

**FALL 2012 RAPTOR MIGRATION STUDIES IN THE
GOSHUTE MOUNTAINS OF NORTHEASTERN NEVADA**



HawkWatch International, Inc.
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FALL 2012 RAPTOR MIGRATION STUDIES IN THE GOSHUTE MOUNTAINS OF NORTHEASTERN NEVADA

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INTRODUCTION

The Goshute Mountains Raptor Migration Project in northeastern Nevada is an ongoing effort to monitor long-term population trends 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 2012 season marking the 33rd consecutive season of banding and the 30th 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 2012 count and banding results.

The Goshute project was 1 of 8 long-term, annual migration count, and 1 of 4 migration banding studies conducted or co-sponsored by HWI in North America during 2012 fall migration season. 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 can serve as important biological indicators of ecosystem health (Bildstein 2001) and long-term migration counts are cost effective and efficient methods for monitoring the regional status and trends of many raptor species (Zalles and Bildstein 2000, Bildstein et al. 2008).

In coordination with the long-term counting and banding efforts, HWI has and will continue to explore related research activities to further help provide valuable information about migratory behavior of raptors, as well as identify species' ranges, migratory routes and connectivity, and track changes in raptor health and populations (e.g., Hoffman et al. 2002, Lott and Smith 2006, Goodrich and Smith 2008). 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 the Goshute Mountain Raptor Migration Project, as well as all other HWI affiliated 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 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 hindered the view covering the east side. To compensate when winds blew from the east, during the first couple decades observers commonly moved about 250 m north to a second observation post (OP2 in Figure 1), which provided an unobstructed view along the lower eastern flanks of the ridge. Beginning in 2001, OP2 was designated the standard observation site and season wide standardized counts have been conducted at this location every year since (cf. Vekasy and Smith 2002).

Two banding stations were in operation this past season; North and West. For a brief history, North station, located approximately 300 m north-northwest of the current observation location (OP2), was established mid-season in 1989, at an elevation of approximately 2,700 m. West station, located on a flank approximately 100 m to the southwest, was established in 1980 at approximately 2,720 m in elevation. Slight modifications to the trapping arenas occurred at North during the 1998 season, and at West during the 1995, as well as the 2000 seasons.

Over the years, the number of trapping stations operated in any one year has varied as high as six. Since 2000, however, only four stations have been in operation. And due to both resource limitations and a reduced need for extensive banding, HWI now primarily use the two stations mentioned above.

METHODS

STANDARDIZED COUNTS

Weather permitting, two primary official observers conducted daily counts throughout the season. Steve Seibel is a long-time HWI veteran counter and volunteer from years past, but Bryce Robinson and Caitlin Davis were new to raptor migration counting, although Bryce has helped with multiple HWI projects, including our winter raptor survey work in the past. (See Appendix A for a complete history of observer participation.) Other crew members and occasionally visitors assisted with the counts as well.

When weather conditions allowed, 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 2012 follows Farmer et al. (2007). In comparing 2012 annual statistics against means and 95% confidence intervals for previous seasons, we equate significance with a 2012 value falling outside the bounds of the confidence interval for the associated mean.

TRAPPING AND BANDING

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

The weather conditions for most of the 2012 fall season were dry and the site was under strict fire restrictions. Observers did record rain, snow, and fog throughout the season, but never to the extent where a whole day of observations was missed or severely shortened (reduced observation time to ≤ 4 hours; see Appendix C for daily weather records). For comparison, weather on average (i.e., 1997-2011) precluded 2.5, and severely hampered 1.6 days of observation in any given season.

During active observation periods, skies were recorded as predominantly fair 48% of the time, 37% transitional (i.e., changed from fair or partly cloudy to mostly cloudy or overcast during the day, or vice versa), and 15% as mostly cloudy to overcast. The averages for the site were 50% fair, 32% transitional, and 19% as mostly cloudy or overcast, suggesting, in comparison, that even though the predominant skies conformed fairly well with long-term averages, transitional skies increased, but skies that are usually predominantly mostly cloudy to overcast or mostly clear, fair, and sunny, decreased. While the season's mean daily temperature was above average (14.4°C vs. average of 13.1°C), the season's ranking of good to excellent thermal lift was only slightly above average (40% vs. 39.1%). Visibility, affected by fog and/or haze (13% of active observation days vs. average of 26.3%), as well as rain and/or snow (11% vs. 18.0% of active observation days) were below average. Visibility distance estimates were only slightly below averages from previous years, but only slightly so (towards east at 82 km vs. an average of 85.0 km and towards the west at 83 km vs. 84.5 km as the long term mean). Low visibility in addition to above average ranking of thermal lift favorable for raptor migration suggests an increase of raptors that may not have been detected during their flight over the Goshute Mountains.

Similar to previous years, the wind conditions in fall 2012 were primarily light (< 12 kph), but considerably less so when compared to the average values (49% of active observation days vs. average of 70.6%). Moderate (12-29 kph) and strong (> 29 kph) winds for the season were both above average, occurring on 37% of active observation days vs. 23.8%, on average for moderate winds and 13% vs. 5.6% on average for strong winds. Average wind directions for the site are typically dominated by SW-W estimates (32.5% of the time) for a major portion of the day, with a N-E pattern in second (15.9%), followed by NE-E (12.8%), and SW-NW (7.8%). This past season, winds came from SW-NW (24%), SW-W (22%), SW-W then switching to N-E later on (19%), NE-E (12%), W-NW (7% vs. 5.9% on average), Calm/Variable (6% vs. 3.4% on average), and SW-NW first and then NE-SE later on (5% vs. 5.4% on average). Thus, although winds seemed to conform well to previous long-term trends, variable winds coming from SW-NW appear to be the dominant direction this past season.

In summary, fall 2012 was overall drier with stronger winds coming more regularly out of the SW-NW. The ranking of good to excellent thermal lift was only slightly above average while visibility was lower, compared to averages over previous years. It is unknown how the stronger more variable SW-NW westerly wind directions affected raptor migratory behavior through the Goshutes but raptors could have been missed due to the lower than average visibility.

OBSERVATION EFFORT

Counts occurred on all possible 83 days standardized from 15 August through 5 November, which is significantly above the long term average ($79 \pm 95\%$ CI of 1.9 days, Appendix E). The number of observation hours (741.00) was also significantly above average (675.55 ± 23.32 hours, Appendix E), but the 2012 average of 2.4 observers per hour (including official and guest observers; value is mean of daily values, which are in turn means of hourly values) was only slightly above the long-term (1983–2011) average of 2.2 ± 0.22 observers per hour.

MIGRATION SUMMARY

Observers counted 12,227 migrants of 17 raptor species (Table 1; see Appendix D for daily count records), which was a 15% decrease compared to the long-term average (Table 1). Significant above average counts were tallied for Red-tailed Hawks and Bald Eagles, and non-significant above average counts for Ospreys, Broad-winged and Swainson's Hawks (Table 1). Significant below average counts were tallied for Sharp-shinned Hawks, Cooper's Hawks, Northern Goshawks, Golden Eagles, and American Kestrels; whereas, non-significant below average counts were tallied for Turkey Vultures, Northern Harriers, Ferruginous Hawks, Merlins, Prairie Falcons, and Peregrine Falcons (Table 1).

The flight consisted of 50% accipiters, 36% buteos, 7% falcons, 3% vultures, 2% eagles, 1% harriers, <1% Ospreys, and < 1% unidentified raptors. The proportions of buteos, harriers, and Ospreys were above average, proportions of vultures and eagles near average, and for accipiters and falcons below average count numbers (Fig. 2). Normally, Sharp-shinned Hawks are the most commonly observed species at the Goshutes but this past season individuals of the Red-tailed Hawk species travelled by the site the most (32% of the total count), followed by Sharp-shinned Hawks (29%), Cooper's Hawks (17%), American Kestrels (6%), Turkey Vultures (3%), Swainson's Hawks (3%), and Golden Eagles (2%, Table 1). Other species that were observed each made up only 1% or less of the total (Table 1).

Passage Rates and Long-Term Trends

Similar to the previous couple of years, Turkey Vultures and Ospreys (Fig. 3); Broad-winged, Swainson's, and Red-tailed Hawks (Fig. 5); and Merlins and Peregrine Falcons (Fig. 7) were all showing significant increases in their population trends. For most of the other species, however, adjusted passage rates showed a quadratic pattern of increasing trends through the late-1990s, followed by various curvatures of declines (Figs. 3-7). Also, similar to previous years, Northern Goshawks continued to show a quadratic decline as well (Fig. 4). Some of these quadratic trends may correspond with patterns of dry and wet cycles (Hoffman and Smith 2003, Smith et al. 2008a), but continued monitoring and further correlation analyses will need to be conducted to confirm these patterns. Golden Eagles and American Kestrels both continued to decline at this and other North American western HWI sites. For Golden Eagles, data from this site, as well as HWI's sites in Oregon (Bonney Butte) and Washington (Chelan Ridge) indicated declining trends could potentially be tied to fewer adults migrating through the sites; whereas, the young were showing no significant trend in either direction. Causes for the widespread declines in American Kestrels remain unknown, but widespread investigations are underway to help understand the negative trends (see, for example, the Peregrine Fund's American Kestrel Partnership; <http://kestrel.peregrinefund.org/>). Rough-legged Hawks were the only species showing no significant trend of overall increase or decrease over time (Fig. 5).

Age Ratios

Immature : adult ratios were below average in 2012 only for Bald Eagles and above average for the rest of the species where the crews were able to obtain age class information (e.g., Sharp-shinned Hawk, Cooper's Hawk, Northern Goshawk, Broad-winged Hawk, Red-tailed Hawk, Golden Eagle, and Peregrine Falcon; Table 2). Typically with Cooper's Hawks, Broad-winged Hawks, and Peregrine Falcons, adults are seen in greater numbers than immatures, but this past season observers identified and counted more immatures (Table 2). In contrast, adult Bald Eagles were counted in greater numbers than immatures during the fall 2012, which was also contrary to the norm (Table 2). As mentioned above, it is important to try and differentiate age (and gender) as best as possible to help determine if adults, immature birds, or both age classes were representative of the current population trends. However, it is often difficult to correctly identify immature vs. adults in many species (see Table 2, Percentage of Unknown Age column). Thus, continued data collection and long-term regression analyses may help investigate if age classes in certain species were increasing or decreasing. However, year-to-year reproductive output based on these data is misleading because of the bias related to large proportions of unidentified birds and general detectability.

Seasonal Timing

The combined-species median passage date of 29 September was one day later than observations from the last few years, but significantly later than the 1990–2011 long-term average by four days (Table 3). On average, the combined-species seasonal distribution normally illustrates an approximate bell-shaped pattern, where the peak migration happens during the end of September (Fig. 8). In comparison, the pattern during fall 2012 followed a similar distribution than in the past with the exception of the presence of a significant temporary reduction in count numbers just prior to the end of the September peak. In addition, crews observed significant increases in flight numbers in mid-October and at the end of the season again (Fig. 8). At the species level, median passage dates for Ospreys, Sharp-shinned Hawks, Northern Goshawks, Rough-legged Hawks, and American Kestrels occurred one to seven days earlier than averages from previous years. The timing for Broad-winged Hawks did not shift from the average, but for the rest of the species, median passage dates were pushed to a later date by one to fifteen days (Table 3). Based on median passage dates among age classes, immature Northern Harriers and Cooper's Hawks passed the site seven and two days early, respectively, and adult Northern Goshawks medians occurred 20 days later. In Broad-winged Hawks, the median passage dates for adults happened three days early whereas in immatures it occurred three days later than expected (Table 4). Again, interpretations of results among age classes should be treated with caution due to the high percentages of birds our crews were not able to age adequately (Table 2).

TRAPPING EFFORT

The crews operated one or both of the two available banding stations on 63 of 68 potential days between 25 August and 31 October 2012 (see Appendix F for daily capture records and Appendix G for annual summaries). The number of trapping days was above the 1980–2011 long-term average for the site, but due to significant reduction in crews in recent years, the number of station days (80) and hours (572) were significantly below average (Appendix G).

TRAPPING SUMMARY

During this past season, our trapping crew captured and banded a total of 1,162 birds representing eleven species, two additional recaptures representing birds originally banded at the Goshutes in years past, and three foreign recaptures of birds already banded under someone else's banding operation at another location (Appendix G). Sharp-shinned Hawks accounted for 57% of the total captures, followed by Cooper's Hawks (26%), Red-tailed Hawks (10%), American Kestrels (4%), Northern Goshawks (1%), and Merlins (1%). Each of the remaining species made up <1% of the total. Since inception of banding operation at the site, a total of 60,741 raptors have been captured, including 106 Goshute recaptures and 47 foreign recaptures (Appendix G).

Due to the reduction of staffed trapping station days and hours in recent years (Appendix G), the combined-species capture total for fall 2012 was again significantly below average (Table 5). Likewise, capture totals for six of the eleven species trapped (e.g., Northern Harriers, Sharp-shinned Hawks, Cooper's Hawks, Northern Goshawks, American Kestrels, and Prairie Falcons) were also significantly below average (Table 5). Three species capture totals were significantly above average (i.e., Red-tailed Hawks, Golden Eagles, and Merlins; Table 5). Also, one hatch-year female Peregrine Falcon was captured on 18 September, and on 28 October, a hatch-year Rough-legged Hawk of unknown age was also captured, both being representatives of raptors rarely captured at HWI ridge-top migration sites (see Appendix F for daily capture totals and Appendix G annual comparisons). Along with reduced overall capture totals, the overall percentage of capture success also declined significantly, but for six of the eleven species (Northern Goshawks, Red-tailed Hawks, Rough-legged Hawks, Golden Eagles, American Kestrels, and Peregrine Falcons) the percentage of capture success increased compared to long-term averages (Table 5). Overall capture rates (birds captured per 100 station hours) increased with lower than average capture rates for only two species (American Kestrels and Prairie Falcons), suggesting that the relative efficiency of trapping is still being maintained (Table 5).

The purpose of HWI's banding efforts is to evaluate and separate age, gender, morphological, and physiological characteristics, especially in accipiters and falcons. Similar to the count data, for certain species, banding offers annual comparisons of how gender and age related characteristics vary over time and space given the multiple trapping sites HWI is running every fall season. Typically in Sharp-shinned Hawks, Northern Goshawks, and American Kestrels, more young are captured than adults during a season, whereas the opposite is expected for Cooper's Hawks. In 2012, the opposite occurred for Cooper's Hawks and more young birds were captured compared to adults (Table 6). Comparing sex ratios for all three accipiter species, usually more females are captured than males, but this past season more male Sharp-shinned Hawks and Northern Goshawks were captured than females (Table 6). In American Kestrels, banding efforts in 2012 confirmed the usual observations of more males trapped compared to females (Table 6), however less kestrels were captured compared to the average from previous years (Appendix G). Tracking deviations in annual sex and age ratios through banding may shed light on regional reproductive efforts within certain species (e.g., major changes in sex ratios, or reduced reproductive effort or success) or changes in migratory behavior (e.g., deviations of adult birds and different genders being captured compared to count data).

ENCOUNTERS WITH PREVIOUSLY BANDED BIRDS

Throughout the existence of HWI's raptor migration project at the Goshute Mountains, a total of 376 raptors banded here have subsequently been encountered elsewhere as foreign encounters. Throughout the year, we received notification of six new recoveries: Four Sharp-shinned Hawks, one Cooper's Hawk, and one Red-tailed Hawk (Table 7). The most interesting recovery was of one of the Sharp-shinned Hawks trapped on 28 August near Wetaskiwin, Alberta, Canada by another bander (Table 7). Because the bird was in full immature plumage when it was initially banded at the Goshutes during migration in 2009, we now know that it has at least survived beyond its third year since it hatched. Whether this bird originated and/or is breeding near the recovery site in Canada, is unknown. Another Sharp-shinned and one Cooper's Hawk were found dead along highways in Idaho and Arizona, respectively. Otherwise, all the other birds were found dead of unknown causes (Table 7), which is typical for most band recoveries. All these birds, with the possible exception of the young Sharp-shinned Hawk recovered in Durango, Colorado on 16 December, were recovered in the Intermountain Flyway, however this location was previously hypothesized as a potential overlap between the Intermountain and the Rocky Mountain Flyways (cf. Hoffman et al. 2002). Regardless, any recovery information is important to piece together patterns of migration, habitat connectivity between breeding and winter grounds, as well as causes of mortality and to help calculate survivorship and longevity in various raptor species.

The crew also recaptured (Appendix G) a Cooper's and a Sharp-shinned Hawk originally banded at the Goshutes a few years ago. The Cooper's Hawk was banded on 02 October, 2010 as a hatch-year male and recaptured on 14 October, 2012. The Sharp-shinned Hawk was banded on 22 October, 2011 as an after-hatch-year male and recaptured the same day as the above recaptured Cooper's Hawk, 14 October. Three foreign recaptures (Appendix G) consisted of two hatch-year Red-tailed Hawks, one captured on 06 September and the other on 04 October, and one hatch-year female Northern Goshawk captured on 06 September. Both Red-tailed Hawks were banded as nestling by Peter Bloom in California, one on 22 April north of Oceanside, California, and the other on 08 May, east-northeast of San Bernadino, California. The Northern Goshawk was also banded as a nestling in Idaho by Dr. Marc Bechard from Boise State University as part of his long-term research on Northern Goshawk nesting ecology. In fact, this bird also carried an alphanumeric color band attached as well. Retrapping birds at the same location helps determine if they were either local residents or that they used the same migration routes. Recaptures of birds banded by other researchers provide us with valuable information on nesting locations and dispersal with added benefits for calculating survivorship estimates.

RESIDENT RAPTORS

Throughout the season from 16 August through 03 November, multiple resident Red-tailed Hawks were observed and recorded. Based on those records, observers documented at least three adults and three immatures that could be separated for a total of six local individuals. Among the adults, observers document two dark morphs and one light morph. As for immature birds, at least one immature was documented as a light morph and another as a dark morph. The immature dark morph retained a distinguishing white primary on the right wing. Even though the detailed plumage observations only covered two immatures, on 24 August, observers recorded three local immatures but unfortunately the plumages were not recorded in any detail. It is also unfortunate that there were no other recordings throughout the season of multiple immatures of various plumages. Thus, it is unknown if there were multiple dark or light immatures, but we do know that there were at least three immatures documented as residents, two of which could be identified based on unique plumage patterns (see above). The only other buteo documented as a resident was a Rough-legged Hawk seen only on 06 October to east of the observation site and it was observed first moving north and later west. This bird was of unknown morphology, age, or gender.

Resident Golden Eagles were seen on most days throughout the season from 16 August through 04 November. Most days one to two eagles of unknown ages were observed, but on 10 September, observers recorded the two eagles as a “pair” and on 18 October, they recorded the two eagles as both being adults. On 01 October, however, observers recorded a single eagle as a non-adult. Thus, there were at least three Golden Eagles recorded as residents this past season.

A single resident Turkey Vulture was recorded on eight days during the first half of the season starting from the first day on 15 August through 13 September. Two resident Turkey Vultures were recorded on 25 August, and on 30 August, observers identified the single resident vulture recorded that day as immature.

Our crews recorded resident birds from all three accipiter species. Sharp-shinned Hawks were recorded early in the season from the first day on 15 August through 02 September. Most days, single immature or birds of unknown age were recorded. On 22 and 24 August, however, the observers recorded three immatures, and on 28 August, the observers noted two residents of unknown age. Resident Cooper’s Hawks appeared on eleven separate days beginning 16 August through 03 September. Again, on most days a single immature or a bird of unknown age was seen, but on 22 August, three immatures passed by, and on 03 September, two Cooper’s Hawks of unknown age were observed. Finally, at least one resident Northern Goshawk was recorded from the beginning of the season, 15 August through 03 October. On 10 of the 13 days during which a resident Goshawk appeared it was classified as immature. The other three days, the observation crew was not able to identify the age of the bird. Whether this was the same immature bird, is not known.

At least three resident Peregrine Falcons were recorded during the season, beginning 16 August through the 10 October. On most days, single immature or birds of unknown age were noted. On 18 August, observers saw a male and female but did not record their ages. Three Peregrine Falcons of unknown age and gender were seen on 26 August and 10 September, and two Peregrine Falcons of unknown age and gender appeared on 15 September. Single adult Peregrine Falcons passed by on 24 August and 02 September. This may have been a family unit of two adults and one immature bird, but it is not certain based on observer records. Resident American Kestrels were seen on five separate days from the first day of observation through 26 August. On three of those days (i.e., 15, 18, and 25 August) the bird appeared to be a male, then on 26 August a resident female was seen, and on 17 August, a kestrel not identified by gender showed resident behavior. Lastly, on 30 September, a Prairie Falcon was observed and counted as a resident. A single immature Northern Harrier appeared at the site on 29 October.

SITE VISITATION

During the season, approximately 140 visitors came to the Goshute site originating from eight different states (i.e., Nevada, Utah, Oregon, California, Montana, New Mexico, Maine, and Maryland) and one foreign country (Australia). To increase donor participation and involvement in the science of our migration sites, this past season we implemented our Frontline Science program. This program provided access to our counting and banding operation for 18 HWI donors. Their visits were spread out over four separate weekends during the migration peak. During their stay, they participated and assisted the experienced crews in banding, observations, interpretation, cooking, and other camp chores. Other organized groups led by HWI staff included: two groups of students from the Salt Lake Center for Science Education, as well as a group of Audubon Society members from the Portland Audubon Oregon chapter.

Every hour, observers assessed the disturbance level of visitors to quantify how human visitation to the site may affect detectability of migrating raptors. During the 2012 season, 766 hourly assessments of visitor disturbance resulted in the following ratings: 93.9% of the time observers ranked their efforts as not being disturbed at all, 4.7% of the time the crew had to deal with low disturbance, and 1.4% of the time the crews dealt with moderate disturbance levels. Therefore, with various levels of visitation, anywhere from individuals to larger groups, visitor disturbance this past season was relatively negligible.

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ways and definitely deserves a huge thank you for going above and beyond. For tear down, we would like to thank Christian Seipp who, although he was able to skip out of school to generously provide his help, got to experience the “real” education nature has to offer. Lastly, over the years, there are a number of volunteers that return on a regular or semi-regular basis to help with observations and trapping. We truly give special thanks to these folks for their continued support: Jenifer Callahan, Jeannie Montplaisir, John Martin, Sue Ellen and John Lynn, Aaron Barna, Leo Chidester, and Jerry Liguori.

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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: 1983–2011 versus 2012.

SPECIES	COUNTS			RAPTORS/100 HOURS ¹		
	1983–2011 ²	2012	% CHANGE	1983–2011 ²	2012	% CHANGE
Turkey Vulture	390 ± 69.5	329	-16	107.7 ± 18.29	87.0	-19
Osprey	94 ± 15.1	95	+2	21.1 ± 3.09	20.7	-2
Northern Harrier	172 ± 24.1	162	-6	26.4 ± 3.31	22.5	-15
Sharp-shinned Hawk	4517 ± 670.4	3527	-22	995.0 ± 122.43	759.7	-24
Cooper's Hawk	3013 ± 493.5	2130	-29	747.8 ± 103.32	519.8	-30
Northern Goshawk	93 ± 20.9	53	-43	15.4 ± 3.34	8.0	-48
Unknown small accipiter ³	224 ± 100.2	355	+59	–	–	–
Unknown large accipiter ³	8 ± 5.5	10	+20	–	–	–
Unknown accipiter	246 ± 82.8	29	-88	–	–	–
TOTAL ACCIPITERS	7949 ± 1121.8	6104	-23	–	–	–
Red-shouldered Hawk	0.2 ± 0.2	0	-100	–	–	–
Broad-winged Hawk	62 ± 21.3	78	+26	26.0 ± 9.51	31.8	+22
Swainson's Hawk	269 ± 85.7	308	+14	71.7 ± 23.23	78.2	+9
Red-tailed Hawk	3136 ± 324.4	3928	+25	516.5 ± 44.21	537.4	+4
Ferruginous Hawk	15 ± 2.4	11	-27	2.4 ± 0.37	1.4	-42
Rough-legged Hawk	14 ± 3.5	30	+116	6.0 ± 1.36	11.6	+93
Unidentified buteo	69 ± 17.1	76	+9	–	–	–
TOTAL BUTEOS	3565 ± 384.9	4431	+24	–	–	–
Golden Eagle	248 ± 23.4	213	-14	38.7 ± 3.49	30.7	-21
Bald Eagle	12 ± 2.3	16	+35	2.4 ± 0.46	3.1	+28
Unidentified eagle	1 ± 0.4	2	+222	–	–	–
TOTAL EAGLES	260 ± 24.7	231	-11	–	–	–
American Kestrel	1772 ± 318.3	726	-59	372.8 ± 61.99	149.3	-60
Merlin	41 ± 8.7	35	-15	8.0 ± 1.70	6.6	-17
Prairie Falcon	25 ± 5.2	20	-18	4.1 ± 0.76	2.9	-28
Peregrine Falcon	15 ± 4.3	11	-25	2.6 ± 0.74	2.4	-10
Unknown small falcon ³	3.1 ± 2.3	0	-100	–	–	–
Unknown large falcon ³	2 ± 1.4	3	+25	–	–	–
Unknown falcon	6 ± 1.9	1	-82	–	–	–
TOTAL FALCONS	1859 ± 328.9	796	-57	–	–	–
Unidentified raptor	104 ± 32.3	79	-24	–	–	–
GRAND TOTAL	14393 ± 1717.1	12227	-15	–	–	–

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: 1990–2011 versus 2012.

SPECIES	TOTAL AND AGE-CLASSIFIED COUNTS							IMMATURE : ADULT			
	1990–2011 AVERAGE			2012			% UNKNOWN AGE		RATIO		
	TOTAL	IMM.	ADULT	TOTAL	IMM.	ADULT	1990–2011 ¹	2012	1990–2011 ¹	2012	
Northern Harrier	192	55	57	162	40	0	42 ± 5.9	39	1.11 ± 0.260	–	
Sharp-shinned Hawk	4916	1635	1269	3527	1073	591	42 ± 5.1	53	1.32 ± 0.210	1.82	
Cooper's Hawk	3331	745	898	2130	496	399	52 ± 4.2	58	0.81 ± 0.178	1.24	
Northern Goshawk ²	93	45	29	53	34	8	21 ± 5.4	51	2.08 ± 0.564	4.25	
Broad-winged Hawk	76	13	26	78	19	16	42 ± 10.1	75	0.60 ± 0.171	1.19	
Red-tailed Hawk	3484	690	1984	3928	1005	2334	23 ± 3.7	15	0.35 ± 0.056	0.43	
Ferruginous Hawk	16	4	5	11	0	0	44 ± 11.1	100	1.12 ± 0.509	–	
Golden Eagle ²	248	121	66	213	87	29	24 ± 4.4	46	2.19 ± 0.361	3.00	
Bald Eagle	13	6	6	16	6	8	9 ± 5.4	12.5	1.04 ± 0.296	0.75	
Peregrine Falcon	18	4	7	11	4	1	36 ± 10.3	55	0.82 ± 0.281	4.00	

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

² Long-term averages based on data for 1983–2011.

Table 3. First and last observed, bulk passage, and median passage dates by species for migrating raptors in the Goshute Mountains, NV in 2012, with comparisons of 2012 to long-term (1990–2011) average median passage dates.

SPECIES	2012				1990–2011
	FIRST OBSERVED	LAST OBSERVED	BULK PASSAGE DATES ¹	MEDIAN PASSAGE DATE ²	MEDIAN PASSAGE DATE ^{2,3}
Turkey Vulture	15-Aug	22-Oct	8-Sep–3-Oct	25-Sep	23-Sep ± 1.2
Osprey	17-Aug	1-Nov	28-Aug–3-Oct	14-Sep	15-Sep ± 1.5
Northern Harrier	16-Aug	5-Nov	28-Aug–31-Oct	4-Oct	26-Sep ± 3.3
Sharp-shinned Hawk	15-Aug	5-Nov	10-Sep–11-Oct	25-Sep	26-Sep ± 1.8
Cooper's Hawk	23-Aug	4-Nov	9-Sep–9-Oct	24-Sep	23-Sep ± 1.5
Northern Goshawk	24-Aug	3-Nov	7-Sep–31-Oct	3-Oct	4-Oct ± 2.6
Broad-winged Hawk	11-Sep	6-Oct	19-Sep–28-Sep	24-Sep	24-Sep ± 1.4
Swainson's Hawk	19-Aug	19-Oct	29-Aug–3-Oct	20-Sep	19-Sep ± 3.0
Red-tailed Hawk	15-Aug	5-Nov	8-Sep–3-Nov	18-Oct	6-Oct ± 2.2
Ferruginous Hawk	20-Aug	5-Nov	6-Sep–26-Oct	14-Oct	29-Sep ± 4.0
Rough-legged Hawk	6-Oct	3-Nov	14-Oct–3-Nov	21-Oct	22-Oct ± 1.6
Golden Eagle	17-Aug	5-Nov	30-Aug–29-Oct	9-Oct	8-Oct ± 1.6
Bald Eagle	29-Sep	1-Nov	4-Oct–1-Nov	24-Oct	20-Oct ± 4.2
American Kestrel	15-Aug	22-Oct	29-Aug–5-Oct	11-Sep	16-Sep ± 1.8
Merlin	5-Sep	31-Oct	19-Sep–22-Oct	14-Oct	2-Oct ± 2.2
Prairie Falcon	4-Sep	4-Nov	10-Sep–3-Nov	28-Sep	15-Sep ± 3.5
Peregrine Falcon	24-Aug	22-Oct	8-Sep–22-Oct	28-Sep	22-Sep ± 3.0
Total	15-Aug	5-Nov	6-Sep–28-Oct	29-Sep	25-Sep ± 1.2

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: 1990–2011 versus 2012.

SPECIES	ADULT		IMMATURE / SUBADULT	
	1990–2011 ¹	2012	1990–2011 ¹	2012
Northern Harrier	29-Sep ± 4.2	-	22-Sep ± 4.6	15-Sep
Sharp-shinned Hawk	06-Oct ± 1.3	10-Oct	16-Sep ± 1.2	18-Sep
Cooper's Hawk	26-Sep ± 1.6	28-Sep	18-Sep ± 1.3	16-Sep
Northern Goshawk ²	12-Oct ± 3.9	01-Nov	29-Sep ± 3.4	24-Sep
Broad-winged Hawk	23-Sep ± 1.5	20-Sep	25-Sep ± 2.0	28-Sep
Red-tailed Hawk	09-Oct ± 1.7	19-Oct	20-Sep ± 4.0	12-Oct
Golden Eagle ²	14-Oct ± 2.4	15-Oct	04-Oct ± 2.9	10-Oct
Peregrine Falcon	22-Sep ± 5.1	-	20-Sep ± 5.6	-

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 1983–2011.

Table 5. Capture totals, rates, and successes for migrating raptors in the Goshute Mountains, NV: 1983–2011 versus 2012.

SPECIES	CAPTURE TOTAL		CAPTURE RATE ¹		CAPTURE SUCCESS (%) ²	
	1983–2011 ³	2012	1983–2011 ³	2012	1983–2011 ³	2012
Northern Harrier	6 ± 1.7	4	0.5 ± 0.2	0.7	3.6 ± 1.0	2.5
Sharp-shinned Hawk	1176 ± 227.4	661	100.1 ± 7.4	115.5	24.8 ± 3.7	17.5
Cooper's Hawk	589 ± 117.3	297	50.4 ± 4.1	51.9	18.3 ± 2.2	13.0
Northern Goshawk	27 ± 7.5	17	2.5 ± 0.6	3.0	29.4 ± 5.3	32.1
Broad-winged Hawk	1 ± 0.3	0	0.1 ± 0.04	0.0	2.9 ± 1.3	0.0
Swainson's Hawk	0.2 ± 0.2	0	0.02 ± 0.02	0.0	0.08 ± 0.09	0.0
Red-tailed Hawk	66 ± 11.3	112	6.3 ± 1.5	19.6	2.0 ± 0.3	2.8
Rough-legged Hawk	0.1 ± 0.1	1	0.004 ± 0.008	0.2	0.3 ± 0.6	3.2
Golden Eagle	4 ± 1.1	7	0.4 ± 0.1	1.2	1.6 ± 0.4	3.3
Bald Eagle	0.03 ± 0.07	0	0.01 ± 0.02	0.0	0.4 ± 0.8	0.0
American Kestrel	128 ± 40.3	48	9.1 ± 1.7	8.4	6.4 ± 1.6	6.6
Merlin	9 ± 2.4	12	0.8 ± 0.2	2.1	19.4 ± 4.4	34.3
Prairie Falcon	5 ± 1.2	2	0.4 ± 0.1	0.3	20.8 ± 3.5	10.0
Peregrine Falcon	1 ± 0.4	1	0.09 ± 0.04	0.2	7.6 ± 3.5	9.1
All Species	2012 ± 389.8	1162	170.8 ± 11.8	203.0	14.4 ± 2.0	10.2

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: 1991–2011 averages versus 2012.

	FEMALE			MALE			FEMALE : MALE	HY : AHY
	AHY	HY	UNK.	AHY	HY	UNK.	RATIO ¹	RATIO ¹
Sharp-shinned Hawk								
1991–2011 mean	238	385	–	188	460	–	1.01	1.98
2012	118	203	–	99	241	–	0.94	2.05
Cooper's Hawk								
1991–2011 mean	214	161	–	117	152	–	1.46	0.94
2012	99	82	–	45	71	–	1.56	1.06
Northern Goshawk								
1991–2011 mean	4	9	–	2	10	–	1.54	7.18
2012	0	6	–	1	10	–	0.55	16.00
American Kestrel								
1991–2011 mean	7	51	16	19	57	2	0.94	4.66
2012	9	10	0	7	22	0	.66	2.00

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 2012 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	F	1623-23435	14-Oct-10	ASY	10-Jun-12	AHY	Coldstream, BC, Can.	1036	found dead – cause unknown
Sharp-shinned Hawk	F	1623-22400	06-Sep-09	HY	28-Aug-12	ATY	Wetaskiwin, AB, Can.	1122	recaptured – another bander
Sharp-shinned Hawk	F	1623-23560	15-Sep-12	HY	10-Nov-12	HY	Cornville, AZ	587	found dead – highway
Sharp-shinned Hawk	F	1623-23807	28-Sep-12	HY	16-Dec-12	HY	Durango, CO	783	found dead – cause unknown
Cooper's Hawk	F	1005-21755	07-Oct-03	SY	07-Jun-12	ATY	Kooskia, ID	540	found dead – highway
Red-tailed Hawk	U	1177-30905	17-Sep-04	HY	21-Nov-12	ATY	Nampa, ID	374	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.

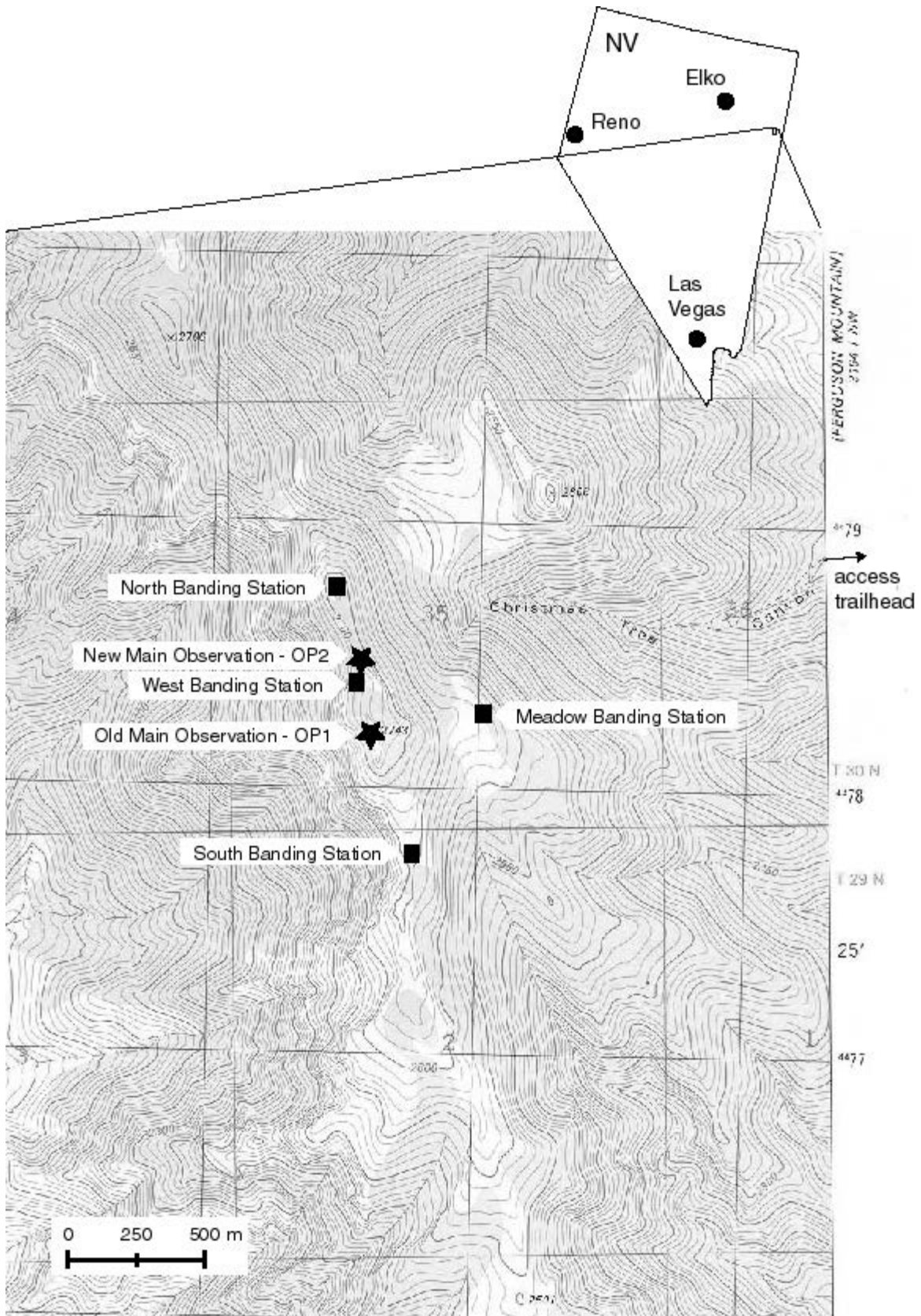


Figure 1. Location of the Goshute Mountains Raptor Migration Project study site.

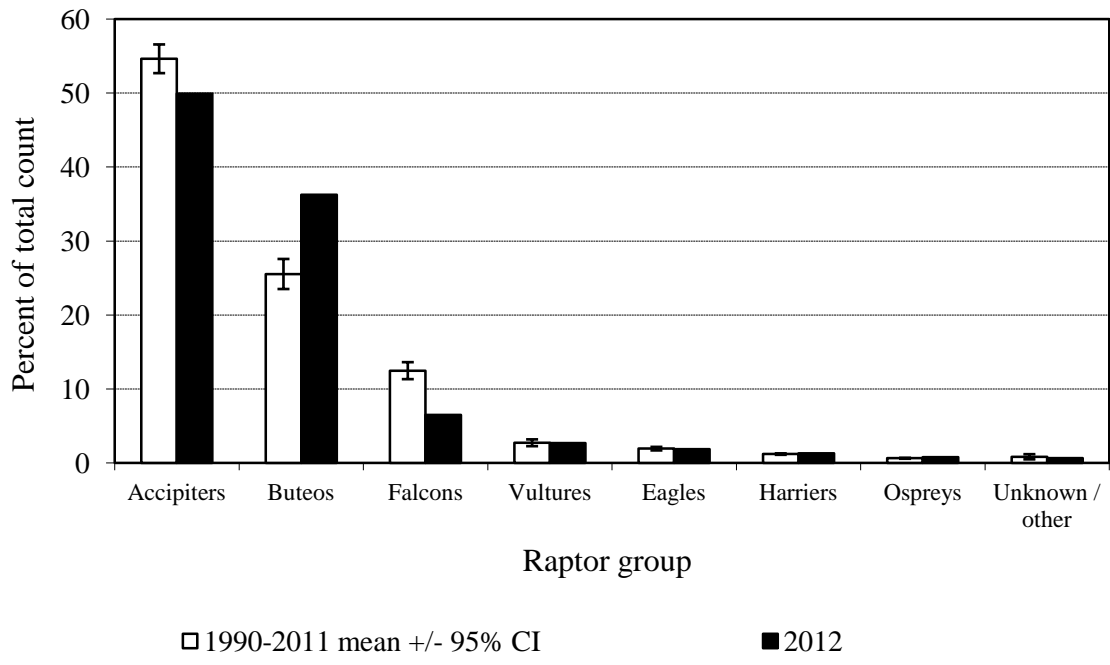


Figure 2. Fall migration flight composition by major species groups in the Goshute Mountains, Nevada: 1983–2011 versus 2012.

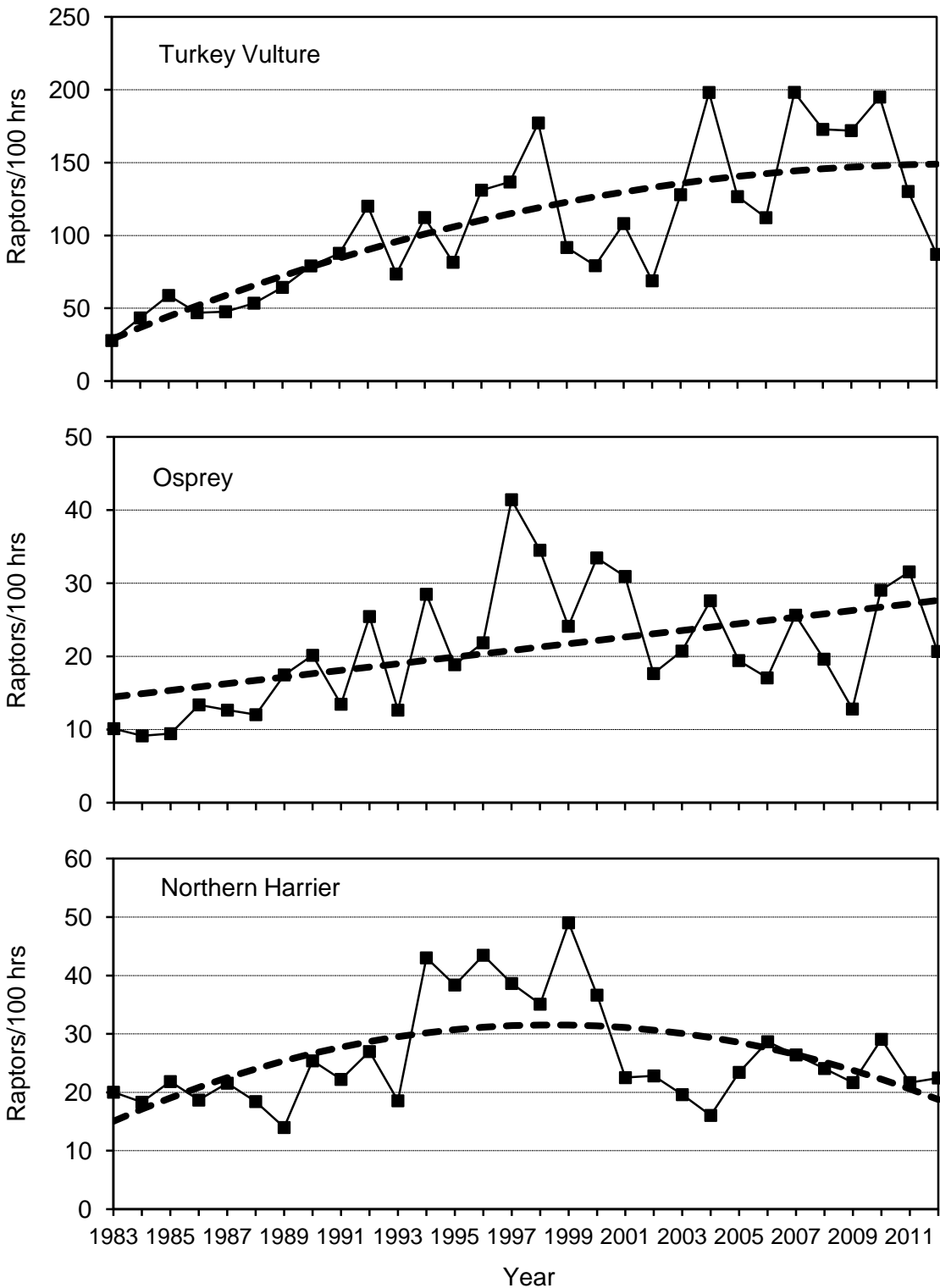


Figure 3. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Turkey Vultures, Ospreys, and Northern Harriers: 1983–2012. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

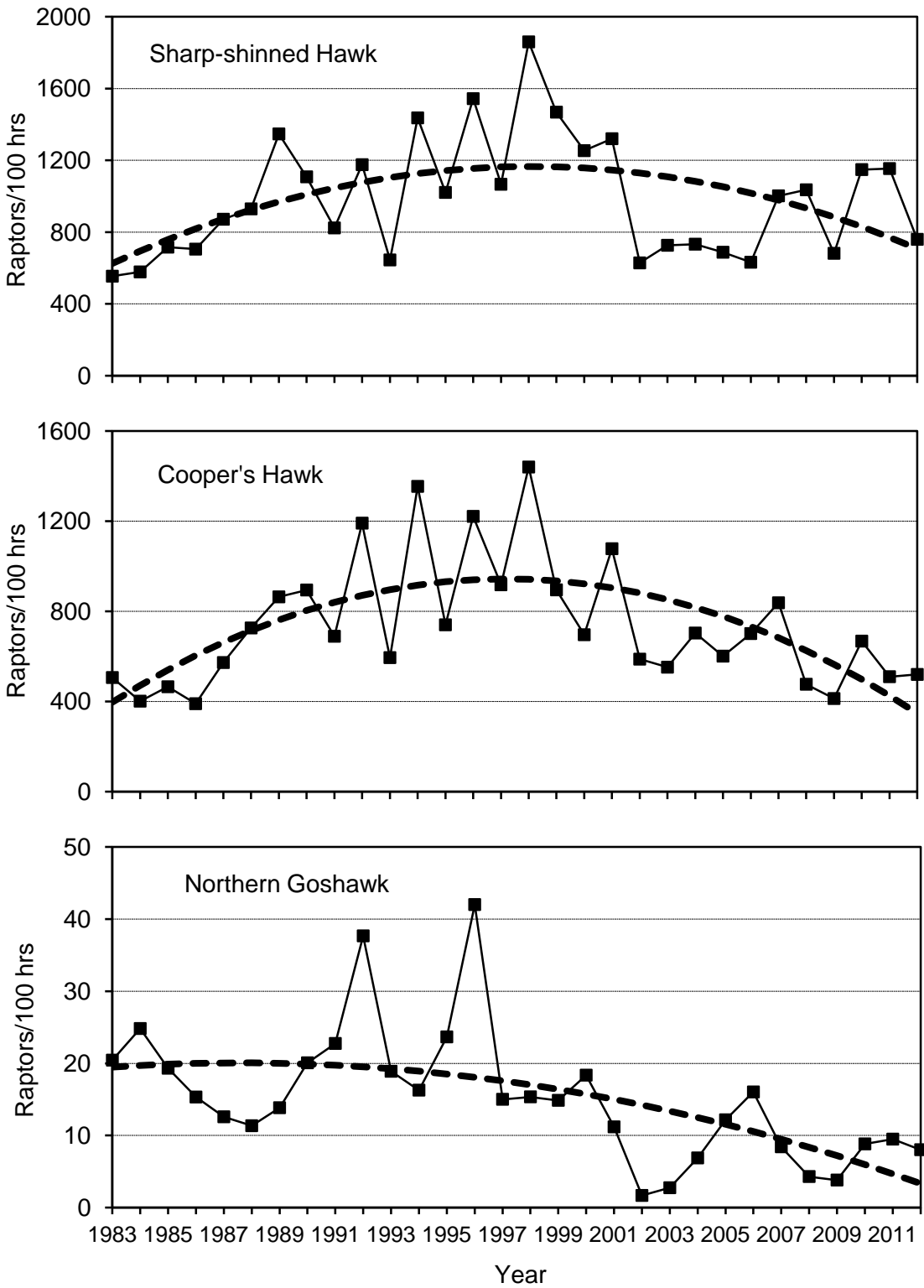


Figure 4. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Sharp-shinned Hawks, Cooper's Hawks, and Northern Goshawks: 1983–2012. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

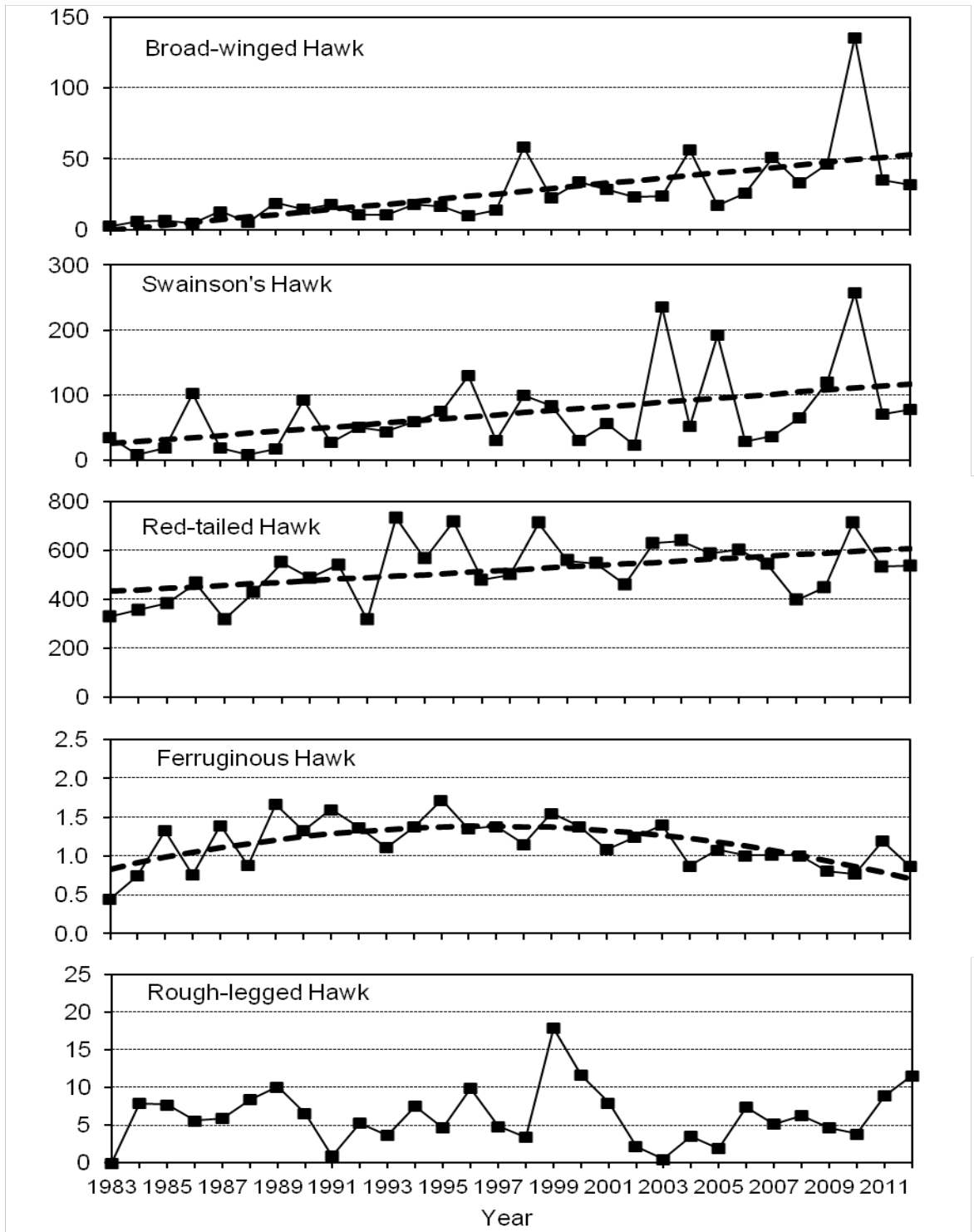


Figure 5. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Broad-winged, Swainson's, Red-tailed, Ferruginous, and Rough-legged Hawks: 1983–2012. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

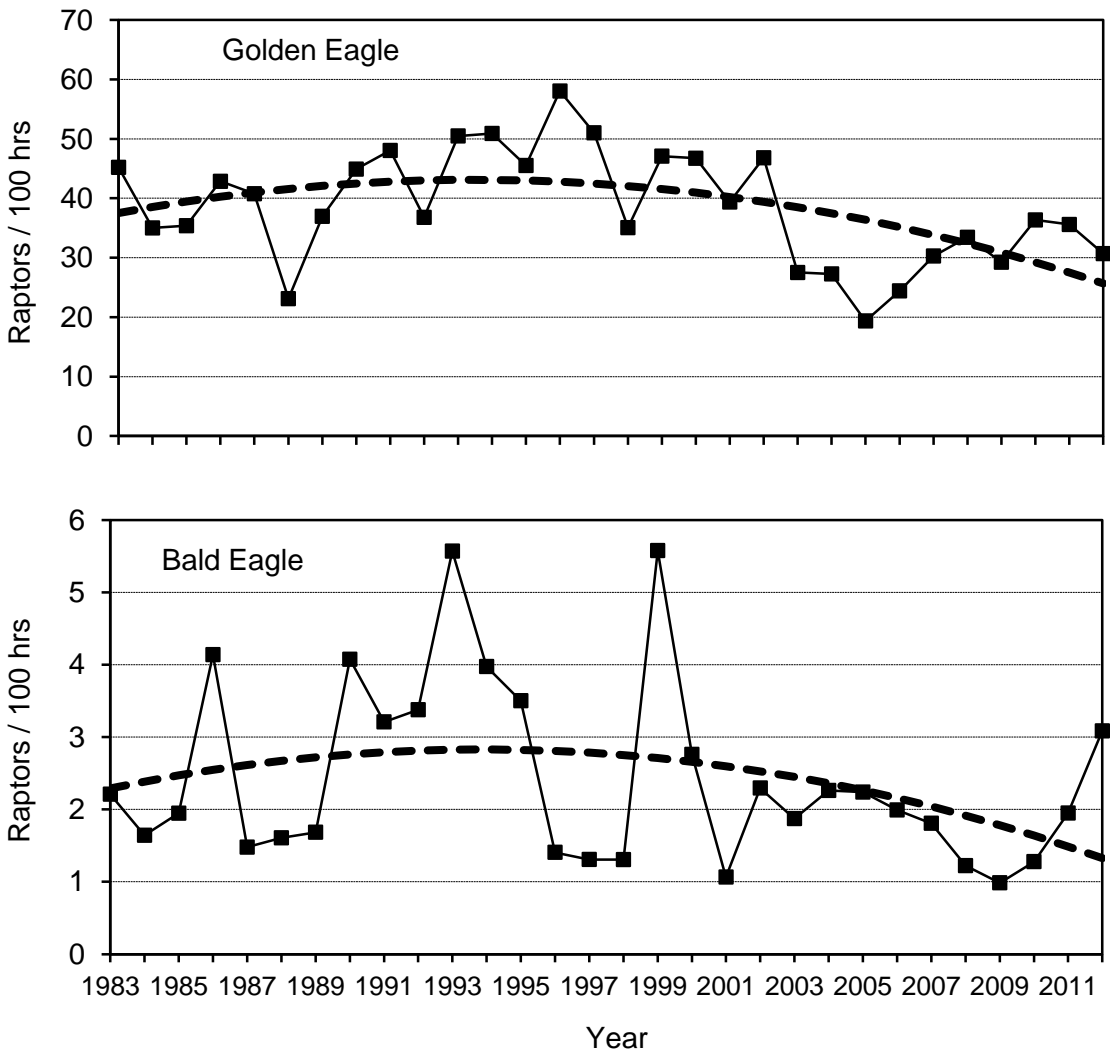


Figure 6. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for Golden and Bald Eagles: 1983–2012. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

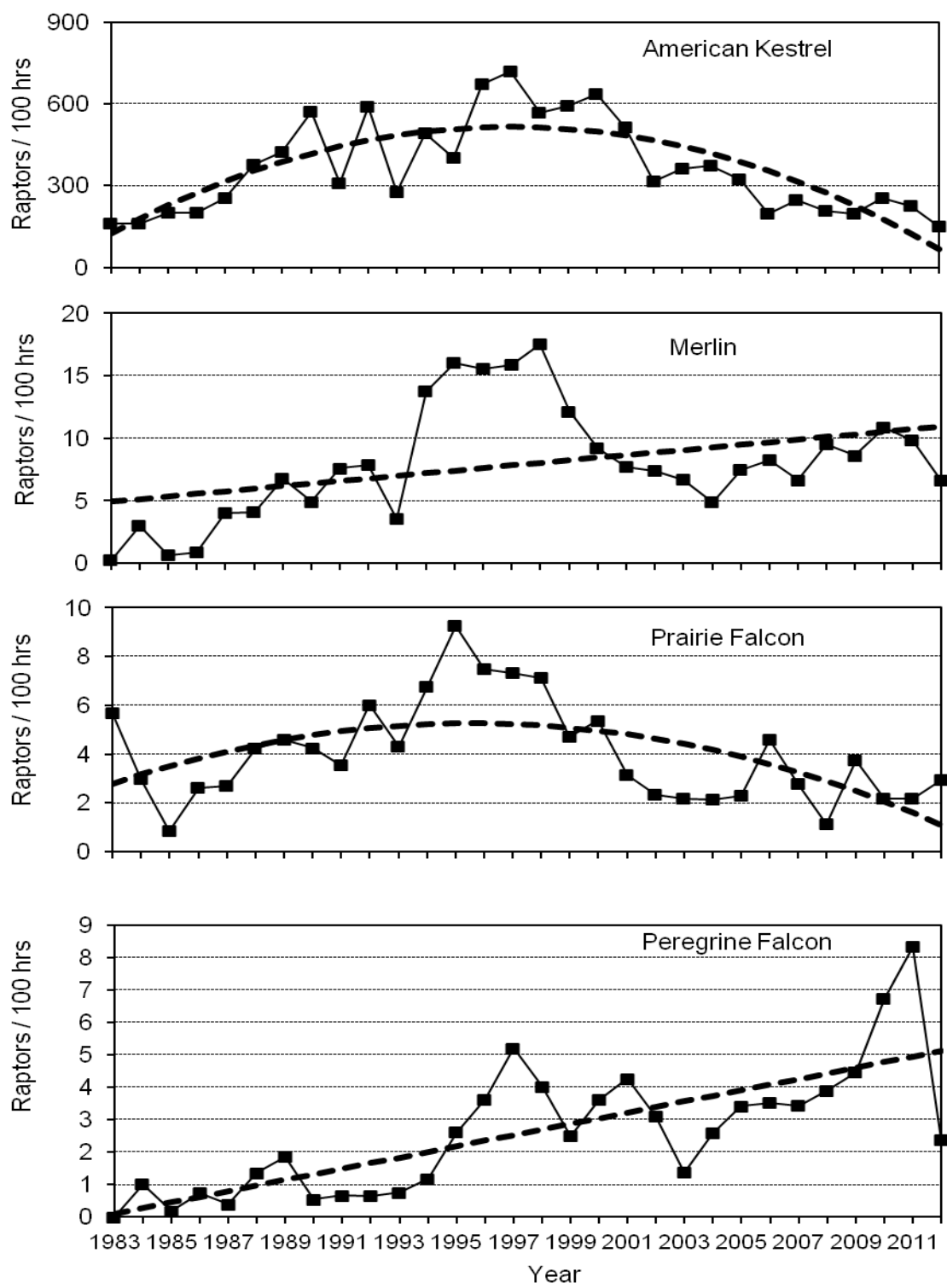


Figure 7. Adjusted fall-migration passage rates in the Goshute Mountains, Nevada for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons: 1983–2012. Dashed lines indicate significant linear, second-order, or third-order polynomial regressions.

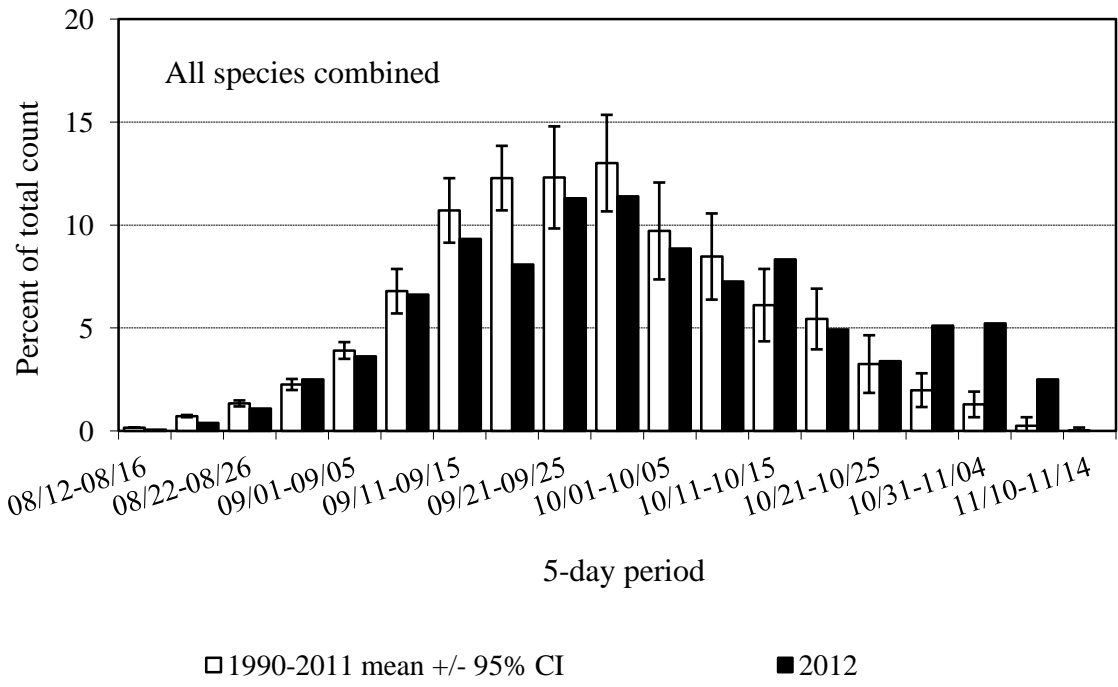


Figure 8. Combined-species passage volume by five-day periods: 1990–2011 versus 2012.

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 (15) and Mike Lanzone (0).
- 1999:** Two observers throughout. Jerry Liguori (17) and Aaron Barna (4).
- 2000:** Two observers throughout. Jerry Liguori (19), Jeff Maurer (3), Nathan McNett (4), and Aaron Barna (5).
- 2001:** Two observers throughout. Jerry Liguori (21) 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 (+), and 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), and Kerry Ross (1+).
- 2011:** Two observers throughout. Rachel Smith (2+), and Kerry Ross (2+).
- 2012:** Two observers throughout. Steve Seibel (7+), Bryce Robinson (0), and Caitlin Davis (0)

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: 2012.

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	1.2	0	haze AM, pc-mc	4.0	w, ene	29.9	30.45	2	59	61	2	0.9
16-Aug	9.00	1.7	0	mc-pc-ovc	1.2	e, w	26.0	30.51	4	60	56	2	0.6
17-Aug	9.00	1.1	0	clr AM, pc PM	2.6	e, n	26.4	30.53	1	47	48	2	1.0
18-Aug	9.00	2.3	0	clr AM, pc PM	2.7	ne, sw	25.8	30.50	1	55	58	2	0.9
19-Aug	9.00	1.0	0	ovc haze AM, mc haze PM, rain	4.2	ne	22.8	30.48	3	49	42	1	1.3
20-Aug	9.00	2.8	0	clr AM, pc	2.8	var calm	29.6	30.50	1	63	63	3	1.6
21-Aug	8.50	2.0	0	ovc, rain, mc	17.8	w, wnw	19.5	30.44	4	75	61	2	1.2
22-Aug	9.00	2.0	0	clr AM, pc-mc PM	3.5	nne, e, ne	23.0	30.43	2	98	100	2	2.7
23-Aug	9.00	2.0	0	clr early AM, pc	3.4	nne, e	24.0	30.42	2	100	100	3	4.3
24-Aug	9.00	2.0	0	clr haze AM, pc, PM	11.8	ws-w	24.4	30.42	2	17	21	2	5.4
25-Aug	9.00	2.0	0	pc AM, mc PM	8.0	w, ne, wsw	21.5	30.41	2	72	73	2	1.3
26-Aug	9.00	2.0	0	clr-pc-mc-ovc, rain	19.2	w	19.9	30.44	3	100	100	1	2.9
27-Aug	9.00	2.0	0	clr early AM, pc	22.2	w	22.2	30.52	2	100	100	2	2.9
28-Aug	9.00	2.0	0	clr	21.8	w, wsw	23.8	30.51	2	100	100	2	6.8
29-Aug	10.00	2.0	0	clr-pc AM, mc PM	12.0	w, wnw, nw	22.3	30.46	3	100	100	2	14.5
30-Aug	7.40	2.0	0	ovc, mc, rain	7.4	ws-w, e	17.3	30.43	4	68	72	2	6.5
31-Aug	8.60	2.0	0	ovc, mc	26.0	w, wsw	16.9	30.41	4	92	91	2	7.0
01-Sep	8.30	1.9	0	pc, mc, ovc, rain PM	13.7	ws-w, w	15.5	30.42	3	88	92	1	4.7
02-Sep	9.00	2.0	0	clr early AM, pc	1.5	ene, nne, ne	19.0	30.49	1	100	100	2	9.8
03-Sep	9.00	2.0	0	clr AM, pc PM	1.8	ws-w, ene, nne	19.0	30.51	1	100	100	3	14.4
04-Sep	9.25	2.0	0	clr	8.6	ws-w, w	22.1	30.52	1	100	100	2	13.6
05-Sep	9.00	2.0	0	clr AM, pc-mc PM	4.1	w, nne, ne	19.8	30.49	2	100	94	3	8.0
06-Sep	9.00	2.6	0	ovc, mc	10.4	w, wsw, ne	19.6	30.43	4	100	100	2	23.2
07-Sep	9.00	2.0	1	mc AM, pc-clr PM	6.5	ene, ne	19.1	30.56	2	100	100	2	9.8
08-Sep	9.00	4.0	0	clr, pc late PM	5.2	ne, nne, ene	22.0	30.54	2	96	92	2	19.0
09-Sep	9.00	3.1	0	pc early AM, ovc	18.4	w, wsw	20.7	30.47	3	87	87	1	30.0
10-Sep	10.00	2.0	0	pc, early AM, ovc-mc	10.3	w	18.5	30.40	3	100	100	2	29.1
11-Sep	9.00	2.0	0	ovc AM, mc PM	8.3	w, ne	15.6	30.41	3	100	90	2	25.3
12-Sep	9.50	4.0	0	clr	3.1	w, ene, ne	14.3	30.54	1	100	100	2	20.4
13-Sep	9.50	4.4	0	haze	7.1	ne, ene	15.3	30.67	2	80	61	2	18.1
14-Sep	9.00	3.0	0	pc, clr mid-day	4.5	w, ne	18.7	30.62	2	100	83	2	28.3
15-Sep	11.00	4.2	0	pc AM, clr PM	17.7	w, wsw	20.8	30.59	2	100	100	3	31.5
16-Sep	9.25	2.8	0	pc AM, mc PM	10.7	w, wnw	19.8	30.50	3	100	100	2	17.9
17-Sep	9.00	2.0	0	clr, haze early AM & late PM	2.3	ne, w	17.1	30.51	3	24	25	1	5.4
18-Sep	9.00	2.0	0	haze	7.8	w, ene	18.3	30.54	3	62	39	2	10.8
19-Sep	9.20	3.0	0	clr	6.0	ne, nne, w, e	17.2	30.55	1	68	75	2	35.9
20-Sep	9.40	2.4	0	clr, pc mid-day, haze	3.4	w, ne	17.5	30.54	3	11	13	2	19.1
21-Sep	9.00	4.0	0	clr, pc late PM, haze	3.1	ene	15.5	30.51	3	41	32	3	40.6
22-Sep	9.00	3.5	0	pc-mc, haze AM	3.7	w, n, ne	19.5	30.49	2	92	74	2	35.7
23-Sep	9.50	4.4	0	mc AM, ovc	20.4	w	16.2	30.41	4	100	100	2	46.0
24-Sep	7.40	1.8	0	ovc-mc AM, rain PM	8.5	w, ne, wnw	9.2	30.34	4	27	46	1	10.5
25-Sep	9.30	3.2	0	ovc, fog mid-day	3.1	ene, ne, w	8.5	30.36	3	31	63	3	14.7
26-Sep	9.40	2.9	0	pc AM, mc mid-day, clr PM	3.1	ene, nne	10.1	30.40	2	44	55	1	24.1
27-Sep	9.70	2.7	0	clr-pc-clr	3.4	w, nne, ene, ne	13.1	30.47	2	55	67	2	41.1
28-Sep	9.50	3.9	0	clr AM, mc PM	4.9	w, wnw	15.9	30.44	2	92	83	2	39.5
29-Sep	9.00	4.1	0	clr early AM, pc	5.2	wnw, wsw	16.5	30.52	2	100	100	2	28.3
30-Sep	9.25	3.0	0	clr	8.1	nne, w, wnw	15.8	30.58	2	100	100	2	20.5
01-Oct	9.50	2.0	0	clr	7.5	w	15.7	30.56	3	80	78	2	28.0
02-Oct	9.90	2.0	0	clr	16.6	ws-w, w, wnw	15.8	30.43	3	92	88	1	11.9
03-Oct	9.75	2.2	0	clr	12.5	w	10.7	30.41	2	100	87	2	29.3

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
04-Oct	9.50	2.9	0	clr	30.8	w	12.9	30.36	3	91	95	2	23.5
05-Oct	9.00	2.8	1	clr early AM, pc, mc PM	16.1	w, wnw	8.6	30.39	3	100	95	2	18.1
06-Oct	9.00	3.3	2	clr	6.4	wsw, wnw, w	6.5	30.36	2	100	100	2	15.8
07-Oct	9.50	2.8	0	clr	9.5	ene, ne, w	5.3	30.36	3	86	100	2	15.8
08-Oct	9.50	1.8	0	clr, pc-mc PM	9.3	w, wsw, wnw	11.2	30.32	3	100	100	2	12.1
09-Oct	9.00	1.9	0	pc	3.7	nne, ne, ene	11.2	30.34	3	100	100	2	35.3
10-Oct	9.00	2.2	0	clr, ovc late PM	9.4	w, wsw	12.1	30.34	3	83	95	1	36.8
11-Oct	9.00	3.0	0	pc, mc PM	8.5	ene, ne	11.5	30.30	3	100	100	2	37.9
12-Oct	6.83	2.0	0	ovc, fog-rain	9.3	ene, nne, e, w	4.8	30.23	4	27	20	1	0.1
13-Oct	9.00	2.0	0	mc AM, pc PM	23.6	w	6.4	30.45	3	100	100	2	10.1
14-Oct	9.00	2.2	0	clr	4.6	e, wnw	9.0	30.53	2	100	100	1	28.3
15-Oct	9.00	2.0	0	ovc-mc-pc-clr	14.7	wsw, w	11.6	30.39	3	100	100	2	5.0
16-Oct	9.00	2.0	0	mc-pc-ovc	46.2	w	12.3	30.24	4	65	79	2	9.4
17-Oct	9.00	1.9	0	clr	13.7	w	4.8	30.39	3	100	95	2	9.3
18-Oct	9.00	2.0	0	clr AM, pc PM	3.9	ene, wnw, w	8.4	30.49	3	100	100	2	22.1
19-Oct	9.00	2.0	0	clr-pc AM, ovc	22.2	w	11.7	30.36	3	100	100	2	21.0
20-Oct	9.00	2.0	0	pc-mc	31.5	w	11.2	30.14	3	100	100	2	11.0
21-Oct	9.00	3.0	0	pc early AM, mc, ovc PM	17.7	wsw, w	7.7	30.12	4	100	100	2	19.4
22-Oct	8.50	2.0	0	mc, ovc, rain late PM	42.1	w, wsw	6.0	29.96	4	81	81	2	12.6
23-Oct	8.75	2.0	0	ovc, snow late PM	21.4	w	-1.1	30.09	4	29	28	2	3.4
24-Oct	5.02	1.7	0	pc, mc, ovc mid-day	5.9	w	-0.5	30.15	4	40	43	2	0.8
25-Oct	7.40	1.8	0	mc AM, ovc mid-day, pc PM	13.0	w	-2.4	30.32	4	35	31	2	0.1
26-Oct	8.70	1.8	0	clr, pc late PM	13.5	s, wsw	-1.5	30.37	4	100	100	2	31.7
27-Oct	9.00	2.0	0	pc AM, ovc PM	24.0	w, wsw	2.6	30.35	4	100	100	2	16.3
28-Oct	8.70	2.0	0	clr, pc late PM	17.1	w, wsw	6.6	30.39	2	100	100	2	17.2
29-Oct	8.70	2.0	0	pc early AM, clr	23.8	w, wsw	7.7	30.44	4	100	100	2	5.9
30-Oct	8.50	1.9	0	pc AM, clr PM	16.5	w, wsw	11.6	30.34	2	100	100	1	20.2
31-Oct	8.50	2.0	0	pc AM, mc mid-day, ovc late PM	20.0	wsw, w	10.7	30.37	4	100	100	2	22.1
01-Nov	8.50	2.0	0	ovc	16.2	wsw, w	7.0	30.25	4	96	96	2	3.1
02-Nov	8.50	2.0	0	pc, clr mid-day	4.8	e, ne, nne, w	5.2	30.34	3	100	100	2	11.1
03-Nov	8.25	1.9	0	mc AM, clr PM	13.4	wsw, w	7.8	30.43	3	100	100	2	19.2
04-Nov	8.25	1.9	0	pc AM, clr PM	2.0	ne	5.8	30.56	3	100	100	2	16.1
05-Nov	8.30	2.0	0	pc	2.7	w	10.8	30.39	2	100	100	2	20.8

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: 2012.

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	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	2	8	0.9
16-Aug	9.00	1	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.6	
17-Aug	9.00	0	1	1	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	1	0	0	0	0	0	0	9	1.0	
18-Aug	9.00	2	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	8	0.9	
19-Aug	9.00	2	0	0	2	0	0	0	0	0	0	0	2	6	0	0	0	0	0	0	0	0	0	0	0	0	0	12	1.3	
20-Aug	9.00	0	0	1	1	0	0	0	0	1	0	0	0	6	1	0	0	2	0	0	2	0	0	0	0	0	0	14	1.6	
21-Aug	8.50	2	0	0	0	0	0	0	0	0	0	0	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1.2	
22-Aug	9.00	2	0	6	0	0	0	0	0	0	0	0	1	9	0	0	0	2	0	0	3	0	0	0	0	1	0	24	2.7	
23-Aug	9.00	0	1	2	0	4	0	2	1	1	0	0	0	8	0	0	1	2	0	0	17	0	0	0	0	0	0	39	4.3	
24-Aug	9.00	0	0	1	3	3	1	1	0	0	0	0	1	13	0	0	1	1	0	0	23	0	0	1	0	0	0	49	5.4	
25-Aug	9.00	0	2	1	2	1	0	1	0	0	0	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	12	1.3	
26-Aug	9.00	0	3	0	4	2	0	0	0	0	0	0	2	10	0	0	0	1	0	0	4	0	0	0	0	0	0	26	2.9	
27-Aug	9.00	0	1	1	1	2	0	0	0	0	0	0	1	12	0	0	0	3	0	0	4	0	0	0	0	0	1	26	2.9	
28-Aug	9.00	0	3	3	3	6	0	1	0	0	0	0	3	29	0	0	1	6	0	0	4	0	0	0	0	0	2	61	6.8	
29-Aug	10.00	1	1	6	5	9	0	1	0	0	0	0	24	40	0	0	2	0	0	0	52	0	0	0	0	0	4	145	14.5	
30-Aug	7.40	1	1	2	4	8	1	2	0	0	0	0	0	13	0	0	0	1	0	0	15	0	0	0	0	0	0	48	6.5	
31-Aug	8.60	2	2	1	4	4	0	0	1	1	0	0	4	23	0	0	1	3	0	0	14	0	0	0	0	0	0	60	7.0	
01-Sep	8.30	0	0	0	2	13	1	0	0	0	0	0	4	15	0	0	1	1	0	0	2	0	0	0	0	0	0	39	4.7	
02-Sep	9.00	1	14	1	6	5	1	4	0	0	0	0	5	35	0	0	0	0	0	0	14	0	0	0	0	0	2	88	9.8	
03-Sep	9.00	4	5	2	10	19	0	6	1	1	0	0	0	44	0	0	2	3	0	0	30	0	0	0	0	0	1	2	130	14.4
04-Sep	9.25	0	0	1	25	10	0	10	0	1	0	0	5	25	0	0	0	4	0	0	40	0	1	0	0	0	4	126	13.6	
05-Sep	9.00	2	3	3	18	5	0	2	0	0	0	0	0	11	0	0	0	2	0	0	25	1	0	0	0	0	0	72	8.0	
06-Sep	9.00	4	2	4	61	37	0	19	0	0	0	0	3	42	1	0	0	1	0	0	33	0	0	0	0	0	2	209	23.2	
07-Sep	9.00	5	1	0	26	17	2	2	0	2	0	0	1	11	0	0	3	1	0	0	14	1	0	0	0	0	2	88	9.8	
08-Sep	9.00	4	0	2	37	53	1	15	1	5	0	0	7	26	0	0	1	0	0	0	15	0	0	2	0	1	0	171	19.0	
09-Sep	9.00	2	1	5	113	77	0	29	1	1	0	0	1	19	0	0	0	1	0	0	20	0	0	0	0	0	0	270	30.0	
10-Sep	10.00	11	1	0	78	53	1	13	0	0	0	0	33	58	0	0	3	5	0	0	30	0	2	0	0	0	3	291	29.1	
11-Sep	9.00	2	0	2	93	46	2	23	0	1	0	2	14	32	0	0	0	0	0	0	10	0	0	0	0	0	1	228	25.3	
12-Sep	9.50	16	3	6	46	31	0	14	0	0	0	0	27	27	1	0	1	2	0	0	19	0	0	0	0	0	1	194	20.4	
13-Sep	9.50	6	2	3	57	57	1	1	0	0	0	0	2	32	0	0	0	2	0	0	9	0	0	0	0	0	0	172	18.1	
14-Sep	9.00	3	6	5	107	87	3	2	0	0	0	0	3	25	0	0	0	6	0	0	6	0	1	0	0	0	1	255	28.3	

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	11.00	2	2	0	159	76	1	16	0	12	0	5	4	26	0	0	3	4	0	0	32	0	3	0	0	0	0	1	346	31.5
16-Sep	9.25	8	0	0	85	37	0	3	0	0	0	0	2	8	0	0	1	3	0	0	18	0	0	0	0	0	0	1	166	17.9
17-Sep	9.00	1	0	0	30	8	0	1	0	0	0	0	0	3	0	0	0	1	0	0	5	0	0	0	0	0	0	0	49	5.4
18-Sep	9.00	1	4	2	40	18	1	2	0	0	0	0	2	8	0	0	3	2	0	0	11	0	1	1	0	0	0	1	97	10.8
19-Sep	9.20	1	1	1	134	73	2	21	0	0	0	13	9	18	0	0	0	0	0	0	49	5	0	0	0	0	0	3	330	35.9
20-Sep	9.40	0	0	0	74	81	2	7	0	0	0	0	4	6	1	0	0	0	0	0	5	0	0	0	0	0	0	0	180	19.1
21-Sep	9.00	18	4	4	115	112	1	6	0	2	0	12	16	61	0	0	1	4	0	0	7	1	0	0	0	0	0	1	365	40.6
22-Sep	9.00	13	2	1	163	85	1	10	0	0	0	2	4	26	0	0	0	5	0	0	7	0	1	1	0	0	0	0	321	35.7
23-Sep	9.50	29	1	1	234	98	2	3	0	0	0	8	6	26	0	0	1	3	0	0	20	0	1	0	0	0	0	4	437	46.0
24-Sep	7.40	15	0	0	38	13	1	8	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	78	10.5
25-Sep	9.30	33	0	2	32	30	0	6	0	0	0	0	23	8	0	0	0	1	0	0	0	0	0	0	0	0	0	2	137	14.7
26-Sep	9.40	3	1	2	62	87	0	2	0	0	0	7	7	45	0	0	1	2	0	0	8	0	0	0	0	0	0	0	227	24.1
27-Sep	9.70	19	12	1	135	91	0	1	2	0	0	21	14	91	0	0	0	4	0	0	4	0	2	1	0	0	0	1	399	41.1
28-Sep	9.50	40	3	2	131	96	0	17	0	0	0	1	7	46	0	0	3	2	0	0	23	1	0	0	0	0	0	3	375	39.5
29-Sep	9.00	17	0	2	100	64	0	16	0	0	0	2	2	28	0	0	8	2	1	0	10	1	0	1	0	0	0	1	255	28.3
30-Sep	9.25	2	0	2	67	72	0	2	0	0	0	0	1	28	0	0	2	2	0	0	9	2	0	0	0	0	0	1	190	20.5
01-Oct	9.50	14	2	1	68	52	0	2	0	0	0	3	26	79	1	0	1	3	0	0	12	0	1	0	0	0	0	1	266	28.0
02-Oct	9.90	1	0	0	39	36	2	1	0	0	0	0	1	21	0	0	0	2	0	0	14	0	0	0	0	0	0	1	118	11.9
03-Oct	9.75	29	2	3	82	61	0	9	0	0	0	0	26	57	0	0	6	3	0	0	5	0	0	0	0	1	0	2	286	29.3
04-Oct	9.50	0	1	1	92	48	0	5	1	0	0	1	1	65	0	0	0	0	1	0	7	0	0	0	0	0	0	0	223	23.5
05-Oct	9.00	0	1	6	50	41	3	8	0	0	0	0	1	45	0	0	1	2	0	0	3	1	0	0	0	0	0	1	163	18.1
06-Oct	9.00	1	1	1	37	18	0	5	0	0	0	1	6	61	0	1	3	2	1	0	2	1	0	0	0	0	0	1	142	15.8
07-Oct	9.50	1	1	2	24	19	2	3	1	0	0	0	0	88	0	0	2	5	0	0	1	0	0	0	0	0	0	1	150	15.8
08-Oct	9.50	0	0	1	53	18	1	7	0	0	0	0	0	19	0	0	0	4	0	0	11	1	0	0	0	0	0	0	115	12.1
09-Oct	9.00	0	0	1	139	67	2	4	0	0	0	0	0	88	0	0	1	5	0	0	9	0	1	0	0	0	0	1	318	35.3
10-Oct	9.00	0	2	3	182	55	0	2	0	0	0	0	1	67	0	0	0	5	0	0	10	2	0	1	0	0	0	1	331	36.8
11-Oct	9.00	2	0	8	126	38	0	7	0	0	0	0	0	125	0	0	2	6	1	0	24	0	1	0	0	0	0	1	341	37.9
12-Oct	6.83	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1
13-Oct	9.00	0	0	4	14	6	0	2	0	0	0	0	0	56	2	0	1	4	0	0	1	1	0	0	0	0	0	0	91	10.1
14-Oct	9.00	1	0	1	36	18	0	3	0	0	0	0	0	176	0	4	4	5	0	0	3	2	0	0	0	0	0	2	255	28.3
15-Oct	9.00	0	0	0	26	8	0	2	1	0	0	0	0	4	0	1	0	1	0	0	1	1	0	0	0	0	0	0	45	5.0

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	9.00	0	0	0	42	3	0	7	0	0	0	0	23	0	1	2	3	0	0	1	1	0	0	0	0	0	2	85	9.4	
17-Oct	9.00	1	0	4	7	6	1	2	0	0	0	0	51	0	0	2	3	0	0	1	3	0	0	0	0	0	3	84	9.3	
18-Oct	9.00	0	0	2	20	10	1	3	0	0	0	0	145	1	3	3	3	1	0	0	1	1	0	0	0	0	5	199	22.1	
19-Oct	9.00	0	0	0	23	3	1	1	0	0	0	0	143	0	5	1	5	1	1	1	2	0	0	0	0	0	1	189	21.0	
20-Oct	9.00	1	1	1	35	4	0	4	0	0	0	0	27	0	1	2	16	2	0	3	1	0	0	0	0	0	1	99	11.0	
21-Oct	9.00	1	0	3	24	3	4	4	0	0	0	0	124	0	2	2	4	0	0	0	2	0	1	0	0	0	1	175	19.4	
22-Oct	8.50	1	0	1	10	8	0	0	0	0	0	0	79	0	2	0	2	0	0	1	1	0	2	0	0	0	0	107	12.6	
23-Oct	8.75	0	0	1	9	0	1	1	0	0	0	0	12	0	1	0	1	1	0	0	1	0	0	0	0	0	2	30	3.4	
24-Oct	5.02	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.8	
25-Oct	7.40	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	0	1	0.1	
26-Oct	8.70	0	0	0	4	1	0	2	0	0	0	0	261	2	0	0	4	2	0	0	0	0	0	0	0	0	0	276	31.7	
27-Oct	9.00	0	0	2	5	4	2	0	0	0	0	0	126	0	1	0	5	1	0	0	0	1	0	0	0	0	0	147	16.3	
28-Oct	8.70	0	0	4	9	1	1	1	0	0	0	0	121	0	1	0	11	0	0	0	0	0	0	0	0	0	1	150	17.2	
29-Oct	8.70	0	0	1	8	1	0	0	0	0	0	0	34	0	0	1	3	2	1	0	0	0	0	0	0	0	0	51	5.9	
30-Oct	8.50	0	0	3	9	1	2	1	0	0	0	0	152	0	0	0	4	0	0	0	0	0	0	0	0	0	0	172	20.2	
31-Oct	8.50	0	0	18	23	3	3	0	0	0	0	0	138	0	0	0	1	0	0	0	2	0	0	0	0	0	0	188	22.1	
01-Nov	8.50	0	1	2	0	1	0	0	0	0	0	0	17	0	1	0	2	2	0	0	0	0	0	0	0	0	0	26	3.1	
02-Nov	8.50	0	0	1	6	0	1	0	0	0	0	0	78	0	1	2	4	0	0	0	0	1	0	0	0	0	0	94	11.1	
03-Nov	8.25	0	0	4	5	3	1	0	0	0	0	0	138	0	5	0	1	0	0	0	0	1	0	0	0	0	0	158	19.2	
04-Nov	8.25	0	0	0	5	2	0	0	0	0	0	0	121	0	0	0	1	0	0	0	0	1	0	0	0	0	3	133	16.1	
05-Nov	8.30	0	0	2	6	0	0	0	0	0	0	0	159	1	0	0	5	0	0	0	0	0	0	0	0	0	0	173	20.8	
Total	741.00	329	95	162	3527	2130	53	355	10	29	0	78	308	3928	11	30	76	213	16	2	726	35	20	11	0	3	1	79	12227	16.5

¹ See Appendix B for explanation of species codes.

Appendix E. Annual summaries of observation effort and unadjusted raptor counts by species: 1983–2012.

	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
Start Date	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
Observation days	79	71	82	78	83	81	79
Observation hours	673.58	719.50	748.08	681.50	787.30	725.67	688.21
Raptors / 100 hours	2,541	3,515	3,003	2,542	2,662	1,564	2,001
SPECIES	RAPTOR COUNTS						
Turkey Vulture	482	732	349	297	441	243	466
Osprey	187	176	110	152	152	83	96
Northern Harrier	255	247	356	233	178	154	127
Sharp-shinned Hawk	4,677	9,598	7,236	6,071	7,429	3,009	3,460
Cooper's Hawk	3,848	6,736	3,689	3,022	5,110	2,369	2,281
Northern Goshawk	97	99	84	123	80	11	16
Unknown small accipiter ¹	-	-	-	-	-	246	268
Unknown large accipiter ¹	-	-	-	-	-	4	3
Unknown accipiter	368	75	132	87	56	7	0
TOTAL ACCIPITERS	8,990	16,508	11,141	9,303	12,675	5,646	6,028
Red-shouldered Hawk	0	0	0	1	0	0	0
Broad-winged Hawk	37	160	59	87	79	58	58
Swainson's Hawk	143	507	334	132	251	91	908
Red-tailed Hawk	2,922	3,329	5,137	3,446	3,926	3,008	3,903
Ferruginous Hawk	18	16	25	19	14	20	20
Rough-legged Hawk	10	6	50	24	23	6	1
Unidentified buteo	77	5	24	21	13	42	57
TOTAL BUTEOS	3,207	4,023	5,629	3,730	4,306	3,225	4,947
Golden Eagle	329	235	341	305	295	330	181
Bald Eagle	6	6	31	14	8	12	9
Unidentified eagle	0	0	0	0	0	0	0
TOTAL EAGLES	335	241	372	319	303	342	190
American Kestrel	3,394	3,169	2,887	3,149	2,774	1,503	1,768
Merlin	78	91	59	49	51	39	33
Prairie Falcon	48	50	30	37	23	12	14
Peregrine Falcon	29	26	14	21	29	15	9
Unknown small falcon ¹	-	-	-	-	-	0	10
Unknown large falcon ¹	-	-	-	-	-	4	1
Unidentified falcon	7	2	7	3	2	2	2
TOTAL FALCONS	3,556	3,338	2,997	3,259	2,879	1,575	1,837
Unidentified raptor	102	25	57	34	26	81	79
GRAND TOTAL	17,114	25,290	21,011	17,327	20,960	11,349	13,770

¹ Designations used consistently beginning in 2002.

Appendix E. continued

	2004	2005	2006	2007	2008	2009	2010	2011	2012	MEAN
Start Date	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	15-Aug	14-Aug
End Date	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	3-Nov
Observation days	76	83	82	82	82	83	82	79	83	79
Observation hours	642.75	695.30	652.58	703.00	698.51	733.59	692.60	682.03	741.00	675.55
Raptors / 100 hours	2,038	1,849	1,658	2,125	1,758	1,502	2,336	1,936	1,650	2,105
SPECIES	RAPTOR COUNTS									
Turkey Vulture	685	445	355	735	637	640	682	443	329	388
Osprey	120	83	68	113	89	59	126	129	95	94
Northern Harrier	96	153	177	186	158	154	201	142	162	171
Sharp-shinned Hawk	3,073	2,973	2,745	4,635	4,967	3,251	5,063	5,171	3,527	4,484
Cooper's Hawk	2,736	2,260	2,541	3,422	1,957	1,691	2,599	2,067	2,130	2,983
Northern Goshawk	41	74	95	55	27	26	54	58	53	92
Unknown small accipiter ¹	299	521	57	360	204	262	14	8	355	236
Unknown large accipiter ¹	11	32	6	1	6	7	10	3	10	8
Unknown accipiter	8	37	9	5	11	11	145	51	29	239
TOTAL ACCIPITERS	6,168	5,897	5,453	8,478	7,172	5,248	7,885	7,358	6,104	7,888
Red-shouldered Hawk	0	0	0	0	0	0	0	0	0	0
Broad-winged Hawk	122	36	57	122	81	101	295	83	78	63
Swainson's Hawk	197	664	109	163	248	445	933	269	308	271
Red-tailed Hawk	3,589	3,678	3,492	3,511	2,439	2,913	4,427	3,237	3,928	3,162
Ferruginous Hawk	8	12	10	11	10	8	8	14	11	15
Rough-legged Hawk	7	6	17	13	15	12	10	24	30	14
Unidentified buteo	117	97	13	44	91	120	34	24	76	70
TOTAL BUTEOS	4,040	4,493	3,698	3,864	2,884	3,599	5,707	3,651	4,431	3,594
Golden Eagle	160	130	152	218	226	206	236	226	213	247
Bald Eagle	12	11	9	10	6	6	6	10	16	12
Unidentified eagle	4	0	0	0	0	0	0	0	2	1
TOTAL EAGLES	176	141	161	228	232	212	242	236	231	259
American Kestrel	1,709	1,468	820	1,174	965	940	1,170	1,132	726	1,737
Merlin	22	40	40	34	51	50	54	49	35	41
Prairie Falcon	11	9	26	19	10	21	14	13	20	24
Peregrine Falcon	11	14	17	18	22	23	42	46	11	14
Unknown small falcon ¹	9	1	2	3	4	2	0	0	0	3
Unknown large falcon ¹	3	6	2	1	0	6	1	0	3	2
Unidentified falcon	0	4	0	2	2	2	1	0	1	5
TOTAL FALCONS	1,765	1,542	907	1,251	1,054	1,044	1,282	1,240	796	1,824

Unidentified raptor	51	104	3	86	51	60	52	5	79	103
GRAND TOTAL	13,101	12,858	10,822	14,941	12,277	11,016	16,177	13,205	12,227	14,321

¹ Designations used consistently beginning in 2002.

Appendix F. Daily trapping effort and captures by species: 2012.

DATE	STATION		SPECIES ¹												CAPTURES		
	HOURS		NH	SS	CH	NG	BW	SW	RT	RL	GE	AK	ML	PR	PG	TOTAL	/STN HR
26-Aug	7.50		0	1	2	0	0	0	1	0	0	0	0	0	0	4	0.5
27-Aug	7.25		0	1	0	0	0	0	2	0	0	2	0	0	0	5	0.7
28-Aug	0.00																
29-Aug	6.75		0	1	1	0	0	0	3	0	0	0	0	0	0	5	0.7
30-Aug	3.25		0	0	3	0	0	0	0	0	0	0	0	0	0	3	0.9
31-Aug	6.50		0	2	0	0	0	0	3	0	0	1	0	0	0	6	0.9
01-Sep	6.00		0	2	0	0	0	0	2	0	0	0	0	0	0	4	0.7
02-Sep	7.75		1	0	3	0	0	0	2	0	0	1	0	0	0	7	0.9
03-Sep	0.00																
04-Sep	6.75		0	5	5	0	0	0	2	0	0	3	0	1	0	16	2.4
05-Sep	7.00		0	4	2	1	0	0	0	0	0	1	0	0	0	8	1.1
06-Sep	7.25		0	11	1	0	0	0	2	0	0	2	0	0	0	16	2.2
07-Sep	8.00		0	10	2	1	0	0	2	0	0	0	0	0	0	15	1.9
08-Sep	8.00		0	10	10	0	0	0	2	0	0	2	0	0	0	24	3.0
09-Sep	7.75		0	26	8	0	0	0	2	0	0	2	0	0	0	38	4.9
10-Sep	7.75		0	17	7	0	0	0	1	0	0	2	0	0	0	27	3.5
11-Sep	7.75		0	25	6	0	0	0	1	0	0	1	0	0	0	33	4.3
12-Sep	7.25		0	8	5	0	0	0	2	0	0	0	0	0	0	15	2.1
13-Sep	7.50		0	11	7	1	0	0	2	0	0	0	0	0	0	21	2.8
14-Sep	7.25		0	13	4	1	0	0	0	0	0	0	0	0	0	18	2.5
15-Sep	8.00		0	29	5	0	0	0	0	0	0	2	0	1	0	37	4.6
16-Sep	13.50		0	20	11	0	0	0	1	0	0	1	0	0	0	33	2.4
17-Sep	8.00		0	7	7	0	0	0	1	0	0	2	0	0	0	17	2.1
18-Sep	7.75		0	12	6	2	0	0	2	0	0	2	0	0	1	25	3.2
19-Sep	8.00		0	28	16	0	0	0	1	0	0	5	1	0	0	51	6.4
20-Sep	7.50		0	23	23	1	0	0	5	0	0	1	0	0	0	53	7.1
21-Sep	8.00		0	19	13	0	0	0	2	0	0	0	0	0	0	34	4.3
22-Sep	8.25		0	28	9	0	0	0	0	0	0	1	0	0	0	38	4.6
23-Sep	11.00		0	26	6	0	0	0	0	0	0	1	0	0	0	33	3.0
24-Sep	3.50		0	11	3	0	0	0	2	0	0	0	0	0	0	16	4.6
25-Sep	8.00		0	6	2	0	0	0	1	0	0	0	0	0	0	9	1.1
26-Sep	8.00		0	10	8	0	0	0	1	0	0	1	0	0	0	20	2.5
27-Sep	7.50		0	13	7	0	0	0	0	0	1	1	0	0	0	22	2.9
28-Sep	15.50		1	43	21	0	0	0	0	0	0	1	0	0	0	66	4.3
29-Sep	16.25		0	16	16	0	0	0	2	0	0	0	0	0	0	34	2.1
30-Sep	16.00		0	17	7	0	0	0	1	0	0	3	1	0	0	29	1.8
01-Oct	7.75		0	5	6	0	0	0	0	0	0	0	0	0	0	11	1.4
02-Oct	7.75		0	13	5	1	0	0	2	0	0	0	0	0	0	21	2.7

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	11	6	0	0	0	1	0	1	1	0	0	0	20	2.6
04-Oct	7.00		0	9	3	0	0	0	4	0	0	1	0	0	0	17	2.4
05-Oct	7.50		0	12	7	0	0	0	0	0	0	0	0	0	0	19	2.5
06-Oct	15.80		0	6	3	0	0	0	1	0	0	2	0	0	0	12	0.8
07-Oct	8.00		0	3	3	1	0	0	0	0	0	0	0	0	0	7	0.9
08-Oct	16.00		0	24	2	1	0	0	3	0	0	1	0	0	0	31	1.9
09-Oct	8.00		0	17	5	1	0	0	2	0	0	3	0	0	0	28	3.5
10-Oct	7.00		0	31	7	0	0	0	0	0	0	0	1	0	0	39	5.6
11-Oct	7.75		1	11	10	0	0	0	4	0	0	1	0	0	0	27	3.5
12-Oct	0.00																
13-Oct	15.50		1	3	1	0	0	0	5	0	1	0	0	0	0	10	0.6
14-Oct	15.25		0	23	2	0	0	0	2	0	0	0	1	0	0	28	1.8
15-Oct	7.50		0	5	1	0	0	0	0	0	1	1	1	0	0	9	1.2
16-Oct	7.50		0	0	0	0	0	0	1	0	0	0	1	0	0	2	0.3
17-Oct	7.00		1	2	1	0	0	0	2	0	1	0	3	0	0	10	1.4
18-Oct	6.75		0	3	2	0	0	0	4	0	0	0	0	0	0	9	1.3
19-Oct	14.75		0	9	2	1	0	0	3	0	0	0	1	0	0	16	1.1
20-Oct	15.00		0	1	0	0	0	0	0	0	1	0	1	0	0	3	0.2
21-Oct	15.00		0	4	1	1	0	0	1	0	0	0	0	0	0	7	0.5
22-Oct	11.25		0	1	2	0	0	0	5	0	0	0	0	0	0	8	0.7
23-Oct	12.25		0	0	0	1	0	0	2	0	0	0	0	0	0	3	0.2
24-Oct	0.00																
25-Oct	0.00																
26-Oct	3.50		0	0	0	0	0	0	4	0	0	0	0	0	0	4	1.1
27-Oct	12.25		0	2	0	2	0	0	6	0	0	0	0	0	0	10	0.8
28-Oct	13.50		0	0	1	1	0	0	4	1	1	0	0	0	0	8	0.6
29-Oct	14.50		0	2	0	0	0	0	1	0	0	0	0	0	0	3	0.2
30-Oct	7.75		0	2	0	0	0	0	3	0	0	0	0	0	0	5	0.6
31-Oct	7.25		0	7	1	0	0	0	4	0	0	0	1	0	0	13	1.8
Total	568.80		4	661	297	17	0	0	112	1	7	48	12	2	1	1162	2.18

¹ See Appendix B for explanation of species codes.

Appendix G. Annual summaries of banding effort and capture totals by species: 1980–2012.

	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
Start date	22 Aug	19 Aug	18 Aug	18 Aug	21 Aug	21 Aug	22-Aug	24-Aug	24-Aug	27-Aug
End date	25 Oct	23 Oct	22 Oct	22 Oct	3 Nov	28 Oct	4-Nov	5-Nov	28-Oct	22-Oct
Blinds in operation	6	5	5	5	3	4	4	4	4	3
Trapping days	63	61	62	63	72	62	72	68	66	53
Station days	312	270	264	236	131	174	210	188	163	105
Station hours	2,382	2,061	2,087	1,690	939	1,286	1,666	1,474	1,276	807
Captures /100 stn hrs	120.1	160.7	147.0	202.3	163.6	167.0	173.0	159.9	114.7	158.2
SPECIES	RAPTOR CAPTURES									
Northern Harrier	2	1	18	4	0	17	11	8	7	2
Sharp-shinned Hawk	1,823	2,091	1,783	2,131	897	1,235	1,608	1,283	825	791
Cooper's Hawk	695	737	767	1,006	438	504	975	791	460	342
Northern Goshawk	27	68	20	20	20	24	23	7	9	28
Broad-winged Hawk	3	0	0	1	0	3	1	0	2	1
Swainson's Hawk	0	0	0	0	0	0	1	0	0	0
Red-tailed Hawk	93	84	67	69	49	58	76	109	63	61
Rough-legged Hawk	0	0	0	0	0	0	2	0	0	0
Golden Eagle	4	7	5	4	8	2	1	9	1	2
Bald Eagle	0	0	0	0	0	0	0	0	0	0
American Kestrel	193	290	351	149	97	285	168	127	88	35
Merlin	13	18	26	13	16	11	12	15	5	11
Prairie Falcon	3	7	17	7	3	8	3	4	3	4
Peregrine Falcon	1	1	4	0	1	1	1	3	0	0
All Species	2,857	3,304	3,058	3,404	1,529	2,148	2,882	2,356	1,463	1,277
Recaptures ¹	3	3	7	9	4	6	9	7	2	2
Foreign Recaptures ²	1	4	3	5	2	3	4	3	1	2
Foreign Encounters ³	16	9	18	15	10	19	10	28	12	16

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

	2005	2006	2007	2008	2009	2010	2011	2012	MEAN
Start date	23-Aug	22-Aug	20-Aug	21-Aug	22-Aug	20-Aug	17-Aug	25-Aug	24-Aug
End date	1-Nov	5-Nov	25-Oct	28-Oct	31-Oct	1-Nov	30-Oct	31-Oct	26-Oct
Blinds in operation	4	3	3	2	2	2	2	2	3.4
Trapping days	69	72	63	62	64	62	57	63	60.3
Station days	150	128	81	69	66	68	59	80	154.9
Station hours	1,073	888	550	503	476	476	429	572	1,098.1
Captures /100 stn hrs	153.8	112.1	210.9	204.2	176.7	245.5	159.8	203.0	175.6
SPECIES	RAPTOR CAPTURES								
Northern Harrier	3	2	6	2	0	1	1	4	9.8
Sharp-shinned Hawk	902	503	683	616	432	700	420	661	1,072.5
Cooper's Hawk	562	356	383	314	307	280	200	297	541.1
Northern Goshawk	21	26	18	2	3	5	9	17	24.7
Broad-winged Hawk	2	1	2	0	1	1	2	0	1.0
Swainson's Hawk	1	1	0	0	0	1	0	0	0.2
Red-tailed Hawk	67	56	39	40	43	119	27	112	62.8
Rough-legged Hawk	0	0	0	0	0	0	0	1	0.1
Golden Eagle	1	1	0	4	4	4	2	7	3.9
Bald Eagle	0	0	0	0	0	0	0	0	0.0
American Kestrel	76	38	19	42	41	38	15	48	115.8
Merlin	11	5	6	6	6	15	5	12	8.3
Prairie Falcon	3	5	3	0	4	3	2	2	4.3
Peregrine Falcon	2	2	0	0	0	1	2	1	0.8
All Species	1,651	995	1,159	1,026	841	1,168	685	1,162	1,840.6
Recaptures ¹	2	2	3	4	3	3	1	2	3.2
Foreign Recaptures ²	4	0	1	2	0	2	0	3	1.4
Foreign Encounters ³	10	8	10	12	3	8	10	6	11.4

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.