instance, the analysis of PNVTs highlighted the important vegetation systems that occur on the Gila, which include ponderosa pine, pinyon-juniper, and madrean encinal woodlands. 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.

The Gila National Forest has significant areas of overlap with ecoregional conservation areas. All of the ranger districts on the Gila are overlapped by one or more conservation areas. These conservation areas include 134 conservation targets, including 97 individual species. The specific locations where conservation areas overlap the Gila 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 Gila 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 Gila National Forest.

### *Relevance to Forest Planning*

This analysis of existing regional assessment information identifies important biological and ecological characteristics of the Gila 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 Gila, identifying ecological characteristics that may be useful in defining desired future conditions, and identifying areas where changes in management may be necessary to sustain biodiversity. For example, the analysis of ecosystem data demonstrates the variety of

systems that occur on the Gila, and identifies systems (and their associated species diversity) for which the Gila has disproportionate responsibility within the context of Region 3, such as ponderosa pine, pinyon-juniper forests, and madrean encinal woodlands.

Ecoregional assessments provide a strategic, regional perspective on maintaining biodiversity at large 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 Forest boundaries.

Within the forest planning framework, it may be useful to evaluate currently allowed land uses and activities within conservation areas and determine associated impacts to biodiversity. As an example, a synthesis of conservation area overlap with designated wilderness and inventoried roadless areas on the Gila demonstrates the variety of current management emphases and activities that occur within conservation areas. The largest proportion (50.9%) of conservation areas that overlap the Gila National Forest are within designated wilderness areas. For forest planning purposes, it may be useful to determine the compatibility of current forest structure and ecological processes within these overlap areas with Forest biodiversity goals, and identify management actions that may be needed to achieve sustainability. As significant non-wilderness areas of the forest are also overlapped, it is apparent that achieving biodiversity sustainability on the Gila must be accomplished within the varied uses and activities that occur on the Forest. Regardless of the types of land use considered, conservation areas provide a means to prioritize consideration of areas based on their importance to biodiversity sustainability.

While the above example focused on wilderness and roadless 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 activities in these areas.

For example, the Mogollon Divide conservation area encompasses 481,400 acres, of which 480,200 (99.8%) overlap several ranger districts of the Gila National Forest. Seventy-two conservation targets, including 32 individual species and 40 communities and ecological systems (see Appendix 10-C), are associated with the Mogollon Divide 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 the forest communities within this conservation area relative to the historic range of variability and, if desired, 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 and future activities can be assessed. 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

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.