

**FALL 2005 RAPTOR MIGRATION STUDIES IN THE
GOSHUTE MOUNTAINS OF NORTHEASTERN NEVADA**



*Hawk*WATCH
INTERNATIONAL

**HawkWatch International, Inc.
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FALL 2005 RAPTOR MIGRATION STUDIES IN THE GOSHUTE MOUNTAINS OF NORTHEASTERN NEVADA

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TABLE OF CONTENTS

List of Tables	iii
List of Figures	iv
Introduction.....	1
Study Site.....	1
Methods	2
Standardized Counts	2
Trapping and Banding.....	2
Results and Discussion	3
Weather.....	3
Observation Effort	4
Migration Summary	4
Trapping Effort	6
Trapping summary	6
Encounters with Previously Banded Birds	7
Satellite Tracking of Migrants	8
Identifying Migrant Origins through Stable Isotope Analyses	8
Resident Raptors	8
Site Visitation	9
Acknowledgments.....	9
Literature Cited.....	10
Tables.....	11
Figures	19
Appendix A. History of official observer participation on the Goshute Mountains Raptor Migration Project.	27
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.....	28
Appendix C. Daily observation effort, visitor disturbance ratings, weather records, and flight summaries: 2005.....	29
Appendix D. Daily unadjusted raptor counts by species: 2005.....	31
Appendix E. Annual summaries of observation effort and unadjusted raptor counts by species: 1983–2005.	34
Appendix F. Daily trapping effort and captures by species: 2005.	36
Appendix G. Annual summaries of banding effort and capture totals by species: 1980–2005.....	38

LIST OF TABLES

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: 1983–2004 versus 2005.	11
Table 2.	Annual raptor migration counts by age classes and immature: adult ratios for selected species in the Goshute Mountains, NV: 1990–2004 versus 2005.	12
Table 3.	First and last observed, bulk passage, and median passage dates by species for migrating raptors in the Goshute Mountains, NV in 2005, with comparisons of 2005 and 1990–2004 average median passage dates.	13
Table 4.	Median passage dates by age classes for selected species of migrating raptors in the Goshute Mountains, NV: 1990–2004 versus 2005.	14
Table 5.	Capture totals, rates, and successes for migrating raptors in the Goshute Mountains, NV: 1985–2004 versus 2005.	15
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: 1992–2004 averages versus 2005.	16
Table 7.	Recaptures during fall 2005 of raptors previously banded in the Goshute Mountains, NV.	17
Table 8.	Recaptures during fall 2005 in the Goshute Mountains, NV, of raptors previously banded elsewhere.	17
Table 9.	Foreign encounters during 2005 with raptors banded in the Goshute Mountains, Nevada.	18

LIST OF FIGURES

Figure 1.	Location of the Goshute Mountains Raptor Migration Project study site.	19
Figure 2.	Fall migration flight composition by major species groups in the Goshute Mountains, Nevada: 1983–2004 versus 2005.	20
Figure 3.	Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Turkey Vultures, Ospreys, and Northern Harriers: 1983–2005. Dashed lines indicate significant linear or quadratic regressions.	21
Figure 4.	Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Sharp-shinned Hawks, Cooper’s Hawks, and Northern Goshawks: 1983–2005. Dashed lines indicate significant linear or quadratic regressions.	22
Figure 6.	Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Golden and Bald Eagles: 1983–2005. Dashed lines indicate significant linear or quadratic regressions.	24
Figure 7.	Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons: 1983–2005. Dashed lines indicate significant linear or quadratic regressions.	24
Figure 7.	Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons: 1983–2005. Dashed lines indicate significant linear or quadratic regressions.	25
Figure 8.	Combined-species passage volume by five-day periods: 1990–2004 versus 2005.	26

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 the West, with the 2005 season marking the 26th consecutive season of banding and 23rd 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 13 long-term, annual migration counts and 1 of 5 migration-banding studies conducted or co-sponsored by HWI in North America during 2005. 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). HWI also conducted a third full-season of owl banding, focused on Flammulated Owls (*Otus flammeolus*), in the Goshutes during fall 2005; the results of this work are summarized in a separate technical report (Smith 2006).

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. Hence, to address the fact that the view to the east from the main count site was obstructed, 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 describe 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 2005, four banding stations were located 100–700 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 are operated simultaneously. **South** station, established in 1982 and modified in 1998, was located 700 m south and slightly east of the count site in a topographic saddle at 2,660 m elevation. 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 observers Ken McEnaney and Chris Jaeger, and veteran Goshute observer, Alison Cebula, who trained and assisted the other observers during the first 10 days of the 2005 season. Visitors and other crewmembers also frequently assisted with spotting migrants and recording data. This was Ken McEnaney's second season of intensive migration counting, with previous experience in Costa Rica (see Appendix A for a complete history of observer participation). This was Chris Jaeger's first full season of migration counting, but he had gained previous exposure to migration counting in the northeast.

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 2005 annual statistics against means and 95% confidence intervals for previous seasons, we equate significance with a 2005 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.

RESULTS AND DISCUSSION

WEATHER

Inclement weather reduced observation time to ≤ 4 hours on only 1 day in 2005 (see Appendix C for daily weather records). Scattered thundershowers were common in late August. High pressure predominated during early September, providing many days of clear skies, whereas low-pressure systems returned during late September and brought more snow, clouds, and cooler temperatures. Fair skies again dominated most of October, 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, high winds, and sporadic precipitation.

Overall sky conditions as recorded during active observation periods in 2005 were similar to the average pattern for 1997–2004 (the period during which detailed weather data have been compiled and analyzed). Fair skies predominated on 47% 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 31%, and mostly cloudy to overcast skies on 22% (1997–2004 averages of 49%, 33%, and 19%, respectively). The prevalence of haze increased markedly during the previous three years, most likely reflecting the influence of widespread drought and the resulting dry, dusty, and fire-prone landscape. In 2005, haze was reported on 27% of the active days, down from a record high of 73% in 2004 (1997–2004 average of 21%).

Light winds (< 12 kph) prevailed on 79% of the active observation days, moderate winds (12–29 kph) on 21%, and strong winds (> 29 kph) on 0%. These values reflect a significantly higher than average prevalence of light winds compared to the 1997–2004 averages (65% light, 26% moderate, and 9% strong), but such has generally been the case for the last five years. Similar to last year, steady SW–W winds once again were the dominant pattern in 2005, prevailing on a record high 49% of the active observation days (1997–2004 average of 34%). Another record setting pattern were days where SW–NW winds prevailed for a significant portion of the day but then shifted to variable winds during the rest of the day (or vice versa). This pattern applied to 33% of the active observation days, compared to an average of 17%. Third most common but below average in prevalence were NE–E winds, which prevailed on 10% of the active days (average 15%). 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 -0.9 – 22.8°C , averaging 11.6°C . These values fall within the range seen since 1997. Daily-average barometric pressure readings (averages of hourly readings) ranged from 31.59 to 32.09 inHg, averaging 31.81 in Hg. These values are record highs compared to the last four years (the extent of records for this measure). Thermal lift was rated poor-to-fair on 83% of the active observation days and good-to-excellent on 17%. These values represent a higher than average proportion of days with poor-to-fair thermal conditions (1997–2004 averages of 66% poor-to-fair and 34% good-to-excellent), which appears somewhat anomalous given the prevalence of fair weather and light winds and therefore may partly reflect the subjective nature of the measure and relative inexperience of the crew.

In summary, the weather during the 2005 season was average to mild and had a less than usual impact on the observer's ability to conduct consistent daily counts. High-pressure systems prevailed, as did consistent southwesterly winds. Visibility also was much better to the west than in recent years due to a relative reduction in the prevalence of visibility-reducing haze.

OBSERVATION EFFORT

Counts occurred every day (83 days total) between 15 August and 5 November 2005. The number of observation days and hours (695.30) were a significant 7% and non-significant 4%, respectively, above the 1983–2004 averages of $78 \pm 95\%$ CI of 2.3 days and 667.02 ± 30.41 hours. The 2005 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 19% below the 1990–2004 (period of full-time two-observer system) average of $2.55 \pm 95\%$ CI of 0.27 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 likely offset by a reduction in visitor disturbance of the primary observers.

MIGRATION SUMMARY

The observers counted 12,858 migrant raptors of 17 species during the 2005 season (see Appendix D for unadjusted daily count records). This count is a non-significant 13% below the 1983–2004 average, but is the third lowest count since 1993, with the other three lowest counts since 1993 having occurred since 2001. The count of 130 Golden Eagles was a significant 50% below the 1983–2004 average and a record low (see Appendix E for annual summaries). No other record low or high counts occurred in 2005.

The 2005 flight was composed of 46% accipiters, 35% buteos, 12% falcons, 4% vultures, 1% harriers, 1% eagles, and <1% each of Ospreys and unidentified raptors. The proportions of buteos and vultures were significantly above average, whereas the proportions of accipiters, eagles, and falcons were significantly below average (Figure 2). The most commonly observed species were the Red-tailed Hawk (29% of the total count), Sharp-shinned Hawk (23%), Coopers' Hawk (18%), American Kestrel (11%), Swainson's Hawk (5%), and Turkey Vulture (4%). No other species comprised more than 2% of the total count. It is noteworthy that the last three years are the first seasons in the 23-year history of the count project that the counts of Red-tailed Hawks have exceeded the counts of Sharp-shinned Hawks (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 13 of 18 commonly observed species, with the differences significant for Northern Goshawks, Ferruginous and Rough-legged Hawks, Golden Eagles, American Kestrels, and Prairie Falcons (Table 1). In contrast, adjusted passage rates were significantly above average for Turkey Vultures, Swainson's Hawks, and Red-tailed Hawks.

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 set in (Figures 3–7). Several such species have shown at least a slight rebound in the past three years, including Turkey Vultures, Northern Goshawks, and Swainson's Hawks; however, low counts in 2005 continued to accentuate the recent decline for Sharp-shinned Hawks, Cooper's Hawks, Ferruginous Hawks, Rough-legged Hawks, Golden Eagles, and American Kestrels. Significant ($P \leq 0.05$) to highly significant ($P \leq 0.01$) quadratic regressions continued to track through 2005 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). Similarly, until last year, Turkey Vultures had also shown the quadratic pattern, but strong rebounds in 2003 and especially 2004 have returned the pattern for this species to a highly significant long-term increasing trend. Other species that continue to show long-term, significant increasing trends include Broad-winged, Red-tailed and Swainson's Hawks, and Peregrine Falcons. As has been the case throughout the history of the project,

only Bald Eagles (Figure 6) and Rough-legged Hawks (Figure 5) show no significant long-term trends; however, passage rates of Rough-legged Hawks dropped sharply for five consecutive years following a record high in 1999, recovering only slightly in 2004 and 2005.

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 1998 (Hoffman and Smith 2003). Prior to 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 coastal California and in the north Cascades of Oregon suggest that, after five years of extensive drought, some migrants may have shifted their migration routes around the severely parched central Great Basin. While precipitation 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 from 2003–2005 in the Goshutes. 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 2005 for 5 of 10 species with data suited to comparisons (significantly so for Golden Eagles, Ferruginous Hawks, and Peregrine Falcons) and above average for five species (significantly so for Sharp-shinned, Broad-winged and Red-tailed Hawks, and Bald Eagles; Table 2). For all species showing reduced age ratios, the reduction was due at least in part to below average tallies of young birds; in fact, tallies of immature birds were below average for 8 of the 10 relevant species. Moreover, among the five species for which the 2005 age ratios were above average, only Red-tailed Hawks and Bald Eagles 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 to 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 the comparisons (Table 2). Nevertheless, the overall impression from these data is that the productivity of Red-tailed Hawks along the Intermountain Flyway was probably high in 2005; the overall abundance remains low from the drought for species such as Sharp-shinned and Cooper's Hawks, but their relative productivity probably improved in 2005; and the abundance of immature/subadult Golden Eagles has shown a marked decline since reaching a high in 1999 and the continued drop to a record low in 2005, while adult numbers have remained comparatively stable (Figure 6), suggests reduced productivity for this species.

The 2005 combined-species median passage date of 25 September was only 1 day later than average (Table 3). Similarly, no distinct, overall early or late shift is evident in the combined-species seasonal distribution pattern; however, the proportional distribution of activity within the season did show some unusual peaks and valleys (Figure 8). Two atypical activity spikes occurred during the 21–25 September and 16–20 October five-day periods, and both were preceded by significant 10-day comparative “lulls” in activity (11–20 September and 1–10 October). The October lull clearly corresponded to the first major snow storm to hit the region, with a good “push” of activity occurring after conditions settled down again. Reasons for the September lull and subsequent peak are less certain; however, the 22–24 September peak did precede passage of a substantial low-pressure system, which may have provided the first major stimulus for a lot of birds to move south from more northerly latitudes.

At the species level, 5 of 17 species showed earlier than average median passage dates in 2005, with the differences significant for three species (American Kestrel, Merlin, and Prairie Falcon), and nine species showed later than average timing, with the differences significant for six species (Osprey, Cooper's Hawk, Swainson's Hawk, Red-tailed Hawk, Ferruginous Hawk, and Golden Eagle; Table 3). Thus, three

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 2005. Age-specific timing data revealed additional detail but no markedly different results (Table 4).

TRAPPING EFFORT

The crews operated one or more of the four available banding stations every day between 23 August and 01 November 2005 (see Appendix F for daily capture records and Appendix G for annual summaries). The number of trapping days (69) was 17% higher than the 1980–2004 average for the site, whereas the number of station hours (1073) was 14% lower than average. Mild weather allowed for the increase in trapping days, while a purposefully reduced crew size accounted for the lower station hours.

TRAPPING SUMMARY

The 2005 capture total of 1,651 raptors included 11 species, 1,645 newly banded birds, 2 recaptures of birds previously banded in the Goshutes, and 4 foreign recaptures (i.e., recaptures of birds originally banded elsewhere; Table 5, Appendix G). The 2005 effort raises the total number of birds captured since project inception to 53,699, including 88 Goshute recaptures and 39 foreign recaptures. Sharp-shinned Hawks accounted for 57% of the total captures, followed by Cooper's Hawks (34%), American Kestrels (5%), and Red-tailed Hawks (4%). Each of the remaining species accounted for less than 1% of the total.

The 2005 combined-species capture total was 20% below the 1980–2004 average (Table 5). Capture totals were markedly below average for Sharp-shinned Hawks and American Kestrels, reflecting the effects of both low flight volume and reduced trapping effort. Capture success also was substantially below average for many species because of the reduced effort (Table 5). The capture total for Red-tailed Hawks was above average, however. In addition, the capture rates for Cooper's Hawks, Red-tailed Hawks, and Merlins exceeded long-term averages, and estimates of capture success were above average for Cooper's Hawks, Merlins, Prairie Falcons, and Peregrine Falcons. Other highlights of the season included two Broad-winged Hawks, which are always a rarity among migration captures in the West, and an immature, intermediate-morph Swainson's Hawk, which is only the fifth individual of this species ever captured at the site.

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 2005 count and capture data yielded very different immature : adult ratios for Sharp-shinned Hawks, with the count ratio a significant 49% above average but the capture ratio a non-significant 9% below average. These data suggest that immature Sharp-shinned Hawks were much more abundant and much less susceptible to capture than usual compared to adults. This in turn suggests that, though overall abundance remained low, the relative abundance of young sharp-shins was high and reduced susceptibility to capture suggests that they. The count and capture age ratios for Cooper's Hawks were more similar and neither differed significantly from average (9% and 17% above average). A noticeable difference in the count and capture ratios was again evident for Northern Goshawks, with the count ratio a non-significant 11% below average and the capture ratio a significant 51% below average. These data suggest that immature goshawks were proportionately slightly less abundant than usual, but were much less susceptible to capture than usual compared to adults. This in turn suggests that regional productivity may not have been high but those immature birds that were produced may have been less hungry than usual compared to adults.

The trapping data alone also indicated a near-equal sex ratio among captured Sharp-shinned Hawks, which was only slightly higher than average (Table 6). The sex ratio of captured Northern Goshawks also was near equality in 2005, but this translates to males being 50% more common than average. In contrast, captured female Cooper's Hawks outnumbered captured males 1.4 : 1, which was a little lower

than average. This suggests that male goshawks were either proportionately more abundant or more susceptible to capture than usual in 2005 compared to females.

The count data do not yield age-specific data for American Kestrels, so the banding data for this species are particularly useful. The banding data yielded an immature : adult ratio that was significant 62% 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 2005 for this species may confound this comparison. The sex ratio of kestrels captured in 2005 (0.90) was only slightly below the long-term average of 0.95 (Table 6), as was the case with the count ratios (0.86 vs. 0.98 average).

ENCOUNTERS WITH PREVIOUSLY BANDED BIRDS

Recaptures

The 2005 recaptures included 1 Sharp-shinned Hawk and 1 Cooper's Hawk originally banded in the Goshutes as hatch-year birds in 2000 and 2004, respectively (Table 7). This brings the total number of Goshute recaptures since 1980 to 88 birds, all accipiters (Appendix G).

Foreign Recaptures

The 2005 captures included recaptures of three Sharp-shinned Hawks and one Cooper's Hawk that were originally banded elsewhere (Table 7). This raises the total number of foreign recaptures for the site since 1980 to 39, involving five species and including 17 recaptures of Sharp-shinned and Cooper's Hawks banded at Boise Ridge.

Foreign Encounters

Seven raptors originally banded in the Goshutes were encountered elsewhere in 2005, which is significantly 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 307. The 2005 encounters involved 3 Sharp-shinned Hawks, 2 Red-tailed Hawks, 1 Golden Eagle, and 1 Cooper's Hawk. Six of the seven birds died of unknown causes, while the seventh died from gunshot wounds.

A female Sharp-shinned Hawk, originally banded in the Goshutes as a hatch-year bird in November 2002, was found injured and later died near Spokane, Washington in April 2005 (~756 km from the project site). A male Sharp-shinned Hawk, originally banded in the Goshutes as a second-year bird in October 2001, was found dead of unknown causes near Calgary, Alberta in April 2005 (~952 km from the project site). The third Sharp-shinned Hawk was a female, originally banded in the Goshutes as an after-second-year bird in September 2002. This bird was found injured near Placerville, ID (~354 km from the project site) in May 2005, and later died in rehabilitation.

The single Cooper's Hawk, a female originally banded in the Goshutes as an after-second-year bird in September 1996, was found dead of unknown causes sometime during 2005 (no specific recovery date given in the BBL report) near Kelowna, British Columbia (~1,021 km from the project site). Although we cannot be certain exactly when this bird died (no knowledge of the state the carcass was in when found), if it in fact died in 2005, that would put it at least 22 years old! HWI's overall recovery database of 359 Cooper's Hawk encounters subsequent to banding documents only 8 other birds that made it past 10 years old: 1 to at least 15 years old, and 7 to at least 10–12 years!

One Red-tailed Hawk, originally banded in the Goshutes as a third-year bird in October 2004, was found dead of unknown causes near Phoenix, Arizona in April 2005 (~640 km from the project site). The second Red-tailed Hawk, originally banded in the Goshutes as a second-year bird in September 2004, was shot dead near San Blas, Sinaloa, Mexico in November 2005 (~1900 km from the project site).

A male Golden Eagle originally banded in the Goshutes as a hatch-year bird in October 1999, was found dead of unknown causes in April 2005 near Potomac, Montana (~583 km from the project site). This is only the fifth band-return HWI has ever recorded for a Golden Eagle. Two of these have been Goshute birds, with 107 banded at the site since 1980 (a 2% return rate).

The new 2005 encounter locations all fall well within the expected ranges of Goshute birds (Hoffman et al. 2002).

SATELLITE TRACKING OF MIGRANTS

We did not deploy any new satellite transmitters in the Goshutes during the 2005 season; however, we do expect to deploy additional units on Golden Eagles during the upcoming 2006 season and one of two eagles that we outfitted at the site in 2004 is still alive and active.

Golden Eagles

Of the two eagles we outfitted during fall 2004 in the Goshutes, one was still alive and active as of this writing in February 2006 and the other died in late June 2005. A successful recovery trip in August revealed that the dead bird was killed by a rock falling on its head! We found the bird intact but pinned to a hillside by a large rock that had crushed its skull. All we can imagine is that the eagle attacked a rabbit (or some other similar animal), missed, and as the rabbit scrambled away it kicked loose the rock and caused it to fall on the eagle. Prior to its demise, this young male eagle had spent the winter in the western section of Prescott National Forest, just northwest of Prescott, Arizona. It then began its spring migration in early April and by mid May had returned to the Goshute Mountains area. It then spent about a month just northwest of the Goshutes before continuing north again and traveling to a point just south of Jackpot, Nevada, near the Idaho border, which is where we recovered it.

The second 2004 Goshute eagle's transmitter failed to transmit effectively for the first several months, giving us only two usable location points through March 2005, one in December from northwest Utah and the other in January from southern Idaho. Fortunately, the transmitter then all of a sudden began working properly and we have received reliable data ever since. Between March and mid-October 2005, this young male eagle wandered around in primarily southern Idaho in the Raft River area, occasionally also dropping back into northwestern Utah overlapping with the range of HWI's Great Basin Raptor Nest Survey. In mid-October it dropped back down into northwest Utah briefly, but then turned northeast again, traveled up to the I-84 corridor and then followed that southeast back down into north-central Utah. Since then it has been wandering around in the northern Wasatch Range of Utah.

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

IDENTIFYING MIGRANT ORIGINS THROUGH STABLE ISOTOPE ANALYSES

In 2005, we continued to collect feather samples from a variety of species to support our on-going stable-isotope research, which seeks to use analyses of hydrogen stable-isotope ratios to identify the approximate natal origins of migrants monitored at migration sites across the West (e.g., Meehan et al. 2001, Lott et al. 2003, Smith et al. 2003, Lott and Smith in press).

RESIDENT RAPTORS

One family group of Golden Eagles, two adults and a hatch-year bird, were present throughout the season and occupied a territory to the north of the project area. One subadult bird was also seen frequenting the area in early September and became adept at foiling targeted trapping efforts in October. A family group of Red-tailed Hawks, including three hatch-year birds (two light morphs and a rufous morph), occupied a territory to the northwest of the project area, and was present throughout the season. The adults appeared

to include two light-morph individuals, but a dark morph was also seen acting in close association with the hatch year birds. This entire family group appeared to disperse by mid-September, except for one light adult with particularly dark carpal patches, who 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. Both hatch year individuals may have been trapped the first day Meadow blind was open. As usual, the adults were seen only infrequently while hunting. The young birds were seen frequently throughout August and September, often attacking a plastic owl erected near the count site or streaking through North and West blinds. At least one adult Sharp-shinned Hawk was recorded as a local bird three times early in the season, and at least one immature bird frequented the project area until 7 September. At least one immature Cooper's Hawk frequented the project area, often striking the owl decoy, through 5 September.

At least one pair of American Kestrels was seen regularly near OP2 until 5 September. Apparently local Prairie Falcons were recorded flying in from the west on three occasions in late August and once in early September. On three occasions in late August and early September, Peregrine Falcons were witnessed engaging in resident hunting behavior.

This is a typical resident assemblage for the site, except for limited sightings of American Kestrels and Prairie Falcons. It seems possible that there is a correlation between increasing Peregrine Falcon activity and declining Prairie Falcon activity in the last three years.

SITE VISITATION

In 2005, 158 individuals signed the HWI Goshute visitor logs, representing a similar visitation rate as in 2004, although the weather was markedly better for visitation this year. The majority of 2005 visitors originated in Utah, with about half of these coming from Salt Lake City. Visitors hailed from 12 other states (AK, CA, CO, ID, ME, MI, MT, NV, OR, PA, WA, and VA) and several other countries, including the UK. A number of international business students based in Wendover, Nevada visited the site this year thanks to the initiative of Tom Ratecki from Poland. The peak visitation day occurred on 17 September and resulted from a combination of small groups and individuals, as well as two scheduled scout troops. The other peaks in visitation occurred on 24 September with attendance of a group from the Great Salt Lake Audubon, and on 27 September with the arrival of an ecotour group from Portland Audubon. A group of 12 middle school students arrived mid-blizzard on 9 October just in time to release an adult male Sharp-shinned Hawk!

In 2005 at the Goshutes, 716 hourly assessments of visitor disturbance resulted in the following ratings: 98% none, 2% low, and <1% moderate.

ACKNOWLEDGMENTS

For financial support in 2005, we enthusiastically thank the Bureau of Land Management–Elko Field Office, the Walbridge Fund and 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 field crews 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 and Salt Lake Roasting Company in Salt Lake City. We are also very grateful for the volunteer assistance provided by established HWI affiliates Don Baccus, John Bell, Samantha Burrell, Leo Chidester, Steve Hoffman, and Steve Seibel, as well as from newcomer Ryan Young. In addition, some of the visitors this year were extremely motivated and helpful. Tom Ratecki, an international business student based in Wendover, liked the site so much on his first

visit that he proceeded to return twice more with friends from around the world in tow. Peggy Riley and Dan Rosa hiked up wonderful sandwich fixings, and as if that were not enough, Dan returned later in the season, again with a pack full of sandwiches and other treats. Lastly, special thanks to Paul Dutton, Orville Hayes, and Brett Prevedal for their help in providing or helping us secure lure birds for the trapping operations.

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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: 1983–2004 versus 2005.

SPECIES	COUNTS			RAPTORS/100 HOURS ¹		
	1983–2004 ²	2005	% CHANGE	1983–2004 ²	2005	% CHANGE
Turkey Vulture	335 ± 71.7	445	33	100.1 ± 20.21	140.7	41
Osprey	93 ± 19.0	83	-11	21.4 ± 3.87	20.4	-5
Northern Harrier	173 ± 31.6	153	-12	27.1 ± 4.32	24.0	-12
Sharp-shinned Hawk	4645 ± 848.4	2973	-36	1023.3 ± 151.92	687.9	-33
Cooper's Hawk	3220 ± 616.1	2260	-30	806.6 ± 128.08	611.1	-24
Northern Goshawk	105 ± 25.0	74	-29	17.5 ± 3.96	12.2	-30
Unknown small accipiter ³	203 ± 134.5	521	156	–	–	–
Unknown large accipiter ³	5 ± 4.6	32	611	–	–	–
Unknown accipiter	312 ± 92.8	37	-88	–	–	–
TOTAL ACCIPITERS	8320 ± 1424.4	5897	-29	–	–	–
Red-shouldered Hawk	0.3 ± 0.2	0	-100	–	–	–
Broad-winged Hawk	47 ± 15.7	36	-23	18.6 ± 6.25	16.9	-9
Swainson's Hawk	226 ± 84.0	664	193	57.4 ± 20.81	182.6	218
Red-tailed Hawk	3056 ± 400.8	3678	20	507.4 ± 53.00	588.4	16
Ferruginous Hawk	17 ± 2.9	12	-28	2.6 ± 0.45	1.8	-31
Rough-legged Hawk	14 ± 4.5	6	-57	6.4 ± 1.83	2.1	-67
Unidentified buteo	72 ± 20.5	97	34	–	–	–
TOTAL BUTEOS	3432 ± 455.0	4493	31	–	–	–
Golden Eagle	263 ± 26.4	130	-51	41.6 ± 3.66	19.4	-53
Bald Eagle	13 ± 2.8	11	-15	2.6 ± 0.54	2.1	-20
Unidentified eagle	1 ± 0.6	0	-100	–	–	–
TOTAL EAGLES	277 ± 27.8	141	-49	–	–	–
American Kestrel	1987 ± 375.2	1468	-26	416.6 ± 72.14	321.0	-23
Merlin	40 ± 11.3	40	1	7.5 ± 2.14	7.3	-3
Prairie Falcon	27 ± 6.3	9	-67	4.6 ± 0.92	2.3	-49
Peregrine Falcon	11 ± 3.8	14	28	1.9 ± 0.63	3.4	78
Unknown small falcon ³	4.8 ± 5.4	1	-79	–	–	–
Unknown large falcon ³	2 ± 1.8	6	200	–	–	–
Unknown falcon	7 ± 2.2	4	-41	–	–	–
TOTAL FALCONS	2073 ± 391.7	1542	-26	–	–	–
Unidentified raptor	121 ± 39.4	104	-14	–	–	–
GRAND TOTAL	14823 ± 2202.2	12858	-13	–	–	–

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: 1990–2004 versus 2005.

SPECIES	TOTAL AND AGE-CLASSIFIED COUNTS						% UNKNOWN AGE		IMMATURE : ADULT RATIO	
	1990–2004 AVERAGE			2005			1990–2004 ¹		2005	
	TOTAL	IMM.	ADULT	TOTAL	IMM.	ADULT	1990–2004 ¹	2005	1990–2004 ¹	2005
Northern Harrier	203	64	58	153	47	39	42 ± 8.1	44	1.32 ± 0.311	1.21
Sharp-shinned Hawk	5290	1849	1439	2973	1182	606	39 ± 6.0	40	1.31 ± 0.274	1.95
Cooper's Hawk	3782	876	1049	2260	504	569	50 ± 5.2	53	0.81 ± 0.234	0.89
Northern Goshawk ²	105	51	34	74	39	20	17 ± 4.9	20	2.19 ± 0.714	1.95
Broad-winged Hawk	60	14	26	36	1	1	34 ± 6.5	94	0.59 ± 0.179	1.00
Red-tailed Hawk	3529	724	1983	3678	934	2109	23 ± 3.8	17	0.37 ± 0.063	0.44
Ferruginous Hawk	19	5	6	12	0	4	42 ± 10.0	67	1.12 ± 0.594	0.00
Golden Eagle ²	263	128	73	130	61	43	23 ± 5.3	20	2.11 ± 0.445	1.42
Bald Eagle	15	6	7	11	7	3	7 ± 5.3	9.1	1.01 ± 0.342	2.33
Peregrine Falcon	14	4	6	14	0	2	28 ± 11.5	71	0.67 ± 0.276	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 1983–2004.

Table 3. First and last observed, bulk passage, and median passage dates by species for migrating raptors in the Goshute Mountains, NV in 2005, with comparisons of 2005 and 1990–2004 average median passage dates.

SPECIES	2005				1990–2004		
	FIRST OBSERVED	LAST OBSERVED	BULK PASSAGE DATES ¹	MEDIAN PASSAGE DATE ²	MEDIAN PASSAGE DATE ^{2,3}		
Turkey Vulture	16-Aug	26-Oct	8-Sep – 29-Sep	22-Sep	23-Sep	±	1.5
Osprey	27-Aug	2-Nov	4-Sep – 26-Sep	19-Sep	14-Sep	±	1.6
Northern Harrier	19-Aug	5-Nov	26-Aug – 24-Oct	28-Sep	25-Sep	±	3.7
Sharp-shinned Hawk	16-Aug	5-Nov	8-Sep – 17-Oct	24-Sep	26-Sep	±	2.4
Cooper's Hawk	16-Aug	5-Nov	8-Sep – 7-Oct	24-Sep	22-Sep	±	1.7
Northern Goshawk	25-Aug	5-Nov	13-Sep – 26-Oct	5-Oct	05-Oct	±	2.8
Broad-winged Hawk	16-Sep	29-Sep	19-Sep – 26-Sep	23-Sep	23-Sep	±	1.7
Swainson's Hawk	20-Aug	10-Oct	15-Sep – 29-Sep	25-Sep	20-Sep	±	3.8
Red-tailed Hawk	15-Aug	5-Nov	9-Sep – 31-Oct	15-Oct	05-Oct	±	2.4
Ferruginous Hawk	22-Aug	31-Oct	23-Sep – 30-Oct	19-Oct	28-Sep	±	3.3
Rough-legged Hawk	5-Oct	3-Nov	5-Oct – 3-Nov	23-Oct	22-Oct	±	2.0
Golden Eagle	16-Aug	5-Nov	31-Aug – 31-Oct	23-Oct	08-Oct	±	2.0
Bald Eagle	23-Sep	5-Nov	1-Oct – 4-Nov	23-Oct	19-Oct	±	5.4
American Kestrel	15-Aug	25-Oct	29-Aug – 28-Sep	12-Sep	16-Sep	±	1.9
Merlin	5-Sep	3-Nov	17-Sep – 17-Oct	29-Sep	01-Oct	±	2.3
Prairie Falcon	20-Aug	21-Oct	20-Aug – 21-Oct	6-Sep	14-Sep	±	4.1
Peregrine Falcon	29-Aug	15-Oct	4-Sep – 11-Oct	22-Sep	24-Sep	±	3.4
Total	15-Aug	5-Nov	7-Sep – 20-Oct	25-Sep	24-Sep	±	1.5

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: 1990–2004 versus 2005.

SPECIES	ADULT			IMMATURE / SUBADULT		
	1990–2004 ¹			2005		
Northern Harrier	28-Sep	± 4.6	14-Oct	21-Sep	± 6.0	27-Sep
Sharp-shinned Hawk	07-Oct	± 1.7	12-Oct	16-Sep	± 1.2	16-Sep
Cooper's Hawk	26-Sep	± 1.9	23-Sep	18-Sep	± 1.3	21-Sep
Northern Goshawk ²	12-Oct	± 5.0	11-Oct	29-Sep	± 3.8	2-Oct
Red-tailed Hawk	09-Oct	± 2.0	17-Oct	18-Sep	± 4.8	29-Sep
Ferruginous Hawk	13-Oct	± 2.7	16-Oct	05-Oct	± 4.1	29-Sep
Golden Eagle ²	21-Oct	± 4.2	–	26-Oct	± 2.6	1-Nov
Peregrine Falcon	28-Sep	± 4.6	14-Oct	21-Sep	± 6.0	27-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 1983–2004.

Table 5. Capture totals, rates, and successes for migrating raptors in the Goshute Mountains, NV: 1985–2004 versus 2005.

SPECIES	CAPTURE TOTAL		CAPTURE RATE ¹		CAPTURE SUCCESS (%) ²	
	1985–2004 ³	2005	1985–2004 ³	2005	1985–2004 ³	2005
Northern Harrier	6.8 ± 2.16	3	0.5 ± 0.15	0.3	4.2 ± 1.26	2.1
Sharp-shinned Hawk	1436.7 ± 253.90	902	97.2 ± 7.14	84.0	28.3 ± 4.28	24.4
Cooper's Hawk	706.2 ± 140.35	562	47.3 ± 4.34	52.4	19.8 ± 2.77	11.9
Northern Goshawk	31.0 ± 9.83	21	2.2 ± 0.64	2.0	32.5 ± 6.87	68.3
Broad-winged Hawk	1.1 ± 0.41	2	0.1 ± 0.03	0.2	2.9 ± 1.42	0.8
Swainson's Hawk	0.2 ± 0.23	1	0.0 ± 0.01	0.0	0.1 ± 0.12	0.0
Red-tailed Hawk	72.1 ± 13.59	67	5.0 ± 0.68	6.3	2.2 ± 0.32	1.7
Rough-legged Hawk	0.1 ± 0.20	0	0.0 ± 0.01	0.0	0.4 ± 0.85	0.0
Golden Eagle	4.9 ± 1.33	1	0.4 ± 0.11	0.1	1.8 ± 0.49	1.2
American Kestrel	167.7 ± 49.02	76	10.2 ± 2.14	7.1	7.5 ± 2.03	2.0
Merlin	10.2 ± 3.06	11	0.7 ± 0.20	1.0	21.5 ± 5.74	50.0
Prairie Falcon	5.4 ± 1.58	3	0.4 ± 0.08	0.3	21.0 ± 4.61	36.4
Peregrine Falcon	0.9 ± 0.51	2	0.1 ± 0.03	0.2	8.3 ± 4.81	0.0
All Species	2443.0 ± 444.43	1651	163.9 ± 11.22	153.8	16.4 ± 2.31	10.6

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: 1992–2004 averages versus 2005.

	FEMALE			MALE			FEMALE : MALE	HY : AHY
	AHY	HY	UNK.	AHY	HY	UNK.	RATIO ¹	RATIO ¹
Sharp-shinned Hawk								
1992–2004 mean	288.4	485.6	0.0	240.2	588.7	0.1	0.94	2.09
2005	182	282	0	129	309	0	1.06	1.90
Cooper's Hawk								
1992–2004 mean	258.4	207.5	0.0	141.7	190.2	0.0	1.47	1.00
2005	171	161	0	87	143	0	1.44	1.18
Northern Goshawk								
1992–2004 mean	5.0	11.6	0.0	2.3	12.9	0.0	1.47	8.76
2005	2	8	0	2	9	0	0.91	4.25
American Kestrel								
1992–2004 mean	7.7	70.6	23.6	25.1	79.6	2.5	0.95	5.86
2005	8	27	1	15	24	1	0.90	2.22

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 2005 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 – 24622	11-Oct-04	HY	1-Oct-05	SY
Sharp-shinned Hawk	M	1162 – 33935	15-Sep-00	HY	30-Sep-05	>5 th yr

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

Table 8. Recaptures during fall 2005 in the Goshute Mountains, NV, of raptors previously banded elsewhere.

SPECIES	SEX	BAND #	BANDING SITE	BANDING DATE	BANDING AGE	RECAPTURE DATE	RECAPTURE AGE
Sharp-shinned Hawk	F	1593 – 61628	Boise Ridge, ID	14-Sep-03	HY	23-Sep-05	TY
Sharp-shinned Hawk	M	1202 – 86330	Boise Ridge, ID	6-Sep-04	HY	30-Sep-05	SY
Sharp-shinned Hawk	F	1483 – 55867	Chelan Ridge, WA	10-Sep-04	HY	17-Oct-05	SY
Cooper's Hawk	F	1005 21176	? ²	?	?	2-Oct-05	ASY

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

² Awaiting BBL report.

Table 9. Foreign encounters during 2005 with raptors banded in the Goshute Mountains, Nevada.

SPECIES	SEX	BAND #	BANDING DATE	BANDING AGE	ENCOUNTER DATE	ENCOUNTER AGE	ENCOUNTER LOCATION	DISTANCE (KM)	STATUS
GE	M	0629 – 42569	22-Oct-99	HY	27-Apr-05	7 th yr	Potomac, MT	583	found dead
RT	U	0987 – 93315	4-Oct-04	ASY	14-Apr-05	ATY	Phoenix, AZ	640	found dead
RT	U	1177 – 06496	9-Sep-04	HY	9-Nov-05	SY	San Blas, Mexico	1,989	shot
SS	M	1202 – 22503	16-Oct-01	SY	30-Apr-05	6 th yr	Calgary, ALB, Canada	952	found dead
SS	F	1593 – 01705	27-Sep-02	ASY	04-May-05	≥5 th yr	Placerville, ID	354	injured/dead
SS	F	1593 – 01917	09-Nov-02	HY	21-Apr-05	4 th yr	Spokane, WA	756	Injured/dead
CH	F	1705 – 35121	23-Sep-96	ASY	2005	≥22 nd yr!!!	Kelowna, BC, Canada	1,021	found dead

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.

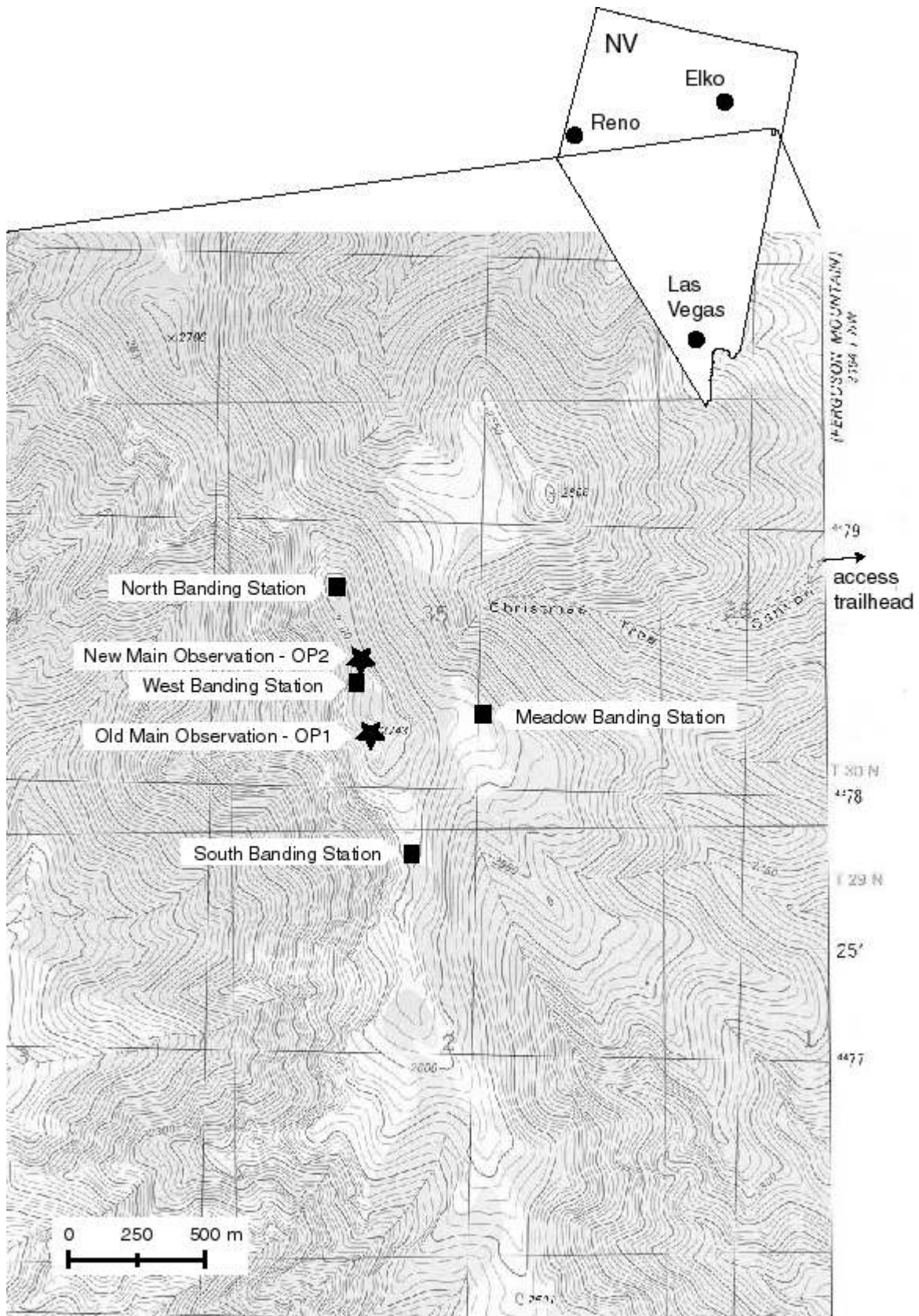


Figure 1. Location of the Goshute Mountains Raptor Migration Project study site.

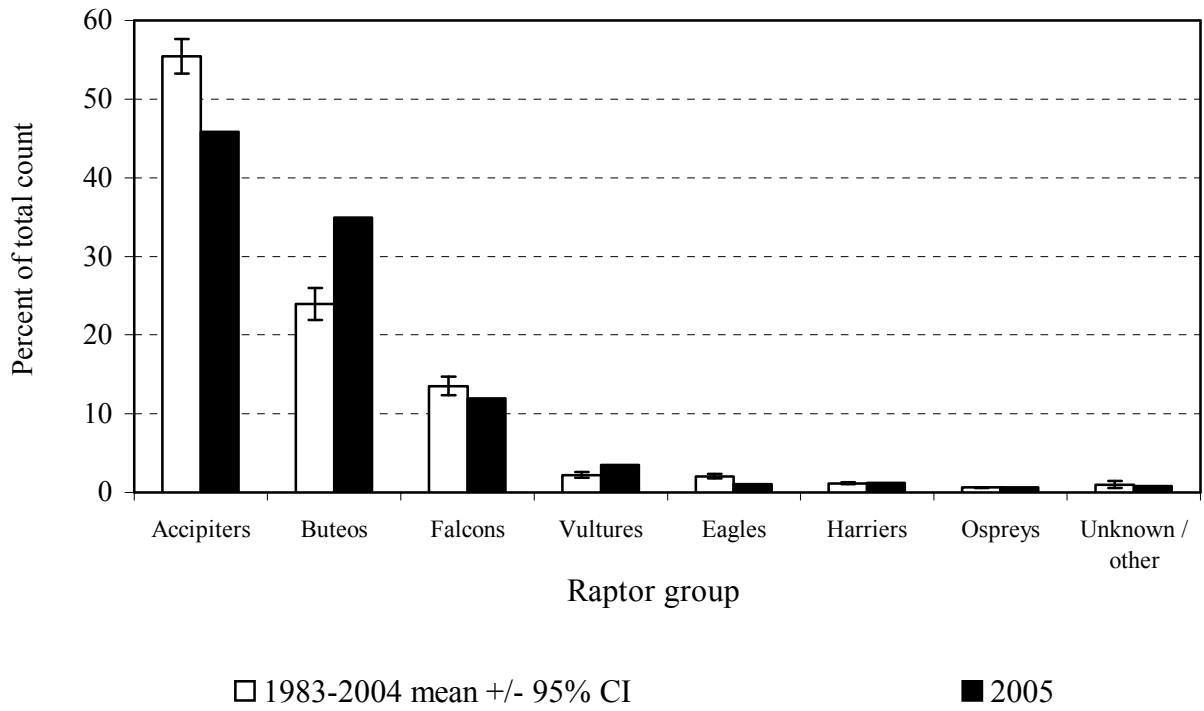


Figure 2. Fall migration flight composition by major species groups in the Goshute Mountains, Nevada: 1983–2004 versus 2005.

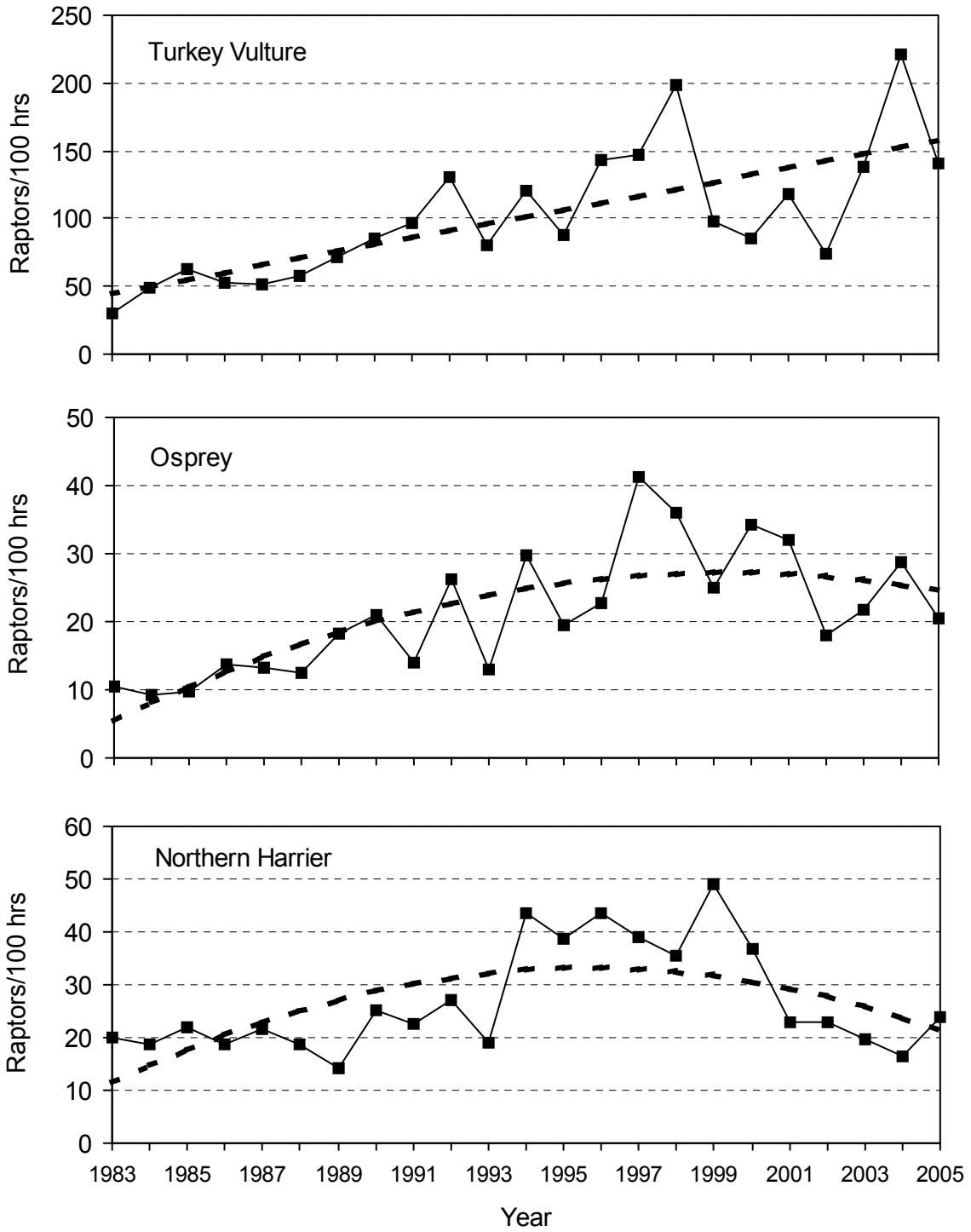


Figure 3. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Turkey Vultures, Ospreys, and Northern Harriers: 1983–2005. Dashed lines indicate significant linear or quadratic regressions.

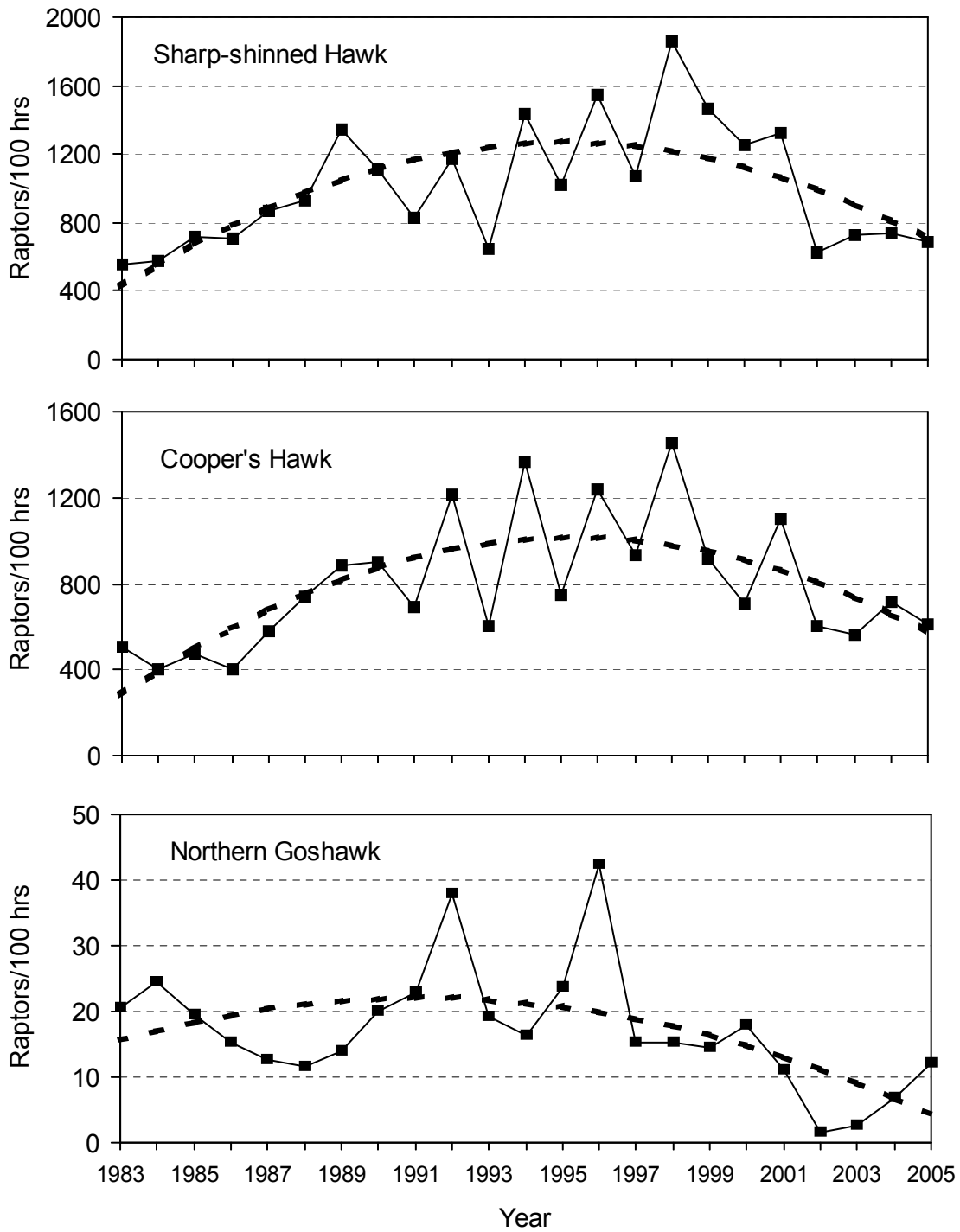


Figure 4. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Sharp-shinned Hawks, Cooper's Hawks, and Northern Goshawks: 1983–2005. Dashed lines indicate significant linear or quadratic regressions.

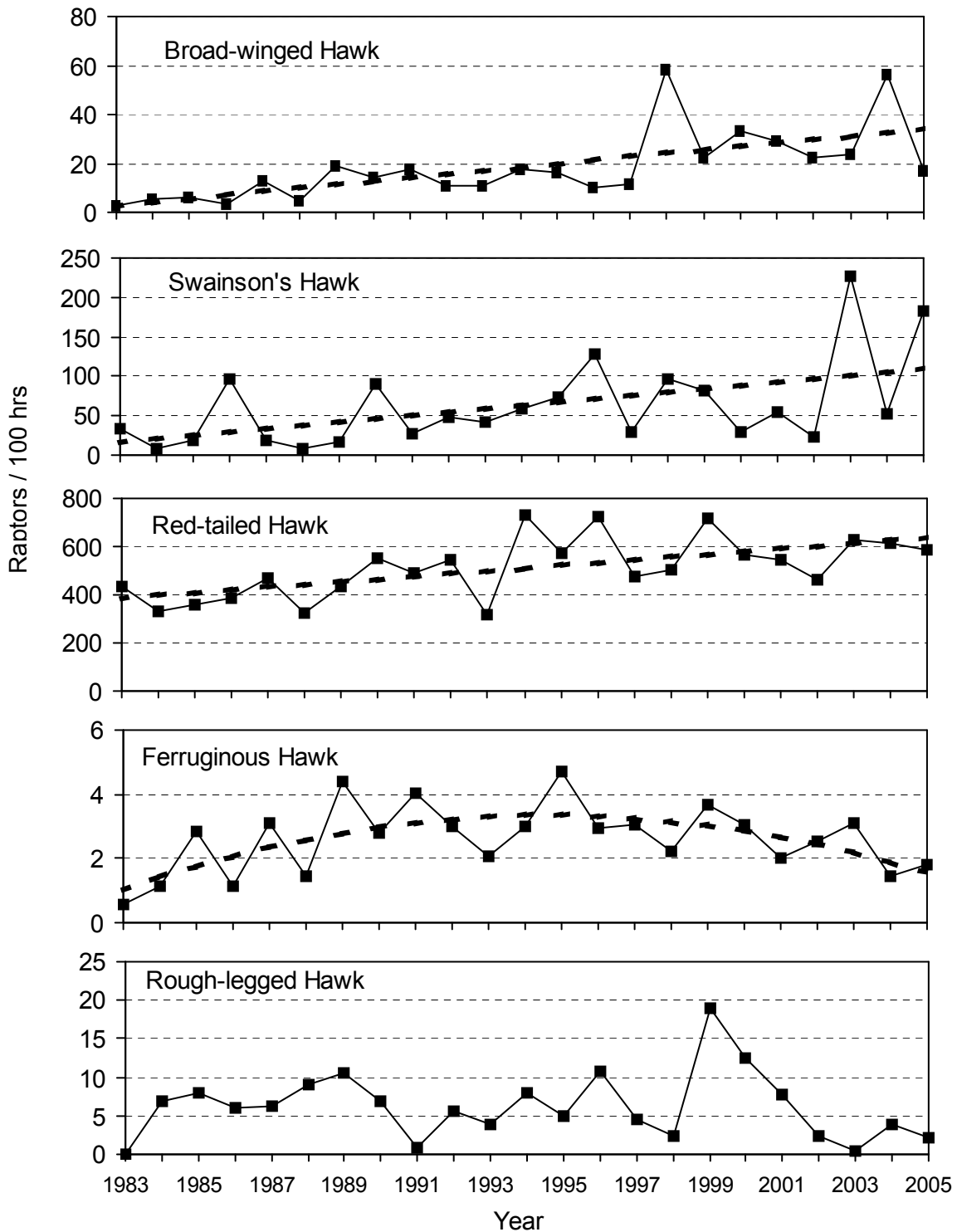


Figure 5. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Broad-winged, Swainson's, Red-tailed, Ferruginous, and Rough-legged Hawks: 1983–2005. Dashed lines indicate significant linear or quadratic regressions.

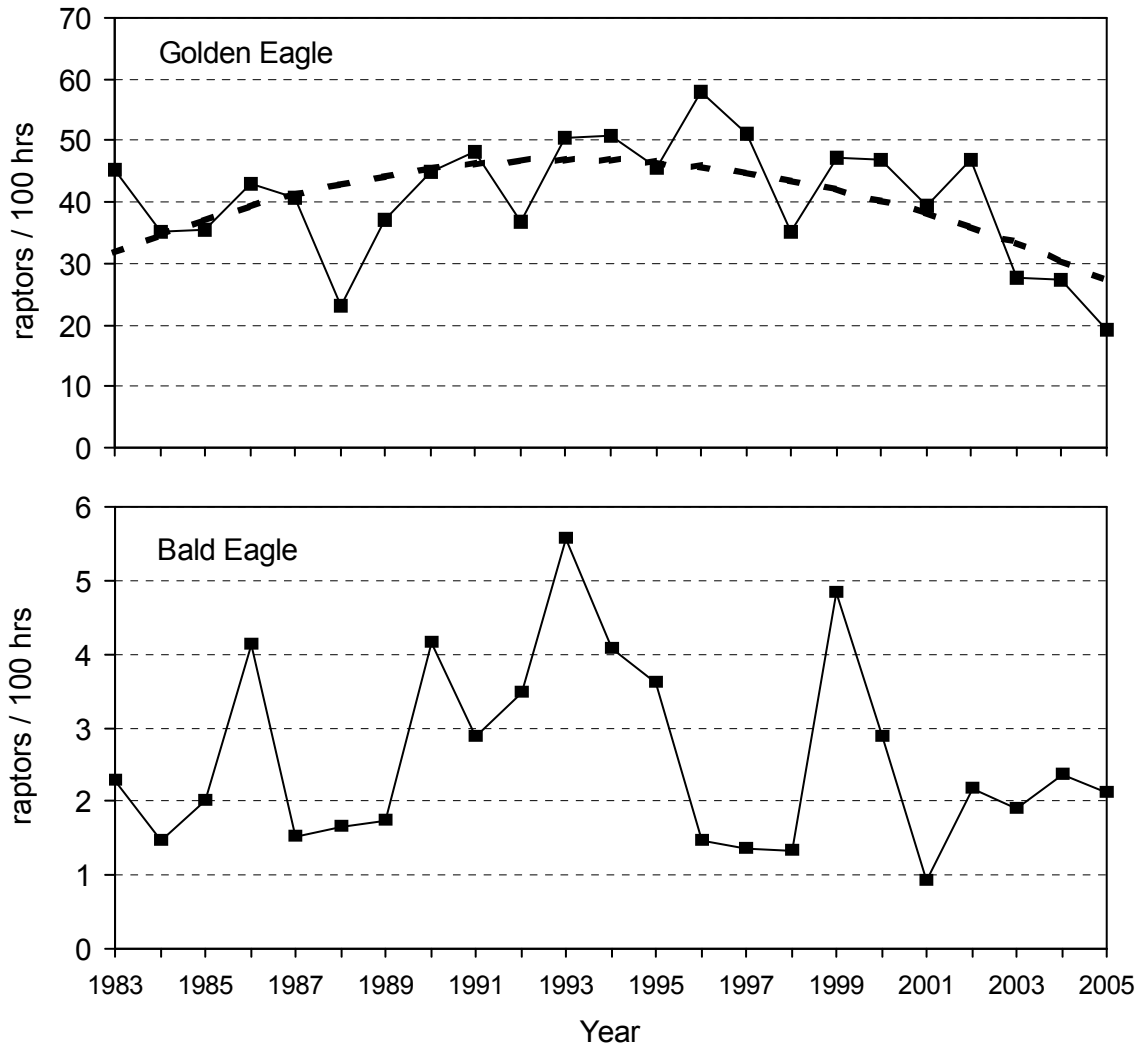


Figure 6. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Golden and Bald Eagles: 1983–2005. Dashed lines indicate significant linear or quadratic regressions.

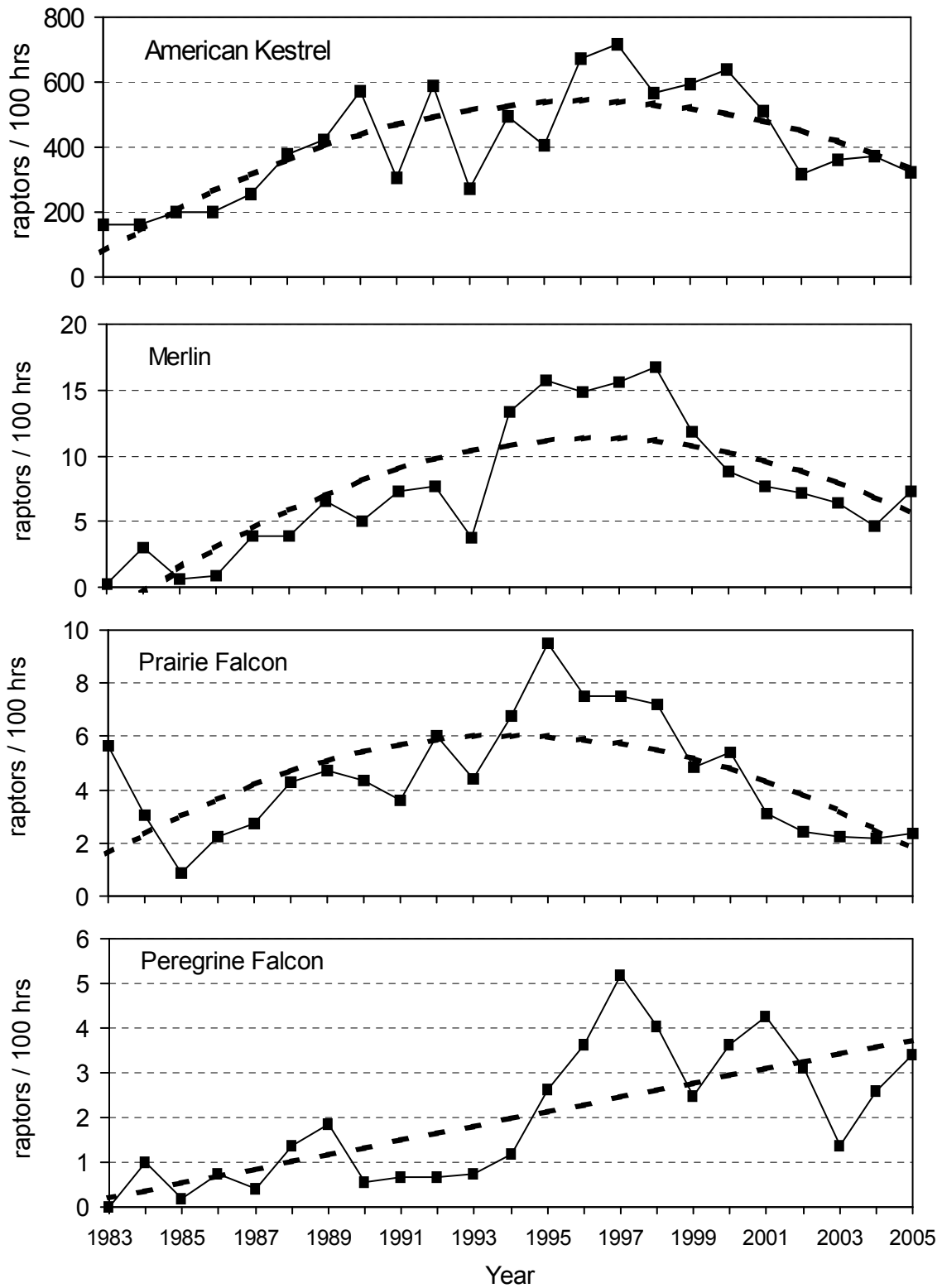


Figure 7. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons: 1983–2005. Dashed lines indicate significant linear or quadratic regressions.

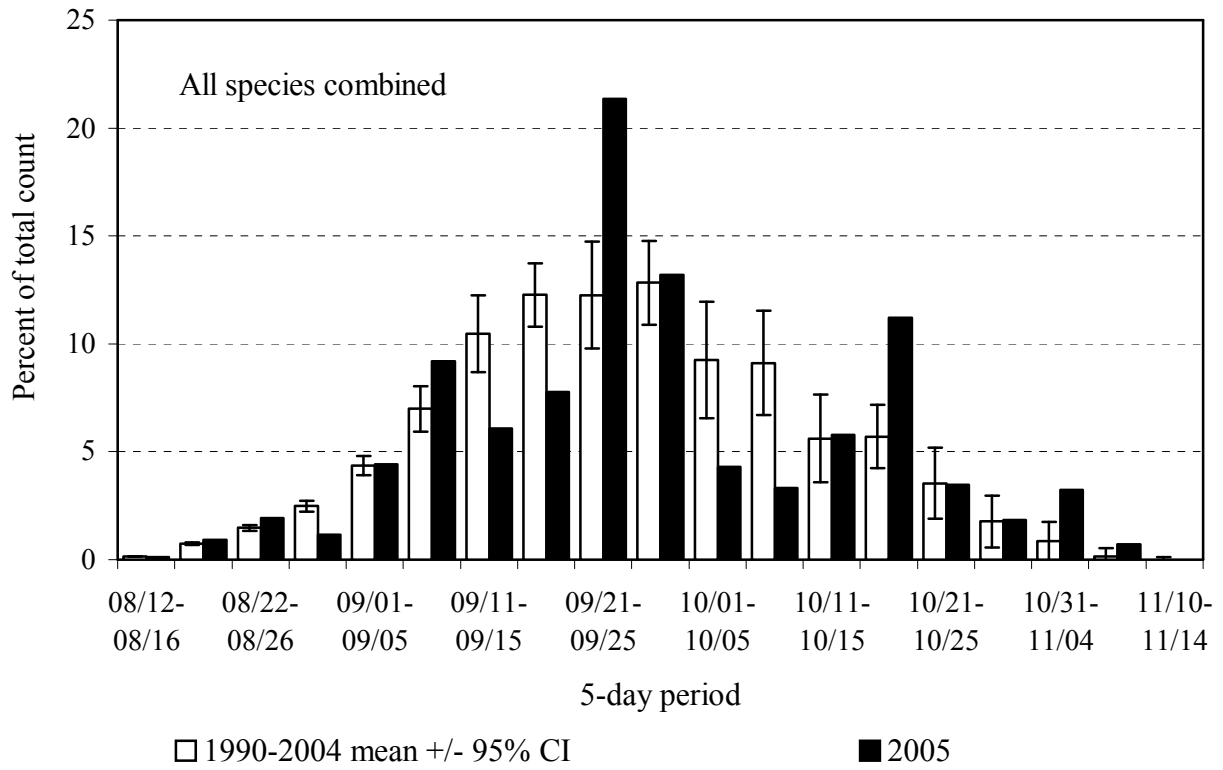


Figure 8. Combined-species passage volume by five-day periods: 1990–2004 versus 2005.

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).

2005: 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).

¹ Numbers in parentheses indicate the number of years of previous experience conducting season-long migratory raptor counts.

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: 2005.

DATE	OBS. HOURS	OBSVR / 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	1.5	0	mc		sw	22.3	31.90	3	49	96	1	0.9
16-Aug	6.00	1.5	0	pc-mc, PM rain/ts		sw, ne	18.1	31.90	3	41	100	2	1.2
17-Aug	8.00	2.0	0	pc-mc, scat rain/ts		wsw	19.1	31.83	3	62	96	1	0.4
18-Aug	8.00	1.9	0	pc-ovc		wsw, nne-ene	19.5	31.78	4	76	87	1	0.5
19-Aug	8.50	1.9	0	mc-pc		wsw, ne	18.4	31.87	2	74	100	2	4.2
20-Aug	8.50	2.3	0	clr-pc		nne-e	22.5	31.98	1	98	98	1	4.6
21-Aug	8.00	2.0	0	clr-pc		nne-ene	22.1	31.97	2	93	96	2	4.4
22-Aug	7.50	2.2	0	mc-ovc/rain/ts		nne-e, ssw	18.8	31.89	4	71	99	2	2.0
23-Aug	8.00	2.4	0	pc-mc, scat rain		sw	22.7	31.79	3	88	94	2	2.1
24-Aug	8.00	2.6	0	clr-mc		sw	22.8	31.78	3	96	94	2	15.5
25-Aug	8.00	2.0	0	clr		sw, ne	21.5	31.90	3	84	90	2	6.3
26-Aug	8.00	2.0	0	clr-pc		sw, ne	21.5	31.97	2	80	88	2	5.3
27-Aug	8.00	2.9	0	clr		sw-w	21.9	31.93	3	75	85	2	3.1
28-Aug	8.00	2.0	0	clr/dust, PM haze		sw-w, ne	22.2	31.91	2	50	90	2	2.5
29-Aug	8.50	2.0	0	clr	20.5	sw-w	22.3	31.76	4	98	93	2	6.0
30-Aug	8.00	2.0	0	clr	5.1	sw-w, ene	13.4	31.85	3	100	100	1	3.8
31-Aug	8.00	2.0	0	clr/haze	5.8	nne-ene	14.6	31.78	3	68	100	1	2.8
1-Sep	8.00	2.0	0	clr-pc	3.9	sw, ene	17.6	31.88	3	93	93	2	2.1
2-Sep	8.00	2.0	0	pc-ovc, scat rain	8.5	sw	21.4	31.88	4	95	95	2	6.6
3-Sep	8.00	2.0	0	clr-pc	18.4	sw	21.5	31.87	4	85	93	2	7.1
4-Sep	10.00	2.0	0	clr-pc	17.9	sw	18.4	31.83	4	98	92	3	32.8
5-Sep	10.50	1.9	0	clr, AM haze	6.0	ene-e, sw	16.2	31.81	3	83	94	2	10.9
6-Sep	8.00	1.9	0	clr	8.1	sw, ne	19.2	31.91	4	100	95	2	17.4
7-Sep	8.00	2.0	0	clr-pc, haze	6.5	sw, ene	19.3	31.93	3	98	95	1	20.6
8-Sep	8.50	2.0	0	pc-clr	11.9	sw-w	18.6	31.82	4	93	95	1	59.2
9-Sep	9.50	2.0	0	clr-pc, PM haze	16.4	sw	16.7	31.59	4	70	91	3	34.2
10-Sep	6.50	2.0	0	ovc/snow/fog	6.1	sw	4.0	31.61	4	75	66	1	7.5
11-Sep	8.00	2.0	0	ovc, AM fog	4.3	calm, ene	8.3	31.69	4	80	75	2	4.3
12-Sep	8.50	2.0	0	clr-pc	5.0	sw-wnw	8.3	31.77	3	100	100	3	22.7
13-Sep	8.00	1.8	0	pc-mc	2.0	ene, sw		32.09	4	100	100	2	14.1
14-Sep	8.00	2.0	0	clr	4.2	sw	9.1	31.81	3	100	100	3	15.5
15-Sep	8.00	2.0	0	clr	5.7	sw, ene	13.0	31.84	3	100	100	2	39.9
16-Sep	9.00	2.7	0	clr, AM haze	11.5	sw	14.1	31.73	4	88	100	3	35.8
17-Sep	8.50	2.1	0	clr-pc, AM haze	11.3	sw,e	8.6	31.74	4	85	100	2	13.8
18-Sep	8.00	2.9	0	clr-pc	5.8	ne-e	10.8	31.80	3	100	100	2	24.1
19-Sep	9.00	2.5	0	clr	2.6	var.	14.2	31.98	2	100	100	2	22.4
20-Sep	6.75	2.0	0	pc-ovc, PM rain	11.9	sw	14.5	31.99	4	82	77	3	24.3
21-Sep	8.00	2.7	0	ovc-mc, AM fog	9.6	sw	12.0	31.83	4	78	78	2	14.9
22-Sep	9.00	2.5	0	clr-mc	5.5	sw, ene	13.3	31.82	2	91	100	2	45.6
23-Sep	8.00	3.7	0	pc-ovc, PM rain/ts	16.0	sw-w	15.0	31.62	4	100	90	3	125.8
24-Sep	9.50	2.0	0	ovc-pc	5.5	sw-w	9.2	31.63	3	77	95	3	75.3
25-Sep	9.50	2.2	0	clr	1.9	n-ene, sw	5.5	31.85	2	100	100	3	52.3
26-Sep	9.00	2.4	0	clr	6.0	ene-ese, sw-w	15.0	31.90	3	100	100	2	37.8
27-Sep	9.00	2.0	0	ovc-pc, scat rain	12.1	sw	10.5	31.81	4	80	91	2	16.7
28-Sep	9.00	2.0	0	clr, PM haze	11.5	ne	9.5	31.98	3	95	100	1	13.2
29-Sep	10.50	2.0	0	clr	2.9	calm, nne-ene, sw	11.6	31.91	2	100	100	2	53.3
30-Sep	10.50	1.8	0	clr	6.8	sw-w	13.3	31.82	2	100	100	2	50.4
1-Oct	9.25	2.2	0	clr-ovc	15.8	sw-w	15.7	31.66	4	100	100	3	35.0
2-Oct	9.00	1.9	0	ovc-pc	5.7	sw, ene	7.6	31.61	3	66	61	2	10.9
3-Oct	2.00	2.0	0	ovc, fog	3.7	ssw	10.3	31.61	4	17	80	2	0.5
4-Oct	5.00	1.6	0	ovc-pc	14.4	w-sw	0.6	31.70	4	50	100	2	1.2
5-Oct	8.50	2.0	0	clr-pc, PM haze	9.8	ene	-0.9	31.85	4	70	95	1	14.7
6-Oct	9.00	1.8	0	clr/haze	6.5	ene, sw	4.2	31.82	4	58	100	2	7.8

Appendix C. continued

DATE	OBS. HOURS	OBSRVR / HOUR ¹	MEDIAN		PREDOMINANT WEATHER ³	WIND		TEMP (°C) ¹	BAROM. PRESS. (IN HG) ¹	MEDIAN THERMAL LIFT ⁴	VISIB. WEST (KM) ¹	VISIB. EAST (KM) ¹	MEDIAN	
			VISITOR DISTURB ²	VISITOR		SPEED (KPH) ¹	DIRECTION						FLIGHT DISTANCE ⁵	BIRDS / HOUR
7-Oct	10.00	2.3	0		clr	11.8	sw	9.4	31.68	4	100	100	2	14.8
8-Oct	9.00	2.0	0		ovc/snow	10.3	sw	3.3	31.60	4	43	55	2	2.4
9-Oct	9.50	2.0	0		ovc-mc, snow	5.5	w-nw, nne-ene	0.4	31.72	4	73	59	2	1.1
10-Oct	10.00	1.8	0		clr	5.4	n-ene, sw	1.0	31.79	3	100	100	2	17.7
11-Oct	10.00	1.7	0		clr-ovc	1.8	sw-w, n	4.7	31.75	3	99	100	2	20.4
12-Oct	9.50	2.0	0		clr	3.5	calm, sw	4.7	31.87	3	100	100	3	9.6
13-Oct	9.00	2.0	0		clr	6.3	sw-w	8.4	31.93	3	100	100	2	6.4
14-Oct	9.50	2.0	0		clr	9.9	sw	11.9	31.90	3	100	100	2	25.4
15-Oct	9.00	2.6	0		ovc	13.2	sw-w	10.3	31.62	4	100	100	2	16.7
16-Oct	9.00	1.9	0		pc-ovc	0.7	calm, sw	8.5	31.87	2	100	100	2	13.2
17-Oct	9.50	2.4	0		clr-ovc	7.0	sw	9.4	31.88	3	98	100	2	79.6
18-Oct	8.00	1.9	0		ovc, scat rain	4.4	ene, sw	9.7	31.72	4	81	78	2	6.3
19-Oct	9.00	1.9	0		pc-ovc	7.7	sw	8.9	31.76	4	100	100	3	21.8
20-Oct	9.75	2.2	0		ovc-pc	4.5	sw	6.0	31.85	3	96	100	2	32.8
21-Oct	9.25	2.5	0		clr/haze	2.5	ene, sw-w	6.2	31.90	3	66	100	2	17.9
22-Oct	9.00	2.2	0		clr/haze	2.3	ene	7.7	31.81	2	95	100	2	10.9
23-Oct	8.75	2.0	0		clr, AM haze	5.3	ene	8.2	31.80	2	98	100	2	6.4
24-Oct	8.75	2.0	0		clr-ovc	5.4	sw, ene	9.2	31.89	2	100	100	2	4.9
25-Oct	9.00	2.0	0		pc-mc	6.7	sw-w	10.3	31.78	3	100	100	3	9.2
26-Oct	8.50	2.0	0		mc-ovc	3.2	sw, ene	8.6	31.73	4	95	93	2	8.2
27-Oct	6.00	2.0	0		ovc, scat rain/snow	16.7	sw	6.3	31.63	4	64	61	1	7.0
28-Oct	8.00	2.0	0		ovc, PM fog	9.1	sw-w	2.9	31.67	4	62	100	2	3.8
29-Oct	4.40	1.0	0		ovc/fog/snow	6.0	sw-w	2.7	31.75	4	30	64	1	2.5
30-Oct	9.00	2.1	0		ovc-clr, scat fog	6.9	sw-w	0.7	31.90	3	38	95	3	9.4
31-Oct	9.50	1.9	0		pc-ovc/haze	17.5	sw	3.5	32.02	4	75	100	2	19.9
1-Nov	8.75	1.7	0		mc-pc	18.5	sw-w	7.6	31.84	4	100	100	2	16.8
2-Nov	8.00	2.0	0		ovc	21.5	w	7.1	31.60	4	98	100	3	6.0
3-Nov	8.00	2.0	0		ovc	12.1	w	0.7	31.61	4	100	100	2	3.1
4-Nov	4.90	2.0	0		ovc, AM fog/snow	16.4	sw-w	-0.2	31.59	4	57	50	2	1.2
5-Nov	8.25	1.8	0		mc-ovc	9.9	sw	-0.5	31.65	4	100	100	2	10.9

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: 2005.

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
15-Aug	8.00	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	7	0.9
16-Aug	6.00	1	0	0	3	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	7	1.2	
17-Aug	8.00	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0.4	
18-Aug	8.00	4	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	4	0.5	
19-Aug	8.50	1	0	3	2	3	0	1	0	0	0	0	18	0	0	1	3	0	0	4	0	0	0	0	0	0	0	36	4.2	
20-Aug	8.50	3	0	1	3	2	0	0	0	0	0	1	18	0	0	1	0	0	9	0	1	0	0	0	0	0	0	39	4.6	
21-Aug	8.00	0	0	0	0	3	0	0	0	0	0	2	23	0	0	1	0	0	6	0	0	0	0	0	0	0	0	35	4.4	
22-Aug	7.50	0	0	1	0	1	0	0	0	0	0	1	5	1	0	0	1	0	5	0	0	0	0	0	0	0	0	15	2.0	
23-Aug	8.00	2	0	1	3	3	0	0	0	0	0	0	7	0	0	0	0	0	1	0	0	0	0	0	0	0	0	17	2.1	
24-Aug	8.00	5	0	6	4	8	0	0	1	0	0	1	36	0	0	1	4	0	57	0	0	0	0	0	1	0	0	124	15.5	
25-Aug	8.00	1	0	0	2	4	1	0	0	0	0	0	20	0	0	0	0	0	22	0	0	0	0	0	0	0	0	50	6.3	
26-Aug	8.00	1	0	4	7	3	0	0	0	0	0	1	15	0	0	0	2	0	8	0	1	0	0	0	0	0	0	42	5.3	
27-Aug	8.00	1	1	1	0	3	0	0	1	0	0	0	11	0	0	1	0	0	6	0	0	0	0	0	0	0	0	25	3.1	
28-Aug	8.00	2	0	3	0	4	0	0	0	0	0	0	0	0	0	0	1	0	10	0	0	0	0	0	0	0	0	20	2.5	
29-Aug	8.50	1	1	2	2	1	0	0	0	0	0	1	18	0	0	1	0	0	22	0	0	1	0	0	0	1	51	6.0		
30-Aug	8.00	0	0	1	6	3	0	0	1	0	0	0	3	0	0	0	0	0	15	0	0	0	0	0	0	0	1	30	3.8	
31-Aug	8.00	0	0	0	2	4	0	0	0	0	0	0	11	0	0	0	2	0	3	0	0	0	0	0	0	0	0	22	2.8	
01-Sep	8.00	3	0	3	0	2	0	0	0	0	0	0	7	0	0	1	0	0	1	0	0	0	0	0	0	0	0	17	2.1	
02-Sep	8.00	0	3	1	5	12	0	0	0	0	0	0	18	0	0	0	1	0	12	0	1	0	0	0	0	0	0	53	6.6	
03-Sep	8.00	3	2	1	5	14	0	1	2	0	0	0	18	0	0	0	3	0	7	0	0	0	0	0	0	0	1	57	7.1	
04-Sep	10.00	1	3	3	11	16	0	0	3	2	0	0	16	42	0	0	1	2	0	223	0	1	2	0	1	0	1	328	32.8	
05-Sep	10.50	10	0	4	6	8	1	2	2	0	0	4	10	0	0	5	0	0	60	1	0	0	0	0	0	0	1	114	10.9	
06-Sep	8.00	2	0	4	48	24	2	7	1	0	0	3	19	0	0	0	2	0	26	0	1	0	0	0	0	0	0	139	17.4	
07-Sep	8.00	0	2	2	49	26	1	3	1	0	0	2	18	0	0	0	0	0	60	1	0	0	0	0	0	0	0	165	20.6	
08-Sep	8.50	7	8	4	249	113	1	13	0	1	0	3	28	0	0	0	1	0	74	1	0	0	0	0	0	0	0	503	59.2	
09-Sep	9.50	2	4	1	131	41	0	12	3	1	0	7	33	0	0	1	0	0	86	0	0	0	1	0	2	0	325	34.2		
10-Sep	6.50	0	1	0	10	10	0	3	1	0	0	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	7.5	
11-Sep	8.00	0	1	0	12	11	0	0	2	2	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	34	4.3	
12-Sep	8.50	3	0	1	58	52	1	10	0	0	0	7	13	0	0	0	0	0	45	0	0	0	0	0	1	0	2	193	22.7	
13-Sep	8.00	5	2	0	43	21	2	8	0	0	0	3	12	0	0	0	1	0	14	0	0	0	0	0	0	0	2	113	14.1	
14-Sep	8.00	1	0	1	38	44	1	2	1	4	0	1	10	0	0	5	2	0	14	0	0	0	0	0	0	0	0	124	15.5	

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
15-Sep	8.00	7	5	3	110	100	2	23	0	1	0	0	3	34	0	0	4	1	0	0	24	0	0	0	0	0	0	2	319	39.9
16-Sep	9.00	1	1	0	123	54	0	15	0	0	0	1	7	23	0	0	1	3	0	0	90	0	0	1	0	0	0	2	322	35.8
17-Sep	8.50	9	3	1	52	10	1	1	0	1	0	0	0	17	0	0	3	2	0	0	15	2	0	0	0	0	0	0	117	13.8
18-Sep	8.00	42	0	1	47	34	2	2	0	3	0	1	1	30	0	0	1	0	0	0	26	1	0	1	0	0	0	1	193	24.1
19-Sep	9.00	16	5	1	60	26	1	8	0	5	0	6	8	35	0	0	5	0	0	0	23	2	0	0	0	0	0	1	202	22.4
20-Sep	6.75	7	3	2	35	41	1	13	0	0	0	2	12	23	0	0	7	0	0	0	12	0	0	1	0	0	0	5	164	24.3
21-Sep	8.00	6	2	2	43	25	1	8	0	2	0	1	2	21	0	0	0	0	0	0	4	0	0	0	0	0	0	2	119	14.9
22-Sep	9.00	116	7	1	61	82	1	19	0	2	0	1	23	24	0	0	1	2	0	0	64	1	0	1	0	0	1	3	410	45.6
23-Sep	8.00	45	11	12	208	274	2	57	1	4	0	15	54	135	2	0	3	0	1	0	171	5	0	0	0	0	0	6	1006	125.8
24-Sep	9.50	27	5	2	211	253	0	90	0	0	0	0	10	32	0	0	21	1	0	0	45	1	1	0	0	0	0	16	715	75.3
25-Sep	9.50	34	1	1	50	95	0	17	0	1	0	1	225	56	0	0	1	2	0	0	10	0	0	2	0	0	0	1	497	52.3
26-Sep	9.00	3	5	1	99	123	1	4	3	5	0	7	6	47	0	0	3	0	0	0	27	1	0	0	0	0	1	4	340	37.8
27-Sep	9.00	2	0	1	37	38	2	5	0	0	0	0	34	21	0	0	0	0	0	0	6	2	0	1	0	0	0	1	150	16.7
28-Sep	9.00	6	0	2	13	17	5	1	0	0	0	0	39	17	0	0	2	0	0	0	14	1	0	0	0	0	0	2	119	13.2
29-Sep	10.50	34	1	5	66	107	1	20	1	0	0	1	142	129	0	0	2	6	0	0	25	2	0	1	0	0	0	17	560	53.3
30-Sep	10.50	12	1	3	182	160	0	39	0	1	0	0	13	75	1	0	2	0	0	0	30	0	0	0	0	1	0	9	529	50.4
01-Oct	9.25	7	0	2	111	92	3	43	1	1	0	0	6	28	0	0	6	2	1	0	18	0	0	1	0	0	0	2	324	35.0
02-Oct	9.00	1	0	0	29	31	3	3	0	0	0	0	5	24	0	0	1	0	0	0	1	0	0	0	0	0	0	0	98	10.9
03-Oct	2.00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5
04-Oct	5.00	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	6	1.2
05-Oct	8.50	1	0	0	16	15	1	5	1	0	0	0	3	78	0	1	0	0	0	0	2	1	0	0	0	0	0	1	125	14.7
06-Oct	9.00	3	0	4	12	11	2	1	1	0	0	0	5	24	0	0	1	1	0	0	1	2	0	0	0	1	0	1	70	7.8
07-Oct	10.00	0	1	2	56	26	0	6	0	0	0	0	0	39	0	0	0	3	0	0	14	1	0	0	0	0	0	0	148	14.8
08-Oct	9.00	0	0	0	4	4	1	1	0	0	0	0	0	10	0	0	0	1	0	0	1	0	0	0	0	0	0	0	22	2.4
09-Oct	9.50	0	0	0	3	2	1	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1.1
10-Oct	10.00	3	0	0	22	14	4	7	0	0	0	0	1	118	0	0	1	4	0	0	1	1	0	0	0	0	0	1	177	17.7
11-Oct	10.00	0	0	1	28	14	2	5	0	0	0	0	0	136	0	0	4	2	1	0	8	1	1	1	0	0	0	0	204	20.4
12-Oct	9.50	0	0	0	20	20	2	2	0	0	0	0	0	39	0	0	0	2	0	0	3	2	0	0	0	0	0	1	91	9.6
13-Oct	9.00	0	0	0	20	3	2	3	0	0	0	0	0	25	1	0	0	3	0	0	1	0	0	0	0	0	0	0	58	6.4
14-Oct	9.50	1	0	2	99	15	1	3	0	0	0	0	0	103	0	0	0	1	0	0	15	0	1	0	0	0	0	0	241	25.4
15-Oct	9.00	0	2	0	49	18	3	5	0	0	0	0	0	61	0	0	0	4	0	0	4	3	0	1	0	0	0	0	150	16.7

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	9.00	0	0	5	34	14	4	3	0	0	0	0	50	0	0	0	4	0	0	3	0	0	0	0	0	0	0	2	119	13.2
17-Oct	9.50	1	1	9	148	34	3	14	0	0	0	0	528	0	0	0	3	0	0	7	4	0	0	0	0	0	4	756	79.6	
18-Oct	8.00	0	0	0	15	5	0	4	0	0	0	0	23	0	0	0	0	0	0	3	0	0	0	0	0	0	0	50	6.3	
19-Oct	9.00	0	0	3	20	11	0	4	0	0	0	0	148	1	0	1	4	0	0	2	0	0	0	0	0	0	2	196	21.8	
20-Oct	9.75	1	0	6	64	25	1	12	0	0	0	0	193	1	0	0	9	0	0	2	1	0	0	0	0	0	5	320	32.8	
21-Oct	9.25	0	0	5	22	12	0	5	0	0	0	0	115	0	0	0	3	1	0	1	1	1	0	0	0	0	0	166	17.9	
22-Oct	9.00	0	0	5	14	4	0	2	1	0	0	0	68	0	1	0	2	0	0	1	0	0	0	0	0	0	0	98	10.9	
23-Oct	8.75	0	0	6	9	4	0	2	1	0	0	0	26	1	1	0	3	2	0	0	0	0	0	0	0	0	1	56	6.4	
24-Oct	8.75	0	0	3	9	1	0	0	0	1	0	0	28	0	0	1	0	0	0	0	0	0	0	0	0	0	0	43	4.9	
25-Oct	9.00	0	0	3	9	1	2	2	2	0	0	0	54	1	0	2	4	0	0	1	0	0	0	0	0	0	2	83	9.2	
26-Oct	8.50	1	0	3	8	2	3	1	0	0	0	0	48	0	0	0	3	0	0	0	0	0	0	0	0	1	0	70	8.2	
27-Oct	6.00	0	0	0	14	0	0	1	0	0	0	0	24	0	1	0	1	0	0	0	0	0	0	0	0	0	1	42	7.0	
28-Oct	8.00	0	0	0	8	0	1	0	0	0	0	0	19	0	0	0	2	0	0	0	0	0	0	0	0	0	0	30	3.8	
29-Oct	4.40	0	0	1	1	0	1	1	0	0	0	0	2	0	1	0	4	0	0	0	0	0	0	0	0	0	0	11	2.5	
30-Oct	9.00	0	0	1	7	1	1	1	0	0	0	0	68	2	0	1	3	0	0	0	0	0	0	0	0	0	0	85	9.4	
31-Oct	9.50	0	0	0	2	2	1	0	0	0	0	0	174	1	0	3	6	0	0	0	0	0	0	0	0	0	0	189	19.9	
01-Nov	8.75	0	0	1	11	0	1	0	0	0	0	0	131	0	0	0	2	1	0	0	0	0	0	0	0	0	0	147	16.8	
02-Nov	8.00	0	1	0	5	0	0	1	0	0	0	0	38	0	0	0	2	0	0	0	1	0	0	0	0	0	0	48	6.0	
03-Nov	8.00	0	0	1	2	0	0	0	1	0	0	0	14	0	1	0	3	2	0	0	1	0	0	0	0	0	0	25	3.1	
04-Nov	4.90	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	6	1.2	
05-Nov	8.25	0	0	1	4	1	1	0	0	0	0	0	80	0	0	0	2	1	0	0	0	0	0	0	0	0	0	90	10.9	
Total	695.30	445	83	153	2973	2260	74	521	32	37	0	36	664	3678	12	6	97	130	11	0	1468	40	9	14	1	6	4	104	12858	18.5

¹ See Appendix B for explanation of species codes.

Appendix E. Annual summaries of observation effort and unadjusted raptor counts by species: 1983–2005.

	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	2005	2005	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
End Date	4-Nov	5-Nov	31-Oct	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	78
Observation hours	620.17	673.58	719.50	748.08	681.50	787.30	725.67	688.21	642.75	695.30	668.25
Raptors / 100 hours	3514	2541	3515	3003	2542	2662	1564	2001	2038	1849	2181
SPECIES	RAPTOR COUNTS										
Turkey Vulture	486	482	732	349	297	441	243	466	685	445	339
Osprey	99	187	176	110	152	152	83	96	120	83	93
Northern Harrier	255	255	247	356	233	178	154	127	96	153	172
Sharp-shinned Hawk	6773	4677	9598	8094	6071	7429	3009	3460	3073	2973	4573
Cooper's Hawk	5075	3848	6736	4109	3022	5107	2369	2281	2736	2260	3178
Northern Goshawk	241	97	99	103	123	80	11	16	41	74	104
Unknown small accipiter ¹	–	–	–	–	–	55	246	268	299	521	334
Unknown large accipiter ¹	–	–	–	–	–	0	4	3	11	32	13
Unknown accipiter	464	368	75	132	87	0	7	0	8	37	300
TOTAL ACCIPITERS	12553	8990	16508	12438	9303	12671	5646	6028	6168	5897	8214
Red-shouldered Hawk	2	0	0	0	1	0	0	0	0	0	0.3
Broad-winged Hawk	27	37	160	59	87	79	58	58	122	36	46
Swainson's Hawk	498	143	507	334	132	251	91	908	197	664	245
Red-tailed Hawk	3990	2922	3329	5183	3446	3924	3008	3903	3589	3678	3083
Ferruginous Hawk	16	18	16	25	19	14	20	20	8	12	16
Rough-legged Hawk	17	10	6	50	24	23	6	1	7	6	14
Unidentified buteo	62	77	5	24	21	13	42	57	117	97	73
TOTAL BUTEOS	4612	3207	4023	5675	3730	4340	3225	4947	4040	4493	3478
Golden Eagle	344	329	235	348	305	295	330	181	160	130	258
Bald Eagle	6	6	6	31	14	8	12	9	12	11	13
Unidentified eagle	1	0	0	0	0	0	0	0	4	0	1
TOTAL EAGLES	351	335	241	379	319	303	342	190	176	141	271
American Kestrel	3199	3394	3169	2974	3149	2774	1503	1768	1709	1468	1965
Merlin	71	78	91	74	49	51	39	33	22	40	40
Prairie Falcon	44	48	50	33	37	23	12	14	11	9	26
Peregrine Falcon	21	29	26	15	21	59	15	9	11	14	11
Unknown small falcon ¹	–	–	–	–	–	0	0	10	9	1	5
Unknown large falcon ¹	–	–	–	–	–	0	4	1	3	6	4
Unidentified falcon	21	7	2	7	3	2	2	2	0	4	7
TOTAL FALCONS	3356	3556	3338	3103	3259	2879	1575	1837	1765	1542	2050
Unidentified raptor	83	102	25	57	34	26	81	79	51	104	120
GRAND TOTAL	21795	17114	25290	22467	17327	20954	11349	13770	13101	12858	14738

¹ Designations used consistently beginning in 2001.

Appendix F. Daily trapping effort and captures by species: 2005.

DATE	STATION		SPECIES ¹												CAPTURES		
	HOURS		NH	SS	CH	NG	BW	SW	RT	RL	GE	AK	ML	PR	PG	TOTAL	/STN HR
23-Aug	6.80		0	1	2	0	0	0	0	0	0	0	0	0	0	3	0.4
24-Aug	7.83		0	1	0	0	0	0	2	0	0	1	0	0	0	4	0.5
25-Aug	7.66		0	1	0	0	0	0	4	0	0	0	0	0	0	5	0.7
26-Aug	11.00		0	1	4	0	0	0	2	0	0	0	0	0	0	7	0.6
27-Aug	8.66		0	0	1	0	0	0	1	0	0	1	0	0	0	3	0.3
28-Aug	14.00		0	1	2	0	0	0	2	0	0	2	0	0	0	7	0.5
29-Aug	10.83		0	1	0	1	0	0	2	0	0	0	0	0	1	5	0.5
30-Aug	16.00		0	6	0	0	0	0	1	0	0	6	0	0	0	13	0.8
31-Aug	16.00		0	2	0	0	0	0	2	0	0	2	0	0	0	6	0.4
1-Sep	15.00		0	0	1	0	0	0	2	0	0	0	0	0	0	3	0.2
2-Sep	15.75		0	8	3	0	0	0	2	0	0	2	0	1	0	16	1.0
3-Sep	16.00		1	2	3	0	0	0	2	0	0	0	0	0	0	8	0.5
4-Sep	15.75		0	2	3	0	0	0	3	0	0	0	0	1	0	9	0.6
5-Sep	8.66		0	3	0	1	0	0	0	0	0	3	0	0	0	7	0.8
6-Sep	8.00		0	17	4	0	0	0	3	0	0	4	0	0	0	28	3.5
7-Sep	8.25		0	14	7	0	0	0	0	0	0	4	1	0	0	26	3.2
8-Sep	8.00		0	46	16	0	0	0	0	0	0	4	0	0	0	66	8.3
9-Sep	16.00		0	28	9	0	0	0	1	0	0	4	0	0	0	42	2.6
10-Sep	9.75		0	3	3	0	0	0	1	0	0	0	0	0	0	7	0.7
11-Sep	18.80		0	2	5	2	0	0	0	0	0	0	0	0	0	9	0.5
12-Sep	11.50		0	19	18	0	0	0	1	0	0	7	0	0	0	45	3.9
13-Sep	19.25		0	9	11	0	0	0	1	0	0	3	1	0	0	25	1.3
14-Sep	7.50		0	5	5	0	0	0	1	0	0	2	0	0	0	13	1.7
15-Sep	10.00		0	19	15	2	0	0	3	0	0	0	0	0	0	39	3.9
16-Sep	15.00		0	16	11	0	0	0	1	0	0	1	0	0	0	29	1.9
17-Sep	24.10		0	19	4	0	0	0	1	0	0	3	1	0	0	28	1.2
18-Sep	24.00		0	22	18	0	0	0	2	0	0	0	1	0	0	43	1.8
19-Sep	24.25		0	30	20	0	1	0	0	0	0	4	0	0	0	55	2.3
20-Sep	20.50		0	10	10	0	0	0	0	0	0	1	0	0	0	21	1.0
21-Sep	23.25		0	15	12	1	0	0	0	0	0	0	0	0	0	28	1.2
22-Sep	15.50		0	35	20	1	0	1	1	0	0	2	0	0	0	60	3.9
23-Sep	23.75		0	60	44	2	0	0	0	0	0	2	1	0	0	109	4.6
24-Sep	23.00		0	85	58	1	0	0	0	0	0	4	0	0	0	148	6.4
25-Sep	22.00		0	12	48	0	0	0	2	0	0	0	0	0	0	62	2.8
26-Sep	24.00		0	35	34	0	1	0	1	0	0	1	0	0	0	72	3.0
27-Sep	16.00		1	10	10	0	0	0	0	0	0	2	0	0	0	23	1.4
28-Sep	21.63		0	12	8	1	0	0	1	0	0	4	0	0	0	26	1.2
29-Sep	24.50		0	28	25	1	0	0	0	0	0	0	0	0	0	54	2.2
30-Sep	22.50		0	50	56	0	0	0	0	0	0	0	0	0	0	106	4.7
1-Oct	23.50		0	27	12	1	0	0	2	0	0	0	0	0	1	43	1.8
2-Oct	26.50		0	18	12	1	0	0	0	0	0	0	0	0	0	31	1.2
3-Oct	0.00																
4-Oct	0.00																
5-Oct	13.25		0	4	2	1	0	0	3	0	0	0	0	0	0	10	0.8
6-Oct	15.00		0	10	6	0	0	0	0	0	0	0	0	0	0	16	1.1
7-Oct	16.50		0	29	8	0	0	0	1	0	0	2	0	0	0	40	2.4

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
8-Oct	8.50		0	1	1	0	0	0	0	0	0	0	0	0	0	2	0.2
9-Oct	15.16		0	2	0	0	0	0	1	0	0	0	0	0	0	3	0.2
10-Oct	15.00		0	8	2	2	0	0	1	0	0	0	1	0	0	14	0.9
11-Oct	22.25		0	11	2	0	0	0	2	0	0	0	0	1	0	16	0.7
12-Oct	15.00		0	9	7	1	0	0	0	0	0	1	0	0	0	18	1.2
13-Oct	23.75		0	4	1	1	0	0	0	0	0	0	0	0	0	6	0.3
14-Oct	21.41		0	26	5	0	0	0	0	0	1	2	0	0	0	34	1.6
15-Oct	23.25		0	12	0	1	0	0	0	0	0	0	2	0	0	15	0.6
16-Oct	14.66		0	5	1	0	0	0	0	0	0	0	0	0	0	6	0.4
17-Oct	16.50		0	36	6	0	0	0	5	0	0	0	2	0	0	49	3.0
18-Oct	23.00		0	3	2	0	0	0	1	0	0	1	1	0	0	8	0.3
19-Oct	14.50		0	4	0	0	0	0	1	0	0	1	0	0	0	6	0.4
20-Oct	16.25		0	25	4	0	0	0	1	0	0	0	0	0	0	30	1.8
21-Oct	24.25		0	13	1	0	0	0	0	0	0	0	0	0	0	14	0.6
22-Oct	15.50		1	4	0	0	0	0	1	0	0	0	0	0	0	6	0.4
23-Oct	16.33		0	5	0	0	0	0	0	0	0	0	0	0	0	5	0.3
24-Oct	8.50		0	2	0	0	0	0	0	0	0	0	0	0	0	2	0.2
25-Oct	7.25		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
26-Oct	14.00		0	2	0	0	0	0	0	0	0	0	0	0	0	2	0.1
27-Oct	19.00		0	6	0	0	0	0	0	0	0	0	0	0	0	6	0.3
28-Oct	15.50		0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.1
29-Oct	3.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
30-Oct	4.00		0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.3
31-Oct	4.50		0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.2
1-Nov	6.50		0	3	0	0	0	0	3	0	0	0	0	0	0	6	0.9
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: 1980–2005.

	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
Capture/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	2005	2005	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	25-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	25-Oct
Blinds in operation	5	6	5	5	5	3	4	4	4	4	3	4	3.6
Trapping days	65	63	61	62	63	72	62	72	68	66	53	69	59.1
Station days	278	312	270	264	236	131	174	210	188	163	105	150	184.2
Station hours	2290	2382	2061	2087	1690	939	1286	1666	1474	1276	807	1073	1251.1
Capture/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	171.2
SPECIES	RAPTOR CAPTURES												
Northern Harrier	7	2	1	18	4	0	17	11	8	7	2	3	5.8
Sharp-shinned Hawk	2686	1823	2091	1783	2131	897	1235	1608	1283	825	791	902	1206.9
Cooper's Hawk	1473	695	737	767	1006	438	504	975	791	460	342	562	604.5
Northern Goshawk	35	27	68	20	20	20	24	23	7	9	28	21	28.2
Broad-winged Hawk	1	3	0	0	1	0	3	1	0	2	1	2	1.0
Swainson's Hawk	1	0	0	0	0	0	0	1	0	0	0	1	0.2
Red-tailed Hawk	158	93	84	67	69	49	58	76	109	63	61	67	63.0
Rough-legged Hawk	0	0	0	0	0	0	0	2	0	0	0	0	0.1
Golden Eagle	11	4	7	5	4	8	2	1	9	1	2	1	4.1
Bald Eagle	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	137.7
Merlin	21	13	18	26	13	16	11	12	15	5	11	11	8.4
Prairie Falcon	7	3	7	17	7	3	8	3	4	3	4	3	4.7
Peregrine Falcon	0	1	1	4	0	1	1	1	3	0	0	2	0.8
All Species	4685	2857	3304	3058	3404	1529	2148	2882	2356	1463	1277	1651	2065.3
Recaptures ¹	10	3	3	7	9	4	6	9	7	2	2	2	3.4
Foreign Recaptures ²	2	1	4	3	5	2	3	4	3	1	2	4	1.5
Foreign Encounters ³	19	16	9	18	15	10	19	10	28	12	16	7	11.8

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.