

**FINAL REPORT**

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

**Prepared by:**

**DAVID WILLEY, Assistant Professor,**  
Montana State University  
Department of Ecology, 310 Lewis Hall  
Bozeman, MT 59717

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IN GRAND CANYON NATIONAL PARK**

**INTRODUCTION**

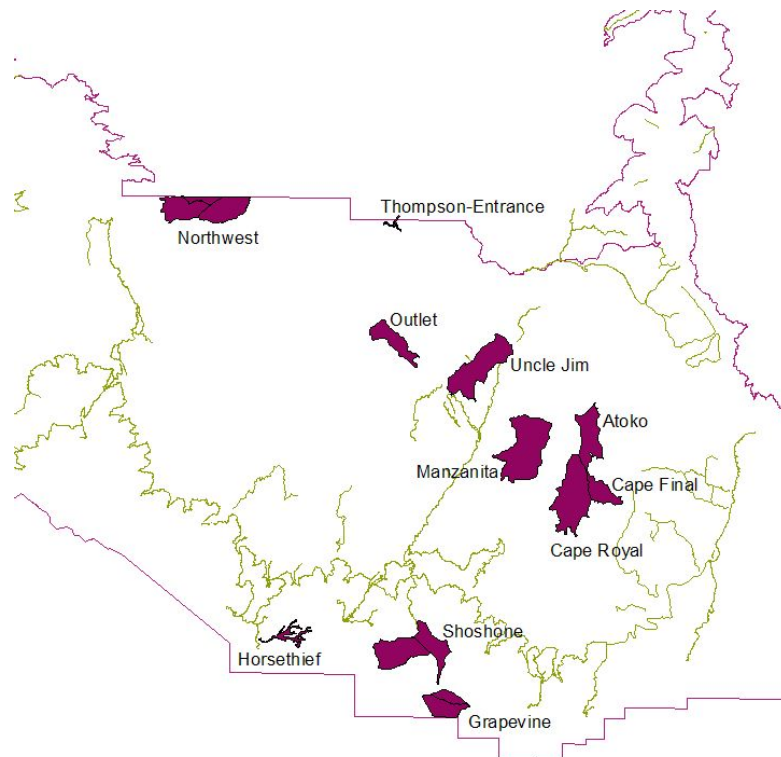
The purpose of this research and the field surveys was to determine, to best of our ability (USDI 1992), the occupancy and breeding status of Mexican spotted owls (*Strix occidentalis lucida*) and Northern Goshawks (*Accipiter gentiles*) in selected project areas in Grand Canyon National Park (NPS Task Agreement No. J8227044011). Spotted owls and Northern goshawks are of special concern to federal agencies due, in part, to their specialized habitat requirements (Willey 1995, Gutiérrez et al. 1995) and because evidence exists for population declines in the southwest U.S. (Seamans et al. 1999, Reynolds et al. 2003). Furthermore, the Mexican spotted owl was listed as a threatened species in 1993 in response to threats from timber management and the potential for catastrophic wildfire (Cully and Austin 1993, USDI 1995). Northern Goshawk During the 1990s, Northern goshawks were identified by numerous agencies as "a species of special concern" in response to various threats, including historic timber management, from planned forest restoration efforts, and from threats to its habitat by wildfire (USDI 1995, Reynolds et al. 1996, Wolf and Mast 1998).

As top-level predators, the owl and goshawk play fundamental roles in proper functioning ecosystems, and via monitoring programs, research may help us assess environmental changes (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 (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.

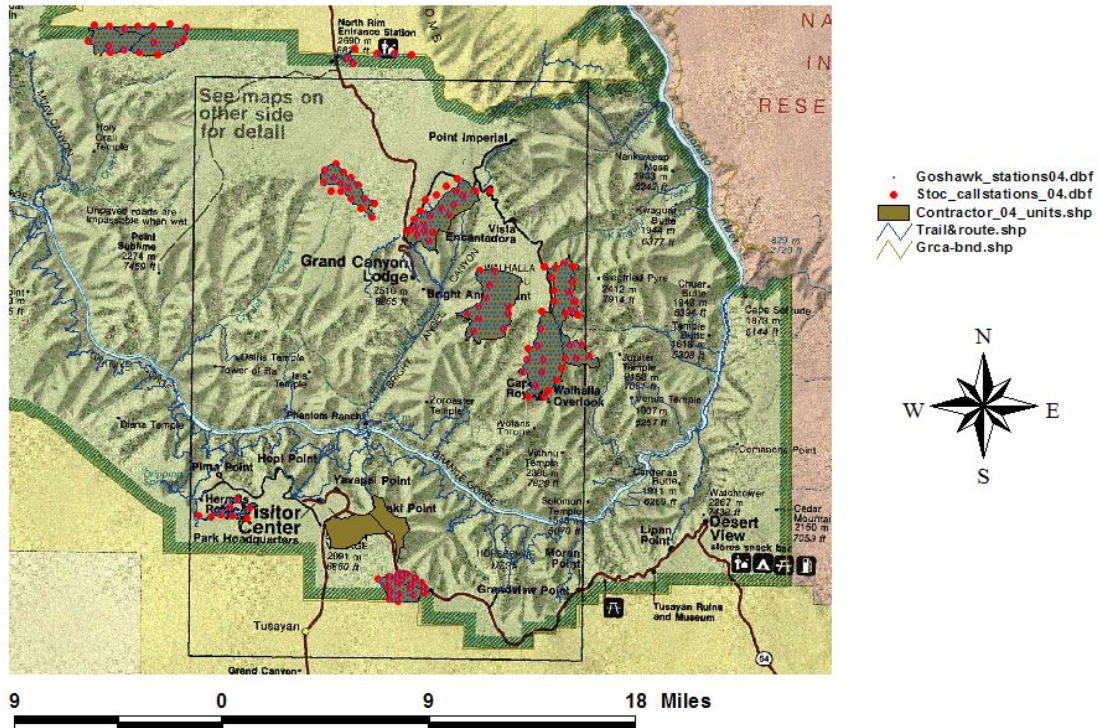
The vocal repertoire of owls consists of a variety of hooting, barking, and whistling calls (Ganey 1990). Three call types accounted for 86 percent of calling bouts heard in Arizona: four-note location call, contact call, and bark series. The four-note call appears to be used the most frequently by owls 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**

Field surveys for spotted owls and goshawks were completed at 136 and 754 stations, respectively, during May-August 2005 (Fig. 2, and Table 1). Mexican spotted owls were detected at several locations, including four calling stations located within Ponderosa pine forest in the Manzanita survey unit (Table 2; Fig. 3), and adjacent to the Cape Final unit, near Vista Encantada (Fig. 3). In addition, the surveys

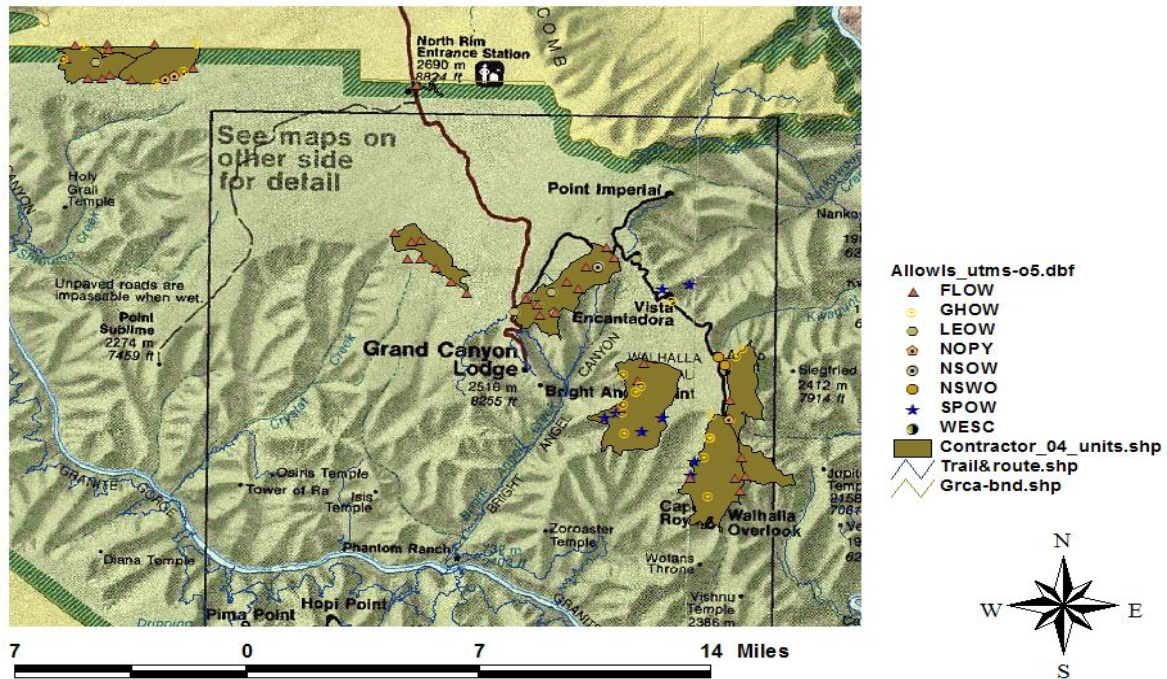
## Spotted Owl and Northern Goshawk Calling Stations, summer 2004



**Figure 2.** Spotted Owl and Northern Goshawk calling stations established in Grand Canyon National Park, summer 2004.

detected Western Screech-owls, Flammulated owls, Northern Sawwhet owls, Long-eared Owls, Northern Pygmy-owls, and Great-horned Owls among the various survey units (Table 2; and Fig. 3). Flammulated owls and Great-horned Owls were by far the most common species detected during the owl surveys (Fig. 3). In addition to the owl species detected, Northern goshawks were located within three study units: Atoko, Cape Final, and Manzanita (Tables 3, Fig. 4). Four Goshawk nests were located, and six juvenile Goshawks were observed. Raptor locations are provided as UTM coordinates for all owls in Appendix I, and UTMs are given for Northern Goshawks in Appendix II.

# Owl species detected in Grand Canyon, 2004



**Figure 3.** Owls detected during the 2004 field surveys in Grand Canyon. Flow = Flammulated owl; GHOW = Great-horned Owl; LEOW = Long-eared Owl; NOPY = Northern Pygmy-owl; NSOW = Short-eared Owls; NSWOW = Northern Sawhet-owl; SPOW = Mexican spotted owl; and WESC = Western Screech-Owl.

**Table 1.** Spotted owls and goshawks detected within study units in Grand Canyon, 2004.

Project Name	Plateau	Hectares (Ac)	MSO Detected	NOGO
Thompson	North Rim	12 (30)	None	None
Northwest	North Rim	779 (1923)	None	None
Uncle Jim	North Rim	1000 (2475)	None	None
Cape Final/Atoko	North Rim	922 (2279)	None	<b>4 sites</b>
Manzanita	North Rim	1214 (3000)	<b>1 site</b>	<b>1 site</b>
Cape Royal	North Rim	1125 (2780)	None	None
Shoshone	South Rim	441 (1090)	<i>NO Survey</i>	None
Grapevine/RX 300	South Rim	508 (1255)	None	None
Horsetail	South Rim	202 (500)	None	None
Long Jim III	South Rim	655 (1618)	<i>NO Survey</i>	None
Outlet	North Rim	485 (1200)	None	None

**Table 2.** Owl species detected during field surveys in Grand Canyon National Park, 2004.

<b>Species</b>	<b>No. Detected</b>	<b>No. Units</b>	<b>Comments/Location</b>
Flammulated Owl	47	9	Most abundant species
Great-horned Owl	24	6	Very common
Long-eared Owl	6	2	
N. Pygmy Owl	4	3	
N. Sawhet Owl	3	2	Uncle Jim and Atoko areas
Western Screech Owl	1	1	
Spotted Owl	3	1	Manzanita, Cape Final

**Table 3.** Northern Goshawks detected during the field surveys in Grand Canyon, 2004.

<b>Survey Unit</b>	<b>Type of detection</b>	<b>Date</b>	<b>Comments</b>
Cape Final	Juvenile and nest	20 August 2004	Historic nest area
Atoko	1 adult, 2 juveniles, nest	14 July 2004	New nest
Atoko	1 adult	16 July 2004	Single adult seen
Atoko	1 adult, 1 juvenile, nest	17 July 2004	Historic nest (2056)
Manzanita	1 juvenile in nest	11 August 2004	New nest



## Northern Goshawk locations on the North Rim

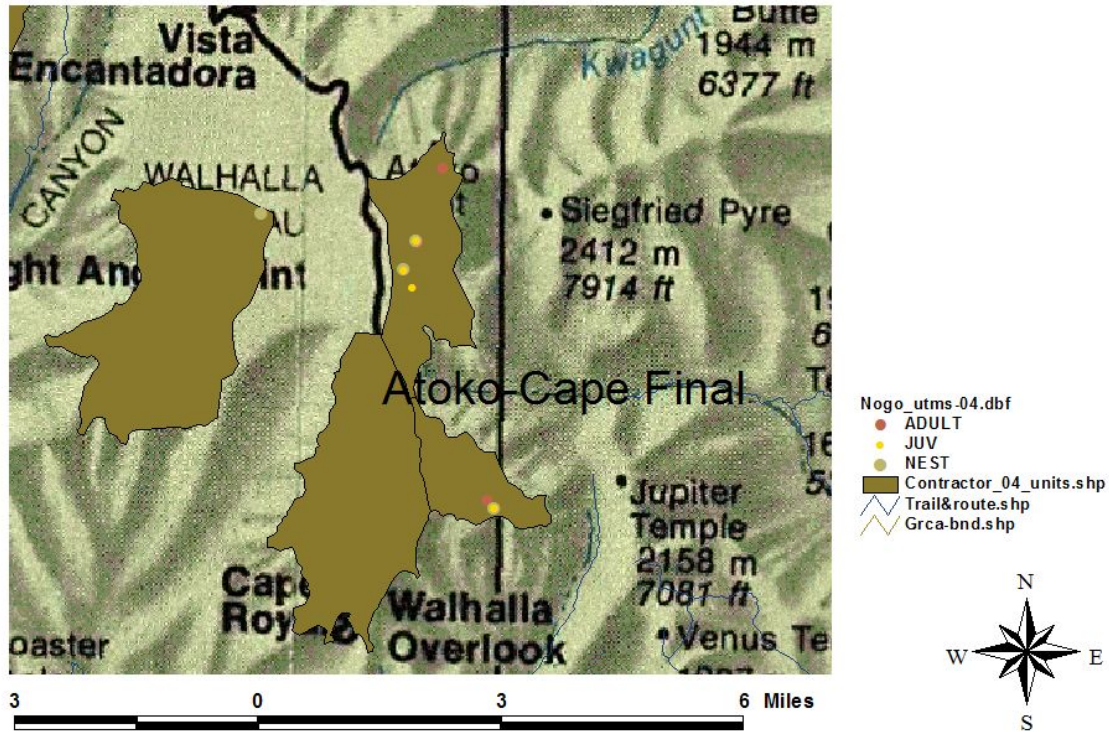


Figure 4. Northern Goshawks located on the North Rim of Grand Canyon, summer 2004.

### DISCUSSION

The purpose of these surveys was to examine habitat occupancy patterns and assess population status of Mexican spotted owls and Northern Goshawks in forested project areas within Grand Canyon National Park (Fig. 1). These surveys provided clearances for ongoing fire management activities in Grand Canyon. Both raptor species are of special concern to biologists and fire managers due in part to their narrow habitat requirements and evidence for population

declines (Willey 1998, Reynolds et al. 2003). The Mexican spotted owl (*Strix occidentalis lucida*) was federally listed as a threatened species but little is known regarding its home range characteristics and nesting success within remote canyonlands (Cully and Austin 1993, Willey 1998). Seamans et al. (1999) detected a 10% annual rate of decline during a ten-year period for spotted owl populations in both Arizona and New Mexico. Northern Goshawks (*Accipiter gentiles*) have been listed as "...a species of special concern" by both state and federal agencies due to threats to its habitat by forest management activities and wildfire (Reynolds et al. 1996). Loss of dense nest-stands in mixed conifer forest patches, e.g., due to wildfire, prescribed fire, and timber management, results in continuing petitions to list the Goshawk as "threatened" (USDI 2000).

The management of Goshawks and Spotted Owls is controversial because of our poor understanding of ecological fundamentals for both species, e.g., limits to nesting success, habitat specificity, and tolerance to habitat change. These gaps in our knowledge highlight the need for research examining both raptor species (Andersen and Mahato 1995). Grand Canyon National Park is an excellent site for ecological investigations because it encompasses perhaps the largest intact remnant (approximately 1.2 million acres) of pristine breeding habitat for both species in the region (USDI 1995).

Spotted owls and Northern Goshawks are possible indicators of environmental change and may perform fundamental roles in a proper functioning ecosystem (Forsman et al. 1984, Franklin et al. 1990, USDI 1995). 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 spotted owls were detected using the forested rim habitats, although two individuals were observed using forest habitat near Vista Encantata and within

the Manzanita study area. In contrast, surveys for Mexican spotted owls below the canyon rims have located over 50 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 2004 field season surveys tend to reinforce the predictions of existing 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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**Appendix I:** UTM locations for Mexican Spotted Owls and all other owl species detected during the field surveys in Grand Canyon National Park.

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StudyArea	CALLPT	SPECIES	XCOOR	YCOOR
CAPERROYAL	4	FLOW	415647	3999492
CAPERROYAL	5	FLOW	415927	4000321
CAPERROYAL	6	FLOW	415746	4001305
CAPERROYAL	10	GHOW	414361	4003664
CAPERROYAL	11	GHOW	414261	4002416
CAPERROYAL	11	GHOW	414310	4002425
CAPERROYAL	13	GHOW	414000	4001350
CAPERROYAL	14	WESC	414985	4006003
CAPERROYAL	15	GHOW	414194	3999233
CAPERROYAL	18	SPOW	413335	4000385
CAPERROYAL	18	FLOW	413223	4000167
CAPERROYAL	19	SPOW	413468	4001134
ENTRANCE	3	FLOW	399992	4021484
GRAPEVINE	2	FLOW	404279	3984579
GRAPEVINE	3	FLOW	405123	3984333
GRAPEVINE	5	FLOW	405978	3984671
GRAPEVINE	7	GHOW	404110	3983603
GRAPEVINE	8	FLOW	403685	3984063
GRAPEVINE	8	GHOW	403667	3984067
GRAPEVINE	9	FLOW	403664	3984295
GRAPEVINE	9	GHOW	403513	3984515
GRAPEVINE	9	GHOW	403552	3984067
ATOKO-FINAL	7	FLOW	415403	4000200
ATOKO-FINAL	8	NOPY	415202	4003320
ATOKO-FINAL	11	GHOW	415837	4007256
ATOKO-FINAL	12	GHOW	415558	4006835
ATOKO-FINAL	13	NSWO	414656	4006701
ATOKO-FINAL	14	NSWO	414977	4006305
ATOKO-FINAL	16	FLOW	415157	4004382
HORSETHIEF	3	FLOW	391878	3989378
HORSETHIEF	4	FLOW	392775	3989406
HORSETHIEF	6	FLOW	393700	3989834
NORTHWEST	1	FLOW	389166	4022405
NORTHWEST	1	GHOW	389400	4023773
NORTHWEST	3	GHOW	388783	4022285
NORTHWEST	4	GHOW	387443	4021581
NORTHWEST	5	FLOW	386153	4021760
NORTHWEST	6	FLOW	385140	4022000
NORTHWEST	7	FLOW	384074	4021833
NORTHWEST	10	FLOW	387320	4023694
NORTHWEST	12	GHOW	385039	4023394
NORTHWEST	12	FLOW	385000	4023689
NORTHWEST	12	FLOW	385029	4023407
NORTHWEST	13	GHOW	383907	4023659

NORTHWEST	14	FLOW	383400	4023670
NORTHWEST	15	FLOW	382988	4022888
NORTHWEST	15	GHOW	382954	4022976
NORTHWEST	16	NOPY	388297	4021954
NORTHWEST	16	NOPY	387840	4021744
NORTHWEST	16	FLOW	384764	4021828
NORTHWEST	16	LEOW	384468	4022735
MANZANITA	1	SPOW	410952	4002739
MANZANITA	2	SPOW	411948	4003501
MANZANITA	15	GHOW	410121	4002638
MANZANITA	16	SPOW	409673	4003703
MANZANITA	16	GHOW	410021	4003802
MANZANITA	17	FLOW	409858	4003978
MANZANITA	17	GHOW	410080	4004211
MANZANITA	17	SPOW	409115	4003504
MANZANITA	19	FLOW	410714	4005479
MANZANITA	19	GHOW	410727	4004924
MANZANITA	19	GHOW	410930	4005180
MANZANITA	20	GHOW	410095	4005813
MANZANITA	21	FLOW	411028	4006430
VISTAENCANT	1	SPOW	411947	4010476
VISTAENCANT	2	SPOW	413231	4010679
OUTLET	10	FLOW	399563	4012045
OUTLET	13	FLOW	401640	4010850
OUTLET	6	FLOW	400167	4013058
OUTLET	8	FLOW	398926	4013525
OUTLET	11	FLOW	400204	4012044
OUTLET	12	FLOW	400919	4011539
OUTLET	9	FLOW	399766	4012970
OUTLET	10	FLOW	399543	4012047
OUTLET	1	FLOW	402390	4010207
UNCLEJIM	2	FLOW	405979	4009003
UNCLEJIM	3	LEOW	405878	4009547
UNCLEJIM	3	FLOW	405859	4009560
UNCLEJIM	5	LEOW	406560	4010250
UNCLEJIM	6	NOPY	406700	4009159
UNCLEJIM	6	FLOW	406679	4009170
UNCLEJIM	7	FLOW	407838	4010430
UNCLEJIM	9	LEOW	404790	4009193
UNCLEJIM	10	LEOW	405376	4010007
UNCLEJIM	10	FLOW	405348	4010039
UNCLEJIM	11	FLOW	405257	4009915
UNCLEJIM	14	FLOW	407287	4010813
UNCLEJIM	15	FLOW	408179	4011639
UNCLEJIM	16	NSOW	408818	4011654
UNCLEJIM	17	LEOW	410692	4012092
UNCLEJIM	17	FLOW	409584	4012108
UNCLEJIM	18	FLOW	409199	4012713

**Appendix II:** UTM locations for Northern Goshawks detected during the field surveys in Grand Canyon National Park.

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AREA	STATION	SPECIES	TYPE	XCOORD	YCOORD	DATE
ATOKO-CAPE	8	NOGO	ADULT	417050	4000300	14-Jul
ATOKO-CAPE	8	NOGO	NEST	417211	4000141	14-Jul
ATOKO-CAPE	8	NOGO	JUV	417211	4000141	14-Jul
ATOKO-CAPE	8	NOGO	JUV	417211	4000141	14-Jul
ATOKO-CAPE	95	NOGO	ADULT	416167	4006884	16-Jul
ATOKO-CAPE	72	NOGO	ADULT	415677	4005415	17-Jul
ATOKO-CAPE	72	NOGO	NEST	415643	4005447	17-Jul
ATOKO-CAPE	72	NOGO	JUV	415643	4005447	17-Jul
ATOKO-CAPE	60	NOGO	JUV	415567	4004526	20-Aug
ATOKO-CAPE	62	NOGO	NEST	415414	4004896	20-Aug
ATOKO-CAPE	65	NOGO	JUV	415400	4004870	21-Aug
MANZANITA	121	NOGO	JUV	412585	4005997	11-Aug
MANZANITA	121	NOGO	NEST	412585	4005997	11-Aug