

**FALL 2009 RAPTOR MIGRATION STUDIES IN THE
GOSHUTE MOUNTAINS OF NORTHEASTERN NEVADA**



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



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TABLE OF CONTENTS

List of Figures.....	iii
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
Passage Rates and Long-Term Trends.....	4
Age Ratios.....	5
Seasonal Timing.....	6
Trapping Effort.....	6
Trapping Summary	6
Encounters with Previously Banded Birds.....	7
Resident Raptors.....	8
Site Visitation.....	9
Acknowledgments.....	9
Literature Cited	9
Tables.....	11
Figures	18
Appendix A. History of official observer participation on the Goshute Mountains Raptor Migration Project.....	26
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.....	27
Appendix C. Daily observation effort, visitor disturbance ratings, weather records, and flight summaries: 2009.....	28
Appendix D. Daily unadjusted raptor counts by species: 2009.....	30
Appendix E. Annual summaries of observation effort and unadjusted raptor counts by species: 1983–2009.....	33
Appendix F. Daily trapping effort and captures by species: 2009.....	35
Appendix G. Annual summaries of banding effort and capture totals by species: 1980–2009.....	37

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: 1983–2008 versus 2009.....	11
Table 2.	Annual raptor migration counts by age classes and immature: adult ratios for selected species in the Goshute Mountains, NV: 1990–2008 versus 2009.....	12
Table 3.	First and last observed, bulk passage, and median passage dates by species for migrating raptors in the Goshute Mountains, NV in 2008, with comparisons of 2009 and 1990–2008 average median passage dates.....	13
Table 4.	Median passage dates by age classes for selected species of migrating raptors in the Goshute Mountains, NV: 1990–2008 versus 2009.....	14
Table 5.	Capture totals, rates, and successes for migrating raptors in the Goshute Mountains, NV: 1985–2008 versus 2009.....	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: 1991–2008 averages versus 2009.....	16
Table 7.	Foreign encounters in 2009 of raptors banded in the Goshute Mountains, NV.....	17

LIST OF FIGURES

Figure 1.	Location of the Goshute Mountains Raptor Migration Project study site.....	18
Figure 2.	Fall migration flight composition by major species groups in the Goshute Mountains, Nevada: 1983–2008 versus 2009.....	19
Figure 3.	Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Turkey Vultures, Ospreys, and Northern Harriers: 1983–2009. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.....	20
Figure 4.	Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Sharp-shinned Hawks, Cooper’s Hawks, and Northern Goshawks: 1983–2009. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.....	21
Figure 5.	Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Broad-winged, Swainson’s, Red-tailed, Ferruginous, and Rough-legged Hawks: 1983–2009. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.....	22
Figure 6.	Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Golden and Bald Eagles: 1983–2009. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.....	23
Figure 7.	Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons: 1983–2009. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.....	24
Figure 8.	Combined-species passage volume by five-day periods: 1990–2008 versus 2009.....	25

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, Smith et al. 2008a). 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 2009 season marking the 30th consecutive season of banding and 27th 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 (Bildstein 2006).

The Goshute project was 1 of 10 long-term, annual migration counts and 1 of 5 migration-banding studies conducted or co-sponsored by HWI in North America during 2009. The primary objective of these efforts is to track long-term population trends of diurnal raptors in western North America and around the Gulf Coast region (Hoffman and Smith 2003; Smith et al. 2008a, b). Raptors serve as important biological indicators of ecosystem health (Bildstein 2001) and long-term migration counts are one of the most cost effective and efficient methods for monitoring the regional status and trends of multiple raptor species (Zalles and Bildstein 2000, Bildstein et al. 2008).

The intensive counting and banding operations, along with related research activities such as satellite tracking of migrants, also provide valuable information about species' ranges, migratory routes and behaviors, and population demographics (e.g., Hoffman et al. 2002, Lott and Smith 2006, Goodrich and Smith 2008). This information helps us understand the life histories, ecology, status, and conservation needs of raptor populations in North America. In addition, these migration studies offer unique opportunities for the public to learn about raptors and the natural environment, and providing such opportunities is another important component of all HWI migration projects.

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 2009, two 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.

Over the years, the number of trapping stations operated in any one year has varied as high as six, but since 2000 only four stations have been considered active options, and more recently HWI has purposefully downsized the operation two primarily the two stations described above to accommodate both resource limitations and a reduced need for extensive banding operations now that we have accumulated nearly 30 years of band-return data.

METHODS

STANDARDIZED COUNTS

Weather permitting, two primary, official observers conducted daily counts throughout the season at OP2. Official observer Aaron Viducich came to the project with two previous, full seasons of raptor migration counting experience, both with HWI in Utah and Oregon. Official observer Laurel Ferreira came to the project with one previous, full season of counting experience with HWI in Utah (see Appendix A for a complete history of observer participation). Other crew members and occasionally visitors regularly assisted with the counts.

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

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 H 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 updated through 2009 follows Hoffman and Smith (2003). In comparing 2009 annual statistics against means and 95% confidence intervals for previous seasons, I equate significance with a 2009 value falling outside the bounds of the confidence interval for the associated mean.

TRAPPING AND BANDING

Weather permitting, variable crews of 2–4 trappers and processors operated one or both trapping stations on most days, generally between 0900 and 1700 H 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 entirely precluded no full days of potential observations and reduced observation time to ≤ 4 hours on only two other days in 2009 (see Appendix C for daily weather records). The 1997–2008 averages for the site are 3 and 1 days, respectively. Rain shortened one day of observations in late August and one day in mid-September, then the first snowfall occurred over a three-day period in early October but substantially shortened observations on only one of those days. Rain and fog hampered observations on another day in mid-October, and then the second snowfall came about two weeks later and shortened observations by a few hours on two days. Relatively fair skies then prevailed for most of the rest of the season and allowed for the project to be shut down as expected and under snow-free conditions.

Generally fair skies prevailed on an above-average 56% of the active observation days (1997–2008 average of 50%), transitional skies (i.e., changed from fair skies to mostly cloudy or overcast during the day, or vice versa) on an average 32%, and mostly cloudy to overcast skies on a below-average 12% (average 18%) of the active days. Scattered rain and snow showers also were slightly less common than usual, occurring on 15% of the active observation days (average 18%); however, the prevalence of visibility-reducing fog and especially haze was almost three times higher than average (56% vs. average 21% of the active days).

Light winds (< 12 kph) prevailed on a near record-high 83% of the active days (average 68%), moderate winds (12–29 kph) on a below-average 16% (average 25%), and strong winds (> 29 kph) on a below-average 1% (average 7%) of the active observation days. This pattern is similar to most years since 2001, but differs markedly from the pattern that prevailed in the late 1990s when stronger winds were the rule. In terms of wind directions, during the past 12 seasons the three most common wind patterns were, in descending order of importance, SW-W winds (prevailing on an average of 35% of the active days and, in combination with periods of calm/variable conditions, on another 5% of the active days), days with SW-W winds for a portion of the day and variable N-E winds during another significant portion of the day (17% of the active days), and NE-E winds (14% of the active days). On average, no other individual pattern prevailed on more than 6% of the active days. In 2009, SW-W and SW-W/calm-variable winds prevailed slightly less often than usual (31% and 4% of the active days), as was also the case for relatively steady W-NW winds (1% vs. average of 5%). In contrast, days with a mix of SW-W and N-E winds were slightly more common than usual (19%) and days with more variable SW-NW winds or a mix of those winds and periods of calm/variable conditions were about twice as common as usual (17% vs. average of 9%). Similarly, days when NE-E winds prevailed throughout the day were about half as common as usual (8% vs. average of 14%), but days with those winds mixed with substantial periods of calm/variable conditions were more than twice as common as usual (10% vs. average of 4%) and days with relatively steady N-NE winds also were more common than usual (4% vs. average of 1% of the active days).

Daily-average temperatures (averages of hourly readings) averaged 13.0°C in 2009, ranging from -5.0–29.3°C. The average value essentially matched the long-term average of 12.8°C, whereas the minimum was the third lowest recorded since 1997 and the maximum was a new record-high for the site since 1997. Daily-average barometric pressure readings (averages of hourly readings) averaged 30.19 inHg, ranging from 29.54–30.70 inHg. The pressure values all fell within the ranges seen since 2001 (period of record for this measure), but the minimum ranked on the low side and the maximum on the high side of previous

values. Thermal lift was rated good-to-excellent on 54% of the active observation days, which was a new record high for the site since 1997 (average 34%). Conversely, the very high prevalence of fog/haze contributed to new record-low average visibility ratings by the observers (66–67 km east and west vs. averages of 88–89%).

In summary, similar to last year, the weather during the 2009 season generally was relatively mild with more fair skies, fewer scattered rain/snow showers, lighter winds, and more favorable thermal-lift conditions the usual; however, unlike in 2008, the range of temperatures was broader than usual at both ends of the spectrum, visibility-reducing fog/haze was much more prevalent than usual, and the wind-direction patterns were more variable than usual compared to the last 12 seasons.

OBSERVATION EFFORT

Counts occurred on all 83 days between the standard observation period of 15 August through 5 November in 2009. The number of observation days was a significant 6% above the 1983–2008 average of $78 \pm 95\%$ CI of 2.1 days, and the number of observation hours (733.59) was a significant 10% above the long-term average of 669.90 ± 26.00 hours. The 2009 average of 2.0 observers per hour (including official and guest observers; value is mean of daily values, which are in turn means of hourly values) was a non-significant 8.7% below the 1983–2008 average of 2.2 ± 0.24 observers/hr.

MIGRATION SUMMARY

The observers counted 11,016 migrant raptors of 17 species during the 2009 season (see Appendix D for daily count records). The count was a significant 24% below the 1983–2008 average (Table 1) and ranks as the third lowest since 1988 (ahead of only 1993 and 2006; see Appendix E for annual summaries). The 2009 tally of six Bald Eagles matched the previous lows for the site (three years in a row from 1996–1998 and again in 2008), but no other record low or high counts occurred in 2009 for commonly encountered species.

The 2009 flight consisted of 48% accipiters, 33% buteos, 9% falcons, 6% vultures, 2% eagles, 1% harriers, and <1% each of Ospreys and unidentified raptors. The proportions of buteos, vultures, and harriers were significantly above average, whereas the proportions of accipiters, falcons, and Ospreys were significantly below average (Figure 2). The most commonly observed species were the Sharp-shinned Hawk (30% of the total count), Red-tailed Hawk (26%), Coopers' Hawk (15%), American Kestrel (9%), and Turkey Vulture (6%). No other species comprised more than 2% of the total count. It is noteworthy that, unlike during the last two years, the count of Sharp-shinned Hawks was again similar to the previous five years and well below average (28%), and that, after having increased ~30% in 2007 compared to the previous five seasons, the count of Cooper's Hawks decreased again to 46% below average and to the lowest level since 1986 (Appendix E). The only species for which the 2009 count was significantly above average were the Turkey Vulture, Broad-winged Hawk, Swainson's Hawk, Merlin, and Peregrine Falcon (Table 1), which is the same as last year except for adding Swainson's Hawk to the mix. In contrast, the 2009 counts were significantly below average for eight commonly encountered species: Ospreys, all three accipiters, Ferruginous Hawks, Golden and Bald Eagles, and American Kestrels.

Passage Rates and Long-Term Trends

The same basic patterns shown by the counts apply to comparisons of adjusted passage rates, except that the passage rates of Northern Harriers and Red-tailed Hawks also were significantly below average and the passage rate of Merlins was only non-significantly above average in 2009 (Table 1). For many species, adjusted passage rates show a common pattern of increasing trends through the late-1990s, which correspond to a wet *El Nino* weather pattern during the early to mid-1990s, followed by either stabilizing patterns or more often sharp declines for a few to several years after 1998 when widespread drought

began plaguing much of the interior West (Figures 3–7; Hoffman and Smith 2003, Smith et al. 2008a). For most such species, passage rates began to creep back upward through 2006/2007, likely in response to improved winter and spring moisture conditions throughout much of the northern Great Basin and Intermountain region in 2005 and 2006; however, this pattern did not continue for many species in 2008/2009, perhaps due to the return of drought conditions in the northern Great Basin from summer 2007 through much of 2008. Species that are now once again showing—or continue to show—overall, long-term increasing trends include Turkey Vultures (Figure 3), Broad-winged and Swainson’s Hawks (Figure 5), and Merlins and Peregrine Falcons (Figure 7). Otherwise, regression analyses updated through 2009 (after Hoffman and Smith 2003) continue to show (newly so for Bald Eagles) significant, hill-shaped, quadratic (second-order polynomial) model fits for all other species except Rough-legged Hawk (no significant trend; Figures 3–7). It is also important to note that, despite the high prevalence of declining trends since the late 1990s, the only species whose recent passage rates have been substantially below levels seen throughout earlier years of the project are the Northern Goshawk (Figure 4) and, to lesser degrees, Golden Eagle and recently Bald Eagle (Figure 6), and Prairie Falcon (Figure 7).

Smith et al. (2008a) present trend analyses of data collected through 2005 for most of the long-term, ongoing, autumn migration studies in western North America, including the Goshutes. These analyses (hereafter called the Raptor Population Index or “RPI” analyses; see <http://www.rpi-project.org>) are based on a more sophisticated analytical approach (also see Farmer et al. 2007) than that represented in Hoffman and Smith (2003) and used herein to present analyses updated through 2009. Among other refinements, this new approach both fits complex polynomial trajectories to the complete series of annual count indices and allows for estimating rates of change between various periods, while also allowing for assessments of trend significance and precision. Note, however, that restrictions related to the mathematical assumptions behind the new approach precluded analyzing data for rare species, which in this case included Ferruginous and Rough-legged Hawks, Bald Eagle, and Peregrine Falcon.

The overall patterns of change and derived trend estimates suggested by the RPI modeling technique generally yielded similar inferences as those derived using the simpler methodology of Hoffman and Smith (2003) and presented herein to provide trend assessments updated through 2009. The only substantive differences between the RPI results and those presented herein, which clearly relate to addition of four more years of data include: 1) high passage rates from 2007–2009 returned stabilizing quadratic trends to significant linear increasing trends for Turkey Vultures (Figure 3) and Broad-winged Hawks (Figure 5); 2) the distinct, recent upswing modeled by a fourth-order model fit in the RPI analyses for Northern Goshawks sharply reversed after 2005 (Figure 4); 3) recent declines in passage rates of Red-tailed Hawks converted a significant long-term, linear increasing trend in the RPI results to a newly significant, second-order model fit tracking an increasing pattern through 1999 but a stable to declining pattern thereafter (Figure 5); 4) a significant fourth-order model fit in the RPI results ended by tracking a steep decline between 2001 and 2005 for Golden Eagles, but passage rates for this species have increased again gradually since then (Figure 6); and 5) a third-order model now provides a significant fit to the data for Merlins, tracking a decline between 1998 and 2004 but renewal of a previous increasing pattern after 2004 (Figure 7).

Age Ratios

Similar to last year, immature : adult ratios were below average in 2009 for 8 of 10 species with data suited to comparisons—but significantly so only for Northern Harriers, Northern Goshawks, Bald Eagles, and Peregrine Falcons—and were significantly above average only for Golden Eagles (Table 2). Note, however, that much lower than usual samples sizes for aged Ferruginous Hawks and Bald Eagles preclude attaching much significance to the data for these species, and that for all other species except Northern Harriers, significant variation in the proportions of aged individuals (consistently higher than average in 2009) may confound the comparisons (Table 2). That said, immature Northern Harriers clearly were much less abundant than usual compared to adults, suggesting that the below average total count and low age ratio for this species largely were due to poor productivity and juvenile recruitment in 2009. For

Northern Goshawks, counts of both immature and adult birds were well below average and the significantly below average age ratio further suggests that low regional productivity contributed to this result. Conversely, counts of both immature/subadult and adult Golden Eagles also were both well below average, but the high age ratio suggests that recent recruitment trends have been relatively positive for this species. Long-term, age-specific trends for Golden Eagles at this site suggest that declining adult numbers may be indicative of reduced migratory activity among mostly sedentary Intermountain breeders in response to improving habitat quality. In fact, after having dropped for four years in a row to a record low in 2004, the counts and passage rates of non-adults increased sharply again in the past four years and returned to average levels from 2007–2009. Over the past 25 years, substantial, multi-year increases in the abundance of immatures/subadults in the Goshutes typically have been preceded by reduced abundance of migrating adults, suggesting that increased productivity correlates with reduced movement among breeding adults in the Intermountain region (Hoffman and Smith 2003).

Lastly, this year's data for Peregrine Falcons indicated a relatively low number of aged juveniles and high number of aged adults. This suggests that the low age ratio was due to a combination of limited productivity but good adult survivorship; however, it is also possible that the low proportion of aged individuals in 2009 reflects a bias against effective aging of immature birds compared to adults (Table 2).

Seasonal Timing

The 2009 combined-species median passage date of 28 September was a significant three days later than the 1990–2008 average (Table 3). The combined-species seasonal distribution pattern confirmed that the season started off a bit slower than average through the first half of September, there was a significant dip in relative activity levels during early October when the first snow storm hit, and then relative activity levels were significantly above average during most of late October (Figure 8). Similar to last year, the overall mild weather conditions likely contributed to the slow start and slightly later overall timing of the season.

At the species level and again similar to last year, 12 of 17 species showed later than average median passage dates in 2009, with the differences significant for 8 species (Turkey Vulture, Northern Harrier, Cooper's Hawk, Swainson's, Red-tailed, Ferruginous and Rough-legged Hawks, and Merlin), and only four species showed significantly early timing (Northern Goshawk, Bald Eagle, American Kestrel, and Peregrine Falcon; Table 3). Age-specific data further revealed that the species-level indication of late passage among Cooper's Hawks likely reflected the case for adults only, with the no difference in timing indicated for immature birds (Table 3). In addition, age-specific data suggested that only immature Northern Goshawks conformed to the species-level indicator of significantly early passage, with significantly late passage indicated for adult goshawks. Conversely, age-specific data indicated significantly late passage for immature Broad-winged Hawks, but slightly early passage for adults.

TRAPPING EFFORT

The crews operated one or both of the two available banding stations on 64 of 70 days between 22 August and 31 October 2009 (see Appendix F for daily capture records and Appendix G for annual summaries). The number of trapping days was 7% higher than the 1980–2008 average for the site, whereas the number of station days (66) and hours (476) were 61% and 60% below average, respectfully, due to a purposefully reduced crew size.

TRAPPING SUMMARY

The 2009 capture total of 841 raptors included nine species, 838 newly banded birds, and three recaptures of birds previously banded in the Goshutes (Table 5, Appendix G). The 2009 effort raises the total number of birds captured since project inception to 56,885, including 98 Goshute recaptures and 41 foreign recaptures. Sharp-shinned Hawks accounted for 51% of the total captures, followed by Cooper's

Hawks (37%), American Kestrels (5%), and Red-tailed Hawks (5%). Each of the remaining species accounted for <1% of the total.

The 2009 combined-species capture total was 60% below the 1983–2008 average (Table 5), consistent with a 60% reduction in station hours. Capture totals were markedly below average for all species except Broad-winged Hawks and Prairie Falcons, reflecting the effects of both low flight volume and reduced trapping effort. Capture success also was substantially below average for all species except Golden Eagles and Prairie Falcons (Table 5). In contrast, capture rates (birds captured per 100 station hours) were substantially above average for five commonly captured species plus Broad-winged Hawks, and were significantly below average only for Northern Harriers, Northern Goshawks, and Peregrine Falcons, indicating that trapping efficiency generally was good (Table 5).

At this site, compared to the counts, banding data yield unique and sufficient sex-age specific data only for the three accipiters and American Kestrels (Table 6). The count and capture data both indicated below-average immature : adult ratios for Sharp-shinned Hawks, with the count data indicating a 13% decline (Table 2) and the capture data a 4% decline (Table 6). In addition, as is typical at this site, the capture age ratio (1.90) was higher than the count age ratio (1.15). Together these data suggest that immature Sharp-shinned Hawks were slightly less abundant and slightly more susceptible to capture (hungrier) than usual compared to adults in 2009. For Cooper's Hawks, both datasets indicated similarly above-average age ratios (3–6%), with the magnitude of the capture age ratio (1.02) about 20% higher than the count age ratio (0.82). Together these data suggest a fairly typical scenario in 2009, with immature Cooper's Hawks about 20% less abundant than adults but about 20% more susceptible to capture. For Northern Goshawks, the count and capture data both suggested below-average age ratios, but with the count age ratio 33% below average and the capture age ratio 63% below average. The difference in the magnitude of change may simply reflect the effects of a very low capture total on the proportional capture statistics. Otherwise, the data would suggest that immature birds were both less abundant and less susceptible to capture than usual compared to adults in 2009, which seems unlikely.

The trapping data alone further indicated that female Sharp-shinned Hawks were captured 12% more often than usual compared to males in 2009, whereas female Cooper's Hawks and Northern Goshawks were captured 13% and 93% less often than usual, respectively, compared to males of the same species in 2009 (Table 6). Again, however, the goshawk statistic must be considered with caution due to an overall capture total that was nearly an order of magnitude smaller than usual (3 vs. average of 22).

The capture sex ratio for American Kestrels in 2009 (1.41) was 53% above average (Table 6), whereas the count sex ratio (0.94) was much lower and 7% below average. These data suggest that, compared to males, female kestrels were slightly less abundant and much more susceptible to capture than usual in 2009. The count data do not yield age-specific data for American Kestrels, so the banding data for this species are particularly useful in this regard. Similar to the past four seasons, the 2009 banding data yielded an immature : adult ratio that was a significant 69% below average (Table 6). This suggests that young kestrels have been relatively scarce during at least the past five years, which in turn suggests that reduced productivity may have been a key contributor to the declining population trends we have recorded for this species in the past decade (Figure 7). In fact, recent evidence from migration counts indicates that kestrels are declining across the continent (Farmer et al. 2008, Farmer and Smith 2009).

ENCOUNTERS WITH PREVIOUSLY BANDED BIRDS

The 2009 captures included same-site recaptures of three female Cooper's Hawks originally banded in the Goshutes in 2004 and 2005. Two birds were banded during their first autumn migration as hatch-year (HY) birds in 2004 and 2005, and the other as an after-second-year (ASY) adult in 2005. The 2004 HY bird had increased its mass by an amazing 33% (126 g) between the two captures, with an empty crop and similar keel-muscle ratings both times, but a higher wing-pit fat rating the second time. In contrast, the masses of both the 2005 birds declined between captures, by 6% (28 g) for the adult and by 10% (46 g)

for the HY bird. However, the HY bird had a full crop at the time of its first capture but an empty crop the second time, and its keel rating had improved the second time. Similarly, the adult bird had an empty crop and similar wing-pit rating both times, but also had a healthier keel rating the second time.

Only three raptors originally banded in the Goshutes were encountered elsewhere in 2009, which is well below average for the site but likely reflects, at least partly, relatively low capture totals in the past few years (Table 7, Appendix G). This raises the total number of “foreign encounters” for the project since 1980 to 352. The 2009 encounters involved 1 Cooper's Hawk, 1 Red-tailed Hawk, and 1 Golden Eagle. The male Cooper's Hawk was banded as a HY bird in 2007 and was found dead of unknown causes 831 km north-northwest near Cranbrook, British Columbia in June 2009, suggesting that it died on a potential breeding range. The Red-tailed Hawk also was banded as a HY bird in 2007 and was found injured 763 km southwest near San Diego, California on 23 October 2009, after which it was taken to a rehabilitation center, with its fate thereafter unknown to us at present. The Golden Eagle recovery comprises a true rarity for HWI, being only the sixth band return for this species that HWI has ever received for a bird captured on migration. This male eagle was banded as a HY bird in 2008 and was hit by a military vehicle 1,119 km to the southeast on the White Sands Missile Range in central New Mexico on 19 April 2009. The bird was taken to a rehabilitation center after having remarkably sustained no broken bones but some major bruising. We were then very pleased to learn that after five months of rehabilitation the bird was returned to excellent health and was successfully released again in September 2009! Of the six band-returns we have received from Golden Eagles, three involved vehicle collisions, but unfortunately the other two resulted in mortalities.

RESIDENT RAPTORS

Two adult Sharp-shinned Hawks resided in the area through 26 September, and were frequently observed hunting and interacting mostly north of the observation site. A resident adult Cooper's Hawk was regularly observed in the area through 23 September, mostly on the east side of the ridge between the owl and north meadows. For the second year in a row, after a consecutive string of at least 7 or 8 successful years, it appeared that the Northern Goshawks that typically nest near the project site either did not attempt to nest or failed to produce any fledglings in 2009, and the crew recorded no obvious resident activity by this species during the 2009 season.

At least one adult light-morph and one immature intermediate-morph Red-tailed Hawk resided in the area this season, with both last seen on 11 October. The adult's territory was centered on Goshute peak, with the bird frequently observed kiting and displaying other hunting behaviors in this area and westward along the “numbered ridge” and eastward to the “pyramid.” The immature bird was most often observed foraging between the owl and north meadows on the east side of the ridge, and sometimes escorted migrant Red-tailed Hawks through the area.

A subadult Golden Eagle resided in the area from at least 8 September through early November, and was frequently observed north of the observation point on both the east and west sides of the ridge, as well as out over the west valley. The bird occasionally exhibited the “roller coaster” territorial display flight of adult males and often escorting other migrating eagles through the area.

A male American Kestrel resided in the area through 13 September. His territory centered on the main camp area and he frequently hunted over the north meadow on the east side of the ridge.

A possible pair of resident adult Peregrine Falcons resided in the area through 19 September. A pair of adults was seen flying together moving north on one occasion. Otherwise, single birds were frequently observed flying south to north, often harassing other migrating raptors of various species. An additional observation involved a south-bound bird headed for the rock wall area west of the south trapping blind location, which is an area where previous resident activity had been noted.

This assemblage differs from the past in terms of the absence of goshawks, immature Sharp-shinned and Cooper's Hawks, and Prairie Falcons, as well as the relatively recent addition of resident Peregrine Falcons. The decline in local Prairie Falcon activity but increase in local Peregrine Falcon activity may well be related.

SITE VISITATION

A total of 139 individuals visited the Goshutes and signed our visitor logs in 2009. Most visitors came from nearby areas of Nevada and Utah, with other guests from California, Minnesota, and Thailand. Special guests this year included both former and current members of HWI's Board of Trustees. Organized groups included students from West Wendover High School, three groups of local boy scouts, and two Utah field-trip groups led by HWI staff and co-sponsored by Hogel Zoo of Salt Lake City.

In 2009, 764 hourly assessments by the official observers of visitor disturbance resulted in the following ratings: 94% none, 5% low, 1% moderate, and 0% high.

ACKNOWLEDGMENTS

Financial and primary in-kind support for the 2009 project was provided by the Bureau of Land Management – Elko District Office, Walbridge Fund, Palladium Foundation, Schaffner Family Foundation, and HWI private donors and members. The BLM Elko District Office also provided helicopter-airlift and other essential logistical support; special thanks to Tamara Hawthorne for her assistance and oversight and to the BLM Fire/Heli-tac crew for their critical support. 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; for donations of veterinary supplies provided by University Pet Clinic of Salt Lake City; for internet-access service provided to the crew by KOA of Wendover and the Wendover Public Library; and for generous donations for the crew provided by Einstein's Bagels and Salt Lake Roasting Company of Salt Lake City. We are also grateful for the volunteer assistance and crew support provided by Leo Chidester, Suzanne Ferreira, the Viducich Family, Eric Jepsen, Brian Kelly, and Art Sandack. Lastly, special thanks to Roy Bouck, Bart Gross, Mike and Jake Braithwaite, John Shipley, Eric Jepsen, and Buzz Hull at Golden Gate Raptor Observatory for 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: 1983–2008 versus 2009.

SPECIES	COUNTS			RAPTORS/100 HOURS ¹		
	1983–2008 ²	2009	% CHANGE	1983–2008 ²	2009	% CHANGE
Turkey Vulture	367 ± 71.1	640	+75	67.0 ± 12.55	111.9	+67
Osprey	92 ± 16.2	59	-36	21.0 ± 3.28	13.1	-38
Northern Harrier	172 ± 26.8	154	-11	26.8 ± 3.66	21.8	-19
Sharp-shinned Hawk	4520 ± 740.0	3251	-28	995.1 ± 133.62	681.8	-31
Cooper's Hawk	3116 ± 534.8	1691	-46	772.9 ± 110.46	412.9	-47
Northern Goshawk	98 ± 22.3	26	-74	16.4 ± 3.54	3.8	-77
Unknown small accipiter ³	279 ± 105.5	262	-6	–	–	–
Unknown large accipiter ³	9 ± 7.9	7	-22	–	–	–
Unknown accipiter	266 ± 88.8	11	-96	–	–	–
TOTAL ACCIPITERS	8078 ± 1234.7	5248	-35	–	–	–
Red-shouldered Hawk	0.2 ± 0.2	0	-100	–	–	–
Broad-winged Hawk	51 ± 14.7	101	+99	20.0 ± 5.69	44.5	+122
Swainson's Hawk	237 ± 79.0	445	+88	61.6 ± 20.58	118.0	+91
Red-tailed Hawk	3091 ± 347.7	2913	-6	511.7 ± 46.63	444.0	-13
Ferruginous Hawk	16 ± 2.6	8	-49	2.5 ± 0.40	1.1	-56
Rough-legged Hawk	14 ± 3.8	12	-13	6.2 ± 1.56	4.8	-23
Unidentified buteo	71 ± 18.1	120	+70	–	–	–
TOTAL BUTEOS	3478 ± 395.9	3599	+3	–	–	–
Golden Eagle	251 ± 25.9	206	-18	39.3 ± 3.84	29.0	-26
Bald Eagle	12 ± 2.5	6	-52	2.6 ± 0.50	1.0	-61
Unidentified eagle	1 ± 0.5	0	-100	–	–	–
TOTAL EAGLES	264 ± 27.2	212	-20	–	–	–
American Kestrel	1852 ± 342.0	940	-49	389.8 ± 66.03	194.6	-50
Merlin	40 ± 9.6	50	+25	7.7 ± 1.84	8.5	+10
Prairie Falcon	26 ± 5.7	21	-18	4.3 ± 0.82	3.9	-9
Peregrine Falcon	12 ± 3.4	23	+92	2.2 ± 0.59	4.5	+106
Unknown small falcon ³	4.1 ± 2.9	2	-52	–	–	–
Unknown large falcon ³	2 ± 1.5	6	+147	–	–	–
Unknown falcon	6 ± 2.0	2	-67	–	–	–
TOTAL FALCONS	1937 ± 355.0	1044	-46	–	–	–
Unidentified raptor	112 ± 34.8	60	-46	–	–	–
GRAND TOTAL	14500 ± 1893.9	11016	-24	–	–	–

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: 1990–2008 versus 2009.

SPECIES	TOTAL AND AGE-CLASSIFIED COUNTS							IMMATURE : ADULT		
	1990–2008 AVERAGE			2009			% UNKNOWN AGE		RATIO	
	TOTAL	IMM.	ADULT	TOTAL	IMM.	ADULT	1990–2008 ¹	2009	1990–2008 ¹	2009
Northern Harrier	196	59	59	154	12	77	41 ± 6.7	42	1.19 ± 0.278	0.16
Sharp-shinned Hawk	4983	1710	1335	3251	734	638	40 ± 5.2	58	1.32 ± 0.233	1.15
Cooper's Hawk	3522	797	964	1691	304	370	51 ± 4.7	60	0.80 ± 0.194	0.82
Northern Goshawk ²	98	49	32	26	10	7	18 ± 4.3	35	2.12 ± 0.626	1.43
Broad-winged Hawk	63	15	28	101	11	21	35 ± 8.6	68	0.64 ± 0.187	0.52
Red-tailed Hawk	3477	687	2014	2913	397	1196	22 ± 3.3	45	0.34 ± 0.059	0.33
Ferruginous Hawk	17	4	5	8	1	0	46 ± 10.0	88	1.12 ± 0.509	1.00
Golden Eagle ²	251	123	68	206	90	35	23 ± 4.6	39	2.14 ± 0.396	2.57
Bald Eagle	14	6	7	6	2	3	6 ± 4.3	16.7	1.06 ± 0.336	0.67
Peregrine Falcon	15	4	6	23	2	9	32 ± 11.2	52	0.89 ± 0.313	0.22

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 1983–2008.

Table 3. First and last observed, bulk passage, and median passage dates by species for migrating raptors in the Goshute Mountains, NV in 2008, with comparisons of 2009 and 1990–2008 average median passage dates.

SPECIES	2009				1990–2008
	FIRST OBSERVED	LAST OBSERVED	BULK PASSAGE DATES ¹	MEDIAN PASSAGE DATE ²	MEDIAN PASSAGE DATE ^{2,3}
Turkey Vulture	16-Aug	23-Oct	16-Sep–7-Oct	29-Sep	23-Sep ± 1.3
Osprey	20-Aug	7-Oct	2-Sep–29-Sep	16-Sep	15-Sep ± 1.5
Northern Harrier	18-Aug	5-Nov	31-Aug–24-Oct	10-Oct	25-Sep ± 3.2
Sharp-shinned Hawk	16-Aug	5-Nov	10-Sep–17-Oct	27-Sep	26-Sep ± 2.0
Cooper's Hawk	16-Aug	5-Nov	11-Sep–10-Oct	25-Sep	22-Sep ± 1.5
Northern Goshawk	20-Aug	5-Nov	15-Sep–2-Nov	25-Sep	06-Oct ± 2.8
Broad-winged Hawk	17-Sep	3-Oct	21-Sep–3-Oct	25-Sep	24-Sep ± 1.5
Swainson's Hawk	21-Aug	12-Oct	7-Sep–28-Sep	25-Sep	19-Sep ± 3.3
Red-tailed Hawk	15-Aug	5-Nov	18-Sep–26-Oct	14-Oct	06-Oct ± 2.2
Ferruginous Hawk	10-Sep	2-Nov	10-Sep–2-Nov	12-Oct	28-Sep ± 3.9
Rough-legged Hawk	9-Oct	4-Nov	12-Oct–2-Nov	26-Oct	22-Oct ± 1.7
Golden Eagle	15-Aug	5-Nov	8-Sep–26-Oct	10-Oct	09-Oct ± 1.8
Bald Eagle	15-Aug	26-Oct	15-Aug–26-Oct	9-Oct	21-Oct ± 4.7
American Kestrel	18-Aug	23-Oct	30-Aug–28-Sep	12-Sep	16-Sep ± 1.7
Merlin	19-Aug	5-Nov	11-Sep–26-Oct	14-Oct	02-Oct ± 2.1
Prairie Falcon	19-Aug	5-Nov	30-Aug–14-Oct	13-Sep	15-Sep ± 3.8
Peregrine Falcon	22-Aug	12-Oct	24-Aug–2-Oct	18-Sep	22-Sep ± 3.2
Total	15-Aug	5-Nov	8-Sep–21-Oct	28-Sep	25-Sep ± 1.3

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: 1990–2008 versus 2009.

SPECIES	ADULT		IMMATURE / SUBADULT	
	1990–2008 ¹	2009	1990–2008 ¹	2009
Northern Harrier	28-Sep ± 4.2	7-Oct	22-Sep ± 4.9	6-Oct
Sharp-shinned Hawk	07-Oct ± 1.5	9-Oct	16-Sep ± 1.1	15-Sep
Cooper's Hawk	26-Sep ± 1.6	28-Sep	18-Sep ± 1.1	18-Sep
Northern Goshawk ²	13-Oct ± 4.2	25-Oct	01-Oct ± 3.6	25-Sep
Broad-winged Hawk	23-Sep ± 1.4	22-Sep	25-Sep ± 2.2	28-Sep
Red-tailed Hawk	09-Oct ± 1.9	12-Oct	18-Sep ± 4.0	27-Sep
Golden Eagle ²	14-Oct ± 2.7	12-Oct	05-Oct ± 3.3	3-Oct
Peregrine Falcon	22-Sep ± 6.2	20-Sep	22-Sep ± 2.8	–

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 1983–2008.

Table 5. Capture totals, rates, and successes for migrating raptors in the Goshute Mountains, NV: 1985–2008 versus 2009.

SPECIES	CAPTURE TOTAL		CAPTURE RATE ¹		CAPTURE SUCCESS (%) ²	
	1985–2008 ³	2009	1985–2008 ³	2009	1985–2008 ³	2009
Northern Harrier	6 ± 1.8	0	0.5 ± 0.2	0.0	3.9 ± 1.1	0.0
Sharp-shinned Hawk	1239 ± 231.2	432	98.1 ± 7.5	90.8	26.1 ± 3.6	8.4
Cooper's Hawk	622 ± 121.6	307	49.4 ± 4.4	64.5	18.8 ± 2.3	15.2
Northern Goshawk	22 ± 7.4	3	2.1 ± 0.8	0.6	22.8 ± 4.9	11.1
Broad-winged Hawk	1 ± 0.3	1	0.1 ± 0.04	0.2	2.5 ± 1.4	1.2
Swainson's Hawk	0.1 ± 0.1	0	0.01 ± 0.01	0.0	0.04 ± 0.05	0.0
Red-tailed Hawk	66 ± 11.5	43	5.5 ± 0.7	9.0	2.1 ± 0.3	1.7
Rough-legged Hawk	0.1 ± 0.2	0	0.005 ± 0.009	0.0	0.3 ± 0.7	0.0
Golden Eagle	4 ± 1.2	4	0.4 ± 0.1	0.8	1.6 ± 0.4	1.8
Bald Eagle	0.04 ± 0.08	0	0.01 ± 0.02	0.0	0.4 ± 0.8	0.0
American Kestrel	135 ± 40.6	41	9.2 ± 1.7	8.6	6.7 ± 1.6	4.2
Merlin	9 ± 2.4	6	0.7 ± 0.2	1.3	19.5 ± 4.8	11.8
Prairie Falcon	3 ± 1.0	4	0.3 ± 0.1	0.8	13.7 ± 4.2	40.0
Peregrine Falcon	1 ± 0.4	0	0.04 ± 0.03	0.0	6.1 ± 4.1	0.0
All Species	2108 ± 397.1	841	166.2 ± 12.2	176.7	15.0 ± 2.0	7.5

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: 1991–2008 averages versus 2009.

	FEMALE			MALE			FEMALE : MALE	HY : AHY
	AHY	HY	UNK.	AHY	HY	UNK.	RATIO ¹	RATIO ¹
Sharp-shinned Hawk								
1991–2008 mean	255	409	–	208	506	–	0.98	1.98
2009	93	133	–	56	150	–	1.10	1.90
Cooper's Hawk								
1991–2008 mean	229	181	–	128	166	–	1.47	0.96
2009	95	77	–	57	78	–	1.27	1.02
Northern Goshawk								
1991–2008 mean	4	10	–	1	3	–	7.20	5.37
2009	0	1	–	1	1	–	0.50	2.00
American Kestrel								
1991–2008 mean	7	55	18	21	63	2	0.92	5.02
2009	9	15	0	5	7	5	1.41	1.57

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. Foreign encounters in 2009 of raptors banded in the Goshute Mountains, NV.

SPECIES	SEX	BAND #	BANDING DATE	BANDING AGE ¹	ENCOUNTER DATE	ENCOUNTER AGE ¹	ENCOUNTER LOCATION	DISTANCE (km)	STATUS
Cooper's Hawk	M	0874-00627	14-Sep-07	HY	11-Jun-09	TY	Cranbrook, BC	832	found dead – unknown cause
Red-tailed Hawk	U	0877-97741	07-Oct-07	HY	23-Oct-09	TY	San Diego, CA	763	injured / rehab
Golden Eagle	M	0629-51558	16-Oct-08	HY	03-Apr-09	SY	White Sands Missile Range, NM	1119	vehicle collision / rehab & release

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.

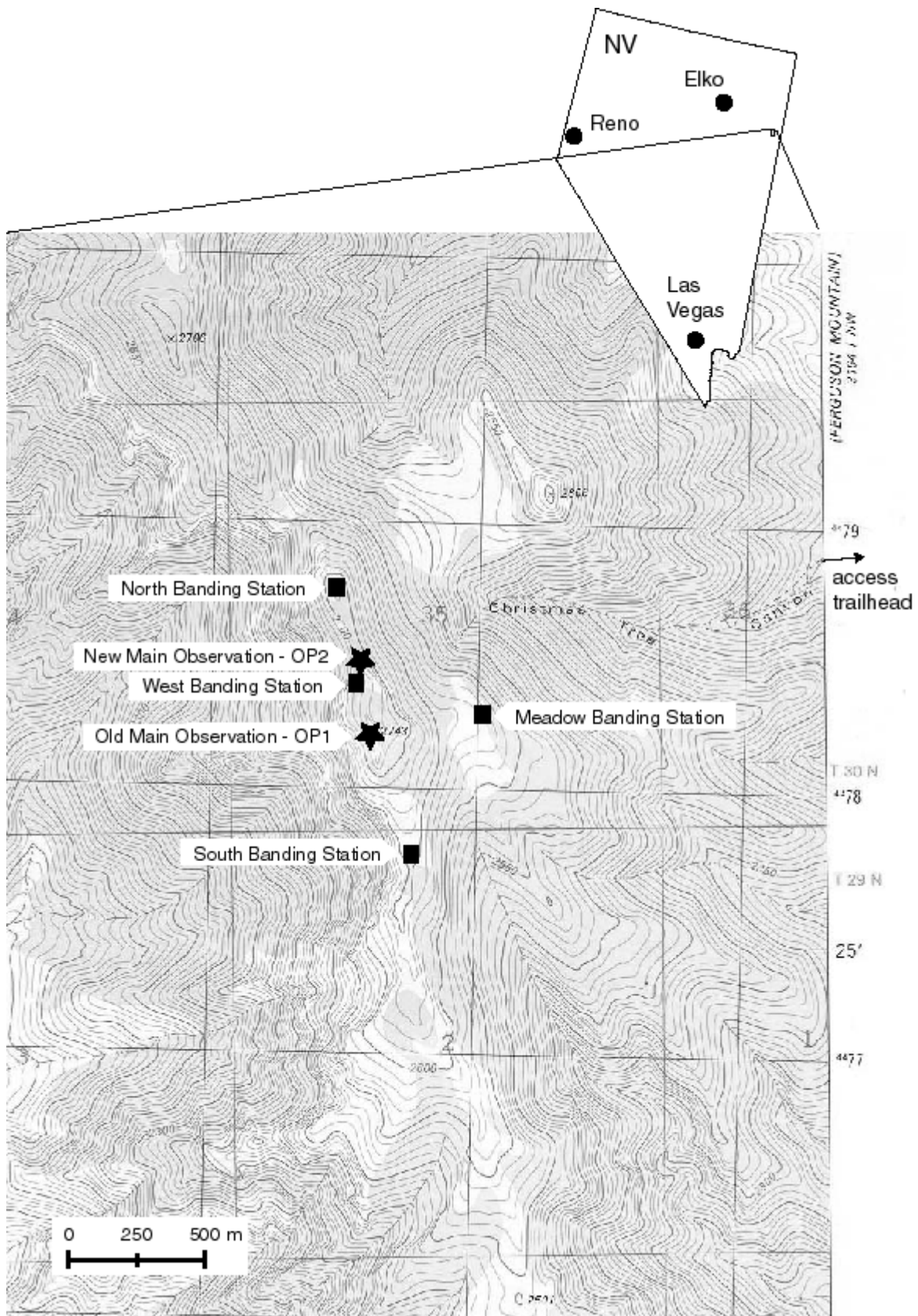


Figure 1. Location of the Goshute Mountains Raptor Migration Project study site.

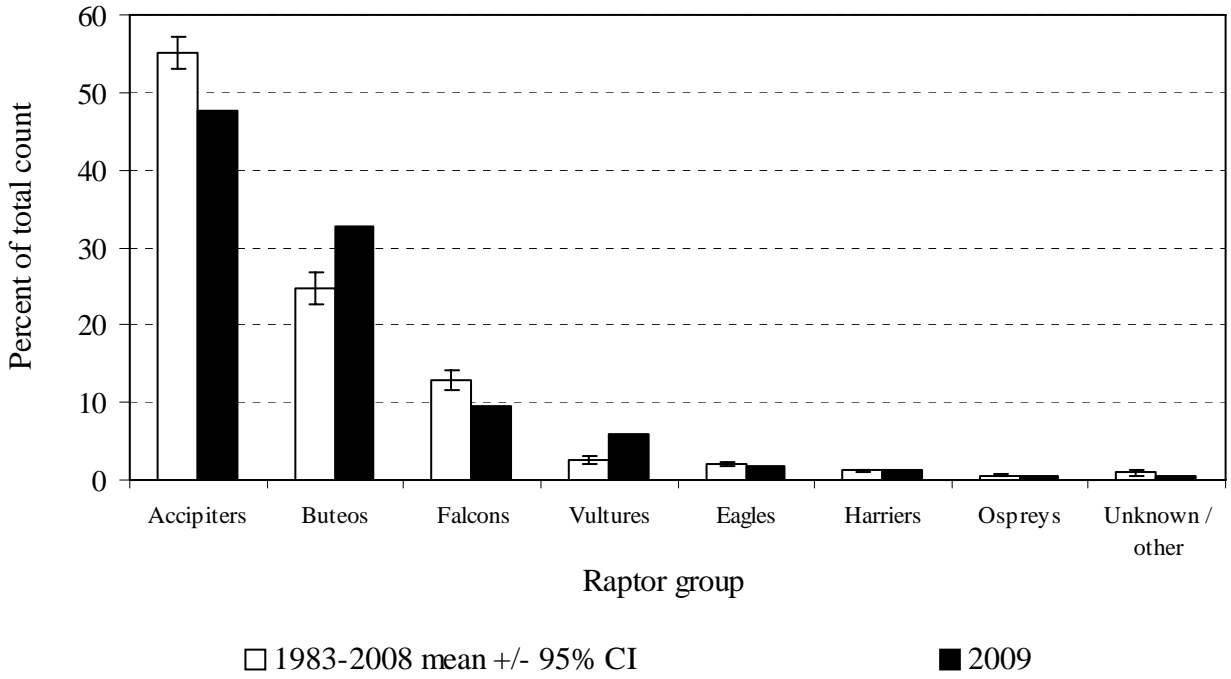


Figure 2. Fall migration flight composition by major species groups in the Goshute Mountains, Nevada: 1983–2008 versus 2009.

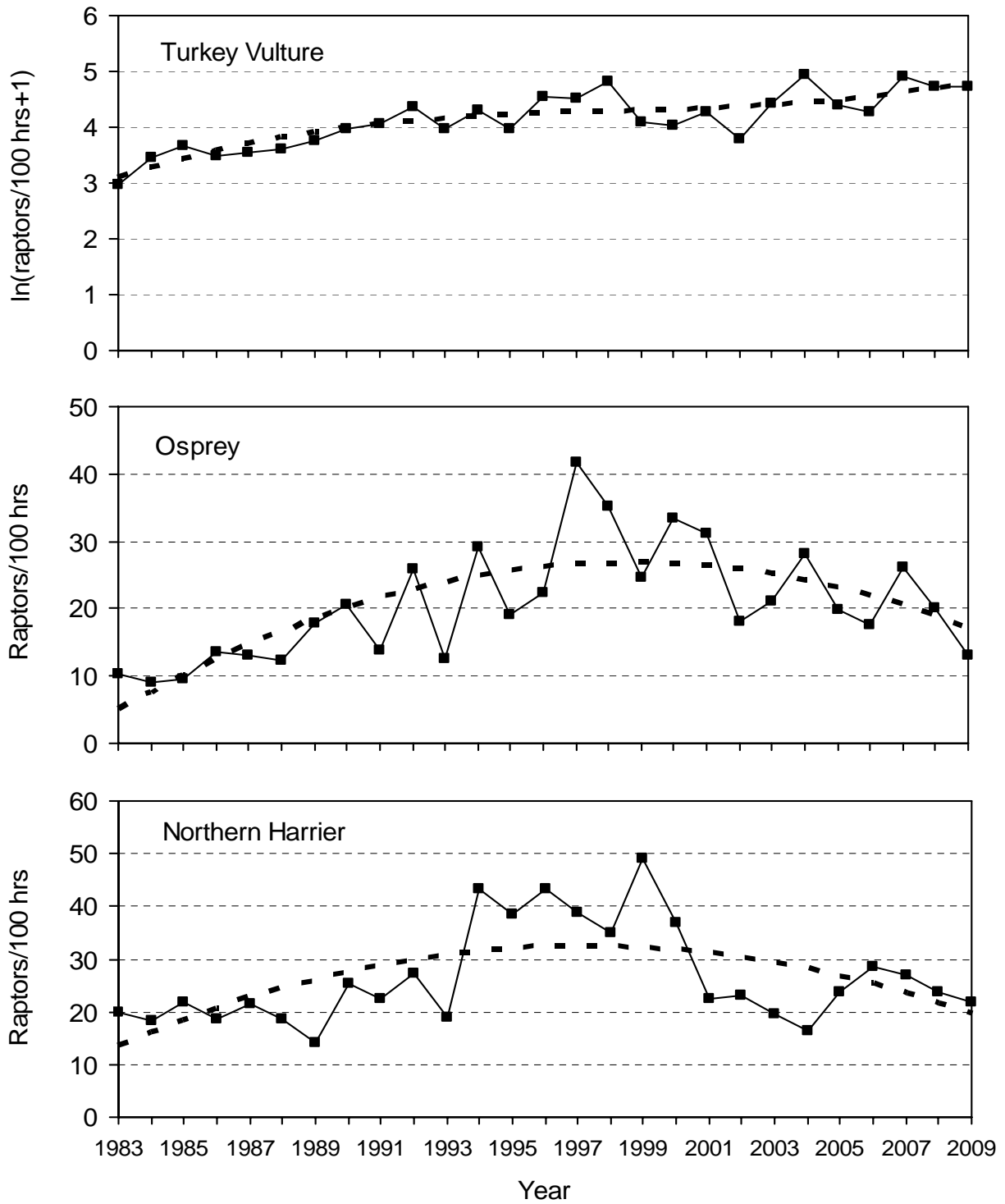


Figure 3. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Turkey Vultures, Ospreys, and Northern Harriers: 1983–2009. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

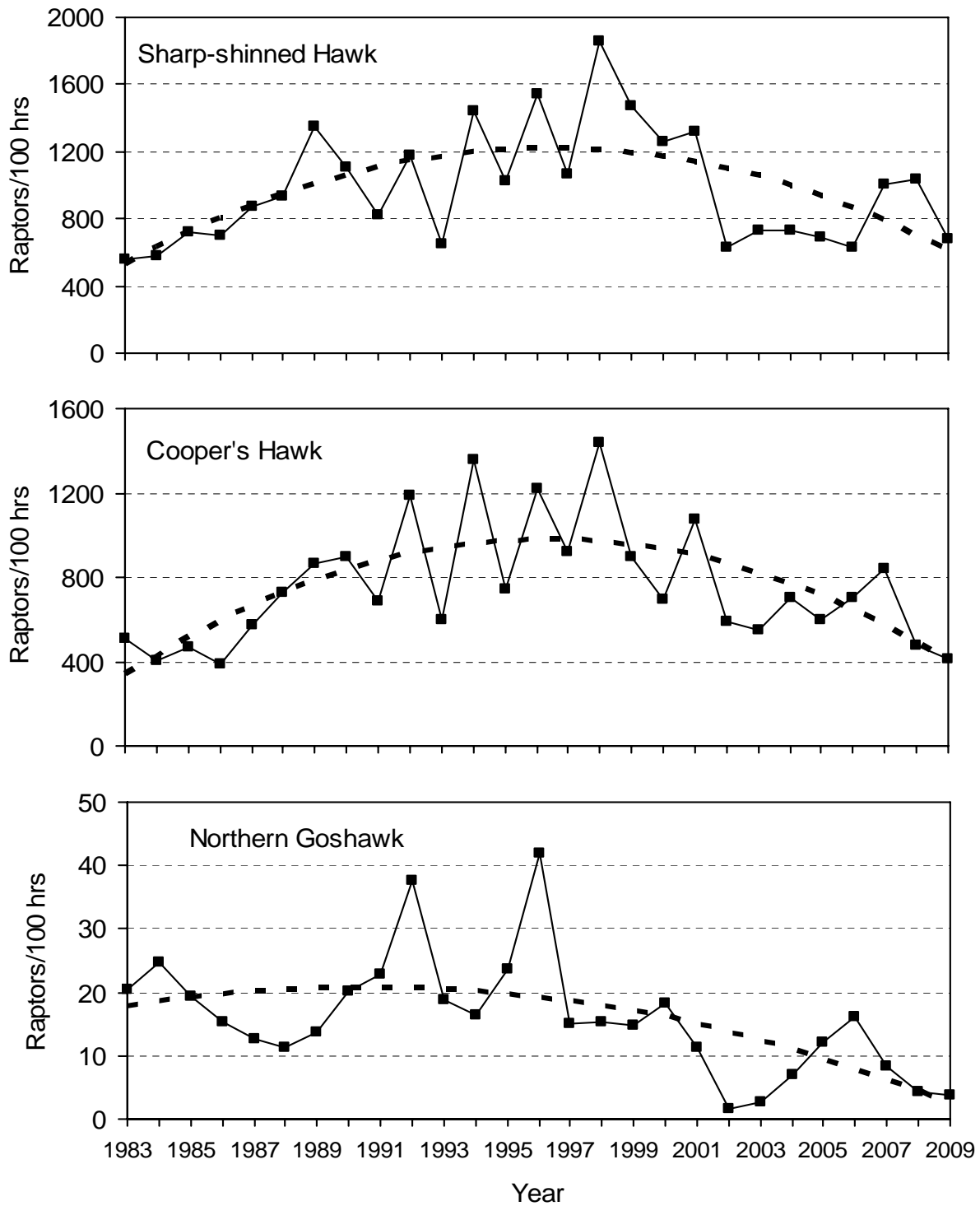


Figure 4. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Sharp-shinned Hawks, Cooper’s Hawks, and Northern Goshawks: 1983–2009. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

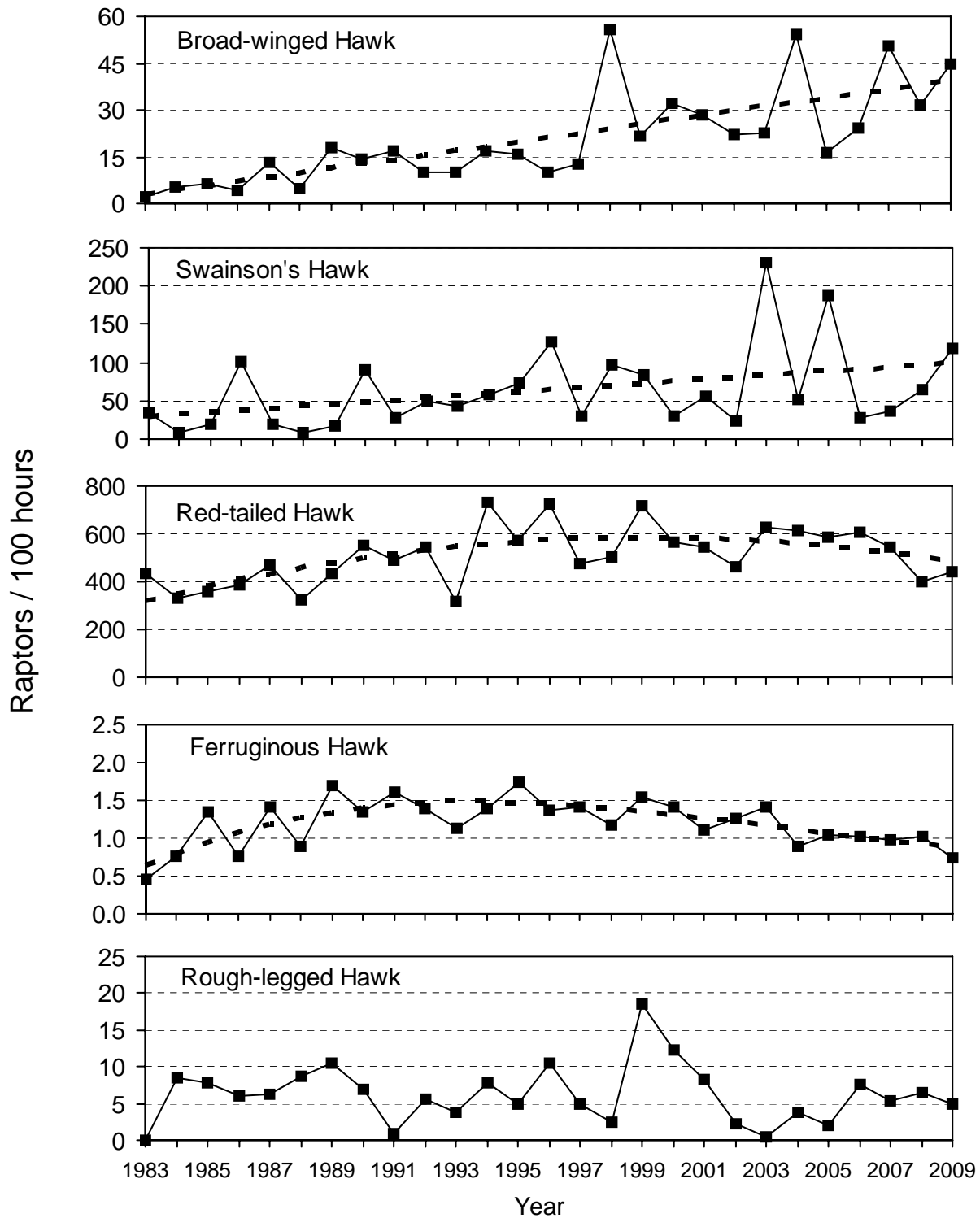


Figure 5. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Broad-winged, Swainson's, Red-tailed, Ferruginous, and Rough-legged Hawks: 1983–2009. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

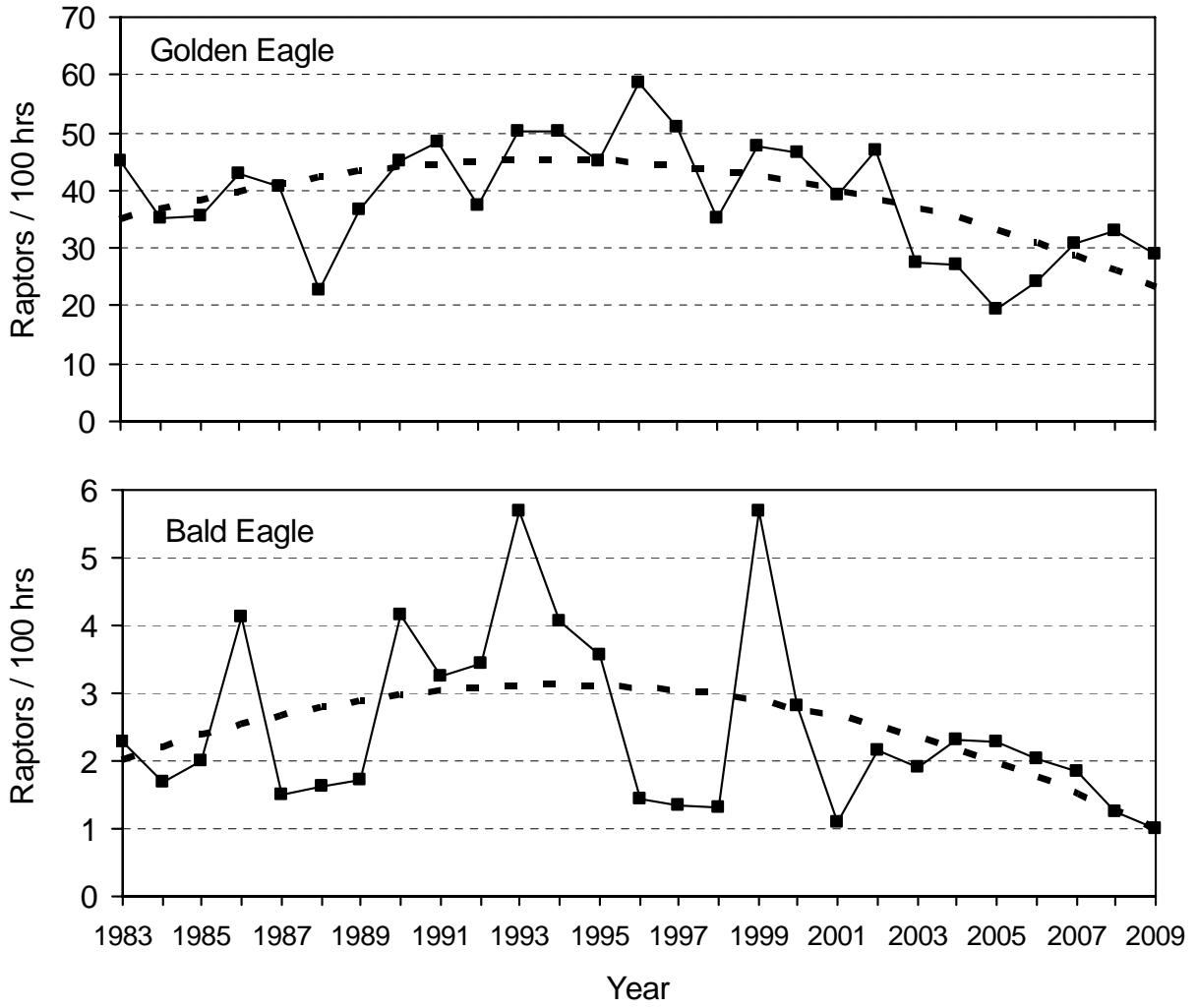


Figure 6. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Golden and Bald Eagles: 1983–2009. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

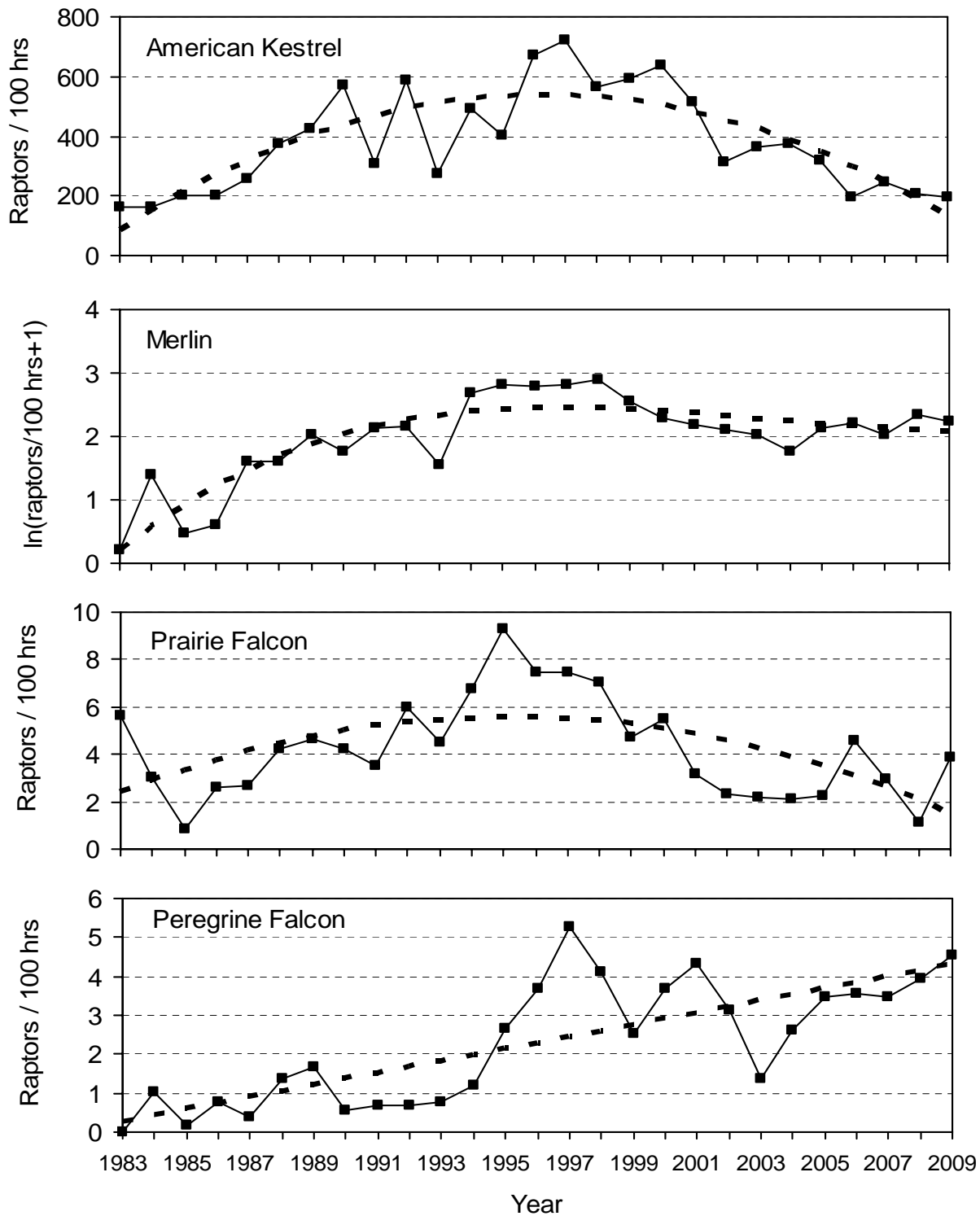


Figure 7. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons: 1983–2009. Dashed lines indicate significant 1 linear, second-order, or third-order polynomial regressions.

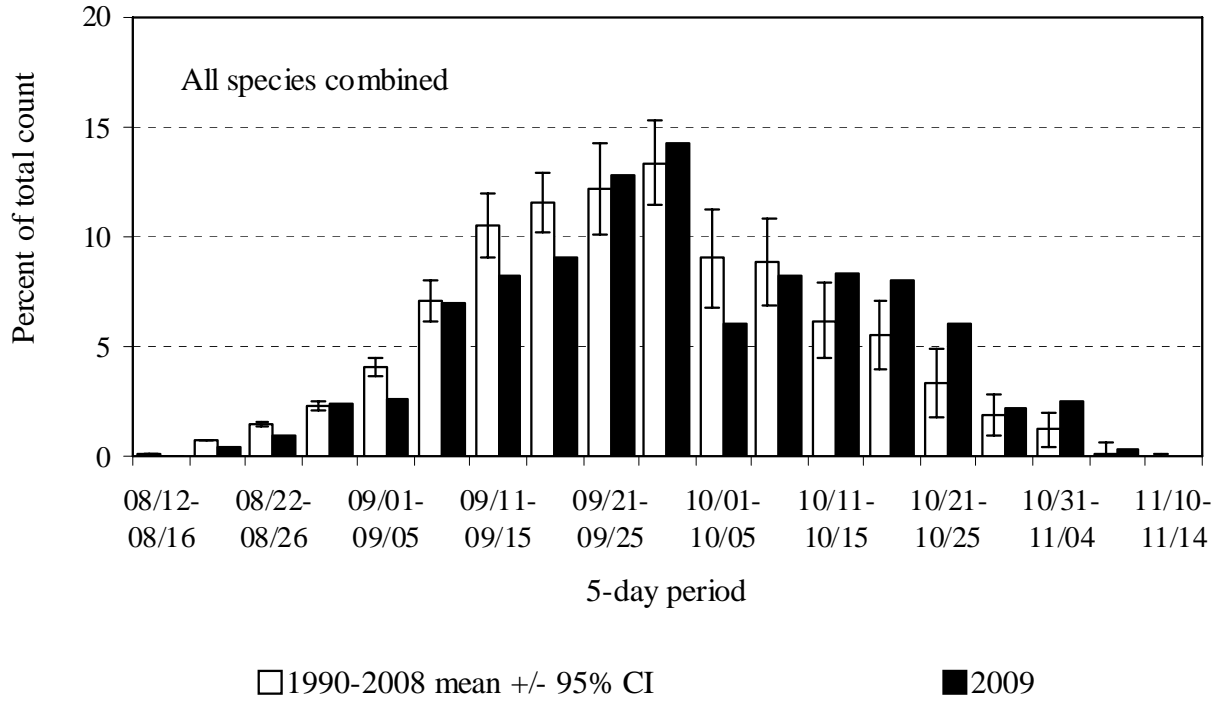


Figure 8. Combined-species passage volume by five-day periods: 1990–2008 versus 2009.

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

- 1983-1986:** Single observer throughout with occasional scribe. Principal observers: 1983, David Sherman (0)¹; 1984, Jim Daly (0), Jeff Smith (0), and Fred Tilly (14); 1985, Jim Daly (1) and Fred Tilly (15); 1986, John Lower (0).
- 1987-1989:** Single observer throughout, two observers during the peak month. Principal observers: 1987, Victor Fazio (2) and Fred Tilly (16); 1988, Brian Mongi (2) and Fred Tilly (17); 1989, Brian Mongi (3) and Fred Tilly (19).
- 1990:** Two observers throughout with two teams of two for a comparison count during the peak month. 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. 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. Jerry Liguori (14) and Mike Lanzone (0).
- 1999:** Two observers throughout. Jerry Liguori (15) and Aaron Barna (4).
- 2000:** Two observers throughout. Jerry Liguori (16), Jeff Maurer (3), Nathan McNett (4), and Aaron Barna (5).
- 2001:** Two observers throughout. Jerry Liguori (17) and Nathan McNett (5).
- 2002:** Two observers throughout. Nathan McNett (6) and Greg Levandoski (2).
- 2003:** Four observers throughout rotating duties at two sites for comparison count. Nathan McNett (7), Adam Hutchins (4), Allison Cebula (3), Eric Hallingstad (2).
- 2004:** Two observers throughout. Allison Cebula (4), Ricardo Perez (1+), and Nathan McNett (8).
- 2005:** Two observers throughout. Ken McEnaney (1), Chris Jager (+), Allison Cebula (5).
- 2006:** Two observers throughout. Christian Nunes (+), John Bell (1), and Jeremy Russell (+).
- 2007:** Two observers throughout. Steve Seibel (5+), Greg Levandoski (4), and Adam Hutchins (5).
- 2008:** Two observers throughout. Steve Seibel (6+) and Jeremy Russell (1+).
- 2009:** Two observers throughout. Aaron Viducich (2) and Laurel Ferreira (1).

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: 2009.

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
15-Aug	9.00	1.9	0	clr/haze	12.6	ws-w	13.9	30.31	3	68	65	2	0.3
16-Aug	9.00	2.0	0	clr/haze	7.1	ws-w	16.3	30.38	2	58	61	1	0.9
17-Aug	9.00	2.0	0	clr-pc, haze	6.4	ne/calm, wsw-wnw, ne/var	18.1	30.42	1	64	65	2	0.9
18-Aug	9.00	2.2	0	clr-mc, haze	4.5	ws-w-wnw	18.8	30.42	3	60	62	2	1.2
19-Aug	9.00	2.2	0	clr/haze	1.6	calm, ne-e, wsw-w	22.1	30.43	1	52	59	2	1.0
20-Aug	9.00	2.0	0	clr/haze	7.8	ne-e	24.2	30.50	3	48	52	2	1.2
21-Aug	9.00	2.0	0	clr-pc, haze	8.2	sw-w, ne-ene	26.1	30.51	2	65	71	3	1.9
22-Aug	9.00	2.0	0	mc	4.0	nne-ene, wsw-wnw/calm	29.3	30.42	2	56	54	2	3.8
23-Aug	5.50	2.0	0	ovc/rain	19.1	ws-w	13.6	30.29	4	24	16	-	0.0
24-Aug	9.00	2.5	0	pc-ovc	6.4	nne-ne, wsw-nw/var	17.3	30.42	4	57	55	1	0.4
25-Aug	9.00	1.9	0	clr-pc, AM haze	4.5	ws-w/var, ne/calm	18.5	30.48	2	60	53	2	2.0
26-Aug	10.00	2.2	0	clr-pc, PM haze	8.9	ws-w, ne-ene	20.1	30.60	2	61	61	2	4.5
27-Aug	9.00	2.0	0	clr-pc, PM haze	9.1	ne	22.3	30.67	1	57	60	2	3.7
28-Aug	9.00	2.0	0	clr-pc	6.7	calm, ne	23.5	30.65	2	75	64	1	3.0
29-Aug	9.00	2.0	0	pc-ovc, haze	6.0	sw-w/calm, ne/calm	25.1	30.47	3	61	57	2	5.9
30-Aug	9.00	2.0	0	clr-pc, haze	19.9	sw-w	22.5	30.30	4	15	14	2	12.1
31-Aug	9.00	1.9	0	clr-pc	8.4	sw-w, ne	19.6	30.37	2	64	69	2	4.7
01-Sep	9.17	2.0	0	clr-pc	8.6	sw-wsw, calm/var, ne	20.9	30.49	2	60	62	2	6.9
02-Sep	9.00	2.0	0	clr-pc, haze	6.9	ne	21.9	30.57	1	60	55	2	6.0
03-Sep	9.50	2.0	0	pc-mc, haze	2.0	calm/var	22.0	30.52	2	51	46	2	6.8
04-Sep	9.00	2.1	0	pc-ovc, scat rain	7.5	calm/var, sw-w	21.5	30.44	3	53	51	2	4.7
05-Sep	9.00	2.0	1	clr-ovc, haze, scat rain	11.2	wsw	18.5	30.34	4	55	52	2	8.0
06-Sep	10.00	2.7	0	pc-mc, haze	16.4	ws-w-wnw	19.8	30.34	2	48	40	2	14.1
07-Sep	10.00	2.0	0	clr-pc, haze	7.6	wsw-wnw, n-ene/var	15.9	30.29	3	58	55	2	18.5
08-Sep	9.92	1.9	0	clr	5.5	ne-ene, calm	14.8	30.35	1	89	82	2	10.6
09-Sep	9.50	2.0	0	clr-pc	6.8	sw/var, ne	18.7	30.44	1	67	65	2	15.1
10-Sep	9.50	2.1	0	clr-mc, haze	4.7	calm/var, ne	21.3	30.07	1	75	78	2	20.7
11-Sep	9.75	1.9	0	clr/haze	5.5	ne/calm, ne-ene	19.8	30.03	1	75	74	2	21.3
12-Sep	9.00	2.3	0	clr/haze	4.8	sw, var, ne-ene	19.9	29.77	1	79	80	3	21.0
13-Sep	10.00	1.9	0	mc-ovc	15.1	ws-w	19.7	29.62	3	49	55	2	35.0
14-Sep	3.00	1.7	0	ovc, haze, rain	20.7	ws-w	11.3	29.68	4	38	27	1	2.0
15-Sep	9.00	2.0	1	pc-mc	6.0	ne-ene/calm	13.7	29.92	3	70	48	2	17.1
16-Sep	9.50	1.9	0	clr-pc	12.1	nne-ene	14.4	29.97	2	62	67	3	18.2
17-Sep	9.00	2.0	0	clr/haze	6.5	wsw-w, ne-ene	16.6	29.92	2	84	80	3	18.3
18-Sep	9.00	2.0	0	clr/haze	7.2	nne-ne	18.5	29.94	1	83	77	2	30.0
19-Sep	10.00	1.9	0	pc-mc, scat rain	11.1	sw-w, calm	18.8	29.86	3	84	78	2	24.0
20-Sep	10.00	1.8	0	clr/haze	12.2	wsw-w	15.2	29.89	2	55	60	3	15.7
21-Sep	9.75	2.1	0	clr	6.9	n-ene/calm	10.5	30.07	2	85	78	3	31.1
22-Sep	10.50	1.8	0	clr	7.1	nnw-ne	13.4	30.10	1	90	85	3	39.7
23-Sep	9.50	1.9	0	clr	7.7	nne-ne	15.9	30.04	1	84	84	3	19.8
24-Sep	9.00	2.0	0	clr	3.3	wsw-wnw/calm/var	17.1	29.95	1	96	91	3	9.7
25-Sep	9.25	1.9	0	clr	3.8	ne/calm	19.7	30.01	1	80	77	3	45.0
26-Sep	9.25	1.9	0	clr/haze	6.4	sw-w/var	19.2	30.06	2	49	48	3	11.1
27-Sep	9.50	2.1	0	clr/haze	2.0	wsw/calm, ene/calm/var	18.1	29.93	1	59	55	3	27.2
28-Sep	10.00	2.0	0	clr-pc, haze	10.2	sw-wnw/var	19.1	29.70	2	66	66	3	78.7
29-Sep	10.00	2.0	0	pc-ovc, haze	16.1	sw-w	17.2	29.54	3	48	49	3	42.2
30-Sep	8.00	2.0	0	mc-ovc	29.8	wsw-w	-0.4	29.55	4	75	60	3	0.3
01-Oct	9.00	2.0	0	clr-pc	4.4	wsw-wnw/calm/var	1.8	29.88	2	85	83	2	29.8
02-Oct	9.00	1.9	0	clr-pc, AM haze	10.0	wsw-wnw	-	-	2	85	84	3	23.2
03-Oct	9.50	1.9	0	mc-ovc, PM snow	6.6	wsw-w, calm/var	8.8	29.77	4	76	76	3	19.5

Appendix C. continued

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
04-Oct	3.00	2.5	0	ovc, snow	15.9	w	0.0	29.94	4	14	20	3	2.3
05-Oct	8.00	2.8	0	mc-ovc, snow	6.6	ws-w-nw	-1.4	30.44	4	73	59	3	0.5
06-Oct	9.00	3.0	0	clr-ovc	3.0	nne-ese	1.9	30.70	3	60	57	2	1.8
07-Oct	9.25	2.4	0	clr	4.0	sw-w-nw	6.3	30.56	2	85	82	2	32.3
08-Oct	10.25	1.9	0	clr/haze	4.2	ws-w-nw	3.8	30.65	2	61	78	3	16.4
09-Oct	9.75	1.9	0	clr-pc, PM haze	8.7	ws-w	7.7	30.70	2	70	70	3	17.0
10-Oct	9.00	1.9	0	clr-pc	4.2	ws-w	4.5	30.54	2	75	72	2	28.9
11-Oct	9.75	2.0	0	clr-ovc	11.5	ws-w	7.8	29.87	4	81	79	2	17.7
12-Oct	9.50	2.0	0	pc-ovc	9.0	sw-wsw	9.8	29.91	4	63	65	2	33.8
13-Oct	8.50	1.9	0	pc-ovc, AM haze, PM rain	12.4	sw-w	5.5	29.88	4	47	49	2	18.4
14-Oct	5.75	1.9	0	ovc/fog/rain-pc	11.2	sw-w	8.3	30.16	4	48	47	3	16.0
15-Oct	9.00	1.8	0	clr, AM haze	4.5	sw-w-nw	7.5	30.49	1	75	72	3	20.0
16-Oct	9.25	1.9	0	clr, PM haze	3.6	ne-e	9.7	30.57	2	78	78	2	34.6
17-Oct	9.00	2.0	0	clr/haze	5.1	sw-w-nw	12.5	30.46	2	71	72	2	26.0
18-Oct	9.50	2.5	0	pc-mc, haze	8.8	sw-w	15.1	30.27	3	74	71	2	25.3
19-Oct	7.75	2.0	0	clr-ovc, scat ts/rain	5.9	w, ne-e	8.8	30.02	3	67	61	2	9.7
20-Oct	8.00	1.9	0	pc-mc	5.1	nne-ne/var	3.9	30.11	4	84	77	2	1.4
21-Oct	9.00	1.9	0	clr-ovc, PM haze	0.8	ne, calm, sw-w	4.7	30.26	3	79	84	2	16.3
22-Oct	9.25	1.8	0	ovc-clr/haze	2.1	ne/calm, sw	6.5	30.29	1	77	76	3	18.8
23-Oct	9.50	1.9	0	clr-ovc, PM haze	7.7	ws-w	6.8	30.29	2	68	65	2	10.7
24-Oct	8.75	1.8	0	pc-mc	9.3	sw-w	6.4	30.17	3	82	78	2	4.0
25-Oct	9.00	1.7	0	clr/haze	3.4	nw/calm, ws-w	1.5	30.35	2	77	80	3	23.7
26-Oct	9.50	1.7	0	pc-ovc	10.8	sw-w	5.0	30.25	3	89	90	2	24.1
27-Oct	6.50	1.6	0	mc, AM snow	18.6	w-w-nw	-5.0	29.71	4	42	35	2	0.5
28-Oct	5.50	1.7	0	ovc-pc	8.5	ne	-3.0	29.77	3	61	71	3	0.2
29-Oct	8.50	1.6	0	clr-ovc, PM haze	4.1	ne/calm, sw-w	-2.2	30.02	4	90	87	2	1.2
30-Oct	8.00	1.9	0	mc-clr, AM fog	10.5	sw-nw	3.3	30.15	3	67	69	2	0.6
31-Oct	8.25	2.3	0	clr/haze	3.4	calm, sw-nw	7.9	30.03	2	86	88	2	1.6
01-Nov	8.75	2.1	0	clr/haze	5.0	sw-wsw	7.9	30.02	3	88	84	2	3.1
02-Nov	8.50	2.6	0	clr	5.5	ws-w	7.7	30.13	3	86	86	2	10.0
03-Nov	8.50	2.0	0	clr	3.6	sw-wsw	9.4	30.09	2	86	88	3	9.5
04-Nov	8.25	1.8	0	clr, PM haze	7.0	sw-wsw	11.2	30.01	3	81	83	2	8.6
05-Nov	8.00	2.0	0	mc-ovc, PM haze	9.8	sw-wsw	11.2	29.89	4	77	81	2	5.3

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: 2009.

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	9.00	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3	0.3
16-Aug	9.00	1	0	0	3	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0.9
17-Aug	9.00	2	0	0	0	0	0	1	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	8	0.9	
18-Aug	9.00	1	0	1	0	0	0	1	0	0	0	0	4	0	0	0	1	0	0	3	0	0	0	0	0	0	0	11	1.2	
19-Aug	9.00	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	3	1	1	0	0	0	0	0	9	1.0	
20-Aug	9.00	2	2	1	0	0	1	1	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	11	1.2	
21-Aug	9.00	0	0	1	1	1	0	1	0	0	0	1	6	0	0	0	1	0	0	3	1	0	0	0	0	0	1	17	1.9	
22-Aug	9.00	2	1	0	4	2	0	2	0	4	0	1	6	0	0	3	5	0	0	2	0	0	2	0	0	0	0	34	3.8	
23-Aug	5.50	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	
24-Aug	9.00	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	4	0.4	
25-Aug	9.00	1	0	1	7	0	0	0	0	0	0	3	1	0	0	0	1	0	0	1	0	0	0	0	0	0	3	18	2.0	
26-Aug	10.00	2	0	2	6	1	0	3	0	1	0	0	2	13	0	0	1	2	0	0	9	0	1	1	0	0	1	45	4.5	
27-Aug	9.00	1	0	1	0	2	0	1	0	0	0	0	10	0	0	0	1	0	0	13	0	0	0	1	0	0	3	33	3.7	
28-Aug	9.00	2	1	3	5	1	0	0	0	1	0	0	4	0	0	1	1	0	0	7	0	0	1	0	0	0	0	27	3.0	
29-Aug	9.00	3	0	1	12	3	0	2	0	0	0	1	6	0	0	0	0	0	0	23	0	0	1	0	0	0	1	53	5.9	
30-Aug	9.00	4	0	4	9	3	0	1	0	0	0	3	39	0	0	4	2	0	0	34	0	1	1	0	1	1	2	109	12.1	
31-Aug	9.00	1	0	2	6	4	0	1	0	0	0	2	5	0	0	0	0	0	0	19	0	0	0	0	0	0	2	42	4.7	
01-Sep	9.17	6	1	2	14	5	0	1	0	0	0	4	9	0	0	0	0	0	0	21	0	0	0	0	0	0	0	63	6.9	
02-Sep	9.00	1	3	1	9	4	0	6	0	0	0	4	10	0	0	1	1	0	0	13	0	0	0	0	0	0	1	54	6.0	
03-Sep	9.50	4	0	1	13	4	0	1	0	0	0	4	12	0	0	3	0	0	0	20	0	1	0	0	0	0	2	65	6.8	
04-Sep	9.00	2	1	1	6	7	0	1	0	0	0	1	11	0	0	1	0	0	0	7	0	1	0	0	1	0	2	42	4.7	
05-Sep	9.00	2	0	2	24	13	0	7	0	0	0	1	2	0	0	1	1	0	0	18	0	0	0	0	0	0	1	72	8.0	
06-Sep	10.00	3	5	0	26	9	1	5	0	1	0	6	14	0	0	3	1	0	0	63	0	2	0	0	0	0	2	141	14.1	
07-Sep	10.00	3	1	6	50	16	0	11	1	0	0	17	17	0	0	2	1	0	0	53	1	1	0	0	0	0	5	185	18.5	
08-Sep	9.92	4	5	3	40	11	0	4	0	0	0	4	17	0	0	5	1	0	0	9	0	0	0	0	0	0	2	105	10.6	
09-Sep	9.50	3	2	2	65	27	0	3	0	0	0	2	10	0	0	1	2	0	0	25	0	0	0	0	0	0	1	143	15.1	
10-Sep	9.50	1	0	1	80	39	0	13	0	0	0	1	16	1	0	7	3	0	0	32	1	1	0	0	0	0	1	197	20.7	
11-Sep	9.75	1	2	4	102	25	0	6	0	2	0	2	9	0	0	1	2	0	0	50	1	0	0	0	0	0	1	208	21.3	
12-Sep	9.00	2	3	2	89	18	0	11	0	0	0	2	13	0	0	2	1	0	0	41	0	0	0	0	0	0	5	189	21.0	
13-Sep	10.00	4	0	2	183	47	0	10	0	0	0	12	16	0	0	2	10	0	0	54	3	3	4	0	0	0	0	350	35.0	
14-Sep	3.00	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2.0	

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	9.00	3	2	4	53	35	1	17	0	0	0	10	9	0	0	1	0	0	0	16	0	0	0	1	0	0	2	154	17.1	
16-Sep	9.50	5	3	2	71	51	0	7	0	0	0	4	8	0	0	0	5	0	0	16	1	0	0	0	0	0	0	173	18.2	
17-Sep	9.00	6	2	1	53	52	0	0	0	0	1	2	8	0	0	5	1	0	0	33	0	0	0	0	0	0	1	165	18.3	
18-Sep	9.00	12	0	1	72	82	0	9	0	0	0	11	29	0	0	5	2	0	0	42	2	0	1	0	0	0	2	270	30.0	
19-Sep	10.00	3	0	0	106	73	0	9	0	0	0	1	4	4	0	0	2	3	0	0	29	1	0	2	0	0	0	3	240	24.0
20-Sep	10.00	0	2	1	64	42	0	3	0	0	0	3	4	18	0	0	0	1	0	0	16	0	0	1	0	0	0	2	157	15.7
21-Sep	9.75	47	1	2	53	48	0	6	0	0	0	18	34	65	0	0	11	3	0	0	12	0	1	0	0	0	0	2	303	31.1
22-Sep	10.50	19	1	0	120	128	3	5	2	0	0	8	26	81	0	0	13	1	0	0	7	1	0	0	0	0	0	2	417	39.7
23-Sep	9.50	14	0	1	67	51	5	4	0	0	0	3	4	24	0	0	2	1	0	0	10	1	1	0	0	0	0	0	188	19.8
24-Sep	9.00	8	0	0	23	15	1	8	0	1	0	14	3	6	0	0	4	1	0	0	2	1	0	0	0	0	0	0	87	9.7
25-Sep	9.25	23	1	1	93	83	1	8	1	0	0	6	90	36	0	0	1	2	0	0	67	1	2	0	0	0	0	0	416	45.0
26-Sep	9.25	1	0	1	50	26	0	4	0	0	0	1	4	9	0	0	0	3	0	0	3	1	0	0	0	0	0	0	103	11.1
27-Sep	9.50	10	3	1	65	60	0	3	1	0	0	1	62	15	0	0	2	4	0	0	31	0	0	0	0	0	0	0	258	27.2
28-Sep	10.00	43	9	5	238	222	2	17	0	0	0	8	71	88	0	0	9	5	0	0	66	0	0	1	0	0	0	3	787	78.7
29-Sep	10.00	167	3	1	111	87	0	0	0	0	0	0	7	30	0	0	0	4	0	0	9	0	0	2	0	0	1	0	422	42.2
30-Sep	8.00	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0.3
01-Oct	9.00	110	1	0	22	22	0	15	0	0	0	15	25	46	0	0	1	5	1	0	2	0	0	1	0	1	0	1	268	29.8
02-Oct	9.00	25	2	0	83	49	0	2	0	0	0	8	3	28	0	0	0	4	0	0	4	0	0	1	0	0	0	0	209	23.2
03-Oct	9.50	5	1	1	68	50	0	4	0	0	0	14	1	31	0	0	2	5	0	0	2	1	0	0	0	0	0	0	185	19.5
04-Oct	3.00	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	7	2.3
05-Oct	8.00	0	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.5
06-Oct	9.00	0	0	1	10	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	16	1.8
07-Oct	9.25	65	1	3	60	31	0	0	0	0	0	0	2	125	0	0	0	1	0	0	9	0	1	1	0	0	0	0	299	32.3
08-Oct	10.25	5	0	0	43	27	0	5	0	0	0	0	3	72	2	0	2	3	0	0	5	0	0	0	0	1	0	0	168	16.4
09-Oct	9.75	6	0	3	83	19	0	9	0	0	0	0	0	31	0	1	0	4	1	0	7	0	1	0	0	0	1	166	17.0	
10-Oct	9.00	1	0	3	71	33	2	0	1	0	0	0	0	134	0	0	0	9	0	0	3	3	0	0	0	0	0	0	260	28.9
11-Oct	9.75	1	0	2	84	14	0	6	0	0	0	0	0	53	0	0	2	7	0	0	2	1	0	0	0	0	0	1	173	17.7
12-Oct	9.50	0	0	4	106	31	0	2	0	0	0	0	1	155	2	1	0	13	0	0	2	2	0	1	0	0	0	1	321	33.8
13-Oct	8.50	0	0	0	60	15	0	2	0	0	0	0	0	68	0	0	1	6	1	0	1	0	0	0	0	0	0	2	156	18.4
14-Oct	5.75	0	0	0	44	11	0	2	0	0	0	0	0	25	0	0	0	7	0	0	1	1	1	0	0	0	0	0	92	16.0
15-Oct	9.00	0	0	8	66	13	0	1	0	0	0	0	0	81	0	0	0	8	0	0	1	2	0	0	0	0	0	0	180	20.0

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	9.25	1	0	3	73	24	0	1	0	1	0	0	0	198	0	1	3	12	0	0	2	1	0	0	0	0	0	0	320	34.6
17-Oct	9.00	0	0	19	102	17	0	1	0	0	0	0	0	86	0	1	0	4	0	0	3	1	0	0	0	0	0	234	26.0	
18-Oct	9.50	0	0	7	106	12	1	0	0	0	0	0	0	91	0	1	1	3	0	0	9	9	0	0	0	0	0	240	25.3	
19-Oct	7.75	0	0	4	33	6	0	8	0	0	0	0	0	20	0	0	0	3	0	0	0	1	0	0	0	0	0	75	9.7	
20-Oct	8.00	0	0	4	2	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	11	1.4	
21-Oct	9.00	0	0	5	2	3	0	1	0	0	0	0	0	130	0	0	1	2	1	0	0	1	1	0	0	0	0	147	16.3	
22-Oct	9.25	0	0	2	13	3	1	1	0	0	0	0	0	152	1	0	1	0	0	0	0	0	0	0	0	0	0	174	18.8	
23-Oct	9.50	1	0	3	14	1	0	0	0	0	0	0	0	79	0	0	0	3	0	0	1	0	0	0	0	0	0	102	10.7	
24-Oct	8.75	0	0	3	13	0	0	0	0	0	0	0	0	14	0	0	0	2	0	0	0	2	0	0	0	0	0	1	35	4.0
25-Oct	9.00	0	0	2	6	2	1	2	0	0	0	0	0	199	0	0	0	1	0	0	0	0	0	0	0	0	0	213	23.7	
26-Oct	9.50	0	0	0	16	2	0	2	1	0	0	0	0	192	0	2	2	7	1	0	0	3	0	0	0	1	0	229	24.1	
27-Oct	6.50	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0.5	
28-Oct	5.50	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	
29-Oct	8.50	0	0	0	0	0	1	0	0	0	0	0	0	4	0	1	2	2	0	0	0	0	0	0	0	0	0	10	1.2	
30-Oct	8.00	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	5	0.6	
31-Oct	8.25	0	0	0	1	0	1	0	0	0	0	0	0	9	0	1	0	1	0	0	0	0	0	0	0	0	0	13	1.6	
01-Nov	8.75	0	0	1	2	0	0	0	0	0	0	0	0	14	1	0	4	4	0	0	0	1	0	0	0	0	0	27	3.1	
02-Nov	8.50	0	0	1	16	0	1	0	0	0	0	0	0	63	1	1	1	1	0	0	0	0	0	0	0	0	0	85	10.0	
03-Nov	8.50	0	0	3	5	1	1	1	0	0	0	0	0	68	0	0	1	1	0	0	0	0	0	0	0	0	0	81	9.5	
04-Nov	8.25	0	0	3	30	1	0	1	0	0	0	0	0	31	0	1	1	1	0	0	0	2	0	0	0	0	0	71	8.6	
05-Nov	8.00	0	0	2	12	1	1	0	0	0	0	0	0	15	0	0	1	8	0	0	0	1	1	0	0	0	0	42	5.3	
Total	733.59	640	59	154	3251	1691	26	262	7	11	0	101	445	2913	8	12	120	206	6	0	940	50	21	23	2	6	2	60	11016	15.0

¹ See Appendix B for explanation of species codes.

Appendix E. Annual summaries of observation effort and unadjusted raptor counts by species: 1983–2009.

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
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	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	4-Nov
Observation days	68	83	76	67	66	85	76	78	79	85	80	78	83	74
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	620.17
Raptors / 100 hours	1,517	1,130	1,427	1435	1,921	1,704	2,397	2,527	1,879	2,703	1,510	3,122	2,276	3,514
SPECIES	RAPTOR COUNTS													
Turkey Vulture	92	141	211	131	165	198	200	278	314	473	270	418	289	486
Osprey	41	39	40	43	51	54	65	80	62	119	54	130	92	99
Northern Harrier	109	105	139	89	120	125	77	147	152	184	116	291	252	255
Sharp-shinned Hawk	2,021	2,067	3,177	2,233	3,537	4,405	5,404	3,994	3,677	5,931	2,838	6,835	4,752	6,773
Cooper's Hawk	1,698	1,378	1,741	1,149	2,042	3,012	3,074	2,945	2,728	5,071	2,298	5,576	3,252	5,075
Northern Goshawk	105	146	119	65	65	74	80	84	144	259	120	106	150	241
Unknown small accipiter ¹	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown large accipiter ¹	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown accipiter	562	362	311	251	710	295	204	402	647	639	348	522	416	464
TOTAL ACCIPITERS	4,386	3,953	5,348	3,698	6,354	7,786	8,762	7,425	7,196	11,900	5,604	13,039	8,570	12,553
Red-shouldered Hawk	0	0	0	1	1	0	0	1	0	0	0	0	0	2
Broad-winged Hawk	6	13	15	7	30	16	37	34	44	26	27	41	40	27
Swainson's Hawk	116	34	78	276	69	43	60	238	105	208	159	244	287	498
Red-tailed Hawk	2,105	1,765	2,132	1,663	2,317	2,048	2,263	3,147	2,992	3,489	1,827	4,663	3,572	3,990
Ferruginous Hawk	3	6	17	5	15	9	23	21	27	19	15	20	29	16
Rough-legged Hawk	0	17	17	10	9	23	21	13	4	13	7	17	11	17
Unidentified buteo	185	74	65	42	156	44	47	33	149	70	128	110	69	62
TOTAL BUTEOS	2,415	1,909	2,324	2,004	2,597	2,183	2,451	3,487	3,321	3,825	2,163	5,095	4,008	4,612
Golden Eagle	239	206	230	196	221	154	203	275	334	263	317	338	299	344
Bald Eagle	8	10	9	13	7	8	9	19	16	21	26	19	17	6
Unidentified eagle	2	0	0	1	0	0	0	1	5	1	1	1	1	1
TOTAL EAGLES	249	216	239	210	228	162	212	295	355	285	344	358	317	351
American Kestrel	731	697	934	708	1,099	1,844	1,669	2,279	1,562	2,982	1,234	2,461	1,964	3,199
Merlin	4	14	3	3	17	20	33	28	37	43	19	72	86	71
Prairie Falcon	31	16	5	11	15	27	24	12	20	40	26	45	58	44
Peregrine Falcon	0	5	1	3	2	8	9	2	6	4	4	7	15	21
Unknown small falcon ¹	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown large falcon ¹	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified falcon	6	7	2	8	6	7	5	12	14	4	6	9	18	21
TOTAL FALCONS	772	739	945	733	1,139	1,906	1,740	2,333	1,639	3,073	1,289	2,594	2,141	3,356
Unidentified raptor	446	113	94	53	186	107	96	101	192	234	117	229	149	83
GRAND TOTAL	8,510	7,215	9,340	6,961	10,840	12,521	13,603	14,146	13,231	20,093	9,957	22,154	15,818	21,795

¹ Designations used consistently beginning in 2002.

Appendix E. continued

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	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	15-Aug	15-Aug
End Date	5-Nov	31-Oct	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	4-Nov
Observation days	79	71	82	78	83	81	79	76	83	82	82	82	83	78
Observation hours	673.58	719.50	748.08	681.50	787.30	725.67	688.21	642.75	695.30	652.58	703.00	698.51	733.59	672.26
Raptors / 100 hours	2,541	3,515	3,003	2,542	2,662	1,564	2,001	2,038	1,849	1,658	2,125	1,758	1,502	2,120
SPECIES	RAPTOR COUNTS													
Turkey Vulture	482	732	349	297	441	243	466	685	445	355	735	637	640	377
Osprey	187	176	110	152	152	83	96	120	83	68	113	89	59	91
Northern Harrier	255	247	356	233	178	154	127	96	153	177	186	158	154	172
Sharp-shinned Hawk	4,677	9,598	7,236	6,071	7,429	3,009	3,460	3,073	2,973	2,745	4,635	4,967	3,251	4,473
Cooper's Hawk	3,848	6,736	3,689	3,022	5,110	2,369	2,281	2,736	2,260	2,541	3,422	1,957	1,691	3,063
Northern Goshawk	97	99	84	123	80	11	16	41	74	95	55	27	26	96
Unknown small accipiter ¹	-	-	-	-	-	246	268	299	521	57	360	204	262	277
Unknown large accipiter ¹	-	-	-	-	-	4	3	11	32	6	1	6	7	9
Unknown accipiter	368	75	132	87	56	7	0	8	37	9	5	11	11	257
TOTAL ACCIPITERS	8,990	16,508	11,141	9,303	12,675	5,646	6,028	6,168	5,897	5,453	8,478	7,172	5,248	7,973
Red-shouldered Hawk	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2
Broad-winged Hawk	37	160	59	87	79	58	58	122	36	57	122	81	101	53
Swainson's Hawk	143	507	334	132	251	91	908	197	664	109	163	248	445	245
Red-tailed Hawk	2,922	3,329	5,137	3,446	3,926	3,008	3,903	3,589	3,678	3,492	3,511	2,439	2,913	3,084
Ferruginous Hawk	18	16	25	19	14	20	20	8	12	10	11	10	8	15
Rough-legged Hawk	10	6	50	24	23	6	1	7	6	17	13	15	12	14
Unidentified buteo	77	5	24	21	13	42	57	117	97	13	44	91	120	72
TOTAL BUTEOS	3,207	4,023	5,629	3,730	4,306	3,225	4,947	4,040	4,493	3,698	3,864	2,884	3,599	3,483
Golden Eagle	329	235	341	305	295	330	181	160	130	152	218	226	206	249
Bald Eagle	6	6	31	14	8	12	9	12	11	9	10	6	6	12
Unidentified eagle	0	0	0	0	0	0	0	4	0	0	0	0	0	1
TOTAL EAGLES	335	241	372	319	303	342	190	176	141	161	228	232	212	262
American Kestrel	3,394	3,169	2,887	3,149	2,774	1,503	1,768	1,709	1,468	820	1,174	965	940	1,818
Merlin	78	91	59	49	51	39	33	22	40	40	34	51	50	40
Prairie Falcon	48	50	30	37	23	12	14	11	9	26	19	10	21	25
Peregrine Falcon	29	26	14	21	29	15	9	11	14	17	18	22	23	12
Unknown small falcon ¹	-	-	-	-	-	0	10	9	1	2	3	4	2	4
Unknown large falcon ¹	-	-	-	-	-	4	1	3	6	2	1	0	6	3
Unidentified falcon	7	2	7	3	2	2	2	0	4	0	2	2	2	6
TOTAL FALCONS	3,556	3,338	2,997	3,259	2,879	1,575	1,837	1,765	1,542	907	1,251	1,054	1,044	1,904
Unidentified raptor	102	25	57	34	26	81	79	51	104	3	86	51	60	110
GRAND TOTAL	17,114	25,290	21,011	17,327	20,960	11,349	13,770	13,101	12,858	10,822	14,941	12,277	11,016	14,371

¹ Designations used consistently beginning in 2002.

Appendix F. Daily trapping effort and captures by species: 2009.

DATE	STATION		SPECIES ¹												CAPTURES		
	HOURS		NH	SS	CH	NG	BW	SW	RT	RL	GE	AK	ML	PR	PG	TOTAL	/STN HR
22-Aug	6.50		0	1	0	0	0	0	1	0	0	0	0	0	0	2	0.3
23-Aug	4.25		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
24-Aug	6.25		0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.2
25-Aug	7.50		0	5	0	0	0	0	0	0	1	0	0	0	0	6	0.8
26-Aug	8.00		0	1	1	0	0	0	0	0	0	0	1	0	0	3	0.4
27-Aug	7.50		0	0	1	0	0	0	2	0	0	0	0	0	0	3	0.4
28-Aug	8.00		0	2	0	0	0	0	0	1	1	0	0	0	0	4	0.5
29-Aug	7.50		0	3	0	0	0	0	1	0	0	2	0	0	0	6	0.8
30-Aug	8.00		0	3	1	0	0	0	3	0	0	3	0	0	0	10	1.3
31-Aug	8.00		0	0	1	0	0	0	2	0	0	0	0	0	0	3	0.4
01-Sep	8.00		0	3	2	0	0	0	2	0	0	1	0	0	0	8	1.0
02-Sep	0.00																
03-Sep	0.00																
04-Sep	5.25		0	0	4	0	0	0	0	0	0	0	0	0	0	4	0.8
05-Sep	8.00		0	11	2	0	0	0	0	0	2	0	0	0	0	15	1.9
06-Sep	8.00		0	10	5	0	0	0	4	0	0	2	0	1	0	22	2.8
07-Sep	8.00		0	5	3	0	0	0	1	0	0	2	0	1	0	12	1.5
08-Sep	8.00		0	11	7	0	0	0	0	0	0	0	0	0	0	18	2.3
09-Sep	7.25		0	9	5	0	0	0	0	0	4	0	0	0	0	18	2.5
10-Sep	8.25		0	18	5	0	0	0	0	0	2	0	0	0	0	25	3.0
11-Sep	8.00		0	13	12	0	0	0	2	0	0	0	0	0	0	27	3.4
12-Sep	4.00		0	8	4	0	0	0	0	0	2	0	0	0	0	14	3.5
13-Sep	0.00																
14-Sep	0.00																
15-Sep	5.50		0	5	7	0	0	0	1	0	0	2	0	0	0	15	2.7
16-Sep	7.75		0	13	12	0	0	0	1	0	0	3	0	0	0	29	3.7
17-Sep	8.00		0	9	13	0	0	0	0	0	0	3	0	0	0	25	3.1
18-Sep	7.25		0	8	10	0	0	0	1	0	0	2	0	0	0	21	2.9
19-Sep	6.75		0	21	13	0	0	0	0	0	0	1	0	0	0	35	5.2
20-Sep	7.75		0	9	6	0	0	0	1	0	0	0	0	0	0	16	2.1
21-Sep	8.00		0	2	7	0	0	0	0	0	0	1	0	0	0	10	1.3
22-Sep	8.00		0	11	22	0	0	0	2	0	0	0	1	0	0	36	4.5
23-Sep	7.75		0	10	14	1	0	0	1	0	0	2	0	0	0	28	3.6
24-Sep	7.75		0	7	5	0	0	0	0	0	0	0	0	0	0	12	1.5
25-Sep	7.75		0	8	8	0	0	0	0	0	0	1	0	0	0	17	2.2
26-Sep	16.00		0	19	15	0	0	0	2	0	1	0	1	0	0	38	2.4
27-Sep	16.00		0	13	7	0	0	0	1	0	0	1	0	0	0	22	1.4
28-Sep	8.00		0	32	39	0	0	0	1	0	0	2	0	0	0	74	9.3
29-Sep	8.00		0	12	14	0	0	0	0	0	0	0	0	0	0	26	3.3
30-Sep	7.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
01-Oct	7.00		0	7	5	0	0	0	0	0	0	0	0	0	0	12	1.7
02-Oct	7.75		0	12	18	0	1	0	0	0	0	0	0	0	0	31	4.0

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
03-Oct	7.75		0	8	5	0	0	0	0	0	0	0	0	0	0	13	1.7
04-Oct	0.00																
05-Oct	4.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
06-Oct	7.00		0	1	1	0	0	0	0	0	0	0	0	0	0	2	0.3
07-Oct	7.25		0	8	1	0	0	0	0	0	0	0	0	0	0	9	1.2
08-Oct	8.25		0	8	2	0	0	0	0	0	0	0	0	0	0	10	1.2
09-Oct	8.00		0	13	2	0	0	0	0	0	0	0	0	0	0	15	1.9
10-Oct	8.00		0	22	5	0	0	0	1	0	0	0	0	0	0	28	3.5
11-Oct	8.25		0	7	0	0	0	0	1	0	1	0	0	0	0	9	1.1
12-Oct	8.00		0	25	8	0	0	0	2	0	0	0	0	0	0	35	4.4
13-Oct	7.00		0	3	3	0	0	0	3	0	0	0	0	0	0	9	1.3
14-Oct	3.75		0	1	1	0	0	0	0	0	0	0	1	0	0	3	0.8
15-Oct	8.00		0	2	2	0	0	0	0	0	0	0	1	0	0	5	0.6
16-Oct	8.00		0	3	4	0	0	0	0	0	1	0	0	0	0	8	1.0
17-Oct	8.00		0	13	2	0	0	0	2	0	0	1	0	0	0	18	2.3
18-Oct	7.75		0	12	0	0	0	0	0	0	0	0	1	0	0	13	1.7
19-Oct	0.00																
20-Oct	3.50		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
21-Oct	6.50		0	0	0	0	0	0	1	0	0	0	0	1	0	2	0.3
22-Oct	7.00		0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.1
23-Oct	7.75		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
24-Oct	8.00		0	1	0	0	0	0	0	0	0	0	1	0	0	2	0.3
25-Oct	7.75		0	1	1	0	0	0	0	0	0	0	0	0	0	2	0.3
26-Oct	8.00		0	3	1	0	0	0	3	0	0	0	0	0	0	7	0.9
27-Oct	5.50		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
28-Oct	0.00																
29-Oct	4.50		0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.2
30-Oct	6.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
31-Oct	6.25		0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.2
Total	476.00		0.0	432.0	307.0	3.0	1.0	0.0	43.0	0.0	4.0	41.0	6.0	4.0	0.0	841.0	1.8

¹ See Appendix B for explanation of species codes.

Appendix G. Annual summaries of banding effort and capture totals by species: 1980–2009.

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
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	19 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	29 Oct
Blinds in operation	1	1	2	2	2	3	3	3	4	4	4	4	5	5	5
Trapping days	21	37	27	55	69	?	?	?	?	?	66	64	74	59	65
Station days	21	37	?	66	104	?	?	?	?	159	205	240	296	254	278
Station hours	149	227	159	443	622	654	483.8	833	1,085	1,203	1,454	1,899	2,316	1,971	2,290
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	205.1
SPECIES	RAPTOR CAPTURES														
Northern Harrier	0	2	0	8	3	6	2	4	10	9	4	9	10	4	7
Sharp-shinned Hawk	62	376	186	571	548	705	410	886	1,177	1,527	1,583	1,694	2,036	1,526	2,686
Cooper's Hawk	36	300	129	306	261	366	164	395	553	652	821	909	1,220	822	1,473
Northern Goshawk	6	11	3	32	40	42	5	27	22	29	44	33	104	27	35
Broad-winged Hawk	0	0	0	0	2	0	1	1	1	1	1	2	0	2	1
Swainson's Hawk	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
Red-tailed Hawk	14	26	13	43	31	51	15	43	37	66	99	93	97	53	158
Rough-legged Hawk	0	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	11
Bald Eagle	0	0	0	1	0	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	285
Merlin	0	1	1	0	2	0	0	1	5	8	2	9	10	8	21
Prairie Falcon	0	0	0	6	5	2	1	3	7	5	7	7	8	1	7
Peregrine Falcon	0	0	0	0	1	0	0	0	0	2	1	1	0	1	0
All Species	126	775	341	1,019	926	1,212	617	1,401	1,904	2,366	2,762	3,026	3,855	2,671	4,685
Recaptures ¹	0	0	0	0	0	0	0	0	0	0	4	4	7	9	10
Foreign Recaptures ²	0	0	1	0	0	0	0	0	0	2	0	0	1	1	2
Foreign Encounters ³	0	1	5	3	9	12	5	7	11	12	15	18	14	21	19

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

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	MEAN
Start date	22 Aug	19 Aug	18 Aug	18 Aug	21 Aug	21 Aug	22-Aug	24-Aug	24-Aug	27-Aug	23-Aug	22-Aug	20-Aug	21-Aug	22-Aug	24-Aug
End date	25 Oct	23 Oct	22 Oct	22 Oct	3 Nov	28 Oct	4-Nov	5-Nov	28-Oct	22-Oct	1-Nov	5-Nov	25-Oct	28-Oct	31-Oct	26-Oct
Blinds in operation	6	5	5	5	3	4	4	4	4	3	4	3	3	2	2	3.5
Trapping days	63	61	62	63	72	62	72	68	66	53	69	72	63	62	64	60.3
Station days	312	270	264	236	131	174	210	188	163	105	150	128	81	69	66	166.1
Station hours	2,382	2,061	2,087	1,690	939	1,286	1,666	1,474	1,276	807	1,073	888	550	503	476	1,159.7
Captures /100 stn hrs	120.1	160.7	147.0	202.3	163.6	167.0	173.0	159.9	114.7	158.2	153.8	112.1	210.9	204.2	176.7	171.3
SPECIES	RAPTOR CAPTURES															
Northern Harrier	2	1	18	4	0	17	11	8	7	2	3	2	6	2	0	5.3
Sharp-shinned Hawk	1,823	2,091	1,783	2,131	897	1,235	1,608	1,283	825	791	902	503	683	616	432	1,108.8
Cooper's Hawk	695	737	767	1,006	438	504	975	791	460	342	562	356	383	314	307	565.0
Northern Goshawk	27	68	20	20	20	24	23	7	9	28	21	26	18	2	3	19.9
Broad-winged Hawk	3	0	0	1	0	3	1	0	2	1	2	1	2	0	1	0.7
Swainson's Hawk	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0.1
Red-tailed Hawk	93	84	67	69	49	58	76	109	63	61	67	56	39	40	43	60.5
Rough-legged Hawk	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0.1
Golden Eagle	4	7	5	4	8	2	1	9	1	2	1	1	0	4	4	3.9
Bald Eagle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
American Kestrel	193	290	351	149	97	285	168	127	88	35	76	38	19	42	41	120.7
Merlin	13	18	26	13	16	11	12	15	5	11	11	5	6	6	6	7.9
Prairie Falcon	3	7	17	7	3	8	3	4	3	4	3	5	3	0	4	2.8
Peregrine Falcon	1	1	4	0	1	1	1	3	0	0	2	2	0	0	0	0.5
All Species	2,857	3,304	3,058	3,404	1,529	2,148	2,882	2,356	1,463	1,277	1,651	995	1,159	1,026	841	1,896.2
Recaptures ¹	3	3	7	9	4	6	9	7	2	2	2	2	3	4	3	3.3
Foreign Recaptures ²	1	4	3	5	2	3	4	3	1	2	4	0	1	2	0	1.4
Foreign Encounters ³	16	9	18	15	10	19	10	28	12	16	10	8	10	12	3	11.7

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.