

**FALL 2010 RAPTOR MIGRATION STUDIES IN THE
GOSHUTE MOUNTAINS OF NORTHEASTERN NEVADA**



**HawkWatch International, Inc.
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INTRODUCTION

The Goshute Mountains Raptor Migration Project in northeastern Nevada is an ongoing effort to monitor long-term trends in populations of raptors using the Intermountain Flyway (Hoffman et al. 2002, Hoffman and Smith 2003, 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 2010 season marking the 31st consecutive season of banding and 28th 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). This report summarizes the 2010 count and banding results

The Goshute project was 1 of 9 long-term, annual migration counts and 1 of 4 migration-banding studies conducted or co-sponsored by HWI in North America during 2010. 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 2010, two banding stations were operated and they were located 100–500 m to the north and southwest 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. Raptors typically encounter the **North** station first, prior to any other banding station at the Goshute site during their

migration southbound. **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 Rachel Smith came to the project with a previous, full season in the Florida Keys and extensive experience as a field ornithologist. Megan Shaub came to the project new, and unfortunately mid-way through the season an injury forced her to leave the project early. Fortunately however, Kerry Ross who worked along with Rachel at the Florida Keys site and who is a very good friend of hers was visiting at the time. That worked out very well as he was able to fulfill the other observer position for the remainder of the season due to Megan's unfortunate injury (see Appendix A for a complete history of observer participation). Other crew members and occasionally visitors regularly assisted with the counts as well.

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 2010 follows Hoffman and Smith (2003). In comparing 2010 annual statistics against means and 95% confidence intervals for previous seasons, I equate significance with a 2010 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.

RESULTS AND DISCUSSION

WEATHER

During the 2010 season, only one day was precluded and two additional days were shortened (reduced observation time to ≤ 4 hours) due to inclement weather (see Appendix C for daily weather records). For comparison, on average in a given season weather has demonstrated to fully preclude 2.5 and severely hamper 1.6 days, when compared over time (i.e., 1997-2009).

Sky condition, visibility, and ranking of thermal lift can all have an affect on raptor detection and helps us further understand raptor migration over a particular location. Observers rated skies as predominantly fair 45% during the total active observational periods, 30% as transitional (i.e., changed from fair or partly cloudy to mostly cloudy or overcast during the day, or vice versa), and 23% as mostly cloudy to overcast. For comparison, the averages for the site are 50% fair, 32 % transitional, and 18% as mostly cloudy or overcast, suggesting that the predominant skies for 2010 were mostly cloudy or overcast and less than predominantly fair. Similarly, the season's visibility was highly affected by fog and/or haze on 45% of active observational days (vs. an average of 24% from previous years), and the proportion of days affected by rain and/or snow was 23% (vs. 18% average). In addition, visibility estimates were also rated less than average observing towards the east (76 km vs. the 1997 – 2010 long-term mean of 87.1 km), as well as towards the west (79 km vs. the long-term mean of 86.2 km). Despite (and, in addition to) estimates of visibility being rated less than average, the season's observations of thermal lift was ranked good to excellent well above the norm (61% vs. the long-term average of 35.8%). Along with excellent thermal lift, the mean daily average temperature was also higher than normal (15.7°C vs. on average of 12.8°C). This suggested excellent migration conditions for raptors to migrate, but raptors also use thermal lift to obtain heights that can exceed cloud cover, and detection!

Similar to last year, near-record light winds (<12 kph) again prevailed throughout the season. These wind conditions were recorded to occur on 83% of the active observation days, which is well above the long-term average of 69%. In contrast, moderate winds (12–29 kph) were well below average (13% vs. 25% from the long-term mean). Similarly, strong winds (>29 kph) also occurred below average (4% vs. the long-term mean of 6%). Since the season's wind speeds were predominantly light, wind directions varied more than usual. Usually SW-W winds are the predominant direction. In 2010, SW-NW winds were predominant, occurring 23% on active observation days vs. on average only 6%. As per normal, SW-W winds then prevailed (occurring 20% vs. on average of 35%), followed by days with SW-W winds for a portion of the day then switching to N-E winds during another significant portion of the day (e.g., 14% of the active days vs. 17% on average). Days with predominantly NE-E winds occurred only 10% this past season (vs. 13% on average). The only other significant wind direction of interest from this past season were from days with SW-NW winds for a portion of the day then switching to NE-SE during another significant portion of the day (occurring 8% vs. on average of 4%). Otherwise, there were no other noteworthy patterns that prevailed on more than 6% of the active days throughout the season.

In summary, this past season's winds were light with more variability but generally still predominated from westerly to NE-E directions. With excellent thermal lift and warmer than average temperatures,

conditions for raptor migration were good, especially for buteos (see, for example, Table 1). However, fog and/or haze may have also affected the season's visibility for detecting raptors, but without testing some method of observer detectability bias (e.g., radar), that is unknown.

OBSERVATION EFFORT

Counts occurred on 82 of the 83 possible days standardized from 15 August through 5 November, which was significantly above the long term average ($79 \pm 95\%$ CI of 2.1 days, Appendix E). Likewise, the number of observation hours (692.60) was also above average (672.98 ± 26.00 hours, Appendix E). The 2010 average of 2.2 observers per hour (including official and guest observers; value is mean of daily values, which are in turn means of hourly values) is on par with the long-term (1983–2009) average of 2.2 ± 0.23 observers per hour.

MIGRATION SUMMARY

During the 2010 season, observers counted 16,177 migrants of 17 species (Table 1; see Appendix D for daily count records), which was a 13% increase compared to the long term average (Table 1). A record high count of Broad-winged (295 birds), Swainson's Hawks (933), and Peregrine Falcons (42) were also observed, while Bald Eagles matched another consistent low count of six individuals (see Appendix E to compare yearly totals). In addition, counts were significantly above the long term average for Turkey Vultures, Ospreys, Northern Harriers, Red-tailed Hawks, and Merlins, but were nonsignificantly above average for Sharp-shinns; whereas counts for Northern Goshawks, Ferruginous Hawks, American Kestrels, and Prairie Falcons were observed to be significantly below average (Table 1). Similarly, nonsignificant below average counts were also observed with Cooper's and Rough-legged Hawks, as well as with Golden Eagles (Table 1).

The flight consisted of 49% accipiters, 35% buteos, 8% falcons, 4% vultures, 1% eagles, 1% harriers, 1% Ospreys, and < 1% unidentified raptors. The proportions of buteos and vultures were significantly above average, whereas the proportions of accipiters and falcons were significantly below average (Figure 2). Sharp-shinned Hawks were the most commonly observed species (31% of the total count), followed by the Red-tailed Hawk (27%), Cooper's Hawk (16%), American Kestrel (7%), Swainson's Hawk (6%), Turkey Vulture (4%), and Broad-winged Hawk (2%). Other species that were observed only comprised of 1%, or less of the total.

Passage Rates and Long-Term Trends

For many species, adjusted passage rates show a common quadratic pattern of increasing trends through the late-1990s, followed by various curvatures of declines (Figs. 3-7). These quadratic trends may correspond with patterns of dry and wet cycles (Hoffman and Smith 2003, Smith et al. 2008a). Other species however, are showing significant increases, such as those of Turkey Vultures and Ospreys (Fig. 3); Broad-winged, Swainson's, and Red-tailed Hawks (Fig. 5); as well as Merlins and Peregrine Falcons (Fig. 7). Beyond a wave-like pattern, Rough-legged Hawks are the only species showing no significant trend of overall increase or decrease over time.

Age Ratios

Immature : adult ratios were below average in 2010 for Northern Harriers, Northern Goshawks, Broad-winged Hawks, Ferruginous Hawks, and Bald Eagles, but above average for Sharp-shinned, Cooper's, and Red-tailed Hawks, as well as Golden Eagles and Peregrine Falcons (Table 2). However, for Broad-winged and Ferruginous Hawks, most of those birds identified to species were unable to be aged (Table 2), due to the distance away from the observers. Thus, comparisons from this past season against the long term average for these two species are equivocal. Similarly, for both Northern Harriers and Goshawks, significantly higher percentage of unknown age classes were also observed when compared to the long term average, especially for Northern Goshawks (Table 2). This type of detectability bias demonstrates the dangers of saying too much pertaining to year-to-year productivity. For Bald Eagles, low annual

counts preclude much meaningful interpretation from this site, compared to other sites and counts throughout North America.

Interestingly, when comparing those species with above average immature : adult ratios, three out of the five species (i.e., Sharp-shinns, Cooper's Hawks, Golden Eagles) demonstrated similar immature counts, but the counts representing the adults were considerably lower compared to the long term average (Table 2). Whether these results represent an unknown bias in detectability, a change in migratory behavior, a change in adult survivorship, or something else, is unknown. For Peregrine's, along with the overall counts being significantly higher than the long term average, there was a relatively high percentage of the age classes classified as unknown. Thus, demonstrating once again on a year to year basis, the potential for large detection error associated with unknown age classifications. Lastly, for Red-tailed Hawks, this past season's total counts were considerably higher, the percentage of unknown aged classified birds were also higher than average but still relatively low (at 29%), but the proportion of identifiable adults were no different compared to the long term average (Table 2). Thus, given the relative adult proportions with low percentages of unknown age classification bias compared to this past season's higher proportion of immatures counted, the increase of this past season's immature : adult ratio may either be indicative of increase in reproductive success; an increase in observer detectability due to the weather or the observers themselves; a combination of both; or the increase may be some other factor altogether.

Seasonal Timing

The combined-species median passage date of 28 September was a significant three days later than the 1990–2009 long-term average (Table 3). Comparing 2010 with the combined-species seasonal distribution pattern illustrates that the season started off a bit slower than average through the first half of September, but then the patterns quickly aligned up to 05 October, where then this past season's combined-species pattern became more erratic (Fig. 8). At the species level, the median passage date of six species (the Sharp-shinned Hawk, Northern Goshawk, Rough-legged Hawk, Golden and Bald Eagles, and Prairie Falcon) shifted anywhere from one to four days early; whereas, the American Kestrel showed consistency, reflecting median dates of no change, and the rest of the ten species reflected median passage dates shifting one to nineteen days later (Table 3). The age-specific median dates generally followed the same pattern except that immature Sharp-shinned Hawks and Golden Eagles arrived significantly later, and immature Peregrine Falcons arrived significantly earlier (Table 4).

TRAPPING EFFORT

The crews operated one or both of the two available banding stations on 62 of 73 days between 20 August and 01 November 2010 (see Appendix F for daily capture records and Appendix G for annual summaries). The number of trapping days was above the 1980–2009 long-term average for the site, but due to significant reduction in crews, the number of station days (68) and hours (476) were significantly below the long-term average (Appendix G).

TRAPPING SUMMARY

The 2010 capture total of 1,165 newly banded birds, three recaptures, and two foreign recaptures involved twelve species (Appendix G). Sharp-shinned Hawks accounted for 60% of the total captures, followed by Cooper's Hawks (24%), Red-tailed Hawks (10%), American Kestrels (3%), and Merlins (1%). Each of the remaining species accounted for <1% of the total. Since inception, a total of 58,894 raptors have been captured, including 103 Goshute recaptures and 44 foreign recaptures (Appendix G)

Consistent with the recent reduction of staffed station hours (Appendix G), this past season's combined-species capture total of 1,168 raptors was again significantly below the long-term average (Table 5). Despite the staff reduction and overall reduced hours, this past season's capture totals were significantly above average for Red-tailed Hawks and Merlins, and on par for Broad-winged Hawks, Swainson's Hawks, Golden Eagles, and Peregrine Falcons. However, for Northern Harriers, Sharp-shinned Hawks, Cooper's Hawks, Northern Goshawks, and American Kestrels, those capture totals were significantly

below average (Table 5). Likewise, capture success compared well with the capture totals when comparing this season's values to the long-term mean, but when looking at the capture rates (birds captured per 100 station hours) specifically from the two "bread-and-butter" species most commonly trapped (Sharp-shinned and Cooper's Hawks), this year's data still maintained significant above average capture rates (Table 5), suggesting that the efficiency of trapping is still being maintained.

Comparing the age-related count (Table 2) and capture data (Table 6) from accipiters at this site suggests that immature/hatch-year Sharp-shinned Hawks and Northern Goshawks are both more commonly observed and captured than their adult counterparts; whereas, with Cooper's Hawks, the opposite generally occurs except for this past season where more immatures were counted (Table 2) but more adults were captured (Table 6). The Cooper's Hawk counts were down this past season (including both the immature and adult age classes), but the change in the proportion of more immature birds being seen than adults (Table 2), suggest that reproductive success is still being maintained. As per normal however, adults are still being captured at a slightly higher proportion (Table 6).

For comparing sex ratios specifically, as well as age and sex ratios from American Kestrels, only capture data can be assessed (Table 6), not counts. With Sharp-shinned Hawks, it is unsurprising that immatures are captured in greater numbers than adults but combining the age classes, the female : male capture ratio is nearly, on average 1:1 (Table 6). However, this past season, more males were captured (Table 6). The attempt to analyze the age ratios in Cooper's Hawks has already been explained above but as per normal, the number of females captured outnumbered the males (Table 6). With Northern Goshawks, slightly more males were captured, which does deviate from the norm but with low sample size comparisons, this year's data seems rather equivocal to compare. Finally, with American Kestrels, as per normal hatch-year captures again far outnumbered adult captures (Table 6). Contrary to the norm, however, more females were captured this past season season than males (Table 6). The reason is unknown but the major drop in the number of hatch-year birds being captured (Table 6) continues to be the trend and may help to explain the drop in American Kestrel counts throughout the continent (see, for example, Farmer et al. 2008, and Farmer and Smith 2009), since age differences from American Kestrels can only be identified in the hand.

ENCOUNTERS WITH PREVIOUSLY BANDED BIRDS

Concluding 2010, a total of 359 raptors banded at the Goshutes have subsequently been encountered elsewhere as foreign encounters. Throughout the year, we received notification of seven new recoveries: 4 Sharp-shinned Hawks, 2 Cooper's Hawks, and 1 Red-tailed Hawk (Table 7). Unfortunately, two birds (a Sharp-shinned and Cooper's Hawk) were shot and killed while on their wintering grounds in Mexico, another hatch-year male Sharp-shinned was reported as being killed by colliding into some stationary object other than wire, while another adult male Sharp-shinned Hawk unfortunately died while trying to be rehabbed (Table 7). The remainder of the three recoveries (a Sharp-shinned, Cooper's and Red-tailed Hawk) were reported as found dead, with unknown causes (Table 7). All these birds were recovered within the Intermountain Flyway, designated by Hoffman et al. (2002). These records are important to understand that raptors are using the same migratory flyway, and it helps provide information on longevity, survivorship, as well as potential sources of mortality, especially when combined with telemetry which is often less biased than band recoveries alone.

Of the three recaptures, the most exciting was from an adult male Sharp-shinned Hawk that was originally banded on 07 October at the HWI Chelan Ridge raptor migration in Washington then captured again nine days later at the Goshutes on 16 October. We calculated that the bird perhaps traveled an average of 67 miles per day to cover the 600-mile straight line distance between the two sites. When birds are captured at other banding stations or by researchers involved in winter or summer-breeding studies, this helps our understanding of migratory routes, connectivity, and survivorship. From the two other recaptures, one was a female Cooper's Hawk that was originally banded as a hatch-year on 16 September, 2003, and retrapped by the Goshute crew on 16 October. The other was from a Northern Goshawk that was originally banded on 29 September, 2005 as another hatch-year bird and recaptured again this past season

on 21 October. Again, retrapping these birds at the same location identifies that they are either local residents or that they use the same migration routes, as well as helps us understand survivorship.

The two foreign recaptures consisted of a hatch-year male Cooper's Hawk that was originally banded at the Boise Ridge migration station in Idaho and recaptured on 13 September, and the other was that of an adult male Sharp-shinned captured at the Goshutes on 16 October. Unfortunately, for the latter raptor we have yet to receive the information pertaining to the recovery so we don't know yet when and where it was originally banded.

RESIDENT RAPTORS

At least one adult and immature resident Red-tailed Hawks were observed consistently from 15 August through 03 September, and subsequently an immature was seen up to 22 September. On 23 August, two adults and immatures were observed hunting and calling. Thus, a possible family of a total of four resident Red-tails may have been occupying the area during the summer and early migration season. Likewise, from 16 August through 02 September, at least one male and female American Kestrels were seen harrassing the owl decoy and chasing migrants from the area. Thereafter, one male was seen on 08 and 11 September, and an American Kestrel of unknown gender was observed on 09 September. On the 24th and 25th of August, the observers recorded two males and females, for a possible total of four American Kestrels occupying the area during the summer and early migration period. On 15 August, up to seven Turkey Vultures were observed circling, flying back and forth, and were counted as residents. Seven were again counted on the 19th of August, but after that date the numbers diminished; three on 20 August, two on 25th of August, and one subsequently thereafter on eight different days up to 16 September, which was when the last resident Turkey Vultures were recorded. Of note, on 24 August, the observers recorded one Turkey Vulture with albinistic primaries. From 16 August through 05 September, at least one Peregrine Falcon was recorded calling, chasing other migrants, and flying in non-migratory directions on nine separate days. The age of the bird was often recorded as unknown or immature, so it is unknown if there were more than one birds or the observers saw the same bird throughout. Likewise, an immature Sharp-shinned Hawk was observed beginning 19 August through six consecutive days ending 24 August. Another immature Sharp-shinned was observed on 09 September. Beyond these regular observations of recorded non-migrants, a couple other notables include: one immature Cooper's Hawk seen on 27 August and pairs of Golden Eagles displaying or making non-migratory flights on 16 September, as well as on the 15th and 16th of October. Whether these were the same Golden Eagle pairs, is unknown.

SITE VISITATION

A total of 172 individuals visited the Goshutes and signed our visitor logs in 2010. Most visitors came from nearby areas of Nevada and Utah. However, the site also received visitors from Montana, Texas, California, Florida, Hawaii, New Mexico, Pennsylvania, Michigan, Maine, New York, Arizona, North Carolina, and even the British U.K.! Organized groups led by HWI staff included: one group of HWI general membership, two groups of students from the Salt Lake Center for Science Education, and at least one group of local Boy Scouts.

Every hour observers assess the disturbance level of visitors to quantify how visitation may affect detectibility. During the 2010 season, 705 hours of assessing visitor disturbance were calculated which resulted in the following ratings: 98% of the time no disturbance was observed, while the remainder of the time was recorded to be at approximately 1% each of moderate and low. The observers recorded no visitation where they ranked the disturbance as being high.

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We are also grateful for discounted hotel accommodations provided to our crewmembers on their days off by the Wendover Nugget, as well as from the West Wendover Waste Water Treatment Plant for supplying water and cleaning logistical support and the West Wendover Public Water Works for supplying the season's essential drinking water. A much appreciated thanks also goes to Einstein's Bagels for supplying delicious fresh bagels and to the Salt Lake Roasting Company of Salt Lake City for their very generous donation of high quality coffee. A very special thanks also goes to our long-term volunteer support from Jerry Liguori, Leo Chidester, Mike Shaw, and Art Sandack. Rex Seabury also deserves special thanks for helping setting up. Lastly, special thanks to Roy Bouck, Bart Gross, Mike and Jake Braithwaite, John Shipley, and Wildlife Services from the Salt Lake City Airport for helping us secure lure birds for the trapping operations.

LITERATURE CITED

- Bildstein, K. L. 2001. Why migratory birds of prey make great biological indicators. Pages 169–179 in K. L. Bildstein and D. Klem (Editors). *Hawkwatching in the Americas*. Hawk Migration Association of North America, North Wales, Pennsylvania, U.S.A.
- Bildstein, K. L. 2006. *Migrating raptors of the world: their ecology and conservation*. Cornell University Press, Ithaca, NY U.S.A. 320 pp.
- Bildstein, K. L., J. P. Smith, E. Ruelas Inzunza, and R. R. Veit (Editors). 2008. *State of North America's birds of prey*. Series in Ornithology No. 3. Nuttall Ornithological Club, Cambridge, Massachusetts, and American Ornithologists' Union, Washington, DC U.S.A.
- Farmer, C. J., L. J. Goodrich, E. Ruelas Inzunza, and J. P. Smith. 2008. Conservation status of North America's birds of prey. Pages 303–420 in K. L. Bildstein, J. P. Smith, E. Ruelas Inzunza, and R. R. Veit (Editors), *State of North America's birds of prey*. Series in Ornithology No. 3. Nuttall Ornithological Club, Cambridge, Massachusetts, and American Ornithologists' Union, Washington, DC U.S.A.
- Farmer, C. J., and J. P. Smith. 2009. Migration counts indicate widespread declines of American Kestrels (*Falco sparverius*) in North America. *Journal of Raptor Research* 43:263–273.
- Goodrich, L. J., and J. P. Smith. 2008. Raptor migration in North America. Pages 37–150 in K. L. Bildstein, J. P. Smith, E. Ruelas Inzunza, and R. R. Veit (Editors), *State of North America's birds of prey*. Series in Ornithology No. 3. Nuttall Ornithological Club, Cambridge, Massachusetts, and American Ornithologists' Union, Washington, DC U.S.A.
- Hoffman, S. W., and J. P. Smith. 2003. Population trends of migratory raptors in western North America, 1977–2001. *Condor* 105:397–419.
- Hoffman, S. W., J. P. Smith, and T. D. Meehan. 2002. Breeding grounds, winter ranges, and migratory routes of raptors in the Mountain West. *Journal of Raptor Research* 36:97–110.
- Lott, C. A., and J. P. Smith. 2006. A geographic-information-system approach to estimating the origin of migratory raptors in North America using hydrogen stable isotope ratios in feathers. *The Auk* 123:822–835.
- Smith, J. P., C. J. Farmer, S. W. Hoffman, G. S. Kaltenecker, K. Z. Woodruff, and P. Sherrington. 2008a. Trends in autumn counts of migratory raptors in western North America. Pages 217–252 in K. L. Bildstein, J. P. Smith, E. Ruelas Inzunza, and R. R. Veit (Editors), *State of North America's birds of prey*. Series in Ornithology No. 3. Nuttall Ornithological Club, Cambridge, Massachusetts, and American Ornithologists' Union, Washington, DC U.S.A.

- Smith, J. P., C. J. Farmer, S. W. Hoffman, C. A. Lott, L. J. Goodrich, J. Simon, C. Riley, and E. Ruelas Inzunza. 2008b. Trends in autumn counts of migratory raptors around the Gulf of Mexico, 1995–2005. Pages 253–278 *in* K. L. Bildstein, J. P. Smith, E. Ruelas Inzunza, and R. R. Veit (Editors), *State of North America’s birds of prey*. Series in Ornithology No. 3. Nuttall Ornithological Club, Cambridge, Massachusetts, and American Ornithologists’ Union, Washington, DC U.S.A.
- Vekasy, M. S., and J. P. Smith. 2002. Fall 2001 raptor migration study in the Goshute Mountains of northeastern Nevada. HawkWatch International, Salt Lake City, Utah U.S.A. 41 pp.
- Zalles, J. I., and K. L. Bildstein (Editors). 2000. *Raptor watch: a global directory of raptor migration sites*. BirdLife Conservation Series No. 9. BirdLife International, Cambridge, United Kingdom, and Hawk Mountain Sanctuary Association, Kempton, Pennsylvania, USA.

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: 1983–2009 versus 2010.

SPECIES	COUNTS			RAPTORS/100 HOURS ¹		
	1983–2009 ²	2010	% CHANGE	1983–2009 ²	2010	% CHANGE
Turkey Vulture	377 ± 71.3	682	+81	68.7 ± 12.50	128.9	+88
Osprey	91 ± 15.8	126	+38	20.7 ± 3.20	29.5	+42
Northern Harrier	172 ± 25.8	201	+17	26.5 ± 3.53	29.1	+10
Sharp-shinned Hawk	4473 ± 718.0	5063	+13	983.5 ± 130.58	1148.4	+17
Cooper's Hawk	3063 ± 524.9	2599	-15	759.6 ± 109.46	667.7	-12
Northern Goshawk	96 ± 22.1	54	-44	15.9 ± 3.53	8.8	-45
Unknown small accipiter ³	277 ± 91.4	14	-95	–	–	–
Unknown large accipiter ³	9 ± 6.8	10	+14	–	–	–
Unknown accipiter	257 ± 87.5	145	-44	–	–	–
TOTAL ACCIPITERS	7973 ± 1205.7	7885	-1	–	–	–
Red-shouldered Hawk	0.2 ± 0.2	0	-100	–	–	–
Broad-winged Hawk	53 ± 14.6	295	+461	21.7 ± 5.94	135.8	+527
Swainson's Hawk	245 ± 77.5	933	+281	63.7 ± 20.22	251.3	+294
Red-tailed Hawk	3084 ± 334.8	4427	+44	508.6 ± 45.15	712.9	+40
Ferruginous Hawk	15 ± 2.6	8	-48	2.5 ± 0.39	1.2	-52
Rough-legged Hawk	14 ± 3.7	10	-27	6.2 ± 1.50	3.9	-36
Unidentified buteo	72 ± 17.8	34	-53	–	–	–
TOTAL BUTEOS	3483 ± 381.1	5707	+64	–	–	–
Golden Eagle	249 ± 25.1	236	-5	38.9 ± 3.77	36.2	-7
Bald Eagle	12 ± 2.4	6	-51	2.5 ± 0.50	1.3	-48
Unidentified eagle	1 ± 0.5	0	-100	–	–	–
TOTAL EAGLES	262 ± 26.4	242	-8	–	–	–
American Kestrel	1818 ± 335.7	1170	-36	382.6 ± 65.10	254.7	-33
Merlin	40 ± 9.2	54	+34	7.7 ± 1.77	10.6	+38
Prairie Falcon	25 ± 5.5	14	-45	4.2 ± 0.79	2.3	-45
Peregrine Falcon	12 ± 3.4	42	+239	2.2 ± 0.57	6.5	+194
Unknown small falcon ³	3.9 ± 2.6	0	-100	–	–	–
Unknown large falcon ³	3 ± 1.6	1	-65	–	–	–
Unknown falcon	6 ± 2.0	1	-83	–	–	–
TOTAL FALCONS	1904 ± 347.7	1282	-33	–	–	–
Unidentified raptor	110 ± 33.7	52	-53	–	–	–
GRAND TOTAL	14371 ± 1839.8	16177	+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: 1990–2009 versus 2010.

SPECIES	TOTAL AND AGE-CLASSIFIED COUNTS							IMMATURE : ADULT		
	1990–2009 AVERAGE			2010			% UNKNOWN AGE		RATIO	
	TOTAL	IMM.	ADULT	TOTAL	IMM.	ADULT	1990–2009 ¹	2010	1990–2009 ¹	2010
Northern Harrier	194	57	60	201	47	53	41 ± 6.3	50	1.14 ± 0.283	0.89
Sharp-shinned Hawk	4896	1662	1300	5063	1743	922	41 ± 5.3	47	1.31 ± 0.222	1.89
Cooper's Hawk	3430	772	934	2599	627	446	52 ± 4.5	59	0.80 ± 0.184	1.41
Northern Goshawk ²	96	47	31	54	14	8	18 ± 4.3	59	2.09 ± 0.604	1.75
Broad-winged Hawk	65	14	28	295	0	4	37 ± 8.8	99	0.63 ± 0.178	0.00
Red-tailed Hawk	3449	673	1973	4427	1152	1973	23 ± 3.9	29	0.34 ± 0.056	0.58
Ferruginous Hawk	17	4	5	8	0	0	48 ± 10.4	0	1.11 ± 0.483	1.00
Golden Eagle ²	249	122	67	236	121	39	23 ± 4.6	32	2.16 ± 0.382	3.10
Bald Eagle	13	6	6	6	2	3	7 ± 4.2	16.7	1.04 ± 0.321	0.67
Peregrine Falcon	15	4	6	42	5	13	33 ± 10.8	57	0.86 ± 0.304	0.38

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 1983–2009.

Table 3. First and last observed, bulk passage, and median passage dates by species for migrating raptors in the Goshute Mountains, NV in 2010, with comparisons of the 2010 to long-term (1990–2009) average median passage dates.

SPECIES	2010				1990–2009
	FIRST OBSERVED	LAST OBSERVED	BULK PASSAGE DATES ¹	MEDIAN PASSAGE DATE ²	MEDIAN PASSAGE DATE ^{2,3}
Turkey Vulture	15-Aug	19-Oct	18-Sep–7-Oct	25-Sep	24-Sep ± 1.3
Osprey	19-Aug	4-Nov	5-Sep–4-Oct	18-Sep	16-Sep ± 1.5
Northern Harrier	18-Aug	5-Nov	5-Sep–31-Oct	9-Oct	26-Sep ± 3.2
Sharp-shinned Hawk	17-Aug	5-Nov	13-Sep–13-Oct	26-Sep	27-Sep ± 2.0
Cooper's Hawk	15-Aug	5-Nov	14-Sep–8-Oct	26-Sep	23-Sep ± 1.5
Northern Goshawk	27-Aug	5-Nov	5-Sep–20-Oct	2-Oct	05-Oct ± 2.8
Broad-winged Hawk	16-Sep	12-Oct	23-Sep–1-Oct	26-Sep	24-Sep ± 1.5
Swainson's Hawk	15-Aug	19-Oct	19-Sep–30-Sep	27-Sep	20-Sep ± 3.3
Red-tailed Hawk	15-Aug	5-Nov	13-Sep–31-Oct	12-Oct	07-Oct ± 2.2
Ferruginous Hawk	22-Sep	3-Nov	22-Sep–2-Nov	18-Oct	29-Sep ± 3.9
Rough-legged Hawk	6-Oct	28-Oct	5-Oct–25-Oct	19-Oct	23-Oct ± 1.7
Golden Eagle	19-Aug	5-Nov	6-Sep–25-Oct	6-Oct	09-Oct ± 1.8
Bald Eagle	28-Sep	5-Nov	28-Sep–4-Nov	20-Oct	21-Oct ± 4.7
American Kestrel	15-Aug	4-Nov	3-Sep–2-Oct	16-Sep	16-Sep ± 1.7
Merlin	5-Sep	4-Nov	18-Sep–18-Oct	9-Oct	03-Oct ± 2.1
Prairie Falcon	17-Aug	19-Oct	21-Aug–15-Oct	13-Sep	15-Sep ± 3.8
Peregrine Falcon	15-Aug	31-Oct	21-Aug–15-Oct	25-Sep	23-Sep ± 3.2
Total	15-Aug	5-Nov	13-Sep–18-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: 1990–2009 versus 2010.

SPECIES	ADULT		IMMATURE / SUBADULT	
	1990–2009 ¹	2010	1990–2009 ¹	2010
Northern Harrier	29-Sep ± 4.2	15-Oct	23-Sep ± 4.9	27-Sep
Sharp-shinned Hawk	07-Oct ± 1.5	05-Oct	16-Sep ± 1.1	19-Sep
Cooper's Hawk	26-Sep ± 1.6	01-Oct	18-Sep ± 1.1	21-Sep
Northern Goshawk ²	14-Oct ± 4.2	05-Oct	01-Oct ± 3.6	17-Sep
Broad-winged Hawk	24-Sep ± 1.4	-	26-Sep ± 2.2	-
Red-tailed Hawk	10-Oct ± 1.9	14-Oct	19-Sep ± 4.0	09-Oct
Golden Eagle ²	15-Oct ± 2.7	10-Oct	05-Oct ± 3.3	09-Oct
Peregrine Falcon	22-Sep ± 6.2	25-Sep	22-Sep ± 2.8	31-Aug

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 1983–2009.

Table 5. Capture totals, rates, and successes for migrating raptors in the Goshute Mountains, NV: 1983–2009 versus 2010.

SPECIES	CAPTURE TOTAL		CAPTURE RATE ¹		CAPTURE SUCCESS (%) ²	
	1983–2009 ³	2010	1983–2009 ³	2010	1983–2009 ³	2010
Northern Harrier	6 ± 1.8	1	0.5 ± 0.2	0.2	3.8 ± 1.1	0.6
Sharp-shinned Hawk	1222 ± 234.8	700	98.4 ± 7.1	147.2	25.7 ± 3.8	20.4
Cooper's Hawk	615 ± 120.3	280	50.2 ± 4.4	58.9	18.8 ± 2.2	15.7
Northern Goshawk	28 ± 7.8	5	2.5 ± 0.7	1.1	30.7 ± 5.3	19.2
Broad-winged Hawk	1 ± 0.3	1	0.1 ± 0.04	0.2	3.0 ± 1.4	1.0
Swainson's Hawk	0.2 ± 0.2	1	0.01 ± 0.01	0.2	0.08 ± 0.09	0.2
Red-tailed Hawk	65 ± 11.2	119	5.7 ± 0.7	25.0	2.1 ± 0.3	3.9
Rough-legged Hawk	0.1 ± 0.1	0	0.004 ± 0.009	0.0	0.3 ± 0.6	0.0
Golden Eagle	4 ± 1.1	4	0.4 ± 0.1	0.8	1.6 ± 0.4	1.9
Bald Eagle	0.04 ± 0.07	0	0.01 ± 0.02	0.0	0.4 ± 0.8	0.0
American Kestrel	135 ± 41.9	38	9.4 ± 1.7	8.0	6.7 ± 1.6	4.0
Merlin	9 ± 2.5	15	0.7 ± 0.2	3.2	19.4 ± 4.7	30.0
Prairie Falcon	5 ± 1.2	3	0.4 ± 0.1	0.6	21.8 ± 4.0	14.3
Peregrine Falcon	1 ± 0.4	1	0.07 ± 0.03	0.2	7.9 ± 3.8	4.3
All Species	2092 ± 401.6	1168	168.4 ± 11.4	245.5	15.0 ± 2.0	11.9

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: 1991–2009 averages versus 2010.

	FEMALE			MALE			FEMALE : MALE	HY : AHY
	AHY	HY	UNK.	AHY	HY	UNK.	RATIO ¹	RATIO ¹
Sharp-shinned Hawk								
1991–2009 mean	252	407	–	200	488	–	1.00	1.98
2010	125	216	–	98	261	–	0.95	2.14
Cooper's Hawk								
1991–2009 mean	229	175	–	124	161	–	1.48	0.94
2010	85	57	–	57	81	–	1.84	0.97
Northern Goshawk								
1991–2009 mean	4	10	–	2	11	–	1.51	7.54
2010	1	1	–	0	3	–	0.67	4.00
American Kestrel								
1991–2009 mean	7	56	18	20	63	2	0.95	4.94
2010	7	15	0	6	10	0	1.38	1.92

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 2010 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
Sharp-shinned Hawk	M	1202-23440	07-Oct-05	AHY	15-Apr-10	ATY	Pendleton, OR	684	injured – died
Sharp-shinned Hawk	M	1212-72422	29-Sep-05	HY	17-Apr-10	ATY	Spangle, WA	721	dead – collision
Sharp-shinned Hawk	F	1623-23437	14-Oct-10	HY	18-Oct-10	HY	Eskdale, UT	137	found dead – cause unknown
Sharp-shinned Hawk	F	1623-22743	15-Sep-10	HY	23-Dec-10	HY	Sinaloa De Leyva, Sinaloa, Mex.	1496	found dead – shot
Cooper’s Hawk	F	1075-00550	16-Sep-09	HY	03-Apr-10	AHY	Morelia, Michoacan De Ocampo, Mex.	2394	found dead - shot
Cooper’s Hawk	F	1005-18537	22-Sep-02	HY	04-Jun-10	ATY	Thompson Falls, MT	648	found dead – cause unknown
Red-tailed Hawk	U	1177-06033	26-Sep-08	SY	31-Aug-10	ATY	Idaho Rocky Mt. Ranch, Custer Co., ID	328	found dead – cause unknown

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.

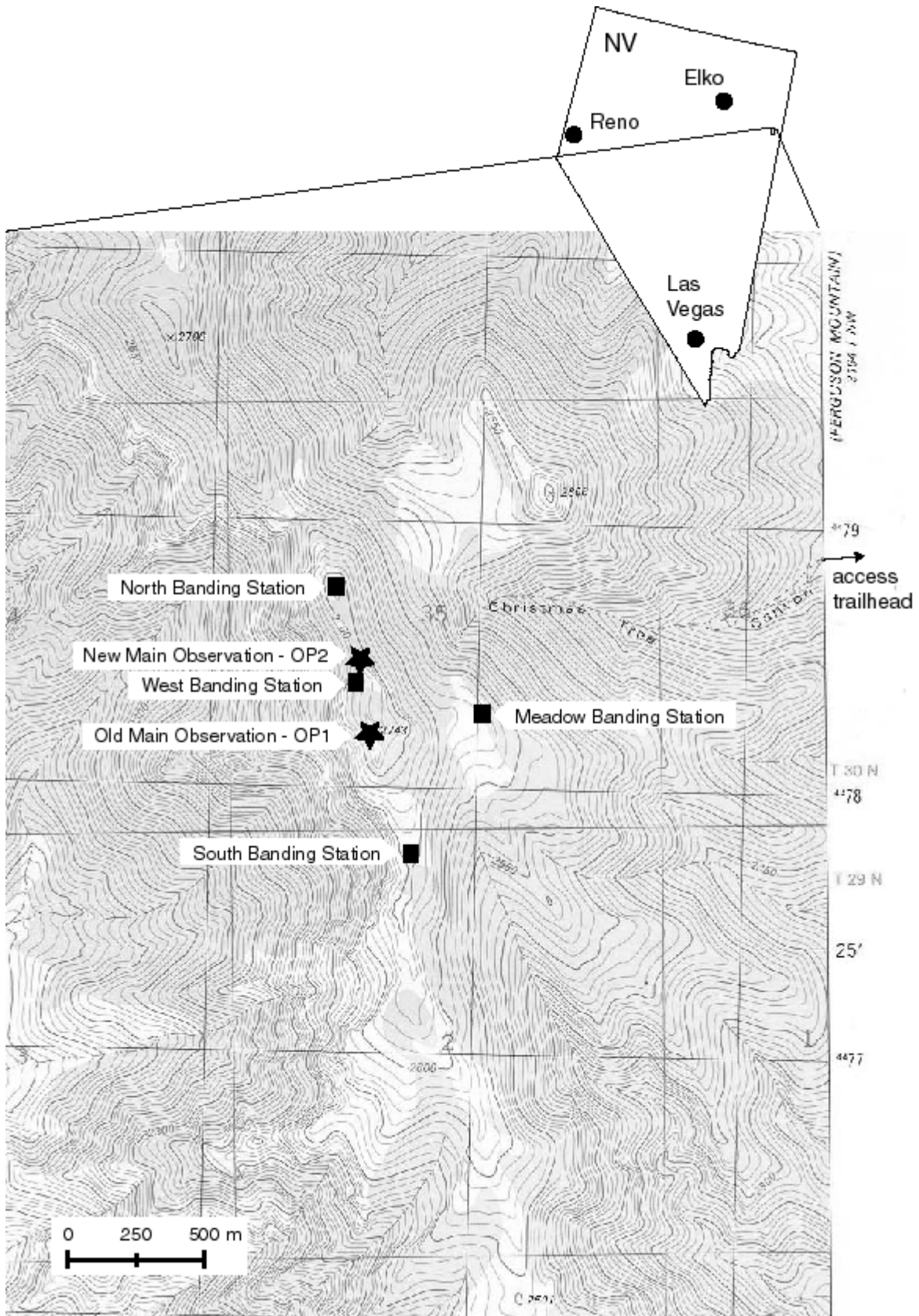


Figure 1. Location of the Goshute Mountains Raptor Migration Project study site.

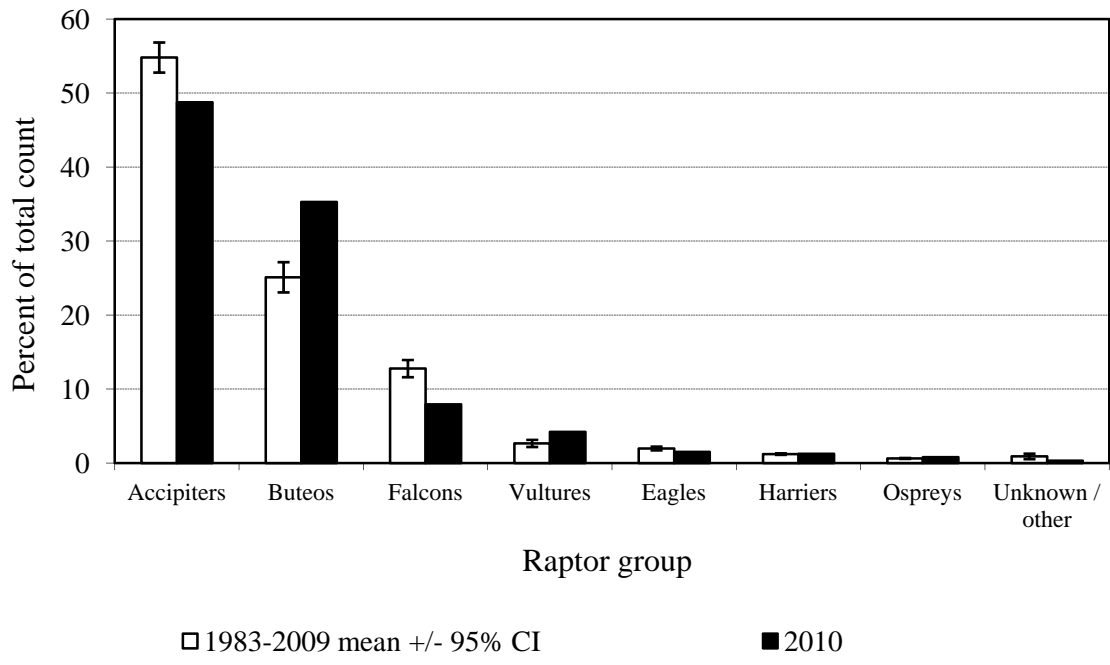


Figure 2. Fall migration flight composition by major species groups in the Goshute Mountains, Nevada: 1983–2009 versus 2010.

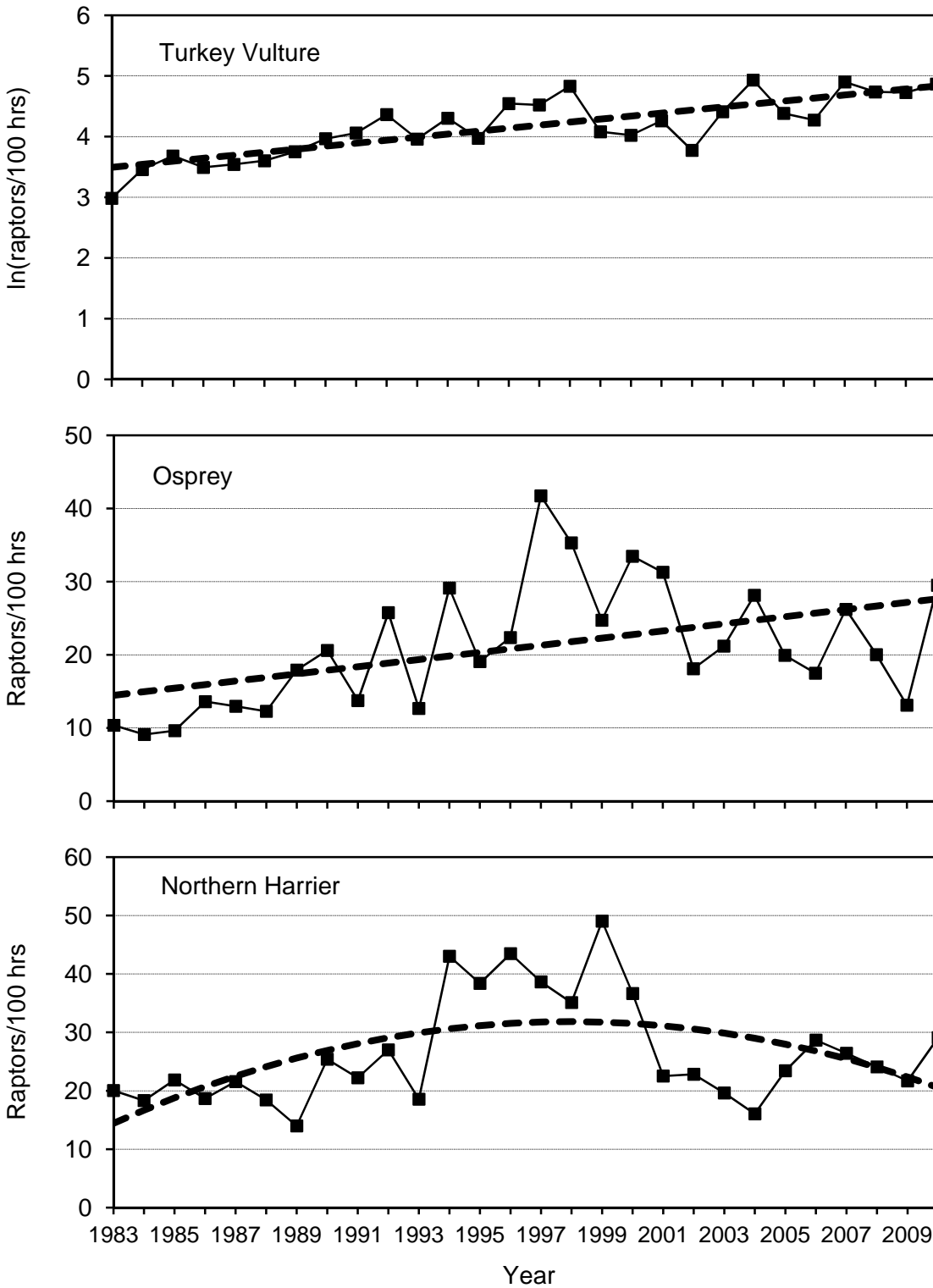


Figure 3. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Turkey Vultures, Ospreys, and Northern Harriers: 1983–2010. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

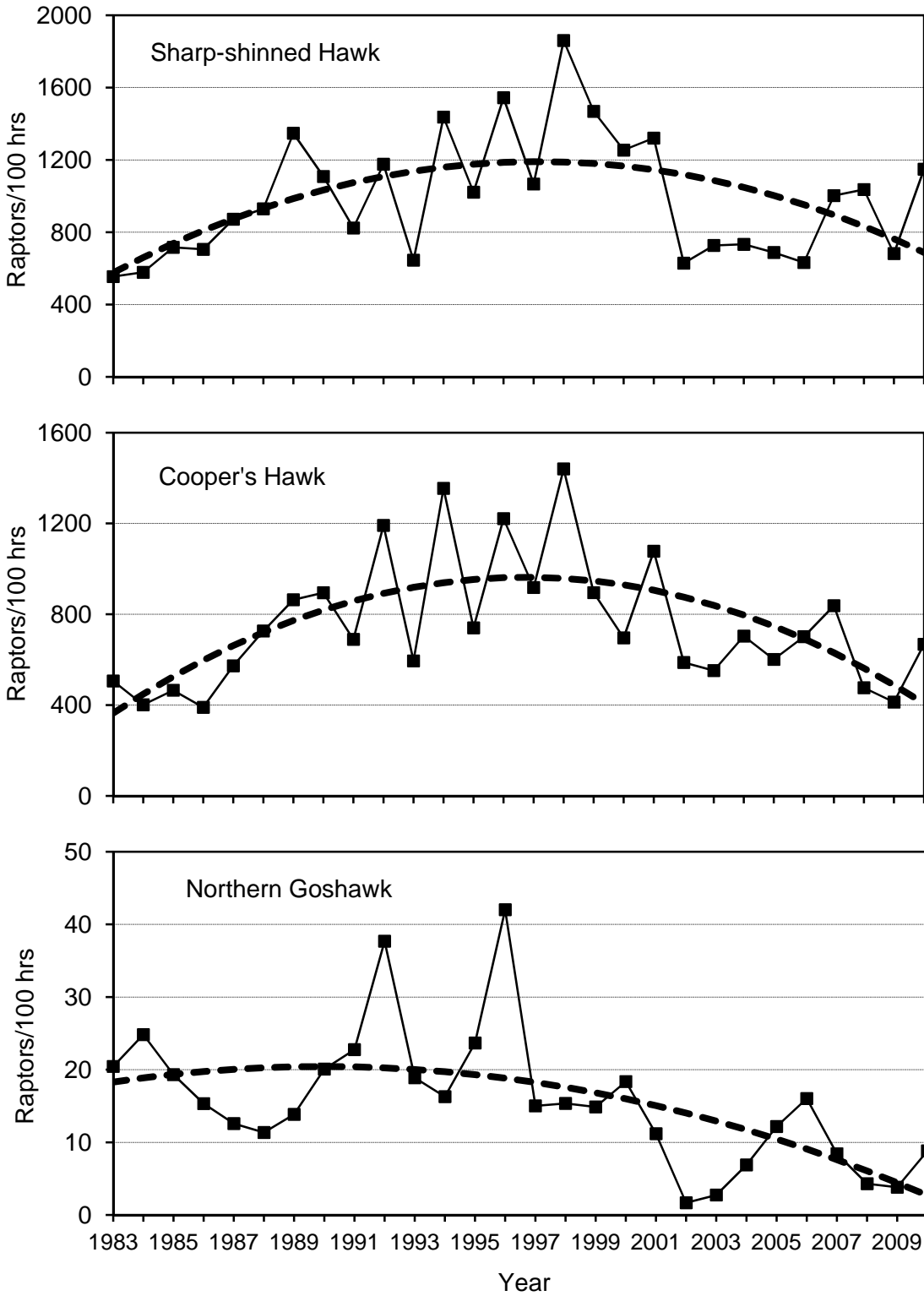


Figure 4. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Sharp-shinned Hawks, Cooper's Hawks, and Northern Goshawks: 1983–2010. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

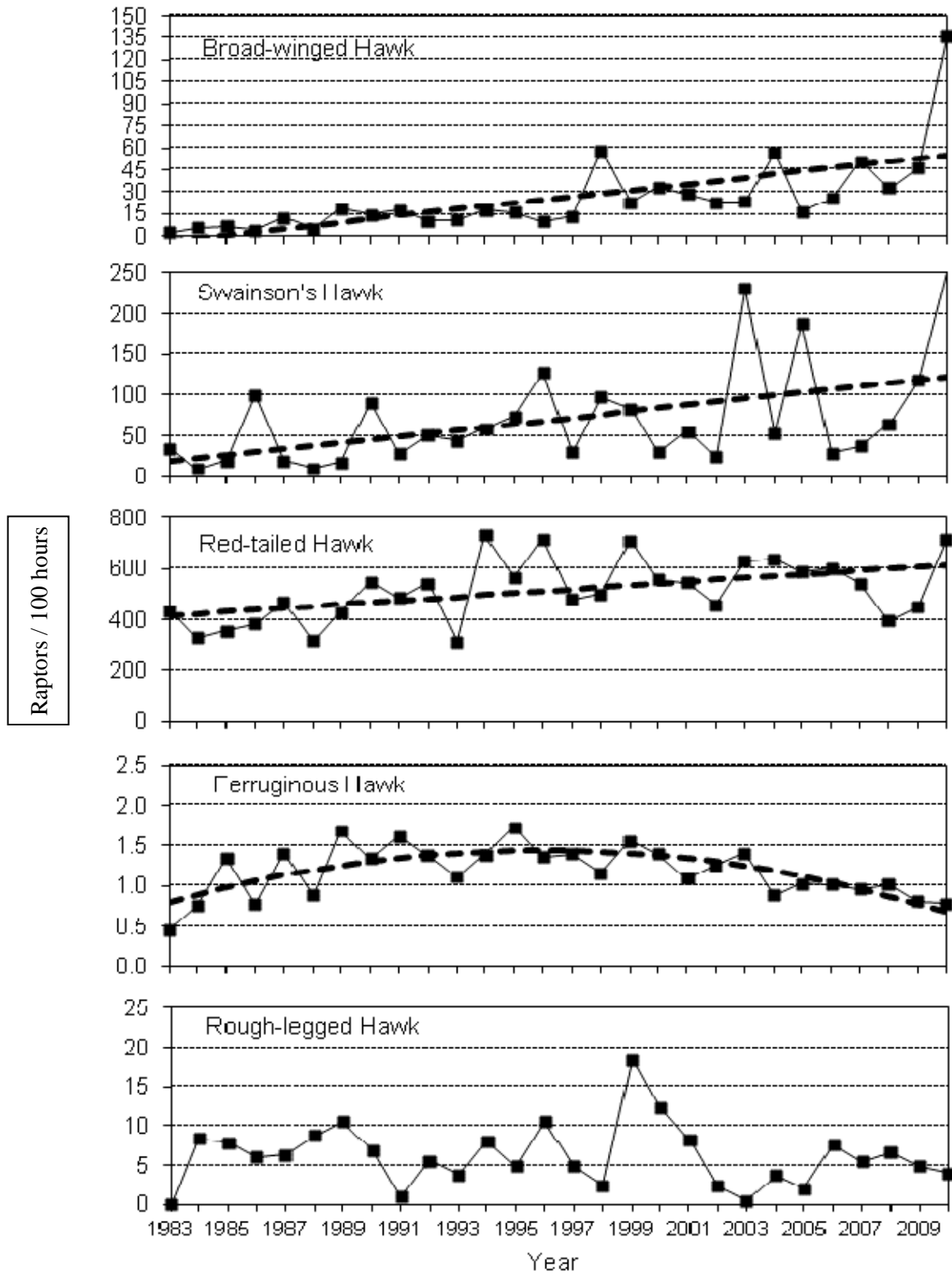


Figure 5. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Broad-winged, Swainson's, Red-tailed, Ferruginous, and Rough-legged Hawks: 1983–2010. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

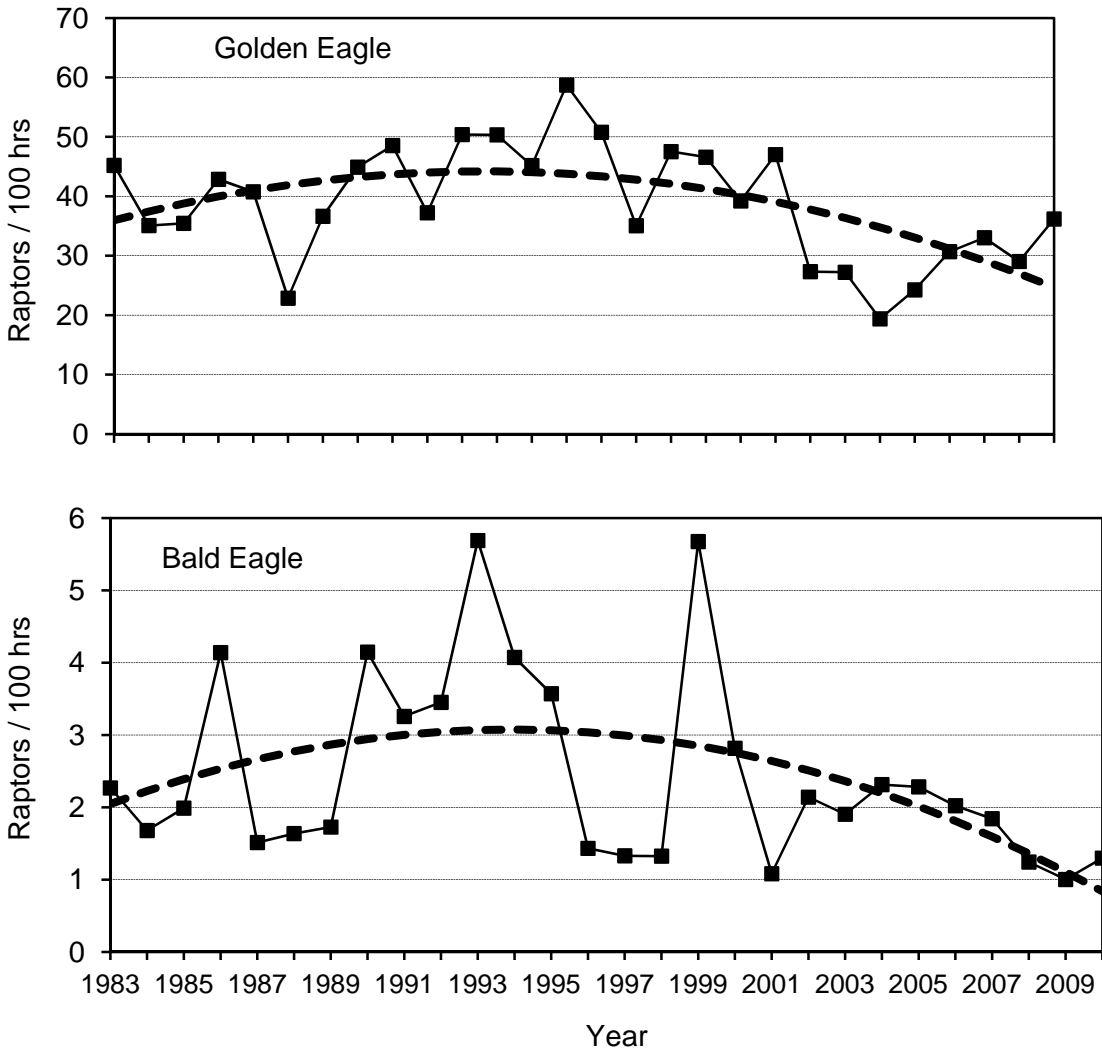


Figure 6. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Golden and Bald Eagles: 1983–2010. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

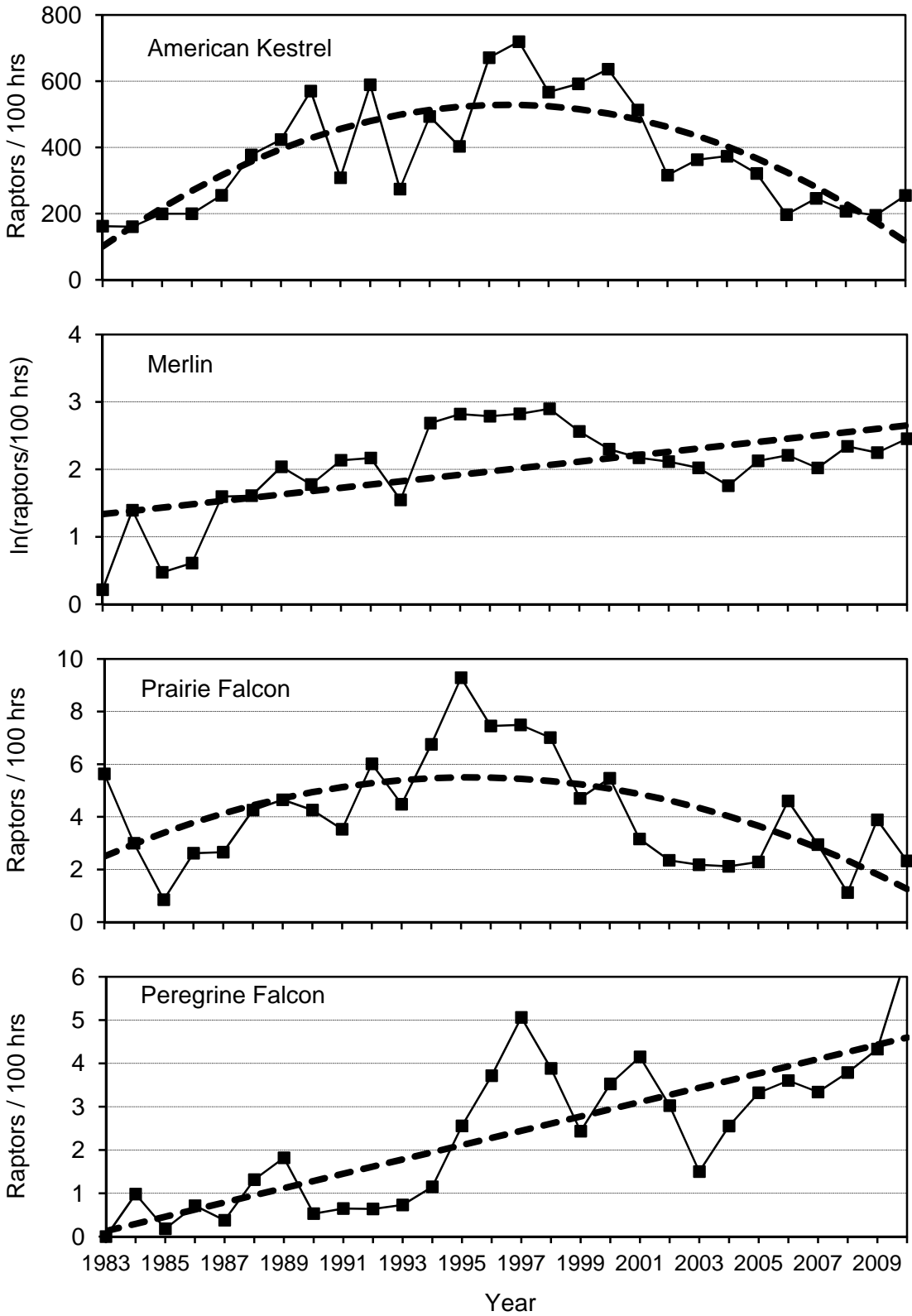


Figure 7. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons: 1983–2010. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

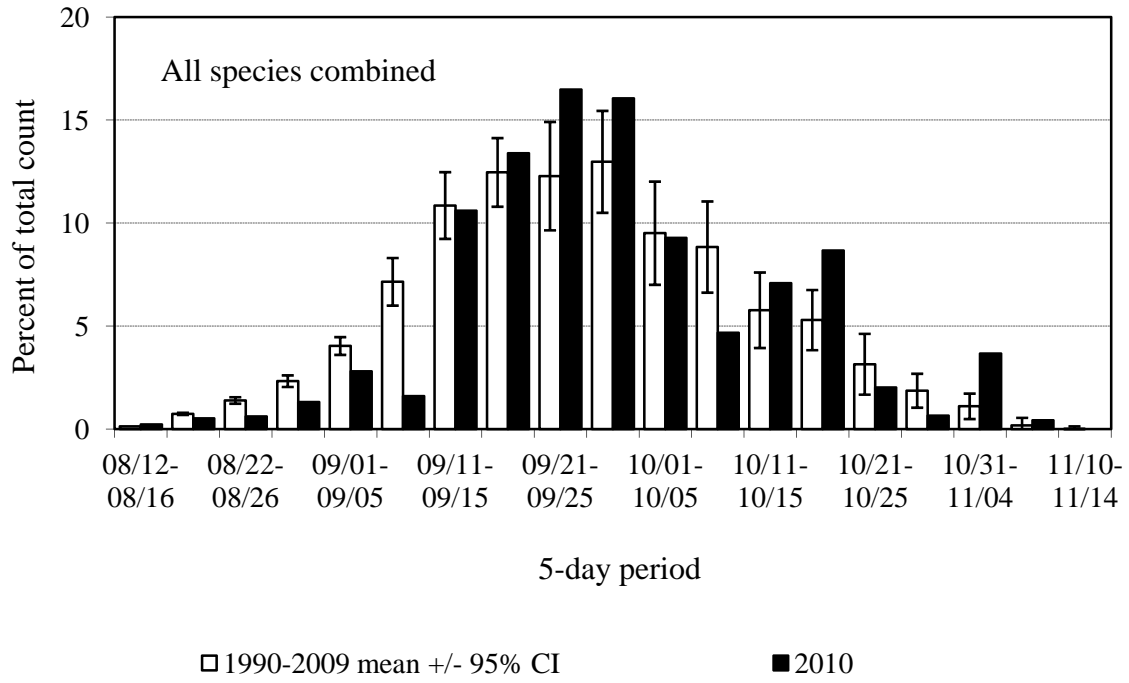


Figure 8. Combined-species passage volume by five-day periods: 1990–2009 versus 2010.

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).
- 2010:** Two observers throughout. Rachel Smith (1+), Megan Shaub (0), Kerry Ross (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: 2010.

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	3.6	0	clr-pcl	4.9	e, nne	27.1	30.43	2	90	90	2	2.0
16-Aug	9.00	2.0	0	clr-pcl-mcl-pcl	2.2	w-wnw, var	32.0	-	2	89	90	2	2.0
17-Aug	9.00	2.1	0	clr, haze	2.4	var sw-wnw, ene	27.0	-	2	80	80	1	2.6
18-Aug	9.00	2.0	0	clr-ovc, haze, ts	3.1	var	27.8	-	2	76	56	1	1.2
19-Aug	9.00	2.0	0	pc-mcl-pcl, haze	4.5	sw, nne-ene	26.2	-	2	95	65	1	0.8
20-Aug	9.00	2.0	0	clr-pcl, haze	3.1	var	28.3	-	2	100	90	2	1.9
21-Aug	9.00	2.0	0	clr-pcl-ovc, haze, ts	8.1	var s-w	27.6	-	3	90	93	2	2.8
22-Aug	8.50	2.0	0	ovc, rain	7.3	var wsw-wnw	20.9	-	4	78	82	1	1.4
23-Aug	9.00	2.0	0	clr, haze	4.3	var n-ene	20.8	-	2	80	80	1	3.2
24-Aug	9.00	2.0	0	clr, haze	6.2	var ene, wnw	21.2	-	2	85	86	0	1.6
25-Aug	9.00	2.0	0	clr	6.1	var ssw-wsw, nne	28.5	-	2	87	85	1	1.8
26-Aug	8.75	2.0	0	pcl-mc, haze, ts	7.2	var ssw-wnw, ene	27.2	-	3	84	84	2	3.2
27-Aug	8.75	2.0	0	clr-blowing dust, haze	5.1	var sw-w	23.5	-	4	79	65	2	2.9
28-Aug	9.00	2.0	1	pcl-mcl, blowing dust, haze	10.3	var wsw-w	23.0	-	3	79	80	2	12.3
29-Aug	8.83	2.0	0	pcl-ovc, haze-rain	5.9	var wsw-wnw	15.2	-	2	62	69	1	1.1
30-Aug	9.00	2.0	0	ovc-mcl	7.2	var w-wnw	13.9	-	3	83	72	1	2.3
31-Aug	9.00	2.0	0	clr, haze	5.4	var	18.1	-	2	88	90	2	5.0
01-Sep	9.00	2.0	0	clr	5.6	var w-wnw	23.9	-	1	90	90	2	7.0
02-Sep	9.00	2.0	0	clr	8.5	ene-e	20.6	-	1	90	90	2	4.2
03-Sep	9.00	2.0	0	clr-pcl	4.8	var s-ssw, e	26.0	-	1	89	90	2	7.2
04-Sep	9.00	2.0	0	clr, haze	8.9	var ssw-wnw	28.7	-	3	87	88	3	13.9
05-Sep	9.00	2.0	0	clr-pcl-clr, haze	15.4	var wsw	23.9	-	3	82	78	3	18.0
06-Sep	9.00	2.0	0	clr	2.9	ne-wsw	20.4	-	1	85	90	1	2.0
07-Sep	8.25	2.0	0	clr-mcl-ovc, haze, ts	8.3	var wsw-w	26.4	-	3	76	79	2	10.3
08-Sep	9.00	2.0	0	mcl-pcl-mcl-ovc	16.7	w-wnw	19.0	-	3	76	80	2	9.2
09-Sep	7.35	1.8	0	ovc, fog-rain-snow	10.0	var wsw-wnw	8.5	-	4	46	62	0	1.9
10-Sep	9.00	2.0	0	clr	4.5	var ssw-wnw	19.4	-	2	90	90	2	6.4
11-Sep	9.00	2.0	0	clr, haze	6.3	var wsw-nw	19.4	-	2	90	90	2	8.2
12-Sep	9.00	2.9	0	clr	2.9	ssw-w, ne-ene	26.6	-	1	86	85	-	17.7
13-Sep	9.00	3.0	0	clr-pcl-ovc	8.8	var wsw-wnw	23.3	-	3	87	89	1	44.9
14-Sep	9.75	2.0	0	pcl-clr, haze	17.4	wsw-w	23.1	-	3	80	79	2	86.3
15-Sep	9.00	3.0	0	ovc-clr, haze	3.8	e-ene, variable	22.7	-	2	85	80	1	26.3
16-Sep	9.00	2.7	0	pcl-mcl-pcl, haze	4.6	sw-w, ene	25.4	-	1	88	87	-	33.4
17-Sep	9.00	3.0	0	clr-pcl	5.5	sw-wsw, ne	24.3	-	1	90	90	2	53.4
18-Sep	9.00	2.8	0	pcl-clr, haze	6.4	ssw-w, ne-ne	25.6	-	2	75	80	2	38.0
19-Sep	9.00	2.0	0	clr, haze	16.9	wsw	22.2	-	4	88	86	2	67.4
20-Sep	9.00	2.2	0	clr-pcl-clr	2.1	var w, e	14.3	-	2	85	80	3	48.2
21-Sep	9.00	2.0	0	clr, haze	5.5	sw-w	17.1	-	2	78	84	2	50.6
22-Sep	9.25	2.1	0	ovc-pcl	8.3	var w	18.8	-	2	88	79	2	27.8
23-Sep	9.25	3.6	0	clr, haze	5.5	var wsw-nw	14.4	-	2	78	79	3	35.9
24-Sep	9.75	4.0	0	clr	4.7	wsw-w, var	16.0	-	2	80	81	3	108.3
25-Sep	9.00	3.3	0	clr	3.3	var ene-e	17.5	-	1	85	85	3	62.9
26-Sep	9.00	2.0	0	clr-pcl-mcl, haze	4.6	var w, e	17.1	-	1	87	87	3	54.2
27-Sep	9.00	2.0	0	clr	1.8	var	15.3	29.93	1	85	83	2	77.3
28-Sep	9.00	2.0	0	clr	3.6	w	18.3	29.88	1	82	79	3	46.1
29-Sep	9.00	2.0	0	clr-pcl-clr, haze	4.0	var ne-ene	23.9	29.84	2	81	69	2	58.3
30-Sep	9.00	2.0	0	clr, haze	1.7	var ene-se	16.0	29.82	1	70	60	2	52.4
01-Oct	9.00	2.0	0	pcl, haze	3.3	ssw-w, ene-e	17.2	29.90	1	70	70	2	44.3
02-Oct	9.00	2.0	0	clr-pcl, haze	2.7	e-ene	16.8	29.85	2	68	67	2	53.2
03-Oct	8.83	2.0	0	pcl-mcl-ovc, rain-snow	7.8	var wsw-w	15.2	29.75	3	75	74	2	48.5

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	7.25	2.0	0	mcl-ovc, rain-ts	10.3	w, var	8.6	29.62	4	53	51	2	26.9
05-Oct	0.00			Weather Day									
06-Oct	4.50	2.0	0	ovc-mcl, fog-haze	8.8	ne-ene	8.1	29.72	4	48	40	2	18.2
07-Oct	4.00	2.0	0	ovc, fog-snow	3.8	w	5.7	29.67	4	50	57	2	11.8
08-Oct	4.00	2.0	0	ovc, haze, rain	7.2	w	6.6	29.80	4	63	67	2	9.3
09-Oct	9.00	2.0	2	ovc-pcl, haze	3.3	w	8.0	29.92	2	70	72	3	35.6
10-Oct	9.00	2.0	0	ovc-mcl-pcl-clr, haze	0.7	ene-e, w	9.8	29.84	3	77	71	2	30.0
11-Oct	6.17	2.0	0	ovc, fog-rain	5.9	nne-ne, var w	10.3	29.83	4	46	21	2	22.1
12-Oct	9.00	2.0	0	clr-mcl	1.3	w, e	6.4	29.91	1	90	80	2	34.9
13-Oct	9.00	2.0	0	clr-pcl-clr, haze	2.8	ne-e, sw-w	12.8	29.96	2	86	76	2	34.0
14-Oct	9.00	3.0	0	clr	8.3	w-wnw	9.1	29.90	1	90	82	2	30.6
15-Oct	9.00	3.0	0	pcl-mcl	8.8	sw-w	11.8	29.83	1	80	80	2	12.7
16-Oct	9.00	4.0	0	ovc	5.3	sw-w	11.4	29.78	2	80	77	3	32.1
17-Oct	9.00	3.1	0	ovc, rain	6.5	sw-w	9.1	29.72	2	65	53	2	10.7
18-Oct	9.00	2.0	0	mcl-pcl	5.5	ene-e	6.6	29.72	2	73	71	2	30.3
19-Oct	9.00	2.0	0	clr	2.4	ne-e	8.0	29.76	1	85	85	3	46.9
20-Oct	9.00	2.0	0	clr, haze	2.8	var, wsw-wnw	9.3	29.73	2	87	78	2	35.7
21-Oct	9.00	2.0	0	mcl-ovc	2.4	ne-ene, ssw-wsw	9.7	29.63	3	89	81	2	22.0
22-Oct	8.75	2.0	0	ovc, rain, snow	7.4	sw-wsw	8.3	29.56	4	60	63	2	10.4
23-Oct	3.25	2.0	0	ovc, rain	29.2	w	2.4	29.55	4	74	74	2	5.2
24-Oct	4.50	2.0	0	ovc, rain	57.7	w	4.3	29.34	4	50	67	3	1.1
25-Oct	8.00	2.0	0	mcl-ovc, snow	30.0	w	-2.9	29.42	4	75	80	2	1.9
26-Oct	5.83	2.0	0	pc-ovc, snow	31.9	w	-1.8	29.40	4	59	34	2	2.1
27-Oct	8.00	2.0	0	clr-pc	3.1	var	4.1	29.75	2	90	85	1	0.6
28-Oct	8.75	2.0	0	ovc	19.8	ssw-wsw	5.4	29.76	4	88	88	1	2.5
29-Oct	8.75	2.0	0	ovc	19.3	sw-wsw	5.0	29.68	3	88	82	2	7.0
30-Oct	3.00	2.0	0	ovc	17.0	wsw-w	4.0	29.50	4	63	71	1	1.7
31-Oct	8.75	2.0	0	mcl-ovc	18.6	wsw-w	1.9	29.72	3	85	85	2	9.7
01-Nov	8.67	2.0	0	pcl-mcl-clr	5.8	wsw	3.5	29.95	2	87	85	2	38.0
02-Nov	8.67	2.0	0	clr, haze	6.6	nne-ne	6.6	30.05	1	88	85	2	8.8
03-Nov	8.50	2.0	0	clr-ovc, haze	9.2	ene, wsw	9.0	30.00	1	90	74	2	5.5
04-Nov	8.50	2.0	0	clr-pcl-mcl	5.8	ssw-wsw	9.7	29.88	1	90	76	2	6.5
05-Nov	8.50	2.0	0	pcl-mcl-ovc	17.2	wsw	10.1	29.77	2	88	79	2	8.0

¹ Average of hourly records.

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

³ Predominant sky condition during day: clr = clear (0-15% cloud cover); pcl = partly cloudy (16-50% cover); mcl = 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: 2010.

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	1	0	0	0	3	0	0	0	0	0	0	1	10	0	0	0	0	0	0	1	0	0	2	0	0	0	0	18	2.0
16-Aug	9.00	1	0	0	0	0	0	0	0	0	0	0	3	11	0	0	0	0	0	0	3	0	0	0	0	0	0	0	18	2.0
17-Aug	9.00	2	0	0	2	0	0	0	0	0	0	0	0	11	0	0	1	0	0	0	5	0	1	1	0	0	0	0	23	2.6
18-Aug	9.00	1	0	2	1	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	11	1.2	
19-Aug	9.00	0	1	0	3	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	7	0.8	
20-Aug	9.00	1	0	1	1	2	0	0	0	0	0	0	0	8	0	0	0	1	0	0	3	0	0	0	0	0	0	17	1.9	
21-Aug	9.00	1	1	0	0	2	0	0	0	0	0	0	1	12	0	0	0	3	0	0	0	0	3	2	0	0	0	25	2.8	
22-Aug	8.50	0	0	0	1	1	0	0	0	0	0	0	0	8	0	0	0	0	0	0	2	0	0	0	0	0	0	12	1.4	
23-Aug	9.00	0	0	1	2	2	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	29	3.2	
24-Aug	9.00	0	0	0	0	0	0	0	0	2	0	0	0	10	0	0	0	2	0	0	0	0	0	0	0	0	0	14	1.6	
25-Aug	9.00	1	0	1	6	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	2	0	0	1	0	0	0	16	1.8	
26-Aug	8.75	1	0	1	4	0	0	0	0	1	0	0	0	14	0	0	0	0	0	0	7	0	0	0	0	0	0	28	3.2	
27-Aug	8.75	0	1	1	3	2	1	0	0	1	0	0	0	12	0	0	0	1	0	0	3	0	0	0	0	0	0	25	2.9	
28-Aug	9.00	0	3	3	6	2	1	2	0	0	0	0	5	44	0	0	0	4	0	0	40	0	0	0	0	0	0	111	12.3	
29-Aug	8.83	0	0	0	4	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	2	0	0	0	0	0	0	10	1.1	
30-Aug	9.00	0	0	1	3	1	0	0	0	0	0	0	0	12	0	0	0	1	0	0	2	0	0	1	0	0	0	21	2.3	
31-Aug	9.00	0	0	1	4	1	1	0	0	0	0	0	5	22	0	0	0	0	0	0	10	0	0	0	0	0	1	45	5.0	
01-Sep	9.00	0	0	1	9	3	0	0	0	1	0	0	0	19	0	0	0	2	0	0	27	0	0	0	0	0	0	63	7.0	
02-Sep	9.00	2	1	2	3	1	0	0	0	0	0	0	0	20	0	0	0	2	0	0	6	0	0	1	0	0	0	38	4.2	
03-Sep	9.00	0	2	4	10	3	0	0	0	0	0	0	0	27	0	0	0	3	0	0	16	0	0	0	0	0	0	65	7.2	
04-Sep	9.00	3	3	1	29	10	1	0	1	0	0	0	0	30	0	0	0	2	0	0	42	0	1	2	0	0	0	125	13.9	
05-Sep	9.00	2	3	6	42	3	2	0	0	0	0	0	7	30	0	0	0	2	0	0	63	1	1	0	0	0	0	162	18.0	
06-Sep	9.00	4	1	0	4	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	2	0	0	0	0	0	0	18	2.0	
07-Sep	8.25	2	2	3	33	25	0	0	0	0	0	0	1	13	0	0	0	2	0	0	3	0	0	1	0	0	0	85	10.3	
08-Sep	9.00	6	14	2	30	12	0	0	0	0	0	0	0	16	0	0	1	0	0	0	1	0	0	1	0	0	0	83	9.2	
09-Sep	7.35	0	0	0	7	2	0	0	0	1	0	0	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	14	1.9	
10-Sep	9.00	7	1	0	20	12	2	0	0	0	0	0	1	7	0	0	0	3	0	0	5	0	0	0	0	0	0	58	6.4	
11-Sep	9.00	0	4	1	46	5	1	0	0	0	0	0	0	11	0	0	0	2	0	0	3	0	1	0	0	0	0	74	8.2	
12-Sep	9.00	8	6	2	58	13	1	0	1	4	0	0	18	24	0	0	4	1	0	0	18	0	1	0	0	0	0	159	17.7	
13-Sep	9.00	10	8	2	207	80	2	0	0	1	0	0	6	37	0	0	3	6	0	0	35	1	0	3	0	0	3	404	44.9	
14-Sep	9.75	2	1	8	400	80	0	0	0	10	0	0	10	39	0	0	0	8	0	0	282	0	0	1	0	0	0	841	86.3	

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	2	8	2	121	43	0	0	0	0	0	6	31	0	0	1	3	0	0	16	1	0	0	0	0	1	2	237	26.3	
16-Sep	9.00	8	3	6	117	70	2	1	2	12	0	8	4	29	0	0	2	3	0	0	33	1	0	0	0	0	0	301	33.4	
17-Sep	9.00	2	1	0	306	99	0	5	0	3	0	6	1	13	0	0	0	4	0	0	38	1	1	1	0	0	0	481	53.4	
18-Sep	9.00	17	4	4	163	67	0	1	1	1	0	6	13	23	0	0	0	4	0	0	36	1	0	1	0	0	0	342	38.0	
19-Sep	9.00	7	1	2	298	169	0	0	1	8	0	0	12	29	0	0	0	14	0	0	64	1	0	1	0	0	0	607	67.4	
20-Sep	9.00	71	0	2	145	120	0	0	0	3	0	5	32	33	0	0	0	1	0	0	22	0	0	0	0	0	0	434	48.2	
21-Sep	9.00	27	8	3	165	129	1	0	0	0	0	0	40	42	0	0	2	5	0	0	31	1	0	1	0	0	0	455	50.6	
22-Sep	9.25	9	2	1	137	47	1	0	0	0	0	0	18	12	1	0	1	2	0	0	26	0	0	0	0	0	0	257	27.8	
23-Sep	9.25	72	6	1	59	30	0	0	1	0	0	14	46	48	0	0	0	6	0	0	40	6	0	1	0	0	0	332	35.9	
24-Sep	9.75	202	12	3	161	163	0	1	0	17	0	76	156	215	1	0	6	2	0	0	30	1	0	2	0	0	0	8	1056	108.3
25-Sep	9.00	12	3	1	135	172	0	0	0	0	0	38	84	97	0	0	2	2	0	0	17	0	1	1	0	0	0	1	566	62.9
26-Sep	9.00	28	0	4	137	122	0	0	0	20	0	30	48	69	0	0	0	4	0	0	10	1	0	0	0	0	0	15	488	54.2
27-Sep	9.00	56	2	4	170	183	4	0	3	19	0	26	118	93	0	0	2	3	0	0	13	0	0	0	0	0	0	0	696	77.3
28-Sep	9.00	15	2	2	115	54	3	0	0	11	0	36	78	74	0	0	1	5	1	0	15	0	1	0	0	0	2	415	46.1	
29-Sep	9.00	7	3	11	134	113	4	0	0	0	0	11	76	98	0	0	2	15	0	0	47	3	0	1	0	0	0	0	525	58.3
30-Sep	9.00	12	2	1	143	106	0	0	0	3	0	2	69	107	0	0	0	1	0	0	25	0	0	1	0	0	0	0	472	52.4
01-Oct	9.00	6	2	2	115	122	1	0	0	1	0	14	34	95	0	0	0	1	0	0	5	0	0	1	0	0	0	0	399	44.3
02-Oct	9.00	19	2	6	172	127	0	0	0	1	0	7	23	95	0	0	0	1	0	0	21	2	0	2	0	0	0	1	479	53.2
03-Oct	8.83	2	2	1	199	88	0	0	0	3	0	3	4	76	0	0	0	2	0	0	28	2	1	3	0	1	0	13	428	48.5
04-Oct	7.25	0	2	1	124	42	1	0	0	4	0	2	2	12	0	0	0	0	0	0	5	0	0	0	0	0	0	0	195	26.9
05-Oct	4.50	0	2	0	47	7	1	1	0	0	0	1	5	9	0	1	0	2	0	0	2	1	0	3	0	0	0	0	82	18.2
06-Oct	4.00	1	0	0	36	4	0	0	0	0	0	0	0	4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	47	11.8
07-Oct	4.00	13	0	0	5	4	0	0	0	0	0	0	1	12	0	0	0	2	0	0	0	0	0	0	0	0	0	0	37	9.3
08-Oct	9.00	9	0	1	137	31	4	0	0	0	0	4	3	109	1	0	2	3	0	0	9	6	0	1	0	0	0	0	320	35.6
09-Oct	9.00	19	0	4	73	37	1	0	0	1	0	1	0	122	1	1	1	6	0	0	1	2	0	0	0	0	0	0	270	30.0
10-Oct	6.17	1	0	1	28	14	0	0	0	0	0	1	0	86	0	0	0	2	0	0	1	2	0	0	0	0	0	0	136	22.1
11-Oct	9.00	2	0	2	62	29	1	0	0	0	0	4	0	203	0	0	0	4	0	0	7	0	0	0	0	0	0	0	314	34.9
12-Oct	9.00	1	1	2	40	28	0	2	0	0	0	0	1	224	0	0	1	2	0	0	1	3	0	0	0	0	0	0	306	34.0
13-Oct	9.00	3	0	11	102	18	0	0	0	0	0	0	0	122	0	1	0	6	1	0	10	1	0	0	0	0	0	0	275	30.6
14-Oct	9.00	1	1	8	32	8	0	0	0	0	0	0	0	50	0	1	0	2	0	0	10	0	0	1	0	0	0	0	114	12.7
15-Oct	9.00	2	1	0	306	99	0	5	0	3	0	6	1	13	0	0	0	4	0	0	38	1	1	1	0	0	0	0	481	53.4

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	2	1	8	142	16	1	0	0	3	0	0	0	99	0	0	0	8	0	0	5	2	1	1	0	0	0	0	289	32.1
17-Oct	9.00	0	0	3	47	5	0	0	0	1	0	0	0	26	0	1	0	5	0	0	6	2	0	0	0	0	0	0	96	10.7
18-Oct	9.00	0	1	4	54	20	3	0	0	1	0	0	0	173	1	0	0	6	0	0	5	4	0	1	0	0	0	0	273	30.3
19-Oct	9.00	1	0	5	38	8	0	0	0	3	0	0	1	353	0	1	0	6	1	0	2	2	1	0	0	0	0	0	422	46.9
20-Oct	9.00	0	1	2	44	9	5	1	0	0	0	0	0	248	0	0	1	5	1	0	2	1	0	0	0	0	0	1	321	35.7
21-Oct	9.00	0	0	6	16	3	5	0	0	2	0	0	0	154	1	1	0	9	0	0	1	0	0	0	0	0	0	0	198	22.0
22-Oct	8.75	0	0	5	15	6	0	0	0	2	0	0	0	54	0	0	1	8	0	0	0	0	0	0	0	0	0	0	91	10.4
23-Oct	3.25	0	0	0	3	1	0	0	0	0	0	0	0	10	0	0	0	2	0	0	0	0	0	0	0	0	0	1	17	5.2
24-Oct	4.50	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	5	1.1
25-Oct	8.00	0	0	0	0	0	0	0	0	1	0	0	0	11	0	0	0	3	0	0	0	0	0	0	0	0	0	0	15	1.9
26-Oct	5.83	0	1	0	0	0	0	0	0	0	0	0	0	4	0	2	0	5	0	0	0	0	0	0	0	0	0	0	12	2.1
27-Oct	8.00	0	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5	0.6
28-Oct	8.75	0	0	0	8	0	1	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	2.5
29-Oct	8.75	0	0	3	28	2	0	0	0	0	0	0	0	23	0	1	0	1	1	0	0	2	0	0	0	0	0	0	61	7.0
30-Oct	3.00	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1.7
31-Oct	8.75	0	0	11	7	2	1	0	0	2	0	0	0	52	0	0	0	8	0	0	0	0	0	2	0	0	0	0	85	9.7
01-Nov	8.67	0	0	6	29	10	1	0	0	1	0	0	0	279	1	0	0	2	0	0	0	0	0	0	0	0	0	0	329	38.0
02-Nov	8.67	0	0	4	4	2	0	0	0	1	0	0	0	63	0	0	0	1	0	0	0	1	0	0	0	0	0	0	76	8.8
03-Nov	8.50	0	0	4	1	1	0	0	0	0	0	0	0	38	1	0	0	2	0	0	0	0	0	0	0	0	0	0	47	5.5
04-Nov	8.50	0	1	6	1	0	0	0	0	0	0	0	0	43	0	0	0	2	0	0	1	1	0	0	0	0	0	0	55	6.5
05-Nov	8.50	0	0	4	3	1	1	0	0	0	0	0	0	53	0	0	0	5	1	0	0	0	0	0	0	0	0	0	68	8.0
Total	692.60	682	126	201	5063	2599	54	14	10	145	0	295	933	4427	8	10	34	236	6	0	1170	54	14	42	0	1	1	52	16177	23.4

¹ See Appendix B for explanation of species codes.

Appendix E. Annual summaries of observation effort and unadjusted raptor counts by species: 1983–2010.

	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	2010	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	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	5-Nov	4-Nov
Observation days	79	71	82	78	83	81	79	76	83	82	82	82	83	82	79
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	692.60	672.98
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	2,336	2,127
SPECIES	RAPTOR COUNTS														
Turkey Vulture	482	732	349	297	441	243	466	685	445	355	735	637	640	682	388
Osprey	187	176	110	152	152	83	96	120	83	68	113	89	59	126	92
Northern Harrier	255	247	356	233	178	154	127	96	153	177	186	158	154	201	173
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	5,063	4,494
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	2,599	3,046
Northern Goshawk	97	99	84	123	80	11	16	41	74	95	55	27	26	54	94
Unknown small accipiter ¹	-	-	-	-	-	246	268	299	521	57	360	204	262	14	248
Unknown large accipiter ¹	-	-	-	-	-	4	3	11	32	6	1	6	7	10	9
Unknown accipiter	368	75	132	87	56	7	0	8	37	9	5	11	11	145	253
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	7,885	7,970
Red-shouldered Hawk	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Broad-winged Hawk	37	160	59	87	79	58	58	122	36	57	122	81	101	295	61
Swainson's Hawk	143	507	334	132	251	91	908	197	664	109	163	248	445	933	269
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	4,427	3,132
Ferruginous Hawk	18	16	25	19	14	20	20	8	12	10	11	10	8	8	15
Rough-legged Hawk	10	6	50	24	23	6	1	7	6	17	13	15	12	10	14
Unidentified buteo	77	5	24	21	13	42	57	117	97	13	44	91	120	34	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	5,707	3,562
Golden Eagle	329	235	341	305	295	330	181	160	130	152	218	226	206	236	249
Bald Eagle	6	6	31	14	8	12	9	12	11	9	10	6	6	6	12
Unidentified eagle	0	0	0	0	0	0	0	4	0	0	0	0	0	0	1
TOTAL EAGLES	335	241	372	319	303	342	190	176	141	161	228	232	212	242	261
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	1,170	1,795
Merlin	78	91	59	49	51	39	33	22	40	40	34	51	50	54	41
Prairie Falcon	48	50	30	37	23	12	14	11	9	26	19	10	21	14	25
Peregrine Falcon	29	26	14	21	29	15	9	11	14	17	18	22	23	42	13
Unknown small falcon ¹	-	-	-	-	-	0	10	9	1	2	3	4	2	0	3
Unknown large falcon ¹	-	-	-	-	-	4	1	3	6	2	1	0	6	1	3
Unidentified falcon	7	2	7	3	2	2	2	0	4	0	2	2	2	1	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	1,282	1,882
Unidentified raptor	102	25	57	34	26	81	79	51	104	3	86	51	60	52	108
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	16,177	14,436

¹ Designations used consistently beginning in 2002.

Appendix F. Daily trapping effort and captures by species: 2010.

DATE	STATION		SPECIES ¹												CAPTURES		
	HOURS		NH	SS	CH	NG	BW	SW	RT	RL	GE	AK	ML	PR	PG	TOTAL	/STN HR
20-Aug	1.50		0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.7
21-Aug	7.50		0	0	0	0	0	0	2	0	0	0	0	1	0	3	0.4
22-Aug	7.50		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
23-Aug	7.25		0	2	2	0	0	0	7	0	0	1	0	0	0	12	1.7
24-Aug	7.25		0	1	0	0	0	0	4	0	0	1	0	0	0	6	0.8
25-Aug	8.00		0	1	0	0	0	0	1	0	0	3	0	0	0	5	0.6
26-Aug	7.50		0	1	1	0	0	0	5	0	0	2	0	1	0	10	1.3
27-Aug	8.00		0	3	0	0	0	0	1	0	0	0	0	0	0	4	0.5
28-Aug	7.75		0	3	1	0	0	0	7	0	0	0	0	0	0	11	1.3
29-Aug	7.00		0	2	1	0	0	0	2	0	0	0	0	0	0	5	0.7
30-Aug	7.50		0	1	1	0	0	0	4	0	0	0	0	0	0	6	0.8
31-Aug	7.00		0	1	0	0	0	0	4	0	0	2	0	0	0	7	1.0
01-Sep	7.50		0	4	0	0	0	0	4	0	0	2	0	0	0	10	1.3
02-Sep	7.50		0	2	1	0	0	0	4	0	0	2	0	0	0	9	1.2
03-Sep	7.75		0	1	2	0	0	0	5	0	0	2	0	0	0	10	1.3
04-Sep	7.75		0	4	0	0	0	0	4	0	0	4	0	1	0	13	1.7
05-Sep	8.00		0	2	1	0	0	0	3	0	0	2	1	0	0	9	1.1
06-Sep	4.00		0	2	0	0	0	0	0	0	0	0	0	0	0	2	0.5
07-Sep	7.25		0	11	3	0	0	0	1	0	0	0	0	0	0	15	2.1
08-Sep	7.75		0	6	3	0	0	0	1	0	0	0	0	0	0	10	1.3
09-Sep	5.00		0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.2
10-Sep	7.75		0	6	3	0	0	0	3	0	0	0	0	0	0	12	1.5
11-Sep	7.50		0	21	3	0	0	0	2	0	0	1	0	0	0	27	3.6
12-Sep	7.75		1	25	3	0	0	0	0	0	0	0	0	0	0	29	3.7
13-Sep	7.75		0	39	10	0	0	0	2	0	0	0	0	0	0	51	6.6
14-Sep	8.00		0	26	5	0	0	1	1	0	0	1	0	0	0	34	4.3
15-Sep	8.00		0	29	16	0	0	0	2	0	0	0	0	0	0	47	5.9
16-Sep	8.00		0	22	6	0	0	0	1	0	0	0	0	0	0	29	3.6
17-Sep	8.00		0	41	14	0	0	0	2	0	0	1	0	0	0	58	7.3
18-Sep	9.00		0	24	20	0	0	0	0	0	1	0	0	0	0	45	5.0
19-Sep	0.00																
20-Sep	0.00																
21-Sep	0.00																
22-Sep	0.00																
23-Sep	6.50		0	4	0	0	0	0	0	0	1	2	0	0	7	1.1	
24-Sep	7.75		0	16	12	0	0	0	0	0	2	1	0	0	31	4.0	
25-Sep	15.91		0	31	22	0	0	0	0	0	0	0	0	0	53	3.3	
26-Sep	8.00		0	5	8	0	0	0	5	0	0	1	1	0	0	20	2.4
27-Sep	15.25		0	37	14	0	0	0	2	0	0	0	0	0	0	53	3.5
28-Sep	15.50		0	27	10	0	0	0	2	0	0	1	0	0	0	40	2.6
29-Sep	8.00		0	16	21	0	0	0	4	0	0	0	0	0	0	41	5.1
30-Sep	8.25		0	20	24	0	0	0	0	0	0	2	0	0	0	46	5.6
01-Oct	8.00		0	10	10	0	0	0	1	0	0	0	0	0	0	21	2.6
02-Oct	8.10		0	35	17	0	1	0	1	0	0	1	0	0	0	55	6.8

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	7.33		0	40	17	0	0	0	0	0	0	2	2	0	0	61	8.3
04-Oct	0.00																
05-Oct	2.50		0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.4
06-Oct	0.00																
07-Oct	4.17		0	17	1	0	0	0	0	0	0	0	0	0	0	18	4.3
08-Oct	4.00		0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.3
09-Oct	7.50		0	13	7	1	0	0	2	0	0	0	1	0	0	24	3.2
10-Oct	15.50		0	27	7	1	0	0	0	0	1	0	2	0	0	38	2.5
11-Oct	7.66		0	3	1	0	0	0	1	0	0	0	1	0	0	6	0.8
12-Oct	0.00																
13-Oct	0.00																
14-Oct	8.00		0	26	1	0	0	0	5	0	0	0	1	0	0	33	4.1
15-Oct	7.75		0	6	2	0	0	0	1	0	0	2	0	0	1	12	1.5
16-Oct	15.50		0	35	4	0	0	0	2	0	0	0	0	0	0	41	2.6
17-Oct	10.00		0	13	2	0	0	0	0	0	1	1	0	0	0	17	1.7
18-Oct	7.00		0	9	1	0	0	0	0	0	0	1	0	0	0	11	1.6
19-Oct	7.25		0	2	1	0	0	0	5	0	0	0	1	0	0	9	1.2
20-Oct	7.00		0	5	1	1	0	0	2	0	0	0	0	0	0	9	1.3
21-Oct	7.25		0	2	0	1	0	0	1	0	0	0	0	0	0	4	0.6
22-Oct	7.50		0	4	0	0	0	0	2	0	0	0	0	0	0	6	0.8
23-Oct	1.25		0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.8
24-Oct	0.00																
25-Oct	0.00																
26-Oct	0.00																
27-Oct	0.00																
28-Oct	6.25		0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.2
29-Oct	7.00		0	7	0	0	0	0	3	0	0	0	2	0	0	12	1.7
30-Oct	2.50		0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.4
31-Oct	6.25		0	2	0	0	0	0	1	0	1	0	0	0	0	4	0.6
01-Nov	7.25		0	4	0	0	0	0	6	0	0	0	0	0	0	10	1.4
Total	468.17		1	700	280	5	1	1	119	0	4	38	15	3	1	1168	2.5

¹ See Appendix B for explanation of species codes.

Appendix G. Annual summaries of banding effort and capture totals by species: 1980–2010.

	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	2010	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	20-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	1-Nov	26-Oct
Blinds in operation	6	5	5	5	3	4	4	4	4	3	4	3	3	2	2	2	3.5
Trapping days	63	61	62	63	72	62	72	68	66	53	69	72	63	62	64	62	60.3
Station days	312	270	264	236	131	174	210	188	163	105	150	128	81	69	66	68	162.0
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	476	1,136.6
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	245.5	175.3
SPECIES	RAPTOR CAPTURES																
Northern Harrier	2	1	18	4	0	17	11	8	7	2	3	2	6	2	0	1	5.2
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	700	1,106.9
Cooper's Hawk	695	737	767	1,006	438	504	975	791	460	342	562	356	383	314	307	280	559.9
Northern Goshawk	27	68	20	20	20	24	23	7	9	28	21	26	18	2	3	5	25.5
Broad-winged Hawk	3	0	0	1	0	3	1	0	2	1	2	1	2	0	1	1	1.0
Swainson's Hawk	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0.2
Red-tailed Hawk	93	84	67	69	49	58	76	109	63	61	67	56	39	40	43	119	62.4
Rough-legged Hawk	0	0	0	0	0	0	2	0	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	4	3.9
Bald Eagle	0	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	38	121.3
Merlin	13	18	26	13	16	11	12	15	5	11	11	5	6	6	6	15	8.3
Prairie Falcon	3	7	17	7	3	8	3	4	3	4	3	5	3	0	4	3	4.4
Peregrine Falcon	1	1	4	0	1	1	1	3	0	0	2	2	0	0	0	1	0.8
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	1,168	1,899.8
Recaptures ¹	3	3	7	9	4	6	9	7	2	2	2	2	3	4	3	3	3.3
Foreign Recaptures ²	1	4	3	5	2	3	4	3	1	2	4	0	1	2	0	2	1.4
Foreign Encounters ³	16	9	18	15	10	19	10	28	12	16	10	8	10	12	3	3	11.5

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.