

Chapter 13:
Ecological & Biological Diversity of the Santa Fe 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 Santa Fe National Forest is one of 11 National Forests within U.S. Forest Service (USFS) Southwestern Region (Region 3) located in north-central New Mexico. The Santa Fe National Forest encompasses approximately 1,560,800 acres, which comprises approximately 7.7% of the total area of all Region 3 Forests, excluding the Cibola National Grasslands. Elevation on the Santa Fe ranges from 5,300 ft. to 13,103 ft. at the summit of Truchas Peak located in the Pecos Wilderness.

The geographic location, climate and elevational gradient found on the Santa Fe National Forest allows for several important ecological and biological features relative to other National Forests in Region 3 and other major landowners in Arizona and New Mexico. For example, the Santa Fe contains the largest proportion of mixed conifer forest on Region 3 lands. The Forest also manages large proportions of spruce-fir forests, montane grasslands, and aspen forest and woodlands relative to that found throughout the Southwest. Many unique plant and animal species can be found in these systems. Furthermore, these exceptional areas of ecological and biological distinction allows for significant opportunities for conserving vegetation systems, and plant and animal biodiversity.

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 Santa Fe National Forest and highlight information that may be pertinent to forest planning. Information from three assessments was synthesized for the Santa Fe National Forest, including:

- Distribution and extent of potential natural vegetation types (PNVTs)
- Conservation status of plant and animal species
- 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 Santa Fe 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 Santa Fe National Forest staff.

Results

I. Potential Natural Vegetation Types within the Santa Fe National Forest

Information from the Southwest Regional Gap Analysis Project (SWReGAP; USGS National Gap Analysis Program 2004) was used to characterize the distribution of potential natural vegetation types (PNVTs) on the Santa Fe 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 they are the basis for the characterizations of historic range of variability and vegetation models being developed in preparation for the forest planning process.

For this analysis, the extent and proportion of each PNVT on the Santa Fe were summarized, as well as the proportion of each PNVT on the Santa Fe relative to all Region 3 Forests. More detailed information on the data and methods used in this analysis can be found in Chapter 2, and comparisons of PNVTs on the Santa Fe to other Region 3 Forests and landowners in the Southwest is available in Chapter 3.

Twenty-one PNVTs were identified on the Santa Fe National Forest (Figure 13-1; see Appendices 2-A and 2-B, respectively, for detailed descriptions of each PNVT and the crosswalk of SWReGAP land cover types to PNVTs). However, three PNVTs comprise approximately 75% of the total area of the Santa Fe National Forest. These three most common PNVTs include: ponderosa pine forest (32.4%), mixed conifer forest (25.2%), and pinyon-juniper woodland (17.3%). Spruce-fir (5.6%) and Great Plains grassland (5.1%) encompasses the next largest portions of the Forest, while sub-alpine grassland (3.6%) and aspen forest and woodland (2.9%) comprise the subsequent largest areas on the Santa Fe, respectively. Finally, the remaining 14 PNVTs cover relatively small percentages of the landscape, and encompass approximately 8% of the Forest combined. For a complete list of all 21 PNVTs found on the Santa Fe National Forest, and the percentage of cover of each, refer to Table 13-1.

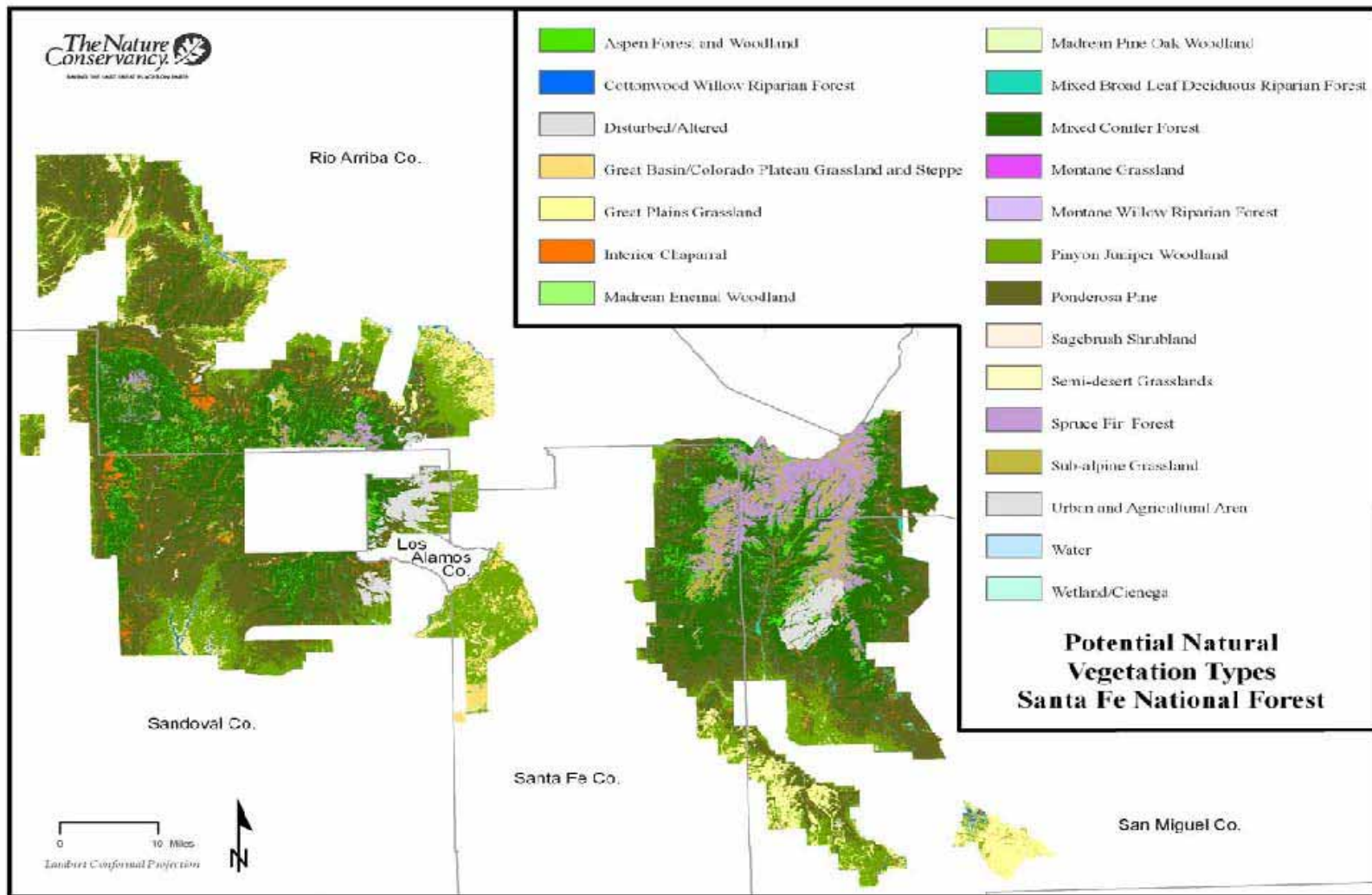


Figure 13-1. Distribution of potential natural vegetation types on the Santa Fe National Forest. Map was created using data from the Southwest Regional Gap Analysis Project (SWReGAP; U.S. Geological Survey National Gap Analysis Program, 2004). SWReGAP vegetation types were aggregated and converted to 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 13-1. Approximate area (in acres) and percent of total area of each potential natural vegetation type on the Santa Fe 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.

Potential Natural Vegetation Type	Total Area (acres)	Percent of Total Area (%)
Aspen Forest and Woodland	46,000	2.9
Cottonwood Willow Riparian Forest	3,600	0.2
Disturbed/Altered (quarries and mines)	36,600	2.3
Great Basin/ Colorado Plateau Grassland and Steppe	43,000	2.8
Great Plains Grasslands	80,200	5.1
Interior Chaparral	23,400	1.5
Madrean Encinal Woodland	100	<0.1
Madrean Pine-Oak Woodland	300	<0.1
Mixed Broadleaf Deciduous Riparian Forest	5,400	0.3
Mixed Conifer Forest	392,700	25.2
Montane Grassland	500	<0.1
Montane Willow Riparian Forest	600	<0.1
Pinyon-juniper Woodland	269,600	17.3
Ponderosa Pine	505,400	32.4
Sagebrush Shrubland	7,800	0.5
Semi-desert Grassland	100	<0.1
Spruce-fir Forest	87,400	5.6
Sub-alpine Grasslands	55,800	3.6
Urban and Agricultural Area	500	<0.1
Water (open water)	1,500	0.1
Wetlands/ Cienega	300	<0.1
Total	1,560,800	

Potential Natural Vegetation Types relative to all Region 3 Forests

The Santa Fe National Forest is responsible for managing large percentages of certain PNVTs relative to all other National Forests in Region 3. For example, the largest proportion of conifer forest found across all Region 3 Forests (30.8%) can be found on the Santa Fe. This is the largest proportion of conifer forest in any single National Forest in the Region. In addition, the Santa Fe also manages 24.0% of all spruce-fir forest, 14.4% of sub-alpine grassland and 13.7% of aspen forest and woodland in Region 3 (Figure 13-2).

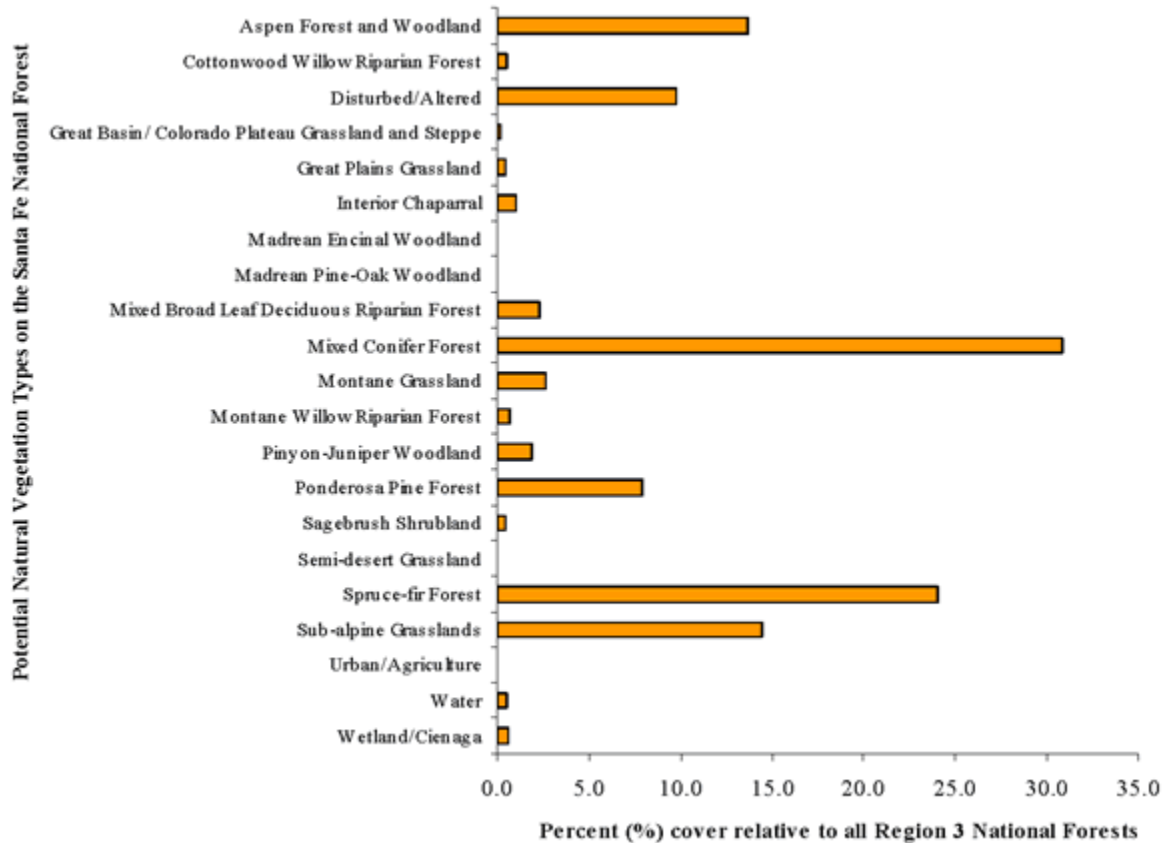


Figure 13-2. Percent area of cover of each potential natural vegetation type that occurs on the Santa Fe National Forest in relation to all Region 3 National Forests combined. Analysis was conducted using data from the Southwest Regional Gap Analysis Project (SWReGAP). See Chapter 2 for information regarding the limitations of SWReGAP.

Potential Natural Vegetation Types across all major landowners in the Southwest

The Santa Fe National Forest also manages significant proportions of particular PNVTs across all major landowners in the Southwest. For example, 22.1% of mixed conifer forest, 15.1% of spruce-fir forest, 9.2% of sub-alpine grassland and 8.8% of aspen forest and woodland found throughout Arizona and New Mexico is located on the Santa Fe National Forest. For more information regarding the proportions of PNVTs the Santa Fe National Forest manages relative to other landowners in the Southwest, refer to Chapter 3.

II. Plant and Animal Species Richness

Species Richness

The R3 Species Database (described in detail in Chapter 2) was used to summarize the conservation status of species that exist on the Santa Fe National Forest, and to identify species that might potentially be considered as species-of-interest and species-of-concern as defined in the USFS planning directives. The R3 Species Database was synthesized from multiple datasets and 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 known terrestrial and aquatic vertebrate species, and plant and invertebrate species that may be of conservation concern. Nonnative aquatic vertebrate species were not included in these analyses. The complete list of species used in this analysis and their conservation status attributes is provided in Appendix 13-A.

According to the R3 Species Database, 407 species of plants and animal occur on the Santa Fe National Forest (Figure 13-3; a complete list is provided in Appendix 13-A). This number is likely conservative in terms of overall species diversity as it may not account for all vertebrate species that may occur in this area, and is not comprehensive for plant and invertebrates. It is also important to note that the number and type of species inhabiting the Santa Fe National Forest likely changes over time.

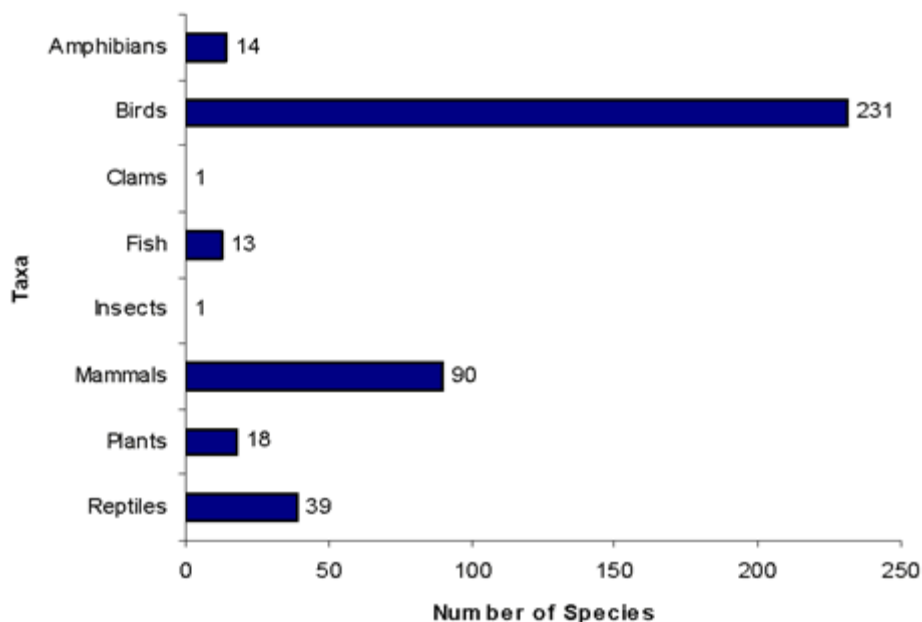


Figure 13-3. Number of species, by taxon, that inhabit the Santa Fe National Forest according to the R3 Species Database. The R3 Species Database includes all known terrestrial vertebrates and native fishes,

but only invertebrates and plants of management concern. Because of the limitations of the R3 Species Database (see Chapter 2 for complete description of the database), the numbers reported in these results are conservative.

Threatened and Endangered Species Listings

Federal listing under the Endangered Species Act – Five species that inhabit the Santa Fe National Forest are listed by the U.S. Fish and Wildlife Service as endangered or threatened under the Endangered Species Act of 1973 (Table 13-6). Refer to Appendix A for a list of species that includes information about threatened and endangered status.

New Mexico state conservation status — Fifteen species that are designated by the New Mexico Game and Fish Department as threatened or endangered occur on the Santa Fe National Forest. Refer to Appendix 13-A for a complete list of those species. Currently, there are 4 animals and 1 plant designated by the state as endangered species and 10 animal species that are listed as threatened on the Forest. Across the six taxa of state listed species, birds comprise the largest proportion (53.3%).

NatureServe Conservation Status Rankings

Global conservation status rankings (G-ranks) — Results indicate 367 species (92.4%) were ranked as G4/T4 or G5/T5 species (Table 13-2). These are species whose populations are considered ‘apparently secure’ or ‘secure’, respectively. Twenty-six species (6.5%) were ranked with a global conservation status of G1, G2, G3, T1, T2 or T3, which warrants conservation concern. The remaining 4 species were considered not rankable, according to NatureServe. Ten species (2.5%) of 407 were not included in this analysis because they were not assigned a NatureServe global conservation rank.

National conservation status rankings (N-ranks) — Three hundred fifty-seven species on the Forest (90.0%) were ranked as N4 or N5 species, whose populations are considered ‘apparently secure’ or ‘secure’, respectively (Table 13-3). Twenty-six species (6.5%) were ranked with a national conservation status of N1, N2, or N3 that warrants conservation concern. The remaining 14 species (3.5%) were considered not rankable, according to NatureServe. The same suite of species was used in this analysis as in the global rankings.

Subnational conservation status rankings (S-ranks) — Of the 407 species analyzed for the Santa Fe National Forest, 386 (94.8%) had assigned subnational conservation status ranks (S-ranks) in the state of New Mexico (Table 13-4). Of these, 282 (73.1%) were considered secure or apparently secure (S5 and S4, respectively). Eighty-six species (22.3%) had rankings that merit conservation concern on a state or more local scale (S1, S2, S3). The remaining 18 species (4.7%) were assigned SNA or SNR rankings. See Appendix 13-A for the complete list of species with their associated S-ranks.

Table 13-2. Number of species, by taxon, that inhabit the Santa Fe National Forest with the various global rankings assigned by NatureServe. Ten species are not included in this table because they do not have an assigned global rank. G1 = critically imperiled; G2 = imperiled; G3 = vulnerable; G4 = apparently secure; G5 = secure; GNA = not applicable; GNR = unranked/not yet assessed; T = infraspecific taxon (subspecies or varieties), TNR = unranked/not yet assessed; TU = unrankable.

Global Ranking	Amphibian	Bird	Clam	Fish	Insect	Mammal	Plant	Reptile	Total
G1	0	0	0	1	0	0	1	0	2
G2	1	0	0	0	0	0	6	0	7
G3	0	0	0	1	1	2	6	0	10
G4	1	13	0	0	0	5	2	1	22
G5	12	210	1	11	0	65	0	37	336
GNA	0	0	0	0	0	1	0	0	1
GNR	0	0	0	0	0	0	1	0	1
T1	0	1	0	0	0	1	0	0	2
T2	0	0	0	0	0	2	1	0	3
T3	0	2	0	0	0	0	0	0	2
T4	0	2	0	0	0	2	1	0	5
T5	0	1	0	0	0	2	0	1	4
TNR	0	0	0	0	0	1	0	0	1
TU	0	1	0	0	0	0	0	0	1

Table 13-3. Number of species, by taxon, that inhabit the Santa Fe National Forest with national rankings assigned by NatureServe. Ten 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.

National Ranking	Amphibian	Bird	Clam	Fish	Insect	Mammal	Plant	Reptile	Total
N1	0	1	0	1	0	1	1	0	4
N2	1	0	0	0	1	2	6	0	10
N3	0	3	0	0	0	4	5	0	12
N4	1	21	0	0	0	7	2	2	33
N5	12	200	1	10	0	64	0	37	324
NNA	0	4	0	1	0	2	0	0	7
NNR	0	1	0	1	0	1	4	0	7

Table 13-4. Number of species, per taxon, currently inhabiting the Santa Fe National Forest that are assigned to the various subnational rankings by New Mexico Natural Heritage. Twenty-one of the 542 species were not assigned a subnational conservation rank by New Mexico Natural Heritage, and therefore are not included in this analysis. S1 = critically imperiled; S2 = imperiled; S3 = vulnerable; S4 = apparently secure; S5 = secure; SNA = not applicable; SNR = not ranked.

Subnational Ranking	Amphibian	Bird	Clam	Fish	Insect	Mammal	Plant	Reptile	Total
S1	1	12	1	1	0	2	2	0	19
S2	1	13	0	1	0	9	6	0	30
S3	1	15	0	2	0	15	2	3	38
S4	2	94	0	4	0	20	1	12	133
S5	8	88	0	1	0	28	0	28	153
SNA	1	4	0	4	0	2	0	0	11
SNR	0	0	0	0	0	0	7	0	7

Other Conservation Rankings

Birds of Conservation Concern —According to the R3 Species Database, the Santa Fe National Forest, is home to at least 231 birds, of which 17 (7.4%) are listed by the U.S. Fish and Wildlife Service as a Bird of Conservation Concern (Table 13-5). In all, the U.S. Fish and Wildlife Service lists 131 species of Birds of Conservation Concern, and 13% of these inhabit the Santa Fe National Forest. Three of these species also are listed as threatened under the state of New Mexico, including the American peregrine falcon, Baird's sparrow, and the Gray vireo.

Partners in Flight Watch List — Of the 100 birds species currently on the Partners in Flight Watch List, 23 (23%) can be found on the Santa Fe National Forest (Table 13-5). This comprises 10% of the known 231 bird species that inhabit the Forest. Two species, the Baird's sparrow and the Gray vireo, are also listed as threatened under the state of New Mexico. Nine species on the Forest occur on both the Partners in Flight Watch List and the U.S. Fish and Wildlife Service Birds of Conservation Concern list, and are highlighted in bold in Table 13-5.

Table 13-5. Bird species on the Partners in Flight Watch list and/or the U.S. Fish and Wildlife Service Birds of Conservation Concern list that inhabit the Santa Fe National Forest (species on both lists are in bold). P = Species on the Partners in Flight Watch list; CC = USFWS Bird of Conservation Concern; * = NM G&F Threatened Species.

Diurnal Raptors	Tyrant Flycatchers
American peregrine falcon* (CC)	Olive-sided flycatcher (P)
Ferruginous hawk* (CC)	Willow flycatcher (P)
Northern harrier (CC)	Shrikes and Vireos
Swainson's hawk (P)	Gray vireo
Shorebirds	Loggerhead Shrike (CC)
Long-Billed Curlew (CC)	Jays, Crows, and Allies
Cuckoos and Allies	Pinyon jay (P)
Upland Game Birds	Mimids – Catbirds, Mockingbirds and Thrashers
Blue Grouse (P)	Bendire's Thrasher
Scaled Quail (P)	Wood Warblers
Pigeons and Doves	Black-throated gray warbler (CC)
Band-tailed pigeon (P)	Grace's warbler
Owls	Virginia warbler (P)
Burrowing owl (CC)	Emberizine Sparrows and Allies
Flammulated owl	Baird's sparrow*
Short-Eared Owl	Brewer's sparrow (P)
Goatsuckers and Swifts	Cassin's sparrow (CC)
Black Swift (P)	Harris's Sparrow
White-Throated Swift (P)	Lark bunting (CC)
Hummingbirds	Sage sparrow (CC)
Calliope hummingbird (P)	Finches and Old World Sparrows
Rufous hummingbird (P)	Black Rosy Finch (P)
Woodpeckers	
Lewis's woodpecker	
Red-Headed Woodpecker	

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 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 Proposed or candidate species under the Federal Endangered Species Act
 - b. Recently (<5 years) de-listed under the Federal Endangered Species Act
 - c. 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 two or less in New Mexico
 - b. Listed as threatened or endangered species with state status in New Mexico
 - c. Identified a 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

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

Threatened and Endangered Species – Five 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 13-7).

Table 13-6. Species listed as endangered or threatened under the Federal Endangered Species Act of 1973 that inhabit the Santa Fe National Forest. The table includes common names that are recognized by NatureServe.

Taxa	Endangered	Threatened
Birds	Southwest Willow Flycatcher	Bald Eagle Mexican Spotted Owl
Fish	Rio Grande Silvery Minnow	
Plants	Holy Ghost Ipomopsis	

Potential species-of-concern — The Santa Fe National Forest is home to at least 22 potential species-of-concern across six distinct taxonomic groups (Table 13-7). Plants comprise over half of all potential species-of-concern on the Forest, approximately 59%; mammals comprise the next largest proportion (22.7%); and amphibians, birds, fish, and insects, 4.5% each (Figure 135). The R3 Species Database, which may not be comprehensive for the Santa Fe National Forest, was used to derive these results. Therefore, it is feasible that some species may be absent from these results.

Among both potential species-of-concern and ESA listed threatened and endangered species, plants continue to comprise half of all listed species on the Forest (52.0%); mammals and birds follow with the next largest proportions (18.5% and 14.8% respectively; Figure 13-4).

Table 13-7. Potential species-of-concern on the Santa Fe National Forest. Species with NatureServe G/T-ranks of 1, 2 or 3, listed as candidate or proposed species under the Federal Endangered Species Act, or having been recently (<5 years) de-listed were identified as potential species-of-concern.

Taxa Scientific Name	Common Name	G/T-rank	Recently de-listed
Amphibians			
<i>Plethodon neomexicanus</i>	Jemez Mtns. Salamander	G2	
Birds			
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	T3	X
Fish			
<i>Macrhybopsis aestivalis</i>	Speckled Chub	G3	
Insects			
<i>Ameletus falsus</i>	False Ameletus Mayfly	G3	
Mammals			
<i>Microtus mogollonensis navaho</i>	Navajo Mexican Vole	T2	
<i>Myotis occultus</i>	Occult Little Brn. Myotis Bat	G3	
<i>Ochotona princeps nigrescens</i>	Goat Peak Pika	T1	
<i>Vulpes velox</i>	Swift Fox	G3	
<i>Zapus hudsonius luteus</i>	New Mexican Jumping Mouse	T2	
Plants			
<i>Abronia bigelovii</i>	Galisteo Verbena	G3	
<i>Asclepias uncialis ssp. uncialis</i>	Greene Milkweed	T2	
<i>Astragalus iodopetalus</i>	Milk Vetch	G2	
<i>Astragalus micromerius</i>	Chaco Milkvetch	G2	
<i>Delphinium robustum</i>	Wahatoya Creek Larkspur	G2	
<i>Erigeron subglaber</i>	Hairless Fleabane	G3	
<i>Herrickia horrida</i>	Horrid Herrickia	G2	
<i>Hymenopappus biennis</i>	Biennial Woolly-white	G3	
<i>Hymenopappus mexicanus</i>	Mexican Woolly-white	G3	
<i>Ligusticum porteri</i>	Porter's Lovage	G3	
<i>Mentzelia conspicua</i>	Conspicuous Blazing Star	G2	
<i>Rumex orthoneurus</i>	Bloomer's Dock	G3	
<i>Salix arizonica</i>	Arizona Willow	G2	

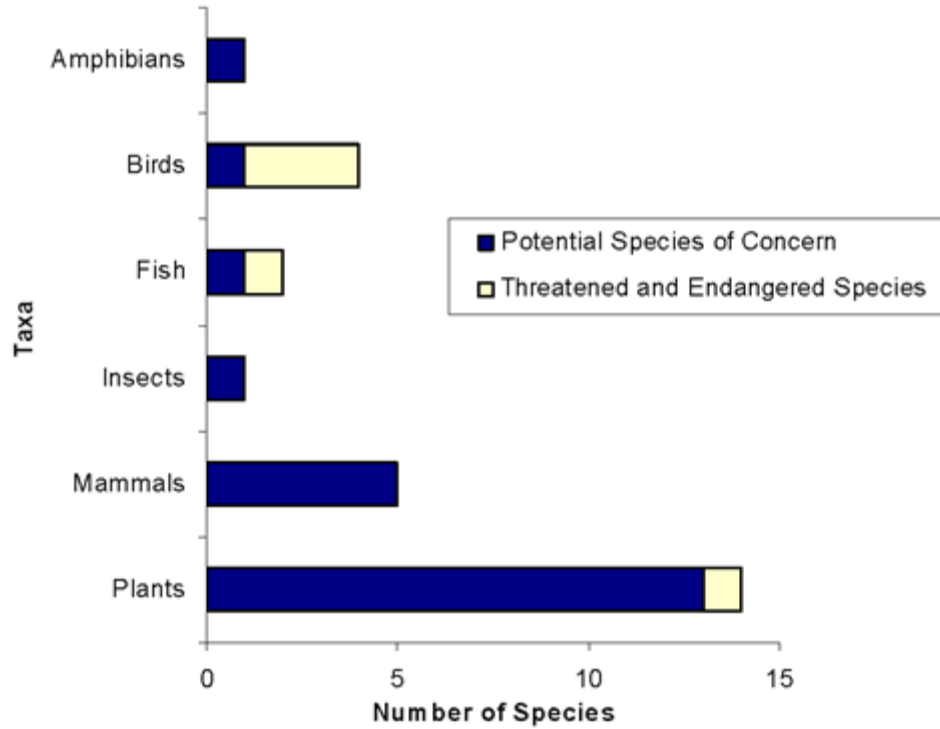


Figure 13-4. The number of potential species-of-concern (blue) and federally listed endangered and threatened species (yellow) by taxon that currently inhabit the Santa Fe National Forest. According to the published Forest Service draft directives (70 Fed. Reg. 14637), species are considered potential species-of-concern if they have a NatureServe global conservation rank of G1, G2, G3, T1, T2, or T3 and are not listed as federally endangered or threatened species. Candidate or proposed species for federal listing may be considered for species-of-concern status.

Potential species-of-interest —At least 76 potential species-of-interest representing five taxonomic groups occur on the Santa Fe National Forest (Figure 13-5). Birds make up the largest proportion (approximately 65.8%) of potential species-of-interest. Mammals comprise 21.1% of the total, while amphibians make up approximately 6.6%, and reptiles comprise 6.0%. Clams comprise 1.3% of all potential species-of-interest on the Santa Fe National Forest. The species used in this analysis for Santa Fe National Forest are listed in Appendix 13-A and those determined as potential species-of-interest are identified.

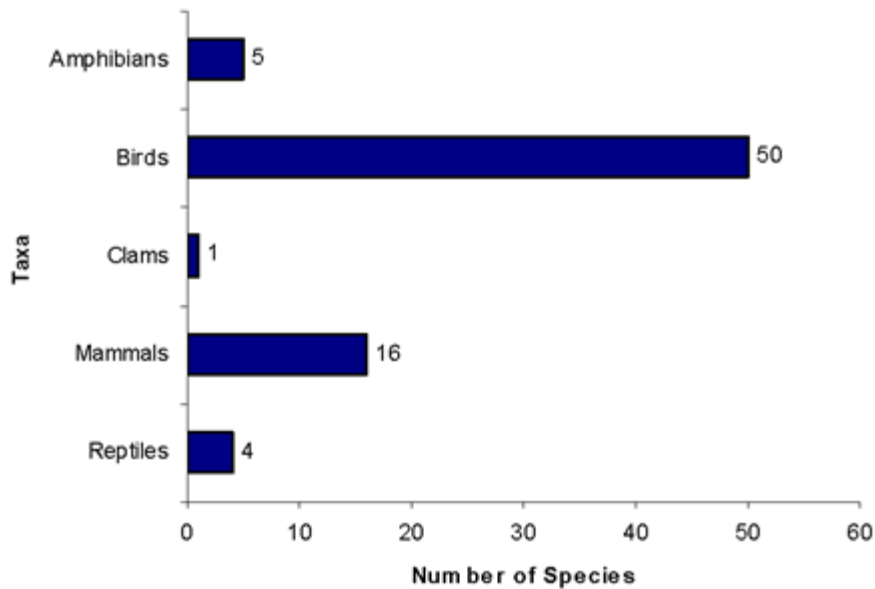


Figure 13-5. The number of potential species-of-interest, by taxa, that currently inhabit the Santa Fe National Forest. Species were considered potential species-of-interest if they fell into one or more of the following categories: state listed threatened or endangered species (NM); listed as a species of concern or priority species in the NM State Comprehensive Wildlife Conservation Strategies; on the U.S. Fish and Wildlife Service Birds of Conservation Concern National Priority list; or 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 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-quarter (25.3%) of all species on the Santa Fe National Forest were identified as falling within categories defined by the USFS planning directives (Table 13-8). While only 5.4% were identified as potential species-of-concern, approximately 18.7% were identified as potential species-of-interest. Notably, 7.1% of all amphibians that inhabit the Santa Fe National Forest are identified as potential species-of-concern, and another 35.7% are potential species-of-interest. Also, over three-quarters (77.8%) of all plants that occur on the Santa Fe are either federally listed as threatened or endangered or are identified as potential species-of-concern.

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 of the species on the Region 3 Sensitive Species List that inhabit Santa Fe National Forest were captured within the categories defined by the directives.

Table 13-8. Number of species identified as endangered or threatened, species-of-concern, species-of-interest, or no category for the Santa Fe National Forest based on information in the R3 Species Database.

Taxa	Endangered and Threatened		Potential Species of Concern		Potential Species of Interest		No Category		Total
	#	%	#	%	#	%	#	%	
Amphibian	0	0.0	1	7.1	5	35.7	8	57.1	14
Bird	3	1.3	1	0.4	50	21.6	177	76.6	231
Clam	0	0.0	0	0.0	1	100.0	0	0.0	1
Fish	1	7.7	1	7.7	0	0.0	11	84.6	13
Insect	0	0.0	1	100.0	0	0.0	0	0.0	1
Mammal	0	0.0	5	5.6	16	17.8	69	76.7	90
Plant	1	5.6	13	72.2	0	0.0	4	22.2	18
Reptile	0	0.0	0	0.0	4	10.3	35	39.7	39
Total	5	1.2	22	5.4	76	18.7	304	74.7	407

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 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 Santa Fe National Forest. The conservation targets associated with each overlapping conservation area are also identified.

Four individual conservation areas from ecoregional assessments overlap the Santa Fe National Forest (Figure 13-6, Table 13-9), totaling 985,200 acres, or 58.2% of the Forest. Conservation area overlap on individual districts ranged from 41.1% on the Pecos District to 96.5% on the Jemez Ranger District (Table 13-10). Overall, 45.9% of the total area of these four conservation areas overlaps the Santa Fe National Forest. For two of the conservation areas, a majority of the conservation area overlaps the Santa Fe, (Table 13-9), demonstrating that the Santa Fe has the primary responsibility for managing these areas to sustain the biodiversity within them.

Approximately one-half of the Santa Fe National Forest overlapped by conservation areas is designated wilderness areas (24.8%) or inventoried roadless area (26.3%), while the remaining one-half of overlap areas do not have these designations (Table 13-12). Larger proportions of wilderness areas (84.9) and inventoried roadless areas (61.6%) are overlapped by conservation areas than areas without these designations (48.8%) on the Forest.

Conservation targets were summarized for all four conservation areas that overlap the Santa Fe National Forest. A total of 71 conservation targets occur within these conservation areas (Figure 13-7). Of these, 36 (50.7%) are coarse filter targets (ecological systems, communities or features), while 35 (49.3%) are individual species. Thirty-six (50.3%) targets are associated with riparian and aquatic systems, while 35 (50.7%) are associated with terrestrial habitats (Table 13-11). A complete listing of all conservation targets by taxonomic group for the Santa Fe is provided in Appendix 13-B and conservation targets for each conservation area are provided in Appendix 13-C.

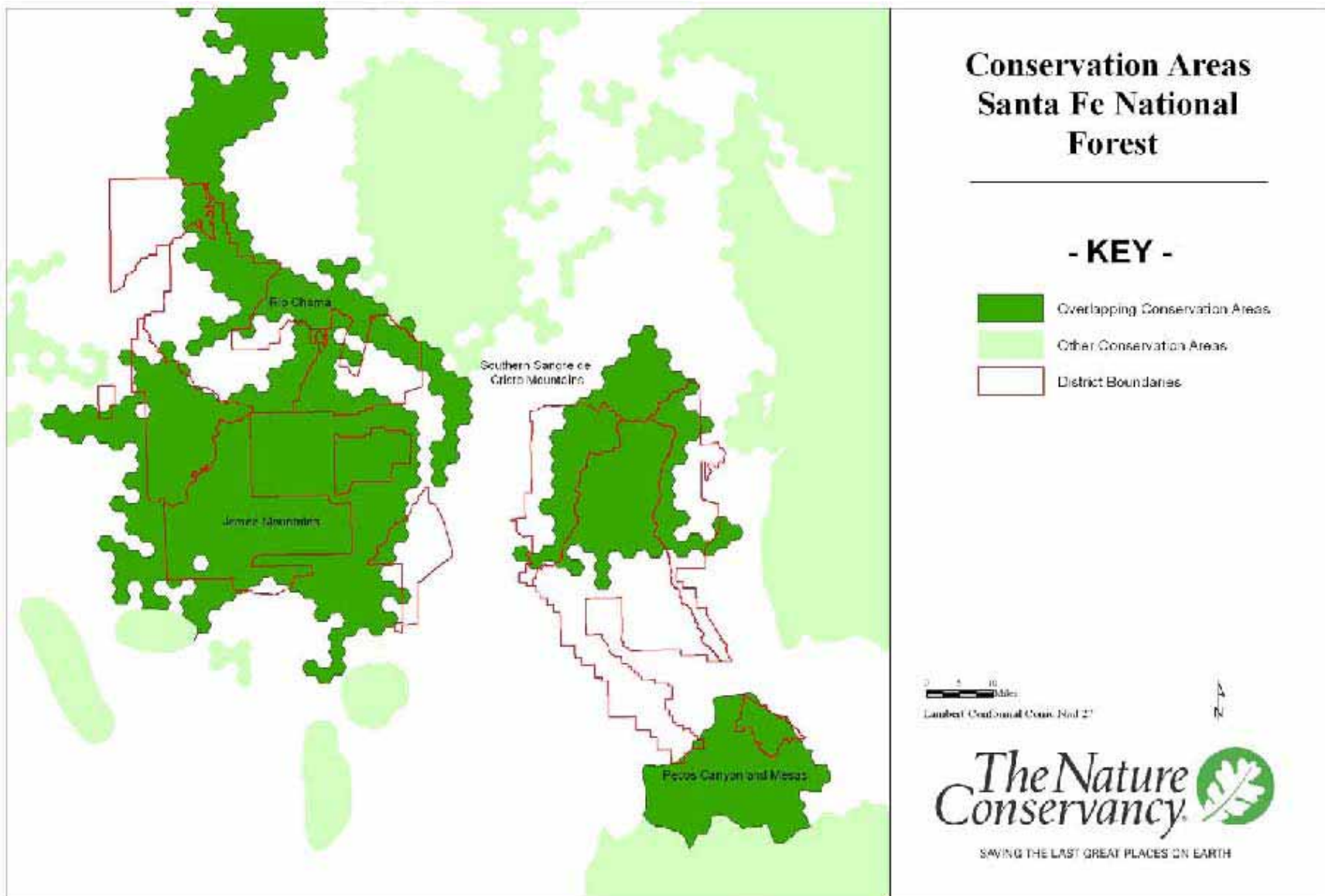


Figure 13-6. Conservation areas (N=4) that overlap six ranger districts on the Santa Fe National Forest in New Mexico. 13-22

Table 13-9. Conservation areas (N=4) that overlap six ranger districts on the Santa Fe National Forest in New Mexico.

Conservation Area	Ranger Districts ^A	Overlap (Acres)	% of Conservation Area
Jemez Mountains	Co,Cu,E,J	534,400	54.0
Pecos Canyons And Mesas	LV,P	27,700	11.3
Rio Chama	Co,Cu,E	125,900	24.1
Southern Sangre De Cristo Mountains	E,LV,P	296,200	76.8

^A Co=Coyote, Cu=Cuba, E=Espanola, J=Jemez, LV=Las Vegas, P=Pecos

Table 13-10. Extent of overlap between ecoregional conservation areas and six ranger districts on the Santa Fe National Forest in New Mexico.

District	Number of Conservation Areas	Overlap (Acres)	Percent of District
Coyote	2	131,800	49.2
Cuba	2	149,000	58.5
Espanola	3	220,600	58.8
Jemez	1	242,000	96.5
Las Vegas	2	84,500	51.9
Pecos	2	157,300	41.1
Santa Fe N.F Total	4 ^A	985,200	58.2%

^A Several conservation areas overlap more than one ranger district.

Table 13-11. Number of conservation targets associated with aquatic/riparian and terrestrial habitats for 4 conservation areas that overlap the Santa Fe National Forest in New Mexico.

Conservation Area	Habitat		Total
	Aquatic/ Riparian	Terrestrial	
Jemez Mountains	20	20	40
Pecos Canyons And Mesas	0	4	4
Rio Chama	21	12	33
Southern Sangre De Cristo Mountains	9	16	25

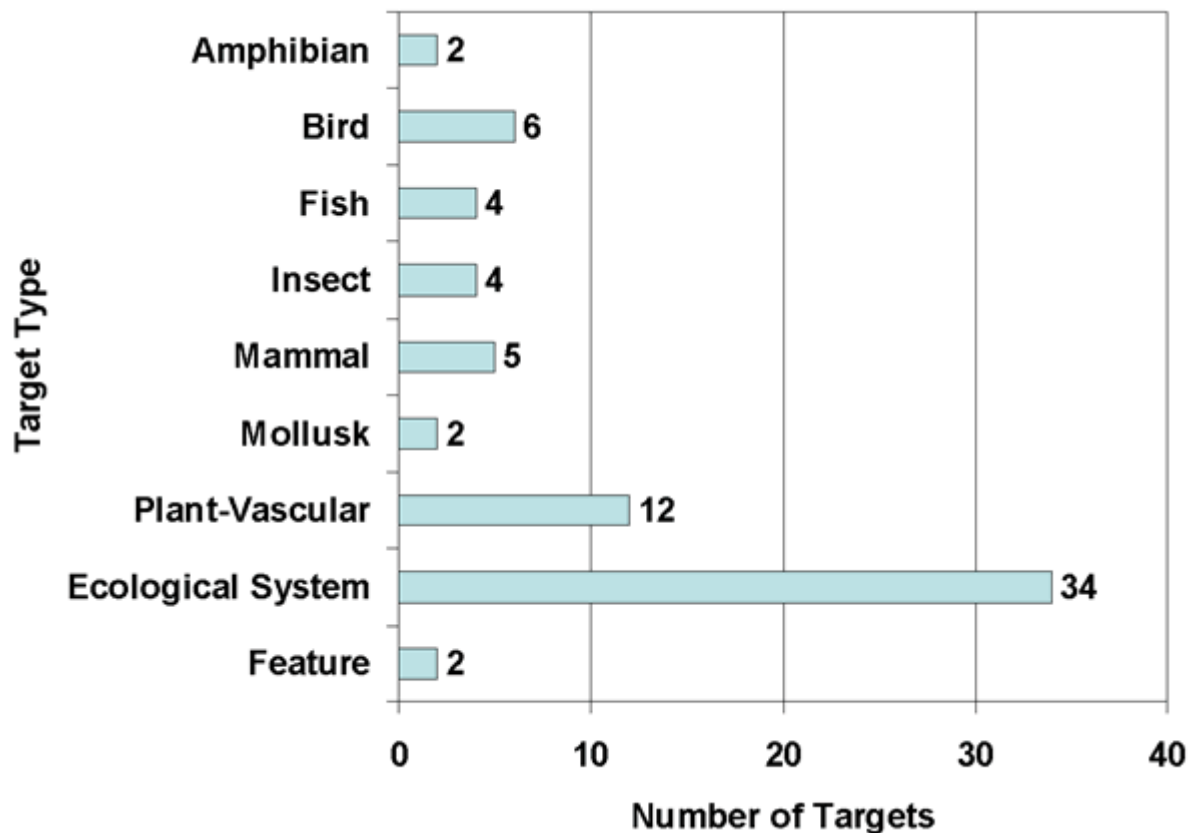


Figure 13-7. Number of conservation targets, by type, that occur on 4 conservation areas that overlap the Santa Fe National Forest in New Mexico.

Table 13-12. Overlap between conservation areas and areas wilderness areas, and non-wilderness inventoried roadless areas on the Santa Fe National Forest in New Mexico.

Designation	Acres within Conservation Areas	% of Conservation Areas	% of Designated Areas
Wilderness Areas	243,700	24.8	84.9
Roadless Areas	258,600	26.3	61.6
No Designation	481,800	49.0	48.8

Discussion

Systems Diversity

According to Southwest Regional Gap Analysis Project (USGS National Gap Analysis Program 2004), ponderosa pine forest, mixed conifer and pinyon-juniper woodland cover approximately three quarters of the Santa Fe National Forest. These systems are ecologically important and provide critical habitat to a variety of plant and animal species. These systems, however, especially ponderosa pine forest and pinyon-juniper woodland, face several threats. For example, many recent studies have shown that altered fire regimes in southwestern United States forests have led to the threat of widespread catastrophic fires, especially in ponderosa pine forests (Allen and others 2002, Fule and others 2004, Savage and Mast 2005, Zausen and others 2005). These catastrophic fires often produce higher intensity burns, in which organism and ecological processes have not evolved, and result in the destruction of such organisms and vital ecological processes (Covington 2001). With much research and attention focused on avoiding such fires by restoring and maintaining the health of ponderosa pine forests in the Southwest, the Santa Fe National Forest has the opportunity to utilize the most recent scientific information and robust methodologies to ensure the health of this system and the species it supports.

Furthermore, the health of pinyon-juniper woodlands are currently threatened across Region 3 lands, primarily due to the combined interactions of drought, bark beetle invasions, and altered fire regimes. One major result of this has been a drastic die-off of pinyon pine, which many wildlife species depend upon, such as the pinyon jay (*Gymnorhinus cyanocephalus*). Approximately 17.3% of the Santa Fe National Forest consists of pinyon-juniper woodlands. This considerable area of pinyon-juniper woodland under the jurisdiction of the Santa Fe allows for this Forest to play an important role in maintaining the health of this system and sustaining the populations of species that depend upon this system for their survival.

The Santa Fe National Forest also manages large percentages of certain systems relative to other Region 3 Forests and other landowners throughout the Southwest. For example, 14.4% and 9.2% of sub-alpine grasslands on Region 3 lands and throughout the Southwest, respectively, can be found on the Santa Fe. In addition, 13.7% and 8.8% of aspen forest and woodlands in Region 3 and throughout the Southwest, respectively, is located on the Santa Fe National Forest. Both systems are of ecological importance and fairly rare throughout the Southwest (approximately half a million acres of each system occur throughout) and/or are becoming more rare. For example, studies have shown that the total acreage of aspen forest and woodlands in the Southwest are drastically declining, due to altered fire regimes and an increase in herbivory as a result of growing populations of elk (Bailey and Whitham 2002, Cocks 2005, Fule and others 2004). Because of the relatively large proportions of each system found on the Santa Fe, the Forest has the opportunity of maintaining the health of sub-alpine forests and aspen forest and woodlands for the Region and the entire Southwest.

Species Richness and Conservation Status

According to the R3 species database, at least 407 terrestrial and aquatic vertebrate species, and plants and invertebrates of conservation concern occur on the Santa Fe National Forest. The Santa Fe is responsible for managing several of the species of conservation concern on Region 3 Forests. For example, the Santa Fe manages five federally endangered, threatened, candidate or proposed species. Furthermore, the Santa Fe manages 15 species listed by the state as threatened or endangered; 26 species with NatureServe global rankings that warrant conservation concern; 26 species with NatureServe national rankings that warrant conservation concern; and 86 species with NatureServe state rankings that warrant conservation concern. Finally, the R3 Species Database identifies 22 potential species-of-concern; 76 potential species-of-interest; 23 bird species on the Partners in Flight Watch List; and 17 Birds of Conservation Concern. Approximately one-quarter (25.3%) of all species on the Santa Fe National Forest were identified as falling within categories defined by the USFS planning directives.

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 Santa Fe National Forest. The assessments in this report provide important information on the systems and locations on the Santa Fe that are important for maintaining system and species diversity. For instance, the analysis of PNVTs highlighted the important vegetation systems that occur on the Santa Fe, which include ponderosa pine, mixed conifer forest, and pinyon-juniper woodland. 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 Santa Fe National Forest has significant areas of overlap with ecoregional conservation areas. All of the ranger districts on the Santa Fe are overlapped by several conservation areas. These conservation areas include 71 conservation targets, including 35 individual species. The specific locations where conservation areas overlap the Santa Fe National Forest 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 Santa Fe 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 Santa Fe National Forest.

Relevance to Forest Planning

This analysis of existing regional assessment information identifies important biological and ecological characteristics of the Santa Fe 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 Santa Fe, 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 Santa Fe, and identifies systems (and their associated species diversity) for which the Santa Fe has disproportionate responsibility within the context of Region

3, such as mixed conifer forest, spruce-fir forest, sub-alpine grassland, and aspen forest and woodland.

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 Santa Fe demonstrates the variety of current management emphases and activities that occur within conservation areas. While relatively large proportions of conservation area overlap occurs with designated wilderness areas and inventoried roadless areas, the largest proportion of conservation area overlap (48.9%) is on other areas of the Forest. It is apparent that achieving biodiversity sustainability on the Santa Fe 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 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. 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, Southern Sangre De Cristo Mountains conservation area encompasses 385,700 acres, of which 296,200 (76.8%) overlaps the Espanol, Las Vegas, and Pecos Ranger Districts of the Santa Fe National Forest. Twenty-five conservation targets, including 13 individual species and 12 ecological systems (see Appendix 13-C), are associated with the Southern Sangre De Cristo Mountains conservation area. These targets associated with the conservation area 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.

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