

**Northern Goshawk Monitoring and Inventory Results from  
2002-2005 in the Lincoln National Forest, New Mexico**



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## **Executive Summary**

The Northern Goshawk (*Accipiter gentilis*) is a large raptor that is closely associated with mature forests. Many of these forests have been extensively altered, leading to concerns over populations of the Northern Goshawk. Although the Northern Goshawk is not currently listed as a threatened or endangered species, the Southwestern Region of the United States Department of Agriculture (USDA) Forest Service listed it as a “Sensitive Species” in 1982. This species is difficult to monitor due to its high mobility, secretive nature, and large home-range size. Because of these monitoring difficulties, and the considerable time investment required, the overall status of the North American population of Northern Goshawks is unknown. Therefore, it is important to monitor current populations of this raptor throughout its range, including the Southwest.

In 2000, the Cree fire burned approximately 2,400 hectares (6,000 acres) of the Lincoln National Forest in New Mexico, including an active Northern Goshawk nesting territory. In 2001, the Forest Service of the Lincoln National Forest-Smokey Bear Ranger District contracted Hawks Aloft, Inc. to annually monitor this site for Northern Goshawk activity in the Cree Fire study area. The study began in 2002 and continued through 2005. Hawks Aloft was also contracted to conduct a complete inventory of the burned area and 402 meter (quarter mile) buffer zone in 2005. The inventory study was designed to locate previously undiscovered Northern Goshawks in the burned area and buffer zone, excluding the one monitoring site.

Over the course of the study, Hawks Aloft did not document any Northern Goshawks in the previously active nesting site from 2002 to 2005 or during the 2005 inventory efforts.

This nesting site was last active during 2000 and Forest Service personnel detected single Northern Goshawks at the site from 2001 to 2003. The information we gathered during this study will assist the United States Forest Service (USFS), Lincoln National Forest determine the best management practices for sustaining Northern Goshawk populations.

### **Introduction**

The Northern Goshawk is not currently listed as a threatened or endangered species, although it has been proposed for listing numerous times. The Northern Goshawk was listed as a “Sensitive Species” in the Southwestern Region of the USDA Forest Service in 1982. It is also currently listed as a Species of Concern by the United States Fish and Wildlife Service. There are growing concerns that Northern Goshawk populations are declining in the Southwest and elsewhere in the United States, primarily due to the effects of timber harvest, but also to the risk of catastrophic fire (Crocker-Bedford 1990, Reynolds et al. 1992). This species might be particularly sensitive to these disturbances because they require a relatively large amount of space for their home range (approximately 2,430 ha)).

In 2000, the Cree fire burned approximately 2,400 ha (6,000 ac) of the Lincoln National Forest in New Mexico. The fire burned a large portion of an active Northern Goshawk nesting territory. During the wildfire, a female goshawk remained on the nest and successfully fledged a single young; however, a pair did not return to the nesting area in 2001. Hawks Aloft Inc. was contracted in 2001 to monitor this active Northern Goshawk nesting territory from 2002 to 2005. We were also contracted to conducted a survey of

the entire Cree fire study area (excluding the nesting territory) to provide a more complete inventory of Northern Goshawks in effected areas.

During this study, we determined if goshawks still occupied the nesting territory where birds historically nested. We also searched other locations for Northern Goshawks within the Cree fire study area. It is important to monitor existing Northern Goshawk territories to determine the population status throughout its range, including the Southwest. Data on population status assists United States Forest Service (USFS) biologists with forest management decisions. Here, we report the 2002 to 2005 monitoring, and 2005 inventory results.

### **Study Area**

We conducted the study in the Smokey Bear Ranger District of the Lincoln National Forest, near Ruidoso in Lincoln County, New Mexico (Figure 1). The Lincoln National Forest provides the variety of habitats that Northern Goshawks prefer for foraging and nesting. The study area consists of unburned and severely burned habitat. The major forest types within the unburned habitat of the study area include two major forest types: mixed-conifer and ponderosa pine (*Pinus ponderosa*) forests. Mixed-conifer habitats are dominated by Douglas fir (*Pseudotsuga menziesii*) and white fir (*Abies concolor*), with Gambel oak (*Quercus gambelii*) and Rocky Mountain maple (*Acer glabrum*) constituting the major understory components. Ponderosa pine forests, although predominately ponderosa pine, also contain stands of pinyon-juniper (*Pinus edulis* - *Juniperus* spp.). The understory of ponderosa pine habitat is less developed than mixed-conifer understories, and consists primarily of grasses and some Gambel oak (Dick-Peddie

1993). Mixed conifer habitat is mostly found on north-facing slopes, whereas ponderosa pine forests dominate south-facing slopes. The severely burned habitat consists of areas with very few live trees. Scatterings of mixed conifers can be found in drainages, while snags and a few green trees cover the slopes. The new growth in these areas primarily consists of New Mexico locust (*Robinia neomexicana*), and a variety of other herbaceous plants.

Hawks Aloft, Inc. attempted to locate Northern Goshawks at the Gavilan Post-Fledging Family Area (PFA) (Figure 1). A PFA is an area (approximately 170 ha [420 ac]) surrounding a historic nest area (Reynolds et al. 1992). This area corresponds to a Northern Goshawk's defended territory and provides cover, as well as prey, for recently fledged young (Reynolds et al. 1992). PFAs include patches of dense trees, habitat optimal for preferred prey, and an herbaceous or shrubby understory that provides protection for fledglings (Reynolds et al. 1992). The PFA monitored by Hawks Aloft, Inc. was severely affected by the Cree fire. Approximately 50% of the PFA was intensively burned; however, there are portions of unburned habitat within the PFA. The unburned habitat remains mostly in drainages throughout the PFA.

The inventory study area includes the PFA monitoring area, as well as additional portions of the burned area and buffer zone, excluding the actual PFA. The inventory study area was designed to detect previously undetected Northern Goshawks outside the known PFA.

## **Methods**

### Post-Fledging Family Area (PFA) Surveys

We conducted all Northern Goshawk surveys according to methods described by Kennedy and Stahlecker (1993). In all years, we conducted one or two complete call point surveys at the PFA which included 40 call point stations. Call point surveys were completed during the nestling and fledgling period (if needed), from early June through mid-July, and mid-July through early September, respectively (Kennedy and Stahlecker 1993). We used transects and call stations established by Hawks Aloft, Inc. in 2002 to locate and monitor Northern Goshawks in the PFA. Adjacent transects were 260 m apart, and call stations were spaced 300 m apart.

We used tape-playback of conspecific calls to facilitate detections of Northern Goshawks. An adult Northern Goshawk alarm call was broadcast using sound equipment. We listened for one minute before calling, and then broadcasted the alarm call four times over the course of 5-6 minutes, in each cardinal direction. We then listened for one additional minute. We recorded general habitat characteristics for each call station, but did not take quantitative measurements. We recorded detections of all raptor species (Appendix 1) using Garmin Global Positioning Systems (GPS) in Universal Transverse Mercator (UTM) coordinates (North American Datum 27), and plotted them on USGS 7.5 minute quadrangle maps.

## Inventory Surveys

Hawks Aloft, Inc. designated approximately 350 call points within the Cree fire study area. Of these, Larry Cordova, USFS biologist prioritized 75 call points in green habitat to be formally called. These call points excluded burned areas, private land, and areas within the PFA. The remaining 275 were explored to determine the presence of any remaining suitable unburned habitat. When suitable green habitat was found, we conducted call points in those areas. Call points were located 300 m apart and were placed on roads, ridgetops, drainages, and sideslopes. Each point was visited once during the nestling period. We surveyed these points in the same manner as the PFA surveys. As requested by Larry Cordova, we documented the habitat throughout the study area (Figure 3).

## **Results**

### Gavilan Post-Fledging Family Area (PFA) Survey

Over the course of the study, Hawks Aloft, Inc. did not detect any Northern Goshawks at the Gavilan PFA. A goshawk pair last occupied this PFA in 2000. The pair successfully fledged one young. Gavilan was a consistently active nesting territory from 1994 to 2000. Forest Service personnel have observed single Northern Goshawks in this PFA from 2001 to 2003.

### Inventory Surveys

We did not detect Northern Goshawks during the inventory surveys of the remaining unburned habitat of the Cree fire study area.

### Additional Raptors

From 2002 to 2005, we detected four raptor species during our surveys, including: American Kestrel (*Falco sparverius*), Great Horned Owl (*Bubo virginianus*), Red-tailed Hawk (*Buteo jamaicensis*), and Sharp-shinned Hawk (*Accipiter striatus*) (Appendix 1). One unknown raptor was detected in 2004. We detected an active Sharp-shinned Hawk nest in 2002 and an active Great Horned Owl nest in 2004, both within the PFA boundary.

### **Discussion**

A goshawk pair has not been detected in the Gavilan PFA since the Cree fire occurred in 2000. Availability of suitable nesting habitat is critical for goshawk presence and reproductive success (Reynolds et al. 1992). Mature forest with large trees, a closed canopy, and an open understory characterizes suitable habitat (Reynolds et al. 1982, Reynolds et al. 1992, Squires and Reynolds 1997, Beier and Drennan 1997). Very little suitable nesting habitat remains in the Gavilan PFA; however, goshawks are known to use both mixed-conifer and ponderosa pine forest for nesting (Squires and Reynolds 1997). The nesting habitat characterized above remains only in drainages that were unburned by the fire. Most of the PFA was burned and little nesting habitat remains, therefore Northern Goshawks may have abandoned the area for nesting.

There is little data concerning the effects of fire on Northern Goshawks and other raptors. The Cree fire burned a large portion of the Lincoln National Forest, Smokey Bear District in 2000, intensively burning 50% of the Gavilan PFA and leaving little suitable habitat in the inventory survey area. Severe fire that burns through a territory or nest stand may displace Northern Goshawks from that area, or render that area unsuitable for nesting if the tree canopy or nest tree is lost (Reynolds et al. 1992). Fire can also lead to direct mortality of immature birds, but mortality is generally low in adult birds (Finch et al. 1997, Landers 1987). Our observations suggest that the Cree fire may have negatively affected the Northern Goshawk pair that historically nested in the Gavilan PFA. Since the fire, only single goshawks have been documented, suggesting the fire has affected nesting activity in the Gavilan PFA.

Northern Goshawk population monitoring is time and labor intensive due to the low densities, large home ranges (approximately 2,430 ha), high mobility, and the secretive behavior of this species. Kimmel and Yahner (1990) suggest that Northern Goshawks might not always respond to survey tapes. There are numerous factors that can affect goshawk detectability such as weather, prey abundance, and timber harvest (Bloxtton 2002, McClaren et al. 2002, Crocker-Bedford 1990). In addition, the degree of responsiveness decreases as the distance from the surveyor is increased (Kennedy and Stahlecker 1993). Because the PFA only represents approximately 10% of a Northern Goshawk's total home range, a non-nesting Northern Goshawk that is not necessarily concentrating its activities within the PFA would be more difficult to detect. Therefore, the PFAs in which Northern Goshawks were not located may still constitute an important

part of the Northern Goshawk's home range. Due to the unpredictable response to tapes and large home ranges, PFAs without goshawk responses are not necessarily unoccupied.

The Northern Goshawk is a species of management concern to the Forest Service. Because the Northern Goshawk was listed as a "Sensitive Species" by the USFS Southwestern Region, management recommendations have been designed to sustain goshawk populations (Reynolds et al. 1992). Goshawk location data and reproductive status is necessary information to determine which management practices can be implemented. Because the likelihood of detecting goshawks and goshawk reproductive success is so variable, data is most valuable if it stems from long-term monitoring studies (greater than ten years; DeStefano 1998). This PFA has been an active nesting territory; however, during this study no nesting activity has been documented. Because individual Northern Goshawks have been located, this PFA may again become active in the future.

### **Recommendations**

Monitoring at this PFA should continue to determine Northern Goshawk presence and productivity. Because this PFA no longer contains an active nesting goshawk pair and only individuals were documented from 2001 to 2003, surveys should be conducted every other year or every third year. The long term effects of the Cree Fire on populations of Northern Goshawks remain unknown. As the forest continues to mature, Northern Goshawks may reoccupy the former territory.

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### **Literature Cited**

- Beier, P. and J. E. Drennan. 1997. Forest structure and prey abundance in foraging areas of Northern Goshawks. *Ecological Applications* 7: 564-571.
- Bloxtton, T. D. Jr. 2002. Prey abundance, space use, demography, and foraging habitat of Northern Goshawks in western Washington. M. S. thesis, University of Washington. Seattle, Washington.
- Crocker-Bedford, D. C. 1990. Goshawk reproduction and forest management. *Wildlife Society Bulletin* 18: 262-269.
- DeStefano, S. 1998. Determining the status of Northern Goshawks in the west: Is our conceptual model correct? *Journal of Raptor Research* 32: 342-348.
- Dick-Peddie, W. A. 1993. *New Mexico Vegetation, Past, Present and Future*. University of New Mexico Press, Albuquerque, NM. Pp. 47-84.
- Finch, D. M., Ganey, J. L., Yong, W., Kimball, R. T., and R. Sallabanks. 1997. Effects and Interactions of fire, logging, and grazing. Pages 103-136 in *Songbird ecology in southwestern ponderosa pine forest: a literature review*. W.M. Block and D.M. Finch, eds. General Technical Report RM-GTR-292. Fort Collins, Colorado.
- McClaren, E. L., Kennedy, P. L., and S. R. Dewey. 2002. Do some Northern Goshawk nest areas consistently fledge more young than others? *Condor* 104: 343-352.
- Kennedy, P. L., and D. W. Stahlecker. 1993. Responsiveness of nesting Northern Goshawks to taped broadcasts of three conspecific calls. *Journal of Wildlife Management* 57: 249-257.

Kimmel, J. T. and R. H. Yahner. 1990. Response of Northern goshawks to taped conspecific and great horned owl calls. *Journal of Raptor Research* 24: 107-112.

Landers, J. L. 1987. Prescribed burning for managing wildlife in southeastern pine forests. In: *Managing southern forests for wildlife and fish: a proceedings*. Dickenson, J. G. and Maughan, O. E., eds. USDA Forest Service General Technical Report SO-65. New Orleans, Louisiana.

Reynolds, R. T., Meslow, E. C., and H. M. Wight. 1982. Nesting habitat of coexisting *Accipiter* in Oregon. *Journal of Wildlife Management* 46: 124-138.

Reynolds, R. T., Graham, R. T., Reiser, M. H., Bassett, R. L., Kennedy, P. L., Boyce, D. A., Goodwin, G., Smith, R., and E. L. Fisher. 1992. Management recommendations for the Northern Goshawk in the southwestern United States. USDA Forest Service, General Technical Report RM-217. Fort Collins, Colorado.

Squires, J. R. and R. T. Reynolds. 1997. Northern goshawk (*Accipiter gentilis*). In: *The Birds of North America*, No. 298. A. Poole and F. Gills, eds. The Academy of Natural Sciences, Philadelphia, PA and the American Ornithologists Union, Washington, D.C.

Figure 1. Cree fire study area, PAC boundary and Inventory points on USGS 7.5' quadrangle. This section includes portions from the Angus, Fort Stanton, Ruidoso, and Ruidoso Downs quads in the Lincoln National Forest, New Mexico.

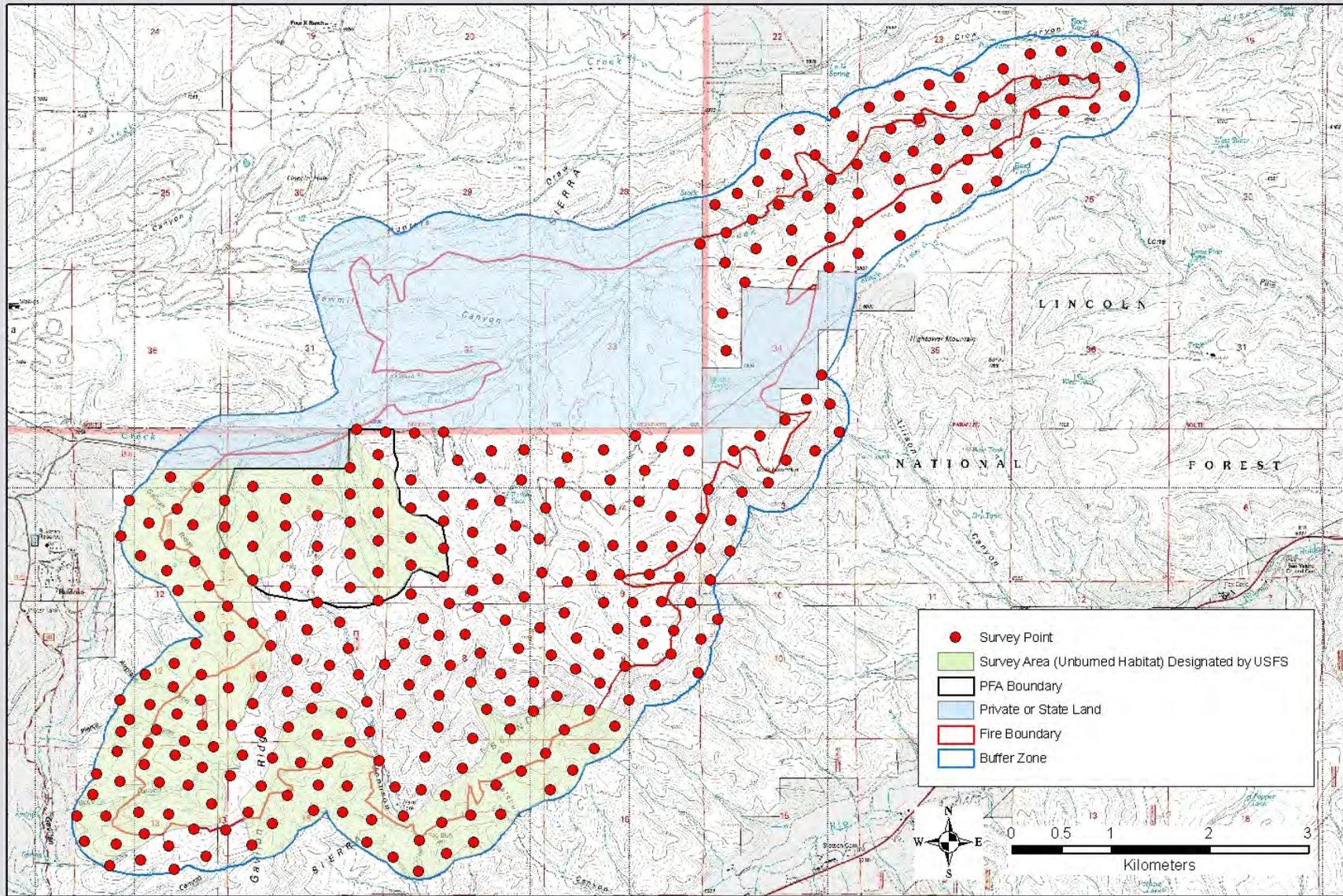


Figure 2. Raptor detections in the Cree study area from 2002 to 2005 on USGS 7.5' quadrangle. This section includes portions from the Angus, Fort Stanton, Ruidoso, and Ruidoso Downs quads in the Lincoln National Forest, New Mexico. Numbers 1-28 indicate information on Appendix 1.

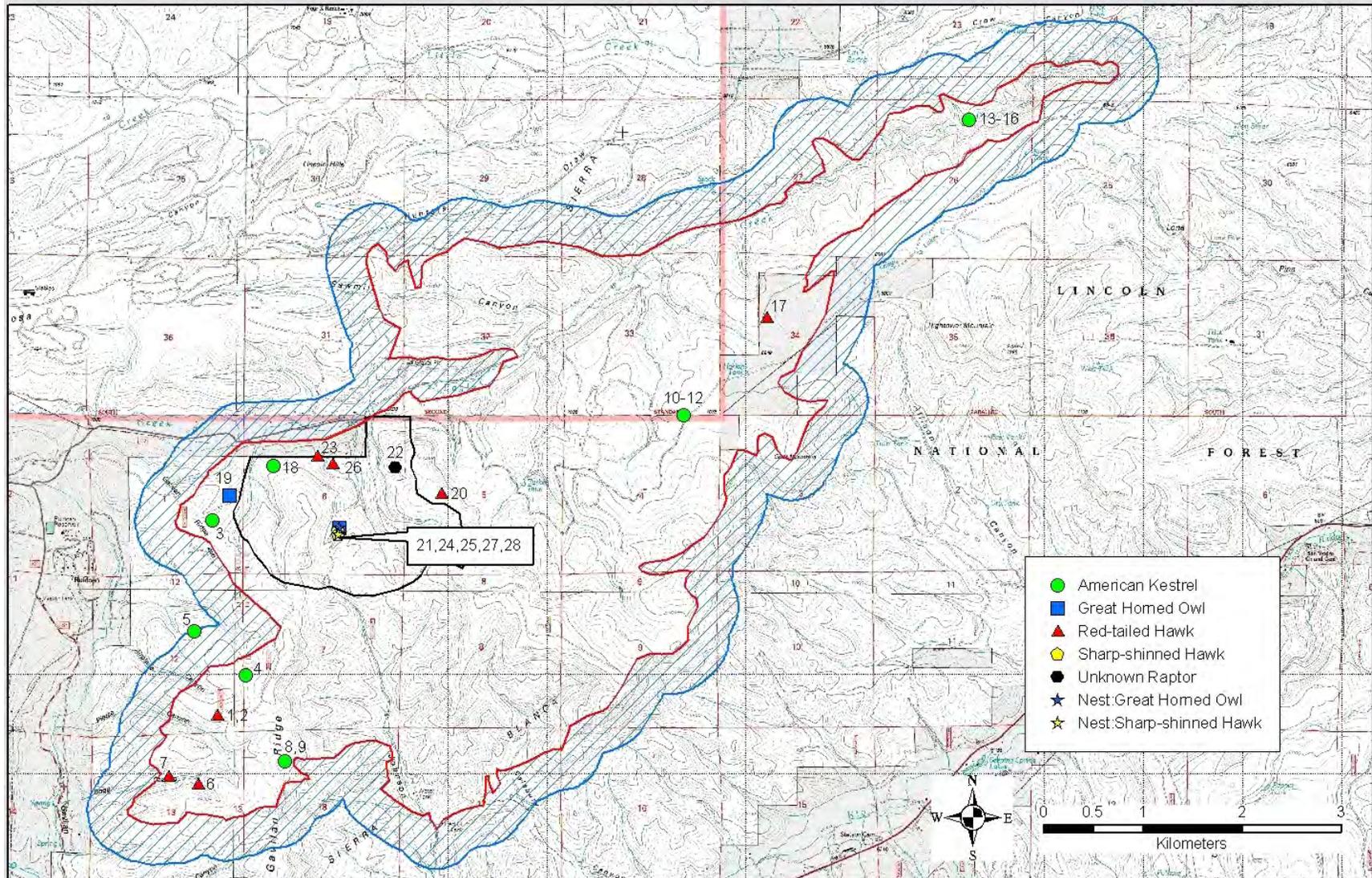
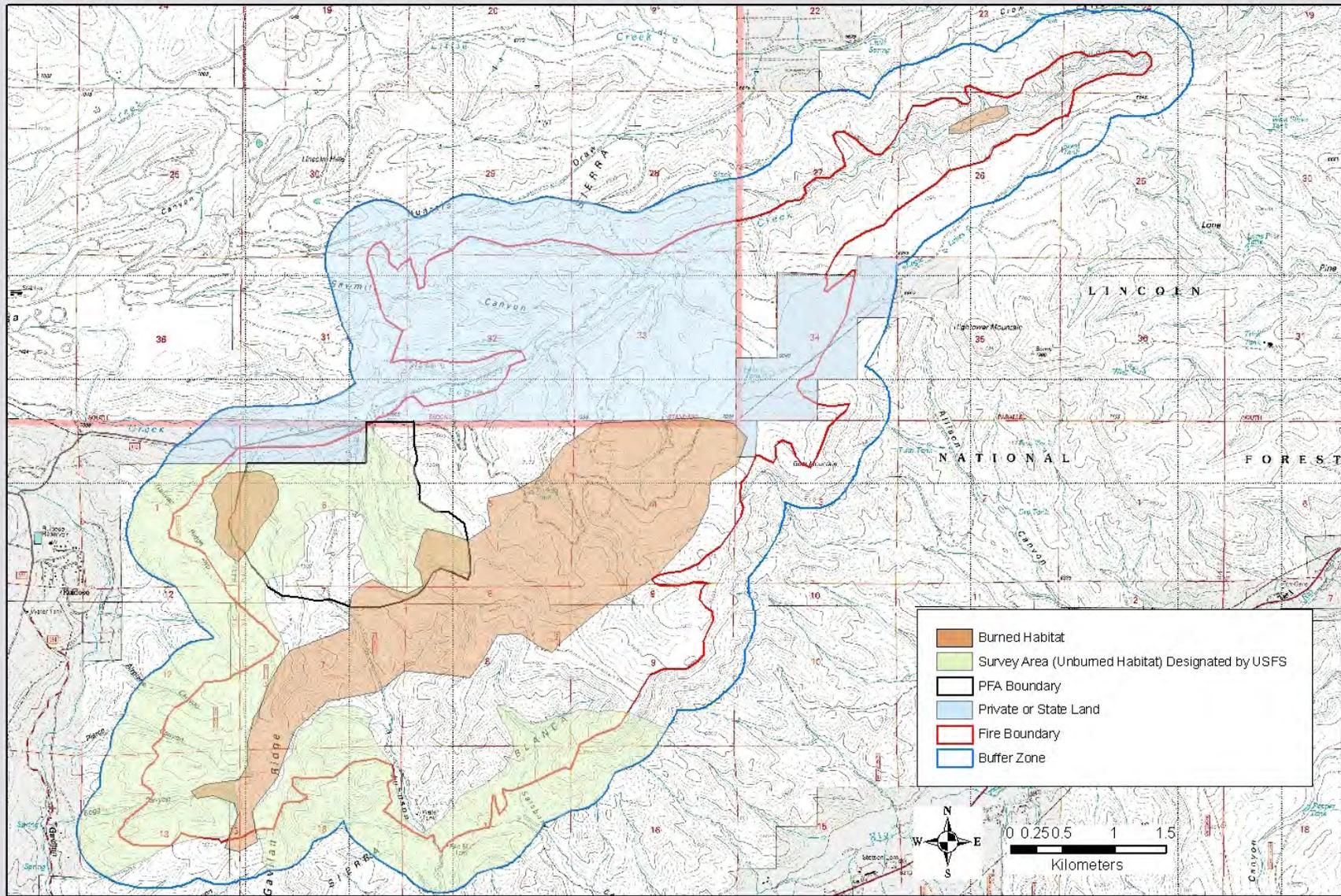


Figure 3. Burned habitat in the Cree study area observed by Hawks Aloft, Inc. in 2005 on USGS 7.5' quadrangle. This section includes portions from the Angus, Fort Stanton, Ruidoso, and Ruidoso Downs quads in the Lincoln National Forest, New Mexico.



Appendix 1. UTM Coordinates (Nad 27) for raptor detections and nest locations in the Cree fire study area in the Lincoln National Forest, New Mexico from 2002-2005. Numbers 1 to 28 indicate individual observation plotted on Figure 2.

#	Survey Area	Date	Common Name	Easting	Northing
1	Inventory	10-July-05	Red-tailed Hawk	441700	3691600
2	Inventory	10-July-05	Red-tailed Hawk	441700	3691600
3	Inventory	10-July-05	American Kestrel	441636	3693551
4	Inventory	10-July-05	American Kestrel	441975	3692000
5	Inventory	10-July-05	American Kestrel	441454	3692436
6	Inventory	11-July-05	Red-tailed Hawk	441500	3690900
7	Inventory	11-July-05	Red-tailed Hawk	441206	3690984
8	Inventory	11-July-05	American Kestrel	442368	3691136
9	Inventory	11-July-05	American Kestrel	442368	3691136
10	Inventory	11-July-05	American Kestrel	446385	3694608
11	Inventory	11-July-05	American Kestrel	446385	3694608
12	Inventory	11-July-05	American Kestrel	446385	3694608
13	Inventory	11-July-05	American Kestrel	449249	3697578
14	Inventory	11-July-05	American Kestrel	449249	3697578
15	Inventory	11-July-05	American Kestrel	449249	3697578
16	Inventory	11-July-05	American Kestrel	449249	3697578
17	Inventory	11-July-05	Red-tailed Hawk	447222	3695588
18	Gavilan PFA	10-July-05	American Kestrel	442250	3694100
19	Gavilan PFA	10-July-05	Great Horned Owl	441808	3693805
20	Gavilan PFA	11-July-05	Red-tailed Hawk	443950	3693825
21	Gavilan PFA	12-June-04	Great Horned Owl	442917	3693479
22	Gavilan PFA	4-July-04	Unknown Raptor	443482	3694079
23	Gavilan PFA	23-June-03	Red-tailed Hawk	442700	3694200
24	Gavilan PFA	23-June-03	Sharp-shinned Hawk	442906	3693452
25	Gavilan PFA	24-June-02	Sharp-shinned Hawk	442908	3693408
26	Gavilan PFA	24-June-02	Red-tailed Hawk	442856	3694119
27	Gavilan PFA	12-June-04	Nest:Great Horned Owl	442917	3693479
28	Gavilan PFA	24-June-02	Nest:Sharp-shinned Hawk	442908	3693408