Santa Fe National Forest Management Indicator Species Assessment

May 2006 Update

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FOREST PLAN MANAGEMENT INDICATOR SPECIES SUMMARY

The Land and Resource Management Plan for the Santa Fe National Forest, adopted in 1987, identified 8 Management Indicator Species (MIS). These species are Rocky Mountain bighorn sheep, Rocky Mountain elk, Mexican spotted owl, Merriam's turkey, hairy woodpecker, Rio Grande cutthroat trout, pinyon jay and the mourning dove.

The reason each species was selected as a MIS species is described in the Environmental Impact Statement, Santa Fe National Forest Plan, 1987. The objective was to select species that would indicate possible effects of changing plant communities and associated seral habitats on each species. These species were selected for their association with plant communities or seral stages, which management activities are expected to affect. Other factors considered in the selection of these species were monitoring feasibility, migratory habits and habitat versatility (LMP EIS page 96).

The Forest Plan EIS identified the habitat types and the projected influences of management actions for each species. Information pertinent to the management indicator species is summarized as follows:

Rocky Mountain Bighorn Sheep (*Ovis canadensis canadensis*)

Bighorn sheep serve as a management indicator for alpine meadow habitat. Changes in bighorn sheep habitat capability result from changes in the health of alpine meadow areas and from encroaching canopy closure. Little or no effects were expected on Bighorn sheep due to plan implementation.

Rocky Mountain Elk (*Cervis elaphus nelsoni*)

Elk serve as a management indicator for mid elevation (generally less than 9000'[1]) grasslands, meadows, and forested areas. Elk habitat capability was modeled based on forage availability during winter months. Harvest in mid elevation areas, and improving range conditions was expected to increase habitat capability for elk. The loss of grasslands to a forested ecosystem through succession was modeled to be a negative effect on elk habitat. Road densities are also a factor affecting the quality of habitat.

Merriam's Turkey (*Meleagris gallopavo*)

Merriam's turkey serve as a management indicator of healthy, mature ponderosa pine habitat. Merriam's turkey habitat capability was modeled based on winter habitat. Feeding habitat was the primary limiting factor. Timber harvest, particularly in the ponderosa pine zone, was the primary factor modeled to affect turkey habitat. Activities that opened the forest canopy, allowing grass, forbs and mast-producing vegetation to grow, improve turkey habitat. Road densities are also a factor affecting the quality of habitat.

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[1] In normal years, winter range habitat for elk would generally be below 9000' elevation due to snow.

Mourning Dove (*Zenaida macroura*)

Mourning dove serve as a management indicator of healthy, mid and low elevation grasslands, woodlands and ponderosa pine habitats. Mourning dove habitat capability is influenced by improved ecological condition in low elevation grasslands, harvested/thinned woodland, and ponderosa pine areas. Activities that improve the amount of feed available have a positive influence on mourning doves.

Hairy Woodpecker *(Picoides villosus)*

Hairy woodpeckers serve as a management indicator for mature forest and woodland habitats (i.e. PP, MC, SF, Aspen, Oak woodland). They are also found in mature pinyon – juniper, but typically pinyon trees are not large enough to provide suitable snags for nesting. Hairy woodpecker habitat quality was expected to increase over time as young stands of forest mature. Activities that reduce the older tree component reduce habitat capability. Activities or events that create snag habitat would benefit hairy woodpeckers.

Pinyon Jay *(Gymnorhinus cyanocephalus)*

Pinyon jays serve as a management indicator of healthy pinyon – juniper habitat. Habitat capability for the pinyon jay was expected to benefit from increasing foraging areas. Activities that favor a variety of mast-producing plants, found in early forest seral stage, increase habitat capability. The Forest Plan projected minimal changes in pinyon jay habitat over time.

Mexican Spotted Owl *(Strix occidentalis lucida)*

Mexican spotted owls serve as a management indicator for late seral stage mixed conifer habitat. Changes in Mexican spotted owl habitat capability result primarily from changing the seral stage of mixed conifer habitat. The Forest Plan projected most changes in habitat capability would be caused by the harvest of trees. Harvested acres were expected to decrease in habitat capability. Unharvested areas were expected to improve over time. Since the Forest Plan was written, major changes have occurred in both the amount and type of timber harvest that occurs on the Forest. The primary factor influencing Mexican spotted owl habitat has been and continues to be wildfire.

Rio Grande Cutthroat Trout (*Oncorhynchus clarki virginalis*)

Rio Grande cutthroat trout serve as a management indicator of healthy riparian and stream habitat and good water quality. The primary factors expected to influence cutthroat trout habitat were grazing, roads, other resource activities, and investments in habitat improvements.

Vegetation and Effects on Vegetation

The Santa Fe LRMP EIS (page 82, Table 35) displays the major vegetative communities on the Forest as follows:

Table FV 1

Major Vegetative Communities of the Forest (Forest Plan EIS)		
Vegetative Community	**Acres**	**Percent**
Alpine Meadow	5,206	0.3%
Spruce / Fir	221,439	14%
Douglas Fir	313,482	20%
Aspen	70,414	4%
Mountain Grassland	31,424	2%
Coniferous Riparian	21,749	1%
Ponderosa Pine	339,187	22%
Gambel Oak	22,681	1%
Deciduous Riparian	5,165	0.3%
Pinyon-Juniper	468,486	30%
Sage	29,655	2%
Grama grassland	38,292	2%
Total	1,567,180	100%

Previous Forest MIS Assessments used vegetative data from the RMRIS database to generate a vegetation database and map for the Forest. These vegetation types did not correspond well to the vegetative communities identified in the Forest Plan EIS. In addition, there were numerous errors and gaps in the data. An effort is currently in progress to update the Forest Vegetation GIS layer. For this 2006 MIS Assessment Update, data from the Terrestrial Ecosystem Survey of the Santa Fe National Forest was used to generate a vegetative community layer that roughly corresponds to the Forest Plan EIS. There are significant differences in some vegetative communities that are largely due to differences in mapping criteria and delineation but are also due, to some degree, to actual changes in vegetative communities. TES units were grouped based on the vegetative taxa to roughly correspond to the Forest Plan EIS. The resulting table based on TES data follows:

Table FV 2

Major Vegetative Communities of the Forest per TES w/o pvtland		
Vegetative Community	**Acres**	**Percent**
Alpine Meadow	5,006	0.3%
Spruce - Fir	235,271	15%
Douglas Fir - White Fir	434,657	28%
Aspen	5,728	0.4%
Mountain Grassland and Meadow	35,305	2%
Coniferous Riparian	1,323	0.1%
Ponderosa Pine	362,227	23%
Gambel Oak Woodland	14,547	1%
Deciduous Riparian	9,254	1%
Pinyon-Juniper	382,031	25%
Sage	31,247	2%
Grama grassland	37,072	2%
Bristlecone	2,157	0.1%
Total	1,555,825	100%

The greatest discrepancy between the two tables is with the aspen community. There are numerous pockets of aspen within the Douglas Fir/White Fir and Spruce/Fir communities. Through natural succession, many of these aspen stands are converting to conifer communities. TES classifies these areas based on climax vegetation, and therefore much of the aspen is classified as conifer. Large fire events have helped maintain aspen in several areas. The on-going vegetation mapping effort will identify these changes. Aspen communities created by high intensity wildfires could potentially total over 30,000 acres.

Changes in vegetative communities occur naturally and as a result of forest management activities. Activities or events that typically have the greatest impact on these communities include fire (wildfire and prescribed fire), insects and disease, road densities, timber treatments (timber harvest, thinning, etc,) and grazing. Depending on the MIS and their habitat requirements, these events or activities may have a positive, neutral, or negative effect on the quantity and quality of habitat, which translates into effects on MIS populations on the Forest.

The following table shows acres of vegetative communities affected by various events and activities. The nature of these effects on MIS species and habitat will be discussed in the individual species sections. Activities and treatments were taken from the FACTS database. Only those activities and treatments that actually changed vegetation since 1987 were used. This may not be a complete list and in many cases, treatments are overlapping the same acres. Consequently, actual acres affected will be somewhat less than indicated in this table. A list of all the activity and treatment types is in Appendix A.

Table FV 3

Vegetative Community	Wildfire Acres burned since 1988	Insect and disease since 1998	Mechanical Treatments and activities since 1987	RX burns
Alpine Meadow	-	-		
Spruce-fir	22,754 [1]	130,978	4126	445
Douglas fir - White fir	45,367 [1]	122,755	48126	16414
Aspen	-	2,899 [2]		
Mountain meadow and grassland	2,033	-	1171	217
Coniferous riparian	4	838	66	2
Ponderosa Pine	36,101	34,672	42659	26111
Oak woodland	488	4,351	903	1793
Deciduous riparian	822	1,793	268	271
Pinyon - Juniper	5,964	65,689	7945	12176
Sage	388	-	2247	1938
Grama grassland	34	-	94	2457
Bristlecone Pine	542	894	11	42
Grand Total	114,497	364,869	107616	61866

1/ High intensity fires within these vegetative communities that contain aspen have been converted to aspen stands. Potentially **30,000** acres or more have been converted to aspen. The on-going mapping effort will identify these areas.

2/ Approximately 26,000 acres of Western tent caterpillar infestation were identified. Most of this is attributed to either Douglas Fir / White Fir or Spruce / Fir communities that have scattered stands of aspen.

Insects/Disease

Since 1987, we have experienced substantial western pine beetle and Ips beetle infestations. The data as shown in Table FV 3 is from 1998 through 2005. Significant acreage has been affected, and in some areas there has been significant mortality. This is especially true with pinyon pine, which has been most affected since 2002 due to drought conditions.

Wildland Fire

Since 1987, wildland fires have been the primary influence on forest succession on the Santa Fe National Forest. Approximately 114,500 acres have burned. The largest, most intense fires have occurred since 1993. In the larger fires, such as the Dome, Cerro Grande and Viveash, significant areas burned with stand-replacing crown fires. Overly dense forest conditions, high accumulations of fuels and current drought conditions have resulted in a high likelihood of more large, intense fires. Table FV-3 provides an estimate of acres burned by vegetation type. Figure FV-1 shows the acres of all wildfires by year since 1988.

Figure FV-1
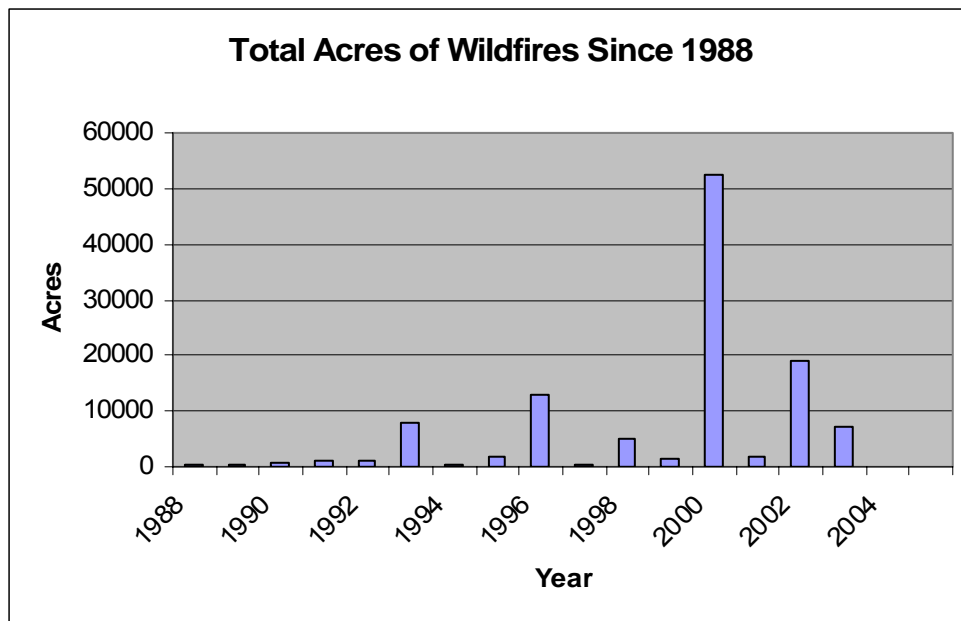
Grazing

Since 1987, there have been significant improvements in grazing practices on the Santa Fe National Forest. Improving the distribution of cattle and controlling the amount of forage use in both riparian and upland areas has been a major emphasis. In 1996, the Forest Plan was amended with a focus on achieving proper forage use. Currently, the Forest has 73 active allotments. Since 1996, the Forest has completed environmental analysis (NEPA) on 40 allotments, with the remaining 33 allotments scheduled for completion by the end of 2008. These analyses identified problem areas and issues and

provided for corrective actions or improvements in livestock distribution and use. Annual Operating Instructions (AOIs) guide the use of those allotments where analysis is not done. Grazing use standards have been established for all grazing allotments on the Forest. For 2005, 77% of the allotments were reported as being administered to standard.

Timber Management

Since 1987, significant changes have occurred in the timber management program. When the Forest Plan was first implemented, timber management focused on the harvest of larger trees, along with thinning to promote timber production. Beginning in about 1993, the focus of the program changed. Timber production leading to harvest was no longer the focus in timber management. Instead, the focus was more on thinning and improving forest health. Timber management activities range from pre-commercial thinning to overstory removal. Each type of activity tends to move an area to an earlier successional stage or a later successional stage (See Appendix A for a listing of activities). Activities that removed most or all of the overstory resulted in stands being modified to an early seral condition. Activities that removed the smaller trees tended to move a stand towards a later seral condition. In either case, the result was opening up the forest canopy to allow more understory vegetation to grow.

Current emphasis on the Santa Fe National Forest and throughout the Southwest Region is on restoration of healthy forest ecosystems with a reduction of accumulated fuels in order to avert catastrophic wildfires. This emphasis is particularly keen in the wildland urban interface (WUI). Timber management activities are geared toward these ends.

Table FV-4 summarizes the effects of forest management activities by vegetation type.

Table FV-4

Vegetative Community	Acres of Forest Activities Tending to Early Sere	Acres of Forest Activities Tending to Later Sere
Alpine Meadow		
Spruce-fir	3,625	501
Douglas fir - White fir	16,188	31,937
Aspen		
Mountain meadow and grassland	[1/] 1,172	
Coniferous riparian	7	53
Ponderosa Pine	9,497	32,695
Gambel Oak woodland	621	282
Deciduous riparian	30	238
Pinyon - Juniper	2473	5472
Sage	[2/] 1,497	[2/] 750
Grama grassland	[1/] 94	
Bristlecone Pine	11	
Grand Total	35,215	71,928

1/ Treatments in grasslands help maintain those grasslands.
2/ These are mostly areas mixed in with Ponderosa Pine stands. There are treatments within sage that are intended for type-conversion to grassland.

The effects of forest management activities will be assessed in the individual species sections.

Roads

For two of our MIS species, elk and turkey, the Forest Plan identified road densities as a factor in determining the quality of habitat. The concern is not one of habitat fragmentation, but rather the disturbance factor relating to the use of roads. The Forest Plan identifies goals and objectives for road management. Table FV-5 is taken from the Forest Plan (page13):

Table FV-5

Road Summary for First Ten Years (1987)	
	Total Miles
Current Inventory	3400
Existing Un-inventoried	+ 1000
New Construction	+ 95
Obliteration	- 660
	3835
Road Management Closures	- 2035
Roads Open to Use	1800

Table FV-6 shows the current status of the road system on the Forest by vegetation type:

Table FV-6

Road System Status – Santa Fe National Forest 2005			
Vegetative Community	Total Miles of Roads	Miles of Closed Roads	Miles of Decommissioned Roads
Alpine Meadow			
Spruce-fir	256	50	9
Douglas fir - White fir	1806	368	41
Aspen	2	0	0
Mountain meadow and grassland	138	7	1
Coniferous riparian	219	1	0
Ponderosa Pine	1559	361	85
Gambel Oak woodland	39	2	0
Deciduous riparian	104	13	1
Pinyon - Juniper	970	254	27
Sage	367	13	1
Grama grassland	538	12	0
Bristlecone Pine	27	0	
Total	6047	1080	166

Obviously, there are a lot more roads than were originally identified in the Forest Plan. This difference is mostly due to an intensive inventory that counted roads that had not been included in the system. Many of these roads were "user created" over the years. Some were "project created" and were never added to the system. The Forest is behind in its effort to reduce road densities through decommissioning (similar to obliteration) or road closures.

FOREST-WIDE MIS POPULATION AND TREND ASSESSMENT

Populations of wildlife are extremely difficult to quantify and in some cases can vary substantially from year to year. Environmental factors can dramatically influence recruitment of young and survival of adults. A precise figure on the number of animals is very difficult if not impossible to attain and would only be valid for a short time period. In order to estimate populations for MIS species, we evaluated a number of sources for each species and then ranked the population into descriptive categories. Populations of MIS species would be expected to fluctuate within a category from year to year. However, we would not expect a species to switch from category to category without some long-term change in environmental conditions. For instance, a change in ranking from uncommon to rare would be a cause for concern and would warrant intensive evaluation of a species. A ranking system is based on the predicted number of breeding pairs or adult females, depending on which is most appropriate for the species addressed.

The ranking system for the Forest-wide evaluation is as follows:

CATEGORY	BREEDING PAIR/ADULT FEMALE
Not Present	0
Extremely Rare	1-10
Rare	10-100
Uncommon	100-1,000
Common	1,000-10,000
Abundant	10,000-100,000
Very Abundant	>100,000

Population trend is most appropriately addressed at scales above the project. Many of these selected MIS species occur and range far beyond a local scale, such as a project analysis area. Individuals, family groups, or herds such as elk, annually use areas much larger than a typical analysis area and population trend must be examined on a much larger scale to be meaningful. For National Forest Management Act implementation, this is at the scale of the Santa Fe National Forest. At a site-specific project level, there is a great deal of fluctuation in wide ranging populations. For most species, it would be technically and practically inappropriate to conduct population trend sampling at the scale of individual projects. For this reason, it is not appropriate to determine population trend at the local level.

SPECIES ASSESSMENTS

GAME SPECIES

Wildlife management, as practiced by Federal land management agencies, has always focused on managing and improving habitat. The States govern the harvest of fish and game (*Geer v. Connecticut,* 161 U.S. 519 (1896) 39, 40, 42, 45). The exceptions are species covered under the Migratory Bird Treaty Act and/or the Endangered Species Act.

The Santa Fe National Forest relies on survey data collected by the New Mexico Department of Game & Fish (NMDGF) for population numbers and trend analysis of all game species {CFR 219.19(6)}. The NMDGF uses this data to set harvest regulations and population goals for the species under their jurisdiction. MIS game species on the Santa Fe National Forest include Rocky Mountain bighorn

sheep, Rocky Mountain elk, Merriam's turkey, and mourning dove. However, mourning dove will be discussed under MIS Birds.

ROCKY MOUNTAIN BIGHORN SHEEP (*Ovis canadensis canadensis*)

<u>**Habitat and Habitat Trend**</u>

Bighorn sheep serve as a management indicator for alpine meadow habitat. On the Santa Fe NF, Rocky Mountain bighorn sheep inhabit the highest alpine areas of the Sangre de Cristo Mountains within the Pecos Wilderness. This includes the cliffs, crags or other extremely rocky areas around the mountain peaks and open alpine meadow areas down to the edge areas of the spruce / fir type. The total range within the Pecos Wilderness encompasses approximately **17,500** acres, but they are generally found in the alpine areas between Pecos Baldy and Jicarita Peak. Within this area, approximately **5,006** acres are alpine meadow habitat. Bighorn prefer precipitous terrain adjacent to suitable feeding sites of high mountain meadows with grasses, forbs and browse species. The Santa Fe Forest Plan estimated habitat capability for bighorn sheep habitat based on the health of alpine and meadow areas and effects of encroaching canopy closure. Habitat conditions in the Pecos Wilderness Area are generally fair to good, but the limiting factor is severe winter conditions where quality and quantity of forage can fluctuate significantly. Cattle grazing can and does occur, but typically cattle use is minimal in the alpine areas and non-existent on the steeper terrain.

Since the entire bighorn habitat is within Wilderness, there have been and will be no projects or treatments affecting alpine meadow habitat. **The habitat trend for bighorn sheep on the Santa Fe Forest is considered stable** based on the small amount of change that has occurred in the alpine habitat since implementation of the Forest Plan.

<u>**Species Status and Population Trend**</u>

Bighorn sheep were reintroduced to the Pecos Wilderness in the 1960's. The estimated carrying capacity, based on winter range, has been 175 to 330 animals. The current estimate is approximately 300 adults (personal communication, Elise Goldstein, NMDGF. April 20, 2006) **The bighorn sheep population is ranked as uncommon for the Santa Fe NF**. This means that the estimated number of breeding females ranges between 100 and 1,000 individuals. Since 1982, the population has fluctuated between 300 and 400. This population is intensively managed by the NMDGF and continues to grow. The NMDGF regularly conducts captures and transplants to maintain this population at or below carrying capacity and to supplement other populations within New Mexico and Arizona. Twenty-nine bighorn sheep were captured and removed from this population in August 2005. The only potentially serious threat to the population is disease. (DRAFT Long Range Plan for the Management of Rocky Mountain Bighorn Sheep in New Mexico 2004-2014) With this on-going effort, **the bighorn sheep population on the Santa Fe NF is considered stable.**

<u>**Monitoring recommendations**</u>

Continue surveys by NMDGF.

ROCKY MOUNTAIN ELK (*Cervis elaphus nelsoni*)

Habitat and Habitat Trend

Rocky Mountain elk are primarily grazers and inhabit most forest types with good forage and cover. However, they were selected to represent mid elevation (generally less than 9000'[2]) grasslands, meadows, and forested areas. The Forest plan modeling predicted that elk were limited primarily by low winter forage availability with road densities having a negative effect on elk habitat. Activities or events that open closed canopy forests, maintain or create grassland or shrub land, or reduce road densities generally improve elk habitat. Hiding and thermal cover are not limiting factors on the Santa Fe NF.

The following table shows vegetative communities that elk represent on the Santa Fe NF.

Table E-1

Vegetative Communities Represented by Elk	
Vegetative Community	**Acres**
Douglas Fir - White Fir [1]	434,657
Aspen	5,728
Mountain Grassland and Meadow [1]	35,305
Coniferous Riparian [1]	1,323
Ponderosa Pine [2]	362,227
Gambel Oak Woodland	14,547
Deciduous Riparian	9,254
Pinyon-Juniper [2]	382,031
Sage	31,247
Grama grassland [2]	37,072
Total	1,313,391

1/ A substantial amount of these communities is at elevations exceeding 9000' and would not be assessed as habitat represented by elk.
2/ The vegetative communities within the Caja del Rio, Glorieta Mesa, and the Anton Chico Grant areas are not managed for elk habitat.

Recent habitat improvement projects such as water developments, prescribed burns, timber harvest, and the thinning of pinyon-juniper woodlands have greatly contributed to the expansion of existing herds into previously unoccupied habitats.

Table E-2 shows activities or events affecting elk habitat.

Table E-2

Treatments / Events within all Vegetative Communities Represented by Elk	Acres or Miles	Effect
Mechanical (tend to early sere)	31,579	Positive
Mechanical (tend to later sere)	71,427	Slight positive
Rx burns	61,379	Positive
Wildfires (since 1988)	91,201	Positive
Insects and Disease	232,996	Slight Positive
Total open roads (miles)	5,741	Negative
Closed or decommissioned roads (miles)	1,187	Positive

Most individual projects have been relatively small (<100 acres). In most cases, treatments would open forest canopy, which would allow increased herbaceous production. Consequently, almost all

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[2] In "normal" years, elevations greater than 9000' are generally snow covered and not used by elk.

treatments within elk habitat could be regarded as beneficial to elk. Wildfires would have a similar effect. Acres that were unaffected by disturbance are gradually declining in quality as encroachment of forest habitat on meadows and other open areas occurs over time.

In general, there is more than enough habitat to support the current population of elk on the Forest. However, there are conflicts with grazing permittees due to the allocation of forage between livestock and elk. Many grazing permittees on the Forest believe the number of elk is increasing on their allotments, therefore causing higher utilization levels on their allotments. This issue continues to be addressed on numerous allotments. Habitat conditions (forage conditions) are negatively affected when forage use exceeds allowable levels. Part of the problem is the increased elk population since they were reintroduced to the Santa Fe. This is exacerbated by the fact that canopy closure is rapidly occurring across much of the Forest, reducing understory forage production. Even so, significant improvement has been made in grazing practices since 1987. Forage utilization standards (by all ungulates) are applied on all grazing allotments.

In the long term, good habitat for elk is dependent on projects specifically designed to provide understory forage recovery, away from streams and riparian vegetation, and to improve small parks and openings through meadow maintenance and thinning near these sites.

Overall, elk habitat is rated as stable. Forest treatments and events are somewhat offsetting forest encroachment. Emphasis in healthy forest restoration should result in an upward trend.

Species Status and Population Trend

Elk were extirpated from New Mexico by 1909. In 1911, efforts to restore elk to New Mexico began with transplants near Raton and Las Vegas (Bison-M 2004). Since that time, elk have been steadily increasing in many areas of the state. This is true for the Santa Fe NF. There is no concern with population viability of elk on the Forest. Elk numbers have steadily increased over the past two decades. They have increased to the point that the NMDGF has made a concerted effort to control the population in certain areas with special hunts.

The Rocky Mountain elk population ranks as common for the Santa Fe NF. This means that the estimated number of breeding females ranges between 1,000 and 10,000 individuals. The population may fluctuate up and down from year to year based on hunting pressure and a variety of environmental factors. This estimate is based on actual counts and surveys conducted periodically by the New Mexico Department of Game and Fish. The New Mexico Department of Game and Fish manages the elk herd by game management unit (GMU). The existing units that are present on the Forest are Units 5B, 6A, 6C, 43, 44 and 45. Unit 6B is the Valles Caldera National Preserve. Unit 43 includes Glorieta Mesa and the Anton Chico Grant. A small population of elk resides on Glorieta Mesa (probably less than 50 head.) Neither area in GMU 43 is managed for elk. Population numbers of elk are based on estimates derived from aerial surveys conducted by the NMDGF. Not all GMUs are surveyed each year.

Table E-3 shows the Game Management Units with estimated elk numbers per GMU that are located on the Santa Fe NF:

Table E-3

Game Management Unit (GMU)	1999	2000	2001	2002	2003	2004	2005
Estimated Elk Population by GMU							
43							
44							
45			1421	1395			2541
5B			668	1039	1167		
6 (A,B&C)	3958	4283		4434			
6A							933
6B							1182
6C							1325
Total	3958	4283	2089	**6868**	1167		**5981**

Data for this table was provided by Steve Kohlmann, PhD, Elk Program Manager, NMDGF, July 27, 2005. Adding in the 2003 value for GMU 5B for year 2005, total elk within GMUs 45, 5B, and 6A-C would be approximately 7,148. Therefore, the total number of elk for the Santa Fe NF is currently estimated to range from 6,000 to 8,000 elk.

The population trend for the Rocky Mountain elk is ranked as increasing on the Forest. The objective, however, is to maintain the herd at about its current level. In recent years, the NMDGF has increased the number of elk licenses, including late season cow permits, in an attempt to arrest the rapid increase in the elk population. This has helped hold the population at current levels and helped prevent depredation of hay fields on private lands along with addressing the elk / livestock issue. Figure E-1 displays this trend in license issuance and elk harvest.

Figure E-1
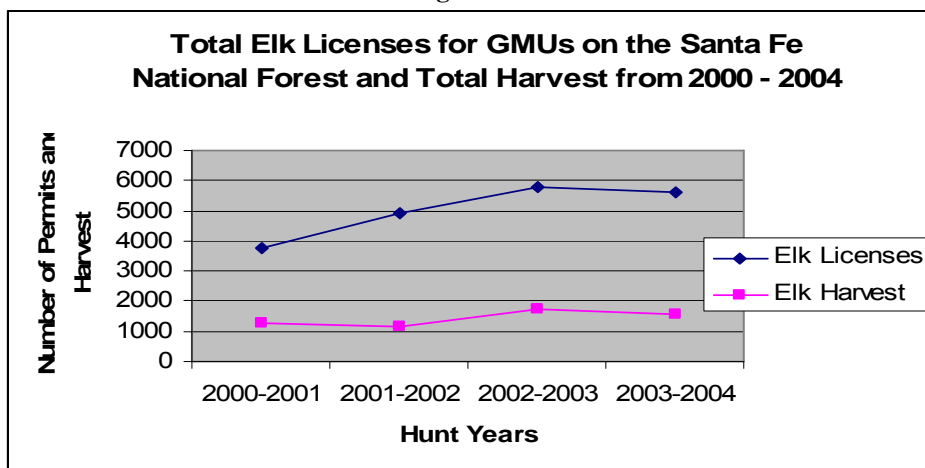
 Data for this chart was provided by Steve Kohlmann, PhD, Elk Program Manager, NMDGF, July 27, 2005.

Monitoring recommendations

Continue to support the current elk studies in conjunction with Los Alamos National Laboratory and Bandelier National Monument. These studies are underway to better quantify the elk populations,

movements and distribution on the Forest. Continue to cooperate with the NMDGF to evaluate population and habitat data to improve elk management.

MERRIAM'S TURKEY (*Meleagris gallopavo*)

Habitat and Habitat Trend

Merriam's turkey uses a wide range of vegetative communities, but they were selected to **serve as a management indicator of healthy, mature ponderosa pine habitat.** Merriam's turkey utilizes ponderosa pine, a source of mast and its favorite roosting tree. Ponderosa pine is an essential component of its permanent habitat, while surface water is a range requirement. Turkeys prefer to roost in tall mature or over-mature ponderosa pines with relatively open crowns and large horizontal branches starting at 20 to 30 feet from the ground. Trees with a diameter at breast height (DBH) of over 14 inches are often used as roosts. These trees generally have excellent protection from the wind and are usually located in sites with an open ridge or rocky ledge nearby to provide ease in entering and exiting the roost site. Hens normally nest within ½ mile radius of water. A good, healthy understory provides cover and forage. Turkeys forage in grasslands, brush communities, deciduous tree-brush and in ponderosa pine. They eat grasses and grasshoppers in the summer. They eat acorns and mature ponderosa pine seeds in the fall. Tall grasses are eaten in the winter when the heavy snows come. Pinyon nut crops are the turkey's "corn" of the southwestern forest (BISON-M 2004).

Suitable, mature ponderosa pine habitat is abundant on the Santa Fe National Forest, however, much of this forest type has become crowed and overstocked with relatively young trees. Open areas are gradually filling in with trees. This situation is causing a decline in the quality of turkey habitat. Events or activities that maintain nesting and roosting areas within ponderosa pine, allow for herbaceous production in the understory, or improve herbaceous production in adjacent vegetation types improve turkey habitat. Closing or decommissioning roads within the ponderosa pine also improves the quality of the habitat. The Santa National Forest has done many habitat improvement projects with turkey in mind, including thinning, water developments, under burning in ponderosa pine, and creating slash piles for nesting habitat. For most projects within ponderosa pine, effects on turkey and turkey habitat would have been considered. Most individual projects have been relatively small (<100 acres). In most cases, treatments would open forest canopy, which would allow increased herbaceous production. Consequently, almost all treatments within the ponderosa pine could be regarded as beneficial or neutral to turkey. Smaller wildfires would have a similar effect. The larger fires, with large areas of severe burn, have had a net negative effect on turkey habitat. Acres that were unaffected by disturbance are gradually declining in quality as encroachment of forest habitat on meadows and other open areas occurs over time. Activities or treatments that move this forest type to within the natural range of variability will improve turkey habitat and will allow turkey populations to continue to thrive. Table T-1illustrates the affects of management treatments, wildfires, insects and disease, and road management on turkey habitat in ponderosa pine:

Table T-1

			Positive Effect	Negative Effect
Treatments / Events Acres or Miles	**Total Acres of Ponderosa Pine**	**362,227**		
	Mechanical (tend to early sere) (acres)	9,497	X	
	Mechanical (tend to later sere) (acres)	32,695	X	
	Rx burns (acres)	26,579	X	
	Wildfires (since 1988) (acres)	10,262	X	
	Large Wildfires (w/ high severity)[1] (acres)	25,839		X
	Insects and Disease (acres)	34,672	X	
	Total roads (miles)	1,559		X
	Closed or decommissioned roads (miles)	446	X	

1/ Not all of these acres were burned severely.

Livestock grazing also affects turkey habitat and occurs in varying degrees throughout turkey habitat on the Santa Fe National Forest. Significant improvement has been made in grazing practices since 1987. Forage utilization standards are applied on all grazing allotments. In general, grazing use of herbaceous production would have a negative effect on turkey foraging habitat. Application and adherence to forage-use standards minimizes this effect. There are undoubtedly localized areas where the effects of grazing are more obvious. "Moderate grazing (restoration systems) can stimulate herbaceous growth and associated insect biomass, thereby improving brood habitat as well as year-round adult feeding areas" (NMDGF Long Range Plan for the Management of Wild Turkey in New Mexico 2001-2005). Overall, on the Santa Fe NF, grazing is having a slight negative effect, but not enough to significantly affect turkey habitat.

On balance, **the estimated habitat trend for turkey is relatively stable** based on disturbed acres providing additional feeding habitat and undisturbed areas declining in quality due to forest encroachment issues. Emphasis in healthy forest restoration should result in an upward trend.

Species Status and Population Trend

The Merriam's turkey has the widest distribution and is the most common subspecies of turkey. Most mountain ranges in New Mexico support healthy, self-sustaining Merriam's turkey populations. They are widespread and are known to reside on all the Ranger Districts on the Santa Fe National Forest. **They are ranked as common on the Forest,** which means that the estimated number of breeding female birds ranges between 1,000 and 10,000 individuals. This estimate is based on the amount of habitat available, hunter success information, breeding bird surveys and the professional judgment of Forest biologists. The New Mexico Department of Game and Fish (NMDGF) estimates approximately 30,000 Merriam's turkey throughout the state. The population may fluctuate from year to year, based on a variety of environmental factors. These factors include predation, weather, disease, and hunting (legal and illegal). Providing quality habitat can reduce the effects of these factors.

The population trend for the Merriam's turkey on the Santa Fe NF is rated as stable to slightly increasing. Again, this estimate is based on the amount of habitat available, hunter success information, breeding bird surveys and the professional opinion of local biologists. Statewide, population numbers are expected to increase in the future (NMDGF Long Range Plan for the Management of Wild Turkey in New Mexico 2001-2005). NMDGF gathers information on hunter success. Figure T-1 shows the percent of hunter success on the Game Management Units (GMUs) on the Santa Fe National Forest.

Figure T-1
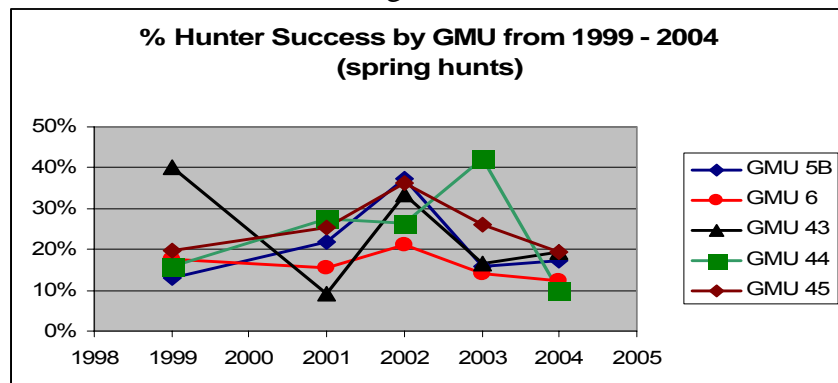
Fluctuations can occur for a variety of reasons, but overall, the trend in hunter success is relatively stable.

USGS Breeding Bird surveys conducted throughout the country support this trend assessment. This breeding bird survey (BBS) is maintained by the Patuxent Research Center (US Geological Survey) and is found on a website (http://www.mbr-pwrc.usgs.gov/bbs.html). Since 1966, the population trend of the Merriam's turkey in the western part of the United States has increased by over 33 percent.

Surveys conducted by the USGS between 1968 and 2005 indicate an increasing population of wild turkey within New Mexico (Figure T-2) (www.mbr-pwrc.usgs.gov). The wild turkey is listed as demonstrably secure in New Mexico.

Figure T-2
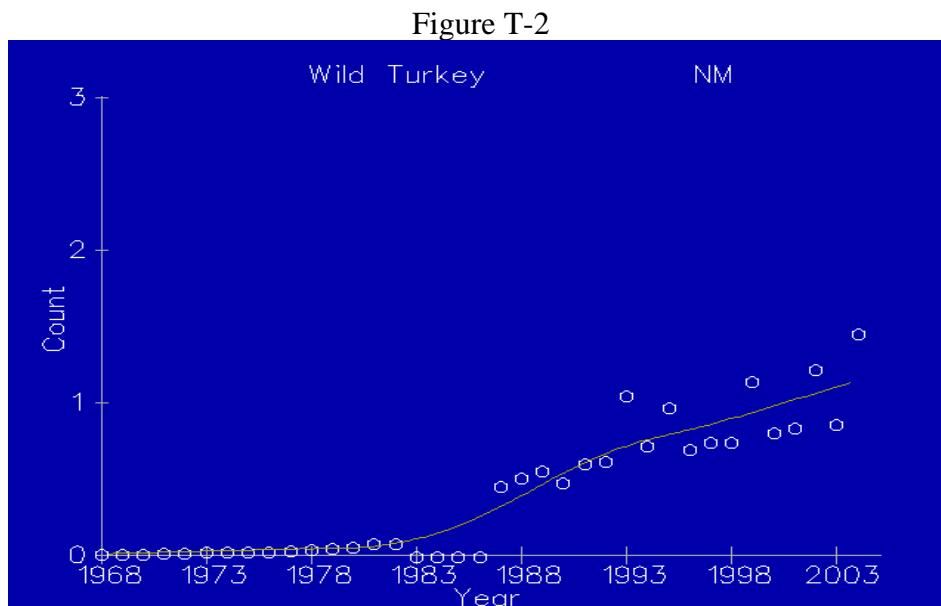
Monitoring recommendations

The Forest Service will continue to work closely with the NM Department of Game and Fish to develop or assist in studies of Merriam's turkey populations on the Santa Fe National Forest.

MIS BIRDS

MOURNING DOVE (*Zenaida macroura*)

Habitat and Habitat Trend

Mourning dove serve as a management indicator of healthy, mid and low elevation grasslands, woodlands and ponderosa pine habitats. They can be found in higher elevation communities but are typically regarded as casual above 7000'. They nest in a variety of habitats including shrub lands and forests. Fields used for feeding are often characterized by an abundance of small weed seeds and grain on relatively bare ground. Activities that improve the amount of feed available have a positive influence on mourning doves.

The mourning dove is found across North America in many types of habitat, including most forest types. It is wide spread except in the Arctic and closed forests. It is abundant and increasing near

farms and suburbs and frequents backyard feeders, suburbs, and towns. They are common to abundant in most counties in New Mexico. Mourning dove habitat is abundant on the Santa Fe NF. The Santa Fe Forest Plan predicted that mourning dove habitat would improve through improving the ecological condition of low elevation grassland and by harvesting/thinning in woodland and ponderosa pine areas. For the Santa Fe NF, low elevation grassland equates to grama grassland. Mourning dove can be found in higher elevation communities such as Douglas Fir / White Fir and Spruce / Fir, but they were not chosen to represent these communities. Table MD-1 shows the vegetative communities on the Santa Fe NF that mourning dove represent.

Table MD-1

Vegetative Communities Represented by Mourning Dove	
Vegetative Community	**Acres**
Ponderosa Pine	362,227
Gambel Oak Woodland	14,547
Deciduous Riparian	9,254
Pinyon-Juniper	382,031
Sage	31,247
Grama grassland	37,072
Total	836,378

For habitat to be favorable, abundant food and water must be available within 20-30 km. The habitats found on the Forest meet the feeding requirements for the mourning dove. Water developments and treatments that open closed canopies to allow for increased herbaceous growth improve habitat for mourning dove. Most nesting occurs in lower elevation habitats. The abundance of nesting and cover opportunities on the Santa Fe contribute to maintaining viable populations of mourning dove.

Table MD-2 shows activities or events affecting mourning dove habitat.

Table MD-2

Treatments / Events within all Vegetative Communities Represented by Mourning Dove	Acres	Effect
Mechanical (tend to early sere)	14,212	Positive
Mechanical (tend to later sere)	39,437	Positive
Rx burns	44,746	Positive
Wildfires (since 1988)	43,796	Positive
Insects and Disease	106,505	Slight Positive

In general, habitat affected by disturbance will have the canopy opened up, allowing for the growth of more understory vegetation and improving mourning dove habitat. Burned areas are particularly desirable since mourning doves generally will not scratch in litter for seeds and will avoid areas with dense vegetation when feeding (BISON-M 2004). Livestock grazing occurs throughout mourning dove habitat but is not regarded as a significant factor affecting mourning dove habitat.

> "For those which use grasslands of the North American Great Plains and Southwest for breeding and/or wintering, the Mourning dove's (Zenaida macroura) response to grazing is noted as 'unresponsive,'...'mixed or uncertain.' The same comments are used to describe the species response where they breed in grazed riparian habitats of the western United States. Mourning doves which breed in shrubsteppe habitats of the Intermountain

West are 'unresponsive' or 'show mixed responses' to grazing (Bock et al., 1992)" (BISON-M 2004)

"Manipulation of fields by mowing, light discing, grazing by livestock, and other agricultural practices can enhance dove feeding areas." (BISON-M 2004)

The habitat trend for the mourning dove is stable to increasing across the Forest. Emphasis in healthy forest restoration should result in an upward trend.

Species Status and Population Trend

Mourning doves are common throughout the state. **They are ranked as common for the Santa Fe NF.** This means that the estimated number of breeding pairs ranges between 1,000 and 10,000. The population may fluctuate from year to year based on a variety of environmental factors. This estimate is based on the amount of habitat available, hunter success statistics, breeding bird surveys and the professional opinion of local biologists.

No threats to the mourning dove are known except for human encroachment or overhunting. The New Mexico Natural Heritage Program ranks mourning dove in New Mexico as "Demonstrably Secure." It is a multiple brooder and the most abundant dove in North America, as well as the most widely hunted and harvested game bird. Natural mortality factors include predation of adults and free-flying young by avian and mammalian predators and destruction of eggs and nestlings.

A report by David Dolton, USF&WS, compiled survey information for mourning dove within the conterminous United States. From 1966 to 2004, there was no apparent trend in mourning dove populations for the central region of the country, which includes New Mexico. Breeding bird surveys just for New Mexico show a similar stable trend (Figure MD-1).

Figure MD-1 USGS New Mexico Mourning dove trend data 1968 - 2004
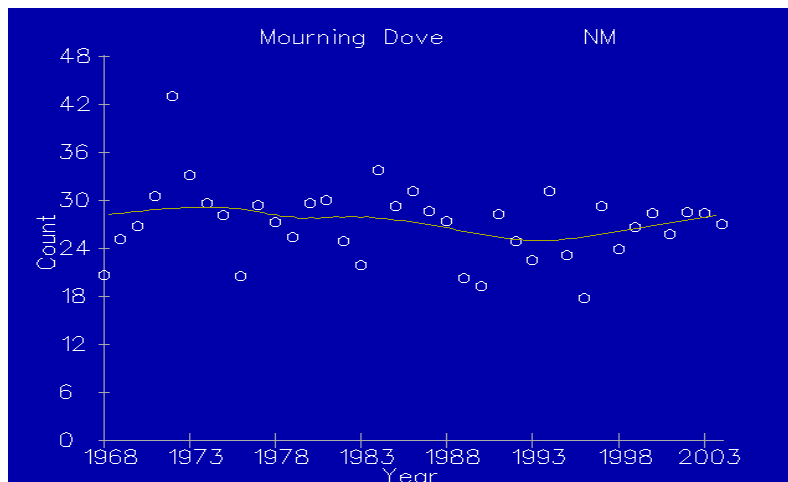
Fluctuations can be attributable to many factors such as weather, food supply and observer ability.

According to NatureServe, the mourning dove is listed as G5, N5, S5, S5B and S5N (i.e. globally, nationally, and State of New Mexico). In all cases, it is secure, common, widespread and abundant

(See Appendix B for definitions). **The population trend for the mourning dove on the Santa Fe Forest is stable** based on the statewide trend and breeding bird surveys in and adjacent to the Forest.

Monitoring recommendations

Use Fish and Wildlife Service Central Management Units data.

Hairy Woodpecker (*Picoides villosus*)

<u>**Habitat and Habitat Trend**</u>

Hairy woodpeckers serve as a management indicator for mature forest and woodland habitats (i.e. PP, MC, SF, Aspen, Oak woodland). They are also found in mature pinyon-juniper, but typically, pinyon trees are not large enough to provide suitable snags for nesting. They are primarily insectivorous and feed on insects associated with snags and down logs. Consequently, snags and down logs are key components of hairy woodpecker habitat. Hairy woodpecker habitat quality was expected to increase over time as young stands of forest mature. Activities that reduce the older tree component typically reduce habitat capability. Activities or events that create snag habitat or that move forest areas to later seral stages, benefit hairy woodpeckers. The species is a forest generalist, keying in on available snags and live aspen. Snags most often used for cavity nesting by hairy woodpeckers are 15+ inches diameter at breast height (with bark), and are more often in soft snags than hard (BISON-M 2004). Down logs are also important to support insect populations for foraging. Removal of large snags, future snags and down logs increases the probability of decreased population numbers of hairy woodpeckers. The Santa Fe Forest Plan modeling predicted that hairy woodpecker habitat quality would improve over time as young stands mature into diameter classes acceptable as cover. Nesting habitat was more limiting than feeding habitat. Table HW-1 shows the vegetative communities on the Santa Fe NF that hairy woodpeckers represent.

Table HW-1

Vegetative Communities Represented by Hairy Woodpecker	
Vegetative Community	**Acres**
Spruce-fir	235,271
Douglas fir / White fir	434,657
Aspen [1/]	5,728
Coniferous riparian	1,323
Ponderosa Pine	362,227
Oak woodland	14,547
Deciduous riparian	9,254
Bristlecone	2,157
Total	1,065,164

[1/] Aspen communities created by high intensity wildfires since 1988 could potentially total over 30,000 acres.

Table HW-2 shows activities or events affecting hairy woodpecker habitat.

Table HW-2

Treatments / Events within all Vegetative Communities Represented by Hairy Woodpecker	Acres or Miles	Effect
Mechanical (tend to early sere)	29,979	Negative
Mechanical (tend to later sere)	65,706	Positive
Rx burns	45,078	Positive
Wildfires (since 1988)	106,079	Positive
Insects and Disease	299,180	Positive
Total open roads (miles)	6,047	Negative
Closed or decommissioned roads (miles)	1,246	Positive

Large trees, which are future down logs and snags, are maintained across the Santa Fe National Forest in accordance with the Forest Plan. Snags and down woody debris comprise important elements of the forested landscape. Road accessibility and increasing demand for firewood make snags and down woody debris susceptible to removal. Areas with high road density have a higher rate of snag removal than areas with low road densities. In areas inaccessible to the public, snags are maintained under normal conditions at far greater numbers than the Forest Plan guidelines of 2-3 snags per acre, thus the National Forest supports adequate numbers of snags and down logs for hairy woodpecker habitat. Prescribed burning and recent wildfires have created large snags in inaccessible areas (steep slopes) or areas with limited road access.

As illustrated in Table HW-2, the area affected by insects and disease, prescribed fire, and wildfire far exceed areas of treatments that would tend to have a negative effect on hairy woodpecker habitat. In general, habitat affected by fire, disease, and bug kill will have many more snags than the minimum levels required by the Forest Plan. With the rate of insect and disease infestation, **the habitat trend for hairy woodpecker is increasing on the Forest.**

Species Status and Population Trend

Hairy woodpeckers are year-round residents of nearly all forest types from central Canada to the southern United States (Scott et al. 1977). This species is one of the most common woodpeckers in the Southwest, particularly in riparian habitats and in ponderosa pine, mixed species and spruce-fir forests (Hubbard, 1978). Overall, the US population is stable. This species is widespread across the Santa Fe National Forest and can be found in any of the suitable habitat types.

The hairy woodpecker population is ranked as abundant for the Santa Fe NF. This means that the estimated number of breeding pairs, ranges between 10,000 and 100,000 pair. The population may fluctuate from year to year based on a variety of environmental factors. This estimate is based on the amount of habitat available, breeding bird surveys, local studies and the professional opinion of local biologists. A study conducted by Eagle Environmental in the spring and summer of 1985 in an area west of the Questa Ranger District on public lands administered by the Bureau of Land Management evaluated woodpecker populations (Stahlecker et al. 1989). Data for this species comes from the wooded canyon benches (WCB) habitat, which is similar to the transition zone between the pinyon-juniper and ponderosa pine type common across the Santa Fe National Forest. This habitat type contains a mix of juniper, pinyon and ponderosa pine. The survey also includes the upland forest (UF) habitat, which is similar to the lower elevation mixed conifer habitats on the Santa Fe, but is generally

a more open canopy than most of the Santa Fe's forested stands. The UF habitat contains ponderosa pine, but Douglas fir is the dominant tree species. The WCB habitat had not been harvested, while the UF habitat was historically harvested. Population densities for the WCB average 11 breeding pair per square kilometer. The UF habitat type averaged 12 breeding pair per square kilometer. Based on this study, 0 to 22 breeding pair per square kilometer can be estimated across mixed conifer vegetation type of the Santa Fe National Forest. Competition from other woodpecker species for cavity sites could affect populations of this management indicator species; however, in this study, Northern flickers averaged almost identical population densities by habitat type. The Santa Fe NF has over a million acres of forested habitats suitable for use by the hairy woodpecker.

Surveys conducted by the USGS between 1968 and 2004 indicate a stable trend for hairy woodpecker within the state of New Mexico (www.mbr-pwrc.usgs.gov). Figure HW-1 illustrates this trend. The Hairy woodpecker is listed as G5, N5, S5, S5B, S5N (i.e. globally, nationally, and state of New Mexico). It is secure, common, widespread and abundant, based on the Nature Conservancy's 2001 database (See Appendix B for complete definitions). **The population of hairy woodpeckers is considered stable to increasing on the Santa Fe National Fores**t, based on the trends seen within the State of New Mexico, observations on breeding bird surveys in or adjacent to the Forest, and habitat conditions within the Forest.

Figure HW 1 USGS New Mexico Hairy woodpecker trend data
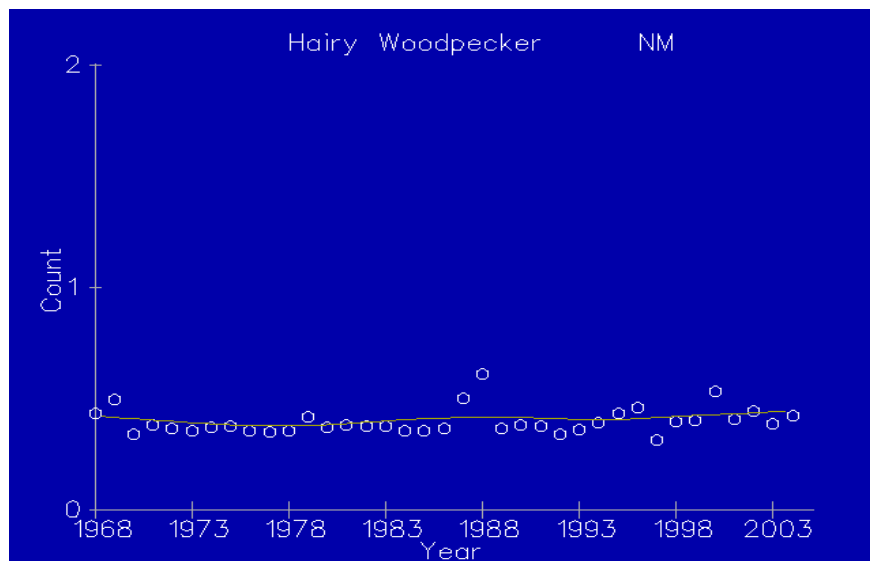
Monitoring recommendations

Monitor as per Partners in Flight recommendations for habitat types where the species is found.

PINYON JAY (*Gymnorhinus cyanocephalus*)

Habitat and Habitat Trend

Pinyon jays can be found in a wide variety of vegetative communities, but they were selected to **serve as a management indicator of healthy pinyon-juniper habitat.** Pinyon jays nest mainly in stands of pinyon-juniper. It needs open woodlands for nesting and an adequate supply of seeds, especially nuts. They are gregarious and breed in colonies up to 150. They spend the winters in large flocks of 10's or 1000's moving in search of pinyon stands with a successful crop of pinyon nuts that are a primary food source along with other seeds, fruits and insects. The Forest Plan modeling predicted that pinyon jay habitat would improve by increasing foraging areas. Alternatives that favored a variety of mast producing plants found in early seral stage forests were best for pinyon jays.

Stands of mature pinyon-juniper provide quality habitat for the pinyon jay on the Santa Fe National. Stand improvements to grow large nut-producing pinyon trees and reduce the risk of crown fires in the pinyon-juniper type continues through managed fuelwood programs to thin dense stands. Prescribed fire is used to reduce woody debris after thinning.

Beginning around 2002, much of the southwest has experienced severe mortality of pinyon stands. The Santa Fe National Forest is no exception. This die off was a result of severe drought conditions that weakened trees and made them susceptible to an infestation of pinyon bark beetle (pinyon ips). Aerial surveys by Forest Pest Management personnel indicate that more that 65,000 acres of pinyon stands on the Santa Fe NF have been affected. In some stands, pinyon mortality is 100%. Pinyon stands that were at lower elevations and that were very dense were affected the most. Even so, there remains over 300,000 acres of pinyon-juniper habitat.

Table PJ-1 illustrates the affects of management treatments, wildfires, and insects and disease on pinyon jay habitat within the pinyon-juniper community.

Table PJ-1

	Acres of Pinyon - Juniper	382,031	Positive Effect	Negative Effect
Treatments or Events / Acres	Mechanical (tend to early sere)	2,473	X	
	Mechanical (tend to later sere)	5,472	X	
	Rx burns	12,176	X	
	Wildfires (since 1988)	5,964	X	
	Insects and Disease	65,689		X

The greatest threat to the pinyon jay is the continued loss of cone producing pinyon due to drought and insect infestation. Because of this wide scale loss of pinyon, **the habitat trend for pinyon jay is ranked as declining on the Forest.** Treatments that thin dense pinyon and juniper stands to increase the vigor and drought resistance of remaining trees would be beneficial.

Species status and Population Trend

The species occupies New Mexico as a breeding and winter resident. They are variable residents in mainly middle elevation areas containing pinyon-juniper woodlands almost statewide, and are considered uncommon to locally abundant. Even within these habitats, however, their occurrence may be very unpredictable and seasonally sporadic. In mass movements during years of poor seed crop especially pinyon nuts, flocks may move hundreds of miles.

The Santa Fe NF contains over 380,000 acres of pinyon-juniper woodlands distributed across all Ranger Districts. Pinyon jay use would be widespread across this area with actual use varying by season and year.

In spite of the high pinyon mortality, **the pinyon jay population remains ranked as common for the Santa Fe NF.** This means that the estimated number of breeding pairs, ranges between 1,000 and 10,000. The population may fluctuate from year to year based on a variety of environmental factors. This estimate is based on the amount of habitat available, breeding bird surveys and the professional opinion of local biologists.

Surveys conducted by the USGS between 1968 and 2004 indicate a downward trend for Pinyon jay within the state of New Mexico (www.mbr-pwrc.usgs.gov). **The trend for the Santa Fe National Forest is now ranked as downward** based on the State trend. Although the USGS data indicate a downward trend in New Mexico for this species, the pinyon jay is listed as G5, N5, S5, S5B, and S5N (i.e. globally, nationally, and state of New Mexico). It is secure, common, widespread, and abundant (See Appendix B for complete definitions).

Figure PJ-1 USGS New Mexico Pinyon jay trend data
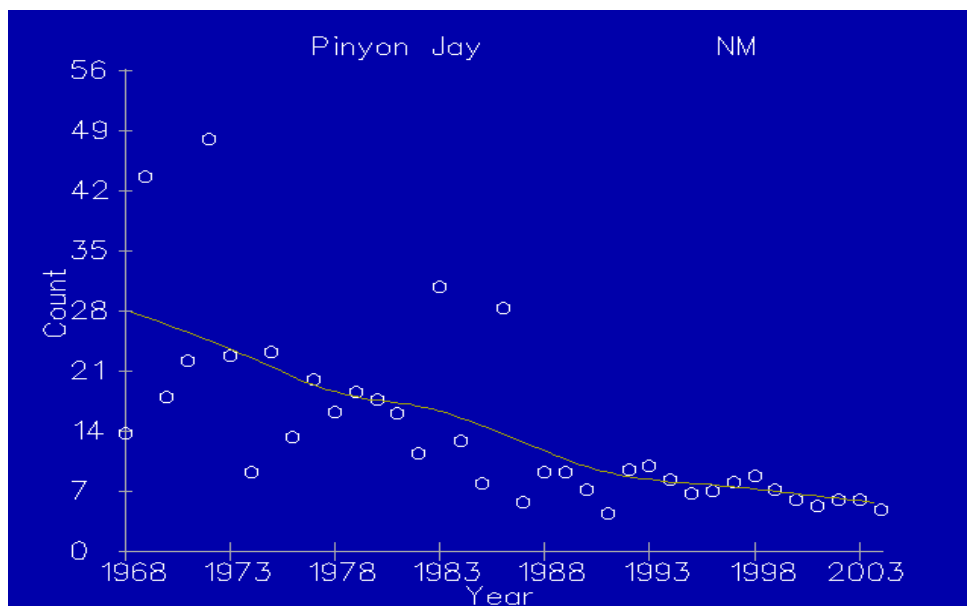
Monitoring Recommendations

None or locate breeding colonies and monitor occasionally. Statewide monitoring may be more effective due to the unpredictable movement of flocks.

FEDERALLY LISTED SPECIES

MEXICAN SPOTTED OWL (*Strix occidentalis lucida*)

Habitat and Habitat Trend

Mexican spotted owls serve as a management indicator for late seral stage mixed conifer habitat.
Changes in MSO habitat capability result primarily from changing the seral stage of mixed conifer habitat. For this assessment, mixed conifer habitat equates to the Douglas fir/White fir and coniferous riparian vegetative communities. Mexican spotted owls may be found in other vegetative communities, but on the Santa Fe National Forest, they are closely linked to the mixed conifer vegetative type. Table MSO-1 shows the vegetative communities represented by the Mexican Spotted Owl.

Table MSO-1

Vegetative Communities Represented by MSO	
Vegetative Community	**Acres**
Douglas Fir / White Fir	434,657
Coniferous Riparian	1,323
Total	435,980

In addition to the forested areas, MSO within the Jemez Mountains also occupy canyon habitats and are cliff nesters. These canyon habitats range from those with a high degree of forest structure on at least one of the slopes above the canyon wall, to little or no tree cover present; although, typically mixed conifer habitat is in very close proximity.

The MSO is most common in mature and old-growth forests throughout much of its range. The most highly sought habitat characteristics include high canopy closure, high stand density, a multi-layered canopy, uneven-aged stands, numerous snags, and downed woody matter. Dominant and co-dominant trees in the main canopy are often 18 inch DBH or larger, with 18 inch DBH or greater in the mature and old forest types -- best expressed in old-growth mixed-conifer forests (usually more than 200 years old). These characteristics may also develop in younger stands that are unmanaged or minimally managed, especially when the stands contain remnant large trees or patches of large trees from earlier stands (USDI, FWS 1993).

The Santa Fe Forest Plan predicted that Mexican spotted owl habitat would improve over time as unharvested acres mature. Harvested acres would decrease habitat capability. The Forest Plan was amended in 1996. Appendix D of the Plan provides standards and guidelines for management of MSO and its habitat. It incorporates key elements from the Recovery Plan for the Mexican Spotted Owl (*Strix occidentalis lucida),* December 1995. Specific standards and guidelines are provided for "Protected", "Restricted", and "Other Forest and Woodland Types" (Appendix D, Santa Fe Forest Plan, 1996). Since the 1996 Forest Plan Amendment, forest management activities within MSO habitat have complied with these standards and guidelines. Any deviations would have been rare and would have been done through consultation with the US Fish and Wildlife Service.

Forest management treatments within protected habitat (includes Protected Activity Centers) have been extremely limited particularly since the 1996 Amendment. Management activities within restricted habitat have typically included thinning and prescribed fires.

The greatest threat to MSO habitat is catastrophic wildfire. The largest, most intense fires have occurred since 1993. Several Protected Activity Centers (PACs) have been affected and 2 have been completely destroyed. Treatments or events that reduce the threat of catastrophic wildfire or tend to move mixed conifer areas to a climax condition are generally beneficial to MSO habitat. Treatments or events that reduce mixed conifer habitat or move it away from climax condition is generally detrimental to MSO habitat.

Table MSO-1 shows activities or events affecting MSO habitat.

Table MSO-1

Treatments / Events within all Vegetative Communities Represented by MSO	Acres or Miles	Effect
Mechanical (tend to early sere) [1]	16,195	Negative
Mechanical (tend to later sere)	31,990	Positive
Rx burns	16,416	Positive
Wildfires (since 1988) [2]	7,783	Positive
Large Wildfires (w/ high severity) [3]	37,589	Negative
Insects and Disease	123,592	Neutral
Total open roads (miles)	2,025	Negative
Closed or decommissioned roads (miles)	411	Positive

[1] The bulk of these treatments would have been prior to the 1996 Forest Plan Amendment
[2] Does not include the large wildfires.
[3] Large fires from 1993 to present. Not all of these acres were burned severely.

The Forest is actively pursuing treatment of mixed conifer areas, as well as other vegetative communities, to reduce the threat of catastrophic wildfire. Treatments within this vegetative type are constrained by the MSO standards and guidelines within the Forest Plan. In addition, much of the mixed conifer type is on steep, inoperable slopes. The threat of catastrophic wildfire will continue well into the foreseeable future. **The habitat trend on the Forest is slightly declining since implementation of the Forest Plan.** The large amount of disturbance related to catastrophic fire has resulted in about a 9% decrease in MSO habitat.

Species status and Population Trend

The Mexican spotted owl is federally listed as Threatened. It is found from parts of central Colorado and Utah, south through Arizona, New Mexico, and west Texas, then south through northwestern Mexico to the State of Michoacan. It has the largest geographic range of the three spotted owl subspecies. Its range extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah, southward through Arizona and New Mexico and, discontinuously, through the Sierra Madre Occidental and Oriental to the mountains at the south end of the Mexican Plateau (USDI, FWS, 1993). Global range-wide abundance is 1,000-3,000 individuals. Total population size is not reliably known, but the minimum number in the early 1990's was 800-1,500 individuals (USFWS, 1995). The Arizona –New Mexico population has been estimated at around 2,000 individuals (USFWS, 1995). "No undisputable evidence is available indicating that the population is declining or is significantly less than historical levels" (USFWS, 1995). Surveys conducted throughout the range of the species are too isolated to present a trend for Mexican spotted owl in the State of New Mexico. The Mexican spotted owl is listed as GT3, N3, S2B, and S2N (i.e. globally, nationally vulnerable, and State of New Mexico –imperiled) (See Appendix B for complete definitions).

MSO are residents in the mountains of New Mexico, being most regular in the south. They can be found in the San Juan, Jemez, Sangre de Cristo, Mount Taylor, Sandia, Manzano, San Francisco, Tularosa, Mogollon, San Mateo, Pinos Altos, Black, White, Sacramento, Guadalupe and Animas mountains (Hubbard, 1978). In the Rocky Mountain region, the MSO is considered uncommon to rare, local in distribution and relatively habitat-specific (Finch, 1992). The MSO is threatened by destruction and modification of habitat caused by timber harvest and fires. Fuel accumulation and forests overstocked with trees place spotted owl habitat at risk to stand-replacing fires. Lack of small-scale, low intensity ground fires has increased this risk.

The MSO has limited distribution across the Santa Fe National Forest. There are historical records from all Ranger Districts; most occurrences are on the Jemez and Pecos-Las Vegas Ranger Districts. Within these Districts, it is found in very specific habitat types.

The MSO population is ranked as rare for the Santa Fe NF. This means that the estimated number of breeding pairs, ranges between 10 and 100 pair. The population may fluctuate from year to year based on a variety of environmental factors. This estimate is based on the amount of habitat available, Mexican spotted owl surveys, and the professional opinion of local biologists. To date, 47 protective activity centers (PACs) have been identified in response to Mexican spotted owls located on the Forest. Given the amount of mixed conifer habitat, this is not a large amount of owls. The total population of MSO on the Forest probably would not exceed 100 breeding pairs, even if all the owls on the Forest were located. MSO are widely distributed on the Lincoln and Gila National Forests in southern New Mexico, but the species does not seem to favor the mixed conifer habitat found on the Santa Fe. No MSO have been found on the Carson National Forest to the north. It appears that much of the Santa Fe NF is at the edge of the MSO range.

Figure MSO-1 summarizes PACs on the Santa Fe National Forest and occupancy information collected by Forest Service biologists or local contract biologists since 1989.

Figure MSO-1
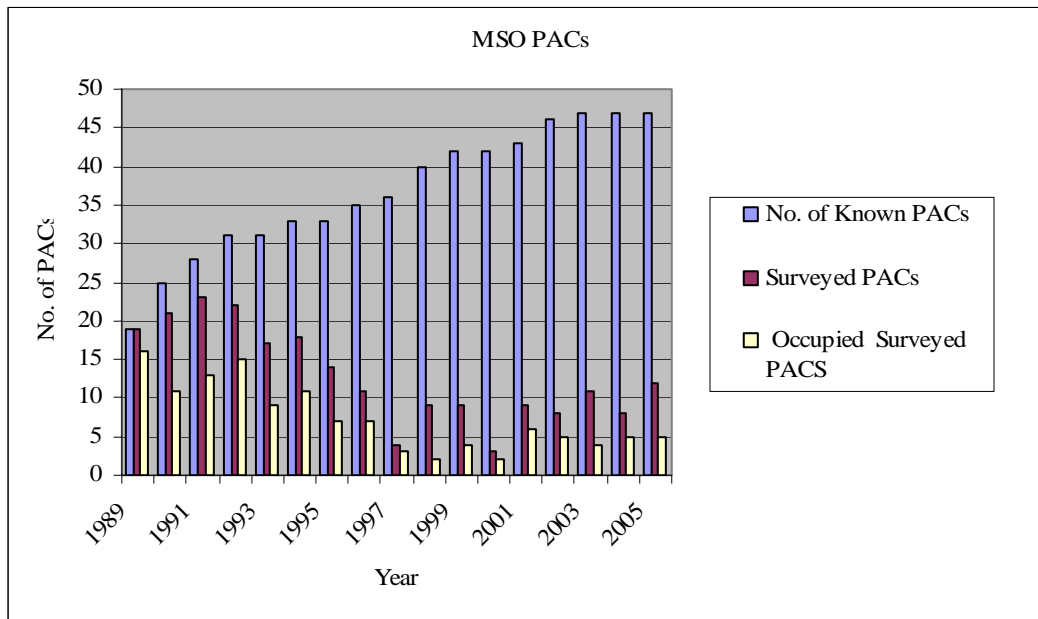
Since around 1988, the Forest has been actively surveying for MSO. As new areas were surveyed, the number of PACs also increased as owls were located. The number of PACs identified has increased from 19 in 1989 to 47 in 2005. Since 1988, over 490,000 acres of the Santa Fe National Forest have been surveyed for the presence of MSO. One PAC on the Cuba Ranger District was decommissioned in 2004. Its original establishment was questionable. Two others should be decommissioned because they were totally burned in the Cerro Grande and Viveash Fires of 2000. Monitoring of existing PACs to determine occupancy has been somewhat sporadic. Since 2001, the number of PACs surveyed or monitored has ranged between 8 and 12 annually. Figure MSO-2 displays the percent occupancy of PAC's that were surveyed.

Figure MSO-2
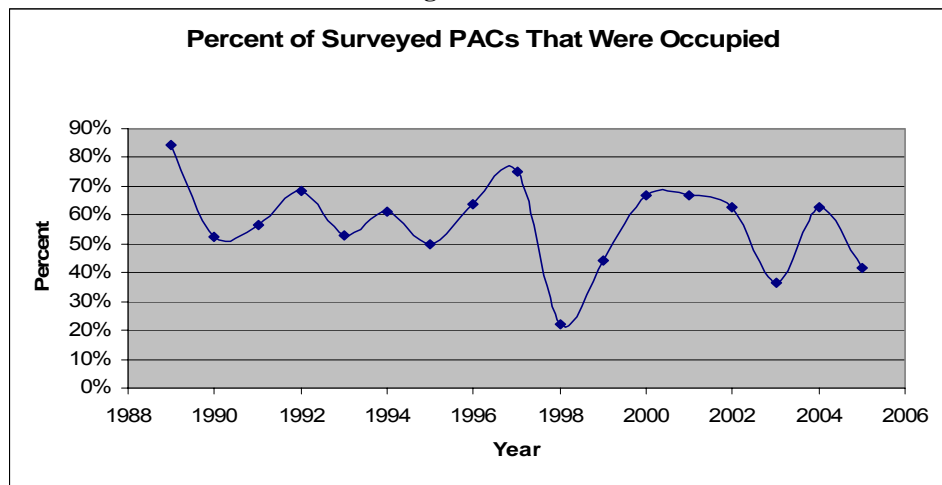
It is possible that continued surveys would reveal owls in habitats thought unoccupied. The rate of occupancy of surveyed PACs has fluctuated, but it does not necessarily indicate a change in MSO population on the Santa Fe NF. Our ability to detect owls from year to year can vary depending on survey routes, local conditions, and whether owls are responsive at the time of survey. The current loss of habitat through catastrophic fire probably would not yet affect population size. There is still ample habitat that appears unoccupied that fire-displaced owls could occupy. For now, **the population trend for the MSO is rated as stable on the Santa Fe National Forest.**

Monitoring recommendations

Continue inventories on an as needed basis. Follow recommendations in the Recovery Plan for the Mexican Spotted Owl.

RIO GRANDE CUTTHROAT TROUT (*Oncorhynchus clarki virginalis*)

Habitat And Habitat Trend

Rio Grande cutthroat trout serve as a management indicator of healthy riparian and stream habitat and good water quality. Rio Grande cutthroat trout (RGCT) is one of 14 subspecies of cutthroat trout native to the western United States (Behnke 2002). RGCT are found primarily in clear, cold mountain lakes and streams in Colorado and New Mexico within the Rio Grande Basin (Sublette et al. 1990). In New Mexico, RGCT exist only in mountain streams primarily within the Sangre de Cristo and Jemez Mountain ranges. Isolated populations persist in southern New Mexico on the Gila National Forest in the Black Range (Sublette et al. 1990) and on the Mescalero Apache Indian Reservation in the Tularosa Basin.

The Santa Fe National Forest manages approximately 1,072 miles of perennial stream. About 965 miles are managed for RGCT (includes all currently and formerly occupied streams).   In May 2001, in order to assess the quantity and quality of stream habitat, the Santa Fe NF adopted the most updated Hankin Reeves stream habitat inventory methodology, modifying the survey so that it meshed with geologic conditions related to RGCT. The survey is utilized to assess fish habitat condition and floodplain function, as well as establishing baseline for future monitoring. Each data set is analyzed and an extensive report is authored. Data interpretation includes utilizing factors and indicators for specific habitat and water quality elements that are properly functioning, at risk or not properly functioning within the range of natural variability as it relates to Rio Grande cutthroat trout historic and currently occupied streams (see Table RGCT-1). The Matrix of Factors and Indicators was developed through a peer and literature review process while incorporating similar formats developed by U.S. Fish & Wildlife Service and NOAA Fisheries Service for Section 7 project review. In addition, water temperature standards related to coldwater fisheries as established by the State of New Mexico Environment Department were incorporated as part of the matrix.

Table RGCT-1. Matrix of Factors and Indicators of Stream Health Condition for Historic and Occupied Rio Grande Cutthroat Trout Streams as Related to R3 Stream Habitat Inventory.

FACTORS	INDICATORS	Properly Functioning	At Risk	Not Properly Functioning
Water Quality	*Temperature – State of New Mexico Standards*	**Fully Supporting** <73.4°F at one time; or ≤ 68°F for 4 consecutive hours over 4 consecutive days		**Non Supporting** ≥ 73.4°F at one time; or > 68°F for 4 consecutive hours over 4 consecutive days
	Temperature – Salmonid Development	≤17.8°C (64°F) (7 day avg. max)	>17.8º (64ºF) < 21.1º (70ºF) (7 day avg. max)	≥21.1ºC (70ºF) (7 day avg. max)
Habitat Characteristics	**Sediment**	<20% fines (sand, silt, clay) in riffle habitat. Fine sediment within range of expected natural streambed conditions		≥20% fines (sand, silt, clay) in riffle habitat. Fine sediment outside of expected natural streambed conditions.
	Large Woody Debris[1]	>30 pieces per mile, >12" diameter, > 35 feet (or twice bankfull width) in length	20-30 pieces per mile, >12" diameter, > 35 feet (or twice bankfull width) in length	<20 pieces per mile, >12" diameter, > 35 feet (or twice bankfull width) in length

FACTORS	INDICATORS	Properly Functioning	At Risk	Not Properly Functioning
	Pool Development[2]	≥30% pool habitat by area[3]		<30% pool habitat by area[3]
	Pool Quality	Average residual pool depth ≥1 foot		Average residual pool depth <1 foot
Channel Condition and Dynamics	**Width/Depth Ratios by Channel Type** *(utilize Rosgen type[4] and range given if applicable)*	Width/depth ratios and channel types within natural ranges and site potential		Width/depth ratios and channel types are well outside of historic ranges and/or site potential
		Expected range of bankfull width/depth ratios and channel type	**Rosgen Type[4]** A, E, G B, C, F D	**W/D Ratio** <12 12-30 >40
	Stream Bank Condition[5]	<10% unstable banks (lineal stream bank distance)	10-20% unstable banks (lineal stream bank distance)	>20% unstable banks (lineal stream bank distance)

[1] Large Woody Debris numeric are not applicable in meadow reaches. For this survey a meadow reach can be defined as an area where there is no natural local recruitment of LWD.
[2] Pool Development numeric are applicable to 3rd order or larger streams.
[3] Area is defined by habitat length.
[4] Rosgen stream typing is used throughout this document to determine stream channel type, condition, and dynamics (Rosgen and Silvey 1998).
[5] Stream Bank Condition numeric are not applicable in reaches with > 4% gradient.

Quality of habitat conditions is generally less than moderate across the SFNF. In high elevation locations where access is limited by topography and wilderness regulations, stream habitat is moderate to excellent. Where poor habitat and water quality conditions occur, the size of RGCT populations is affected. Decreased water quality can be attributed but not limited to soil compaction, road run-off, unstable banks, and delivery of pollutants from non-point sources. Poor habitat conditions can be attributed but not limited to a lack of in-stream large woody debris, sediment-filled pools, loss of undercut banks, depletion of beaver populations, lack of side channel development and poor riparian health.

Many contributing factors lead to each shortcoming. For example, in the case of large woody debris, removal of riparian and in-stream wood from past timber and firewood practices is only one contributing factor. In addition, biologists were removing large wood from streams up until the 1980's because of previous scientific thought that wood was a barrier to migration (AFS 1983).

At the conclusion of 2005, the Forest had surveyed over 234 miles of stream. These surveys (2001 to 2005) noted that in the wilderness, streams average 33 pieces of large wood per mile. In similar stream types outside of the wilderness, streams achieved only 11 pieces per mile, in many cases going several miles without one piece of wood.

Where stream habitats are less than desirable, factors contributing to this condition often include:
1) Fire suppression, which has resulted in coniferous encroachment into riparian habitats and has diminished the delivery of large wood and nutrient cycling;
2) Timber harvest and fuelwood consumption, removing current and potential stream habitat as well as delivering non-point source pollutants;
3) Grazing practices that alter floodplain dynamics and riparian habitats, destabilize streambanks, widen streams, introduce sediments, and increase nutrient loading;
4) Road construction which encroaches on stream structure and floodplain dynamics, straightens channels, introduces non-point source pollutants, and hardens stream banks; and

5) Dispersed and developed recreational practices that alter riparian habitats, harden floodplains, widen streams, increase non-point source pollutants and remove stream structure.

Surveys have also noted other habitat components below standard: 1) excessive sediment and fines in riffle habitat (>20%); 2) stream widening which has led to high water temperatures; 3) high amounts of lineal feet of unstable bank, approximately 197 miles; 4) most pools are small in nature with only 9.5% pool volume; and 5) lack of side channel development.

Table RGCT-2 shows the current conditions of streams surveyed from 2001 to 2005 as related to Factors & Indicators of stream health for historic & occupied RGCT streams.

Stream	Temperature (State)	Temperature (Salmonid)	Sediment	LWD	Pool Development	Pool Quality	W:D Ratio	Streambank Condition
Cow Creek	PF	PF	NPF	NPF	NPF	PF	PF	PF
Elk Creek	PF	PF	NPF	NPF	*	PF	NPF	PF
Sheep Creek	PF	PF	NPF	NPF	*	NPF	PF	PF
Gallinas River	PF	PF	PF	NPF	NPF	PF	PF	PF
Rio de las Vacas	NPF	NPF	NPF	NPF	NPF	PF	NPF	PF
RGCT Occupied	PF	PF	PF	PF	*	PF	PF	PF
Rio Cebolla	NPF	NPF	NPF	NPF	NPF	PF	AR	NPF
RGCT Occupied	PFF	NPF	NPF	NPF	NPF	NPF	PF	AR
Rio Frijoles	2	2	PF	PF	NPF	PF	PF	PF
RGCT Occupied	2	2	NPF	3	NPF	PF	PF	PF
East Fork Jemez	NPF	NPF	NPF	NPF	NPF	PF	AR	PF
San Antonio Creek	PF	NPF	NPF	NPF	NPF	1	NPF	PF
Pecos River	PF	AR	PF	NPF	NPF	PF	NPF	PF
RGCT Occupied	PF	PF	NPF	NPF	*	PF	PF	PF
Rito Peñas Negras	NPF	NPF	NPF	NPF	PF	PF	AR	NPF
Chihuahueños Creek *(RGCT Occupied)*	PF	PF	NPF	PF	NPF	NPF	NPF	NPF
Polvadera Creek *(RGCT Occupied)*	PF	AR	NPF	AR	NPF	NPF	NPF	AR
Panchuela Creek	PF	PF	PF	PF	NPF	PF	PF	PF
Horsethief Creek	PF	PF	PF	PF	NPF	PF	PF	PF
Rito Perro	PF	PF	PF	PF	*	PF	PF	PF
Cave Creek	PF	PF	PF	NPF	NPF	PF	PF	PF
RGCT Occupied	PF	PF	PF	NPF	*	PF	PF	PF
Canones Creek *(RGCT Occupied)*	AR	AR	PF	NPF	NPF	PF	PF	AR

PF – Properly Functioning   AR – At Risk   NPF – Not Properly Functioning
* - Pool development is not applicable to 1st and 2nd order streams
1 - Not analyzed due to surveyor error
2 - Long-term water temperature data has not been collected
3 - RGCT occupied portion is a meadow reach; thus, LWD is not applicable

Good baseline information on RGCT stream habitat at the time of the Forest Plan does not exist. We continue to collect stream habitat information each year. Table RGCT-2 shows seventeen streams that

have been inventoried as having elements that are not properly functioning. These conditions likely existed at the time of the Forest Plan. Since then, efforts have been made to improve conditions affecting stream habitat such as closing or decommissioning roads, providing buffer areas between streams and treatment areas, employing best management practices on treatments affecting watersheds, and improving grazing practices on many grazing allotments on the Forest. Direct stream and riparian habitat improvements have included thinning of conifers along streams to improve riparian vegetation, placing large woody debris in stream channels, fencing sensitive areas against livestock and recreation use, etc. Efforts such as Respect the Rio have been and continue to be successful in restoring the health of stream and riparian systems. In addition, the current emphasis on restoration of healthy forest ecosystems should result in improved watershed conditions and reduce the threat of catastrophic wildfire, which is a serious threat to stream conditions and RGCT habitat on the Santa Fe NF.

Continued threats to RGCT stream habitat include:
- Uncontrolled recreation use
- Grazing (on some allotments)
- Roads within riparian corridors
- Catastrophic wildfire

While watershed restoration efforts have been implemented or are on-going, stream habitat conditions have minimally improved and in some locations declined. A stream inventory program in the early 90's utilized the same protocol. While some attributes have changed, two components (pool volume and pool quality) are comparable. In three streams that have been re-inventoried in the last 10 to 15 years, the trend indicates status quo or a decline. Photo points have been matched across the landscape in streams that have been surveyed in the last 5 years compared to photos taken from 10 to 20 years ago. These areas do indicate some improving trends. Since the Forest Plan, stream habitat conditions for RGCT have varied from slightly declining to slightly improving. **Therefore, the habitat trend for RGCT is rated as stable.**

Species Status and Population Trend

The Regional Forester for the Southwest Region of the Forest Service has designated Rio Grande cutthroat trout as a sensitive species in New Mexico. The U.S. Fish and Wildlife Service has reviewed whether or not to accept the species as a candidate to be petitioned for listing on two occasions. Both petitions were denied as warranted. The Rio Grande cutthroat trout population ranks as abundant for the Santa Fe NF. This means that the estimated number of breeding females ranges between 10,000 and 100,000 individuals. This category, however, does not fit well for a fish species.

In order to develop a historic picture of current and potential Rio Grande cutthroat trout distribution, the forest is divided into four significant Geographical Management Units (GMU's): 1) Jemez Mountains (Rio Grande); 2) Sangre de Cristo Mountains (Rio Grande); 3) Pecos River; and 4) Canadian River. Within each GMU, stream corridors are defined into three distinct Rio Grande cutthroat trout management areas (MA's): 1) Secure; 2) At Risk; and 3) Proposed Occupied (See Map for visual arrangement and Appendix C for tables that specifically outline stream corridors with these MA's).

"Secure" are segments of stream that are currently known to be inhabited and have populations that are considered genetically intact and free of invasive species. "At Risk" populations are inhabited stream segments that are either genetically introgressed and/or occupied by invasive species. "Proposed

Occupied" is where SFNF and NMDGF is currently assessing corridors to determine whether RGCT could be re-introduced to these segments in the long term, forming extensive, more connected meta-populations. "Proposed Occupied" are defined as potential habitat in the State-Wide Conservation Agreement.

The Santa Fe NF manages 1,072 miles of perennial stream length. Approximately 965 miles were thought to be historically occupied prior to stocking of non-native trout [the first stocking record noted in New Mexico was in 1896 (Sublette et al. 1990)] and is considered potential habitat in the State-Wide Conservation Agreement. As of data collected up until April 2006, 35 streams have been identified to be occupied with RGCT, occupying 136.2 miles of stream (see Table 3) (NMDGF, USFS). Of these occupied stream miles, 76.4 miles are currently considered secure. In addition, 59.8 miles are at risk and no miles are currently proposed for occupation. A recent re-introduction occurred in Capulin Canyon. Assessments are forthcoming on future proposals.

Table RGCT-3. Historic, Secure, At Risk and Proposed Stream Miles of RGCT on SFNF

Genetic Management Unit	Secure	At Risk	Proposed Occupied	Total Current and Proposed Occupied	Historic Occupied w/in SFNF Boundary (approximate)
Jemez Mountains	39.6 miles	32.8 miles	0.0 miles	72.4 miles	402 miles
Sangre de Cristo	2.0	12.6	0.0	14.6	141
Pecos	34.8	14.4	0.0	49.2	339
Canadian	0.0	0.0	0.0	0.0	83
Total	**76.4**	**59.8**	**0.0**	**136.2**	**965**

Today, total known occupied stream miles are over 136 miles. Only approximately 100 miles were known to be occupied in the early 1990's (Lee Johnson, personal communication). This number has jumped for two reasons: 1) Further data collection has located previously unknown occupied sites that were once listed as suspected (or unconfirmed); 2) Completion of efforts to re-introduce, secure and/or expand the range of RGCT in streams where they were completely or nearly extirpated (i.e. Capulin Canyon, Rio Cebolla, Rio de las Vacas, Jacks Creek, Doctor Creek, Valdez Creek, Rito del Padre and Pecos River).

While stream mileage occupied has generally increased since the onset of the Forest Plan, mileage has declined since originally reported during the 2002 USFWS Candidate Assessment. This is due to an assortment of factors: 1) Better information about population range; 2) further genetic analysis; 3) population loss due to drought; and 4) invasion of exotic species. In 2002, the Santa Fe National Forest reported to USFWS that there were approximately 158.7 miles of occupied habitat. Since that time, intensive data gathering and analysis by NMDGF and the Forest has confirmed 136.2 occupied miles (see RGCT-Table 4).

RGCT-Table 4. Trend of Stream Miles Occupied from 2002 to 2006

SFNF Occupied Waters	Stream Miles		
	2002	2006	Difference
Secure	81.0	76.4	(4.6)
At Risk	77.7	59.8	(17.9)
Proposed	0.0	0.0	0.0
Total	158.7	136.2	(22.5)

Observations by field biologists (USFS, NMGF) note that RGCT populations have declined in areas where they are unprotected from brown and rainbow trout. Secure populations seem to be stable in low elevation, front country and high elevation, wilderness areas.

The greatest threats to the RGCT population on the Santa Fe NF are:
- Presence of exotic trout, i.e. German brown trout and rainbow trout. German brown trout compete directly with RGCT as well as prey on young RGCT. Rainbow trout hybridize with RGCT and essentially breed them out of existence.

- Whirling disease. In 1999, whirling disease, a debilitating and fatal parasite introduced by unsanitary hatchery practices, was discovered in waters in New Mexico. This includes waters on the SFNF (Pecos River, Rio Cebolla, Cañones Creek, Jacks Creek). It is unclear at this time what effects this may have on the overall population of RGCT over the long-term.

- Catastrophic fire. Large, intense fires can totally wipe out a fish population due to ash flow and sedimentation and make streams uninhabitable for several years. The Viveash Fire of 2000 is a prime example of this.

Since the Forest Plan (1987), the RGCT population on the Santa Fe NF has increased. This is largely due to efforts to re-introduce RGCT into various streams on the Forest. This is offset by population losses due to invasive species and drought conditions; but overall, occupied miles has increased by approximately 40 miles since 1987.

RGCT are afforded a number of protections. It is a Region 3 sensitive species, as well as a native fish and a management indicator species. Future petitions to list the species as threatened are likely, which has prompted a range-wide and statewide conservation agreement.

The Santa Fe National Forest has an obligation to conserve the species and its habitat. Regulation 9500-4 (1983) mandates that "Habitats for all existing native…fish…species will be managed to maintain at least viable populations of such species." In order to achieve this, "habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species throughout its geographic range." This is further illustrated by the National Forest Management Act (36 CFR, Ch. 2, 1990), which states that the FS must "provide for adequate fish…habitat to maintain viable populations of existing native…species and provide that for species chosen [as management indicator species]." NFMA further protects riparian areas, defined as "land and vegetation…approximately 100 feet from the edges of perennial streams, lakes and other bodies of water" by stating that "no management practices causing detrimental changes in water temperature or chemical composition, blockages of water courses, or deposits of sediment shall be permitted within these areas which seriously and adversely affect water conditions or fish habitat" (36 CFR, Ch. 2, 1990).

This is complemented by the Forest Plan (amended 1996), which states the Forest will "continue activities to improve Rio Grande cutthroat trout habitat with the objective of securing the species; develop RGCT fisheries within selected areas identified in conjunction with the New Mexico Game and Fish."

These previous mandates and the risks to the species has led to conservation agreements signed by various state, tribal and federal entities in order to assure the conservation of RGCT. The state-wide conservation agreement (USFS 2002), of which the Southwest Region of the Forest Service is a party,

states that the FS shall "protect, maintain, and improve existing and potential Rio Grande cutthroat trout habitat and manage these watersheds and stream-riparian habitats to ensure long-term conservation and persistence of the subspecies." In order to achieve this, the FS shall "prevent or alleviate management related impacts that could degrade occupied or potential Rio Grande cutthroat trout habitat and/or impair current populations."

Population surveys have limited applicability due to seasonal and annual variances in population size. With that in mind, the Santa Fe National Forest considers stream miles occupied as a gauge for population trend. With protections in place and with the success and continued effort to improve stream habitat and to re-introduce RGCT into recipient streams**, the population trend, despite recent setbacks on the Santa Fe NF, is precariously upward.**

MONITORING RECOMMENDATIONS

Continue to coordinate with NMDGF and USFWS on monitoring RGCT populations. Continue with stream inventory and monitoring.

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Relevant Activities	Tends toward early sere	Tends toward later sere
Commercial Thinning		X
Construction of Fuel Breaks	X	
Disease Control	X	
Group selection cut (UA/RN/F	X	
Improvement Cut		X
Individual tree release and		X
Man-Caused Fire Damage	X	
Natural Changes (no timber h	X	
Overstory removal cut (from	X	
Partial removal		X
Patch clearcutting (EA/RN/FH	X	
Permanent Land Clearing	X	
Precomm thinning/cleaning ne		X
Precommercial thinning - ind		X
Range Control Vegetation	X	
Salvage cut (intermediate tr	X	
Sanitation (salvage)	X	
Sanitation Cut	X	
Seed-tree seed cut (EA/RN/NF	X	
Shelterwood cut (EA/RN/NFH)	X	
Shelterwood final removal cu	X	
Shelterwood preparation cut		X
Single-tree selection cut (U		X
Special Cut		X
Stand Clearcutting(EA/RH/FH)	X	
Thin of Natural Fuels		X
Tree Encroachment Control	X	
Watershed Resource Non-Struc	X	
Wildlife Habitat Grasses and	X	
Wildlife Habitat Precommerci		X
Wildlife Habitat Prescribed		X
Wildlife Habitat Rehabilitat	X	

Global (G), National (N) and Subnational (S) Heritage Status Rank Definitions

G5	Secure-Common, widespread, and abundant (although it may be rare in pats of its range, particularly on the periphery). Not vulnerable in most of its range. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
N5 S5 S5B S5N	Secure-Common, widespread, and abundant in the nation or subnation*. Essentially ineradicable under present conditions. Typically with considerably more than 100 occurrences and more than 10,000 individuals.

Breeding Status Qualifiers

Rank	Definitions
B	Basic rank refers to the breeding population of the element in the nation or subnation.*
N	Nonbreeding. Basic rank refers to the non-breeding population of the element in the nation or subnation.*

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GT 3	Vulnerable; Vulnerable in the nation or subnation* either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals. T -denotes Intraspecific taxon or more than one form of the species included within the rank.
N3	Vulnerable; Vulnerable in the nation or subnation* either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000.
S2B S2N	Imperiled; Imperiled in the nation or subnation* because of rarity or because of some factor(s) making it very vulnerable to extirpation from the nation or subnation*. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).

NatureServe. 2006 Version 4.7 (http://www.natureserve.org/explorer)

APPENDIX C

RGCT occupied streams on the Santa Fe National Forest
Jemez Mtns GMU

Secure	Miles 2002	2006	Difference	Reason for change	Status
Peralta Canyon	5.6	4.4	-1.2	Better data	2005 genetic sampling; results expected in 2006
Rito Resumidero	2.6	2.6	0.0	N/A	genetics collected; results expected in 2006
Rio Puerco de Grande	8.7	8.7	0.0	N/A	genetics are in question; 2005 genetic sampling; results expected 2006; core population (2002)
Canones Creek	11.1	6.1	-5.0	Better data	genetic results pure (2005); core population (2002)
Chihuahuenos Creek	9.5	9.5	0.0	N/A; fully mapped	genetics collected in 2004; results expected in 2005
Polvadera Creek	0.0	5.4	5.4	Better data	natural barrier in place; genetics show pure strain (2004)
Rio Cebolla	5.1	0.0	-5.1	brown trout found above barrier	brown trout above barrier, multiple age class (2005); core population (2002); follow-up genetics conducted in 2005 (results in 2006)
La Jara Creek	0.0	1.3	1.3	Better data	unscheduled
Capulin Canyon	0.0	1.6	1.6	Population introduced March 2006	Canones RGCT; pure; 6.0 additional miles on Bandelier
Total	**42.6**	**39.6**	**-3.0**		

At Risk	Miles 2002	2006	Difference	Reason for change	Status
Rio de las Vacas	11.1	11.1	0.0	N/A	brown trout above barrier; genetics are in question (results expected 2005); includes tribs
Rito de las Palomas	4.5	4.5	0.0	N/A	brown trout; genetics are in question; unscheduled
La Jara Creek	3.7	0.0	-3.7	Better data	-
Rio Cebolla	0.0	5.6	5.6	brown trout found above barrier; better data	-

	2002	2006	Difference	Reason for change	Status
Clear Creek	2.9	2.9	0.0	N/A	rainbow trout; genetics are in question (assumed introgressed)
American Creek	2.3	2.3	0.0	N/A	brown trout, rainbow trout; unscheduled
Rito Café	2.4	2.4	0.0	N/A	brown trout above barrier (2001); stream survey will be done in 2006; genetics initially show introgression
Cecilia Creek	0.0	0.2	0.2	Better data	brown trout, rainbow trout; genetics are in question; unscheduled
Rio Capulin	3.3	0.2	-3.1	Better data	brown trout, rainbow trout; genetics are in question; unscheduled
Rito de los Pinos	3.9	2.1	-1.8	Better data	brook trout; 2005 sampling, results expected in 2006
Medio Dia Canyon	0.0	0.5	0.5	Better data	genetics are in question; 2005 sampling, results expected in 2006
Polvadera Creek	17.8	1.0	-16.8	Better data	rainbow trout below barrier; genetics are in question (assumed introgressed)
Total	**51.9**	**32.8**	**-19.1**		

Pecos GMU

	Miles				
Secure	**2002**	**2006**	**Difference**	**Reason for change**	**Status**
Pecos River	4.2	3.2	-1.0	Better data	genetics are in question; unscheduled
Doctor Creek	3.5	0.0	-3.5	brown trout found above barrier	collected in 2004; genetics are in question; results expected in 2005; brown trout
Cave Creek	0.0	1.9	1.9	Better data	unscheduled
Dalton Creek	3.6	3.6	0.0	N/A	pure (2005)
Indian Creek	4.4	4.4	0.0	N/A	collected in 2004; results expected in 2005
Macho Creek	4.6	4.6	0.0	N/A	pure (2005)
Jack's Creek	6.8	6.8	0.0	N/A	population crashed in 2002; core population (2002); ;unscheduled
Rio Mora	1.2	1.2	0.0	N/A	collected in 2000; results expected in 2005
Rio Valdez	3.1	3.1	0.0	N/A	collected in 2000; pure (2005)
Rito los Esteros	1.7	1.7	0.0	N/A	collected in 2000; pure (2005)
unnamed tributary to Mora	2.3	2.3	0.0	N/A	collected in 2000; pure (2005)
Bear Creek	2.0	2.0	0.0	N/A	collected in 2000; pure (2005)
Cow Creek	1.0	0.0	-1.0	Genetic analysis showed introgression	genetics show introgression (2004)
Total	**38.4**	**34.8**	**-3.6**		

At Risk	Miles 2002	2006	Difference	Reason for change	Status
Doctor Creek	0	3.5	3.5	brown trout found above barrier	-
Rito de los Chimayosos	3.6	3.6	0.0	N/A	genetics show introgression with Snake River (2005)
Rito del Padre	4.2	4.2	0.0	N/A	genetics show introgression with Snake River (2005)
Rito Maestas	2.1	2.1	0.0	N/A	genetics show introgression with Snake River (2005)
Rito Azul	3.3	0.0	-3.3	extirpated due to drought	Extirpated (2002); needs to be reconned for recolonization after drought
Cow Creek	0	1.0	1.0	Genetic analysis showed introgression	-
Total	**13.2**	**14.4**	**1.2**		

Sangre de Cristo GMU

Secure	Miles 2002	2006	Difference	Reason for change	Status
Rio Nambe	0	2.0	2.0	Better data	genetics are in question (results due 2005)
Total	**0**	**2.0**	**2.0**		

At Risk	Miles 2002	2006	Difference	Reason for change	Status
Rio Frijoles	7.1	7.1	0.0	N/A	brown trout, rainbow trout; genetics are in question; includes tribs; unscheduled
Rio Medio	5.5	5.5	0.0	N/A	brown trout; genetics are in question; includes tribs; unscheduled
Total	**12.6**	**12.6**	**0.0**		

Total RGCT Occupied Waters

Santa Fe National Forest	Miles 2002	2006	Difference
Secure	81.0	76.4	-4.6
At Risk	77.7	59.8	-17.9
Total Miles Occupied	**158.7**	**136.2**	**-22.5**