

**FALL 2010 RAPTOR MIGRATION STUDY IN THE
BRIDGER MOUNTAINS, MONTANA**



**Montana Audubon, Helena, Montana
&
HawkWatch International, Salt Lake City, Utah**

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IN THE BRIDGER MOUNTAINS, MONTANA**

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INTRODUCTION

The Bridger Mountains Raptor Migration Project in southwestern Montana is an ongoing effort to monitor long-term population trends of raptors using this northern portion of the Rocky Mountain Flyway (Omland and Hoffman 1996, Hoffman and Smith 2003, Smith et al. 2008a). HawkWatch International (HWI) initiated full-season counts at the site in 1991, with standardized annual monitoring commencing in 1992. This flyway is noted for large concentrations of Golden Eagles (see Appendix A for scientific names of all raptor species observed at the site). To date, 18 species of raptors have been observed migrating along the Bridger Mountains, with annual counts typically ranging between 2,000 and 3,500 migrants. This report summarizes results of the 2010 count, which marked the 20th consecutive full-season autumn count of migratory raptors at the site. The Bridger Mountains project was 1 of 9 long-term, annual migration counts conducted or co-sponsored by HWI in North America during 2009. The primary objective of these efforts is to track long-term population trends of diurnal raptors in western North America and around the Gulf Coast region (Hoffman et al. 2002, 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).

STUDY SITE

The Bridger Mountains are a relatively small range that runs primarily along a north–south axis. From Sacagawea Peak (2,950 m elevation), the range extends southward for 40 km before meeting the Gallatin Valley 5 km northeast of Bozeman, Montana. Consistent westerly winds collide with the Bridger range and create the lift that attracts southbound migrating raptors each fall. The observation site is a helicopter-landing platform atop the Bridger Bowl Ski Area at an elevation of 2,610 m (45° 49.022' N, 110° 55.778' W; Figure 1). The site lies within the Gallatin National Forest on the east slope of the mountain range, about 25 km north of Bozeman and 3 km north of Saddle Peak. The helicopter pad is a 5 m x 5 m concrete platform located approximately 50 m north of an avalanche cache/ski patrol hut. The site is accessed by following a primitive dirt road for 2.5 km (780 m rise in elevation) to the top of the Bridger chairlift, then continuing a short way along a footpath to the observation site at the top of the ridge.

METHODS

Weather permitting, two official or designated observers conducted standardized daily counts of migrating raptors from a single, traditional observation site from late August through late October in 2010. One of the official observers conducted the count on 1 November 2010. Observations typically began at 0900 H and ended at 1700 H Mountain Standard Time (MST). This was the first full season of migration counting for both official observers (see Appendix B for a complete observer history). Both observers received 2 days of on-site and off-site training with Montana Audubon Executive Director, Steve Hoffman. Local enthusiast Matt Keefer and long-time enthusiast John Parker occasionally assisted with the count. Local expert Beth Madden assisted with the count for one day as well. Data gathering and recording followed standardized protocols used at all HWI migration sites (Hoffman and Smith 2003). The observers routinely recorded the following data:

1. Species, age, sex, and color morph of each migrant raptor, whenever possible and applicable (Appendix A 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 (high, moderate, low, none) for each hour, recorded on the hour. The exact numbers of visitors were also recorded for each hour 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, we equate significance with a 2010 value falling outside the bounds of the confidence interval for the associated mean.

RESULTS AND DISCUSSION

WEATHER SUMMARY

This past season, 12 full days of observations were precluded due to inclement weather and attendant difficult access conditions. This is on par with the average of 11.6 days taken during the last 13 years for which weather data has been compiled and analyzed, from 1997-2009. In addition, we try to take into account when weather or attendant difficult access conditions reduce observations to ≤ 4 hours per day. This occurred a total of eight days this past season, which was relatively high compared to the average of 2.5 days taken during the same time period (see Appendix C for daily weather records).

During full days of active observations, skies were recorded 35% of the time as predominantly fair, 35% as transitional (i.e., cloud cover changed from clear or partly cloudy to mostly cloudy or overcast during the day, or vice versa), and 30% as mostly cloudy or overcast. In comparison, the averages for the site are 37% fair, 33% transitional, and 30% mostly cloudy to overcast, suggesting that the skies in 2010 were less predominantly fair and more transitional. Despite the skies being recorded as less than predominantly fair, observer's estimated visibility distances to being 92-95 km (vs. average 76-80 km), which again puts this estimate at a record high for a second straight year in a row. The prevalence of visibility due to fog and/or haze was reduced (28% of active days vs. average of 32%), as was the proportion of days that included rain and/or snow showers (12% vs. average of 14%). Lastly, observers subjectively rated only 25% of the active days as featuring predominantly good to excellent thermal lift conditions, which is lower than the 38% average from 1997 to 2009. All of these factors perhaps played a role of increased detection.

In 2010, the prevalent winds were light (< 12 kph), dominating 96% of active observational days, opposed to only 4% moderate (12-29 kph). On average (1997-2009), winds are generally 80% light, 18% moderate, and 2% strong. Wind direction mostly prevailed from SW-W, occurring 69% of active observational days. To a far lesser extent, winds also blew from the W (9%), SE-SW (7%), SW-NW (6%), NE-SE (6%), and variable (4%). On average (1997-2009), the prevailing winds have traditionally

come from a SW-W (28%), W (27%), and W-NW (11%) directions, accounting for 66% of the variability. Whereas, when winds blow from other directions, their percentages on average account for less than 10%. Thus, this year's dominating light SW-W and W winds conformed very well with prevailing winds. This seemingly good weather for raptor flights, along with favorable visibility for detections, made this year's flight favorable for most species.

OBSERVATION EFFORT

Observations occurred on 54 of 66 days between 28 August and 01 November in 2010. The number of observation days was a 6% increase over the 1992–2008 average of $51 \pm 95\%$ CI of 3.7 days, and the number of observation hours (366) increased 8% over the long-term average of 338.63 ± 28.193 hours. The 2010 average of 2.07 observers per hour (including official and guest observers; value is mean of daily values, which are in turn means of hourly values) also exceeded the long-term average of $1.9 \pm 95\%$ CI of 0.10 observers per hour.

FLIGHT SUMMARY

The observers tallied 2,349 migrating raptors of 17 species during the 2010 season (Table 1; see Appendix D for daily count records). The 2010 counts of Golden and Bald Eagles were again observed below average, but counts of most other species are slightly to significantly above average (Table 1). Numbers of Osprey, Broad-winged, Swainson's, and Rough-legged Hawks, as well as Peregrine Falcons were also observed below average this year. Because these species are often encountered in relatively low annual numbers, interannual variability is often inflated as represented by a high percentage of change in one direction or another (Table 1, see also Appendix E for annual summaries). The flight was composed of 52% eagles, 28% accipiters, 10% buteos, 5% falcons, 3% harriers, 1% Ospreys, and 1% unidentified raptors (Figure 2). The most numerous species were the Golden Eagle (50% of the total count), Sharp-shinned Hawk (14%), Cooper's Hawk (9%), Red-tailed Hawk (8%), American Kestrel (4%), and Northern Harrier (3%). All other species each comprised $\leq 2\%$ of the total (Table 1).

Passage Rates and Long-term Trends

In 2010, adjusted passage rates were significantly above average for Northern Harriers, and Red-tailed Hawks. Conversely, passage rates were significantly below average for Golden and Bald Eagles (Table 1, Figures 3–8). Regression analyses updated through 2010 (after Hoffman and Smith 2003) revealed a highly significant ($P \leq 0.01$) second order, or quadratic, trend for Golden Eagles at the species level, tracking a mostly stable pattern through about 1999, but an accelerating decline since then (Figure 6). Age-specific analyses further revealed a similar accelerating decline for adults ($P = 0.001$) but only a highly significant linear decline for immatures/subadults. Although American Kestrels were observed in greater numbers this past year, the long-term trend is still linearly projecting downward (Figure 8). Likewise, a quadratic negative decline is being observed for Northern Goshawks (Figure 4). No other significant ($P \leq 0.10$) trends were indicated.

Smith et al. (2008a) present trend analyses of data collected through 2005 for most of the long-term, ongoing, autumn migration studies in western North America, including the Bridger Mountains. These analyses (hereafter called the Raptor Population Index or "RPI" analyses; see <http://www.rpi-project.org>) are based on a more complex analytical approach (also see Farmer et al. 2007) than that represented in Hoffman and Smith (2003) and used herein to present analyses updated through 2010. Among other refinements, this new approach both fits polynomial trajectories to the complete series of annual count indices and allows for estimating rates of change between various periods, while also allowing for assessments of trend significance and precision. Note, however, that restrictions related to the mathematical assumptions behind the new approach precluded analyzing data for rare species, which in

this case included Turkey Vultures, Ospreys, all buteos except Red-tailed and Rough-legged Hawks, and all falcons except American Kestrels. Otherwise, with a few notable exceptions, the overall patterns of change and derived trend estimates suggested by the new modeling technique generally yielded similar inferences as those derived using the simpler methodology of Hoffman and Smith (2003).

Differences between the RPI results and those presented herein that clearly relate to addition of four more years of data include: a) addition of low counts from 2007–2010 resulted in a new significant overall decline for Sharp-shinned Hawks (Figure 4); b) five more years of near-record-low and record-low passage rates translated to a now highly significant and accelerating decline for Golden Eagles through 2010 (Figure 6); and c) five more years of low passage rates for American Kestrels now translate to a significant long-term decline, although the passage rates of this species have increased gradually since 2006 (Figure 8). Farmer et al. (2008) and Farmer and Smith (2009) highlight recent evidence of widespread declines across North America among kestrels, an otherwise common and ubiquitous species.

Age Ratios

Immature : adult ratios were above average in 2010 for 6 of 9 species for which relevant age-specific data were available (Table 2). For Peregrines, a high percentage of birds were not able to be aged, even though the Peregrine count is relatively low on an annual basis (Table 2). With most species, the counts of both adults and immatures were above average, perhaps suggesting that weather aided in funneling migrants through this location; thus, sampling a larger proportion of the source population. In contrast, both adult Golden and Bald Eagles exhibited significant decreases compared to the average, whereas the immature counts of both species were quite comparable (Table 2). However, this is where we caution when interpreting annual counts in relation to the overall average because the overall trends for Golden Eagles demonstrate that both age classes are exhibiting similar negative downward trends (Figure 7).

Seasonal Timing

In terms of 2010 phenology, specific species and combined-species median passage dates tended to follow closely to the overall averages (Table 3, Figure 9). The combined-species median passage date of 05 October was only three days early than on average (Table 3). Only two species exhibited noteworthy deviations from the overall median date, the American Kestrel and Merlin. The median passage date for American Kestrels occurred on 14 September, eight days earlier than on average; whereas, the median passage date for Merlins occurred on 11 October, passing through eight days later than on average (Table 3). This year's annual median passage date and flight volume distribution pattern of Golden Eagles also tended to be similar to the overall average (Table 3 & Figure 10, respectively).

Weather can be a factor that may be able to explain a lot of interannual variability of species migrating through an area from year to year. Biased estimates, resulting in underestimating a migrating species' age-gender related differences can result if weather causes birds to migrate broadly utilizing other pathways, rather than concentrating on a particular ridgeline location during timing of peak migration. HawkWatch International staff are beginning to investigate these issues and hope to soon understand better how weather and phenology interact so that we can better understand why there is so much variation from year to year.

RESIDENT RAPTORS

This year's crew recorded eight different species as displaying resident behavior: Sharp-shinned Hawk, Cooper's Hawk, Northern Goshawk, Red-tailed Hawk, Golden Eagle, American Kestrel, Prairie Falcon, and Peregrine Falcon.

Resident Sharp-shinned Hawks were seen from 1 September until 13 October, including at least two immature birds. Immature residents were observed mobbing and escorting migrant raptors on three occasions and stooped on the decoy owl twice in September. An adult was seen in the area twice in late September and an immature female was seen on 13 October.

An adult Northern Goshawk was seen flying north on three occasions between 7-15 September. An immature was seen mobbing a Red-tailed Hawk migrant on 27 September. Later in the season (17,19, 23 October) an immature bird was seen flying close to the ridge and once stooped on the owl.

Resident Red-tailed Hawks circled and hunted above Tilly Ridge from 2-28 September late in the morning hours. They were observed at least one time a week. At least three immature light morphs were present on two mornings. There was also an adult light morph and an adult dark morph in the area, and they were last seen on 2 October.

An adult Golden Eagle was observed near Ross Peak on 31 August and an adult, a subadult and an immature were seen at different times on 2 September. As the season progressed, the adult and the immature birds were often seen flying and interacting (chasing and playing) together. On 24 September an immature was observed dropping and catching a bloody object approximately 20 times over the valley to the west for 10 minutes. There continued to be Golden Eagle residents through October and were usually seen west of Ross flying above the Treed Ridge.

At least two American Kestrels, a male and a female, resided near the Bridger site from 2-26 September. They were consistently observed hunting near the ridgeline.

A resident Prairie Falcon was observed near the site on 4 September and a resident Peregrine Falcon was seen on 3 September.

OTHER WILDLIFE OBSERVATIONS

This season marked the first confirmed sighting of a Pileated Woodpecker and a Williamson's Sapsucker on the Bridger ridge. A Pileated Woodpecker was seen and/or heard on 4, 8, 24 September and 12 October. The Williamson's sapsucker was seen on 2 October east of the observation site. Mountain goats were seen on four different occasions (2 - 12 individuals/group). On 30 September a large black bear was observed actively stalking two mountain goats (one adult and one kid) headed south down Tilly Ridge toward the observation site late after 1600 MST. A partial-albino Dark-eyed Junco was seen on 21 September, 5 meters north of the observation site. Small flocks of American White Pelicans were seen on two occasions. Numerous flocks of passerine species were observed near the site as well during the migration count.

VISITATION

Throughout the course of the season, 86 individuals signed the visitor logs kept at the watch site. However, at least three times as many people passed through the site but did not sign the visitor log. Most visitors hailed from nearby areas of Montana, primarily from the Bozeman area, with some from Billings, Livingston, and Gardiner. Other guests visited from four other states (Arizona, Colorado, Delaware, and Vermont) and enjoyed the spectacle of the fall migration! The eleventh annual Bridger Raptor Festival once again coincided with opening ticket sales for the Bridger Bowl Ski Area, and as a result well over a thousand people were exposed to the festival, including a sizeable ornithology class from Rocky Mountain College that hiked up to the observation site. In 2010, 381 hourly assessments by the primary observers of visitor disturbance resulted in the following ratings: 80% none, 16% low, 4% moderate, and 1% high, which indicates an average level of visitor disturbance for this site but slightly above last year.

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Table 1. Annual fall-migration counts and adjusted passage rates (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) by species in the Bridger Mountains, MT: 1992–2009 versus 2010.

| SPECIES | COUNTS | | | RAPTORS/100 HRS | | |
|--------------------------------------|------------------------|------|---------|------------------------|-------|---------|
| | 1992–2009 ¹ | 2010 | %CHANGE | 1992–2009 ¹ | 2010 | %CHANGE |
| Turkey Vulture | 0.7 ± 0.69 | 2 | +177 | 0.4 ± 0.36 | 1.1 | 176 |
| Osprey | 6 ± 1.9 | 3 | -50 | 2.4 ± 0.73 | 1.1 | -54 |
| Northern Harrier | 49 ± 22.3 | 77 | +59 | 15.3 ± 7.23 | 22.7 | +48 |
| Sharp-shinned Hawk | 326 ± 51.8 | 336 | +3 | 122.1 ± 18.24 | 118.5 | -3 |
| Cooper's Hawk | 163 ± 33.0 | 207 | +27 | 119.7 ± 23.42 | 137.4 | +15 |
| Northern Goshawk | 32 ± 9.9 | 33 | +2 | 11.1 ± 3.97 | 10.1 | -9 |
| Unknown small accipiter ² | 27 ± 18.3 | 40 | +49 | – | – | – |
| Unknown large accipiter ² | 5 ± 2.3 | 22 | +360 | – | – | – |
| Unknown accipiter | 24 ± 8.4 | 25 | +6 | – | – | – |
| TOTAL ACCIPITERS | 560 ± 85.3 | 663 | +18 | – | – | – |
| Broad-winged Hawk | 10 ± 4.8 | 5 | -52 | 5.3 ± 2.55 | 2.8 | -47 |
| Swainson's Hawk | 3 ± 1.4 | 1 | -63 | 1.3 ± 0.75 | 0.4 | -72 |
| Red-tailed Hawk | 105 ± 22.8 | 178 | +70 | 37.9 ± 7.72 | 57.4 | +51 |
| Ferruginous Hawk | 2 ± 0.9 | 3 | +23 | 0.9 ± 0.29 | 0.9 | +4 |
| Rough-legged Hawk | 33 ± 8.9 | 31 | -7 | 23.7 ± 6.28 | 19.3 | -19 |
| Unidentified buteo | 12 ± 3.0 | 20 | +67 | – | – | – |
| TOTAL BUTEOS | 166 ± 30.9 | 238 | +44 | – | – | – |
| Golden Eagle | 1364 ± 159.1 | 1171 | -14 | 532.9 ± 60.35 | 399.0 | -25 |
| Bald Eagle | 77 ± 12.5 | 50 | -35 | 30.0 ± 5.20 | 16.7 | -44 |
| Unidentified eagle | 7 ± 3.4 | 1 | -85 | – | – | – |
| TOTAL EAGLES | 1448 ± 166.9 | 1222 | -16 | – | – | – |
| American Kestrel | 68 ± 18.3 | 87 | +27 | 58.6 ± 15.45 | 65.2 | +11 |
| Merlin | 9 ± 2.6 | 12 | +27 | 6.9 ± 1.73 | 6.4 | -7 |
| Prairie Falcon | 14 ± 1.9 | 18 | +29 | 9.2 ± 1.63 | 10.8 | +18 |
| Peregrine Falcon | 9 ± 2.7 | 8 | -15 | 7.6 ± 2.07 | 5.2 | -32 |
| Gyr Falcon | 0.1 ± 0.11 | 0 | -100 | – | – | – |
| Unknown small falcon ² | 4 ± 5.7 | 3 | -27 | – | – | – |
| Unknown large falcon ² | 4 ± 2.6 | 2 | -45 | – | – | – |
| Unknown falcon | 5 ± 2.0 | 0 | -100 | – | – | – |
| TOTAL FALCONS | 110 ± 21.6 | 130 | +18 | – | – | – |
| Unidentified raptor | 28 ± 6.2 | 14 | -50 | – | – | – |
| GRAND TOTAL | 2367 ± 265.3 | 2349 | -1 | – | – | – |

¹ Mean ± 95% confidence interval.

² Designations used for the first time in 2001.

Table 2. Fall counts by age class and immature : adult ratios for selected species of migrating raptors in the Bridger Mountains, MT: 1992–2009 versus 2010.

| | TOTAL AND AGE-CLASSIFIED COUNTS | | | | | | | IMMATURE : ADULT | | | |
|--------------------|---------------------------------|------|-------|-------|------|-------|------------------------|------------------|------------------------|------|--|
| | 1992–2009 AVERAGE | | | 2010 | | | % UNKNOWN AGE | | RATIO | | |
| | TOTAL | IMM. | ADULT | TOTAL | IMM. | ADULT | 1992–2009 ¹ | 2010 | 1992–2009 ¹ | 2010 | |
| Northern Harrier | 49 | 22 | 11 | 77 | 41 | 21 | 33 ± 7.4 | 19 | 3.4 ± 3.25 | 2.0 | |
| Sharp-shinned Hawk | 326 | 61 | 123 | 336 | 76 | 133 | 44 ± 6.3 | 38 | 0.5 ± 0.12 | 0.6 | |
| Cooper’s Hawk | 163 | 43 | 55 | 207 | 59 | 75 | 40 ± 5.3 | 35 | 0.9 ± 0.29 | 0.8 | |
| Northern Goshawk | 32 | 12 | 13 | 33 | 20 | 7 | 28 ± 10.0 | 18 | 1.6 ± 0.56 | 2.9 | |
| Broad-winged Hawk | 10 | 2 | 4 | 5 | 1 | 4 | 38 ± 17.6 | 0 | 0.9 ± 0.76 | 0.3 | |
| Red-tailed Hawk | 105 | 32 | 49 | 178 | 79 | 55 | 23 ± 4.2 | 25 | 0.7 ± 0.32 | 1.4 | |
| Golden Eagle | 1364 | 527 | 496 | 1171 | 528 | 305 | 25 ± 4.2 | 29 | 1.1 ± 0.19 | 1.7 | |
| Bald Eagle | 77 | 27 | 48 | 50 | 23 | 24 | 3 ± 15.4 | 6 | 0.6 ± 0.12 | 1.0 | |
| Peregrine Falcon | 9 | 0.6 | 4 | 8 | 1 | 1 | 52 ± 15.4 | 75 | 0.2 ± 0.27 | 1.0 | |

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

Table 3. First and last observation, bulk passage, and median passage dates by species for migrating raptors in the Bridger Mountains, MT in 2010, with a comparison of 2010 and 1992–2009 average median passage dates.

| SPECIES | 2010 | | | | 1992–2009 |
|--------------------|----------------|---------------|---------------------------------|----------------------------------|----------------------------------|
| | FIRST OBSERVED | LAST OBSERVED | BULK PASSAGE DATES ¹ | MEDIAN PASSAGE DATE ² | MEDIAN PASSAGE DATE ³ |
| Osprey | 3-Sep | 13-Oct | – | – | 16-Sep ± 3.1 |
| Northern Harrier | 2-Sep | 23-Oct | 4-Sep – 7-Oct | 15-Sep | 20-Sep ± 3.9 |
| Sharp-shinned Hawk | 2-Sep | 30-Oct | 12-Sep – 15-Oct | 1-Oct | 01-Oct ± 1.7 |
| Cooper’s Hawk | 31-Aug | 22-Oct | 8-Sep – 9-Oct | 26-Sep | 24-Sep ± 2.8 |
| Northern Goshawk | 2-Sep | 20-Oct | 5-Sep – 15-Oct | 17-Sep | 13-Oct ± 5.6 |
| Broad-winged Hawk | 7-Sep | 7-Oct | 7-Sep – 7-Oct | 14-Sep | 19-Sep ± 1.9 |
| Swainson’s Hawk | 2-Sep | 2-Sep | – | – | 15-Sep ± 5.2 |
| Red-tailed Hawk | 2-Sep | 23-Oct | 4-Sep – 7-Oct | 24-Sep | 24-Sep ± 2.0 |
| Ferruginous Hawk | 3-Sep | 13-Oct | – | – | 05-Oct ± 15.4 |
| Rough-legged Hawk | 23-Sep | 30-Oct | 30-Sep – 28-Oct | 21-Oct | 22-Oct ± 1.4 |
| Golden Eagle | 31-Aug | 1-Nov | 26-Sep – 19-Oct | 13-Oct | 14-Oct ± 1.8 |
| Bald Eagle | 4-Sep | 1-Nov | 2-Oct – 29-Oct | 19-Oct | 18-Oct ± 2.6 |
| American Kestrel | 2-Sep | 12-Oct | 4-Sep – 4-Oct | 14-Sep | 22-Sep ± 2.1 |
| Merlin | 4-Sep | 23-Oct | 4-Sep – 23-Oct | 11-Oct | 04-Oct ± 3.5 |
| Prairie Falcon | 5-Sep | 29-Oct | 5-Sep – 19-Oct | 28-Sep | 27-Sep ± 3.7 |
| Peregrine Falcon | 7-Sep | 2-Oct | 7-Sep – 2-Oct | 26-Sep | 27-Sep ± 2.4 |
| All species | 31-Aug | 1-Nov | 11-Sep – 18-Oct | 5-Sep | 08-Oct ± 1.8 |

¹ Dates between which the central 80% of the flight passed; values are given only for species with annual counts ≥5 birds.

² Date by which 50% of the flight had passed; values are given only for species with annual counts ≥5 birds.

³ Mean of annual values ± 95% confidence interval in days; calculated only for species with annual counts ≥5 birds for ≥3 years.

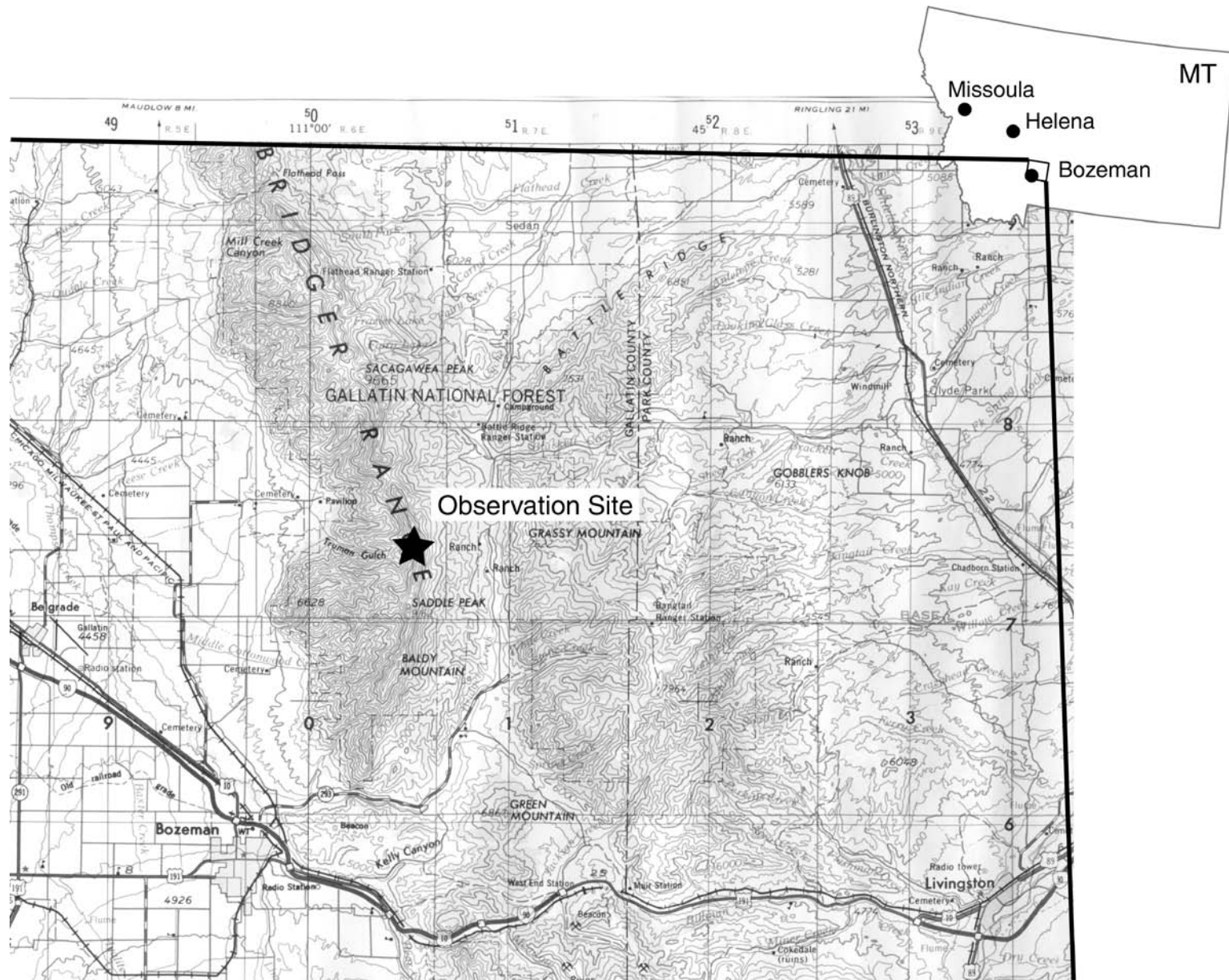


Figure 1. Location of the Bridger Mountains Raptor Migration Project study site.

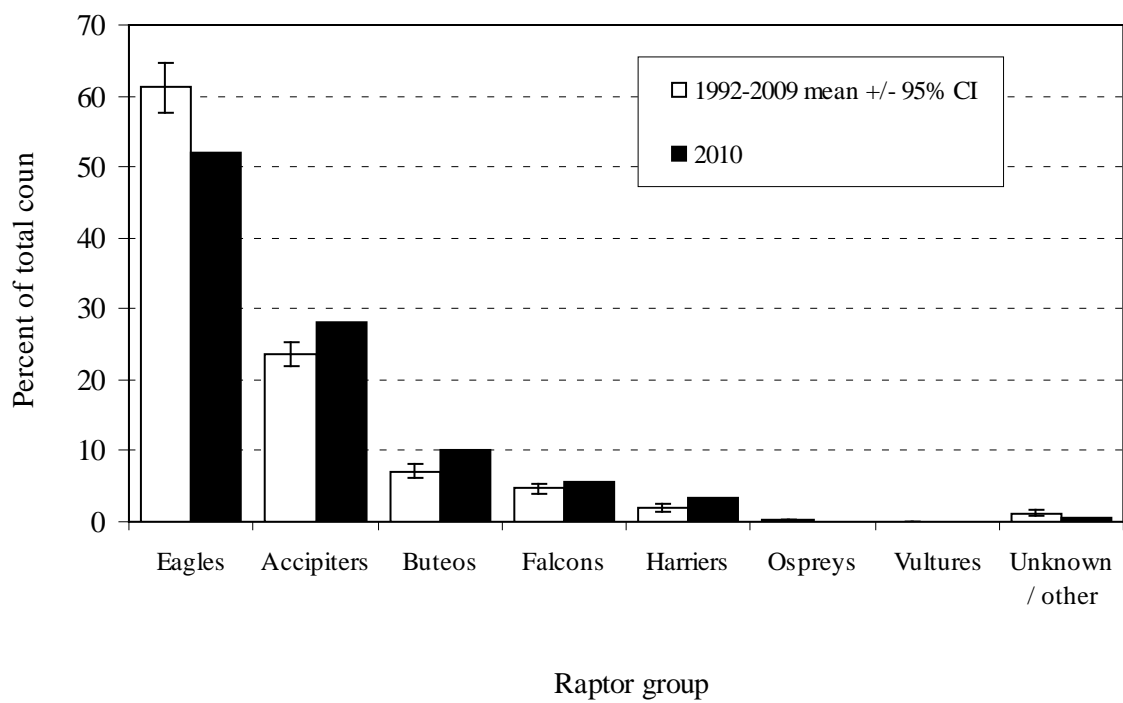


Figure 2. Composition of the fall raptor migration in the Bridger Mountains by major species groups: 1992–2009 versus 2010.

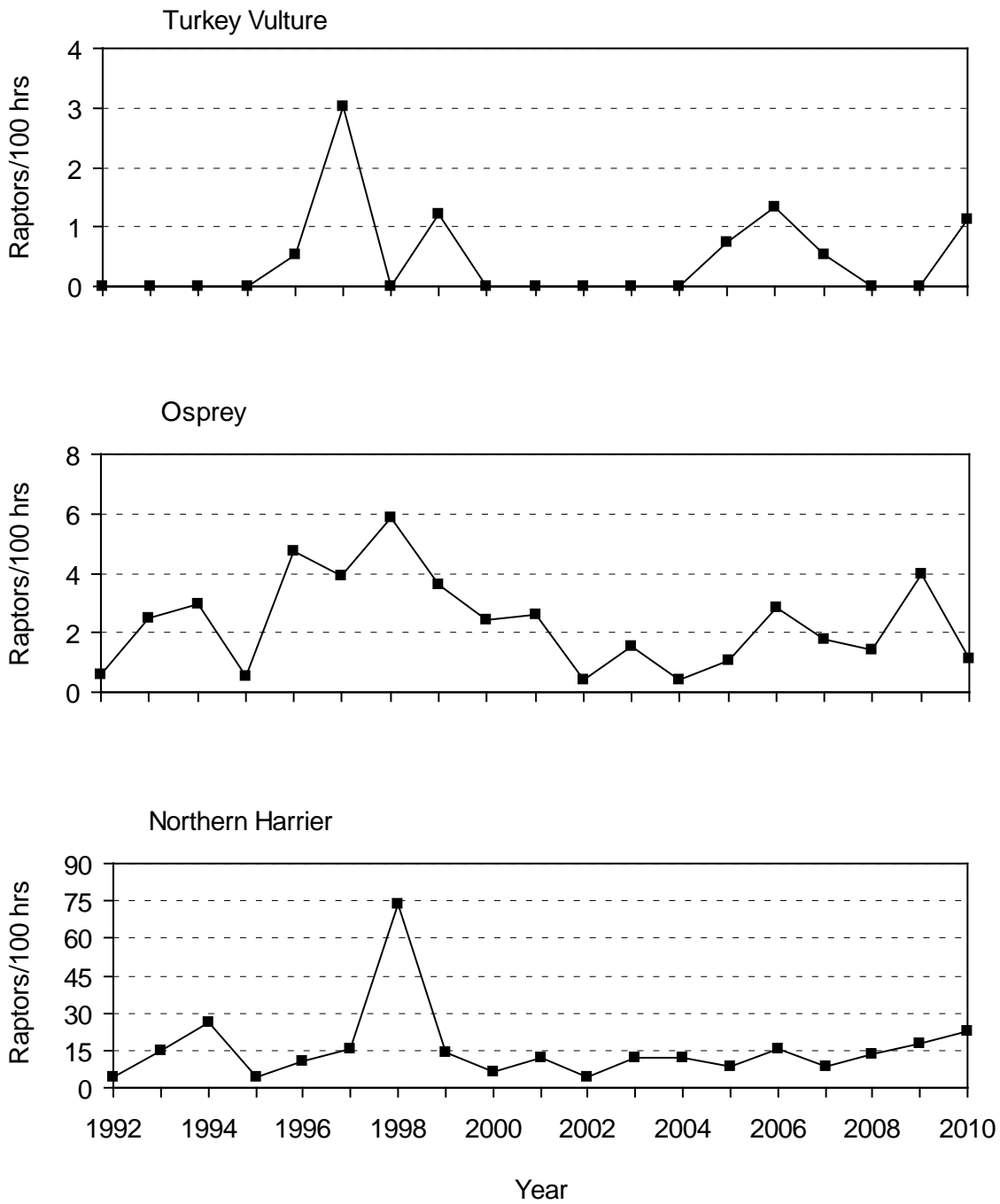


Figure 3. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Turkey Vultures, Ospreys, and Northern Harriers in the Bridger Mountains, MT: 1992–2010. Dashed lines indicate significant ($P \leq 0.10$) regressions.

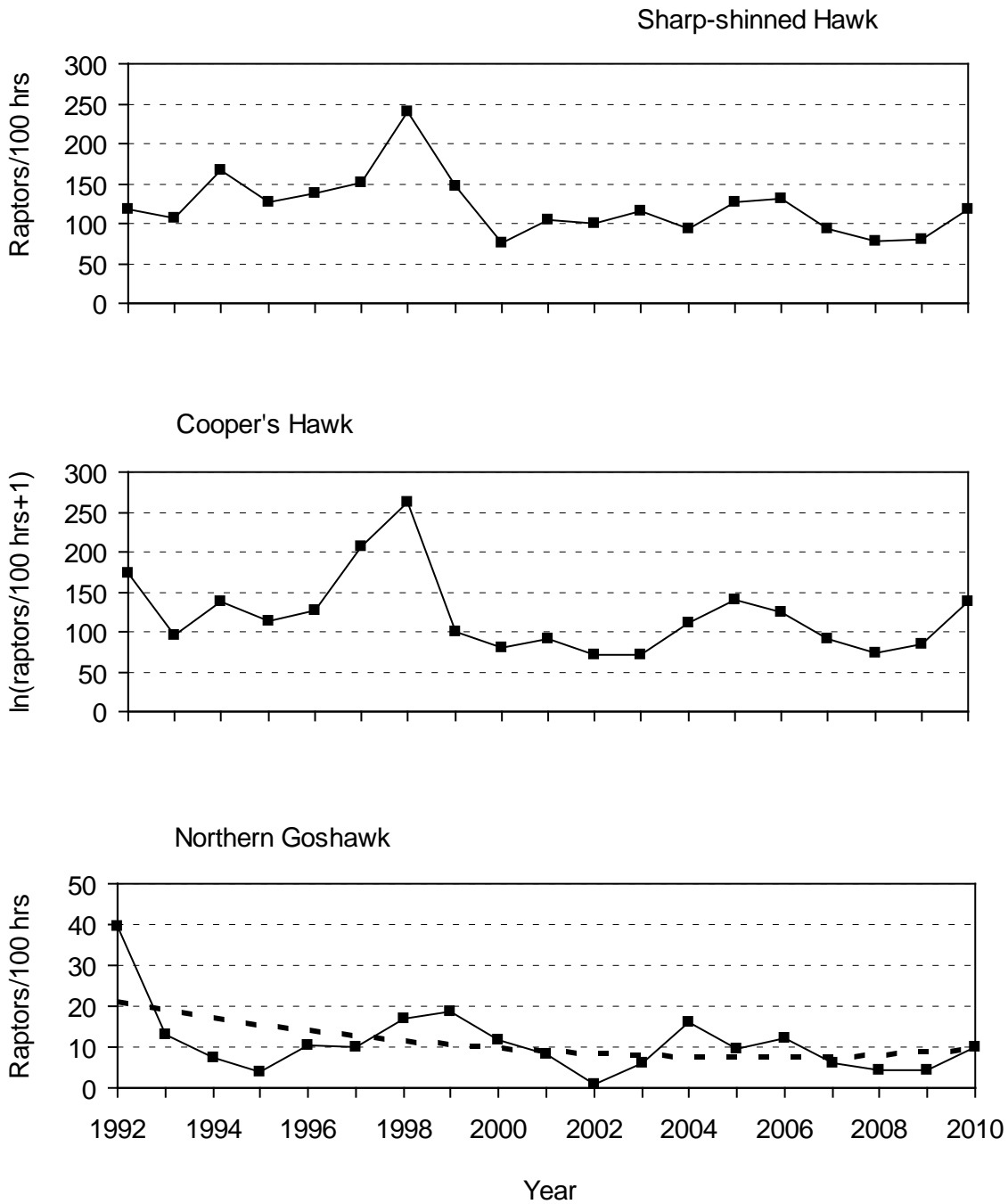


Figure 4. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Sharp-shinned Hawks, Cooper's Hawks, and Northern Goshawks in the Bridger Mountains, MT: 1992–2010. Dashed lines indicate significant ($P \leq 0.10$) regressions.

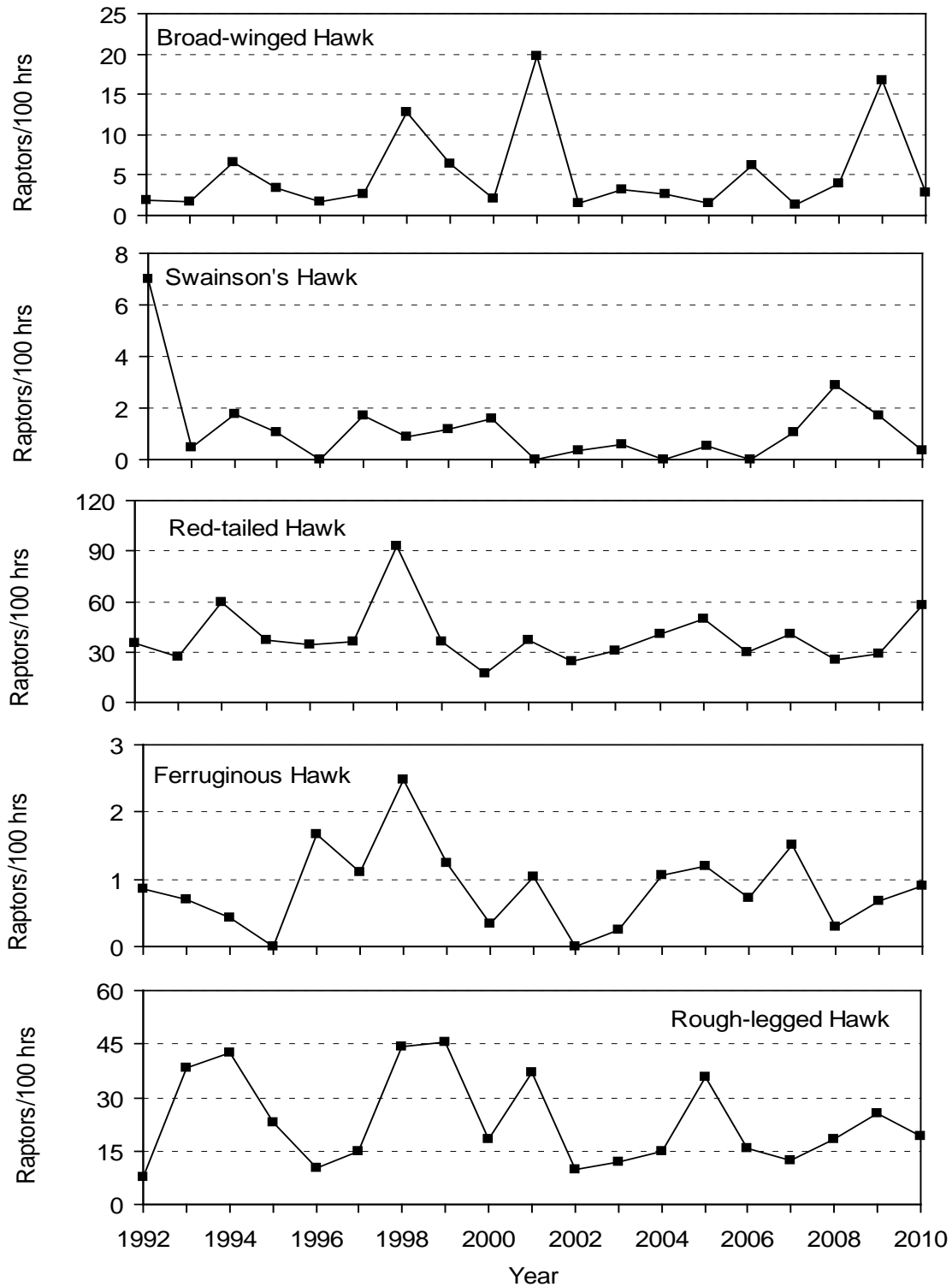


Figure 5. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Broad-winged, Swainson's, Red-tailed, Ferruginous, and Rough-legged Hawks in the Bridger Mountains, MT: 1992–2010. Dashed lines indicate significant ($P \leq 0.10$) regressions.

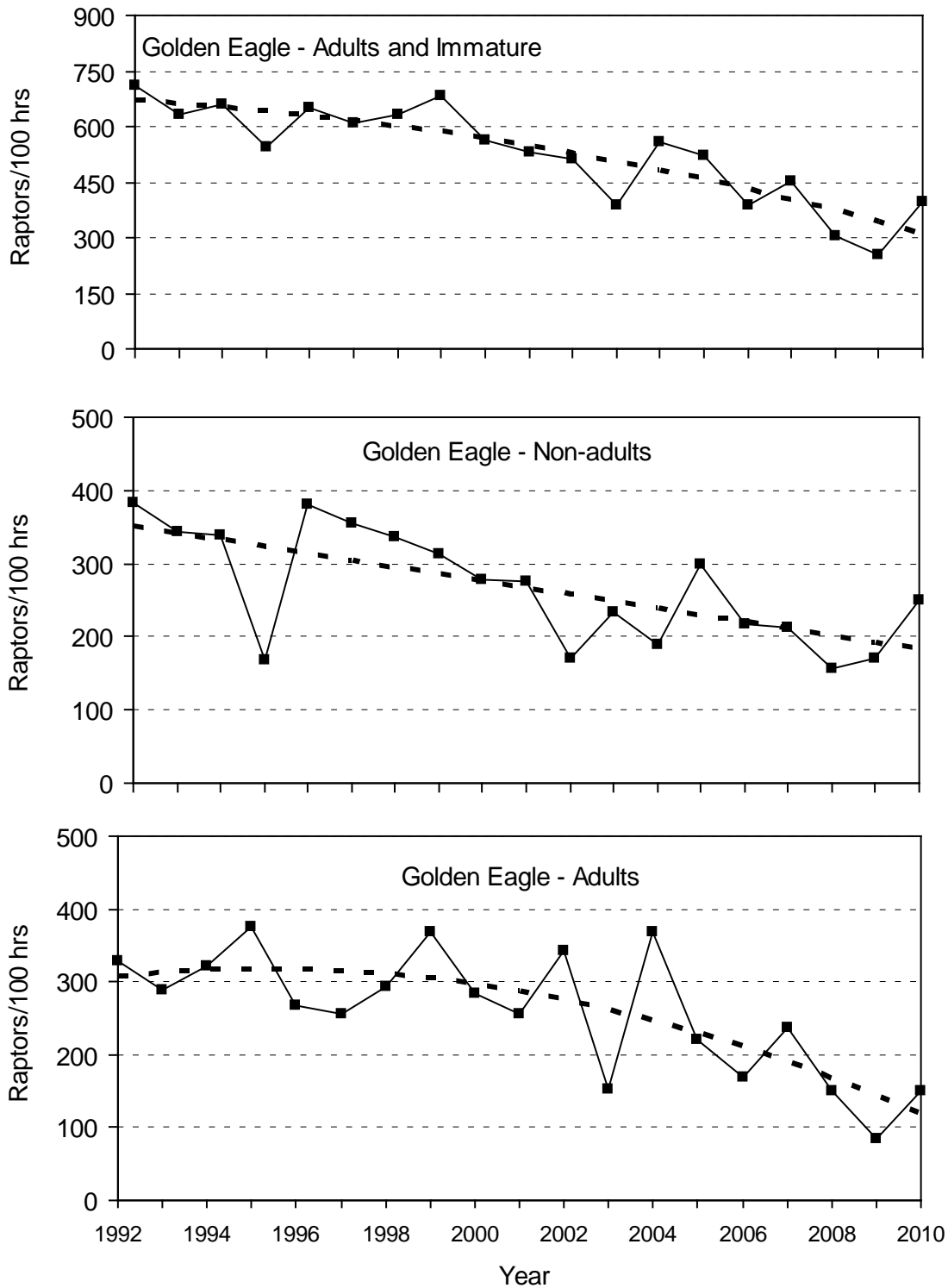


Figure 6. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Golden Eagles (separated by all birds, non-adults, and adults) in the Bridger Mountains, MT: 1992–2010. Dashed lines indicate significant ($P \leq 0.10$) regressions.

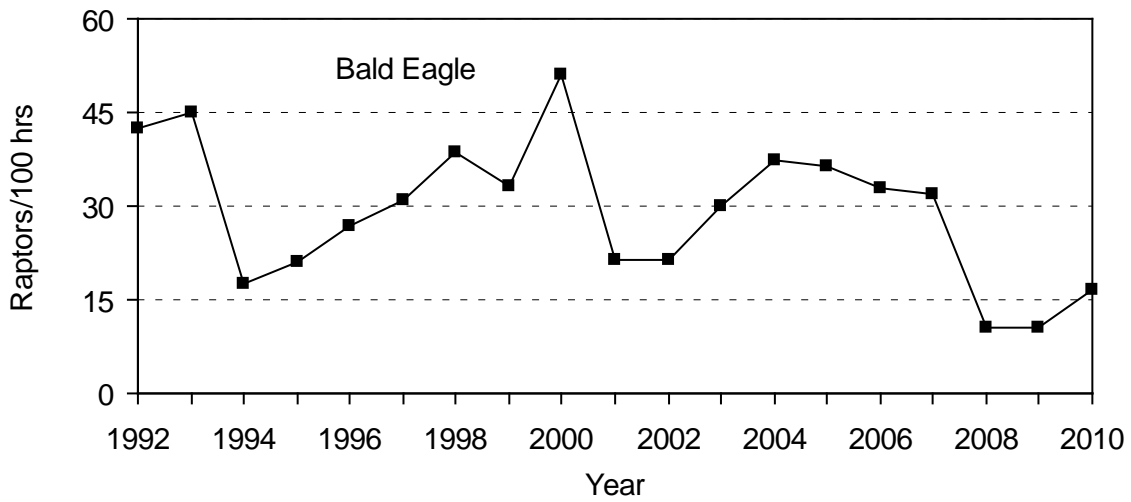


Figure 7. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Bald Eagles in the Bridger Mountains, MT: 1992–2010. Dashed lines indicate significant ($P \leq 0.10$) regressions.

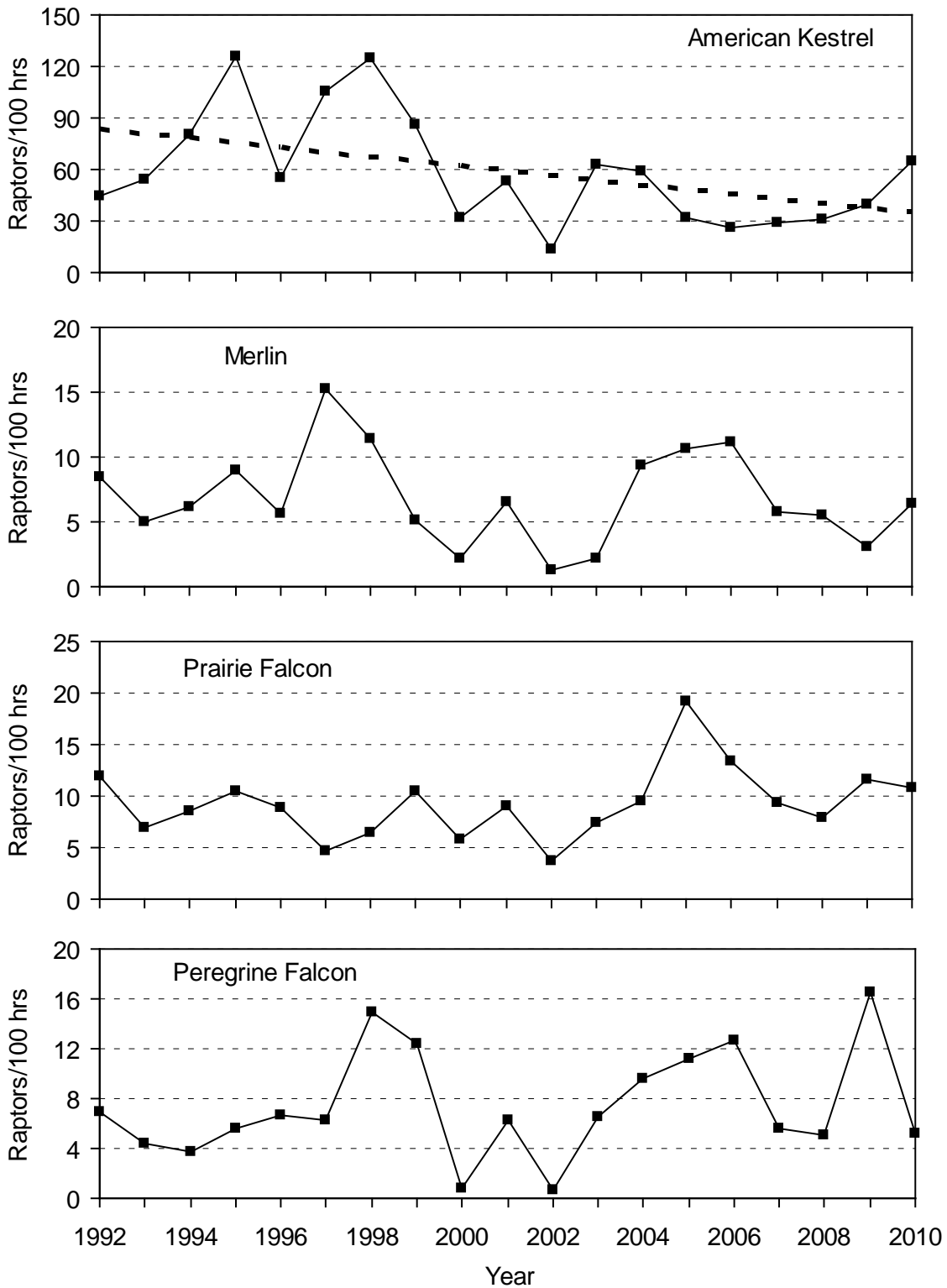


Figure 8. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons in the Bridger Mountains, MT: 1992–2010. Dashed lines indicate significant ($P \leq 0.10$) regressions.

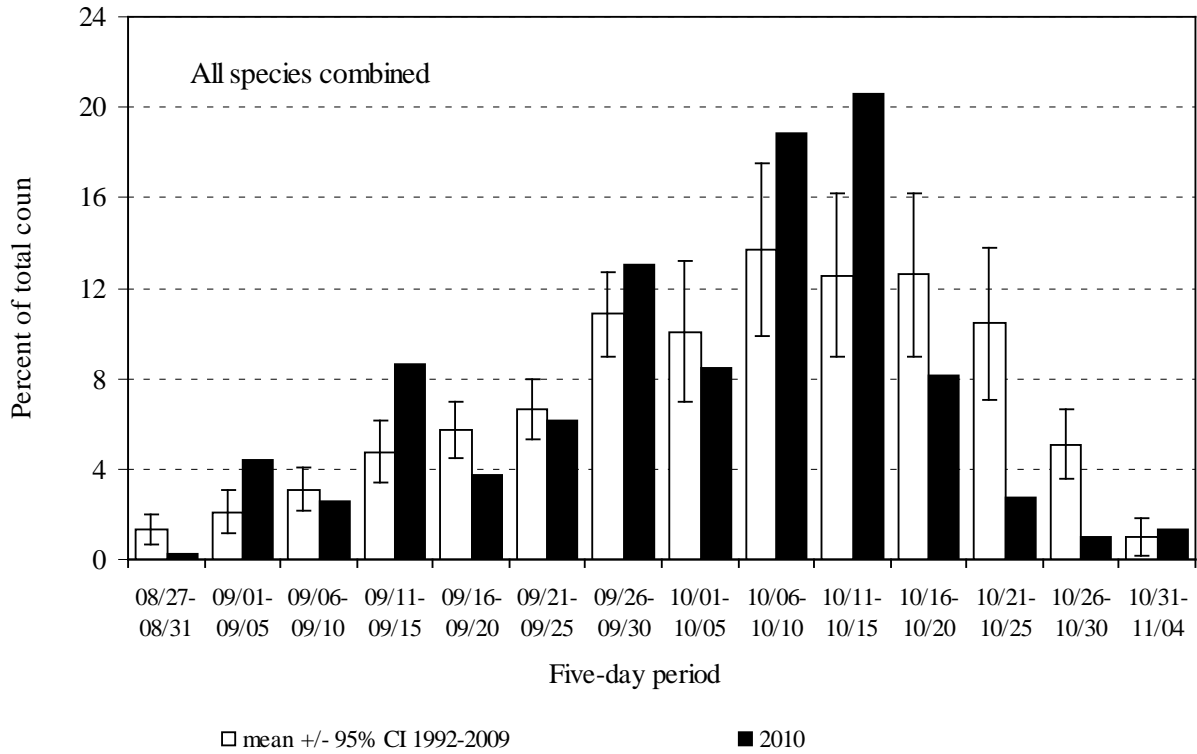


Figure 9. Combined-species passage volume by five-day periods for migrating raptors in the Bridger Mountains, MT: 1992–2009 versus 2010.

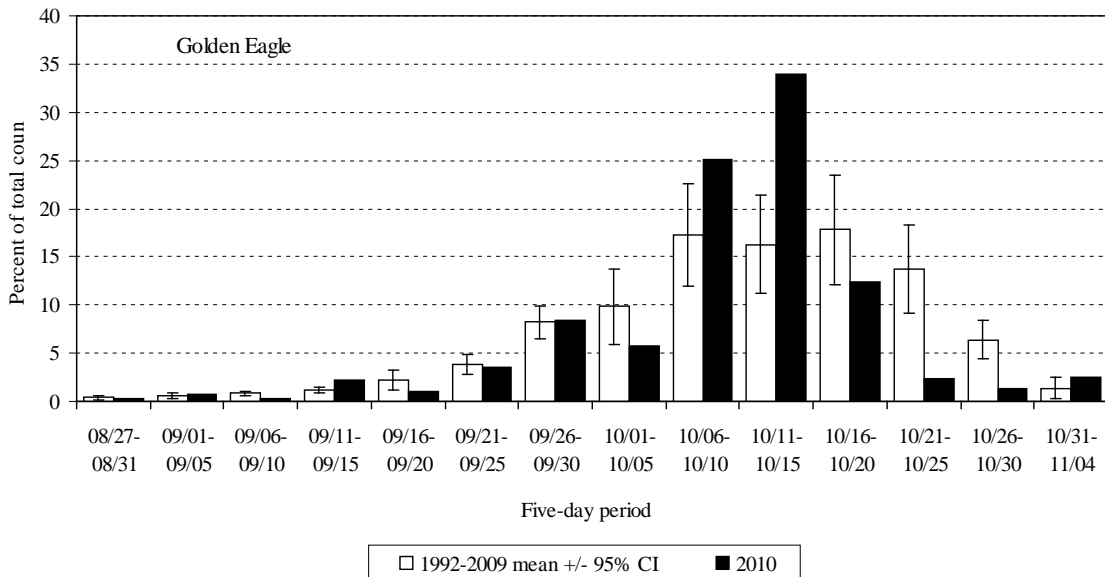


Figure 10. Passage volume by five-day periods for migrating Golden Eagles in the Bridger Mountains, MT: 1992–2009 versus 2010.

Appendix A. Common and scientific names, species codes, and regularly applied age, sex, and color-morph classifications for all diurnal raptor species observed during fall migration in the Bridger Mountains, MT.

| 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 |
| Broad-winged Hawk | <i>Buteo platyterus</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 |
| Gyr Falcon | <i>Falco rusticolus</i> | GY | A I U | U | W G D |
| 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, G = gray; L = light, W = white; 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 B. A history of primary observers for the Bridger Mountains Raptor Migration Project.

- 1991:** Variable teams throughout: Kristian Shawn Omland (0), Phil West (1), LisaBeth Daly (2), Craig Limpach (1)
- 1992:** Two observers throughout: Emily Teachout (1), Phil West (2)
- 1993:** Two observers throughout: Adam Kaufman (0), Anne-Marie Gillesberg (0)
- 1994:** Two observers throughout: Chris Gill (0), Stephanie Schmidt (1)
- 1995:** Two observers throughout: Scott Harris (0), Sue Thomas (0)
- 1996:** Two observers throughout: Jason Beason (0), Niels Maumenee (0)
- 1997:** Two observers throughout: Jason Beason (1), Patty Scifres (0)
- 1998:** Two observers throughout: Jason Beason (2), Mike Neal (0)
- 1999:** Two observers throughout: Mike Neal (2), Greg Levandoski (1)
- 2000:** Two observers throughout: Ryan Wagner (1), Tracy Elsey (0)
- 2001:** Two observers throughout: Ryan Wagner (2), Jeff Maurer (4)
- 2002:** Two observers throughout: Matt Proett (0), Marg Lomow (2; half season), Maureen Essen (0; half season)
- 2003:** Two observers throughout: Samantha Burrell (0), Carl Bullock (0)
- 2004:** Two observers throughout: Allison Peterson (0), John Bell (0)
- 2005:** Two observers throughout: Corey Michell (0), Beau Fairchild (0)
- 2006:** Two observers throughout: Brian Cook (0), Jamie Granger (0)
- 2007:** Two observers throughout: Jody Vogeler (0), Brenden McGugin (0)
- 2008:** Two observers throughout: Amy Seaman (0), Michaela Hitchcock (0), John Bell (2)
- 2009:** Two observers throughout: Caitlin Kroeger (0), Jason Minné (0)
- 2010:** Two observers throughout: Jamie Hogberg (0), David Laufenberg (0)

Note: Numbers in parentheses indicate number of full-seasons of previous raptor migration monitoring experience.

Appendix C. Daily observation effort, visitor disturbance ratings, weather records, and flight summaries for the Bridger Mountains Raptor Migration Project: 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 | BIRDS /HOUR |
|--------|------------|---------------------------|-------------------------------------|----------------------------------|-------------------------------|----------------|------------------------|------------------------------------|----------------------------------|-------------------------------|-------------------------------|-------------------------------------|-------------|
| 28-Aug | 1.58 | 2.0 | 0 | ovc, rain | 12.5 | sw-w, e-se | 6.3 | 26.63 | 4 | 18 | 100 | 1 | 0.0 |
| 29-Aug | 0.00 | | | Weather Day: fog/rain | | | | | | | | | |
| 30-Aug | 0.00 | | | Weather Day: fog | | | | | | | | | |
| 31-Aug | 6.83 | 2.0 | 0 | mc-ovc | 4.9 | sw-nw | 5.7 | 26.84 | 4 | 74 | 79 | 2 | 0.7 |
| 1-Sep | 0.00 | | | Weather Day: fog/rain | | | | | | | | | |
| 2-Sep | 8.00 | 2.0 | 1 | pc-clr, haze AM | 4.3 | wse-w | 9.2 | 27.09 | 2 | 100 | 100 | 3 | 2.1 |
| 3-Sep | 8.00 | 2.0 | 0 | clr-pc | 4.0 | sw-w | 17.8 | 27.05 | 2 | 100 | 100 | 3 | 1.9 |
| 4-Sep | 8.00 | 2.8 | 0 | clr-ovc | 4.6 | sw-w | 18.0 | 26.86 | 3 | 96 | 100 | 3 | 8.3 |
| 5-Sep | 3.83 | 2.0 | 0 | ovc, fog/snow | 3.3 | sw-nw | 4.9 | 26.65 | 4 | 42 | 65 | 1 | 1.6 |
| 6-Sep | 7.42 | 2.0 | 0 | pc-ovc | 3.2 | sw-w | 4.8 | 26.83 | 3 | 97 | 98 | 1 | 0.5 |
| 7-Sep | 7.50 | 2.0 | 0 | pc-mc | 5.4 | ne-se | 12.9 | 26.81 | 3 | 99 | 98 | 3 | 6.3 |
| 8-Sep | 3.50 | 2.0 | 0 | ovc | 7.6 | sse-sw | 14.8 | 26.70 | 4 | 92 | 92 | 2 | 2.9 |
| 9-Sep | 0.00 | | | Weather Day: fog/snow | | | | | | | | | |
| 10-Sep | 0.00 | | | Weather Day: fog/snow | | | | | | | | | |
| 11-Sep | 8.00 | 2.0 | 0 | clr | 6.6 | sw-w | 9.3 | 26.90 | 2 | 100 | 100 | 3 | 3.4 |
| 12-Sep | 8.00 | 2.0 | 1.5 | clr | 2.7 | sw-w | 12.8 | 26.99 | 2 | 100 | 100 | 3 | 8.9 |
| 13-Sep | 7.33 | 2.0 | 0 | clr-pc | 3.3 | sw-w | 16.0 | 26.98 | 2 | 98 | 100 | 3 | 9.4 |
| 14-Sep | 7.00 | 2.0 | 0 | pc-ovc | 9.7 | ne-e | 12.9 | 26.88 | 4 | 92 | 94 | 2 | 3.3 |
| 15-Sep | 8.00 | 2.0 | 0 | pc-ovc | 2.0 | sw-w | 10.4 | 26.94 | 3 | 100 | 90 | 3 | 1.6 |
| 16-Sep | 6.50 | 2.8 | 0 | ovc | 5.5 | sw-w | 10.5 | 26.87 | 4 | 94 | 99 | 2 | 0.9 |
| 17-Sep | 4.50 | 1.2 | 0 | mc-ovc | 1.8 | sw-w | 9.7 | 26.89 | 4 | 88 | 71 | 1 | 0.4 |
| 18-Sep | 3.50 | 2.0 | 0 | pc-ovc | 3.0 | sw-w | 15.0 | 26.87 | 3 | 88 | 92 | 1 | 0.3 |
| 19-Sep | 8.00 | 2.6 | 0 | clr-pc, haze PM | 5.7 | s-sw | 18.5 | 26.76 | 3 | 90 | 81 | 4 | 9.0 |
| 20-Sep | 8.00 | 2.0 | 0 | pc-ovc | 5.0 | s-sw | 6.6 | 26.72 | 4 | 100 | 99 | 2 | 0.9 |
| 21-Sep | 7.00 | 2.0 | 0 | mc-ovc | 2.0 | sw-w | 8.1 | 26.70 | 3 | 98 | 98 | 3 | 1.4 |
| 22-Sep | 0.00 | | | Weather Day: fog/rain | | | | 29.85 | | | | | |
| 23-Sep | 7.83 | 2.0 | 0 | pc-ovc, fog AM | 5.1 | sw-w | 7.0 | 26.78 | 3 | 88 | 92 | 3 | 4.2 |
| 24-Sep | 8.00 | 2.1 | 0 | mc-ovc | 6.1 | sw-w | 7.4 | 26.98 | 4 | 99 | 98 | 3 | 3.6 |
| 25-Sep | 8.00 | 2.7 | 0 | clr-pc | 7.3 | sw-w | 13.6 | 27.13 | 2 | 100 | 100 | 3 | 9.1 |
| 26-Sep | 8.00 | 2.5 | 2 | clr-ovc | 6.7 | sw-w | 16.2 | 26.98 | 3 | 100 | 99 | 4 | 9.1 |
| 27-Sep | 8.00 | 2.0 | 0 | pc | 5.0 | sw-w | 15.8 | 27.08 | 3 | 100 | 100 | 3 | 9.8 |
| 28-Sep | 7.00 | 2.0 | 0 | clr, haze | 6.9 | sw-w | 16.8 | 26.95 | 3 | 97 | 98 | 4 | 3.1 |
| 29-Sep | 8.00 | 2.0 | 0 | clr, haze AM | 1.0 | sw-w | 13.4 | 27.02 | 3 | 91 | 98 | 4 | 8.9 |
| 30-Sep | 7.67 | 2.0 | 0 | clr | 1.3 | sw, nw-n PM | 15.9 | 26.99 | 2 | 100 | 100 | 3 | 8.1 |
| 1-Oct | 8.00 | 2.0 | 0 | clr | 14.4 | ne-e | 8.9 | 27.08 | 3 | 100 | 100 | 2 | 4.5 |
| 2-Oct | 8.00 | 2.9 | 1.5 | clr | 3.5 | s-sw | 15.8 | 27.05 | 2 | 100 | 100 | 2 | 7.6 |
| 3-Oct | 8.00 | 2.6 | 1.5 | clr-pc, haze AM | 4.8 | s-sw-w | 19.7 | 26.94 | 2 | 98 | 98 | 3 | 5.5 |
| 4-Oct | 7.50 | 2.0 | 0 | pc-ovc, rain PM, | 7.4 | sw-w | 12.0 | 26.83 | 3 | 98 | 94 | 3 | 7.7 |

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 | BIRDS /HOUR |
|--------|------------|---------------------------|-------------------------------------|----------------------------------|-------------------------------|----------------|------------------------|------------------------------------|----------------------------------|-------------------------------|-------------------------------|-------------------------------------|-------------|
| 5-Oct | 0.00 | | | Weather Day: fog/rain | | | | | | | | | |
| 6-Oct | 8.00 | 2.0 | 0 | clr-pc | 7.6 | sw-w, e | 11.4 | 27.05 | 3 | 100 | 98 | 2 | 4.8 |
| 7-Oct | 8.50 | 2.7 | 0 | clr-mc | 6.8 | sw-w | 10.6 | 26.89 | 3 | 100 | 100 | 3 | 26.9 |
| 8-Oct | 0.00 | | | Weather Day: fog/rain | | | | | | | | | |
| 9-Oct | 8.00 | 2.0 | 1 | pc-ovc, fog AM | 9.3 | sw-w | 4.2 | 27.02 | 4 | 70 | 70 | 3 | 8.9 |
| 10-Oct | 8.00 | 2.0 | 1 | mc-ovc, rain AM | 9.1 | sw-w | 6.4 | 26.97 | 4 | 100 | 100 | 3 | 13.0 |
| 11-Oct | 0.00 | | | Weather Day: fog/rain | | | | | | | | | |
| 12-Oct | 8.25 | 2.0 | 0 | clr-mc | 11.9 | sw-w | 0.5 | 27.08 | 4 | 100 | 100 | 2 | 15.4 |
| 13-Oct | 8.00 | 2.0 | 0 | pc-ovc | 11.6 | sw-w | 6.9 | 27.11 | 4 | 100 | 100 | 2 | 18.0 |
| 14-Oct | 8.00 | 1.8 | 0 | clr-pc | 9.6 | sw-w | 11.0 | 27.02 | 2 | 100 | 100 | 2 | 10.1 |
| 15-Oct | 8.00 | 1.9 | 0 | mc-ovc | 10.1 | sw-w | 8.3 | 26.85 | 4 | 100 | 100 | 3 | 16.5 |
| 16-Oct | 2.00 | 2.0 | 1 | ovc, snow | 6.3 | w | 0.7 | 26.91 | 4 | 43 | 67 | 2 | 0.5 |
| 17-Oct | 4.00 | 2.0 | 1.5 | pc-mc, haze PM | 6.5 | sw-w | 5.3 | 26.87 | 3 | 100 | 100 | 3 | 9.8 |
| 18-Oct | 8.00 | 2.0 | 0 | mc, haze | 9.3 | w | 1.8 | 26.88 | 4 | 100 | 100 | 2 | 8.0 |
| 19-Oct | 8.00 | 2.0 | 0 | clr-pc, haze | 12.9 | w | 2.1 | 26.91 | 4 | 100 | 100 | 2 | 6.3 |
| 20-Oct | 8.00 | 2.0 | 0 | pc | 6.1 | w | 7.8 | 26.92 | 4 | 100 | 100 | 2 | 4.8 |
| 21-Oct | 8.00 | 2.0 | 0 | clr, haze | 6.6 | sw-w | 9.6 | 26.81 | 3 | 100 | 100 | 2 | 2.5 |
| 22-Oct | 7.25 | 2.0 | 0 | pc-ovc, haze | 3.6 | var | 8.2 | 26.73 | 3 | 82 | 93 | 2 | 1.9 |
| 23-Oct | 6.50 | 2.0 | 0 | pc-ovc, haze | 5.9 | w | 4.3 | 26.66 | 3 | 74 | 98 | 2 | 4.8 |
| 24-Oct | 0.00 | | | Weather Day: fog/rain | | | | | | | | | |
| 25-Oct | 0.00 | | | Weather Day: fog/snow | | | | | | | | | |
| 26-Oct | 0.00 | | | Weather Day: fog/snow | | | | | | | | | |
| 27-Oct | 1.67 | 2.0 | 2 | ovc | 10.3 | s-sw | -6.0 | 26.87 | 4 | 100 | 100 | 1 | 0.0 |
| 28-Oct | 5.75 | 2.0 | 1 | mc-ovc | 9.0 | s-sw | -0.3 | 26.90 | 4 | 100 | 100 | 1 | 0.5 |
| 29-Oct | 4.75 | 2.0 | 1 | ovc | 10.3 | sw-w | 0.2 | 26.76 | 4 | 100 | 100 | 2 | 1.7 |
| 30-Oct | 6.00 | 2.4 | 1 | pc-ovc, haze | 3.3 | se-sw | 2.5 | 26.70 | 4 | 100 | 100 | 2 | 2.2 |
| 31-Oct | 1.50 | 2.0 | 1 | ovc, snow | 6.7 | sw-w | 0.3 | 26.78 | 4 | 43 | 77 | 1 | 0.0 |
| 1-Nov | 5.33 | 1.0 | 0 | mc | 11.4 | sw-w | 0.4 | 27.03 | 4 | 100 | 100 | 2 | 5.8 |

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); pc = partly cloudy (16-50% cover); mc = mostly cloudy (51-75% cover); ovc = overcast (76-100% cover); ts = thunderstorms.

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

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

Appendix D. Daily observation effort and fall raptor migration counts by species in the Bridger Mountains, MT: 2009.

| DATE | HOURS | SPECIES ¹ | | | | | | | | | | | | | | | | | | | | | | | | | BIRDS | | | | | |
|--------|-------|----------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|-----|-------|-------|---|-----|
| | | TV | OS | NH | SS | CH | NG | SA | LA | UA | BW | SW | RT | FH | RL | UB | GE | BE | UE | AK | ML | PR | PG | GY | SF | LF | UF | UU | TOTAL | /HOUR | | |
| 28-Aug | 1.58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 29-Aug | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Aug | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-Aug | 6.83 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0.7 | | |
| 1-Sep | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 8.00 | 0 | 0 | 6 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 2.1 | | |
| 3-Sep | 8.00 | 0 | 1 | 2 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 1.9 | | | |
| 4-Sep | 8.00 | 0 | 0 | 4 | 7 | 8 | 1 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 5 | 1 | 0 | 18 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 66 | 8.3 | | | |
| 5-Sep | 3.83 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1.6 | | | |
| 6-Sep | 7.42 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0.5 | | | |
| 7-Sep | 7.50 | 0 | 0 | 12 | 0 | 7 | 4 | 0 | 1 | 0 | 1 | 0 | 12 | 0 | 0 | 2 | 0 | 0 | 7 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 47 | 6.3 | | | |
| 8-Sep | 3.50 | 0 | 0 | 1 | 2 | 4 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 2.9 | | | | |
| 9-Sep | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 8.00 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 3 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 27 | 3.4 | | | |
| 12-Sep | 8.00 | 0 | 0 | 1 | 17 | 14 | 1 | 4 | 3 | 3 | 0 | 7 | 0 | 0 | 1 | 9 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 71 | 8.9 | | | |
| 13-Sep | 7.33 | 0 | 0 | 8 | 17 | 10 | 4 | 2 | 1 | 5 | 2 | 7 | 0 | 0 | 0 | 10 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 69 | 9.4 | | | | |
| 14-Sep | 7.00 | 0 | 0 | 4 | 2 | 4 | 2 | 1 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 3.3 | | | | |
| 15-Sep | 8.00 | 0 | 0 | 0 | 3 | 7 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 1.6 | | | | |
| 16-Sep | 6.50 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0.9 | | | | |
| 17-Sep | 4.50 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.4 | | | | |
| 18-Sep | 3.50 | 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 | 1 | 0.3 | | | | |
| 19-Sep | 8.00 | 0 | 0 | 3 | 4 | 23 | 1 | 5 | 2 | 3 | 0 | 16 | 0 | 0 | 0 | 9 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 72 | 9.0 | | | | |
| 20-Sep | 8.00 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0.9 | | | | |
| 21-Sep | 7.00 | 0 | 0 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1.4 | | | | |
| 22-Sep | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Appendix D. continued

| DATE | HOURS | SPECIES ¹ | | | | | | | | | | | | | | | | | | | | | | | BIRDS | | | | | |
|--------|-------|----------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|----|----|-------|----|----|-----|-------|-------|
| | | TV | OS | NH | SS | CH | NG | SA | LA | UA | BW | SW | RT | FH | RL | UB | GE | BE | UE | AK | ML | PR | PG | GY | SF | LF | UF | UU | TOTAL | /HOUR |
| 23-Sep | 7.83 | 0 | 0 | 0 | 5 | 4 | 0 | 2 | 1 | 1 | 0 | 0 | 9 | 0 | 1 | 0 | 7 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 4.2 |
| 24-Sep | 8.00 | 0 | 0 | 1 | 9 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 12 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 3.6 | |
| 25-Sep | 8.00 | 0 | 0 | 0 | 9 | 16 | 0 | 3 | 1 | 1 | 0 | 0 | 7 | 0 | 0 | 2 | 18 | 1 | 1 | 6 | 1 | 3 | 3 | 0 | 0 | 1 | 0 | 73 | 9.1 | |
| 26-Sep | 8.00 | 0 | 0 | 2 | 13 | 10 | 1 | 1 | 1 | 0 | 0 | 0 | 8 | 0 | 0 | 1 | 29 | 0 | 0 | 4 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 73 | 9.1 | |
| 27-Sep | 8.00 | 0 | 0 | 0 | 19 | 7 | 0 | 0 | 4 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 31 | 0 | 0 | 3 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 78 | 9.8 | |
| 28-Sep | 7.00 | 1 | 0 | 0 | 2 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 12 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 3.1 | |
| 29-Sep | 8.00 | 0 | 0 | 5 | 20 | 12 | 0 | 1 | 0 | 3 | 0 | 0 | 8 | 0 | 0 | 1 | 14 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 71 | 8.9 | |
| 30-Sep | 7.67 | 0 | 0 | 6 | 23 | 8 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 3 | 1 | 13 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 62 | 8.1 | |
| 1-Oct | 8.00 | 0 | 0 | 6 | 7 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 15 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 | 4.5 | |
| 2-Oct | 8.00 | 0 | 0 | 1 | 13 | 12 | 0 | 0 | 0 | 1 | 1 | 0 | 8 | 0 | 0 | 0 | 17 | 2 | 0 | 4 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 61 | 7.6 | |
| 3-Oct | 8.00 | 0 | 0 | 0 | 22 | 11 | 2 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 5.5 | |
| 4-Oct | 7.50 | 0 | 0 | 0 | 10 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 33 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 58 | 7.7 | |
| 5-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Oct | 8.00 | 0 | 0 | 3 | 14 | 6 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 2 | 0 | 5 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 4.8 | |
| 7-Oct | 8.50 | 0 | 0 | 2 | 22 | 11 | 1 | 5 | 2 | 2 | 1 | 0 | 4 | 0 | 2 | 5 | 156 | 10 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 229 | 26.9 | |
| 8-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Oct | 8.00 | 0 | 0 | 1 | 8 | 3 | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 48 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 71 | 8.9 | |
| 10-Oct | 8.00 | 0 | 0 | 0 | 12 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 85 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 104 | 13.0 | |
| 11-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Oct | 8.25 | 0 | 0 | 2 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 112 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 127 | 15.4 | |
| 13-Oct | 8.00 | 0 | 1 | 0 | 5 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 1 | 131 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 144 | 18.0 | |
| 14-Oct | 8.00 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 69 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 81 | 10.1 | |
| 15-Oct | 8.00 | 0 | 0 | 0 | 21 | 8 | 1 | 7 | 0 | 2 | 0 | 0 | 1 | 0 | 2 | 1 | 85 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 132 | 16.5 | |
| 16-Oct | 2.00 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | |
| 17-Oct | 4.00 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 34 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 9.8 | |
| 18-Oct | 8.00 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 57 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 64 | 8.0 | |
| 19-Oct | 8.00 | 0 | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 50 | 6.3 | |

Appendix D. continued

| DATE | HOURS | SPECIES ¹ | | | | | | | | | | | | | | | | | | | | | | | BIRDS | | | | | |
|--------|--------|----------------------|----|----|-----|-----|----|----|----|----|----|----|-----|----|----|----|------|----|----|----|----|----|----|----|-------|----|----|-----|-------|-------|
| | | TV | OS | NH | SS | CH | NG | SA | LA | UA | BW | SW | RT | FH | RL | UB | GE | BE | UE | AK | ML | PR | PG | GY | SF | LF | UF | UU | TOTAL | /HOUR |
| 20-Oct | 8.00 | 0 | 0 | 2 | 4 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 9 | 0 | 16 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 4.8 |
| 21-Oct | 8.00 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 10 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 2.5 |
| 22-Oct | 7.25 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 5 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 1.9 | |
| 23-Oct | 6.50 | 0 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 13 | 6 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 4.8 | |
| 24-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Oct | 1.67 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Oct | 5.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.5 | |
| 29-Oct | 4.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1.7 | |
| 30-Oct | 6.00 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 7 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 2.2 | | |
| 31-Oct | 1.50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Nov | 5.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 5.8 | |
| Total | 366.00 | 2 | 3 | 77 | 336 | 207 | 33 | 40 | 22 | 25 | 5 | 1 | 178 | 3 | 31 | 20 | 1171 | 50 | 1 | 87 | 12 | 18 | 8 | 0 | 3 | 2 | 0 | 14 | 2349 | 6.4 |

¹ See Appendix A for interpretation of species codes.

Appendix E. Annual observation effort and fall raptor migration counts by species in the Bridger Mountains, MT: 1991–2010.

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|------------------------|---------------|--------|--------|--------|--------|--------|--------|
| Start date | 15-Sep | 6-Sep | 9-Sep | 13-Sep | 10-Sep | 1-Sep | 27-Aug |
| End date | 3-Nov | 28-Oct | 31-Oct | 30-Oct | 2-Nov | 30-Oct | 31-Oct |
| Observation days | 32 | 39 | 46 | 36 | 42 | 53 | 62 |
| Observation hours | 191.1 | 242.58 | 298.50 | 239.25 | 269.17 | 378.25 | 422.92 |
| Raptors / 100 hours | 926.7 | 1000.1 | 871.7 | 1027.8 | 824.0 | 808.5 | 796.1 |
| SPECIES | RAPTOR COUNTS | | | | | | |
| Turkey Vulture | 3 | 0 | 0 | 0 | 0 | 1 | 6 |
| Osprey | 2 | 2 | 5 | 5 | 1 | 14 | 12 |
| Northern Harrier | 19 | 13 | 41 | 59 | 10 | 38 | 66 |
| Sharp-shinned Hawk | 88 | 248 | 279 | 364 | 304 | 436 | 480 |
| Cooper's Hawk | 87 | 175 | 124 | 134 | 131 | 206 | 347 |
| Northern Goshawk | 27 | 96 | 39 | 17 | 10 | 37 | 36 |
| Unkown small accipiter | - | - | - | - | - | - | - |
| Unkown large accipiter | - | - | - | - | - | - | - |
| Unknown accipiter | 70 | 35 | 27 | 20 | 33 | 51 | 53 |
| Total accipiters | 272 | 554 | 469 | 535 | 478 | 730 | 916 |
| Broad-winged Hawk | 0 | 2 | 3 | 16 | 5 | 5 | 5 |
| Swainson's Hawk | 1 | 11 | 0 | 3 | 2 | 0 | 6 |
| Red-tailed Hawk | 26 | 67 | 65 | 110 | 79 | 106 | 130 |
| Ferruginous Hawk | 3 | 1 | 1 | 1 | 0 | 5 | 4 |
| Rough-legged Hawk | 9 | 10 | 53 | 48 | 29 | 17 | 23 |
| Unidentified buteo | 14 | 8 | 19 | 15 | 18 | 13 | 20 |
| Total buteos | 53 | 99 | 141 | 193 | 133 | 146 | 188 |
| Golden Eagle | 1280 | 1579 | 1699 | 1500 | 1322 | 1871 | 1844 |
| Bald Eagle | 43 | 95 | 124 | 41 | 57 | 79 | 93 |
| Unidentified eagle | 5 | 2 | 17 | 0 | 25 | 14 | 0 |
| Total eagles | 1328 | 1676 | 1840 | 1541 | 1404 | 1964 | 1937 |
| American Kestrel | 33 | 38 | 54 | 67 | 117 | 82 | 146 |
| Merlin | 2 | 10 | 7 | 7 | 12 | 9 | 26 |
| Prairie Falcon | 9 | 14 | 10 | 11 | 14 | 16 | 10 |
| Peregrine Falcon | 1 | 7 | 6 | 4 | 7 | 10 | 10 |
| Gyr Falcon | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unkown small falcon | - | - | - | - | - | - | - |
| Unkown large falcon | - | - | - | - | - | - | - |
| Unknown falcon | 5 | 3 | 2 | 4 | 2 | 5 | 17 |
| Total falcons | 50 | 72 | 79 | 93 | 152 | 122 | 209 |
| Unidentified raptor | 44 | 10 | 27 | 33 | 40 | 43 | 33 |
| Grand Total | 1771 | 2426 | 2602 | 2459 | 2218 | 3058 | 3367 |

¹ Designations used for the first time in 2002.

Appendix E. continued

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|-------------------------|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Start date | 28-Aug | 29-Aug | 29-Aug | 27-Aug | 27-Aug | 27-Aug | 27-Aug |
| End date | 31-Oct | 31-Oct | 29-Oct | 31-Oct | 27-Oct | 31-Oct | 27-Oct |
| Observation days | 56 | 57 | 52 | 58 | 52 | 64 | 48 |
| Observation hours | 339.33 | 358.24 | 335.40 | 347.49 | 365.84 | 443.18 | 316.70 |
| Raptors / 100 hours | 1040.9 | 871.8 | 630.9 | 636.3 | 556.0 | 517.6 | 655.2 |
| SPECIES | RAPTOR COUNTS | | | | | | |
| Turkey Vulture | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Osprey | 13 | 9 | 6 | 6 | 2 | 5 | 1 |
| Northern Harrier | 230 | 52 | 20 | 36 | 15 | 54 | 39 |
| Sharp-shinned Hawk | 612 | 442 | 190 | 274 | 288 | 416 | 229 |
| Cooper's Hawk | 343 | 149 | 109 | 120 | 103 | 132 | 142 |
| Northern Goshawk | 50 | 61 | 34 | 26 | 2 | 23 | 41 |
| Unkown small accipiter | - | - | - | 0 | 11 | 29 | 32 |
| Unkown large accipiter | - | - | - | 0 | 4 | 4 | 9 |
| Unknown accipiter | 49 | 39 | 35 | 27 | 5 | 0 | 7 |
| Total accipiters | 1054 | 691 | 368 | 447 | 413 | 604 | 460 |
| Broad-winged Hawk | 20 | 13 | 3 | 38 | 3 | 9 | 6 |
| Swainson's Hawk | 2 | 3 | 3 | 0 | 1 | 2 | 0 |
| Red-tailed Hawk | 277 | 121 | 45 | 117 | 78 | 113 | 100 |
| Ferruginous Hawk | 7 | 4 | 1 | 3 | 0 | 1 | 3 |
| Rough-legged Hawk | 66 | 77 | 26 | 57 | 11 | 22 | 20 |
| Unidentified buteo | 13 | 3 | 8 | 6 | 9 | 6 | 18 |
| Total buteos | 385 | 221 | 86 | 221 | 102 | 153 | 147 |
| Golden Eagle | 1516 | 1870 | 1429 | 1330 | 1359 | 1226 | 1196 |
| Bald Eagle | 95 | 91 | 128 | 58 | 55 | 93 | 79 |
| Unidentified eagle | 15 | 5 | 3 | 2 | 15 | 4 | 2 |
| Total eagles | 1626 | 1966 | 1560 | 1390 | 1429 | 1323 | 1277 |
| American Kestrel | 141 | 113 | 39 | 62 | 16 | 102 | 65 |
| Merlin | 17 | 8 | 3 | 9 | 2 | 4 | 11 |
| Prairie Falcon | 12 | 20 | 9 | 14 | 6 | 15 | 12 |
| Peregrine Falcon | 18 | 18 | 1 | 8 | 1 | 10 | 10 |
| Gyr Falcon | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Unkown small falcon | - | - | - | 0 | 0 | 0 | 3 |
| Unkown large falcon | - | - | - | 0 | 1 | 3 | 3 |
| Unknown falcon | 8 | 6 | 4 | 3 | 4 | 1 | 9 |
| Total falcons | 196 | 166 | 56 | 96 | 30 | 135 | 113 |
| Unidentified raptor | 28 | 16 | 20 | 15 | 43 | 20 | 38 |
| Grand Total | 3532 | 3123 | 2116 | 2211 | 2034 | 2294 | 2075 |

¹ Designations used for the first time in 2002.

Appendix E. continued

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Mean |
|------------------------|----------------------|--------|--------|--------|--------|--------|--------|
| Start date | 27-Aug | 27-Aug | 27-Aug | 27-Aug | 6-Sep | 28-Aug | 30-Aug |
| End date | 31-Oct | 29-Oct | 29-Oct | 31-Oct | 31-Oct | 1-Nov | 29-Oct |
| Observation days | 48 | 45 | 56 | 56 | 44 | 54 | 50 |
| Observation hours | 300.83 | 331.25 | 384.59 | 415.49 | 306.25 | 366.00 | 332.62 |
| Raptors / 100 hours | 674.8 | 538.3 | 550.5 | 427.7 | 453.2 | 641.8 | 722.5 |
| SPECIES | RAPTOR COUNTS | | | | | | |
| Turkey Vulture | 1 | 2 | 1 | 0 | 0 | 2 | 1 |
| Osprey | 2 | 7 | 5 | 4 | 9 | 3 | 6 |
| Northern Harrier | 22 | 50 | 30 | 47 | 52 | 77 | 49 |
| Sharp-shinned Hawk | 228 | 344 | 277 | 222 | 230 | 336 | 314 |
| Cooper's Hawk | 153 | 182 | 151 | 115 | 113 | 207 | 161 |
| Northern Goshawk | 22 | 33 | 20 | 22 | 13 | 33 | 32 |
| Unkown small accipiter | 92 | 10 | 18 | 43 | 6 | 40 | 28 |
| Unkown large accipiter | 4 | 0 | 6 | 10 | 6 | 22 | 7 |
| Unknown accipiter | 27 | 0 | 5 | 3 | 7 | 25 | 26 |
| Total accipiters | 526 | 569 | 477 | 415 | 375 | 663 | 551 |
| Broad-winged Hawk | 3 | 12 | 5 | 7 | 33 | 5 | 10 |
| Swainson's Hawk | 0 | 0 | 3 | 8 | 4 | 1 | 3 |
| Red-tailed Hawk | 108 | 89 | 130 | 75 | 75 | 178 | 104 |
| Ferruginous Hawk | 2 | 3 | 5 | 1 | 2 | 3 | 3 |
| Rough-legged Hawk | 40 | 21 | 19 | 32 | 30 | 31 | 32 |
| Unidentified buteo | 27 | 2 | 11 | 10 | 10 | 20 | 13 |
| Total buteos | 180 | 127 | 173 | 133 | 154 | 238 | 164 |
| Golden Eagle | 1061 | 859 | 1247 | 1003 | 638 | 1171 | 1350 |
| Bald Eagle | 75 | 74 | 85 | 43 | 27 | 50 | 74 |
| Unidentified eagle | 1 | 1 | 0 | 10 | 4 | 1 | 6 |
| Total eagles | 1137 | 934 | 1332 | 1056 | 669 | 1222 | 1431 |
| American Kestrel | 20 | 38 | 41 | 46 | 45 | 87 | 68 |
| Merlin | 7 | 15 | 9 | 10 | 4 | 12 | 9 |
| Prairie Falcon | 20 | 22 | 17 | 13 | 17 | 18 | 14 |
| Peregrine Falcon | 8 | 15 | 8 | 5 | 23 | 8 | 9 |
| Gyr Falcon | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unkown small falcon | 27 | 0 | 2 | 2 | 3 | 3 | 4 |
| Unkown large falcon | 13 | 1 | 3 | 6 | 3 | 2 | 4 |
| Unknown falcon | 13 | 0 | 2 | 2 | 4 | 0 | 5 |
| Total falcons | 108 | 91 | 82 | 84 | 99 | 130 | 108 |
| Unidentified raptor | 54 | 3 | 17 | 38 | 30 | 14 | 28 |
| Grand Total | 2030 | 1783 | 2117 | 1777 | 1388 | 2349 | 2337 |

¹ Designations used for the first time in 2002.