

**FINAL REPORT**

FIELD SURVEYS FOR  
MEXICAN SPOTTED OWLS (*Strix occidentalis lucida*)  
AND NORTHERN GOSHAWKS (*Accipiter gentiles*)  
IN GRAND CANYON NATIONAL PARK

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**INTRODUCTION**

Understanding the distribution of sensitive raptor species is germane to their long term persistence and perhaps ecosystem health (Gutiérrez et al. 1995). The purpose of this research was to determine the occupancy and breeding status of Mexican spotted owls (*Strix occidentalis lucida*) and Northern Goshawks (*Accipiter gentiles*) within fire management areas in Grand Canyon National Park. Spotted owls and Northern goshawks are of special concern to agencies due, in part, to their specialized habitat requirements (Willey 1995, Gutiérrez et. al. 1995) and evidence for population declines in the southwest (Seamans et al. 1999, Reynolds et al. 2003).

The Mexican spotted owl was listed as a threatened species in 1993 due to threats from timber management and catastrophic fire (Cully and Austin 1993, USDI 1995). During the 1990s, Northern goshawks were identified as "a species of special concern" in response to various threats, including historic timber management, planned forest restoration, and also due to threats to its habitat by fire (USDI 1995, Reynolds et al. 1996, Wolf and Mast 1998).

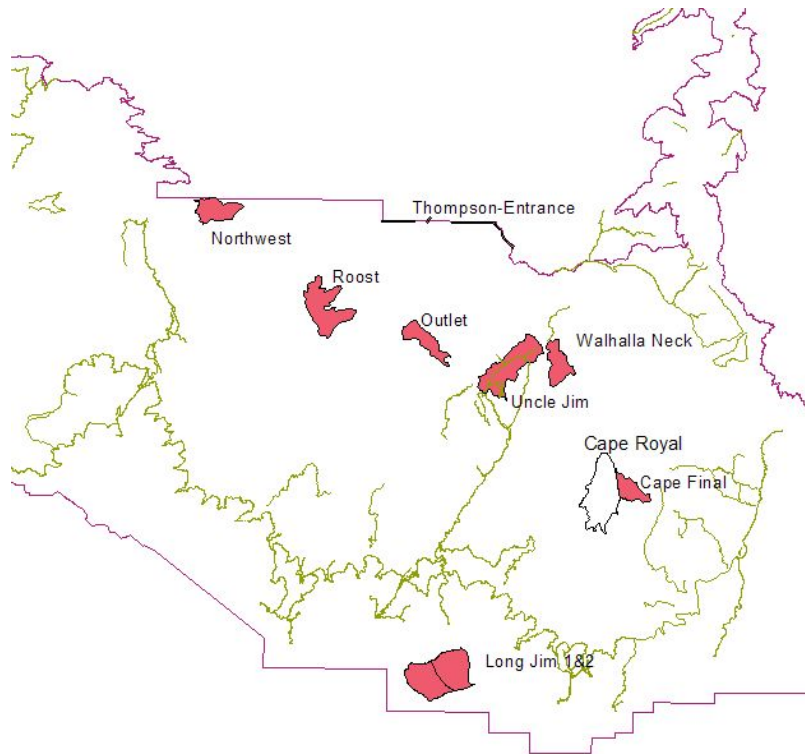
As top-level predators, the spotted owl and goshawk play fundamental roles in proper functioning ecosystems (Forsman et al. 1984, Franklin et al. 1990, USDI 1995). Grand Canyon National Park represents one of the last large pristine landscapes (over 486,000 ha) of breeding habitat for both raptors in the southwest region (USDI 1995). Further, spotted owls and goshawks have been reported in numerous visitor accounts in Grand Canyon since the 1920's (Natural Resources Office, GRCA), and more recently, surveys located spotted owls in over 45 territories in the park (Willey et al. 2003), and goshawks have established 100+ territories across

the Kaibab Plateau (Reynolds et. al 2003). The National Park Service has initiated detailed surveys for both species within planned management project areas in the park's forest highlands

(Fig. 1). Specifically, this research project had the following objectives:

- Conduct surveys for spotted owls and Northern goshawks in designated project areas (Fig. 1).
- Conduct all owl and goshawk surveys using the standardized protocols.
- Conduct follow-up visits to all active owl and goshawk sites to locate roost and nest site UTMS, and assess the reproductive status.
- Document all techniques and survey results on standardized data forms.
- Create shapefiles using ArcView GIS 3.2a that show project and survey boundaries, survey points, and locations of all raptor species encountered.

**Figure 1.** Location of the raptor survey areas on the North and South Rims of Grand Canyon National Park.



## **METHODS**

### **Study Area**

Grand Canyon is located within the Colorado Plateau physiographic province of the western United States (Thornbury 1965, Brown 1982). Grand Canyon National Park is located approximately 120-km northwest of Flagstaff, Arizona. Within the park, the raptor survey units were distributed among the forested highlands located on the north and south rims of Grand Canyon (Fig. 1). The park landscape is dominated by a deeply entrenched river corridor dissected by numerous tributaries and rimmed by high cliffs and stair-step benchlands. The rim habitats give way to relatively flat forested plateaus often including Ponderosa pine (*Pinus ponderosa*) forests. Vegetation below the canyon rims includes riparian and upland vegetation stretching along canyon bottoms, desert scrub and montane vegetation present along the uplands and side-canyons, pinyon juniper habitat is scattered at mid-elevation slopes, and mixed conifer vegetation dominates the highest elevations. Elevations throughout the park range from 1,109 to 3,960 m. Total annual precipitation averages 17 cm per year, and temperatures range seasonally from below 0 to 40<sup>0</sup>C (U.S. Weather Bureau, Climate and Precipitation Summaries, Arizona).

### **Survey Methods**

Survey methods for spotted owls followed the standardized survey protocol (USDI 2003). This protocol includes guidance and recommendations for owl surveyors to: (1) make inferences regarding the presence or absence of owls in a defined area; (2) assess occupancy and nesting status, and locate nests, in areas where habitat alterations or disturbances to owls are likely to occur; and (3) provide information to allow designation of Protected Activity Centers (PACs)(USDI 1995). It has long been recognized that the

best way to detect the presence of spotted owls within potential habitat is to mimic their calls and listen for a response. The standard protocol uses calling points placed every 0.5 miles along survey routes stratified along ridges and canyon bottoms in the study areas to accomplish complete coverage of the area. The survey design uses designated **calling stations** to locate owls. The intent of establishing calling routes and calling stations is to obtain **complete coverage** of the survey area so that owls will be able to hear a surveyor calling and a surveyor will be able to hear the owl(s) responding. The number of calling routes and calling stations depends on the size of the area, topography, vegetation, and access.

The vocal repertoire of owls consists of a variety of hooting, barking, and whistling calls (Ganey 1990). Three call types accounted for 86 percent of calling bouts heard in Arizona: four-note location call, contact call, and bark series. The four-note call appears to be used the most frequently by owls defending a territory. Therefore, surveyors used all three of these calls during surveys, with the four-note call as the primary call. Surveyors spent at least 15 minutes at each calling station: 10 minutes devoted to calling and listening in an alternating fashion, and the last 5 minutes listening. Each calling point was called four times during the field season.

The northern goshawk protocol required two complete surveys between April 15 and Aug 31. The standardized protocol for goshawks included use of tape playback to produce goshawk alarm and begging calls while traversing line transects placed every 300 meters throughout each study area. Once a spotted owl or a goshawk was detected, surveyors recorded the following information: location of the raptor by UTM (Universal Transverse Mercator); sex and age of raptor; habitat type of raptor's position; time; date; weather conditions; moon phase; and a description of the type of raptor response.

## **RESULTS AND DISCUSSION**

### **Mexican Spotted Owls**

Field surveys for spotted owls were conducted in 12 survey areas and surveys for goshawks were completed in 5 study areas during May-August 2005 (Table 1). Mexican spotted owls were not detected in any survey unit during 2005. The field surveys did detect Western Screech Owls, Flammulated Owls, Northern Sawhet Owls, and Great Horned Owls. Detection of other owl species appeared to be influenced by season, e.g., within the Thompson study area, Flammulated Owls (OTFL) were not detected until the fourth survey visit on 28 July, suggesting that detection probability is low or the owls are not present until mid to late summer. In contrast, OTFL, Long-eared Owls, Pygmy Owls, and Northern Sawhet Owls were detected in the Northwest study area in mid-June but none were detected in the area during July.

### **Northern Goshawk Surveys**

Northern goshawks were not detected within the project areas, although several other diurnal raptors were detected (Table 1). An adult Northern Harrier responded to a goshawk call in the Long Jim II study area and juvenile female Cooper's Hawk responded to a juvenile goshawk call used during playback. In addition, an adult Cooper's Hawk responded to tape playback of the mature adult goshawk in the Long Jim – I study area. Raptors often respond to tape playbacks used to attract birds, in particular, goshawk calls can frequently elicit territorial responses (Reynolds et al. 1994, 2005).

**Table 1.** Results of field surveys for spotted owls and northern goshawks within survey areas in Grand Canyon National Park, summer 2005.

<b>Project Name</b>	<b>Plateau</b>	<b>Acres</b>	<b>MSO Detected</b>	<b>NOGO Detected</b>
Thompson05/06	North Rim	79	None	None
Thompson07	North Rim	94	None	None
Range Roost	North Rim	70	None	None
Northwest 5 RX	North Rim	1199	None	No Survey
Uncle Jim RX	North Rim	1403	None	No Survey
Cape Royal	North Rim	2780	None	No Survey
Cape Final	North Rim	801	None	No Survey
Outlet	North Rim	1000	None	No Survey
Neck	North Rim	1084	None	No Survey
Roost	North Rim	2215	None	No Survey
Long Jim I	South Rim	1776	None	None
Long Jim II	South Rim	1656	None	None

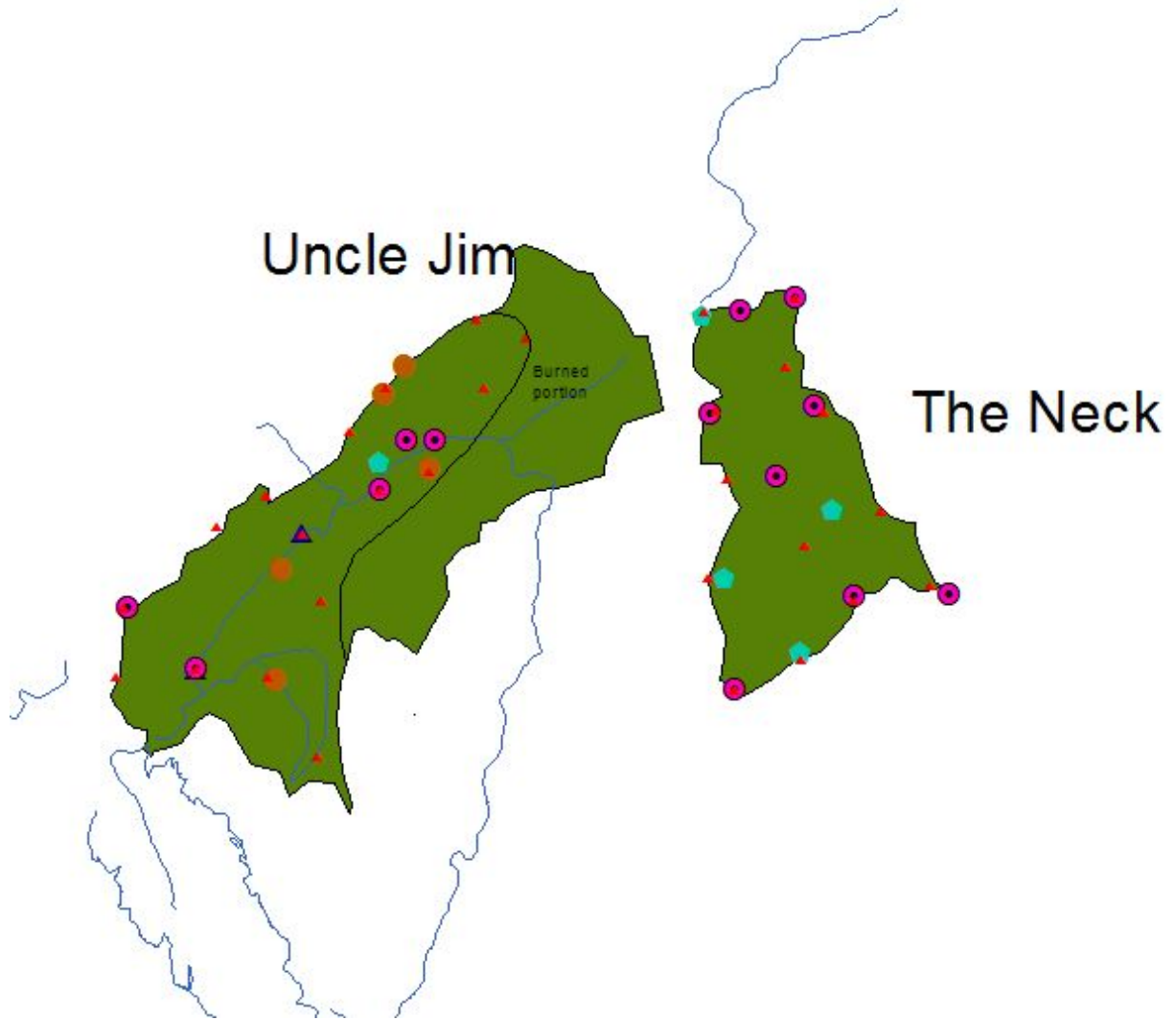


Figure 2. Example of owl species detected in Grand Canyon survey units, 2005. Bulls-eye symbols are Flammulated owls, Green pentagons are Great-horned owls, Blue and red triangles are Northern Pygmy owls, and orange circles are Northern Saw-whet Owls. Red triangles are calling stations.



The potential effects of activities like trail building and prescribed fire on the owl, and its habitat in Grand Canyon, are unclear. The survey results suggest that effects from rim activities on spotted owls may be minimal since few, if any spotted owls use the rim habitats. Surveys for Mexican spotted owls below the rims in the park have located over 45 spotted owl territories, and nesting was confirmed at several sites by the observation of young owls (e.g., Willey and Ward 2001). Habitat at the interior sites ranges from low elevation desert-shrub to higher elevation mixed-conifer forest. Spotskey and Willey (2000) categorized these sites as "Steep Canyon Habitat Cover Type". Results from the 2005 field season reinforce the predictions of habitat models, i.e., the owl primarily occupies the interior canyons and relatively open Great Basin Desert scrub and Great Basin Conifer Woodland vegetation, but on occasion will use the higher elevation montane habitats.

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