2013 Breeding Raptor Survey
Bureau of Land Management
Taos Field Office Resource Area
Final Report

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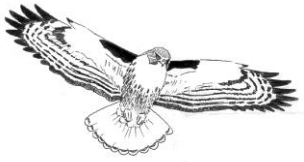

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Executive Summary

The Upper Rio Grande Gorge, Rio San Antonio Gorge, and Orilla Verde Recreation Area are important sites for breeding raptors in northern New Mexico and southern Colorado. In 2000, Hawks Aloft, Inc. was contracted to conduct distribution and productivity surveys of breeding raptors in the region. These surveys, although variable in survey area, effort, and species monitored, were continued from 2003-2007, 2010 (with a different contractor and protocol), and 2011-2013. This report summarizes results from 2013 and provides a review of results from previous survey years. Field work in 2013 was initiated on 24 March, and results for 2013 represent a complete season of effort. Nine previously undocumented raptor/raven nest sites were discovered, bringing the total number of documented sites in the study area to 123. A total of 13 occupied territories and 22 active nest sites, representing seven raptor species and Common Raven (*Corvus corax*), were documented in 2013. Reproductive success was determined at 15 sites, representing six raptor species and Common Raven, and 12 sites with known fates were successful, fledging 20 chicks. Nest success rates and productivity rates by species were: Prairie Falcon (*Falco mexicanus*, 100%, 3.0, n=2), Ferruginous Hawk (*Buteo regalis*, 100%, 2.5, n=2), Great Horned Owl (*Bubo virginianus*, 100%, 1.0, n=1), Swainson's Hawk (*B. swainsoni*, 100%, 1.0, n=1), Golden Eagle (*Aquila chrysaetos*, 83%, 1.0, n=6), Red-tailed Hawk (*B. jamaicensis*, 50%, 0.5, n=2), and Common Raven (0%, 0.0, n=1). Because all successful nests in 2013 had known fledgling counts, and because the success/fail-ratio of nests with known fate was based on a complete survey season, 2013 results are particularly useful for multi-year analyses. The years 2003-2007, and 2012, are most similar, in terms of start date and effort to 2013; the years 2007, 2012, and 2013 are the only years when all successful nests had known fledgling counts, making productivity calculations possible without the use of fledgling estimates.

Introduction

The Upper Rio Grande Gorge, Orilla Verde Recreation Area, and the Rio San Antonio Gorge are important areas for nesting raptors in north-central New Mexico, as well as migration corridors for many other raptor species. This relatively undeveloped area includes an abundance of cliff walls that provide ideal nesting substrate for many raptor species, including Golden Eagle (*Aquila chrysaetos*), Prairie Falcon (*Falco mexicanus*), Peregrine Falcon (*F. peregrinus*), Red-tailed Hawk (*Buteo jamaicensis*), and Great Horned Owl (*Bubo virginianus*). Over the past two decades, recreational use of the Upper Rio Grande Gorge and Orilla Verde Recreation Area has substantially increased. Activities such as boating, fishing, hiking, and cycling can potentially have adverse impacts on nesting raptors (Call 1978, New Mexico Avian Protection Working Group 2005, Watson and Dennis 1992). All raptor species and their nests are protected under the Migratory Bird Treaty Act of 1918. Bald Eagles (*Haliaeetus leucocephalus*) and Golden Eagles receive further protection under the Bald and Golden Eagle Protection Act of 1940.

Prior to 2000, little information concerning the status of raptors in the Upper Rio Grande Gorge region was available, and official surveys had not occurred since the 1980s. In 2000, the Taos Field Office of the Bureau of Land Management (BLM) contracted Hawks Aloft, Inc. to conduct a survey of the breeding raptor population in the Upper Rio Grande Gorge. In 2003, this work was extended to include the Orilla Verde Recreation Area and the Rio San Antonio Gorge, and these surveys were continued through 2007. In 2009, only Golden Eagle sites in the Upper Rio Grande Gorge were monitored. Full surveys were reinstated in 2010, but were not conducted by Hawks Aloft, Inc., and a different protocol was followed. Since 2011, Hawks Aloft has again conducted surveys for all raptor species in the full survey area. The primary purpose of this

project is to document raptor distribution, productivity, and population trends in the project area in order to assist the BLM in decision making that may impact raptor populations. This report documents the results of 2013 breeding raptor surveys and also summarizes findings from past survey years.

Study Area

Surveys were conducted in three areas in northern New Mexico and southern Colorado: The Upper Rio Grande Gorge, the Rio San Antonio Gorge, and the Orilla Verde Recreation Area. These sites occur in Taos and Rio Arriba counties, New Mexico, and in Conejos and Costilla counties, Colorado.

The Upper Rio Grande Gorge survey area covers approximately 66 kilometers of river from the John Dunn Bridge in New Mexico to the Lobatos Bridge in southern Colorado. The John Dunn Bridge is located approximately four kilometers west of the town of Arroyo Hondo, and the Lobatos Bridge crosses the Rio Grande approximately 13 kilometers north of the Colorado-New Mexico border. The Rio Grande begins to cut into the layered basalt of the Taos Plateau just south of the Lobatos Bridge where the Upper Gorge technically begins. The gorge is approximately 60 meters wide and 45 meters deep at the New Mexico-Colorado border. The gorge meanders south and gradually widens and deepens, reaching its maximum size at the Wild Rivers Area, where it is approximately one kilometer across and 250 meters deep. Continuing south, the canyon narrows and becomes shallower again; at the John Dunn Bridge it is approximately 0.4 kilometers wide and 100 meters deep.

The Taos Plateau is flanked by the alluvial fans of the Sangre de Cristo Mountains to the east, and the Tusas Mountains to the west. The plateau is dotted with numerous cinder cones and a few widely scattered, large shield volcanoes. The elevation of the Taos Plateau along the canyon rim ranges from 2,072 meters at the John Dunn Bridge to about 2,316 meters in southern Colorado. Habitat on the Taos Plateau can be generally categorized as Great Basin desert shrub with big sagebrush (*Artemisia tridentata*) as the major shrub component. From the John Dunn Bridge north through the Wild Rivers Area, the east rim of the gorge is predominantly pinyon-juniper woodland, containing Colorado pinyon pine (*Pinus edulis*) and juniper (*Juniperus* sp.). Some of the larger side canyons contain mixed conifer woodland with ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). The west rim is primarily juniper savanna and shrub/grassland habitat, with pinyon-juniper woodland becoming dominant along the Wild Rivers Area. Both the east and west rim from Sheep Crossing north to the Lobatos Bridge are mainly shrub/grassland and sparse shrub/grassland with scattered areas of juniper savanna. The bottom of the Rio Grande Gorge consists of riparian woodland, with areas of mixed conifer woodland occurring mainly in the southern portion of the survey area north through the Wild Rivers Area. This reach of the Rio Grande Gorge has large, widely scattered mature ponderosa pines along the canyon bottom in close proximity to the river. North of the Wild Rivers Area the canyon bottom narrows and few trees are found in this portion of the survey area.

The Orilla Verde Recreation Area begins just north of the town of Pilar, New Mexico and follows the Rio Grande north for approximately 10 kilometers to the point where county road No. 570 climbs to the west rim of the gorge. Riparian habitat here is relatively consistent with the upper gorge area. The east and west rims are also characterized as Great Basin desert shrub.

The elevation ranges from 1,830 meters on the canyon bottom to 2,073 meters at the canyon rim. The width of the canyon is about one kilometer at the north end and widens to over a kilometer near Pilar.

The Rio San Antonio Gorge is located approximately 35 kilometers north of the town of Tres Piedras, New Mexico and five kilometers west of Highway 285. The headwaters of the Rio San Antonio originate approximately 25 kilometers west of San Antonio Mountain at the boundary line of the Tierra Amarilla Land Grant and the Carson National Forest. The study area covers approximately 10 kilometers of the Rio San Antonio Gorge, from just south of the town of Ortiz, Colorado, south to the northwestern flank of San Antonio Mountain (3,325 meters), one of several large shield volcanoes that rise above the Taos Plateau. The Rio San Antonio Gorge has been cut through the basaltic rock of the Taos Plateau, with the canyon depth ranging from approximately 15 meters to 46 meters, and its width ranging from approximately 75 meters to 150 meters. At the canyon rim, the elevation ranges from 2,438 meters at the northern end to 2,621 meters at the southern end. The Rio San Antonio Gorge is very similar in structure and associated habitats to the Rio Grande Gorge, with basalt canyon walls and vegetation characteristic of an inverted ecosystem.

Methods

Surveys were conducted on foot and by vehicle using existing roads and tracks. Areas that had previously documented raptor nests and territories were visited first; additional areas were searched for undocumented sites as the season progressed. Canyon walls were scanned with binoculars and spotting scopes for active nests and raptor activity. In order to adequately cover

the survey area, attempts were made to search each canyon wall for signs of raptor presence. In areas with easy access, this could be accomplished by scanning both sides from the canyon bottom, but in most areas, it was necessary to search visible cliff faces from the canyon rims. Where possible, surveys occurred on both canyon rims, but in several areas, such as the northern half of the upper Rio Grande Gorge and the Rio San Antonio Gorge, accessing one side of the canyon (in these instances, the west side) was difficult and time consuming due to the poor condition of the existing roads. As a result, some sections of the survey area were surveyed only from one side and coverage was less than ideal.

When undocumented nest sites were found, coordinates of the site or vantage point were recorded with GPS units (NAD 27), and information on nest type, substrate, height, and habitat were recorded. During all visits, species attendance, number and development stage of chicks, and behavioral data were collected and catalogued on field data forms. Active raptor nests were viewed from a distance of more than 100 yards to avoid disturbance to the nest (Fuller and Mosher 1987) and were monitored for a minimum of 15 minutes to accurately determine nesting status. All active nests were visited a minimum of three times throughout the breeding season. Visiting sites more often results in better estimates of productivity, and effort was made to visit active sites as often as resources allowed.

Nest status was determined to be “active” (occupied by a breeding pair and at least one breeding attempt was known to occur) if an adult was observed in the incubating position, or nestlings were observed in the nest. Nest sites were considered to be “occupied territories” if adult or sub-adult birds were observed consistently at the site, but no evidence of breeding was observed. All

sites determined to be active during the incubation or brooding periods received a minimum of two additional visits to determine the number of nestlings and the number of young fledged. Young still in the nest were considered fledged if they were 90% feathered and estimated to be within 1-2 weeks of leaving the nest. Active sites where chick fates could not be determined were assigned an "unknown" status and were excluded from productivity analyses. Nest success is calculated as the number of sites that fledge at least one chick divided by the number of sites with known fates (successes + failures), and productivity is calculated as the number of fledglings divided by the number of nests with known fate. The period of nest monitoring is not factored into success calculations (see Discussion).

Results

Overview of Documented Sites

Eight previously undocumented raptor, and one Common Raven nest sites were discovered in 2013, bringing the total number of sites documented in the study area since 2000 to 123. This number includes sites with multiple proximate stick nests that were judged to be alternate nests for a single raptor pair. Of the 123 sites, five represent stick nests located outside of the primary gorges; these sites include one Golden Eagle nest, three Ferruginous Hawk (*Buteo regalis*) nests and one nest likely used by Swainson's Hawk (*Buteo swainsoni*). Although not located in the focus survey area, these nests are situated along routes used to access other gorge sites and were included because of the ease with which they could be monitored. Hawks Aloft maintains in its project database Universal Traverse Mercator (UTM) coordinates for all nest sites, as well as a comprehensive history for all sites, including years-active and any species associations. Because

of the sensitivity of raptor breeding sites and the potential for data misuse, figures, tables and maps documenting the location of nest sites are not provided in this report.

Results of 2013 Surveys

Surveys were initiated in 2013 on 24 March, and were conducted on 22 days through 20 July, allowing for a full season of raptor breeding chronology to be documented in the study area. A total of 13 occupied territories and 22 active nest sites, representing seven raptor species plus Common Raven were documented in 2013 (Table 1, Figure 1). Reproductive success was determined at 15 of 22 active sites. Of these, 12 of 15 (80%) sites with known fates were successful, and 20 chicks were fledged, resulting in an average productivity of 1.33 chicks per site. Nest success rates and productivity rates for individual breeding species were: Prairie Falcon (100%, 3.0, n=2), Ferruginous Hawk (100%, 2.5, n=2), Great Horned Owl (100%, 1.0, n=1), Swainson's Hawk (100%, 1.0, n=1), Golden Eagle (83%, 1.0, n=6), Red-tailed Hawk (50%, 0.5, n=2), and Common Raven (0%, 0.0, n=1). No nests with known fate were determined for Peregrine Falcon in 2013. The only known active site, New65, in the Orilla Valley, had an unknown outcome. Activity and productivity statuses at individual nest sites in 2013, as well as statuses reported from previous survey years, are presented in Appendix 1.

Table 1: Productivity parameters by species for 2013, BLM Taos raptor survey area. Productivity is the number of chicks fledged divided by the number of sites with known fates. Codes used are CORA (Common Raven), FEHA (Ferruginous Hawk), GHOW (Great Horned Owl), GOEA (Golden Eagle), PEFA (Peregrine Falcon), PRFA (Prairie Falcon), RTHA (Red-tailed Hawk), and SWHA (Swainson's Hawk).

Species	Occupied Territories	Active Sites	Known Fates	Failed sites	Successful sites	Chicks Fledged	***Productivity***
CORA	-	2	1	1	-	-	***0.00***
FEHA	-	2	2	-	2	5	***2.50***
GHOW	-	1	1	-	1	1	***1.00***
GOEA	2	7	6	1	5	6	***1.00***
PEFA	2	1	-	-	-	-	***N/A***
PRFA	6	5	2	-	2	6	***3.00***
RTHA	3	3	2	1	1	1	***0.50***
SWHA	-	1	1	-	1	1	***1.00***
Totals	***13***	***22***	***15***	***3***	***12***	***20***	***1.33***

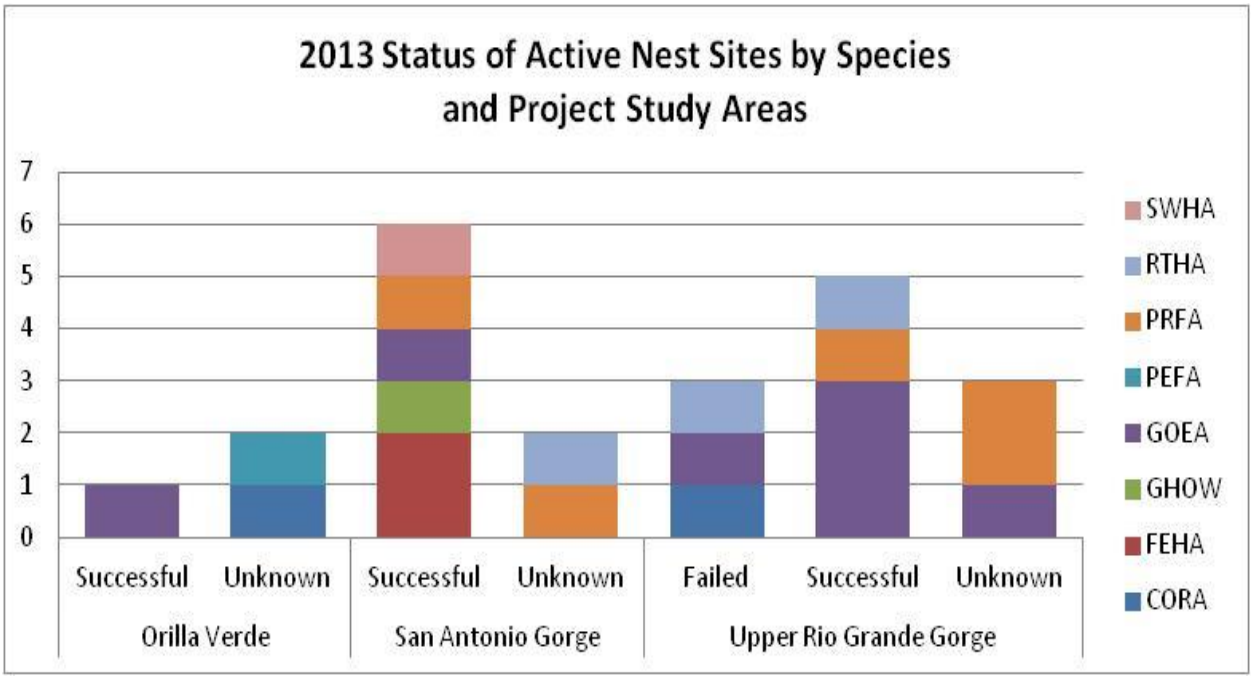

Figure 1: Summary of active nest outcomes, by project study areas, for all target species breeding in 2013. Codes used are SWHA (Swainson's Hawk), RTHA (Red-tailed Hawk), PRFA (Prairie Falcon), PEFA (Peregrine Falcon), GOEA (Golden Eagle), GHOW (Great Horned Owl), FEHA (Ferruginous Hawk), and CORA (Common Raven).

Overview of Results from All Survey Years

Of the 123 sites that have been identified since 2000, 37 have not been active or occupied during any survey year. Four sites never documented as active, however, have been designated as occupied territories on at least one occasion. Of the remaining 82 sites that have been active during at least one survey year, 37 were active during only one year, 15 during two years, 12 during three years, seven during four years, six during five years, one during seven years, and one during eight years. A total of 51 site-years of occupied territories and 194 site-years of active nest sites have been documented during all 11 survey years. Of the 194 active sites, 24 were considered unknown fates (e.g. reproductive status could not be determined), 30 were determined to have failed, and 140 were considered successful. This results in an overall nest success rate of 82.35% for the survey area.

Productivity parameters for all raptor species by year are presented in Table 2. Because monitoring period, effort, survey area, and protocol have varied among years, inter-year comparisons of productivity are difficult. For years when all raptor species were monitored with similar start dates, protocols, and effort (2003-2007, 2012-2013), the number of active nests has ranged from 13 to 25 with a mean of 20.3. During these similar-effort years, nest success has ranged from 66.7% to 82.4%, with a mean of 76.8%. Late start dates (2010 and 2011), insufficient survey effort and weak protocol adherence (2010), and different focal species and survey area (2009), makes these atypical years unsuitable for inter-year productivity comparisons. All project years, however, provide important documentation of the composition and distribution of breeding raptors in the survey area.

Table 2. Productivity parameters for all raptor/raven species by year, BLM Taos raptor survey area. Nest success is the number of nests that fledged at least one chick (e.g. Successful) divided by the number of sites with known fates.

Year	Start	Occupied Territory	Active	Known Fate	Successful	Failed	***Nest Success***
2013	24-Mar	13	22	15	12	3	***0.80***
2012	12-Mar	3	19	17	12	5	***0.71***
2011	1-Jun	2	17	16	16	-	***1.00***
2010[1]	15-Jun	4	14	5	5	-	***1.00***
2009[2]	24-Jun	3	3	3	2	1	***0.67***
2007	15-Mar	2	25	22	18	4	***0.82***
2006	12-Mar	6	21	21	17	4	***0.81***
2005	24-Mar	4	24	24	18	6	***0.75***
2004	19-Mar	5	18	17	14	3	***0.82***
2003	28-Mar	6	13	12	8	4	***0.67***
2000[3]	24-Mar	3	18	18	18	-	***1.00***
Totals		***51***	***194***	***170***	***140***	***30***	***0.82***

[1] surveys were not conducted by Hawks Aloft, Inc. and different protocol were followed
[2] only Golden Eagle sites in the Upper Rio Grande Gorge were monitored
[3] only the Upper Rio Grande Gorge was surveyed

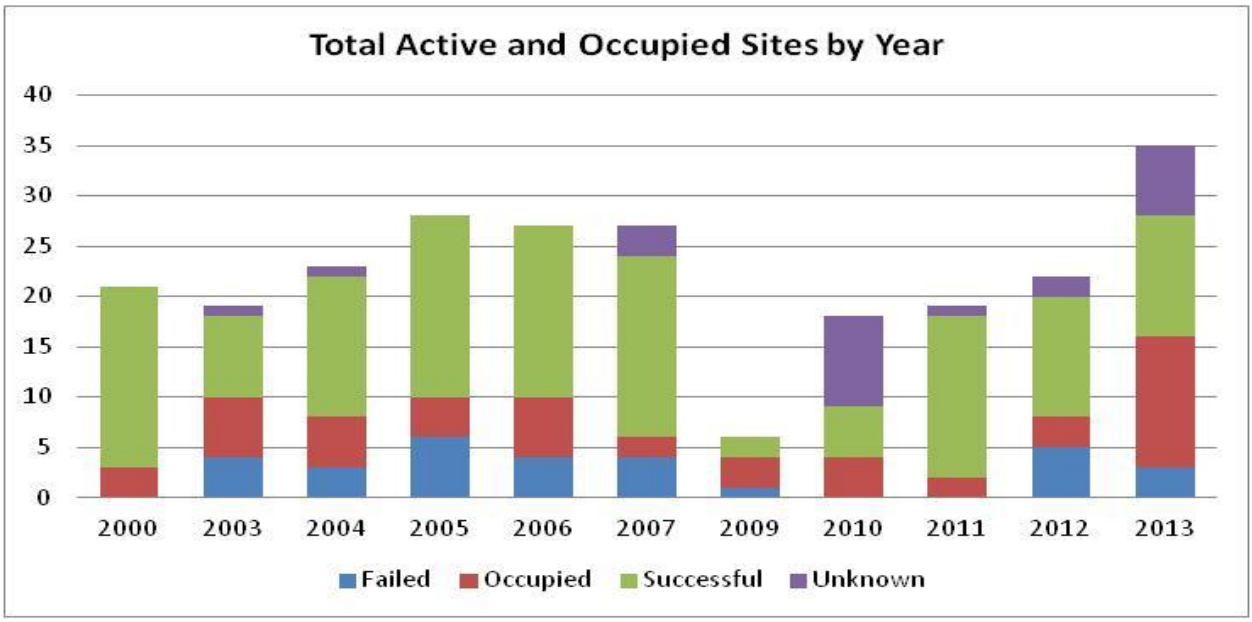

Figure 2: Total combined number of active and occupied sites documented per survey year in the BLM Taos breeding raptor survey area.

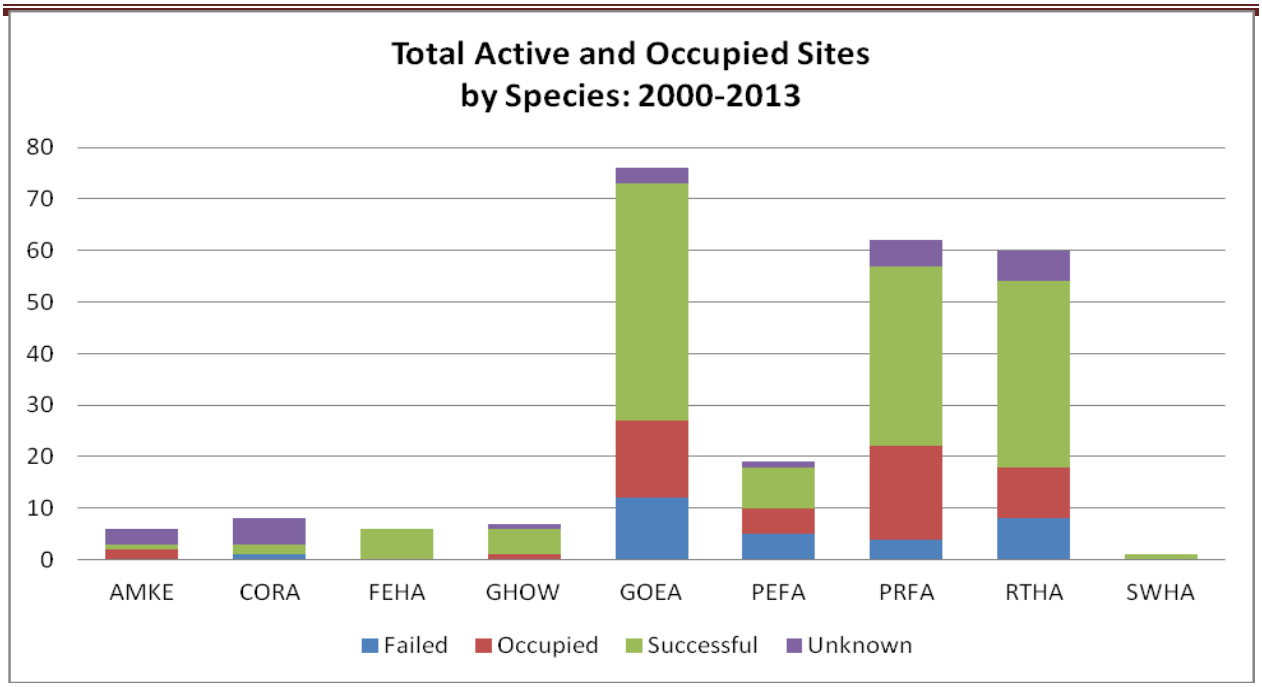

Figure 3: Total combined number of active and occupied sites, by species, in the BLM Taos breeding raptor survey area. The following codes are used: AMKE (American Kestrel), CORA (Common Raven), FEHA (Ferruginous Hawk), GHOW (Great Horned Owl), GOEA (Golden Eagle), PEFA (Peregrine Falcon), PRFA (Prairie Falcon), RTHA (Red-tailed Hawk), and SWHA (Swainson's Hawk).

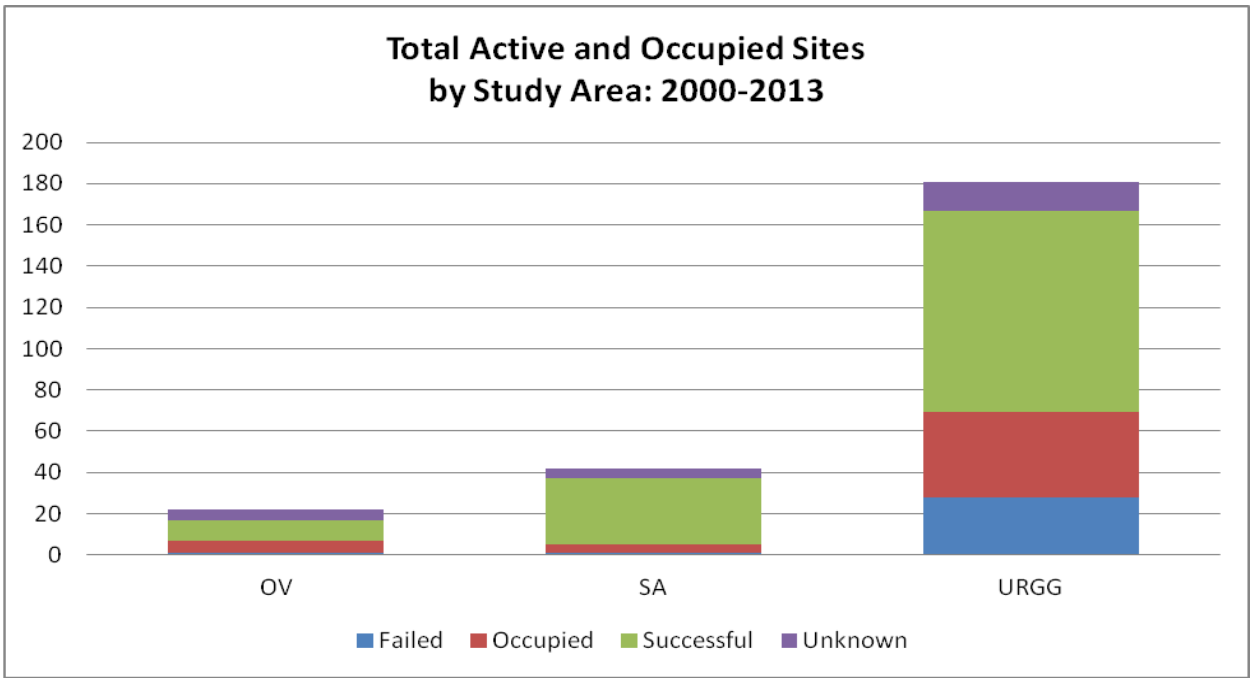

Figure 4: Total combined number of active and occupied sites documented per study area in the BLM Taos breeding raptor survey area.

Results by Species

In the eleven survey years between 2000 and 2013, breeding attempts have been documented for eight raptor species and Common Raven. Reported activity and productivity statuses by species during all survey years are presented in Table 3. The highest numbers of active nests were documented for Golden Eagle (61) and Red-tailed Hawk (50). Although these findings indicate that Golden Eagle is the most common breeding raptor in the study site, it should be noted that only sites utilized by this species were monitored in 2009; if data from that year were removed, the number of Red-tailed Hawk sites (50) is somewhat closer to Golden Eagle sites (58). Slightly less numerous over the survey period were Prairie Falcon sites (44), followed by Peregrine Falcon sites (14). Six active nest sites have been documented for Great Horned Owl, four for American Kestrel (*Falco sparverius*), and one for Swainson's Hawk, a newly documented breeding raptor in 2013. Ferruginous Hawk sites (6) have only been monitored in 2007 and 2011-2013, and although reported during these years, the nests were located outside of survey area boundaries. Because ideal Ferruginous Hawk nesting habitat is located only outside of the gorges where surveys are concentrated, it is likely that the species was excluded from monitoring during many survey years and more active nests were likely associated with the two sites (60, 61) monitored in recent years. Common Raven, with a total of eight active sites, continues to be monitored for the important role the species plays as a builder of nests often utilized by breeding raptors in subsequent years.

For species with at least ten site-years where fate was determined, nest success has been highest for Prairie Falcon (90%), slightly lower for Red-tailed Hawk (82%) and Golden Eagle (79%), and much lower for Peregrine Falcon (62%). For these species with higher sample sizes, the ratio

of occupied territories to active nest sites is higher for Peregrine Falcon (0.36) and Prairie Falcon (0.41), and lower for Golden Eagle (0.25) and Red-tailed Hawk (0.20). The number of active nest sites by species and year are presented in Table 4 and Figure 5, and the number of occupied territories by species and year are presented in Table 5 and Figure 6. Differences among years in survey area, protocol, and species monitored make comparisons difficult, but in several cases, years with a higher numbers of active sites (relative to other years with similar survey effort) show lower numbers of occupied territories during the same year. Table 6 and Figure 7 present the cumulative number of occupied territories and active nest sites by species and year. The summation of these parameters provides an estimate of the total number of raptor sites with attending individuals each year.

Table 3. Productivity parameters by species for all survey years (2000-2013), BLM Taos raptor survey area. Nest success is the number of nests that fledged at least one chick (e.g. Successful) divided by the number of sites with known fates. Productivity is the number of estimated fledglings produced divided by the number of sites with known fate. The following codes are used: AMKE (American Kestrel), CORA (Common Raven), FEHA (Ferruginous Hawk), GOEA (Golden Eagle), GHOW (Great Horned Owl), PEFA (Peregrine Falcon), PRFA (Prairie Falcon), RTHA (Red-tailed Hawk), and SWHA (Swainson's Hawk).

Species	Occupied Territory	Active	Known Fate	Failed	Successful	Successful with Known Fledgling #	Total Fledglings	Total estimated Fledglings	***Nest Success***	***Productivity[1]***
AMKE	2	4	1	-	1	-	-	N/A	***100%***	***N/A***
CORA	-	8	3	1	2	2	4	N/A	***67%***	***1.33***
FEHA	-	6	6	-	6	6	13	N/A	***100%***	***2.17***
GHOW	1	6	5	-	5	4	6	8	***100%***	***1.50***
GOEA	15	61	58	12	46	25	31	57	***79%***	***0.98***
PEFA	5	14	13	5	8	6	9	12	***62%***	***0.92***
PRFA	18	44	39	4	35	16	36	79	***90%***	***2.02***
RTHA	10	50	44	8	36	17	24	51	***82%***	***1.16***
SWHA	-	1	1	-	1	1	1	N/A	***100%***	***1.00***
All Species	***51***	***194***	***170***	***30***	***140***	***77***	***124***	**225**	***82%***	***1.33***

[1]Estimated fledgling number and productivity rates are used for species with successful nests that have unknown fledgling counts. Estimated productivity is based on overall success/failure rates and known fledgling counts

Table 4. Number of active nest sites reported by species, per year, BLM Taos raptor survey area. The following codes are used: AMKE (American Kestrel), CORA (Commion Raven), FEHA (Ferruginous Hawk), GOEA (Golden Eagle), GHOW (Great Horned Owl), PEFA (Peregrine Falcon), PRFA (Prairie Falcon), RTHA (Red-tailed Hawk), and SWHA (Swainson's Hawk).

Species	2013	2012	2011[1]	2010[2]	2009[3]	2007	2006	2005	2004	2003	2000[4]
AMKE	-	1	-	1	-	-	-	-	1	1	-
CORA	2	3	-	3	-	-	-	-	-	-	-
FEHA	2	2	1	-	-	1	-	-	-	-	-
GHOW	1	2	-	1	-	-	-	2	-	-	-
GOEA	7	5	4	3	3	8	8	8	6	3	6
PEFA	1	2	2	-	-	2	-	3	2	2	-
PRFA	5	1	5	2	-	6	6	5	4	3	7
RTHA	3	3	5	4	-	8	7	6	5	4	5
SWHA	1	-	-	-	-	-	-	-	-	-	-
Totals	***22***	***19***	***17***	***14***	***3***	***25***	***21***	***24***	***18***	***13***	***18***

[1] delayed start date likely resulted in a low count of active sites
[2] surveys not conducted by Hawks Aloft and different protocol were followed; delayed start date
[3] only Golden Eagle sites in the Upper Rio Grande Gorge were monitored
[4] only the Upper Rio Grande Gorge was surveyed

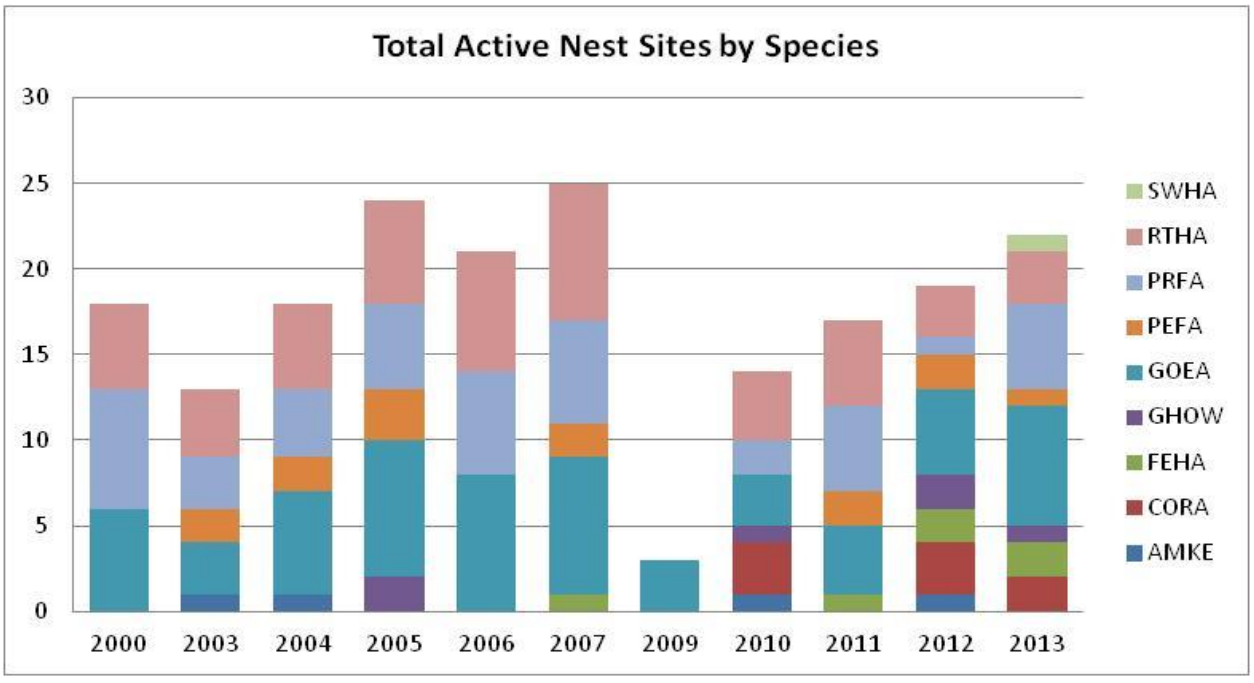

Figure 5: Number of active nest sites reported by species, per year, BLM Taos raptor survey area. The following codes are used: AMKE (American Kestrel), FEHA (Ferruginous Hawk), GOEA (Golden Eagle), GHOW (Great Horned Owl), PEFA (Peregrine Falcon), PRFA (Prairie Falcon), RTHA (Red-tailed Hawk), SWHA (Swainson's Hawk), and CORA(Common Raven). Survey area, protocol, and species monitored varied among years.

Table 5. Number of occupied territories reported by species, per year, BLM Taos raptor survey area. The following codes are used: AMKE (American Kestrel), GOEA (Golden Eagle), GHOW (Great Horned Owl), PEFA (Peregrine Falcon), PRFA (Prairie Falcon), and RTHA (Red-tailed Hawk).

Species	2013	2012	2011[1]	2010[2]	2009[3]	2007	2006	2005	2004	2003	2000[4]
AMKE	-	1	-	-	-	-	1	-	-	-	-
GHOW	-	-	-	-	-	-	1	-	-	-	-
GOEA	2	-	-	-	3	1	1	-	2	4	2
PEFA	2	-	-	1	-	-	1	-	1	-	-
PRFA	6	1	1	3	-	1	1	2	2	1	-
RTHA	3	1	1	-	-	-	1	2	-	1	1
Totals	13	3	2	4	3	2	6	4	5	6	3

[1] delayed start date likely resulted in a low count of active sites
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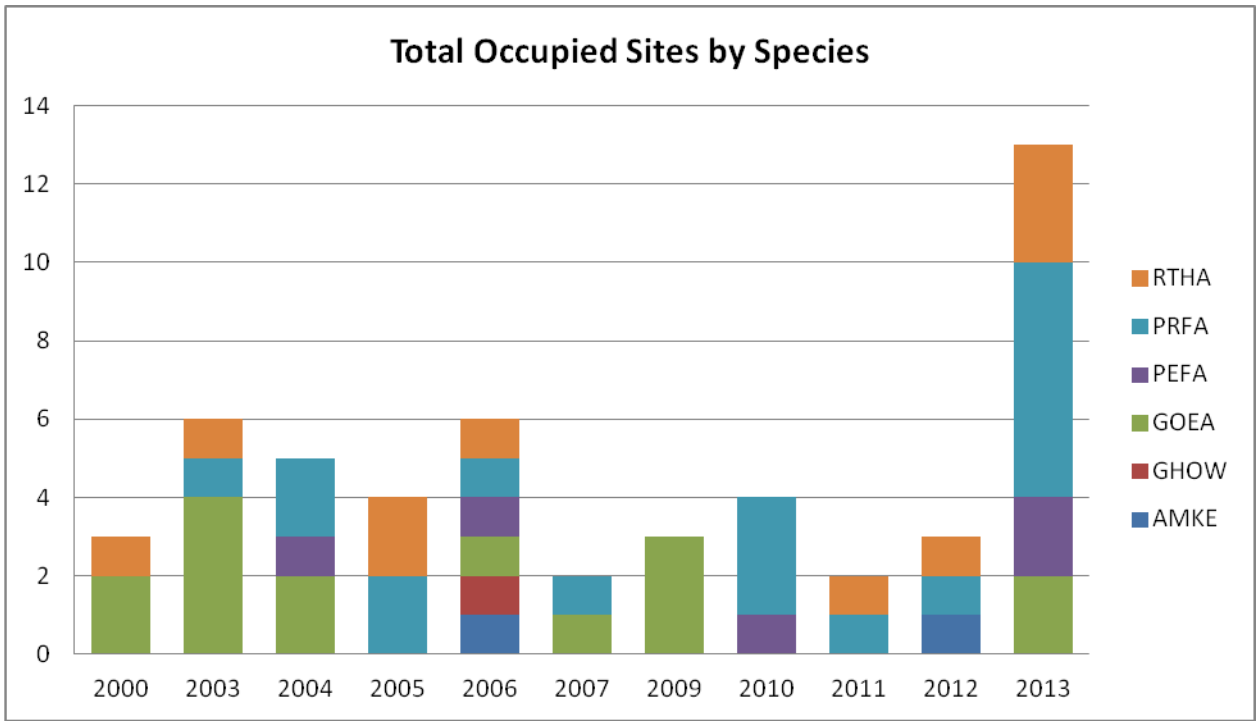


Figure 6: Number of occupied sites reported by species, per year, BLM Taos raptor survey area. The following codes are used: AMKE (American Kestrel), GOEA (Golden Eagle), GHOW (Great Horned Owl), PEFA (Peregrine Falcon), PRFA (Prairie Falcon), RTHA (Red-tailed Hawk). Survey area, protocol, and species monitored varied among years.

Table 6. Total number of occupied territories and active nest sites reported by species, per year, BLM Taos raptor survey area. The following codes are used: AMKE (American Kestrel), CORA (Common Raven), FEHA (Ferruginous Hawk), GOEA (Golden Eagle), GHOW (Great Horned Owl), PEFA (Peregrine Falcon), PRFA (Prairie Falcon), RTHA (Red-tailed Hawk), and (SWHA) Swainson's Hawk.

Species	2000[4]	2003	2004	2005	2006	2007	2009[3]	2010[2]	2011[1]	2012	2013
AMKE	-	1	1	-	1	-	-	1	-	2	-
CORA	-	-	-	-	-	-	-	3	-	3	2
FEHA	-	-	-	-	-	1	-		1	2	2
GHOW	-	-	-	2	1	-	-	1	-	2	1
GOEA	8	7	8	8	9	9	6	3	4	5	9
PEFA	-	2	3	3	1	2	-	1	2	2	3
PRFA	7	4	6	7	7	7	-	5	6	2	11
RTHA	6	5	5	8	8	8	-	4	6	4	6
SWHA	-	-	-	-	-	-	-	-	-	-	1
Totals	***21***	***19***	***23***	***28***	***27***	***27***	***6***	***18***	***19***	***22***	***35***

[1] delayed start date likely resulted in a low count of active sites and occupied territories
[2] surveys not conducted by Hawks Aloft and different protocol were followed; delayed start date
[3] only Golden Eagle sites in the Upper Rio Grande Gorge were monitored
[4] only the Upper Rio Grande Gorge was surveyed

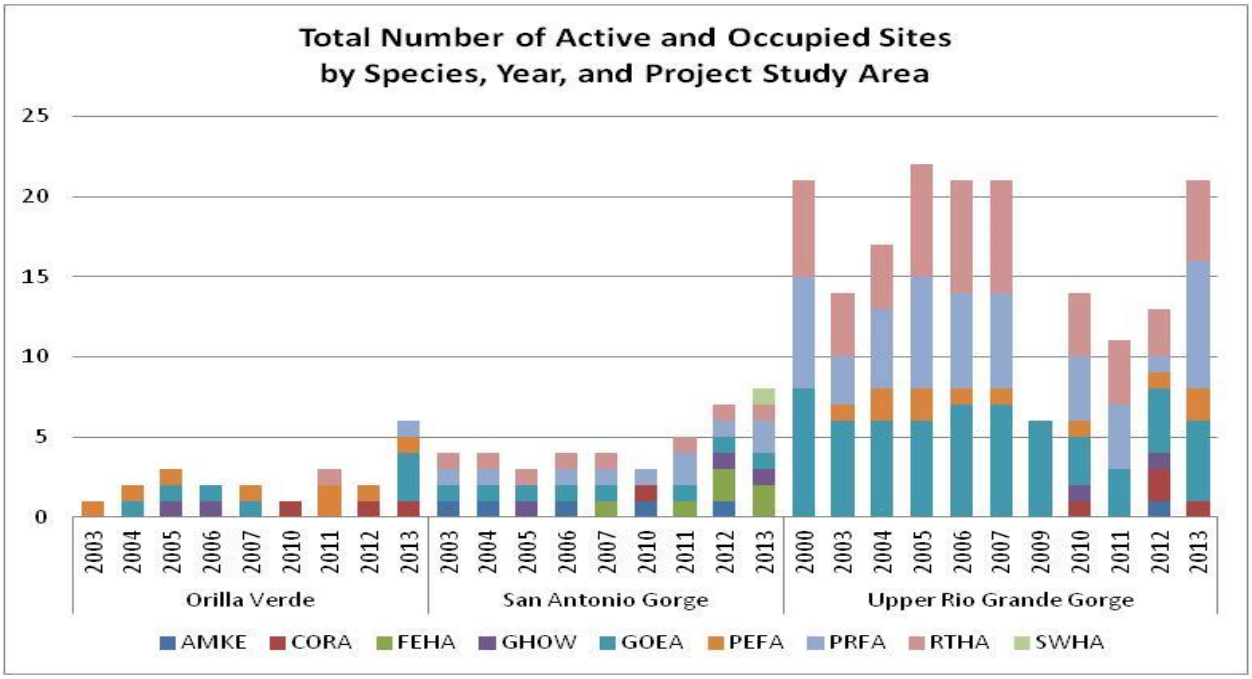
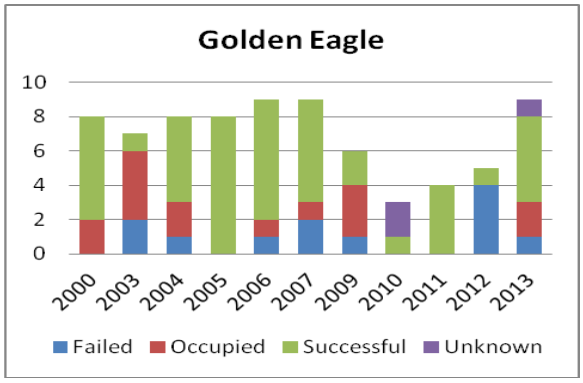
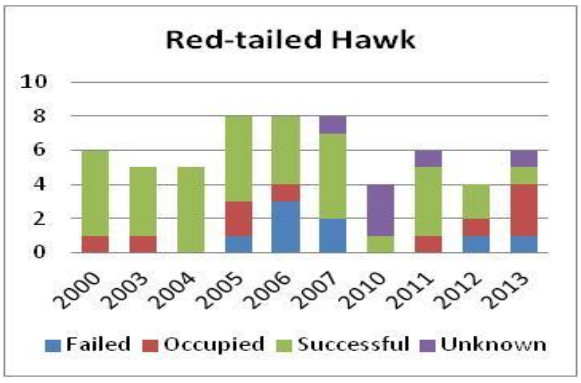
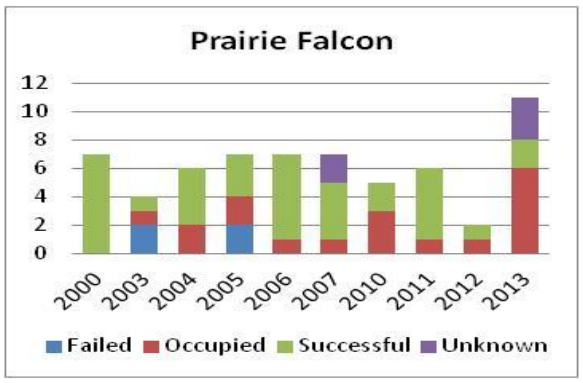
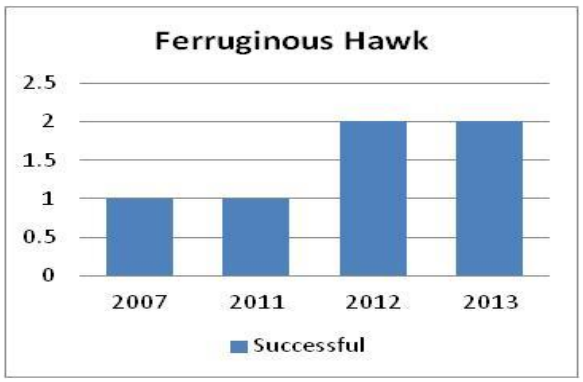


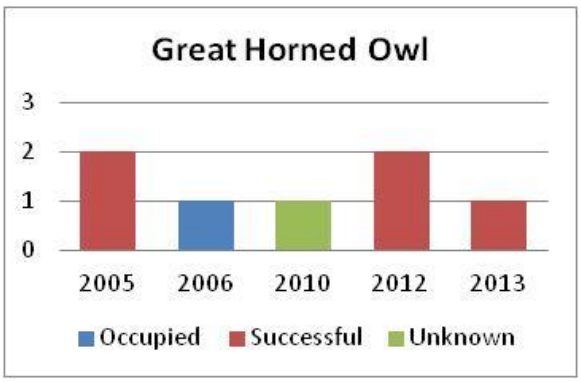
Figure 7: Cumulative number of occupied territories and active nest sites for all species, by year and study area estimates total raptor abundance and distribution in the project area over time. Species codes are: AMKE (American Kestrel), CORA (Common Raven), FEHA (Ferruginous Hawk), GHOW (Great Horned Owl), GOEA (Golden Eagle), PEFA (Peregrine Falcon), PRFA (Prairie Falcon), RTHA (Red-tailed Hawk), and SWHA (Swainson's Hawk).











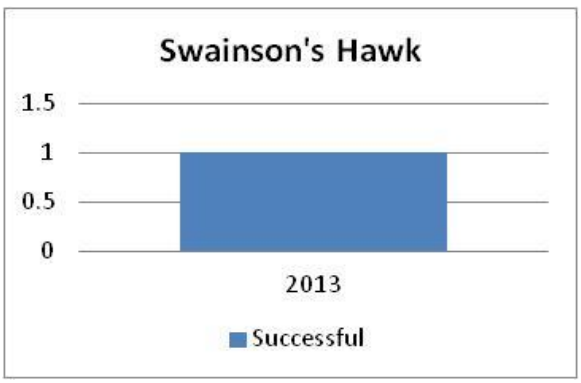


Figure 8: Status summary of all active and occupied nests for individual raptor species, by year.

Results by Survey Area

For all survey years, productivity parameters for the Upper Rio Grande Gorge, Orilla Verde Recreation Area, and the Rio San Antonio Gorge are presented in Table 7. Seventy-five percent of documented occupied territories and 71% of active sites occurred in the much larger Upper Rio Grande Gorge section of the study area. Nest success was highest in the Rio San Antonio Gorge (97%), where only one failure out of 36 known outcomes has been documented. Success was lower in the Upper Rio Grande Gorge (77%) than in the Orilla Verde Recreation Area (91%); however, only eleven sites with known fates have been monitored in the latter area.

Table 7. Productivity parameters for all raptor species by survey area for all survey years, BLM Taos raptor survey area. Nest success is the number of nests that fledged at least one chick (e.g. Successful) divided by the number of sites with known fates.

Study Area	Occupied	Active	Known Fate	Failed	Successful	Nest Success
Orilla Verde	6	16	11	1	10	91%
San Antonio	7	41	36	1	35	97%
Upper Rio Grande	38	137	123	28	95	77%
Totals	***51***	***194***	***170***	***30***	***140***	***82%***

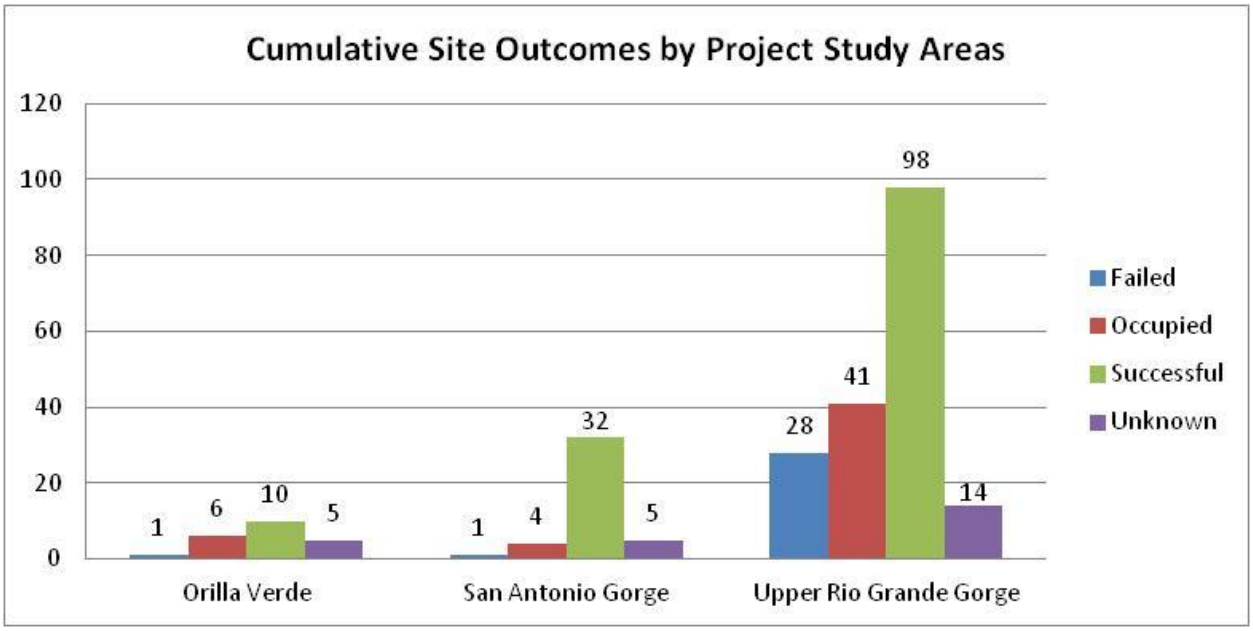


Figure 9: Cumulative 2000-2013 status results for all active and occupied sites, by study area.

Discussion

Factors Affecting Survey Findings

Determining reproductive success in breeding raptors is dependent on accurately estimating the fledging success of chicks. Intensive monitoring allows observers to better estimate early stage chronological events (i.e. laying and hatching dates) which can assist with the timing of future visits to maximize the probability of determining nest success. For example, if the hatch date at a nest is accurately determined, the fledge date can be estimated by adding the average chick-rearing period for the species to the hatch date. This allows observers to time their final monitoring visit to within a few days of the expected fledge date. If fully feathered chicks are visible during this visit, the probability of a successful fledge is high. However, if an early stage chronology date is not estimated accurately, the timing of later visits is more difficult and observers may find an empty nest where it is impossible to determine with confidence whether the chick fledged or died. These unknown fates lower the sample size of sites used in success analyses, and can lead to an underestimation of nest failure. The number of unknown fates reported from this project is low; yet, in many years, the monitoring schedule involved a very limited number of visits. This indicates that observers may have tended to categorize sites as failed or successful without adequate evidence.

The bias towards success can also be exacerbated by a delay in the onset of monitoring, which can cause nesting attempts that fail early in the season to be missed. In order to provide the most complete and accurate estimates of raptor productivity, we stress the importance of an intensive monitoring schedule that begins early in the breeding season. The late initiation of surveys in

several survey seasons (1 June in 2011 and 15 June in 2010) likely accounts for the absence of documented nest failures during those years.

Perhaps most significantly, the time span of monitoring is very important when measuring breeding success. Nest failure is a function of time, where decreased monitoring periods result in a decreased number of observed losses (Mayfield 1961, Ricklefs 1969). For this reason, the success of each development stage (i.e. laying, hatching, fledging) should not be calculated for sites where the previous stage was not observed. For example, sites discovered with chicks already present should not be used in estimating fledging success because if that site was empty at the time of discovery, there would be no way of knowing whether a nesting attempt occurred. However, the span of nest observation has not been factored into calculations of success for this project, and reported rates are likely higher than true outcomes.

Further, we feel that the standards used to determine nest fate have been variable among survey years, and limited resources have led to less than ideal survey effort in some years. A site is considered to be successful if a surveyor observes chicks that are 90% feathered and estimated to be within 1-2 weeks of fledging. Basing success on chick appearance is a standard procedure for measuring raptor productivity, but chick development can be difficult to accurately gauge and can be highly subjective when estimated by different observers. A better means of estimating fledging success is by utilizing known chick ages. When monitoring intervals are regular and small, the midpoint between events can be used to age chicks. For example, if an adult Golden Eagle was incubating on 1 April and a chick was observed on 15 April, 7 April can be used as a hatch date. If the chick disappeared from the nest between visits on 1 and 15 June, 7 June can be

used as a disappearance date and the nestling stage can be estimated at 61 days. Every raptor species would have a minimum age requirement (based on known ages at fledging) to be considered fledged. If that number was 61 or less—which it certainly would be for a Golden Eagle since mean age at fledging is approximately 64 days with a range of 45 to 84 (Kochert et al. 2002)—the hypothetical eagle would be counted as fledged. If the minimum nestling age was greater than 61, the site would be considered to have failed. If the chronology events needed to estimate age were not clearly observed (i.e. incubating on 1 April, unknown status on 15 April, chick on 29 April), the site would be excluded from analysis. When the date of a chronology event has been determined, visits to the site can be suspended until the period near the next expected event (i.e. if a Golden Eagle hatch date was known and chicks older than 50 days were considered fledged, the next visit would not need to occur until ~45 days after the hatch date). This methodology does not rely on the ability of an observer to accurately estimate chick age from appearance, and also removes subjectivity, reduces bias, and can standardize analysis among survey years. However, a shorter monitoring interval would be required, and resources likely preclude adopting this protocol.

Results from this study reliably document the species composition and distribution of breeding raptors in the study area. However, for reasons discussed above, productivity results are less reliable, and inter-year comparisons should be viewed with these factors in mind. In summary, it should be stressed that:

1. Productivity parameters are likely inaccurate when sites were not visited with adequate effort during the appropriate periods. Current protocol does not ensure adequate survey effort, and effort likely varied among years. Gauging monitoring adequacy for past years

is difficult and, therefore, the validity of inter-year comparisons is also difficult to gauge. Modifying survey protocol to ensure adequate monitoring effort, however, would require resources that are unlikely to become allocated to this project.

2. Numbers of successful sites may be inflated because of the tendency of observers to overestimate the age of nestlings. Even if nestling age is accurately estimated, chicks that are at least 90% feathered could remain at the nest site for one to two weeks (depending on species) before fledging. Although the probability of successful fledging increases with development, the possibility of chick mortality remains. For sites where fledglings are not observed and success is based on nestling stage before disappearance (which is the case for the majority of site-years), results should be viewed as the maximum possible number of successful sites.
3. On many occasions during the course of this project, fledglings were observed and considered associated with sites where nestlings were not previously detected. Assuming that the fledglings were attributed to the correct nest site, these birds should be included in the overall count of successful sites. However, because they represent sites that did not have a chance to fail (because they were not discovered until already successful), they should not rightly be included in measurements of nest success or productivity. When estimating the success rate of a development stage (i.e. laying, hatching, fledging), sites discovered after the earliest evidence of that chronology event should be excluded from analysis. True measures of nest success and productivity should only be calculated for sites that were monitored from the egg laying period until the conclusion, but this has not been the case for this study, and all reported success rates should be viewed as maximums that could be much higher than the true rates for raptors in the study area.

Discussion of Survey Results

Although the number and quality of nesting sites may limit the number of raptors that breed in the survey area, the abundance of cliff faces leads us to believe that other factors are likely more important in influencing the number and success of breeding raptors. Prey abundance and weather are often the most significant factors affecting raptor breeding success (Smith and Murphy 1979, Bates and Moretti 1994, Steenhof et al. 1997). Jackrabbits (*Lepus* spp.), cottontails (*Sylvilagus* spp.), ground squirrels (*Spermophilus* spp.), and possibly prairie dogs (*Cynomys* spp.) likely comprise the vast majority of the prey taken during the breeding season by the three most common raptor species (Golden Eagle, Red-tailed Hawk, Prairie Falcon) in the survey area. Black-tailed jackrabbits (*L. californicus*) and cottontails have been documented as the primary prey species for Golden Eagles in Great Basin Desert Shrub habitats (Kochert et al. 2002). At the eagle nest sites we have been able to access and visually inspect during previous years, we have found rabbit species to be the only identifiable prey. For Red-tailed Hawks, Gatto et al. (2005) reported that *Sylvilagus* rabbits were the most common prey item taken on the Kaibab Plateau, Arizona, and Smith and Murphy (1973) reported that jackrabbits were nearly the exclusive prey item taken in the Great Basin Desert region of Utah. Ground squirrels are the dominant prey item taken by Prairie Falcons during the breeding season throughout most of their range (Steenhof 1998). All of these mammals appear numerous in the survey area, but likely vary in abundance among years. Future study of small mammal populations would likely lead to a better understanding of the factors affecting raptor abundance and breeding success in the survey area.

In 2013, a record 35 sites had attending individuals (3 Failed, 13 Occupied, 12 Successful, and 7 Unknown), with the number of unknown (7) and occupied (13) sites both more than double any previous survey year. Increased raptor utilization in 2013 may be attributed simply to better coverage by individual surveyors, or it may be a response to New Mexico's severe and ongoing drought, with more individuals seeking refuge near permanent water sources in canyon environments.

The lack of survey standardization among years creates difficulties with inter-year productivity comparisons. The strongest component of this project is the multi-year dataset that tracks the distribution and species composition of breeding raptors in the survey area. Additionally, for years with early start dates (2000, 2003-2007, 2012-2013), the total number of active sites and occupied territories provides strong population estimates for raptor species utilizing the survey area. Limited survey effort may cause confusion when categorizing sites as active or occupied territories; for purposes of tracking population changes, the summation of the two classifications, as presented in Table 6, may provide the strongest means of inter-year comparison.

The higher rate of occupied territories to active sites noted for the two large falcon species compared to Red-tailed Hawk and Golden Eagle for all survey years could be caused by several possible factors: 1) in the survey area, the two falcon species may be more likely to skip breeding in some years; 2) falcon nest sites may be missed by the observer (falcons do not build nests, and the presence of eyries, unlike the stick nests of hawks and eagles, are impossible to verify when birds are not present); 3) young falcons may be less likely than Red-tailed Hawks and Golden Eagles to disperse from the study area, and the presence of adult-plumaged birds that are not of

breeding age in subsequent years could inflate the number of documented occupied territories; 4) the falcon species may be more likely to fail early in the nesting season before the sites are documented by observers.

All raptor species are susceptible to human disturbance during the breeding season, but of the species that breed in the study area, Golden Eagle and Ferruginous Hawk are likely the most sensitive. This sensitivity is most pronounced during the incubation and early nestling periods when the potential for nest abandonment is the highest (Fyfe and Olendorff 1976, Watson and Dennis 1992, Olendorff 1993). Human activity that occurs in close proximity to active nest sites has the potential to adversely affect nest success. The Golden Eagle nest sites that are potentially the most susceptible to human disturbance (e.g. low cliff height, close proximity to river, roads, and trails, narrow gorge width) are sites 8-13, 17, 18, 22, 43, 51, and 52. Ferruginous Hawk nests, which are often highly visible because of their large size and location in isolated junipers, are also at risk of disturbance. This may be especially true at site 61 which is located less than 200 yards from Highway 285 and is visible from the road. If recreational use of the study area continues to increase, the need for effective nest protection measures during the breeding season will become more critical.

For all survey years, nest success was highest in the Rio San Antonio Gorge (97%), the region of the survey area that is likely subjected to the least amount of human disturbance. In contrast, nesting success in the Orilla Verde Recreation area (91%) was higher than in the Upper Rio Grande Gorge (77%), despite the likelihood that the former area is subjected to more human disturbance than the latter. Figures for human utilization of these areas were not available to us,

and our speculations on the probability of disturbance are based only on our own observations. If our impressions of human disturbance by general area are correct, evidence of decreased raptor nesting success with increased human utilization is likely not reflected in the data. However, many factors impact raptor breeding success, and in order to more accurately study the correlation between human resource use and raptor success, large scale data on human utilization of the study site are needed.

The number of active Golden Eagle sites has varied among survey years (from 3 to 8), with a total of 58 active nests documented to known fate. Nest success for the species, across all years, stands at 79%. Although a total 46 of those known-fate nests were successful, only 39 of those successful nests were documented in years represented by similar start dates and effort (2000-2007, 2012-2013). When the overall nest success rate for Golden Eagle is limited to years of similar effort, the rate falls to 78%. Although Table 3 provides comprehensive nest success and estimated species' productivity rates for all species across all survey years, restricting calculations of productivity rates to similar-effort years may provide more accurate results and is the filter used for the more detailed discussion of Golden Eagle, Red-tailed Hawk, Prairie Falcon, and Peregrine Falcon below.

Of the 39 successful Golden Eagle nests associated with years of similar effort, approximately half (19) had known fledgling counts. The remaining 20 nests documented as successful had no reliable fledgling number associated with their successful outcome. Since productivity rates are based on the total number of fledglings produced divided by the total number of nests with known fate, the successful nests with unknown fledgling counts makes exact productivity

analyses impossible. However, as sample sizes increase with additional years of survey effort, nest success ratios and known fledgling counts can used as proxies in the calculation of estimated productivity rates. For Golden Eagle, the overall (all study areas combined) estimated productivity rate for years of similar survey effort is 0.98 fledglings per nest. Broken down by study area, estimated Golden Eagle productivity for years of similar effort is: Orilla Valley (1.25, n=4), San Antonio Gorge (1.25, n=6), and Upper Rio Grande Gorge (0.86, n=40). In general, overall productivity remains robust with rates similar to that reported in other areas of the western United States (Thompson et al. 1982, Phillips et al. 1990, Bates and Moretti 1994, Steenhof et al. 1997). As described above, however, more intensive monitoring efforts to obtain reliable fledgling counts in years of similar effort are needed to ensure valid productivity results.

Nest success for Red-tailed Hawks, across all years, now stands at 82%, slightly higher than for Golden Eagle. For similar-effort years only, Red-tailed Hawk nest success drops slightly to 79.5%. Although nesting success is relatively high compared to other nesting species, there is evidence that the breeding Red-tailed Hawk population in the study area has declined. A one-year study in the Upper Rio Grande Gorge by Ponton (1980) documented 12 active Red-tailed Hawk nests. Since Hawks Aloft began monitoring in 2000, the number of active Red-tailed Hawk nests documented in that section of the survey area has ranged from three to seven, with no more than eight territories with attending individuals (active/occupied) documented in any given year. Although our knowledge of populations prior to 2000 is based on only one survey year, it seems possible that far fewer Red-tailed Hawks have nested in the Upper Rio Grande Gorge during the past decade than during earlier periods.

Like Golden Eagle, Red-tailed Hawk estimated productivity rates for the overall project area are within the range of those reported elsewhere (0.91, 1.1, 1.36, 1.4. 1.8; Preston and Beane 2009) with an estimated rate of 1.16 fledglings per nest (n=44) across all years and a rate of 1.19 (n=39) when limited to the years of similar effort. By project study area, estimated productivity rates are 0.88 (n=33) for the Upper Rio Grande Gorge, and 2.0 (n=6) for the San Antonio Gorge, where no nest failures have been documented for the species. No Active Red-tailed Hawk nests have yet been documented in the Orilla Valley study area.

Breeding trends for Prairie Falcons are similar to those of Golden Eagles and Red-tailed Hawks. The combined number of active and occupied sites for this species has ranged from two to eleven during all survey years, with active sites alone ranging from one to seven. Oddly, the biggest difference in site attendance occurred in just the last two years, with a jump from two to eleven active/occupied sites. At the Snake River Birds of Prey Area (SRBPA) near Boise, Idaho, the amount of cliff area present per 10 km stretch of survey route explained 91% of the variation in nesting density (Steenhof et al. 1999). This suggests that the number of breeding Prairie Falcons is limited by the availability of nest sites. Because the Rio Grande Gorge has a similar cliff structure and surrounding habitat to that of the SRBPA, we initially expected to find a similar correlation in nesting density relative to the amount of cliff area. However, on the upper Rio Grande Gorge, Prairie Falcons nest in higher densities in the northern portion of the survey area (over 80% of sites are located in the Rio San Antonio Gorge and northern quarter of the Upper Rio Grande Gorge), where the cliff area is substantially lower than in the southern portion. Overall, the Upper Rio Grande Gorge appears to contain a myriad of potential nest sites. Many of these sites showed signs of previous use, such as thick accumulations of old whitewash

indicating that these sites were once heavily used, and that the Prairie Falcon populations may well have been significantly larger in the past. We believe that nesting Prairie Falcons in the Rio Grande Gorge are most likely limited by prey availability, and not by a lack of suitable nest sites.

Across all years, Prairie Falcon nest success in the overall project area now stands at 90%, with an estimated species' productivity rate of 2.02 fledglings per nest (n=39). In years of similar effort, both nest success and estimated productivity rates fall slightly to 87.5% and 1.91 (n=32), respectively. Productivity in the project area appears to be near the median replacement standard of 2.0 calculated by Runde (1987) as necessary for population maintenance, but further analysis and study are needed. In years of similar effort, productivity rates for Prairie Falcon differ considerably by study area, with much higher values in the San Antonio Gorge where no nest failures have yet been documented. Nest success and estimated productivity in that area are 100% and 2.75 fledglings per nest (n=8), respectively. In the much larger Upper Rio Grande Gorge, nest success now stands at 87% and estimated productivity is calculated as 1.81 (n=31).

Among the four species with at least ten site-years of known fates: Golden Eagle, Red-tailed Hawk, Prairie Falcon, and Peregrine Falcon, nest success remains lowest for Peregrine Falcon. In 2013, the only known active nest was presumed failed due to no documented evidence of young or fledglings despite repeated visits to this site. Since 2000, we have documented a total of thirteen breeding attempts by the species, resulting in an overall nest success rate of 62%. The rate was higher in 2011 when at least four chicks were fledged from two successful nests. Prior to 2011, nest success was reported at 37% and productivity at 0.63. The current overall estimated productivity rate for the species of 0.92 fledglings per nest (n=13) still falls well below the

estimated recruitment standard of at least 1.45 young per nest site required to maintain a stable population (Johnson 1999). Although the much lower breeding success of Peregrine Falcons compared to Golden Eagles, Red-tailed Hawks, and Prairie Falcons could be influenced by many factors, it seems likely that diet is the most significant. Peregrine Falcons feed primarily on birds, while the other three most common raptor species feed primarily on small and medium-sized mammals. Investigations of Peregrine Falcon prey items and populations in the survey area merit further study.

When calculating Peregrine Falcon productivity rates using only years of similar effort (so that earlier start dates allow for more reliable counts of nest failures), the species seems to be even more vulnerable, with overall nest success in the project area at only 55% and an estimated productivity rate of 0.68 fledglings per nest (n=11). In the Upper Rio Grande Gorge, where two-thirds (6 of 9) of Peregrine Falcon active/occupied sites have been documented, similar-year rates are even lower, with nest success at 43% and estimated productivity at 0.64 fledglings per nest (n=7). Although the sample size remains very small, nest success and estimated productivity are boosted by limited breeding in the Orilla Verde where, in years of similar effort, nest success stands at 75% and estimated productivity is 0.75 fledglings per nest (n=4). To date, no active or occupied Peregrine Falcon sites have been documented in the smaller, and likely less suitable, San Antonio Gorge.

Review of Historic Data

In preparation for analysis of the 2013 data set, a concerted effort was made by Hawks Aloft biologists to clean-up the historic data record through the identification and elimination of redundant sites and logical inconsistencies. There are, however, still significant challenges presented by the historic data record that make inter-year analyses more problematic, such as the number of successful nests reported with no corresponding fledgling counts, and a general lack of recorded negative data (i.e., the consistent recording of unoccupied and inactive sites as known "Inactive"). To ensure that long-term, multi-year data are collected and managed in a way that preserve consistency, continuity, and usefulness in the face of field technician and project management staff changes, standardized protocols for site naming, site/species association, year-end status determinations, data entry, and data storage, are currently being developed.

Acknowledgments

This report was prepared by Mike Fugagli, and reviewed by Trevor Fetz, Lead Avian Biologist, and Gail Garber, Executive Director of Hawks Aloft. Field studies were conducted by Kieran Sullivan with limited assistance from Mike Fugagli. Cover photo by Mike Fugagli.

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Appendix 1. Productivity status reported at nest sites during survey years from 2000-2013. The following codes are used: "O" indicates an occupied territory where no breeding attempt was documented, "U" indicates an active site where the productivity status was not confirmed, "F" indicates a failed breeding attempt, "S" indicates a successful breeding attempt where the number of fledglings was not reported, and numbers (1,2,3..) indicate the minimum number of successful fledglings reported from the site.

Site	Species	2013	2012	2011	2010[1]	2009[2]	2007	2006	2005	2004	2003	2000[3]
3	GOEA	F	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-
5	GOEA	-	F	-	-	-	-	-	-	-	-	-
7	PEFA	-	-	-	O	-	-	-		-		
7	PRFA	-	-	-	-	-	-	-	O	-	F	S
8	GOEA	-	-	-	-	-	2	-	-	-	-	O
10	GOEA	-	-	-	-	O	-	-	-	-	-	-
13	PRFA	O	-	-	-	-	-	-	-	-	-	
13	GOEA	-	-	-	-	-	-	-	-	-	-	S
14	-	-	-	-	-	-	-	-	-	-	-	-
15	PEFA	-	-	-	-	-	2	-	-	-	-	
15	GOEA	-	-	-	-	-	-	-	-	-	-	O
17	GOEA	1	-	-	-	-	-	S	-	-	-	-
18	GOEA	-	-	-	-	-	-	-	1	S	-	-
19	-	-	-	-	-	1	1	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-
21	RTHA	-	-	-	-	-	2	F	O	-	-	S
23	PRFA	O	-	O	-	-	-	-	-	-	-	
23	RTHA	-	-	-	-	-	-	-	-	-	-	S
24	RTHA	-	-	1	1	-	1	S	1	S	S	S
25	PRFA	-	-	-	-	-	5	S	2	S	-	S
26	PRFA	-	-	-	-	-	-	-	F	-	-	S
27	PRFA	-	-	-	O	-	2	S	-	O	F	S
28	PRFA	-	-	O	O	-	-	-	-	-	-	-
30	RTHA	-	-	-	-	-	-	-	O	-	-	S
31	RTHA		-	-	-	-	-	F	1	S	O	S
31	PRFA	O	-	-	-	-	-	-	-	-	-	-
32	PRFA	-	-	-	-	-	-	-	O	-	-	S
33	PRFA	-	-	-	-	-	-	O	1	S	O	S
36	PEFA	O	-	-	-	-	-	-	F	F	S	-
39	GOEA	O	-	-	-	-	2	-	1	O	-	-

Site	Species	2013	2012	2011	2010[1]	2009[2]	2007	2006	2005	2004	2003	2000[3]
40	-	-	-	-	-	-	-	-	-	-	-	-
41	PRFA	O	1	2	-	-	1	-	F	O	S	-
42	CORA	U	U	-	-	-	-	-	-	-	-	-
43	GOEA	-	-	-	-	-	-	-	-	-	-	S
44	PEFA	-	-	-	-	-	-	O	F	F	-	-
45	PRFA	2	O	1	-	-	U	S	F	O	-	-
46	PRFA	O	-	3	O	-	4	S	1	S	-	-
47	RTHA	-	-	-	U	-	2	S	F	S	-	-
48	RTHA	-	-	-	U	-	-	-	-	-	-	-
49	GHOW	-	-	-	-	-	-	O	2	-	-	-
50	PRFA	U	-	-	-	-	U	1	-	-	-	-
51	GOEA	1	F	-	-	-	-	-	-	-	-	-
51	CORA	-	-	-	U	-	-	-	-	-	-	-
52	GOEA	-	-	-	-	-	2	-	S	-	-	-
53	GOEA	-	-	1	-	-	-	S	-	S	O	-
54	AMKE		-	-	-	-	-	O	-	U	U	-
54	PRFA	4	-	-	-	-	-	-	-	-	-	-
55	PRFA	-	-	3	-	-	O	S	-	S	S	-
56	RTHA	-	1	-	-	-	3	S	S	S	S	-
57	GHOW	-	2	-	-	-	-	-	S	-	-	-
58	-	-	-	-	-	-	-	S	-	-	-	-
59	RTHA	-	-	-	-	-	F	-	-	-	-	-
60	FEHA	2	2	3	-	-	-	-	-	-	-	-
61	FEHA	3	1	-	-	-	2	-	-	-	-	-
62	-	-	-	-	-	U	-	1	-	-	-	-
63	-	-	-	-	-	-	-	-	-	-	-	-
64	-	-	-	-	-	-	-	-	-	-	-	-
65	GOEA	O	-		-	-	-	-	-	-	-	-
65	PEFA	-	-	2	-	-	-	-	-	-	-	-
66	-	-	-	-	-	-	-	-	-	-	-	-
68	-	-	-	-	-	-	-	-	-	-	-	-
69	GOEA	1	-	-	-	-	-	-	-	-	-	-
70	-	-	-	-	-	-	-	-	-	-	-	-
71	-	-	-	-	-	-	-	-	-	-	-	-
72	-	-	-	-	-	-	-	-	-	-	-	-
73	PRFA	U	-	-	-	-	-	-	-	-	-	-
74	RTHA	-	-	2	-	-	-	-	-	-	-	-

Site	Species	2013	2012	2011	2010[1]	2009[2]	2007	2006	2005	2004	2003	2000[3]
75	RTHA	-	-	U	-	-	-	-	-	-	-	-
76	GHOW	1	-		-	-	-	-	-	-	-	-
76	RTHA	-	-	1	-	-	-	-	-	-	-	-
78	-	-	-	-	-	-	-	-	-	-	-	-
11a	GOEA	-	-	-	-	-	O	S	1	O	O	S
11b	-	-	-	-	-	-	-	-	-	-	-	-
12a	-	-	F	-	-	O	F	F	1	-	-	S
12b	GOEA	1	-	-	-	-	-	-	-	-	S	-
12c	-	-	-	-	-	-	-	-	-	-	-	-
16a	GOEA	-	-	-	-	-	-	S	1	S	O	-
16b	-	-	-	-	-	-	-	-	-	-	-	-
16c	GOEA	-	-	-	-	F	-	-	-	-	-	-
16d	-	-	-	-	-	-	-	-	-	-	-	-
18A	RTHA	O	-	-	-	-	-	-	-	-	-	-
1a	GOEA	U	-	-	-	-	1	S	2	F	F	-
1b	GOEA	-	F	1	S	2	-	-	-	-	-	-
1c	-	-	-	-	-	-	-	-	-	-	-	-
22a,b	GOEA	-	-	1	-	O	F	S	1	S	F	S
25A	-	-	-	-	-	-	-	-	-	-	-	-
29a	PRFA	O	-	-	-	-	-	-	-	-	-	S
29b	PRFA	U	-	-	-	-	1	-	-	-	-	-
2a	GOEA	-	-	-	-	-	-	-	-	-	-	S
2b	-	-	-	-	-	-	-	-	-	-	-	-
32A	RTHA	O	-	-	-	-	-	-	-	-	-	-
37a	RTHA	-	-	-	-	-	F	S	2	-	S	-
37b	-	-	-	-	-	-	-	-	-	-	-	-
38a	RTHA		-	-		-	U	F	2	S	S	-
38a	CORA	-	-	-	U	-	-	-	-	-	-	-
38a	PEFA	O	-	-	-	-	-	-	-	-	-	-
38b	-	-	-	-	-	-	-	-	-	-	-	-
38c	-	-	-	-	-	-	-	-	-	-	-	-
45A	CORA	F	-	-	-	-	-	-	-	-	-	-
6a	RTHA	O	-	-	-	-	1	O	-	-	-	O
6b	-	-	-	-	-	-	-	-	-	-	-	-
70B	SWHA	1	-	-	-	-	-	-	-	-	-	-
76B	RTHA	U	-	-	-	-	-	-	-	-	-	-
77a,b,c	GOEA	2	-	-	-	-	-	-	-	-	-	-

Site	Species	2013	2012	2011	2010[1]	2009[2]	2007	2006	2005	2004	2003	2000[3]
9a,b,c	GOEA	-	1	1	U	-	-	O	-	S	O	-
KNOV1V	-	-	-	-	-	-	-	-	-	-	-	-
KNOV2	CORA	-	-	-	-	-	-	-	-	-	-	-
MEB20v	-		1	-	-	-	-	-	-	-	-	-
New 1	-	-	-	-	-	-	-	-	-	-	-	-
New 10	-	-	1	-	-	-	-	-	-	-	-	-
New 2	-	-	-	-	-	-	-	-	-	-	-	-
New 5	-	-	2	-	-	-	-	-	-	-	-	-
New 6	RTHA	F	O	-	-	-	-	-	-	-	-	-
New 7	AMKE	-	U	-	-	-	-	-	-	-	-	-
New 8	-	-	2	-	-	-	-	-	-	-	-	-
New 9	-	-	F	-	-	-	-	-	-	-	-	-
New65	PEFA	U	-	-	-	-	-	-	-	-	-	-
NewMEB01	-	-	-	-	-	-	-	-	-	-	-	-
NewMEB02	-	-	-	-	-	-	-	-	-	-	-	-
NewMEB03	-	-	-	-	-	-	-	-	-	-	-	-
NewMEB06	-	-	-	-	-	-	-	-	-	-	-	-
NewMEB07	RTHA	-	-	-	-	-	-	-	-	-	-	-
NewMEB08	-		-	-	-	-	-	-	-	-	-	-
NewMEB09	RTHA	-	-	-	U	-	-	-	-	-	-	-
NewMEB10	-	-	-	-	-	-	-	-	-	-	-	-
NewMEB11	PRFA	-	-	2	S	-	-	-	-	-	-	-
NewMEB12	GHOW	-	-	-	U	-	-	-	-	-	-	-
NewMEB13	-	-	-	-	-	-	-	-	-	-	-	-
NewMEB14	-	-	-	-	-	-	-	-	-	-	-	-
NewMEB15	RTHA	1	1	1	U	-	-	-	-	-	-	-
NewMEB16	-	-	-	-	-	-	-	-	-	-	-	-
NewMEB17	-	-	1	3	S	-	-	-	-	-	-	-
NewMEB18	-	-	-	-	-	-	-	-	-	-	-	-
NewMEB19	AMKE	-	O	-	S	-	-	-	-	-	-	-
Total Occupied		13	3	2	4	3	2	6	4	5	6	3
Total Active		22	19	17	11	3	25	21	24	18	13	18
Total Successful		12	12	16	5	2	18	17	18	14	8	18
Total Failed		3	5	0	0	1	4	4	6	3	4	0
Total Unknown		7	2	1	6	0	3	0	0	1	1	0

[1] surveys were not conducted by Hawks Aloft, Inc. and different protocol were followed
[2] only Golden Eagle sites in the Upper Rio Grande Gorge were monitored
[3] only the Upper Rio Grande Gorge was surveyed