

**FALL 2006 RAPTOR MIGRATION STUDIES IN THE
GOSHUTE MOUNTAINS OF NORTHEASTERN NEVADA**



**HawkWatch International, Inc.
Salt Lake City, Utah**



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INTRODUCTION

The Goshute Mountains Raptor Migration Project in northeastern Nevada is an ongoing effort to monitor long-term trends in populations of raptors using the Intermountain Flyway (Hoffman et al. 2002, Hoffman and Smith 2003). HWI and its organizational precursors have been studying the fall raptor migration in the Goshute Mountains since 1980, when HWI founder Steve Hoffman and colleagues first began banding at the site. Standardized counts began in 1983 and have continued each year since. This is one of the longest running standardized, raptor-migration monitoring efforts in western North America, with the 2006 season marking the 27th consecutive season of banding and 24th consecutive annual count at the site. Annual counts have ranged between ~12,000–25,000 migrants of up to 18 species, making this one of the largest concentrations in the western U.S. and Canada. The Goshute project was 1 of 14 long-term, annual migration counts and 1 of 7 migration-banding studies conducted or co-sponsored by HWI in North America during 2006. The primary objective of these efforts is to track long-term population trends of diurnal raptors, emphasizing western North America and the Gulf Coast region (Smith and Hoffman 2000, Inzunza et al. 2000, Smith et al. 2001, Hoffman and Smith 2003, Lott 2006). HWI also conducted a third full-season of owl banding in the Goshutes during fall 2006, with effort focused on Flammulated Owls (*Otus flammeolus*). The results of this work are summarized in a separate technical report (Smith 2007).

STUDY SITE

The Goshute Mountains form a 100-km ridge that runs north–south along the Utah–Nevada border. The study site is located in the Goshute Wilderness Study Area approximately 40 km southwest of Wendover, Nevada, on land administered by the Elko Field Office of the Bureau of Land Management (40° 25.417' N, 114° 16.276' W; Figure 1). The project site is located near the south end of the Goshute range and is reached via a primitive road that begins near Ferguson Springs and then a primitive trail that ascends Christmas Tree Canyon from the east.

Before 2001, the main count site was located atop the highest point of the ridge in the project area at an elevation of 2,743 m (OP1 in Figure 1). This location provided an expansive 360° view of the surrounding landscape, but poor visibility at or below eye level on the east side. To compensate for the limited view to the east, in most years after 1983 when easterly winds prevailed, the observers commonly moved about 250 m north to a second observation post (OP2 in Figure 1) that provided an unobstructed view along the lower eastern flanks of the ridge. After considerable deliberation and for reasons described in detail in Vekasy and Smith (2002), HWI's Science Committee (which includes HWI staff and Board members, experienced HWI field observers, and outside experts) decided to adopt a new standard of using only OP2 throughout the season beginning in 2001.

In 2006, three banding stations were located 100–500 m to the north and southeast of the observation post. **North** station, established mid-season in 1989 and modified slightly in 1998, was located about 300 m north-northwest of OP2 on top of the ridge at 2,700 m elevation, and was the first station southbound migrants encountered. **West** station, established in 1980 and modified slightly in 1995 and 2000, was located about 100 m south and slightly west of OP2 on the west flank of the ridge at 2,720 m elevation. **Meadow** station, established in 1987 and modified in 1996, 1998, and 2000, was located about 500 m southeast of OP2 on the east flank of the ridge in a natural sagebrush meadow at 2,620 m elevation. West and Meadow station generally represent a west wind / east wind swapping situation, though at times both were operated simultaneously. **South** station, established in 1982 and modified in 1998, is typically located 700 m south and slightly east of the count site in a topographic saddle at 2,660 m elevation, but was not deployed in 2006 due to limited crew availability. Over the years, the number

of trapping stations operated in any one year has varied as high as six, but since 2000 only the four stations listed above have been considered active options.

METHODS

STANDARDIZED COUNTS

Weather permitting; a rotating team of two primary observers conducted daily, two-observer counts throughout the season at OP2. The team consisted of full-season observer Christian Nunes, with Jeremy Russell and John Bell alternating between counting and trapping duties throughout the season. Visitors and other crewmembers also frequently assisted with spotting migrants and recording data. This was Christian Nunes first full season of intensive migration counting, but he had gained previous experience in the northeast (see Appendix A for a complete history of observer participation). John Bell previously conducted a full season count for HWI in the Bridger Mountains, Montana. This was also Jeremy Russell's first season of migration counting, but he also gained previous exposure to migration counting in with Idaho Bird Observatory.

Weather permitting, observations usually began between 0800 and 0900 Hrs Mountain Standard Time (MST) and ended near sunset, usually between 1700 and 1900 hrs.

The observers routinely recorded the following data:

1. Species, age, sex, and color morph of each migrant raptor, whenever possible and applicable (Appendix B lists common and scientific names for all species, information about the applicability of age, sex, and color morph distinctions, and two-letter codes used to identify species in some tables and figures).
2. Hour of passage for each migrant; e.g., the 1000–1059 hrs MST.
3. Wind speed and direction, air temperature, percent cloud cover, predominant cloud type(s), presence or of precipitation, visibility, and an assessment of thermal-lift conditions, recorded for each hour of observation on the half hour.
4. Predominant direction, altitude, and distance from the lookout of the flight during each hour.
5. Total minutes observed and the mean number of observers present during each hour (included designated observers plus volunteers/visitors who actively contributed to the count [active scanning, pointing out birds, recording data, etc.] for more than 10 minutes in a given hour), recorded on the hour.
6. A subjective visitor-disturbance rating for each hour, recorded on the hour.
7. Daily start and end times for each official observer.

Calculation of “adjusted” (to standardize sampling periods and adjust for incompletely identified birds) passage rates (migrants counted per 100 hours of observation) and analysis of trends follows Hoffman and Smith (2003). In comparing 2006 annual statistics against means and 95% confidence intervals for previous seasons, we equate significance with a 2006 value falling outside the bounds of the confidence interval for the associated mean.

TRAPPING AND BANDING

Weather permitting, rotating crews of 1–3 trappers and processors operated each trapping station, with crew size depending on trapper experience, characteristics of the station, and flight volume. The crews generally trapped between 0900 and 1700 hrs MST. Capture devices included mist nets, dho-gaza nets,

and remotely triggered bow nets. Trappers lured migrating raptors into the capture stations from camouflaged blinds using live, non-native avian lures attached to lines manipulated from the blinds. Unless already banded, all captured birds were fitted with a uniquely numbered USGS Biological Resources Division aluminum leg band. Data gathering and recording followed standardized protocols used at all HWI migration-banding sites (Hoffman et al. 2002). All birds were released within 45 minutes of capture, usually much quicker, unless outfitted with a satellite transmitter, which takes longer.

RESULTS AND DISCUSSION

WEATHER

Inclement weather entirely precluded observations on 1 day and reduced observation time to ≤ 4 hours on a 3 other days in 2006 (see Appendix C for daily weather records). The 1997–2005 averages for the site are the opposite: 3 and 1 days, respectively. Scattered thundershowers and haze were common from late August through early September. Otherwise, high pressure predominated during September, providing many days of clear skies, whereas low-pressure systems returned during early October and brought snow, clouds, and cooler temperatures. Fair skies again prevailed during most of the rest of October, but with scattered rain or snow events every 7–10 days. Low pressure moved back in for the last week of the season, producing overcast skies and moderate winds.

Overall sky conditions as recorded during active observation periods in 2006 were similar to the average pattern for 1997–2005 (the period during which detailed weather data have been compiled and analyzed). Fair skies predominated on 49% of the active observation days, transitional skies (i.e., changed from fair skies to mostly cloudy or overcast during the day, or vice versa) on 28%, and mostly cloudy to overcast skies on 22% (1997–2005 averages are 48%, 33%, and 19%, respectively). The prevalence of haze increased markedly during the previous four years, most likely reflecting the influence of widespread drought and the resulting dry, dusty, and fire-prone landscape. In 2006, visibility reducing fog or haze was reported on 36% of the active days, down from a record high of 73% in 2004 (1997–2005 average of 21%).

Light winds (< 12 kph) prevailed on 73% of the active observation days, moderate winds (12–29 kph) on 24%, and strong winds (> 29 kph) on 2%. These values reflect a modest shift in favor of lighter winds compared to the 1997–2005 averages (67% light, 26% moderate, and 7% strong), but such has generally been the case for the last five years. Similar to the last two years, steady SW–W winds were the dominant pattern in 2006, prevailing on a high 43% of the active observation days (1997–2005 average of 36%). The second most common pattern involved days where SW–NW winds prevailed for a significant portion of the day, but then shifted to NE–SE winds during the rest of the day (or vice versa). This pattern applied to 18% of the active observation days, and matched the 1997–2005 average. Third most common were NE–E winds, which prevailed on a near-average 13% of the active days (average 14%). Calm/variable (7%) and N–NE winds (5%) were slightly more common than usual (averages 4% and 1%, respectively). Most other days featured some other combination of westerly winds, with no substantial variation from usual patterns.

Daily-average temperatures (averages of hourly readings) ranged from -3.0 – 26.1 °C, averaging 13.4 °C. These values fall within the range seen since 1997. Daily-average barometric pressure readings (averages of hourly readings) ranged from 29.36 to 30.45 inHg, averaging 29.92 in Hg. These values are record lows compared to the last five years (the extent of records for this measure). Thermal lift was rated poor-to-fair on 62% of the active observation days and good-to-excellent on 38%. These values represent a slightly above-average proportion of days with good-to-excellent thermal conditions (1997–2005 average of 32%), which is congruent with the prevalence of fair weather and light winds.

In summary, the weather during the 2006 season was average to mild, with inclement weather hampering observations less than usual, fairly typical wind patterns but a bit lighter than usual, and visibility reducing haze still prevalent on many days but much less so than during many of the last several years.

OBSERVATION EFFORT

Counts occurred on 82 of 83 days between 15 August and 5 November 2006. The number of observation days was a significant 5% above the 1983–2005 average of $78 \pm 95\%$ CI of 2.3 days, whereas the number of observation hours (652.58) was a non-significant 2% below the long-term average of 668.25 ± 29.16 hours. The 2006 average of 2.1 observers per hour (including official and guest observers; value is mean of daily values, which are in turn means of hourly values) was a significant 17% below the 1990–2005 (period of full-time two-observer system) average of $2.52 \pm 95\%$ CI of 0.26 observers/hr. Having moved the main count site to OP2 is the primary reason for this decline, because most general visitor activity now occurs at OP1 away from the main counters, where our site educators provide interpretive guidance. However, although the number of recorded observers has declined slightly due to the reduction in guest observers, the loss of these extra eyes is normally offset by a reduction in visitor disturbance of the primary observers.

MIGRATION SUMMARY

The observers counted 10,822 migrant raptors of 17 species during the 2006 season (see Appendix D for daily count records). The count was a significant 27% below the 1983–2005 average (Table 1), and the lowest recorded since 1993 (see Appendix E for annual summaries). No record low or high counts occurred in 2006; however, the counts of nine species were significantly below average, with many hovering near record lows.

The 2006 flight was composed of 50% accipiters, 34% buteos, 8% falcons, 3% vultures, 2% harriers, 2% eagles, and <1% each of Ospreys and unidentified raptors. The proportions of buteos, vultures, and harriers were significantly above average, whereas the proportions of accipiters, eagles, falcons, and unidentified raptors were significantly below average (Figure 2). The most commonly observed species were the Red-tailed Hawk (32% of the total count), Sharp-shinned Hawk (25%), Coopers' Hawk (24%), American Kestrel (8%), Turkey Vulture (3%), and Northern Harrier (2%). No other species comprised more than 2% of the total count. It is noteworthy that in the last five years the count of Red-tailed Hawks has either closely matched (2002) or substantially exceeded (2003–2006) the Sharp-shinned Hawk count, but previous to this period such had occurred only one other time—during the first year of the count project in 1983 (Appendix E). This reflects both a continuing, long-term increasing trend for red-tails and a sharp and continuing drop in the abundance of sharp-shins since 1998 (see below). The latter coincides with the recent widespread drought in the interior West (Hoffman and Smith 2003).

Adjusted passage rates were 10% or more below average for 8 of 17 commonly observed species, with the differences significant for Sharp-shinned, Swainson's and Ferruginous Hawks, Golden and Bald Eagles, and American Kestrels (Table 1). In contrast, adjusted passage rates were significantly above average for Broad-winged Hawks, Red-tailed Hawks, and Peregrine Falcons.

For many species, adjusted passage rates show a common pattern of stable to increasing trends through the mid-1990s followed by either stabilizing or more often declining patterns, especially after 1998 when widespread drought began plaguing much of the interior West (Figures 3–7). Several such species have shown at least slight rebounds in the past four years, including Northern Harriers, Cooper's Hawks, Northern Goshawks, and three larger falcons; however, low counts in 2006 continued to accentuate the recent decline for Ospreys, Sharp-shinned Hawks, and American Kestrels. Significant ($P \leq 0.05$) to highly significant ($P \leq 0.01$) quadratic (second-order polynomial) regressions continued to track through 2006 the overall pattern for Ospreys, Northern Harriers, all three accipiters, Ferruginous Hawks, Golden

Eagles, and the three smaller falcons. The same basic pattern is also evident for Peregrine Falcons; however, only an increasing linear trend provided a significant fit to the data (Figure 7). A significant quadratic regression also previously tracked the trend in Turkey Vulture passage rates, with counts of this species dropping markedly for four years after reaching a high point in 1998; however, a return to high counts in 2003 and 2004 (new record high) and maintenance of at least moderately high counts in 2004 and 2005 returned the statistical fit to a highly significant long-term, linear increasing trend. Other species that continue to show significant, long-term increasing trends include Broad-winged, Red-tailed, and Swainson's Hawks (Figure 5). As has been the case throughout the history of the project, only Rough-legged Hawks (Figure 5) and Bald Eagles (Figure 6) show no significant long-term trends at this site.

The common pattern of increases through the mid-1990s followed by declines likely reflects the effects of variation in regional moisture conditions on productivity and perhaps flyway dynamics in the Intermountain region. In particular, declines since 1998 undoubtedly reflect adverse effects of the prolonged and extensive drought that has plagued much of the interior West since then (Hoffman and Smith 2003). Before that, high moisture levels associated with a large-scale El Niño event in the Pacific likely contributed to enhanced productivity across much of the otherwise xeric Great Basin. Most recently, declining patterns in the Goshutes but high counts in Idaho, in the north Cascades of Oregon, and in coastal California suggest that, after five years of extensive drought, some migrants may have shifted their migration routes around the severely parched central Great Basin. While more favorable precipitation levels returned to the region in 2004 and especially 2005, it is important to recognize that population trends and migration dynamics may experience a lag effect in relation to changing climatic variables. It is also important to recognize that other factors may have contributed to the reduced counts in the Goshutes since 2002. Lighter winds, stronger thermal lift conditions, increasingly less seasoned observers and a relatively high prevalence of days with nothing but clear blue skies most likely both dispersed the flight more than usual and made it more difficult to see migrants passing overhead.

Immature : adult ratios were below average in 2006 for 5 of 10 species with data suited to comparisons (significantly so for Northern Harriers, Red-tailed Hawks, Golden Eagles, and Peregrine Falcons) and were significantly above average for the remaining five species (Cooper's Hawks, Northern Goshawks, Broad-winged Hawks, Ferruginous Hawks, and Bald Eagles; Table 2). For all species showing high age ratios, the increase was due at least in part to below average tallies of adult birds; in fact, tallies of adult birds were below average for 9 of the 10 relevant species. Moreover, among all 10 species, only Northern Harriers, Northern Goshawks, and Broad-winged Hawks showed above-average tallies of young birds; i.e., for the others the high ratios reflected proportionally greater reductions in the abundances of identified adults, rather than high counts of young birds. It is also important to note that for several species significant variation in the proportions of unaged birds may confound these comparisons (Table 2). Nevertheless, the overall impression from these data is that the productivity of Northern Goshawks along the Intermountain Flyway was probably high in 2006, whereas the overall abundance of Sharp-shinned and Cooper's Hawks remained low, and the relative productivity of sharp-shins probably decreased in 2006. The abundance of immature/subadult Golden Eagles has declined markedly since reaching a high in 1999 and remained low in 2006, whereas adult numbers have remained comparatively stable during this time (Figure 6). This suggests that regional productivity may have declined for this species in recent years.

The 2006 combined-species median passage date of 29 September was 4 days later than average (Table 3). No distinct, overall early or late shift was evident in the combined-species seasonal distribution pattern; however, the proportional distribution of activity was unusual, appearing somewhat bimodal (Figure 8). An atypical activity lull occurred from 16–25 September, followed by a significant spike in activity from 6–15 October. The October spike clearly signaled a response to the first major series of rain and snow storms to hit the region, with a good "push" of activity occurring after conditions settled

down again. Reasons for the September lull are less certain; however, 20 and 22 September marked the first snowstorms of the season and may have stalled migration preceding the next series of fronts.

At the species level, 9 of 17 species showed earlier than average median passage dates in 2006, with the differences significant for five species (Ospreys, Swainson's Hawks, Red-tailed Hawks, Ferruginous Hawks, and Golden Eagles), and six species showed earlier than average timing, with the differences significant for only two species (American Kestrels and Prairie Falcons; Table 3). Thus, two of the four commonly observed falcons showed early timing and three of the five commonly observed buteos showed late timing, but no other distinct multi-species patterns of variation in seasonal timing occurred in 2006. Age-specific timing data revealed additional detail but no markedly different results (Table 4).

TRAPPING EFFORT

The crews operated one or more of the three available banding stations every day between 22 August and 05 November 2006 (see Appendix F for daily capture records and Appendix G for annual summaries). The number of trapping days (72) was 20% higher than the 1980–2005 average for the site, whereas the number of station hours (888) was 28% lower than average. Mild weather and the additional five days in November allowed for the increase in trapping days, while a purposefully reduced crew size accounted for the lower station hours.

TRAPPING SUMMARY

The 2006 capture total of 995 raptors included 11 species, 993 newly banded birds, and 2 recaptures of birds previously banded in the Goshutes (Table 5, Appendix G). This represents a record low capture total for ≥ 3 blinds being in operation, and the lowest overall total since 1987. The 2006 effort raises the total number of birds captured since project inception to 54,694, including 90 Goshute recaptures and 39 foreign recaptures. Sharp-shinned Hawks accounted for 51% of the total captures, followed by Cooper's Hawks (36%), Red-tailed Hawks (6%), American Kestrels (4%), and Northern Goshawks (3%). Each of the remaining species accounted for less than 1% of the total.

The 2006 combined-species capture total was 61% below the 1980–2005 average (Table 5). Capture totals were markedly below average for all species except Peregrine Falcons, Broad-winged Hawks, and Swainson's Hawks, reflecting the effects of both low flight volume and reduced trapping effort and efficiency. Capture success also was substantially below average (41% combined) for most species because of the reduced effort and efficiency (Table 5). The only species for which the capture total, capture rate, and capture success were all above average were the Swainson's Hawk (only the sixth individual of this species ever caught at the site) and Peregrine Falcon. Capture totals and estimates of capture success were below average for all other species; however, capture rates were above average for Northern Goshawks, Broad-winged and Red-tailed Hawks, and Prairie and Peregrine Falcons.

At this site, compared to the counts, banding data yields unique and sufficient sex–age specific data only for the three accipiters and American Kestrels (Table 6). The 2006 count and capture data both indicated immature : adult ratios for Sharp-shinned Hawks that did not differ significantly from the long-term averages; however, the count age ratio was 14% below average while the capture age ratio was 11% above average. These data suggest that immature Sharp-shinned Hawks were less abundant (lower productivity) and more susceptible to capture (hungrier) than usual compared to adults. The count and capture age ratios for Cooper's Hawks were even more disparate, with the count ratio a significant 40% above average and the capture ratio a non-significant 14% below average. These data suggest that, in contrast to sharp-shins, immature Cooper's Hawks were proportionately more abundant and much less susceptible to capture than usual compared to adults; i.e., both signs of a healthier population. Both the count and capture age ratios were significantly above average for Northern Goshawks, but the count ratio was only 47% above average while the capture ratio was 248% above average. These data suggest that

regional goshawk productivity was high and immature birds proportionately more abundant than usual, but that the young birds were also hungrier than usual compared to adults.

The trapping data alone also indicated that female Sharp-shinned Hawks were captured roughly 30% more often than males (female : male ratio of 1.31), and that this sex ratio was 38% above average (Table 6). This suggests that female sharp-shins were either proportionately more abundant or considerably more susceptible to capture than usual in 2006 compared to males. Female Cooper's Hawks also were captured more often than males in 2006 (sex ratio 1.42), but this sex ratio was only slightly below average (1.47). Similarly, the capture sex ratio for Northern Goshawks was 1.36 in 2006, which is only 5% below average (1.44).

The count data do not yield age-specific data for American Kestrels, so the banding data for this species are particularly useful. Similar to 2005, the banding data yielded an immature : adult ratio that was a significant 43% below average, reflecting a proportionately greater reduction in captures of immature birds rather than high capture totals for adults (Table 6). This suggests that young kestrels may have been relatively scarce this year; however, very low overall capture totals in 2006 for this species may confound this comparison. The sex ratio of kestrels captured in 2006 (0.81) was 14% below the long-term average of 0.94 (Table 6), whereas the count ratio was closer to average (0.96 vs. 0.97).

ENCOUNTERS WITH PREVIOUSLY BANDED BIRDS

Recaptures

The 2006 recaptures included 1 male Sharp-shinned Hawk and 1 female Cooper's Hawk originally banded in the Goshutes (Table 7). The sharp-shin was banded as a hatch-year bird in 2005. The Cooper's Hawk was banded as an after-second-year bird in 1999, making her at least 11 years old. Though not the oldest we have confirmed (14.5+ yrs), this is among the top ten oldest Cooper's Hawks for which we have longevity records (of 364). These two new recaptures bring the total number of Goshute recaptures since 1980 to 90 birds, all accipiters (Appendix G).

Foreign Recaptures

The 2006 captures did not include any birds that were originally banded elsewhere. The total number of foreign recaptures for the site since 1980 remains 39, involving 5 species and including 17 recaptures of Sharp-shinned and Cooper's Hawks banded at Idaho Bird Observatory's site at Boise Ridge.

Foreign Encounters

Eleven raptors originally banded in the Goshutes were encountered elsewhere in 2006, which is slightly lower than the average annual total for the site (Table 8, Appendix G). This raises the total number of foreign encounters for the project since 1980 to 326. The 2006 encounters involved 5 Cooper's Hawks, 3 Sharp-shinned Hawks, and 3 Red-tailed Hawks. Seven of the 2006 encounters involved birds that were found dead of unknown causes, one was killed by a dog, and the status of the remaining three remains unknown to us (awaiting reports from the National Bird Banding Lab).

A female Sharp-shinned Hawk banded in the Goshutes as an after-second-year bird in September 2005 was found dead of unknown causes near Crescent, British Columbia in May 2006 (~1,255 km from the project site). Two other female Sharp-shinned Hawks banded during October 2006 were encountered sometime shortly thereafter, but their disposition remains unknown to us at present.

A female Cooper's Hawk banded in the Goshutes as an after-hatch-year bird in September 2005 was found dead of unknown causes in March 2006 near La Cruz Opio, Sinaloa, Mexico (~1,722 km from the project site). Another female Cooper's Hawk banded in the Goshutes as an after-second-year bird in September 1997 was found dead of unknown causes in April 2006 near State Hwy 55 in Idaho (~422 km from the project site). The third Cooper's Hawk encountered in 2006 was a male banded in the Goshutes

as an after-second-year bird in September 2005. This bird also was found dead of unknown causes in May 2006 near Malta, Idaho (~212 km from the project site). The last Cooper's Hawk encountered in 2006 was a female banded in the Goshutes as a second-year bird in October 1998. This bird was reported as the unfortunate victim of a dog in November 2006 near Dolan Springs, Arizona (~442 km from the project site).

One Red-tailed Hawk banded in the Goshutes as an after-second-year bird in September 2004 was found dead of unknown causes near Temecula, California in April 2006 (~709 km from the project site). A second Red-tailed Hawk banded in the Goshutes as a hatch-year bird in October 2003 was found dead of unknown causes in Sinaloa, Mexico in June 2006 (~1,620 km from the project site). A third Red-tailed Hawk banded in the Goshutes as a hatch-year bird in August 2006 was later encountered, but its status and location have not yet been reported to us.

The new 2006 encounter locations all fall well within the expected ranges of Goshute birds (Hoffman et al. 2002).

SATELLITE TRACKING OF MIGRANTS

We deployed two new satellite transmitters in the Goshutes during the 2006 season, one on a young male Golden Eagle and another on a young Red-tailed Hawk. In addition, another Golden Eagle that we outfitted at the site in 2004 is still alive and transmitting.

Golden Eagles

On 12 October 2006, we deployed an 80-g battery powered transmitter on a hatch-year, male Golden Eagle captured at the site. The bird was in good condition (mass 2,900 g) with an average keel muscle but no wing-pit fat and an empty crop. After release, this bird headed south a short ways, then followed an erratic path to the southeast, eventually ending up a month later in the Cedar Mountain Draw area of central Utah near Holden and Fillmore, where it has resided since 11 November 2006. Sensor data current through early March 2007 indicate that the bird is alive and well.

Our 2004 Goshute eagle spent most of the first year after we outfitted him as a hatch-year bird wandering around in northern Utah and southern Idaho in the Raft River area. Then in mid-October 2005 he set off to the northeast then southeast, and ended up spending the winter in north-central (Cache Valley area) and northeast Utah (near Neponset Reservoir ~30 km NW of Evanston, Wyoming). Then in early February 2006, he set off again to the northwest back into southern Idaho, returned for three weeks to the area of south-central Idaho where he resided from winter 2004 through fall 2005, then in late April moved west ~200 km, turned north, and wandered up into the mountains of central Idaho. After wandering a bit more, he finally settled for the summer in the Sawtooth National Forest region of central Idaho. Then in mid-September he set out to the southwest, more or less following the Big Wood River corridor, and four days later had settled just south of the Snake River near Hagerman, Idaho. He proceeded to spend the winter in this area and was still located there as of early March 2007.

Red-tailed Hawks

On 3 November 2006, we deployed a 32-g battery powered transmitter on a big hatch-year, probable female (mass 1,277 g) Red-tailed Hawk captured at the site. This bird was in fantastic condition with a robust keel muscle and moderate wing-pit fat, but an empty crop. After release, this bird headed south down through the Snake Range along the Utah-Nevada border, then veered southeast across the southwest corner of Utah in the vicinity of St. George to intersect the Hurricane Cliffs, which it then followed down into northwest Arizona. It then veered to the east and crossed the Grand Canyon in the immediate vicinity of HWI's monitoring sites on the south rim near Grand Canyon Village. After crossing the canyon, it continued due south and by 12 November had settled for the winter on the

northwest outskirts of Phoenix near the community of Glendale. As of early March 2007, it had not yet begun its spring migration, but sensor data indicated it was alive and well.

Tracking summaries and maps for all of HWI's satellite-tracked raptors can be found at www.hawkwatch.org.

SAMPLING NORTHERN MIGRANTS FOR AVIAN INFLUENZA

In 2006, HWI began pilot efforts to sample 50 raptors, via cloacal swabbing, for avian influenza. In the end, 28 samples were extracted from six different species of various age classes. Totals by species included: Cooper's Hawk (10), Sharp-shinned Hawk (9), Red-tailed Hawk (3), Northern Goshawk (3), Merlin (2), and Golden Eagle (1). Following the field season, these samples were submitted for processing to a virology lab at the University of California Los Angeles; we expect to receive the results some time in 2007. This sampling effort was conducted in conjunction with a much larger, multifaceted avian sampling effort being coordinated by personnel and other colleagues of the U.S. Forest Service Redwood Sciences Laboratory in northern California, and the Landbird Migration Monitoring Network of the Americas (LaMMNA) program.

RESIDENT RAPTORS

One family group of Golden Eagles, two adults and two hatch-year birds, were present throughout the season and occupied a territory to the north of the project area. One subadult bird also was seen frequenting the area. A family group of Red-tailed Hawks, including two light-morph adults and three hatch-year birds (two light morphs and a rufous morph), occupied a territory to the northwest of the project area, and were present throughout the season. This entire family group appeared to disperse by mid-September, except for one light adult that persisted through the end of the season.

A family group of Northern Goshawks, including two hatch-year birds, occupied their usual territory very near the project site. As usual, the adults were seen only infrequently while hunting. The young birds were seen frequently throughout August and September, often vocalizing near the count site or streaking through North and West blinds. At least one adult and two immature Sharp-shinned Hawks were recorded as local birds early in the season, but were indistinguishable from migrants by mid-September. At least one immature and one adult Cooper's Hawk frequented the project area, often hunting near the aviary, through 7 September.

At least one pair of American Kestrels was seen regularly near OP2 until mid-September. No other falcon species were observed exhibiting resident behavior.

This is a typical resident assemblage for the site, except for limited sightings of American Kestrels and a lack of observations of local Prairie or Peregrine Falcons.

SITE VISITATION

In 2006, 185 individuals signed the HWI Goshute visitor logs, representing a slightly higher visitation rate than 2005. The majority of 2006 visitors originated in Nevada and Utah, with about half of these coming from Salt Lake City. Organized groups visiting the site included several Boy and Cub Scout troops, a Great Salt Lake Audubon group, and a University of Utah ornithology class. In addition, HWI education staff conducted two teacher-training workshops at the site this season as part of the T.A.L.O.N.S. (Teaching And Learning Observation and Natural Science) Program.

In 2006 at the Goshutes, 672 hourly assessments of visitor disturbance resulted in the following ratings: 85% none, 15% low, and <1% moderate. This is the highest level of visitor disturbance recorded since the count location was moved to OP2 in 2001. The increased level of visitor disturbance in 2006 was primarily reflective of minor crewmember disturbance, rather than the influence of outside visitors.

ACKNOWLEDGMENTS

Primarily financial support for the 2006 project was provided by the U.S. Fish and Wildlife Service – Neotropical Migratory Bird Conservation Act grant program, the Walbridge Fund, the Schaffner Family Foundation, Nevada Power, Jason Bjork, and other HWI private donors and members. The BLM Elko Field Office also provided helicopter-airlift and other essential logistical support; special thanks to Tamara Hawthorne for her assistance and oversight. We are also grateful for discounted hotel accommodations provided to our crewmembers on their days off by the Wendover Nugget; for the logistical support of the West Wendover Waste Water Treatment Plant and West Wendover Public Water Works; and for generous donations of supplies for the crew provided by Einstein's Bagels, Great Harvest Bread, and Salt Lake Roasting Company in Salt Lake City. We are also very grateful for the volunteer assistance provided by established HWI affiliates Leo Chidester, Art Sandack and family, Jen Callahan, and Jerry Liguori. Lastly, special thanks to Paul Dutson, Orville Hayes, Neil Pace, John Muir, Roy Bouk, Arnold Frisbee, Barry Herbert, JoAn Ellsworth, and Brett Prevedal for their help in providing or helping us secure lure birds for the trapping operations.

LITERATURE CITED

- Hoffman, S. W., and J. P. Smith. 2003. Population trends of migratory raptors in western North America, 1977–2001. *Condor* 105:397–419.
- Hoffman, S. W., J. P. Smith, and T. D. Meehan. 2002. Breeding grounds, winter ranges, and migratory routes of raptors in the Mountain West. *Journal of Raptor Research* 36:97–110.
- Inzunza, E. R., S. W. Hoffman, L. J. Goodrich, and R. Tingay. 2000. Conservation strategies for the world's largest known raptor migration flyway: Veracruz the River of Raptors. Pages 591–596 in R. D. Chancellor and B.-U. Meyburg, editors. *Raptors at risk*. World Working Group on Birds of Prey and Owls, Berlin, Germany, and Hancock House Publishers, British Columbia and Washington.
- Lott, C. A. 2006. A new raptor migration monitoring site in the Florida Keys: counts from 1999–2004. *Journal of Raptor Research* 40:200–209.
- Smith, J. P. 2007. Fall 2006 migration banding study of Flammulated Owls in the Goshute Mountains of northeastern Nevada. HawkWatch International, Inc., Salt Lake City, Utah, USA.
- Smith, J. P., J. Simon, S. W. Hoffman, and C. Riley. 2001. New full-season autumn hawkwatches in coastal Texas. Pages 67–91 in K. L. Bildstein and D. Klem, editors. *Hawkwatching in the Americas*. Hawk Migration Association of North America, North Wales, Pennsylvania, USA.
- Vekasy, M. S., and J. P. Smith. 2002. Fall 2001 raptor migration study in the Goshute Mountains of northeastern Nevada. HawkWatch International, Salt Lake City, Utah. 41 pp.

Table 1. Annual raptor migration counts and adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) annual passage rates by species in the Goshute Mountains, NV: 1983–2005 versus 2006.

SPECIES	COUNTS			RAPTORS/100 HOURS ¹		
	1983–2005 ²	2006	% CHANGE	1983–2005 ²	2006	% CHANGE
Turkey Vulture	339 ± 69.2	355	+5	62.0 ± 12.17	70.7	+14
Osprey	93 ± 18.2	68	-27	21.4 ± 3.73	17.9	-16
Northern Harrier	172 ± 30.3	177	+3	26.8 ± 4.14	28.5	+6
Sharp-shinned Hawk	4573 ± 823.1	2745	-40	1008.8 ± 147.96	632.2	-37
Cooper's Hawk	3178 ± 594.4	2541	-20	798.1 ± 123.52	707.6	-11
Northern Goshawk	104 ± 24.1	95	-8	17.3 ± 3.81	15.7	-9
Unknown small accipiter ³	267 ± 162.4	57	-79	–	–	–
Unknown large accipiter ³	10 ± 11.3	6	-40	–	–	–
Unknown accipiter	300 ± 91.7	9	-97	–	–	–
TOTAL ACCIPITERS	8214 ± 1376.7	5453	-34	–	–	–
Red-shouldered Hawk	0.3 ± 0.2	0	-100	–	–	–
Broad-winged Hawk	46 ± 15.1	57	+24	18.6 ± 5.93	25.5	+37
Swainson's Hawk	245 ± 88.5	109	-56	65.2 ± 23.58	29.8	-54
Red-tailed Hawk	3083 ± 386.7	3492	+13	510.9 ± 51.11	610.0	+19
Ferruginous Hawk	16 ± 2.8	10	-39	2.6 ± 0.43	1.8	-31
Rough-legged Hawk	14 ± 4.3	17	+25	6.2 ± 1.79	7.4	+19
Unidentified buteo	73 ± 19.7	13	-82	–	–	–
TOTAL BUTEOS	3478 ± 444.1	3698	+6	–	–	–
Golden Eagle	258 ± 27.7	152	-41	40.6 ± 3.98	24.4	-40
Bald Eagle	13 ± 2.7	9	-30	2.6 ± 0.52	2.1	-21
Unidentified eagle	1 ± 0.5	0	-100	–	–	–
TOTAL EAGLES	271 ± 29.0	161	-41	–	–	–
American Kestrel	1965 ± 361.2	820	-58	412.4 ± 69.42	196.9	-52
Merlin	40 ± 10.8	40	+1	7.5 ± 2.04	8.0	+6
Prairie Falcon	26 ± 6.2	26	-2	4.5 ± 0.90	4.7	+6
Peregrine Falcon	11 ± 3.7	17	+53	2.0 ± 0.62	3.5	+77
Unknown small falcon ³	4.0 ± 4.4	2	-50	–	–	–
Unknown large falcon ³	3 ± 2.1	2	-29	–	–	–
Unknown falcon	7 ± 2.2	0	-100	–	–	–
TOTAL FALCONS	2050 ± 377.0	907	-56	–	–	–
Unidentified raptor	120 ± 37.7	3	-97	–	–	–
GRAND TOTAL	14738 ± 2110.9	10822	-27	–	–	–

¹ Adjusted for incompletely identified birds and to standardized, species-specific sampling periods.

² Mean ± 95% confidence interval.

³ These categories represent new distinctions initiated as standard practice in 2001 (see Appendix B for classification details).

Table 2. Annual raptor migration counts by age classes and immature: adult ratios for selected species in the Goshute Mountains, NV: 1990–2005 versus 2006.

SPECIES	TOTAL AND AGE-CLASSIFIED COUNTS						% UNKNOWN AGE		IMMATURE : ADULT RATIO	
	1990–2005 AVERAGE			2006			1990–2005 ¹	2006	1990–2005 ¹	2006
	TOTAL	IMM.	ADULT	TOTAL	IMM.	ADULT				
Northern Harrier	200	63	57	177	69	69	42 ± 7.6	22	1.31 ± 0.291	1.00
Sharp-shinned Hawk	5145	1808	1387	2745	1044	902	39 ± 5.6	29	1.35 ± 0.268	1.16
Cooper's Hawk	3687	853	1019	2541	828	724	50 ± 4.9	39	0.82 ± 0.219	1.14
Northern Goshawk ²	104	51	33	95	64	20	17 ± 4.7	12	2.18 ± 0.682	3.20
Broad-winged Hawk	58	13	25	57	23	14	38 ± 9.6	35	0.62 ± 0.175	1.64
Red-tailed Hawk	3539	737	1991	3492	606	2543	23 ± 3.6	10	0.37 ± 0.060	0.24
Ferruginous Hawk	19	5	6	10	5	3	44 ± 9.8	20	1.04 ± 0.572	1.67
Golden Eagle ²	258	125	72	152	86	53	23 ± 5.1	9	2.08 ± 0.429	1.62
Bald Eagle	15	7	7	9	5	3	7 ± 5.0	11.1	1.09 ± 0.359	1.67
Peregrine Falcon	14	4	6	17	0	4	31 ± 12.0	12	0.62 ± 0.271	0.00

¹ Mean ± 95% confidence interval. For age ratios, note that long-term mean immature : adult ratios are averages of annual ratios and may differ from values obtained by dividing average numbers of immatures and adults. Discrepancies in the two values reflect high annual variability in the observed age ratio.

² Long-term averages based on data for 1983–2005.

Table 3. First and last observed, bulk passage, and median passage dates by species for migrating raptors in the Goshute Mountains, NV in 2006, with comparisons of 2006 and 1990–2005 average median passage dates.

SPECIES	2006				1990–2005
	FIRST OBSERVED	LAST OBSERVED	BULK PASSAGE DATES ¹	MEDIAN PASSAGE DATE ²	MEDIAN PASSAGE DATE ^{2,3}
Turkey Vulture	19-Aug	8-Oct	6-Sep – 8-Oct	19-Sep	23-Sep ± 1.4
Osprey	22-Aug	18-Oct	3-Sep – 4-Oct	14-Sep	15-Sep ± 1.6
Northern Harrier	17-Aug	5-Nov	28-Aug – 23-Oct	27-Sep	25-Sep ± 3.5
Sharp-shinned Hawk	15-Aug	5-Nov	11-Sep – 15-Oct	30-Sep	26-Sep ± 2.3
Cooper's Hawk	15-Aug	27-Oct	10-Sep – 8-Oct	27-Sep	22-Sep ± 1.6
Northern Goshawk	23-Aug	5-Nov	2-Sep – 28-Oct	27-Sep	05-Oct ± 2.6
Broad-winged Hawk	18-Sep	11-Oct	24-Sep – 8-Oct	28-Sep	23-Sep ± 1.5
Swainson's Hawk	18-Aug	21-Oct	6-Sep – 5-Oct	18-Sep	20-Sep ± 3.6
Red-tailed Hawk	15-Aug	5-Nov	6-Sep – 27-Oct	8-Oct	06-Oct ± 2.5
Ferruginous Hawk	31-Aug	31-Oct	31-Aug – 29-Oct	27-Sep	29-Sep ± 4.0
Rough-legged Hawk	8-Oct	5-Nov	11-Oct – 4-Nov	26-Oct	22-Oct ± 1.8
Golden Eagle	19-Aug	5-Nov	30-Aug – 29-Oct	14-Sep	09-Oct ± 2.0
Bald Eagle	10-Sep	3-Nov	10-Sep – 3-Nov	14-Sep	16-Sep ± 1.8
American Kestrel	17-Aug	22-Oct	31-Aug – 1-Oct	28-Sep	01-Oct ± 2.2
Merlin	25-Aug	30-Oct	7-Sep – 27-Oct	10-Sep	14-Sep ± 4.0
Prairie Falcon	15-Aug	29-Oct	21-Aug – 15-Oct	10-Sep	14-Sep ± 4.0
Peregrine Falcon	21-Aug	20-Oct	23-Aug – 5-Oct	16-Sep	24-Sep ± 3.1
Total	15-Aug	5-Nov	7-Sep – 20-Oct	29-Sep	24-Sep ± 1.4

¹ Dates between which the central 80% of the flight passed the lookout.

² Date by which 50% of the flight had passed the lookout.

³ Mean ± 95% confidence interval in days; calculated using only data for years with counts ≥5 birds.

Table 4. Median passage dates by age classes for selected species of migrating raptors in the Goshute Mountains, NV: 1990–2005 versus 2006.

SPECIES	ADULT		IMMATURE / SUBADULT	
	1990–2005 ¹	2006	1990–2005 ¹	2006
Northern Harrier	29-Sep ± 4.7	30-Sep	22-Sep ± 5.7	24-Sep
Sharp-shinned Hawk	07-Oct ± 1.7	8-Oct	16-Sep ± 1.2	18-Sep
Cooper's Hawk	26-Sep ± 1.8	30-Sep	18-Sep ± 1.3	18-Sep
Northern Goshawk ²	12-Oct ± 4.6	11-Oct	29-Sep ± 3.6	25-Sep
Broad-winged Hawk	23-Sep ± 1.5	30-Sep	24-Sep ± 2.6	30-Sep
Red-tailed Hawk	09-Oct ± 2.1	11-Oct	19-Sep ± 4.7	15-Sep
Ferruginous Hawk	06-Oct ± 5.0	–	27-Sep ± 11.3	27-Sep
Golden Eagle ²	13-Oct ± 2.5	19-Oct	05-Oct ± 3.9	4-Oct
Bald Eagle	21-Oct ± 4.2	–	26-Oct ± 2.6	24-Oct
Peregrine Falcon	22-Sep ± 6.9	–	22-Sep ± 3.3	21-Sep

Note: Median passage dates are dates by which 50% of the flight had passed the lookout; values were calculated based only on counts of ≥5 birds per year.

¹ Mean ± 95% confidence interval in days; unless otherwise indicated, values were calculated only for species with ≥3 years of counts ≥5 birds per year.

² Average for 1983–2005.

Table 5. Capture totals, rates, and successes for migrating raptors in the Goshute Mountains, NV: 1985–2005 versus 2006.

SPECIES	CAPTURE TOTAL		CAPTURE RATE ¹		CAPTURE SUCCESS (%) ²	
	1985–2005 ³	2006	1985–2005 ³	2006	1985–2005 ³	2006
Northern Harrier	7 ± 2.1	2	0.5 ± 0.14	0.2	4.1 ± 1.22	1.1
Sharp-shinned Hawk	1411 ± 246.6	503	96.6 ± 6.91	56.7	28.2 ± 4.07	18.1
Cooper's Hawk	699 ± 134.2	356	47.5 ± 4.16	40.1	20.0 ± 2.65	13.8
Northern Goshawk	30 ± 9.4	26	2.2 ± 0.61	2.9	32.3 ± 6.55	27.4
Broad-winged Hawk	1 ± 0.4	1	0.1 ± 0.03	0.1	3.0 ± 1.37	1.8
Swainson's Hawk	0.2 ± 0.2	1	0.01 ± 0.01	0.1	0.1 ± 0.12	0.9
Red-tailed Hawk	72 ± 12.9	56	5.1 ± 0.66	6.3	2.2 ± 0.31	1.6
Rough-legged Hawk	0.1 ± 0.2	0	0.01 ± 0.01	0.0	0.4 ± 0.81	0.0
Golden Eagle	5 ± 1.3	1	0.4 ± 0.11	0.1	1.8 ± 0.48	0.7
American Kestrel	163 ± 47.4	38	10 ± 2.1	4.3	7.4 ± 1.94	4.6
Merlin	10 ± 2.9	5	0.7 ± 0.19	0.6	21.8 ± 5.49	12.5
Prairie Falcon	5 ± 1.5	5	0.4 ± 0.08	0.6	21.6 ± 4.53	19.2
Peregrine Falcon	1 ± 0.5	2	0.1 ± 0.03	0.2	8.5 ± 4.61	11.8
All Species	2405 ± 429.1	995	163.4 ± 10.72	112.1	16.3 ± 2.21	9.7

¹ Captures / 100 station hours.

² Number of birds captured / number of birds observed * 100, with birds identified only to the generic group level (i.e., unknown accipiter, buteo, falcon, or eagle) allocated to relevant species in proportion to their occurrence. For calculating the “all species” values, non-trappable species and distant birds not identified at least to the generic group level were excluded.

³ Mean of annual values ± 95% confidence interval. Limited to years when at least three trapping blinds were operated.

Table 6. Capture totals by sex and age (HY = hatching year; AHY = after hatching year), female : male capture ratios, and immature : adult capture ratios for selected species of migrating raptors in the Goshute Mountains, NV: 1992–2005 averages versus 2006.

	FEMALE			MALE			FEMALE : MALE	HY : AHY
	AHY	HY	UNK.	AHY	HY	UNK.	RATIO ¹	RATIO ¹
Sharp-shinned Hawk								
1992–2005 mean	287.3	466.1	0.0	236.0	566.9	0.1	0.95	1.95
2006	104	181	0	55	163	0	1.31	2.16
Cooper's Hawk								
1992–2005 mean	254.9	202.1	0.0	139.8	185.3	0.1	1.47	0.99
2006	129	80	0	63	84	0	1.42	0.85
Northern Goshawk								
1992–2005 mean	5.0	11.2	0.0	2.3	12.6	0.0	1.44	7.18
2006	1	14	0	0	11	0	1.36	25.00
American Kestrel								
1992–2005 mean	7.7	67.7	22.1	24.5	75.8	2.4	0.94	5.61
2006	5	12	0	4	17	0	0.81	3.22

¹ Long-term mean ratios are averages of annual ratios and may differ from values obtained by dividing long-term average numbers of relevant sex or age classes. Discrepancies between the two values reflect high annual variability in the observed age ratio.

Table 7. Recaptures during fall 2006 of raptors previously banded in the Goshute Mountains, NV.

SPECIES	SEX	BAND #	BANDING DATE	BANDING AGE	RECAPTURE DATE	RECAPTURE AGE
Cooper's Hawk	F	1005 – 01715	3-Oct-99	ASY	8-Oct-06	≥11 th yr
Sharp-shinned Hawk	M	1212 – 97772	22-Sep-05	HY	5-Oct-06	SY

¹ HY = hatching year; SY = second year; TY = third year.

Table 8. Foreign encounters during 2006 with raptors banded in the Goshute Mountains, Nevada.

SPECIES	SEX	BAND #	BANDING DATE	BANDING AGE	ENCOUNTER DATE	ENCOUNTER AGE	ENCOUNTER LOCATION	DISTANCE (km)	STATUS
CH	F	1005 – 24275	22-Sep-05	AHY	11-Mar-06	ASY	Sinaloa, Mexico	1722	found dead
RT	U	1177 – 30902	8-Sep-04	ASY	19-Apr-06	ATY	Temecula, CA	709	found dead
CH	F	1705 – 35748	26-Sep-97	ASY	19-Apr-06	≥9 th yr	State HWY 55, ID	402	found dead
SS	F	1593 – 94703	29-Sep-05	ASY	13-May-06	ATY	Crescent/BC, Canada	1255	found dead
CH	M	0804 – 31480	19-Sep-05	ASY	14-May-06	ATY	Malta, ID	212	found dead
RT	U	1807 – 93642	25-Oct-03	HY	27-Jun-06	ATY	Sinaloa, Mexico	1620	found dead
CH	F	1005 – 18715	28-Sep-02	ASY	18-Oct-06	≥6 th yr	Paulden, AZ	549	found dead
CH	F	1705 – 41358	8-Oct-98	SY	7-Nov-06	≥9 th yr	Dolan Springs, AZ	443	dog kill
RT	U	1177 – 31028	28-Aug-06	HY	Unknown ²				
SS	F	1623 – 21609	04-Oct-06	HY	Unknown ²				
SS	F	1593 – 53368	09-Oct-06	HY	Unknown ²				

¹ L = local or nestling; HY = hatching year; SY = second year; TY = third year; AHY = after hatching year; ASY = after second year; ATY = after third year; otherwise self-explanatory.

² Awaiting Bird Banding Lab report.

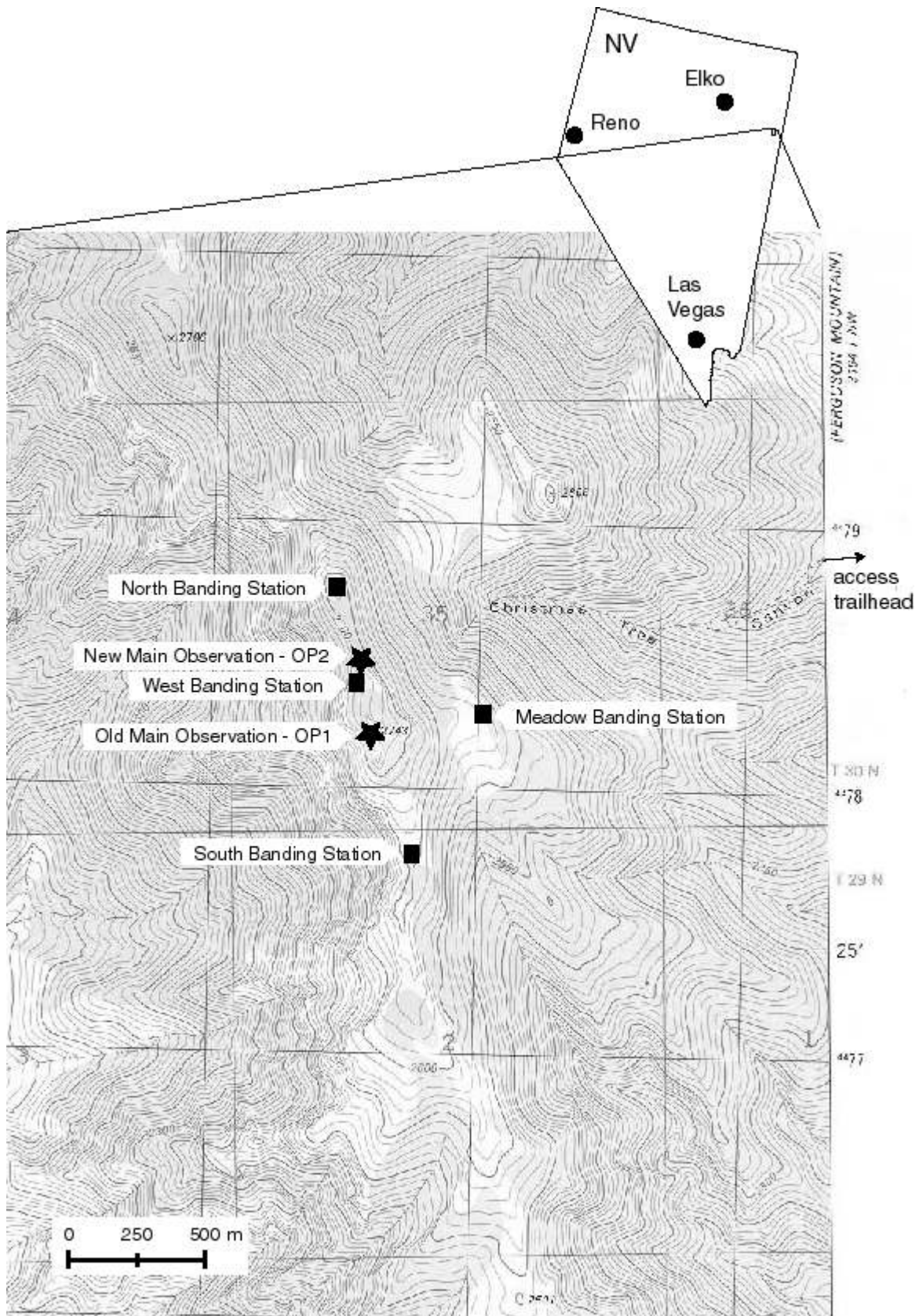


Figure 1. Location of the Goshute Mountains Raptor Migration Project study site.

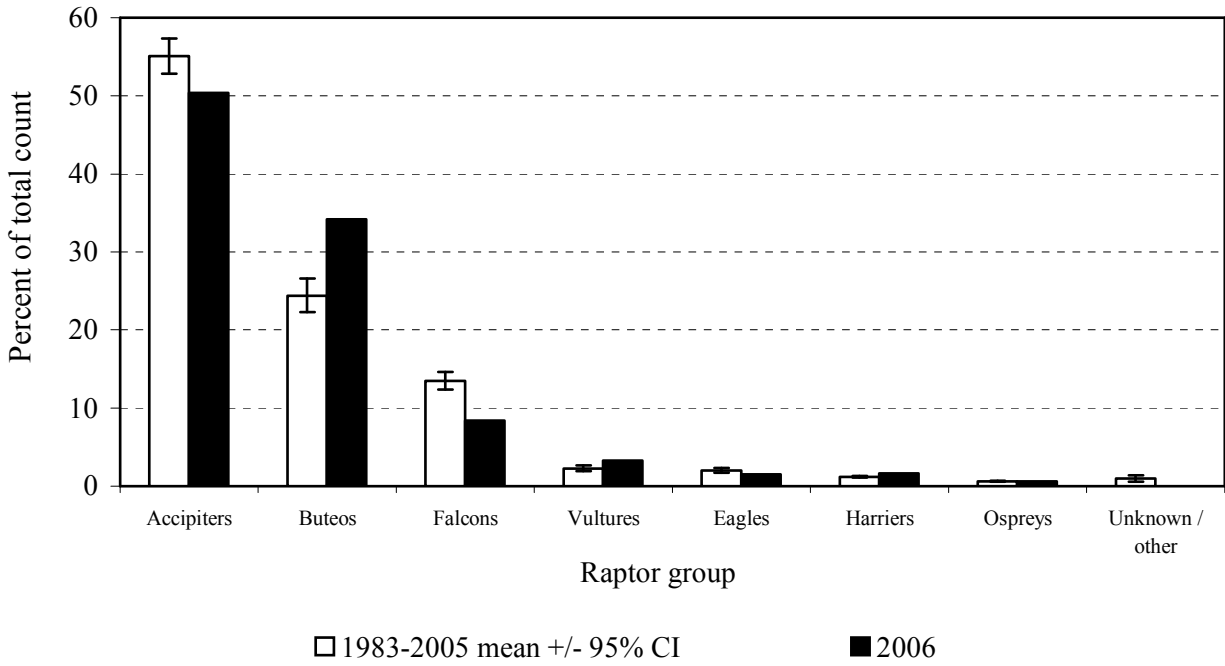


Figure 2. Fall migration flight composition by major species groups in the Goshute Mountains, Nevada: 1983–2005 versus 2006.

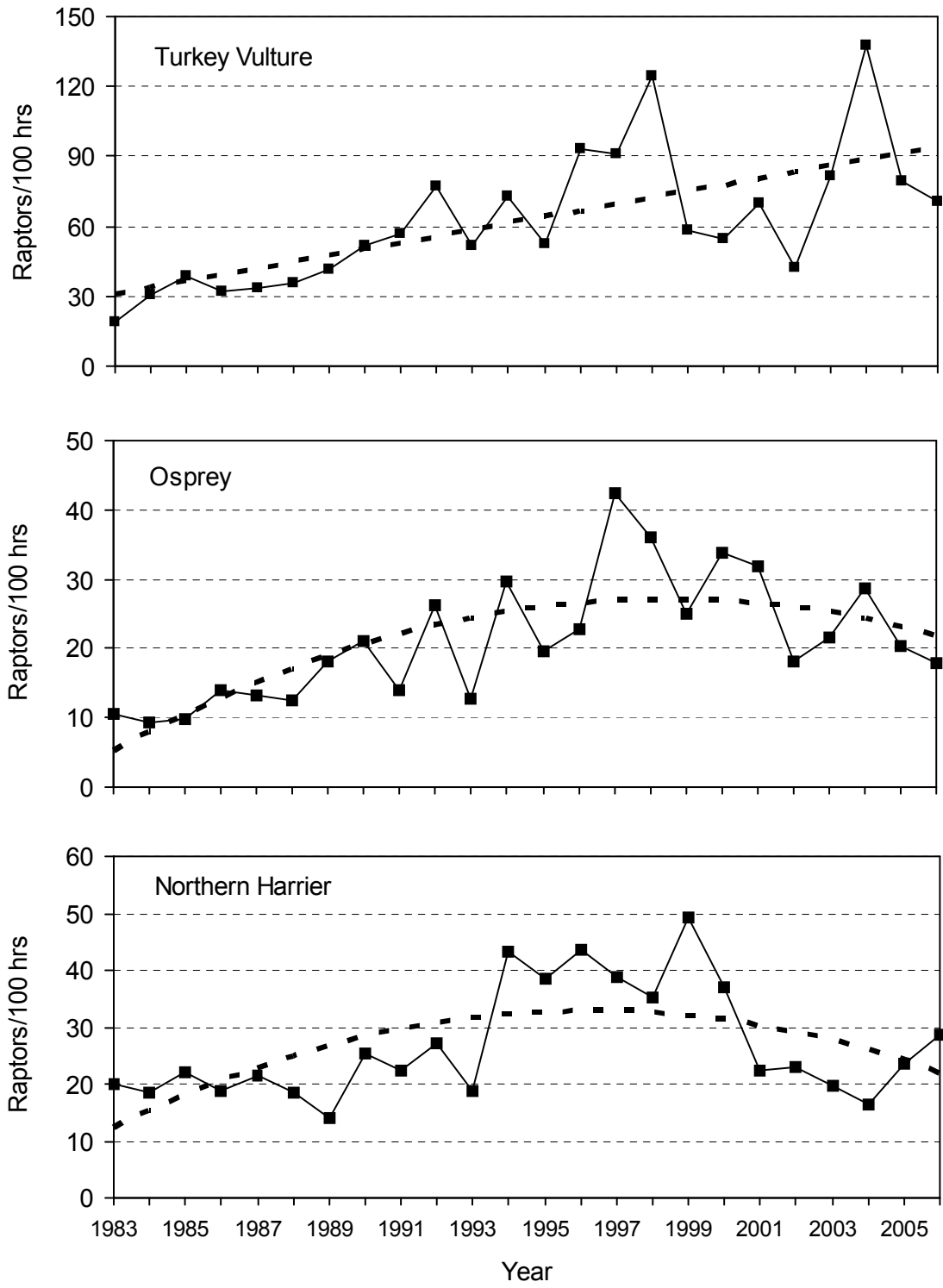


Figure 3. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Turkey Vultures, Ospreys, and Northern Harriers: 1983–2006. Dashed lines indicate significant linear or quadratic regressions.

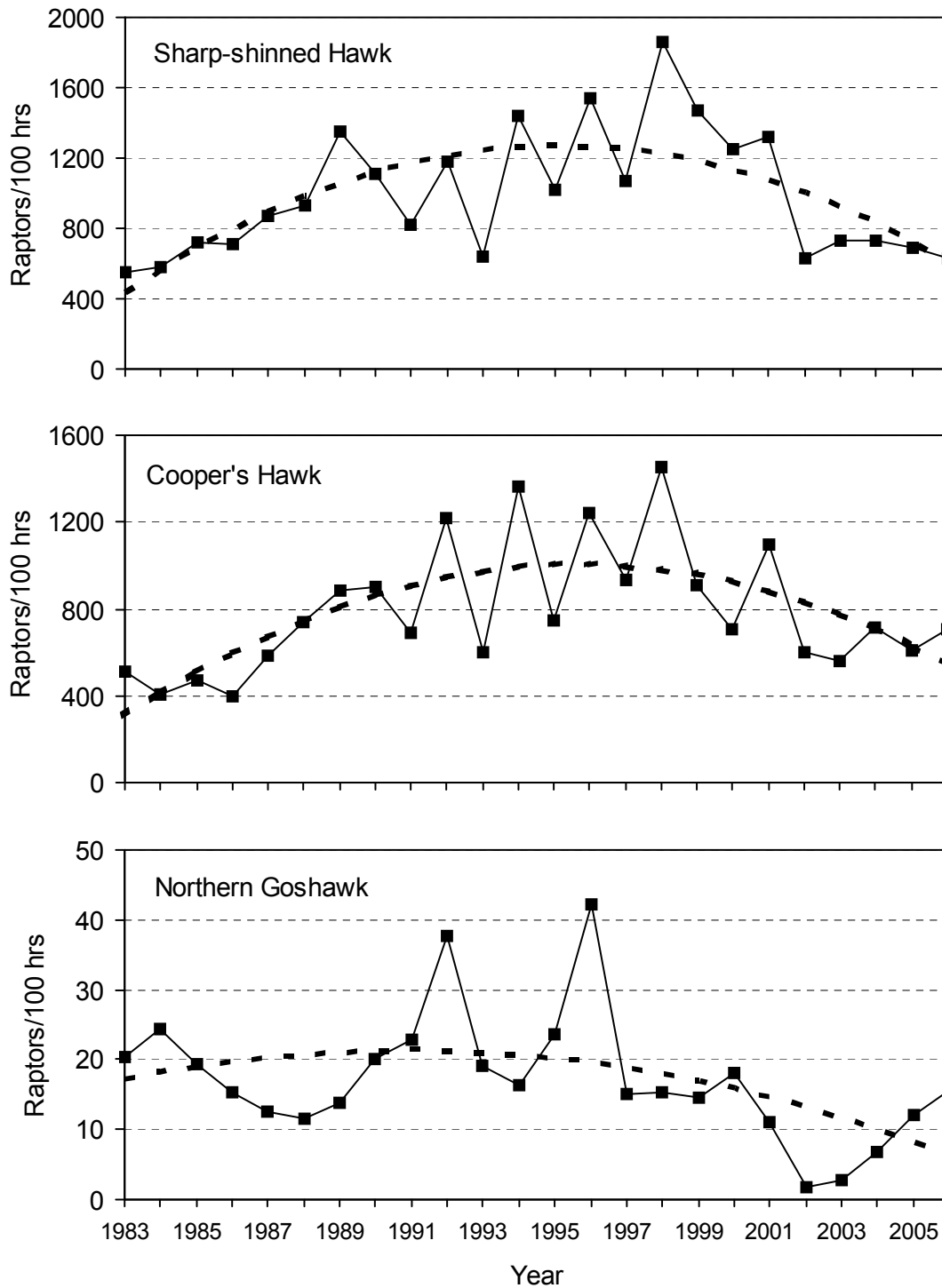


Figure 4. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Sharp-shinned Hawks, Cooper's Hawks, and Northern Goshawks: 1983–2006. Dashed lines indicate significant linear or quadratic regressions.

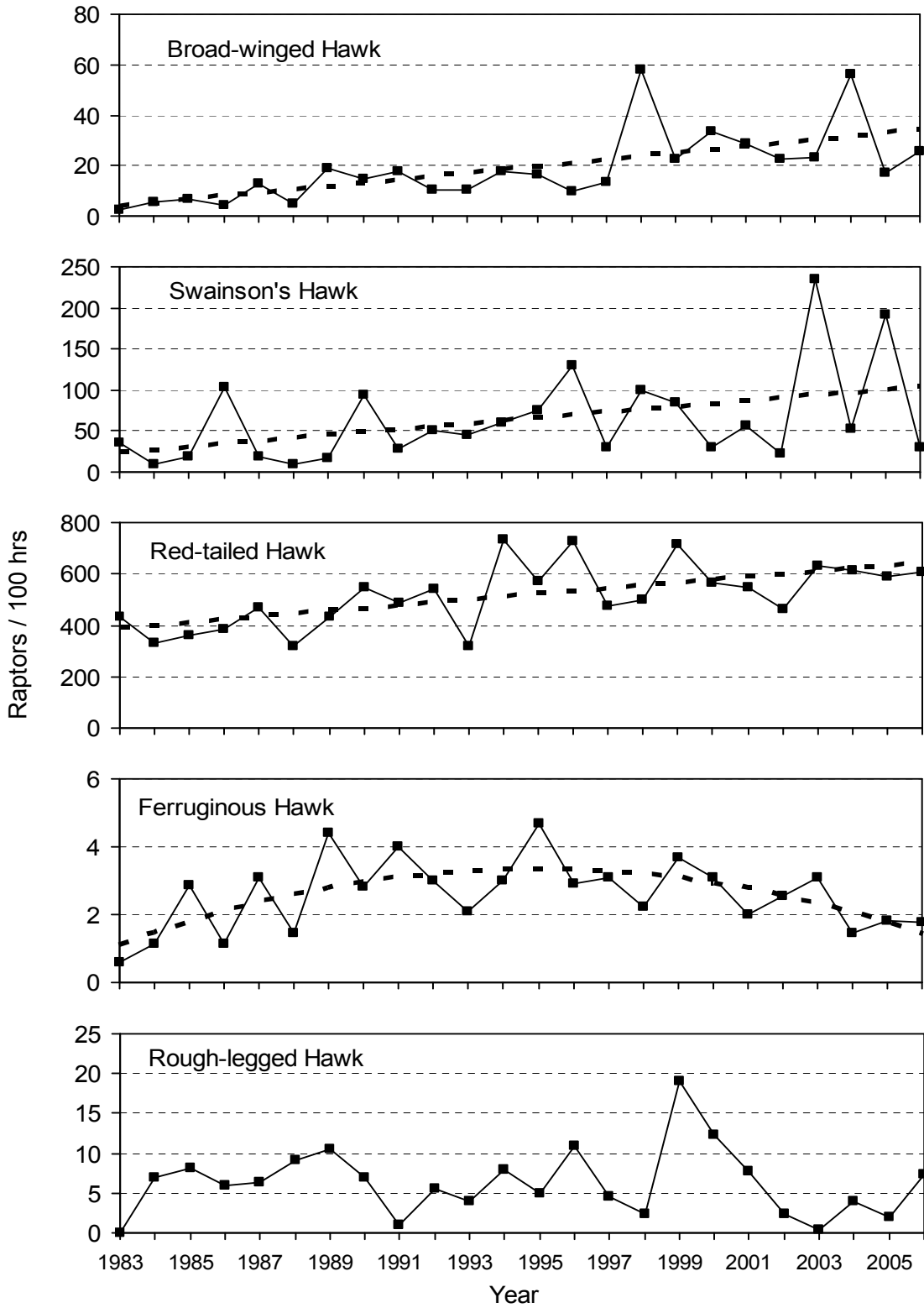


Figure 5. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Broad-winged, Swainson's, Red-tailed, Ferruginous, and Rough-legged Hawks: 1983–2006. Dashed lines indicate significant linear or quadratic regressions.

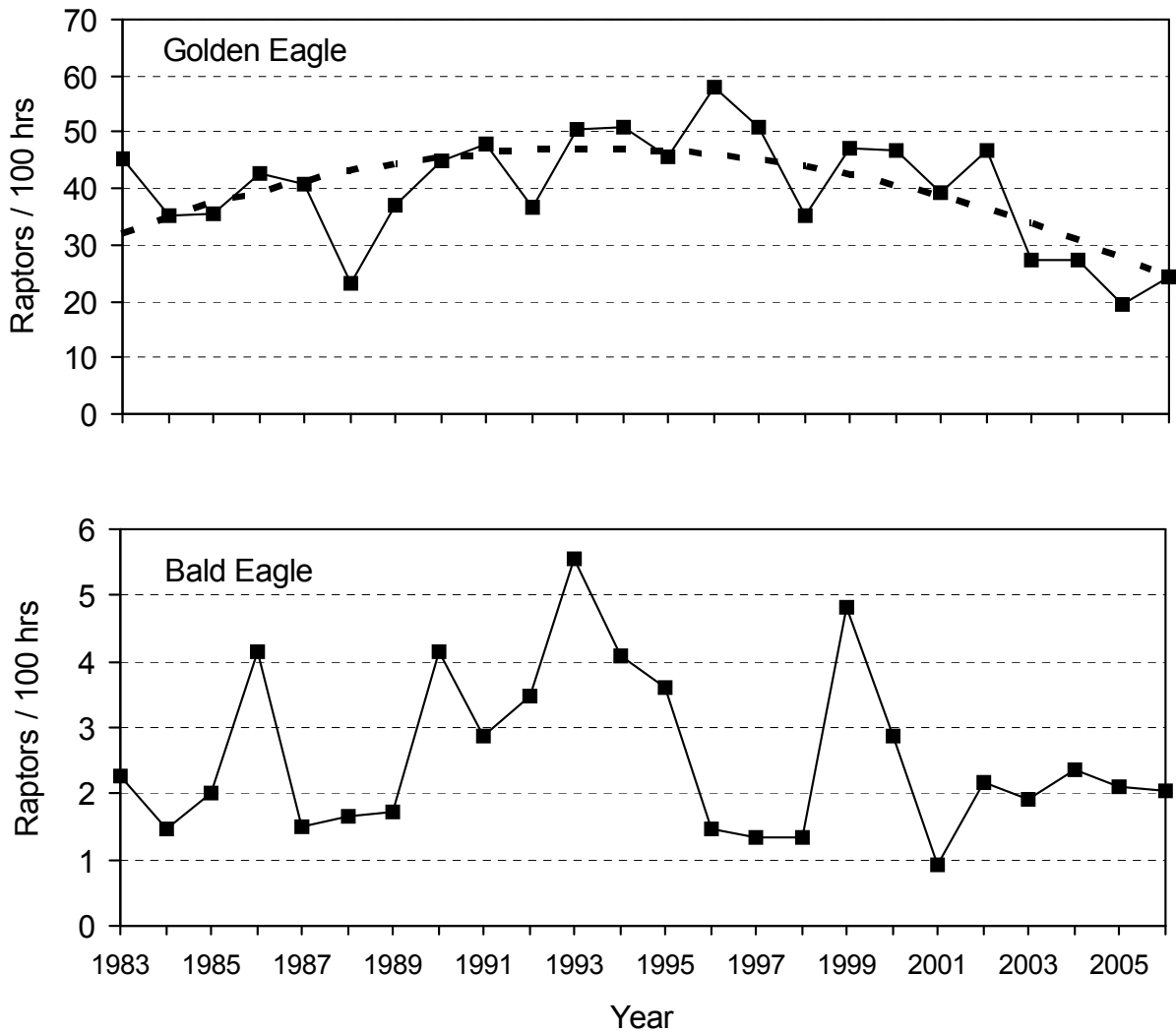


Figure 6. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Golden and Bald Eagles: 1983–2006. Dashed lines indicate significant linear or quadratic regressions.

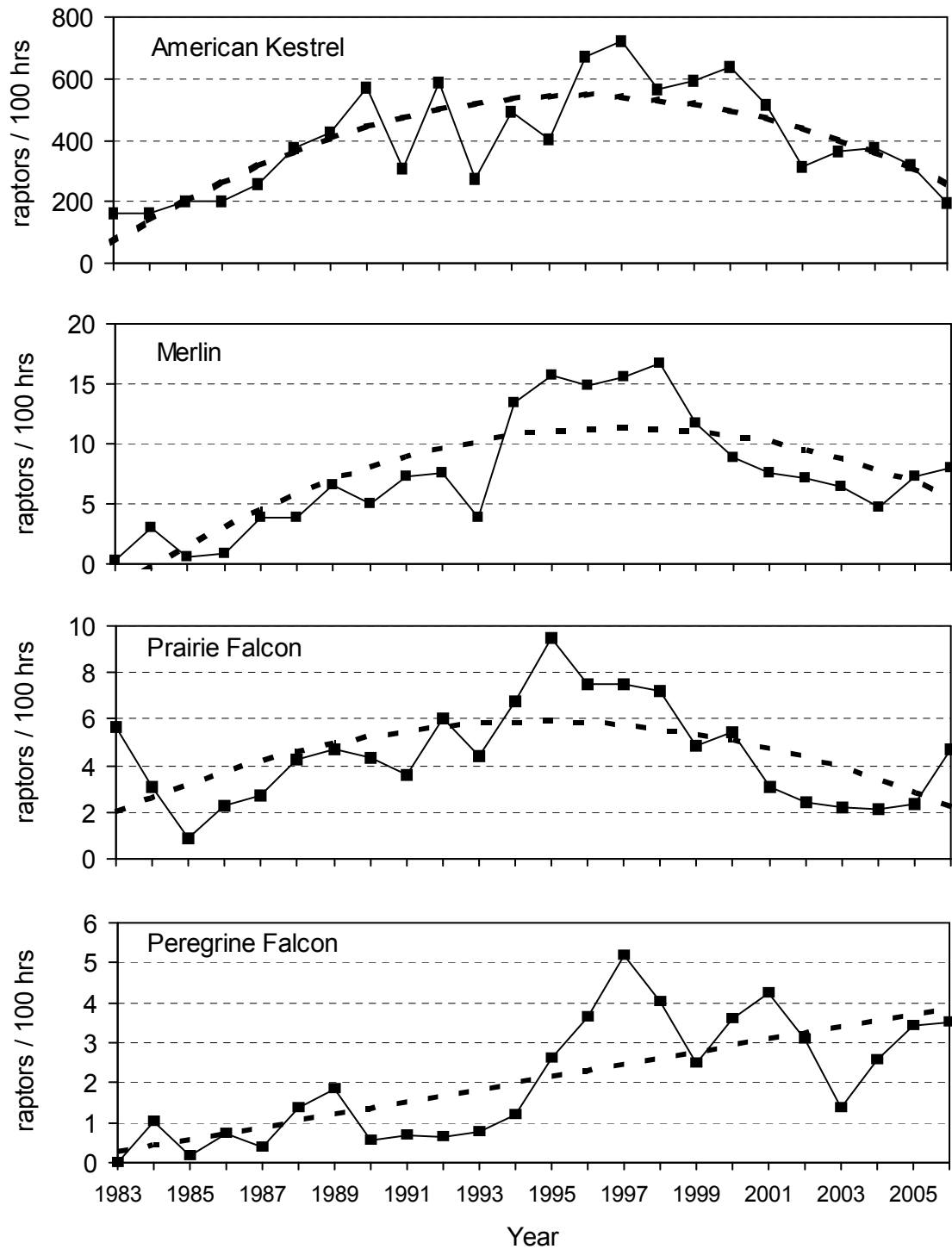


Figure 7. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons: 1983–2006. Dashed lines indicate significant linear or quadratic regressions.

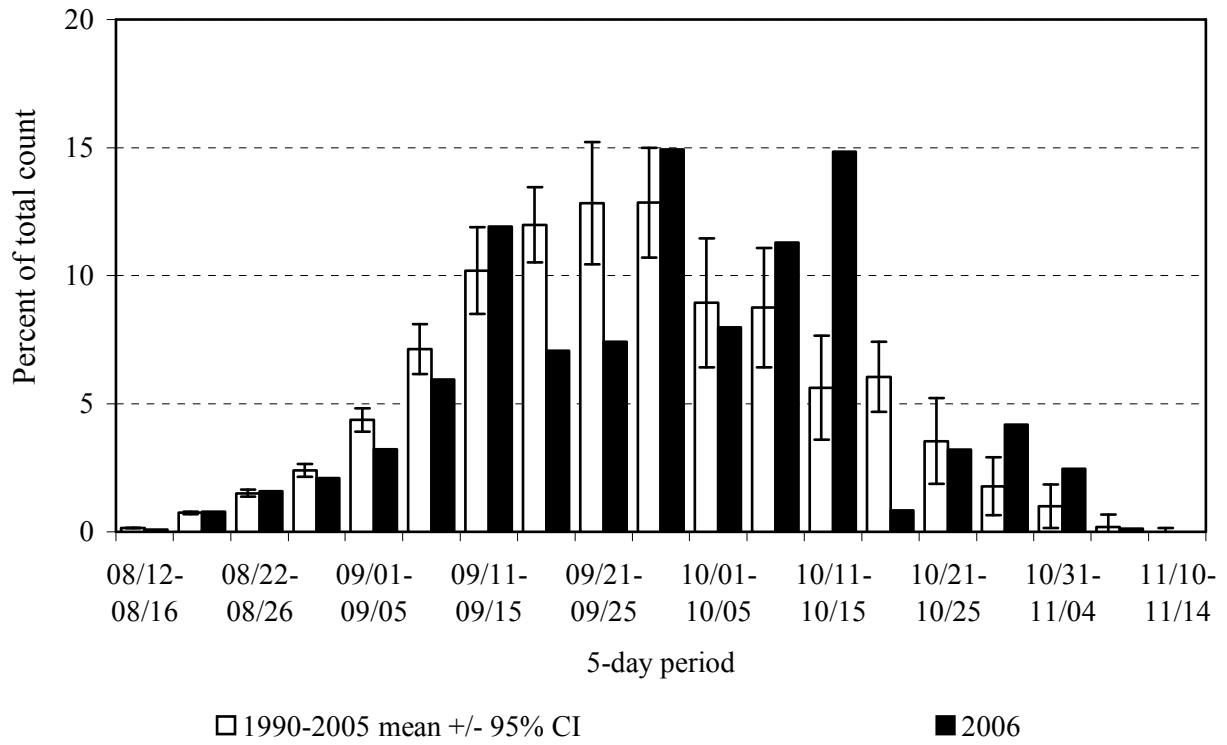


Figure 8. Combined-species passage volume by five-day periods: 1990–2005 versus 2006.

Appendix A. History of official observer participation on the Goshute Mountains Raptor Migration Project.

1983-1986: Single observer throughout with occasional scribe. 1983, David Sherman (0)¹; 1984, three principal observers: Jim Daly (0), Jeff Smith (0), and Fred Tilly (14); 1985, two principal observers: Jim Daly (1) and Fred Tilly (15); 1986, principal observer: John Lower (0).

1987-1989: Single observer throughout, two observers during the peak month. 1987, two principal observers: Victor Fazio (2) and Fred Tilly (16); 1988, two principal observers: Brian Mongi (2) and Fred Tilly (17); 1989, two principal observers: Brian Mongi (3) and Fred Tilly (19).

1990: Two observers throughout with two teams of two for a comparison count during the peak month. Four principal observers: John Martin (1), LisaBeth Daly (2), Fred Tilly (21), and Cathy Tilly (1).

1991: Two observers throughout except 30 October - 5 November, with a scribe throughout. Principal observers: Steve Engel (1) and Dale Payne (0).

1992: Two observers throughout, three observers during the peak month, with a scribe throughout. Three principal observers: Steve Engel (2), Maureen O'Mara (0), and Fred Tilly (24).

1993: Two observers throughout with a scribe throughout. Principal observers: Emily Teachout (1) and Jeff Maurer (0).

1994: Two observers throughout, three observers during the peak month, with a scribe throughout. Principal observers: Steve Engel (3), Jeff Maurer (1), and Fred Tilly (27).

1995: Two observers throughout with a scribe through 17 October. Principal observers: Robert Clemens (3) and Susan Salafsky (2).

1996: two observers throughout except 27 October- 4 November, three observers for the peak month with a scribe until 27 October. Principal observers: Fred Tilly (29), Cathy Tilly (4), Robert Clemens (4), and Aaron Barna (1).

1997: Two observers throughout with a scribe from 10 September - 15 October. Principal observers: Jessie Jewell (9) and Neils Maumenee (2).

1998: Two observers throughout. Principal observers: Jerry Liguori (14) and Mike Lanzone (0).

1999: Two observers throughout. Principal observers: Jerry Liguori (15) and Aaron Barna (4).

2000: Two observers throughout. Principle observers: Jerry Liguori (16), Jeff Maurer (3), Nathan McNett (4), and Aaron Barna (5).

2001: Two observers throughout. Principle observers: Jerry Liguori (17) and Nathan McNett (5).

2002: Two observers throughout. Principle observers: Nathan McNett (6) and Greg Levandoski (2).

2003: Two observers throughout. Principle observers: Nathan McNett (7), Adam Hutchins (4), Allison Cebula (3), Eric Hallingstad (2).

2004: Two observers throughout. Principle observers: Allison Cebula (4), Ricardo Perez (1+), and Nathan McNett (8).

2005: Two observers throughout. Principle observers: Ken McEnaney (1), Chris Jager (+), Allison Cebula (5).

2006: Two observers throughout. Principle observers: Christian Nunes (+), John Bell (1), and Jeremy Russell (+).

¹ Numbers in parentheses indicate the number of seasons of previous experience conducting migratory raptor counts (+ indicates less concentrated previous exposure).

Appendix B. Common and scientific names, species codes, and regularly applied age, sex, and color-morph classifications for all migrant raptors seen in the Goshute Mountains, Nevada.

COMMON NAME	SCIENTIFIC NAME	SPECIES CODE	AGE ¹	SEX ²	COLOR MORPH ³
Turkey Vulture	<i>Cathartes aura</i>	TV	U	U	NA
Osprey	<i>Pandion haliaetus</i>	OS	U	U	NA
Northern Harrier	<i>Circus cyaneus</i>	NH	A I Br U	M F U	NA
Sharp-shinned Hawk	<i>Accipiter striatus</i>	SS	A I U	U	NA
Cooper's Hawk	<i>Accipiter cooperii</i>	CH	A I U	U	NA
Northern Goshawk	<i>Accipiter gentilis</i>	NG	A I U	U	NA
Unknown small accipiter	<i>A. striatus</i> or <i>cooperii</i>	SA	U	U	NA
Unknown large accipiter	<i>A. cooperii</i> or <i>gentilis</i>	LA	U	U	NA
Unknown accipiter	<i>Accipiter</i> spp.	UA	U	U	NA
Red-shouldered Hawk	<i>Buteo lineatus</i>	RS	A I U	U	NA
Broad-winged Hawk	<i>Buteo platypterus</i>	BW	A I U	U	D L U
Swanson's Hawk	<i>Buteo swainsoni</i>	SW	U	U	D L U
Red-tailed Hawk	<i>Buteo jamaicensis</i>	RT	A I U	U	D L U
Ferruginous Hawk	<i>Buteo regalis</i>	FH	A I U	U	D L U
Rough-legged Hawk	<i>Buteo lagopus</i>	RL	U	U	D L U
Unknown buteo	<i>Buteo</i> spp.	UB	U	U	D L U
Golden Eagle	<i>Aquila chrysaetos</i>	GE	I, S, NA, A, U ⁴	U	NA
Bald Eagle	<i>Haliaeetus leucocephalus</i>	BE	I, S1, S2, NA, A, U ⁵	U	NA
Unknown eagle	<i>Aquila</i> or <i>Haliaeetus</i> spp.	UE	U	U	NA
American Kestrel	<i>Falco sparverius</i>	AK	U	M F U	NA
Merlin	<i>Falco columbarius</i>	ML	AM Br	AM U	NA
Prairie Falcon	<i>Falco mexicanus</i>	PR	U	U	NA
Peregrine Falcon	<i>Falco peregrinus</i>	PG	A I U	U	NA
Unknown small falcon	<i>F. sparverius</i> or <i>columbarius</i>	SF	U	U	NA
Unknown large falcon	<i>F. mexicanus</i> or <i>peregrinus</i>	LF	U	U	NA
Unknown falcon	<i>Falco</i> spp.	UF	U	U	NA
Unknown raptor	Falconiformes	UU	U	U	NA

¹ Age codes: A = adult, I = immature (HY), Br = brown (adult female or immature), U = unknown age.

² Sex codes: M = male, F = female, U = unknown.

³ Color morph codes: D = dark or rufous, L = light, U – unknown, NA = not applicable.

⁴ Golden Eagle age codes: I = Immature: juvenile or first-year bird, bold white wing patch visible below, bold white in tail, no molt; S = Subadult: white wing patch variable or absent, obvious white in tail and molt or tawny bar visible on upper wing; NA = Not adult: unknown age immature/subadult; A = Adult: no white in wings or tail; U = Unknown.

⁵ Bald Eagle age codes: I = Immature: juvenile or first-year bird, dark breast and tawny belly; S1 = young Subadult: Basic I and II plumages, light belly, upside-down triangle on back; S2 = older Subadult: Basic III plumage, head mostly white with osprey-like dark eye line and dark band on tail; NA = Not adult:

unknown age immature/subadult; A = Adult: includes near adult with dark flecks in head and dark tail tip, and adult with white head and tail; U = Unknown.

Appendix C. Daily observation effort, visitor disturbance ratings, weather records, and flight summaries: 2006.

DATE	OBS. HOURS	OBSRVR / HOUR ¹	MEDIAN VISITOR DISTURB ²	PREDOMINANT WEATHER ³	WIND SPEED (KPH) ¹	WIND DIRECTION	TEMP (°C) ¹	BAROM. PRESS. (IN HG) ¹	MEDIAN THERMAL LIFT ⁴	VISIB. WEST (KM) ¹	VISIB. EAST (KM) ¹	MEDIAN FLIGHT DISTANCE ⁵ / HOUR	BIRDS / HOUR
15-Aug	8.00	2.5	0	clr, haze	12.1	sw	25.6	29.96	2	100	100	3	1.3
16-Aug	8.00	2.0	0	clr, haze	22.5	w	23.3	29.94	2	100	100	-	0.0
17-Aug	8.00	2.0	0	clr	7.2	nne, w	20.8	30.06	2	50	65	1	1.3
18-Aug	8.00	2.0	0	clr-pc, haze	7.9	ne	19.6	30.15	2	54	56	3	1.0
19-Aug	8.00	2.3	0	clr-mc, haze	3.3	nne	23.9	30.10	1	75	93	2	2.6
20-Aug	8.00	2.3	0	pc-mc	3.9	ne	24.1	30.09	2	100	100	2	2.4
21-Aug	8.00	2.0	0	clr-mc	6.1	wsw	26.1	30.13	2	100	100	3	3.5
22-Aug	8.00	2.0	0	pc-mc	18.0	wsw	26.1	30.14	2	100	100	3	4.0
23-Aug	8.25	2.0	0	mc-ovc, scat ts	15.6	w	25.6	30.06	3	98	100	3	4.6
24-Aug	8.00	2.0	0	pc, haze	4.4	ene, w	21.0	29.93	2	40	38	2	3.3
25-Aug	8.00	2.0	0	mc-ovc, haze	5.4	wnw	22.1	29.82	3	50	83	3	6.8
26-Aug	8.00	2.0	0	pc-mc, haze	5.7	wsw	18.6	29.95	3	48	46	2	2.6
27-Aug	8.00	2.0	1	clr, haze	7.6	nne	19.0	30.13	2	76	60	2	1.9
28-Aug	8.00	2.0	0	clr-pc, haze	9.0	ne	20.7	30.11	2	97	97	3	5.4
29-Aug	8.00	2.0	0	clr-pc, haze	19.2	wsw	24.4	29.93	3	88	85	3	6.6
30-Aug	8.00	2.0	1.5	clr-pc	23.3	w	22.7	29.86	2	100	100	3	7.0
31-Aug	8.00	2.0	0	clr, haze	4.5	var	17.7	30.01	3	100	100	2	7.5
1-Sep	8.00	2.0	0	clr, haze	7.7	ene	17.7	30.11	2	90	91	2	5.5
2-Sep	8.00	2.0	0	clr-pc, haze	8.7	ne	20.8	30.09	2	70	99	2	10.5
3-Sep	8.00	2.0	0	pc-mc	9.6	ne	22.4	30.05	2	99	100	2	13.3
4-Sep	8.00	2.0	0	pc-ovc, scat ts	5.0	ne, wsw	21.6	30.14	3	100	91	3	5.9
5-Sep	8.00	2.0	0	clr-ovc, haze/scat ts	8.2	calm/var	23.4	30.45	2	94	92	2	8.5
6-Sep	7.75	2.0	1	clr-ovc, haze	7.4	ne, wnw	21.0	30.13	3	77	69	3	21.0
7-Sep	8.25	2.0	0	pc-ovc, haze	7.9	ne	19.5	29.95	3	63	71	2	14.8
8-Sep	8.50	2.0	0	clr-mc, haze/rain	4.9	ne, wsw	18.0	29.85	2	78	81	3	11.9
9-Sep	6.83	2.0	0	ovc, ts/rain	11.0	ene, w	16.8	29.89	3	77	63	2	13.5
10-Sep	8.75	2.0	1.5	clr-pc, haze	3.3	calm, e	16.7	30.04	2	86	100	2	18.9
11-Sep	9.00	2.4	0	clr, haze	6.2	calm, ne, w	18.8	30.16	2	87	86	2	32.9
12-Sep	9.50	2.3	0	clr, haze	6.5	ne	19.2	30.15	2	77	72	2	26.1
13-Sep	8.75	2.4	0	clr-pc, haze	6.4	w	22.5	29.93	2	79	78	2	25.9
14-Sep	7.75	2.0	1.5	pc-ovc	19.3	w	17.4	29.54	3	72	78	3	43.1
15-Sep	8.00	2.3	0	mc-ovc, PM haze	20.2	w	9.4	29.36	4	39	55	3	23.1
16-Sep	8.50	2.8	0	pc	19.2	w	4.7	29.80	4	100	100	2	3.2
17-Sep	8.75	2.9	1	clr	3.9	w	8.4	29.99	2	100	100	3	14.7
18-Sep	10.25	1.9	0	clr	4.9	var	13.2	29.98	2	100	100	3	35.1
19-Sep	8.00	2.0	0	mc-ovc, PM haze	18.4	w	16.7	29.78	3	95	79	3	31.0
20-Sep	3.17	2.4	0	ovc, AM snow	12.0	w	3.7	29.75	4	67	67	-	0.6
21-Sep	8.25	2.0	0	mc-ovc	35.4	w	8.1	29.56	4	94	90	3	14.4
22-Sep	8.00	2.0	0	pc-ovc, scat snow	7.2	nnw, ne	2.3	29.72	4	79	88	1	2.8
23-Sep	8.00	2.0	0	clr	7.5	ne	5.7	30.00	2	100	100	2	21.6
24-Sep	8.25	2.0	0	clr	5.4	ene	8.7	30.08	3	100	100	2	23.5
25-Sep	9.00	2.0	0	clr	5.0	calm/var	11.6	30.08	3	100	94	3	32.8
26-Sep	8.75	1.9	0	clr	3.3	ne, wsw	14.7	30.13	2	99	89	3	17.5
27-Sep	8.50	2.0	0	clr	6.0	nne, wsw	16.6	30.17	2	99	90	3	44.9
28-Sep	9.50	2.0	1.5	clr, haze	6.5	w	17.1	30.15	2	100	100	3	36.1
29-Sep	8.50	2.4	0	clr, haze	0.9	calm, wsw	18.3	30.10	2	87	84	3	28.9
30-Sep	8.75	2.8	0	clr-mc, haze	5.9	e, wsw	18.6	29.98	2	94	97	2	56.1
1-Oct	9.00	2.0	0	mc-ovc	7.7	var	18.7	29.90	3	100	98	2	21.0
2-Oct	3.75	2.2	0	pc-ovc, AM rain	29.3	ssw, w	7.8	29.80	4	64	64	3	20.3
3-Oct	8.00	1.9	0	pc, haze	4.2	calm, ene	11.8	29.98	3	100	100	2	13.8
4-Oct	7.50	1.9	0	mc-ovc, PM ts/rain	10.4	var	12.7	29.89	4	100	100	1	29.5
5-Oct	8.00	2.0	0	mc-ovc	19.8	sw	12.4	29.84	4	94	92	2	33.6
6-Oct	4.25	2.0	0	ovc, fog/rain	11.0	ne, sw	7.3	29.75	4	27	56	2	1.4

Appendix C. continued

DATE	OBS. HOURS	OBSRVR / HOUR ¹	MEDIAN	PREDOMINANT WEATHER ³	WIND	WIND DIRECTION	TEMP (°C) ¹	BAROM.	MEDIAN	VISIB.	VISIB.	MEDIAN	BIRDS / HOUR
			VISITOR DISTURB ²		SPEED (KPH) ¹			PRESS. (IN HG) ¹	THERMAL LIFT ⁴	WEST (KM) ¹	EAST (KM) ¹	FLIGHT DISTANCE ⁵	
7-Oct	4.25	2.0	0	ovc, PM snow	4.8	wsw, ene	7.8	29.91	4	83	68	3	7.5
8-Oct	10.25	2.0	0	clr-pc	4.4	calm, nne, sw	6.1	29.97	2	100	97	3	100.7
9-Oct	7.75	1.9	0	pc-ovc, snow/ts	3.7	calm, nne, ene	5.9	29.77	4	89	76	2	19.5
10-Oct	0.00			count day – lost data									
11-Oct	9.00	2.0	0	clr-pc	7.2	w	7.0	29.86	3	100	100	2	47.0
12-Oct	9.00	2.0	0	clr	4.1	calm, ne, sw	9.9	29.89	3	100	99	2	63.4
13-Oct	8.00	2.0	0	clr	2.4	e, wsw	11.4	29.79	3	100	100	2	26.3
14-Oct	8.00	4.0	0	pc-mc	3.4	ne	11.1	29.67	3	100	100	2	15.4
15-Oct	10.00	3.7	0	mc-ovc	10.4	wsw-w	12.1	29.58	4	100	100	2	27.9
16-Oct	3.25	1.0	0	ovc, AM fog/snow	12.4	w	3.7	29.40	4	14	29	-	0.0
17-Oct	6.25	1.9	0	ovc, snow	6.8	ne, nnw	0.9	29.53	4	56	53	1	1.6
18-Oct	8.50	1.7	0	clr-pc	6.1	wsw	2.8	29.88	3	100	100	2	2.5
19-Oct	8.00	2.0	0	pc-ovc	14.0	wsw	6.4	29.94	4	100	100	2	4.9
20-Oct	8.75	2.0	0	clr	23.3	wsw	6.7	29.72	3	100	100	2	2.4
21-Oct	8.83	2.0	0	clr	6.2	e, w	3.3	29.94	2	100	100	2	13.5
22-Oct	8.50	2.0	0	clr	3.3	wsw	8.5	30.02	3	100	100	2	11.1
23-Oct	9.00	1.9	0	clr	7.8	wsw	11.7	29.89	3	100	94	1	9.3
24-Oct	9.00	2.0	0	clr-mc	10.3	wsw	11.1	29.75	3	100	100	2	5.6
25-Oct	4.00	2.0	0	pc-ovc, scat snow	39.8	wnw	-3.0	29.63	4	80	42	-	0.0
26-Oct	8.50	2.0	0	clr-ovc	6.8	ne, wsw	4.0	30.11	4	100	100	2	12.4
27-Oct	8.25	2.0	0	clr	2.0	calm, ne, sw	9.6	30.29	3	100	100	2	22.2
28-Oct	8.50	2.0	0	clr	6.1	wsw	11.3	30.09	3	100	100	2	8.6
29-Oct	8.00	2.0	0	pc	13.8	wsw	9.6	29.67	4	100	100	2	3.4
30-Oct	8.50	2.0	0	clr, haze	16.4	wsw	4.3	29.63	4	91	95	2	7.6
31-Oct	8.00	2.0	0	clr-ovc, haze	10.7	wsw	3.4	29.69	4	100	100	2	21.1
1-Nov	7.50	2.0	0	clr-mc	5.2	w	3.4	29.87	4	100	97	1	4.7
2-Nov	8.00	2.0	0	ovc	10.1	wsw	7.4	29.87	4	100	98	2	1.8
3-Nov	8.00	2.0	0	pc-ovc	7.9	wsw	6.6	29.87	4	98	100	2	5.3
4-Nov	8.00	2.0	0	mc, AM fog, scat snow	5.8	nne, w-wsw	5.1	29.97	4	98	91	2	0.6
5-Nov	7.00	1.9	0	mc-ovc	13.7	wsw	7.2	30.01	3	100	100	2	2.0

¹ Average of hourly records.

² Median hourly visitor-disturbance rating (subjective assessment by observers): 0 = none, 1 = low, 2 = moderate, 3 = high.

³ Predominant sky condition during day: clr = clear (0-15% cloud cover); pc = partly cloudy (16-50% cover); mc = mostly cloudy (51-75% cover); ovc = overcast (76-100% cover); ts = thunderstorms.

⁴ Median hourly rating concerning prevalence of lift-generating thermals, based on subjective assessments of solar intensity, wind speeds, and migrant behavior: 1 = excellent, 2 = good, 3 = fair, 4 = poor.

⁵ Median hourly rating concerning line-of-sight distance of flight from observation site: 1 = close, detection and identification possible with naked eye; 2 = moderate, detection possible with naked eye, but binoculars needed for identification; 3 = far, binoculars needed for both detection and identification; 4 = distant, birds detected and identified only with excellent binoculars or spotting scope and by experienced observers.

Appendix D. Daily unadjusted raptor counts by species: 2006.

DATE	HOURS	SPECIES ¹																							BIRDS				
		TV	OS	NH	SS	CH	NG	SA	LA	UA	RS	BW	SW	RT	FH	RL	UB	GE	BE	UE	AK	ML	PR	PG	SF	LF	UF	UU	TOTAL
15-Aug	8.00	0	0	0	1	2	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	10	1.3
16-Aug	8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
17-Aug	8.00	0	0	1	0	0	0	0	0	0	0	0	3	0	0	2	0	0	0	4	0	0	0	0	0	0	10	1.3	
18-Aug	8.00	0	0	1	0	3	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	8	1.0	
19-Aug	8.00	2	0	0	1	1	0	0	0	0	0	0	14	0	0	0	2	0	0	1	0	0	0	0	0	0	21	2.6	
20-Aug	8.00	1	0	1	0	1	0	0	1	0	0	0	10	0	0	1	2	0	0	1	0	1	0	0	0	0	19	2.4	
21-Aug	8.00	1	0	5	0	2	0	0	0	1	0	0	9	0	0	0	3	0	0	2	0	1	1	2	1	0	28	3.5	
22-Aug	8.00	0	1	1	2	6	0	0	0	0	0	0	17	0	0	1	0	0	3	0	1	0	0	0	0	32	4.0		
23-Aug	8.25	2	0	1	0	2	2	0	0	0	0	0	18	0	0	1	3	0	0	8	0	0	1	0	0	0	38	4.6	
24-Aug	8.00	0	1	3	3	1	0	0	1	0	0	0	8	0	0	0	3	0	0	6	0	0	0	0	0	0	26	3.3	
25-Aug	8.00	0	0	2	4	7	1	2	0	0	0	0	27	0	0	0	0	0	0	10	1	0	0	0	0	0	54	6.8	
26-Aug	8.00	0	0	2	1	2	0	0	0	0	0	0	13	0	0	0	1	0	0	0	0	1	1	0	0	0	21	2.6	
27-Aug	8.00	0	0	0	2	3	0	0	0	0	0	0	6	0	0	0	0	0	0	3	0	1	0	0	0	0	15	1.9	
28-Aug	8.00	0	0	2	3	3	1	0	1	0	0	0	3	28	0	0	1	0	0	0	0	0	0	0	0	1	43	5.4	
29-Aug	8.00	0	1	2	2	17	0	0	0	0	0	1	13	0	0	0	1	0	0	14	0	1	1	0	0	0	53	6.6	
30-Aug	8.00	1	1	2	3	7	1	0	0	0	0	0	17	0	0	0	4	0	0	18	0	1	1	0	0	0	56	7.0	
31-Aug	8.00	2	0	0	2	14	1	0	0	0	0	2	24	1	0	0	0	0	0	13	1	0	0	0	0	0	60	7.5	
01-Sep	8.00	2	1	0	13	9	1	0	0	1	0	0	13	0	0	0	1	0	0	2	0	0	0	0	0	0	44	5.5	
02-Sep	8.00	10	1	4	9	12	4	0	0	0	0	0	2	31	0	0	0	1	0	0	9	0	1	0	0	0	84	10.5	
03-Sep	8.00	1	4	0	24	21	5	0	0	0	0	0	42	0	0	0	1	0	0	8	0	0	0	0	0	0	106	13.3	
04-Sep	8.00	2	3	1	8	13	0	0	0	0	0	0	15	0	0	0	1	0	0	3	0	1	0	0	0	0	47	5.9	
05-Sep	8.00	5	1	0	14	6	1	0	0	0	0	0	4	0	0	0	0	0	0	34	1	0	1	0	0	1	68	8.5	
06-Sep	7.75	18	2	2	20	35	0	1	0	0	0	0	2	41	0	0	0	1	0	0	40	0	1	0	0	0	163	21.0	
07-Sep	8.25	13	2	1	26	19	0	0	0	0	0	0	37	1	0	0	2	0	0	19	1	0	1	0	0	0	122	14.8	
08-Sep	8.50	2	0	5	29	30	1	0	0	0	0	0	4	14	0	0	0	0	0	14	1	1	0	0	0	0	101	11.9	
09-Sep	6.83	1	0	2	33	25	1	1	0	0	0	0	3	14	0	0	1	0	0	11	0	0	0	0	0	0	92	13.5	
10-Sep	8.75	2	7	8	38	30	1	0	0	0	0	0	5	29	0	0	0	1	1	0	41	0	1	1	0	0	165	18.9	
11-Sep	9.00	7	2	2	76	64	3	4	0	2	0	0	12	54	0	0	0	3	0	0	66	0	0	0	0	0	1	296	32.9
12-Sep	9.50	1	3	3	94	72	1	2	0	0	0	0	5	28	0	0	1	0	0	35	2	1	0	0	0	0	248	26.1	
13-Sep	8.75	11	0	4	92	55	2	2	0	0	0	0	1	18	0	0	1	1	0	40	0	0	0	0	0	0	227	25.9	
14-Sep	7.75	4	5	3	127	118	1	0	0	2	0	0	2	26	0	0	1	1	0	41	3	0	0	0	0	0	334	43.1	

Appendix D. continued

DATE	HOURS	SPECIES ¹																							BIRDS				
		TV	OS	NH	SS	CH	NG	SA	LA	UA	RS	BW	SW	RT	FH	RL	UB	GE	BE	UE	AK	ML	PR	PG	SF	LF	UF	UU	TOTAL
15-Sep	8.00	3	5	1	60	91	0	2	0	0	0	2	11	0	0	0	1	0	0	8	1	0	0	0	0	0	0	185	23.1
16-Sep	8.50	0	3	0	2	9	0	1	0	0	0	0	9	0	0	0	0	0	0	2	0	0	1	0	0	0	0	27	3.2
17-Sep	8.75	54	0	0	15	17	2	3	0	0	0	8	18	0	0	0	0	0	0	11	0	1	0	0	0	0	0	129	14.7
18-Sep	10.25	25	8	6	75	127	4	3	1	0	0	1	5	92	1	0	1	1	0	9	1	0	0	0	0	0	0	360	35.1
19-Sep	8.00	19	2	6	59	124	2	1	1	0	0	1	7	18	0	0	0	0	0	7	0	1	0	0	0	0	0	248	31.0
20-Sep	3.17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0.6
21-Sep	8.25	22	1	2	28	34	0	0	0	0	0	1	4	14	0	0	0	0	0	10	1	0	2	0	0	0	0	119	14.4
22-Sep	8.00	11	0	0	2	5	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	2.8
23-Sep	8.00	16	0	1	36	54	1	0	0	0	0	2	5	50	0	0	0	1	0	0	6	0	1	0	0	0	0	173	21.6
24-Sep	8.25	9	2	4	46	59	2	0	0	3	0	10	3	51	0	0	0	0	0	5	0	0	0	0	0	0	0	194	23.5
25-Sep	9.00	13	1	6	53	111	5	3	0	0	0	12	6	58	0	0	1	6	0	0	19	1	0	0	0	0	0	295	32.8
26-Sep	8.75	7	1	2	47	57	2	5	0	0	0	1	1	15	0	0	0	2	0	0	9	3	1	0	0	0	0	153	17.5
27-Sep	8.50	10	0	8	71	154	1	12	0	0	0	0	4	40	2	0	0	1	0	0	76	1	0	2	0	0	0	382	44.9
28-Sep	9.50	13	1	6	93	131	1	0	0	0	0	5	0	43	0	0	0	4	0	0	42	4	0	0	0	0	0	343	36.1
29-Sep	8.50	2	0	3	77	86	0	3	0	0	0	1	2	18	0	0	1	0	0	0	52	0	1	0	0	0	0	246	28.9
30-Sep	8.75	8	0	7	163	214	3	0	0	0	0	6	3	54	0	0	0	2	0	0	29	1	0	1	0	0	0	491	56.1
01-Oct	9.00	2	1	9	51	71	2	3	0	0	0	2	1	34	0	0	0	1	0	0	11	0	1	0	0	0	0	189	21.0
02-Oct	3.75	0	0	0	10	15	0	0	0	0	0	0	0	21	0	0	0	2	0	0	28	0	0	0	0	0	0	76	20.3
03-Oct	8.00	4	0	8	42	37	1	0	0	0	0	2	0	11	0	0	0	1	0	0	3	1	0	0	0	0	0	110	13.8
04-Oct	7.50	0	2	1	99	92	0	0	0	0	0	1	1	13	0	0	0	3	0	0	9	0	0	0	0	0	0	221	29.5
05-Oct	8.00	12	3	1	109	86	1	0	0	0	0	0	5	43	0	0	0	1	0	0	4	1	1	2	0	0	0	269	33.6
06-Oct	4.25	0	1	0	3	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1.4
07-Oct	4.25	0	0	2	9	9	0	0	0	0	0	0	0	4	0	0	0	0	0	0	8	0	0	0	0	0	0	32	7.5
08-Oct	10.25	37	0	1	240	130	2	2	0	0	0	7	3	603	0	1	0	2	1	0	3	0	0	0	0	0	0	1032	100.7
09-Oct	7.75	0	0	3	47	15	0	0	0	0	0	3	0	80	0	0	0	3	0	0	0	0	0	0	0	0	0	151	19.5
10-Oct	0.00																												
11-Oct	9.00	0	0	6	55	95	4	6	0	0	0	2	1	237	0	2	0	5	0	0	7	2	1	0	0	0	0	423	47.0
12-Oct	9.00	0	1	1	154	100	5	0	0	0	0	0	1	285	0	0	0	13	0	0	8	3	0	0	0	0	0	571	63.4
13-Oct	8.00	0	0	5	89	16	1	0	0	0	0	0	1	87	1	0	0	8	0	0	1	1	0	0	0	0	0	210	26.3
14-Oct	8.00	0	0	1	47	8	1	0	0	0	0	0	0	60	1	0	0	2	0	0	2	0	1	0	0	0	0	123	15.4
15-Oct	10.00	0	0	6	116	7	3	0	0	0	0	0	1	131	1	1	0	10	0	0	1	1	1	0	0	0	0	279	27.9

Appendix D. continued

DATE	HOURS	SPECIES ¹																								BIRDS					
		TV	OS	NH	SS	CH	NG	SA	LA	UA	RS	BW	SW	RT	FH	RL	UB	GE	BE	UE	AK	ML	PR	PG	SF	LF	UF	UU	TOTAL	/HOUR	
16-Oct	3.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
17-Oct	6.25	0	0	0	4	0	1	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1.6	
18-Oct	8.50	0	1	0	1	0	2	0	0	0	0	0	13	0	1	0	2	0	0	1	0	0	0	0	0	0	0	21	2.5		
19-Oct	8.00	0	0	0	5	0	1	0	0	0	0	0	29	0	0	0	4	0	0	0	0	0	0	0	0	0	0	39	4.9		
20-Oct	8.75	0	0	0	3	1	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	1	1	0	0	0	21	2.4			
21-Oct	8.83	0	0	1	13	3	2	0	0	0	0	1	96	0	0	0	2	0	0	1	0	0	0	0	0	0	119	13.5			
22-Oct	8.50	0	0	2	30	0	2	0	0	0	0	0	57	0	0	0	2	0	0	1	0	0	0	0	0	0	94	11.1			
23-Oct	9.00	0	0	3	35	0	2	0	0	0	0	0	41	0	1	0	1	0	0	0	1	0	0	0	0	0	84	9.3			
24-Oct	9.00	0	0	1	12	0	2	0	0	0	0	0	25	0	1	0	6	2	0	0	1	0	0	0	0	0	50	5.6			
25-Oct	4.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0		
26-Oct	8.50	0	0	0	16	0	0	0	0	0	0	0	84	0	1	0	3	0	0	0	1	0	0	0	0	0	105	12.4			
27-Oct	8.25	0	0	2	24	2	1	0	0	0	0	0	147	0	0	0	6	0	0	0	1	0	0	0	0	0	183	22.2			
28-Oct	8.50	0	0	1	35	0	1	0	0	0	0	0	29	0	2	0	3	0	0	0	2	0	0	0	0	0	73	8.6			
29-Oct	8.00	0	0	0	11	0	0	0	0	0	0	0	8	1	1	0	5	0	0	0	0	1	0	0	0	0	27	3.4			
30-Oct	8.50	0	0	3	9	0	0	0	0	0	0	0	47	0	1	0	3	0	0	0	2	0	0	0	0	0	65	7.6			
31-Oct	8.00	0	0	1	6	0	2	0	0	0	0	0	152	1	0	0	5	2	0	0	0	0	0	0	0	0	169	21.1			
01-Nov	7.50	0	0	3	6	0	1	0	0	0	0	0	23	0	0	0	2	0	0	0	0	0	0	0	0	0	35	4.7			
02-Nov	8.00	0	0	1	2	0	1	0	0	0	0	0	8	0	1	0	1	0	0	0	0	0	0	0	0	0	14	1.8			
03-Nov	8.00	0	0	4	6	0	2	0	0	0	0	0	26	0	1	0	0	3	0	0	0	0	0	0	0	0	42	5.3			
04-Nov	8.00	0	0	0	1	0	0	0	0	0	0	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	5	0.6			
05-Nov	7.00	0	0	1	1	0	3	0	0	0	0	0	5	0	1	0	3	0	0	0	0	0	0	0	0	0	14	2.0			
Total	652.58	355	68	177	2745	2541	95	57	6	9	0	57	109	3492	10	17	13	152	9	0	820	40	26	17	2	2	0	3	10822	16.6	

¹ See Appendix B for explanation of species codes.

Appendix E. Annual summaries of observation effort and unadjusted raptor counts by species: 1983–2006.

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Start Date	15-Aug	16-Aug	20-Aug	16-Aug	17-Aug	17-Aug	18-Aug	15-Aug	16-Aug	16-Aug	16-Aug	16-Aug	15-Aug
End Date	23-Oct	17-Nov	5-Nov	31-Oct	27-Oct	9-Nov	4-Nov	31-Oct	5-Nov	10-Nov	5-Nov	5-Nov	5-Nov
Observation days	68	83	76	67	66	85	76	78	79	85	80	78	83
Observation hours	561.08	638.66	654.50	485.00	564.25	734.66	567.50	667.00	707.67	743.42	659.50	709.58	694.92
Raptors / 100 hours	1517	1130	1427	1435	1921	1704	2397	2527	1879	2703	1510	3122	2276
SPECIES	RAPTOR COUNTS												
Turkey Vulture	92	141	211	131	165	198	200	285	327	473	270	418	289
Osprey	41	39	40	43	51	54	65	86	62	119	54	130	92
Northern Harrier	109	105	139	89	120	125	77	161	152	184	116	292	252
Sharp-shinned Hawk	2021	2067	3177	2233	3537	4405	5404	5275	3702	5931	2838	6835	4752
Cooper's Hawk	1698	1378	1741	1149	2042	3012	3074	3647	2779	5071	2298	5576	3252
Northern Goshawk	105	146	119	65	65	74	80	123	146	259	120	105	150
Unknown small accipiter ¹	–	–	–	–	–	–	–	–	–	–	–	–	–
Unknown large accipiter ¹	–	–	–	–	–	–	–	–	–	–	–	–	–
Unknown accipiter	562	362	311	251	710	295	204	374	648	639	348	522	416
TOTAL ACCIPITERS	4386	3953	5348	3698	6354	7786	8762	9419	7275	11900	5604	13038	8570
Red-shouldered Hawk	0	0	0	1	1	0	0	1	0	0	0	0	0
Broad-winged Hawk	6	13	15	7	30	16	37	35	44	26	27	41	40
Swainson's Hawk	116	34	78	276	69	43	60	351	108	208	159	244	287
Red-tailed Hawk	2105	1765	2132	1663	2317	2048	2263	3336	2976	3489	1827	4663	3572
Ferruginous Hawk	3	6	17	5	15	9	23	17	26	19	15	20	29
Rough-legged Hawk	0	17	17	10	9	23	21	14	3	13	7	17	11
Unidentified buteo	185	74	65	42	156	44	47	36	147	70	128	110	69
TOTAL BUTEOS	2415	1909	2324	2005	2597	2183	2451	3790	3304	3825	2163	5095	4008
Golden Eagle	239	206	230	196	221	154	203	290	324	263	317	338	299
Bald Eagle	8	10	9	13	7	8	9	19	16	21	26	19	17
Unidentified eagle	2	0	0	1	0	0	0	2	6	1	1	1	1
TOTAL EAGLES	249	216	239	210	228	162	212	311	346	285	344	358	317
American Kestrel	731	697	934	708	1099	1844	1669	2634	1564	2982	1234	2461	1964
Merlin	4	14	3	3	17	20	33	25	37	43	19	72	86
Prairie Falcon	31	16	5	11	15	27	24	26	23	40	26	45	58
Peregrine Falcon	0	5	1	3	2	8	9	3	5	4	4	7	15
Unknown small falcon ¹	–	–	–	–	–	–	–	–	–	–	–	–	–
Unknown large falcon ¹	–	–	–	–	–	–	–	–	–	–	–	–	–
Unidentified falcon	6	7	2	8	6	7	5	10	11	4	6	9	18
TOTAL FALCONS	772	739	945	733	1139	1906	1740	2698	1640	3073	1289	2594	2141
Unidentified raptor	446	113	94	53	186	107	96	106	193	234	117	229	149
GRAND TOTAL	8510	7215	9340	6961	10840	12521	13603	16856	13299	20093	9957	22154	15818

¹ Designations used consistently beginning in 2001.

Appendix E. continued

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	MEAN
Start Date	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug
End Date	4-Nov	5-Nov	31-Oct	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	3-Nov
Observation days	74	79	71	82	78	83	81	79	76	83	82	78
Observation hours	620.17	673.58	719.50	748.08	681.50	787.30	725.67	688.21	642.75	695.30	652.58	667.60
Raptors / 100 hours	3514	2541	3515	3003	2542	2662	1564	2001	2038	1849	1658	2159
SPECIES	RAPTOR COUNTS											
Turkey Vulture	486	482	732	349	297	441	243	466	685	445	355	340
Osprey	99	187	176	110	152	152	83	96	120	83	68	92
Northern Harrier	255	255	247	356	233	178	154	127	96	153	177	172
Sharp-shinned Hawk	6773	4677	9598	8094	6071	7429	3009	3460	3073	2973	2745	4496
Cooper's Hawk	5075	3848	6736	4109	3022	5107	2369	2281	2736	2260	2541	3151
Northern Goshawk	241	97	99	103	123	80	11	16	41	74	95	103
Unknown small accipiter ¹	–	–	–	–	–	55	246	268	299	521	57	278
Unknown large accipiter ¹	–	–	–	–	–	0	4	3	11	32	6	11
Unknown accipiter	464	368	75	132	87	0	7	0	8	37	9	288
TOTAL ACCIPITERS	12553	8990	16508	12438	9303	12671	5646	6028	6168	5897	5453	8099
Red-shouldered Hawk	2	0	0	0	1	0	0	0	0	0	0	0.3
Broad-winged Hawk	27	37	160	59	87	79	58	58	122	36	57	47
Swainson's Hawk	498	143	507	334	132	251	91	908	197	664	109	240
Red-tailed Hawk	3990	2922	3329	5183	3446	3924	3008	3903	3589	3678	3492	3100
Ferruginous Hawk	16	18	16	25	19	14	20	20	8	12	10	16
Rough-legged Hawk	17	10	6	50	24	23	6	1	7	6	17	14
Unidentified buteo	62	77	5	24	21	13	42	57	117	97	13	71
TOTAL BUTEOS	4612	3207	4023	5675	3730	4340	3225	4947	4040	4493	3698	3487
Golden Eagle	344	329	235	348	305	295	330	181	160	130	152	253
Bald Eagle	6	6	6	31	14	8	12	9	12	11	9	13
Unidentified eagle	1	0	0	0	0	0	0	0	4	0	0	1
TOTAL EAGLES	351	335	241	379	319	303	342	190	176	141	161	267
American Kestrel	3199	3394	3169	2974	3149	2774	1503	1768	1709	1468	820	1917
Merlin	71	78	91	74	49	51	39	33	22	40	40	40
Prairie Falcon	44	48	50	33	37	23	12	14	11	9	26	26
Peregrine Falcon	21	29	26	15	21	59	15	9	11	14	17	11
Unknown small falcon ¹	–	–	–	–	–	0	0	10	9	1	2	4
Unknown large falcon ¹	–	–	–	–	–	0	4	1	3	6	2	3
Unidentified falcon	21	7	2	7	3	2	2	2	0	4	0	6
TOTAL FALCONS	3356	3556	3338	3103	3259	2879	1575	1837	1765	1542	907	2002
Unidentified raptor	83	102	25	57	34	26	81	79	51	104	3	115
GRAND TOTAL	21795	17114	25290	22467	17327	20954	11349	13770	13101	12858	10822	14574

¹ Designations used consistently beginning in 2001.

Appendix F. Daily trapping effort and captures by species: 2006.

DATE	STATION		SPECIES ¹												CAPTURES		
	HOURS		NH	SS	CH	NG	BW	SW	RT	RL	GE	AK	ML	PR	PG	TOTAL	/STN HR
22-Aug	7.00		0	0	1	1	0	0	2	0	0	1	0	0	0	5	0.7
23-Aug	7.50		0	0	0	1	0	0	2	0	0	0	0	0	0	3	0.4
24-Aug	7.50		0	4	0	0	0	0	0	0	0	0	0	0	0	4	0.5
25-Aug	15.75		0	1	1	1	0	0	4	0	0	3	0	0	0	10	0.6
26-Aug	15.42		0	0	0	1	0	0	2	0	0	0	0	1	0	4	0.3
27-Aug	11.25		0	0	0	0	0	0	2	0	0	1	0	0	0	3	0.3
28-Aug	7.83		0	3	1	0	0	0	2	0	0	0	0	0	0	6	0.8
29-Aug	7.25		0	0	0	1	0	0	1	0	0	0	0	0	0	2	0.3
30-Aug	7.75		0	1	0	1	0	0	0	0	0	3	0	0	0	5	0.6
31-Aug	7.50		0	2	0	0	0	0	2	0	0	1	0	0	0	5	0.7
1-Sep	15.42		0	7	0	0	0	0	1	0	0	0	0	0	0	8	0.5
2-Sep	19.08		1	2	1	2	0	0	1	0	0	0	0	1	0	8	0.4
3-Sep	12.92		0	14	2	0	0	0	3	0	0	0	0	0	0	19	1.5
4-Sep	7.42		0	6	2	0	0	0	0	0	0	0	0	0	0	8	1.1
5-Sep	14.00		0	8	1	0	0	0	0	0	0	2	1	0	0	12	0.9
6-Sep	7.00		0	4	3	0	0	0	0	0	0	0	0	0	0	7	1.0
7-Sep	15.00		0	6	5	0	0	0	2	0	0	1	0	0	0	14	0.9
8-Sep	17.50		0	7	11	1	0	0	0	0	0	1	0	1	0	21	1.2
9-Sep	13.50		0	13	7	0	0	0	1	0	0	3	0	0	0	24	1.8
10-Sep	16.25		0	14	6	0	0	0	0	0	0	3	0	0	0	23	1.4
11-Sep	8.00		0	11	11	0	0	0	2	0	0	3	0	0	0	27	3.4
12-Sep	7.50		0	14	10	1	0	0	1	0	0	0	0	0	0	26	3.5
13-Sep	16.75		0	25	9	1	0	0	1	0	0	3	0	0	0	39	2.3
14-Sep	14.50		0	27	12	0	0	0	1	0	0	1	1	0	0	42	2.9
15-Sep	16.00		0	18	7	0	0	0	0	0	0	1	0	0	0	26	1.6
16-Sep	13.25		0	1	1	0	0	0	0	0	0	0	0	0	0	2	0.2
17-Sep	16.00		0	1	3	0	0	0	2	0	0	2	0	1	0	9	0.6
18-Sep	16.00		0	11	12	1	0	0	6	0	0	1	0	0	0	31	1.9
19-Sep	14.00		0	22	18	0	0	0	1	0	0	0	0	0	0	41	2.9
20-Sep	1.75		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
21-Sep	6.25		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
22-Sep	13.00		0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.1
23-Sep	8.00		0	9	15	0	0	0	2	0	0	0	0	0	0	26	3.3
24-Sep	13.75		0	12	12	1	0	0	1	0	0	0	0	0	0	26	1.9
25-Sep	7.75		0	6	16	0	0	0	0	0	0	1	0	0	0	23	3.0
26-Sep	7.50		0	12	9	0	0	0	1	0	0	0	1	0	0	23	3.1
27-Sep	15.25		0	16	17	1	0	0	0	0	0	1	0	0	0	35	2.3
28-Sep	16.25		0	20	10	0	0	0	1	0	0	2	0	0	0	33	2.0
29-Sep	16.75		1	26	15	0	0	0	0	0	0	2	1	0	0	45	2.7
30-Sep	16.00		0	48	32	3	0	0	0	0	0	1	0	0	0	84	5.3
1-Oct	16.00		0	9	3	1	1	0	1	0	0	1	0	0	0	16	1.0
2-Oct	7.50		0	2	0	0	0	0	0	0	0	0	0	0	0	2	0.3
3-Oct	14.50		0	9	10	0	0	0	0	0	0	0	0	0	0	19	1.3
4-Oct	23.25		0	16	28	0	0	0	0	0	0	0	0	0	0	44	1.9

Appendix F. continued

DATE	STATION		SPECIES ¹												CAPTURES		
	HOURS		NH	SS	CH	NG	BW	SW	RT	RL	GE	AK	ML	PR	PG	TOTAL	/STN HR
5-Oct	16.00		0	24	27	0	0	0	0	0	0	0	0	1	2	54	3.4
6-Oct	7.67		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
7-Oct	1.75		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
8-Oct	16.00		0	26	20	0	0	0	1	0	0	0	0	0	0	47	2.9
9-Oct	14.50		0	21	5	0	0	0	0	0	0	0	0	0	0	26	1.8
10-Oct	0.00																
11-Oct	6.25		0	1	2	0	0	0	0	0	0	0	0	0	0	3	0.5
12-Oct	10.50		0	4	0	1	0	0	1	0	1	0	1	0	0	8	0.8
13-Oct	13.25		0	6	6	1	0	0	0	0	0	0	0	0	0	13	1.0
14-Oct	14.75		0	3	2	1	0	0	0	0	0	0	0	0	0	6	0.4
15-Oct	14.92		0	8	2	0	0	0	1	0	0	0	0	0	0	11	0.7
16-Oct	0.00																
17-Oct	6.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
18-Oct	13.25		0	1	0	1	0	0	0	0	0	0	0	0	0	2	0.2
19-Oct	13.67		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
20-Oct	19.75		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
21-Oct	19.75		0	0	0	2	0	0	1	0	0	0	0	0	0	3	0.2
22-Oct	20.50		0	0	0	0	0	0	2	0	0	0	0	0	0	2	0.1
23-Oct	13.67		0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.1
24-Oct	13.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
25-Oct	0.00																
26-Oct	12.75		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
27-Oct	19.25		0	0	1	0	0	0	3	0	0	0	0	0	0	4	0.2
28-Oct	20.50		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
29-Oct	5.75		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
30-Oct	3.75		0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.3
31-Oct	5.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
1-Nov	0.00																
2-Nov	14.50		0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.1
3-Nov	14.25		0	0	0	1	0	0	1	0	0	0	0	0	0	2	0.1
4-Nov	14.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
5-Nov	4.50		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	1073.28		3	902	562	21	2	1	67	0	1	76	11	3	2	1651	1.5

¹ See Appendix B for explanation of species codes.

Appendix G. Annual summaries of banding effort and capture totals by species: 1980–2006.

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Start date	23 Sep	2 Sep	8 Sep	25 Aug	28 Aug	2 Sep	27 Aug	30 Aug	28 Aug	30 Aug	24 Aug	21 Aug	19 Aug	22 Aug
End date	19 Oct	10 Oct	16 Oct	22 Oct	17 Nov	8 Nov	10 Oct	27 Oct	23 Oct	24 Oct	31 Oct	26 Oct	7 Nov	22 Oct
Blinds in operation	1	1	2	2	2	3	3	3	4	4	4	4	5	5
Trapping days	21	37	27	55	69	?	?	?	?	?	66	64	74	59
Station days	21	37	?	66	104	?	?	?	?	159	205	240	296	254
Station hours	149	227	159	443	622	654	483.8	833	1085	1203	1454	1899	2316	1971
Captures /100 stn hrs	84.5	341.0	215.1	228.9	149.1	185.2	127.5	168.2	175.4	196.9	190.3	159.8	166.8	136.0
SPECIES	RAPTOR CAPTURES													
Northern Harrier	0	2	0	8	3	6	2	4	10	9	4	9	10	4
Sharp-shinned Hawk	62	376	186	571	548	705	410	886	1177	1527	1583	1694	2036	1526
Cooper's Hawk	36	300	129	306	261	366	164	395	553	652	821	909	1220	822
Northern Goshawk	6	11	3	32	40	42	5	27	22	29	44	33	104	27
Broad-winged Hawk	0	0	0	0	2	0	1	1	1	1	1	2	0	2
Swainson's Hawk	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Red-tailed Hawk	14	26	13	43	31	51	15	43	37	66	99	93	97	53
Rough-legged Hawk	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Golden Eagle	1	1	1	1	5	6	2	4	7	6	10	3	3	2
Bald Eagle	0	0	0	1	0	0	0	0	0	0	0	0	0	0
American Kestrel	7	58	8	51	28	34	17	37	85	61	190	266	367	223
Merlin	0	1	1	0	2	0	0	1	5	8	2	9	10	8
Prairie Falcon	0	0	0	6	5	2	1	3	7	5	7	7	8	1
Peregrine Falcon	0	0	0	0	1	0	0	0	0	2	1	1	0	1
All Species	126	775	341	1019	926	1212	617	1401	1904	2366	2762	3026	3855	2671
Recaptures ¹	0	0	0	0	0	0	0	0	0	0	4	4	7	9
Foreign Recaptures ²	0	0	1	0	0	0	0	0	0	2	0	0	1	1
Foreign Encounters ³	0	1	5	3	9	12	5	7	11	12	15	18	14	21

¹ Recaptures in the Goshutes of birds originally banded in the Goshutes.

² Recaptures in the Goshutes of birds originally banded elsewhere.

³ Birds originally banded in the Goshutes and subsequently encountered elsewhere.

Appendix G. continued

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	MEAN
Start date	19 Aug	22 Aug	19 Aug	18 Aug	18 Aug	21 Aug	21 Aug	22-Aug	24-Aug	24-Aug	27-Aug	23-Aug	22-Aug	24-Aug
End date	29 Oct	25 Oct	23 Oct	22 Oct	22 Oct	3 Nov	28 Oct	4-Nov	5-Nov	28-Oct	22-Oct	1-Nov	5-Nov	26-Oct
Blinds in operation	5	6	5	5	5	3	4	4	4	4	3	4	3	3.6
Trapping days	65	63	61	62	63	72	62	72	68	66	53	69	72	59.7
Station days	278	312	270	264	236	131	174	210	188	163	105	150	128	181.4
Station hours	2290	2382	2061	2087	1690	939	1286	1666	1474	1276	807	1073	888	1237.7
Captures /100 stn hrs	205.1	120.1	160.7	147.0	202.3	163.6	167.0	173.0	159.9	114.7	158.2	153.8	112.1	169.0
SPECIES	RAPTOR CAPTURES													
Northern Harrier	7	2	1	18	4	0	17	11	8	7	2	3	2	5.7
Sharp-shinned Hawk	2686	1823	2091	1783	2131	897	1235	1608	1283	825	791	902	503	1180.8
Cooper's Hawk	1473	695	737	767	1006	438	504	975	791	460	342	562	356	595.3
Northern Goshawk	35	27	68	20	20	20	24	23	7	9	28	21	26	28.1
Broad-winged Hawk	1	3	0	0	1	0	3	1	0	2	1	2	1	1.0
Swainson's Hawk	1	0	0	0	0	0	0	1	0	0	0	1	1	0.2
Red-tailed Hawk	158	93	84	67	69	49	58	76	109	63	61	67	56	62.7
Rough-legged Hawk	0	0	0	0	0	0	0	2	0	0	0	0	0	0.1
Golden Eagle	11	4	7	5	4	8	2	1	9	1	2	1	1	4.0
Bald Eagle	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
American Kestrel	285	193	290	351	149	97	285	168	127	88	35	76	38	134.0
Merlin	21	13	18	26	13	16	11	12	15	5	11	11	5	8.3
Prairie Falcon	7	3	7	17	7	3	8	3	4	3	4	3	5	4.7
Peregrine Falcon	0	1	1	4	0	1	1	1	3	0	0	2	2	0.9
All Species	4685	2857	3304	3058	3404	1529	2148	2882	2356	1463	1277	1651	995	2025.7
Recaptures ¹	10	3	3	7	9	4	6	9	7	2	2	2	2	3.3
Foreign Recaptures ²	2	1	4	3	5	2	3	4	3	1	2	4	0	1.4
Foreign Encounters ³	19	16	9	18	15	10	19	10	28	12	16	7	11	12.1

¹ Recaptures in the Goshutes of birds originally banded in the Goshutes.

² Recaptures in the Goshutes of birds originally banded elsewhere.

³ Birds originally banded in the Goshutes and subsequently encountered elsewhere.