

**FALL 2010 RAPTOR MIGRATION STUDIES AT
BONNEY BUTTE, OREGON**



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



March 2011

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BONNEY BUTTE, OREGON**

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March 2011

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INTRODUCTION

The Bonney Butte Raptor Migration Project in the northern Cascade Mountains of Oregon is an ongoing effort to monitor long-term trends in populations of raptors using the Cascade Mountains portion of the Pacific Coast Flyway (Hoffman et al. 2002, Smith et al. 2008a). HawkWatch International (HWI) initiated standardized counts of the autumn raptor migration at Bonney Butte in 1994, and began a trapping and banding program at the site in 1995. To date, HWI observers have recorded 18 species of migratory raptors at the site, with counts typically ranging between 2,000 and 4,000 migrants per season. The 2010 season marked the 17th consecutive count and the 16th consecutive season of trapping and banding conducted at the site by HWI. This report summarizes the 2010 count and banding results.

The Bonney Butte project was 1 of 9 long-term, annual migration counts and 1 of 4 migration banding studies conducted or co-sponsored by HWI in North America during 2010. The primary objective of these efforts is to track long-term population trends of diurnal raptors in western North America and around the Gulf Coast region (Hoffman and Smith 2003; Smith et al. 2001, 2008a, b). Raptors serve as important biological indicators of ecosystem health (Bildstein 2001) and long-term migration counts are one of the most cost effective and efficient methods for monitoring the regional status and trends of multiple raptor species (Zalles and Bildstein 2000, Bildstein et al. 2008).

The intensive counting and banding operations, along with related research activities such as satellite tracking of migrants, also provide valuable information about species' ranges, migratory routes and behaviors, and population demographics (e.g., Hoffman et al. 2002, Lott and Smith 2006, Goodrich and Smith 2008), as well as affording rich opportunities for a variety of other biological assessments and studies (e.g., DeLong and Hoffman 2004, McBride et al. 2004). This information helps us understand the life histories, ecology, status, and conservation needs of raptor populations in North America. In addition, these migration studies offer unique opportunities for the public to learn about raptors and the natural environment, and providing such opportunities is another important component of all HWI migration projects.

STUDY SITE

Bonney Butte is located approximately 9.5 km ESE of Government Camp, on the east side of the White River drainage within the Mt. Hood National Forest, Hood River County, Oregon (45°15'46.8" N, 121°35'31.2" W; elevation 1,754 m; Figure 1). The butte is the southern terminus of Surveyor's Ridge, which originates near Hood River, Oregon south of the Columbia River Gorge. The ridge extends southward for approximately 50 km and ends southeast of Mt. Hood. The central Oregon shrub steppe region lies immediately to the east. The observation site is located on the highest point of the butte. The trapping station is located approximately 500 m north on a separate knoll and slightly lower in elevation. The intervening space is largely forested.

METHODS

COUNT

Three official observers were hired as per diem volunteers to conduct daily counts, interact with the public for on-site outreach, and assist with the banding efforts (see Appendix A for a complete observer history). 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. Observations typically began between 0800–0900 hrs and ended near 1700 hrs Pacific Standard Time (PST). Other visitors also periodically assisted with the count.

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 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 tables and figures).
2. Hour of passage for each migrant; e.g., the 1000–1059 hrs PST.
3. Wind speed and direction, air temperature, percent cloud cover, predominant cloud type(s), presence of precipitation, visibility, and an assessment of thermal-lift conditions were 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 including 2010 data 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.

TRAPPING AND BANDING

Due to budgetary issues, this year’s trapping efforts at Bonney Butte were unfortunately scaled down. HawkWatch International is grateful for the leadership of two local long-term volunteers (offering their help without per diem or cost reimbursements) for working in close association with the rest of the seasonal staff and other local participants to make this past season’s trapping efforts both possible and fairly comparable! Weather permitting, the trappers operated a single traditional banding station daily from late August through late October, generally between 0900–1700 hrs PST (see Appendix F for daily trapping records). Capture devices included mist 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 SUMMARY

Inclement weather forced operations to end nine days early (see Appendix C for daily weather records, as well as Appendix E for comparisons of annual start and end dates). Five additional days were also precluded, and three days were shortened (reduced observation time to ≤ 4 hours) due to weather (Appendix C). For comparison, weather, on an average seasonal basis (i.e., from 1997-2009) has demonstrated to preclude 12.7, and severely hamper 5.3 days of observation in a given season.

During active observation periods, skies were recorded 40% of the time as predominantly fair, 28% as transitional (i.e., cloud cover changed from clear or partly cloudy to mostly cloudy or overcast during the day, or vice versa), and 32% as mostly cloudy or overcast. In comparison, the averages for the site are 50% fair, 23% transitional and 26% mostly cloudy to overcast, suggesting that the skies in 2010 were less predominantly fair and more transitional. The season's visibility estimates were rated higher than average facing east (74 km in 2010 vs. 67.8 km for the average, 1997 – 2009), but slightly lower than average facing the west (62 km vs. the mean of 64.3 km). Similarly, the season's visibility was affected by fog and/or haze on 48% of the active observational days (vs. on average 58%), and the proportion of days affected by rain and/or snow was 16% (vs. 12% average). Lastly, observers rated thermal lift as good to excellent 58% of the active days, which is considerably above the 1997-2009 average of 38%.

The prevalent winds that occurred during the 2010 migration season were light (<12 kph), dominating 96% of the active observation days, opposed to only 4% of days with moderate winds (12-29 kph). On average (1997-2009), autumnal winds are generally 87% light, 12% moderate, and 1% strong (>29 kph), and the prevailing directions tend to be SW-W (29%), SW-NW (13%), and NE-E (12%). In comparison, the 2010 autumn wind directions prevailed also from the SW-W (27%), but SW-W/variable (21% vs. 4% average) and W-NW (13% vs. 1% average) winds also dominated. Also, in conjunction with the average prevailing winds already mentioned, the 2010 season witnessed SW-NW (12%) and NE-E (12%) directional winds that were directly comparable to the prevailing long-term average winds (see above). Since the dominant winds of the season were recorded as light, Calm/variable (13%), SW-NW/variable (8%), NE-E/variable (4%), and Variable (2%) winds were also recorded. To a far lesser extent, NE-SE (2%) and E-S (2%) winds were recorded as well. Thus, the light predominantly SW-W and variable winds with storms bringing NE-E variable winds seems to conform well with average weather.

In summary, inclement weather forced operations to end at least a week early for the second straight year. With a high ranking of good to excellent thermal lift being well above average coupled with above average light conditions, SW-W and variable winds, some raptors could have been soaring high enough to escape consistent detection. In addition, the conditions of sky visibility often transitioned to mostly cloudy and over cast. Thus, if conditions persisted to cause raptors to soar above cover, those birds could have easily been missed.

COUNT SUMMARY

In 2010, observers were able to work 52 of 63 possible days between 27 August and 22 October, which is slightly above the long term average ($51 \pm 95\%$ CI of 3.0 days, Appendix E). In addition, the number of observation hours (421.42) was also well above the average (376.26 ± 32.272 hours, Appendix E). The 2010 average of 2.9 observers per hour (including official and guest observers; value is mean of daily values, which are in turn means of hourly values) was a significant 20% above the long-term average of 2.4 ± 0.24 observers per hour.

Observers counted 3,390 migrant raptors of 16 species, which resulted with the count being significantly 20% above the 1994–2009 average (Table 1, and see Appendix D for daily count records). Three species (i.e., the Northern Goshawk, Swainson's Hawk, and Merlin) were observed to be slightly above the record high (Appendix E). In addition, this past year's numbers of Bald Eagles (numbering 69 individuals) tied the previous record set in 2003 (Appendix E). Outside observing a record high of four Swainson's Hawks, two Broad-winged Hawks were also recorded as representative of this year's more uncommon species (see Appendix D and E). Otherwise, after observing a record high of 27 American Kestrels in 2009, they again dropped down to nearly a record low (Appendix E). The numbers of Golden Eagles and Northern Harriers were also observed as being below the overall average this past season (Appendix E).

The 2010 flight was composed of 58% accipiters, 18% buteos, 13% vultures, 4% eagles, 4% falcons, 2% Ospreys, 1% harriers, and <1% unidentified raptors. The season featured significantly higher than average proportions of vultures and Ospreys, but only buteos were significantly below average (Figure 2).

As usual, the Sharp-shinned Hawk was by far the most abundant species (42% of total count), followed by the Red-tailed Hawk (17%), Turkey Vulture (13%), Cooper's Hawk (12%), Merlin (3%), Osprey (2%), Golden Eagle (2%), and Bald Eagle (2%; Table 1, Appendix E).

Passage Rates and Long-term Trends

In 2010, adjusted passage rates were significantly above average for ten species (Turkey Vulture, Osprey, all three accipiters, Swainson's Hawk, Bald Eagle, Merlin, Prairie and Peregrine Falcons), but were significantly below average for the Northern Harrier, Rough-legged Hawk, and American Kestrel (Table 1). Regression analyses of the adjusted passage rates through 2010 also revealed significant ($P \leq 0.10$) overall declines for Northern Harriers (Fig. 3), Red-tailed and Ferruginous Hawks (Fig. 6), adult Golden Eagles (Fig. 7), and American Kestrels (Fig. 8). The statistical decline of Ferruginous Hawks however is suspect because this species is not commonly seen at this site (see Table 1 and Appendix E). Although historically quite ubiquitous, widespread American Kestrel populations throughout North America have been decreasing at alarming rates (Farmer et al. 2008, Farmer and Smith 2009), and in 2007 at a joint meeting of the Raptor Research Foundation and Hawk Migration Association of North America a special symposium was held to discuss evidence to their widespread decline (see Journal of Raptor Research 2009, Vol. 43, No. 4). In western North America, Golden Eagles have also been showing steady declines in recent years (Farmer et al. 2008). Thus, it is important to be able to contrast whether adults, non-adults, or both age groups are declining to understand what age-specific group may be decreasing. In contrast, Peregrine Falcons continue to significantly increase steadily (Fig. 8).

Age Ratios

With observational data it can be difficult to correctly identify immature vs. the adults in raptor species (see Table 2, % of unknown age column). Nevertheless, it is important to identify age (and gender) differences as best as possible so that if a species shows a certain trend in passage rates, age structure (immatures vs. adults) in comparison to the trend results can be assessed more thoroughly. One likely assessment based on observed age classes is to compare the ratio from the most recent seasonal counts in relation to the average ratio over all the years observed (Table 2). In 2010, the immature : adult ratios were above average in four species, the Sharp-shinned Hawk, Northern Goshawk, Red-tailed Hawk, and Golden Eagles, below average in two, the Northern Harrier and Cooper's Hawk, and similar to previously observed averages in Bald Eagles (Table 2). There are a number of reasons why annual age ratios vary; e.g., observer experience, weather and how it affects migration at a location in relation to phenology, annual reproductive success, short stopping, etc.

Seasonal Timing

The combined-species median passage date of 03 October was three days later this past season compared to the long-term average (Table 3). The volume of migration usually peaks around the last ten days of September then steadily declines; whereas, this past season demonstrated a slight shift towards the beginning of October (Figure 9). Likewise, most species-level median passage dates were also 1 to 5 days later, accept for Merlins which were seven days earlier (Table 3). Northern Goshawks and Rough-legged Hawks showed consistency, reflecting median dates of no change (Table 3). The age-specific median dates generally followed the same pattern accept that immature Sharp-shinned, Cooper's and both age groups of Red-tailed Hawks were significantly later (Table 4).

Resident Raptors

Several raptors had territories within the Bonney Butte area. Observers noticed at least two non-migrating Sharp-shinned Hawks (one adult and one immature) between 27 August and 22 October. The adult was observed on fifteen days, while the immature, which exhibited extremely territorial behavior and often chased migrants out of the area, was seen on a total of 22 separate days. One immature Cooper's Hawk frequented the area, appearing on thirteen days between 29 August and 26 September. Non-migratory adult and immature Red-tailed Hawks were frequently present at the site as well, with adults (possibly more than one individual) observed on 23 days from 28 August to 16 October, and immature birds (at least two individuals) observed on 26 days between 27 August and 21 October. All local Red-tailed Hawks were light morphs and none had physical features that made them easily distinguishable, so it is difficult to determine exactly how many resident birds were present at the site. A single immature Northern Goshawk was seen on thirteen separate days between 05 September and 21 October, displaying territorial behavior in the west valley and around the Butte. Observers also saw an adult Bald Eagle circling in the west valley on seven occasions from 04 September to 02 October, a Prairie Falcon of undetermined age on four occasions between 03 September and 20 October, and a brown Merlin on ten occasions between 12 September and 19 October. Although these were the only non-migrating birds observed regularly at the site, several other birds were seen around the sites that could not be counted as migrants based on their flight patterns. These included an immature Bald Eagle on 30 August; an adult Cooper's Hawk on 31 August; an adult Northern Goshawk on 04 October and 22 October; a dark-morph immature Red-tailed Hawk on 10 September; an adult Golden Eagle on 11 October and 16 October; an Osprey on 13, 15, and 16 of September; a Turkey Vulture on 02 and 12 of September; and a Northern Harrier on 11 and 30 of September, as well as on 19 October.

TRAPPING AND BANDING SUMMARY

Trapping occurred on 38 of 56 possible days between 27 August and 31 October, with the effort totaling 359.5 hours (see Appendix G for comparing annual efforts against the overall mean, as well as Appendix F for daily trapping records).

A total of 355 raptors of seven different species were captured this past season. And despite this year's reduced effort, the 2010 total captures and capture rates still exceeded the 15 year (1995-2009) averages (Table 5). Even more excitingly, a record high of 21 Northern Goshawks (Appendix G) were also captured, along with a Golden Eagle and an American Kestrel, making the Kestrel only the eighth bird of this species ever captured at this location (Appendix G)! As usual, the three most frequently captured species were the Sharp-shinned Hawk (56% of captures), Cooper's Hawk (19%), and Red-tailed Hawk (16%). For additional information comparing capture rates (i.e., captures per 100 station hours) and capture success (i.e., number of birds captured/number of birds observed) please refer to Table 5.

Trapping some raptor species (primarily accipiters) while on migration can often yield useful sex-age specific comparisons, which allow further insight into the site-specific count data pertaining to those species. Comparing capture ratios of males to females and immatures to adults (Table 6) is a typical method for obtaining such a perspective. Typically, immatures of all species are captured at higher proportions compared to adults (see Table 6, looking specifically at the mean of immature to adult ratios of all species), but this past season the crew captured a significantly higher proportion of immature Cooper's, as well as Northern Goshawks (Table 6). The reason immature accipiters (or many species of raptors for that matter) are often captured in higher proportion is because they are still learning to hunt and a lure bird at a trapping station may be seen as potentially easy prey for a less cautious bird. Likewise, female accipiters are often captured in proportionally higher numbers than the males (Table 6), often because males learn quickly to become efficient hunters, especially the adults who are often the food providers at the nest site. However, there are potentially a number of different reasons why the gender or age specific ratio of a species captured can increase or decrease from year to year (e.g., differences in yearly abundances, hungrier birds, trapper bias of inexperienced trappers learning the skill set to trap

raptors, etc.). Thus, although it is interesting to compare the most recent sampling year to the mean, plotting the annual changes of ratio data over time is probably more meaningful, especially if count data detects an increasing or decreasing trend against the null of no change.

Physiological measures (i.e., crop fullness, keel muscle, and wing-pit fat ratings) are also collected from birds trapped not only to understand how healthy individual birds are, but also to learn some of the baseline physiological requirements raptor species are facing as they undergo fall migration. Table 7 compares these indices among accipiters captured in 2010 with averages of previous years. The results suggest that this group of raptors from 2010 appeared to be relatively near the average wing-pit fat and above average keel muscle ratings in contrast to past trapping years. Nearly half the birds of all three species captured in 2010 contained some levels of food within their crops (Table 7). Based on these comparisons, it appears that migratory raptors at this location are not showing deteriorating signs of health in contrast to past surveys.

ENCOUNTERS WITH BANDED BIRDS

To date, 75 birds banded at Bonney Butte have subsequently been encountered elsewhere. In 2010, we received eight new recoveries: 2 Sharp-shinned Hawks, 4 Cooper's Hawks, 1 Merlin, and 1 Golden Eagle (Table 8). All, except for the Golden Eagle, were recovered within the expected confines of the Pacific Coast Flyway (along the Cascade-Sierra Nevada ranges and westward from southern British Columbia to Baja California) (Hoffman et al. 2002). The Golden Eagle was equipped with a PTT satellite telemetry backpack unit enabling HWI to monitor much of its life history. This bird wandered extensively throughout much of North America (see also *RaptorWatch* Summer 2010 issue, Pg.6-7) and was eventually found dead in south central Saskatchewan, Canada, this past spring, 07 April, 2010 (Table 8). Necropsy revealed that lead poisoning was the probable cause of its demise (Table 8). All the other birds were simply reported as dead of unknown causes in locations ranging from as far north as the Olympic Peninsula, WA to various locations in central California at its southern extent.

The only "foreign recapture" encountered was a hatch-year Red-tailed Hawk originally banded at the Portland, Oregon airport on 15 August, 2010. Local airport biologists banded the bird using both a federal USGS-Bird Banding Lab aluminum band as well as an alpha-numeric orange and black plastic band on the other leg. Those markers were supplemented with a trace of blue dye on the breast. The auxiliary marking with alpha-numeric colored plastic bands, dyes, and other methods are part of management techniques that airport wildlife biologist employ to help keep track of animals that are captured at the airport and released at a location away from the original site of capture. In some cases, these birds return and are more easily recognized through color markers. Not all airport biologists are authorized to use USGS-Bird Banding Lab issued bands to band birds under their federal authorization but there is agreement between the BBL and airport biologist to mark birds using plastic or other auxiliary markers to keep track of individual problem animals that continuously return.

VISITATION

A total of 368 individuals visited the Bonney Butte monitoring site during the season. Most of them appeared alone or in small groups up to 5 people. On 18 September, a Portland Audubon group arrived on site with 20 individuals and on two other occasions, smaller groups of 10 to 11 individuals also participated in hawk watching. Based on our site registration data, most visitors were from Oregon, but visitors also traveled from Washington, British Columbia, and Alabama.

Primary observers assess every hour the disturbance level of visitors. In 2010, 424 hourly assessments of visitor disturbance resulted in the following disturbance ratings: 71% of the time no disturbance was observed, 23% of the time crews had to deal with low, 5% with moderate, and 1% with high levels of disturbance during observation hours. These ratings reflect a typical level of disturbance for the site during the past few years.

ACKNOWLEDGMENTS

Funding and logistical support for this project were provided by the USDA Forest Service–Mt. Hood National Forest, Oregon Community Foundation, Fledgling Fund, Kinsman Foundation, and HWI private donors and members. We also extend special thanks to the following dedicated, local volunteers who have greatly assisted the project for several years now and directly aided the 2010 season: Dwight Porter, Mark Lundgren, Tom Jordan, Aurora Gerhardt, Nathan Gerhardt, and Craig Plummer.

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Table 1. Fall raptor migration unadjusted counts and adjusted passage rates by species at Bonney Butte, OR: 1994–2009 versus 2010.

| SPECIES | COUNT | | | RAPTORS / 100 HOURS | | |
|--------------------------------------|------------------------|-------------|------------|------------------------|----------|----------|
| | 1994–2009 ¹ | 2010 | % CHANGE | 1994–2009 ¹ | 2010 | % CHANGE |
| Turkey Vulture | 305 ± 60.1 | 449 | +46 | 125.9 ± 24.58 | 166.6 | +32 |
| Osprey | 66 ± 10.7 | 81 | +23 | 23.5 ± 4.03 | 25.0 | +7 |
| Northern Harrier | 29 ± 6.3 | 18 | -38 | 8.7 ± 1.94 | 4.9 | -44 |
| Sharp-shinned Hawk | 1093 ± 154.8 | 1438 | +32 | 384.4 ± 57.76 | 427.3 | +11 |
| Cooper's Hawk | 339 ± 41.5 | 420 | +24 | 118.4 ± 18.19 | 117.9 | 0 |
| Northern Goshawk | 26 ± 5.2 | 47 | +78 | 7.9 ± 1.69 | 13.0 | +64 |
| Unknown small accipiter ² | 36 ± 23.6 | 10 | -72 | – | – | – |
| Unknown large accipiter ² | 5 ± 3.4 | 10 | +91 | – | – | – |
| Unknown accipiter | 59 ± 24.9 | 27 | -54 | – | – | – |
| TOTAL ACCIPITERS | 1541 ± 188.5 | 1952 | 27 | – | – | – |
| Red-shouldered Hawk | 1 ± 0.9 | 0 | -100 | 0.5 ± 0.33 | 0.0 | -100 |
| Broad-winged Hawk | 7 ± 9.0 | 2 | -73 | 4.2 ± 4.71 | 1.1 | -74 |
| Swainson's Hawk | 1 ± 0.4 | 4 | +700 | 0.2 ± 0.14 | 1.1 | +570 |
| Red-tailed Hawk | 559 ± 78.2 | 588 | +5 | 175.1 ± 30.07 | 155.7 | -11 |
| Ferruginous Hawk | 0 ± 0.2 | 0 | -100 | 0.1 ± 0.07 | 0.0 | -100 |
| Rough-legged Hawk | 13 ± 4.0 | 5 | -62 | 9.1 ± 2.75 | 3.1 | -66 |
| Unidentified buteo | 29 ± 8.0 | 7 | -75 | – | – | – |
| TOTAL BUTEOS | 611 ± 88.8 | 606 | -1 | – | – | – |
| Golden Eagle | 85 ± 16.3 | 80 | -6 | 28.2 ± 5.88 | 23.4 | -17 |
| Bald Eagle | 47 ± 4.9 | 68 | +43 | 14.2 ± 1.54 | 18.6 | +31 |
| Unidentified eagle | 3 ± 1.4 | 1 | -70 | – | – | – |
| TOTAL EAGLES | 136 ± 16.7 | 149 | +10 | – | – | – |
| American Kestrel | 20 ± 3.6 | 9 | -56 | 6.6 ± 1.38 | 2.4 | -64 |
| Merlin | 67 ± 10.9 | 108 | +61 | 25.4 ± 4.78 | 35.2 | +39 |
| Prairie Falcon | 5 ± 1.4 | 8 | +73 | 1.7 ± 0.47 | 2.1 | +27 |
| Peregrine Falcon | 7 ± 2.3 | 10 | 38 | 2.5 ± 0.89 | 2.9 | +17 |
| Unknown small falcon ² | 1 ± 1.1 | 0 | -100 | – | – | – |
| Unknown large falcon ² | 2 ± 2.1 | 0 | -100 | – | – | – |
| Unknown falcon | 3 ± 1.2 | 0 | -100 | – | – | – |
| TOTAL FALCONS | 104 ± 12.7 | 135 | +30 | – | – | – |
| Unidentified Raptor | 23 ± 11.1 | 3 | -87 | – | – | – |
| ALL SPECIES | 2814 ± 312.2 | 3390 | +20 | – | – | – |

¹ Mean of annual values ± 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 at Bonney Butte, OR: 1994–2009 versus 2010.

| | TOTAL AND AGE-CLASSIFIED COUNTS | | | | | | IMMATURE : ADULT | | | |
|--------------------|---------------------------------|------|-------|-------|------|-------|------------------------|------|------------------------|------|
| | 1994–2009 AVERAGE | | | 2010 | | | % UNKNOWN AGE | | RATIO | |
| | TOTAL | IMM. | ADULT | TOTAL | IMM. | ADULT | 1994–2009 ¹ | 2010 | 1994–2009 ¹ | 2010 |
| Northern Harrier | 29 | 14 | 4 | 18 | 4 | 3 | 37 ± 9.0 | 44 | 4.0 ± 1.86 | 1.6 |
| Sharp-shinned Hawk | 1093 | 246 | 341 | 1438 | 465 | 418 | 46 ± 6.1 | 39 | 0.8 ± 0.17 | 1.1 |
| Cooper's Hawk | 339 | 107 | 73 | 420 | 155 | 111 | 47 ± 6.6 | 37 | 1.8 ± 0.66 | 1.4 |
| Northern Goshawk | 26 | 11 | 7 | 47 | 31 | 13 | 31 ± 7.8 | 6 | 2.1 ± 0.68 | 2.4 |
| Broad-winged Hawk | 7 | 1 | 2 | 2 | 1 | 0 | 35 ± 25.2 | 50 | 0.4 ± 0.33 | - |
| Red-tailed Hawk | 559 | 161 | 273 | 588 | 212 | 239 | 23 ± 3.9 | 23 | 0.6 ± 0.10 | 0.9 |
| Golden Eagle | 85 | 48 | 19 | 80 | 55 | 12 | 21 ± 3.2 | 16 | 3.4 ± 1.05 | 4.6 |
| Bald Eagle | 47 | 10 | 34 | 68 | 15 | 51 | 8 ± 3.2 | 3 | 0.3 ± 0.06 | 0.3 |
| Peregrine Falcon | 7 | 1 | 2 | 10 | 0 | 3 | 51 ± 4.5 | 70 | 0.8 ± 0.66 | 0.0 |

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.

Table 3. First and last observed, bulk-passage, and median-passage dates by species for migrating raptors at Bonney Butte, OR in 2010, with a comparison between 2010 and the 1994–2009 average median passage dates.

| SPECIES | 2010 | | | | 1994–2009 |
|---------------------|----------------|---------------|---------------------------------|----------------------------------|------------------------------------|
| | FIRST OBSERVED | LAST OBSERVED | BULK PASSAGE DATES ¹ | MEDIAN PASSAGE DATE ² | MEDIAN PASSAGE DATE ^{2,3} |
| Turkey Vulture | 28-Aug | 14-Oct | 14-Sep – 2-Oct | 26-Sep | 22-Sep ± 1.2 |
| Osprey | 30-Aug | 19-Oct | 11-Sep – 11-Oct | 23-Sep | 19-Sep ± 1.6 |
| Northern Harrier | 10-Sep | 17-Oct | 22-Sep – 16-Oct | 30-Sep | 29-Sep ± 2.7 |
| Sharp-shinned Hawk | 27-Aug | 22-Oct | 21-Sep – 17-Oct | 8-Oct | 5-Oct ± 1.7 |
| Cooper's Hawk | 27-Aug | 21-Oct | 17-Sep – 13-Oct | 2-Oct | 26-Sep ± 1.7 |
| Northern Goshawk | 5-Sep | 19-Oct | 15-Sep – 17-Oct | 3-Oct | 3-Oct ± 3.1 |
| Red-shouldered Hawk | | | – | – | 26-Sep ⁴ 0.0 |
| Broad-winged Hawk | 28-Sep | 1-Oct | – | – | 24-Sep ± 5.1 |
| Swainson's Hawk | 4-Sep | 1-Oct | – | – | |
| Red-tailed Hawk | 27-Aug | 22-Oct | 13-Sep – 17-Oct | 3-Oct | 28-Sep ± 1.7 |
| Rough-legged Hawk | 13-Oct | 20-Oct | 13-Oct – 20-Oct | 20-Oct | 20-Oct ± 2.4 |
| Golden Eagle | 6-Sep | 22-Oct | 29-Sep – 19-Oct | 14-Oct | 12-Oct ± 1.7 |
| Bald Eagle | 2-Sep | 22-Oct | 25-Sep – 18-Oct | 12-Oct | 8-Oct ± 2.5 |
| American Kestrel | 6-Sep | 6-Oct | 6-Sep – 6-Oct | 23-Sep | 19-Sep ± 2.8 |
| Merlin | 12-Sep | 22-Oct | 21-Sep – 17-Oct | 3-Oct | 10-Oct ± 2.1 |
| Prairie Falcon | 14-Sep | 21-Sep | 14-Sep – 19-Oct | 2-Oct | 21-Sep ± 6.0 |
| Peregrine Falcon | 21-Sep | 19-Oct | 21-Sep – 19-Oct | 3-Oct | 28-Sep ± 4.8 |
| Total | 27-Aug | 22-Oct | 14-Sep – 16-Oct | 3-Oct | 30-Sep ± 1.7 |

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 of annual values ± 95% confidence interval in days; unless otherwise indicated, values are given only for species with annual counts ≥5 birds for ≥3 years.

⁴ Data for 2004 only.

Table 4. Median passage dates by age for selected species of migrating raptors at Bonney Butte, OR: 1994–2009 versus 2010.

| SPECIES | ADULT | | IMMATURE | |
|--------------------|------------------------|--------|------------------------|--------|
| | 1994–2009 ¹ | 2010 | 1994–2009 ¹ | 2010 |
| Sharp-shinned Hawk | 11-Oct ± 1.7 | 14-Oct | 24-Sep ± 1.6 | 30-Sep |
| Cooper’s Hawk | 03-Oct ± 2.3 | 7-Oct | 21-Sep ± 2.3 | 29-Sep |
| Northern Goshawk | 12-Oct ± 5.3 | 12-Oct | 30-Sep ± 4.8 | 30-Sep |
| Red-tailed Hawk | 02-Oct ± 2.5 | 12-Oct | 22-Sep ± 2.1 | 29-Sep |
| Golden Eagle | 12-Oct ± 2.7 | 17-Oct | 10-Oct ± 2.1 | 13-Oct |
| Bald Eagle | 08-Oct ± 2.9 | 12-Oct | 11-Oct ± 3.1 | – |

Note: Median passage dates are dates by which 50% of species/age-specific flights had passed; values are based only on annual counts ≥5 birds.

¹ Mean ± 95% confidence interval in days; values are given only for species with annual counts ≥5 birds for ≥ 3 years.

Table 5. Fall capture totals, rates, and successes by species for migrating raptors at Bonney Butte, OR: 1995–2009 versus 2010.

| | CAPTURE TOTALS | | CAPTURE RATES ¹ | | CAPTURE SUCCESS ² | |
|---------------------|------------------------|------|----------------------------|-------|------------------------------|------|
| | 1995–2009 ³ | 2010 | 1995–2009 ³ | 2010 | 1995–2009 ³ | 2010 |
| Northern Harrier | 2 ± 1.1 | 0 | 0.7 ± 0.30 | 0.0 | 7.8 ± 3.56 | 0.0 |
| Sharp-shinned Hawk | 188 ± 44.7 | 199 | 68.1 ± 7.76 | 75.6 | 16.9 ± 4.26 | 13.6 |
| Cooper's Hawk | 62 ± 16.8 | 68 | 21.0 ± 4.32 | 25.8 | 18.0 ± 5.39 | 15.6 |
| Northern Goshawk | 8 ± 2.3 | 21 | 3.0 ± 0.70 | 8.0 | 34.3 ± 14.99 | 42.9 |
| Red-shouldered Hawk | 0 ± 0.2 | 0 | 0.0 ± 0.05 | 0.0 | 7.4 ± 9.60 | 0.0 |
| Broad-winged Hawk | 0 ± 0.2 | 0 | 0.0 ± 0.06 | 0.0 | 2.7 ± 3.82 | 0.0 |
| Red-tailed Hawk | 53 ± 15.1 | 57 | 18.8 ± 3.91 | 21.7 | 9.6 ± 2.98 | 9.6 |
| Rough-legged Hawk | 0 ± 0.3 | 0 | 0.2 ± 0.11 | 0.0 | 4.4 ± 4.51 | 0.0 |
| Golden Eagle | 2 ± 0.8 | 1 | 0.8 ± 0.34 | 0.4 | 2.4 ± 1.33 | 1.2 |
| Bald Eagle | 0 ± 0.3 | 0 | 0.1 ± 0.08 | 0.0 | 0.4 ± 0.50 | 0.0 |
| American Kestrel | 0 ± 0.3 | 1 | 0.2 ± 0.12 | 0.4 | 2.9 ± 2.33 | 11.1 |
| Merlin | 6 ± 2.1 | 8 | 2.3 ± 0.65 | 3.0 | 9.0 ± 2.84 | 7.4 |
| Prairie Falcon | 2 ± 0.8 | 0 | 0.6 ± 0.30 | 0.0 | 37.1 ± 15.85 | 0.0 |
| Peregrine Falcon | 1 ± 0.6 | 0 | 0.2 ± 0.18 | 0.0 | 5.1 ± 4.23 | 0.0 |
| All species | 325 ± 74.6 | 355 | 115.9 ± 13.17 | 134.9 | 14.0 ± 3.66 | 12.4 |

¹ Captures / 100 station hours.

² Number of birds captured / number of birds observed. The combined-species value was calculated excluding Ospreys, Turkey Vultures, and unknown raptors from the count totals. Species-specific values were calculated after birds identified only to genus were allocated across possible species in proportion to the relative abundance of birds identified to those species.

³ Mean of annual values ± 95% confidence interval.

Table 6. Fall 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 at Bonney Butte, OR: 1995–2009 versus 2010.

| SPECIES | YEARS | FEMALE | | MALE | | FEMALE : MALE | IMMATURE : ADULT |
|--------------------|-----------|--------|-----|------|-----|--------------------|--------------------|
| | | HY | AHY | HY | AHY | RATIO ¹ | RATIO ¹ |
| Sharp-shinned Hawk | 1995–2009 | 59 | 43 | 59 | 28 | 1.2 ± 0.15 | 1.7 ± 0.42 |
| | 2010 | 63 | 41 | 69 | 26 | 1.1 | 2.0 |
| Cooper's Hawk | 1995–2009 | 27 | 14 | 17 | 5 | 2.0 ± 0.29 | 2.2 ± 0.47 |
| | 2010 | 26 | 17 | 21 | 4 | 1.7 | 7.0 |
| Northern Goshawk | 1995–2009 | 2 | 1 | 3 | 1 | 1.4 ± 0.82 | 2.6 ± 1.22 |
| | 2010 | 10 | 1 | 9 | 1 | 1.1 | 9.5 |

¹ Long-term values: mean ± 95% Confidence Interval (CI).

Table 7. Fall body condition indices for migrant accipiters captured at Bonney Butte, OR: 1995–2009 versus 2010.

| SPECIES | YEARS | CROP FULLNESS | | | | | KEEL MUSCLE ¹ | | | WING-PIT FAT ² | | | |
|--------------------|----------------|---------------|-----|-----|-----|----|--------------------------|----|----|---------------------------|----|----|---|
| | | E | 1/4 | 1/2 | 3/4 | F | 0 | 1 | 2 | 0 | 1 | 2 | 3 |
| Sharp-shinned Hawk | 1995-2009 mean | 54 | 22 | 12 | 5 | 7 | 1 | 71 | 28 | 10 | 58 | 24 | 8 |
| | 2010 | 61 | 17 | 13 | 5 | 4 | 6 | 80 | 15 | 19 | 61 | 18 | 2 |
| Cooper's Hawk | 1995-2009 mean | 56 | 16 | 14 | 6 | 8 | 7 | 78 | 15 | 15 | 62 | 18 | 6 |
| | 2010 | 57 | 9 | 16 | 9 | 9 | 4 | 85 | 10 | 21 | 51 | 25 | 3 |
| Northern Goshawk | 1995-2009 mean | 64 | 16 | 4 | 5 | 11 | 11 | 84 | 4 | 13 | 70 | 18 | 0 |
| | 2010 | 67 | 14 | 10 | 10 | 0 | 0 | 86 | 14 | 5 | 81 | 14 | 0 |

¹ Subjective rating based on visual and tactile assessment of keel muscle mass, with 0 indicating a skinny bird, 1 indicating a moderately healthy bird, and 2 indicating a bird with a robust keel muscle.

² Subjective rating based on visual assessment of fat deposit in the "wing-pit" hollow directly under the wing, with 0 indicating no fat, 1 indicating a modest fat deposit, 2 indicating a deposit that mostly fills the wing-pit, and 3 indicating a bulging deposit.

Table 8. Foreign encounters in 2010 of raptors banded during autumn migration at Bonney Butte, Oregon.

| BAND # | SPECIES-SEX ¹ | BANDING DATE | BANDING AGE ² | ENCOUNTER DATE | ENCOUNTER AGE ² | ENCOUNTER LOCATION | DISTANCE (km) | STATUS |
|------------|--------------------------|--------------|--------------------------|----------------|----------------------------|----------------------|---------------|---|
| 1005-01175 | CH-F | 07-Sep-05 | HY | 12-Jan-10 | 4 th yr | Thorp, WA | 180 | found dead – cause unknown |
| 1613-17822 | ML-M | 16-Oct-09 | HY | 5-Mar-10 | HY | Lompoc, CA | 978 | found dead – cause unknown |
| 1075-01215 | CH-F | 16-Sep-08 | HY | 9-Apr-10 | ASY | Los Alamos, CA | 965 | found dead – cause unknown |
| 1483-55908 | SS-F | 08-Sep-09 | HY | 15-May-10 | ≤1 yr | Sequim, WA | 293 | found dead – cause unknown |
| 0629-29190 | GE-M | 23-Oct-05 | HY | 7-Apr-10 | 4 th yr | Glenbain, Sask., CAN | 1675 | found dead – lead poisoning most probable cause |
| 1075-01936 | CH-F | 01-Oct-10 | HY | 16-Dec-10 | HY | Yuba City, CA | 565 | found dead – cause unknown |
| 1623-24220 | SS-F | 15-Sep-10 | HY | 29-Nov-10 | HY | Castro Valley, CA | 689 | found dead – cause unknown |
| 1075-01944 | CH-F | 21-Oct-10 | HY | 27-Dec-10 | HY | Parkdale, OR | 23 | found dead – cause unknown |

¹ Species: CH = Cooper's Hawk; RT = Red-tailed Hawk; SS = Sharp-shinned Hawk.

² HY = hatch year, SY = second year, TY = third year, AHY = after hatch year, ASY = after second year, ATY = after third year.

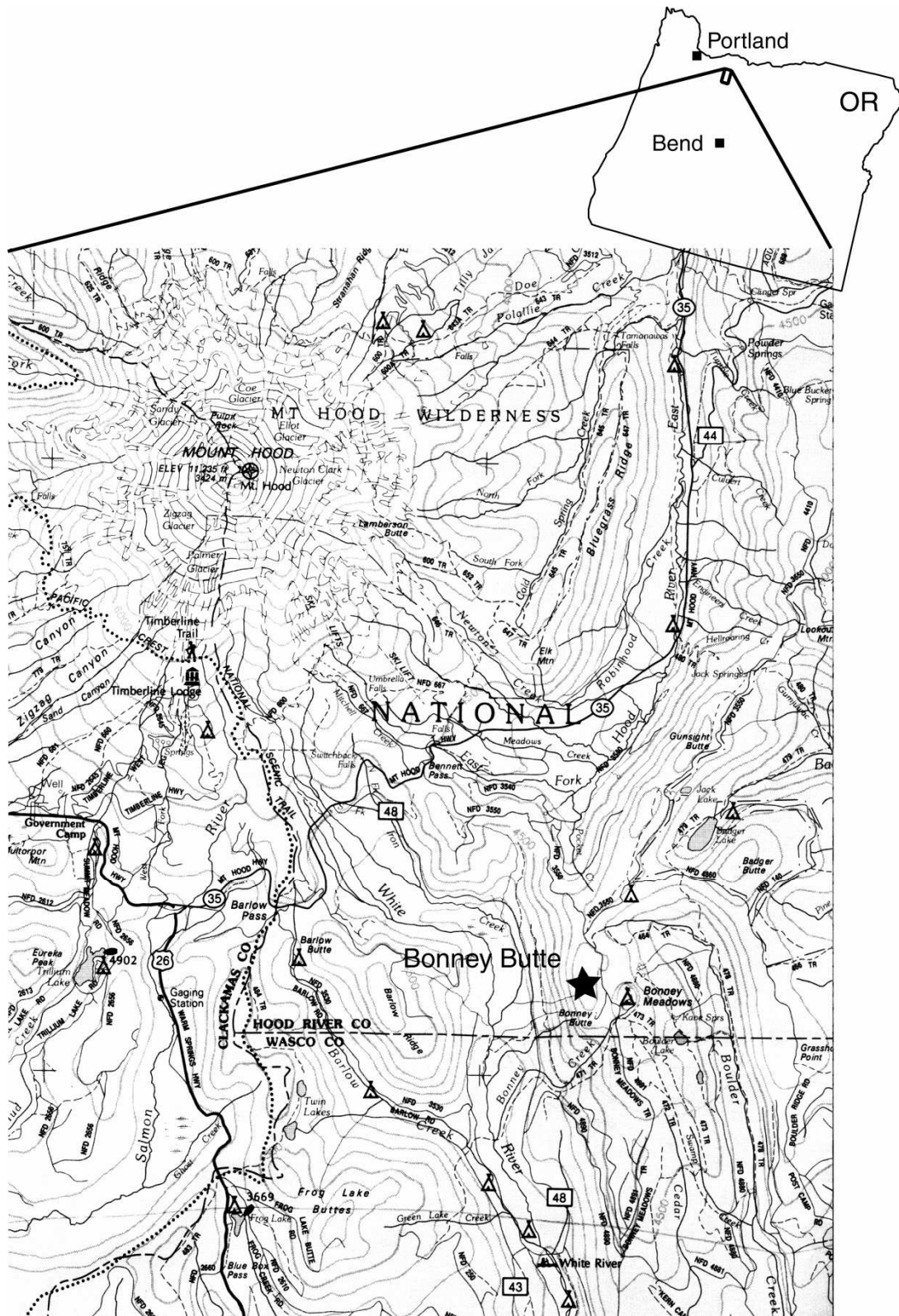


Figure 1. Location of the Bonney Butte Raptor Migration Project study site near Mt. Hood, Oregon.

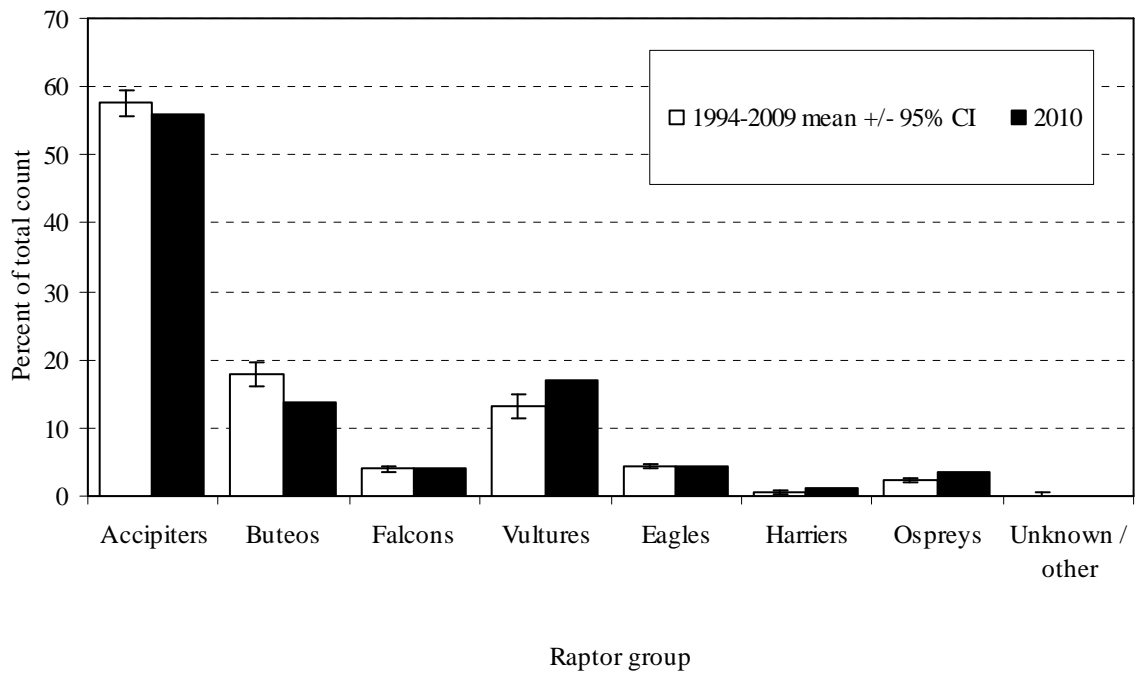


Figure 2. Fall raptor migration flight composition by major species groups at Bonney Butte, Oregon: 1994–2009 versus 2010.

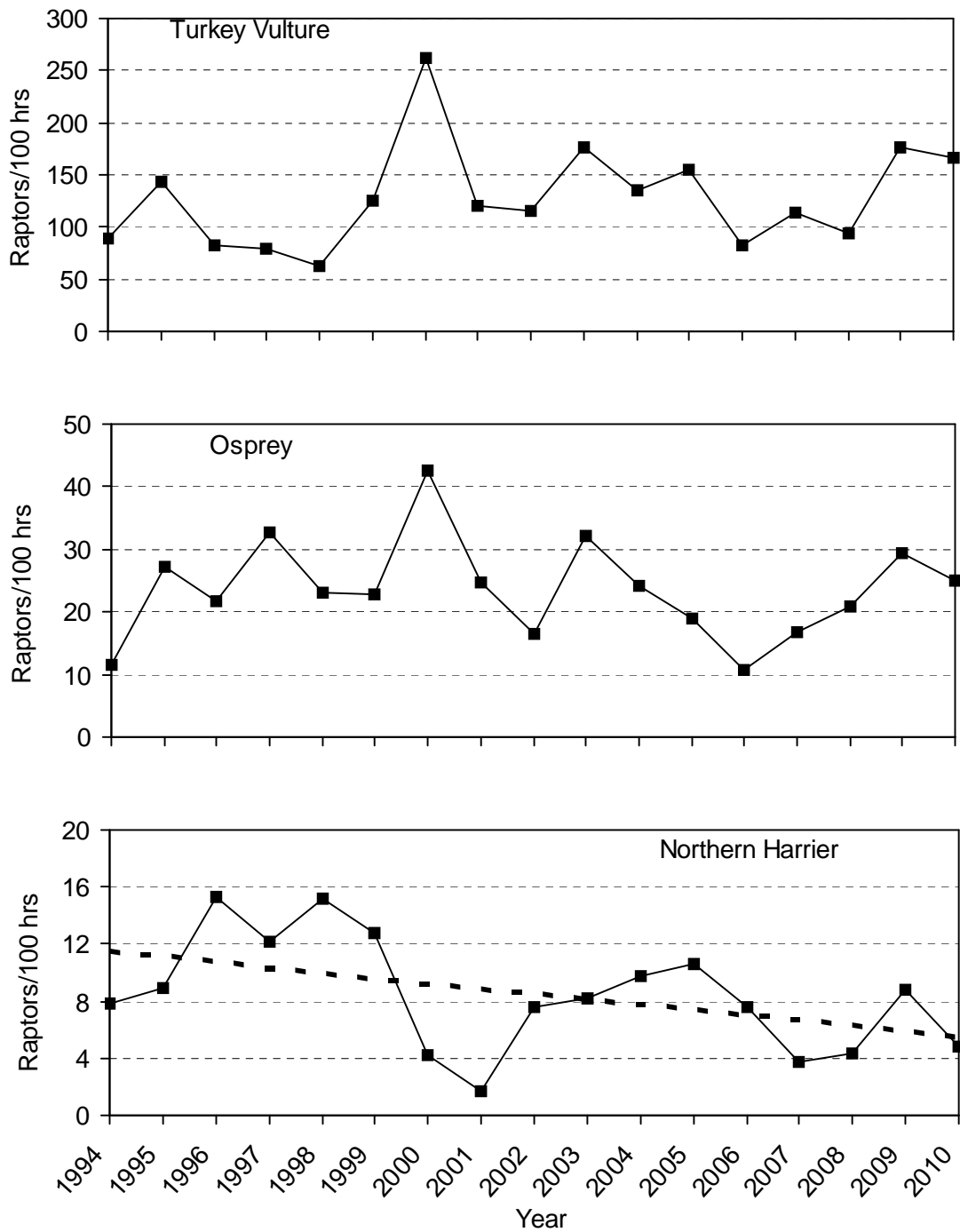


Figure 3. Adjusted, fall-migration passage rates for Turkey Vultures, Ospreys, and Northern Harriers at Bonney Butte, Oregon: 1994–2010. Dashed lines indicate significant ($P < 0.10$) regressions.

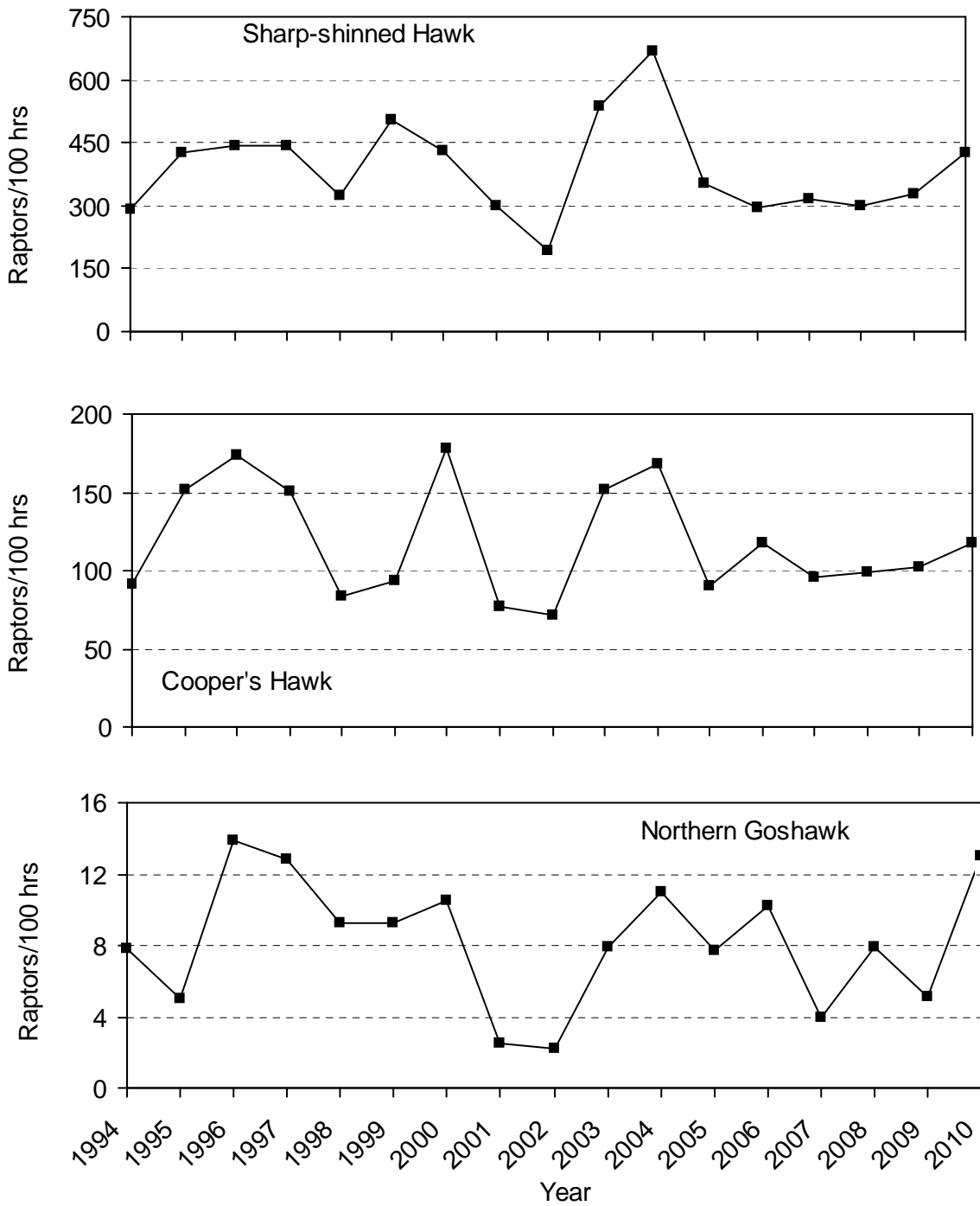


Figure 4. Adjusted, fall-migration passage rates for Sharp-shinned Hawks, Cooper’s Hawks, and Northern Goshawks at Bonney Butte, Oregon: 1994–2010. Dashed lines indicate significant ($P < 0.10$) regressions.

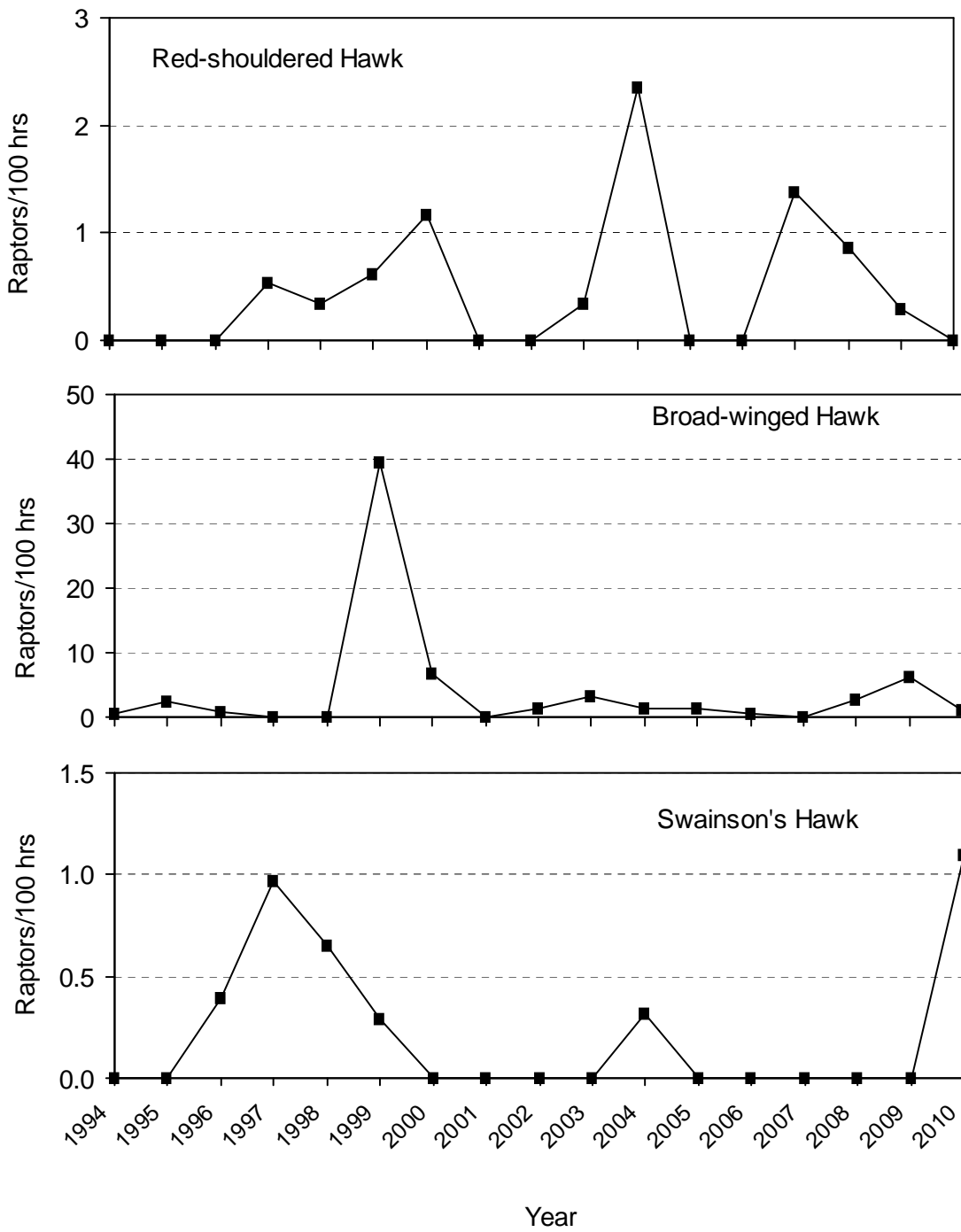


Figure 5. Adjusted, fall-migration passage rates for Red-shouldered, Broad-winged, and Swainson’s Hawks at Bonney Butte, Oregon: 1994–2010. Dashed lines indicate significant ($P < 0.10$) regressions.

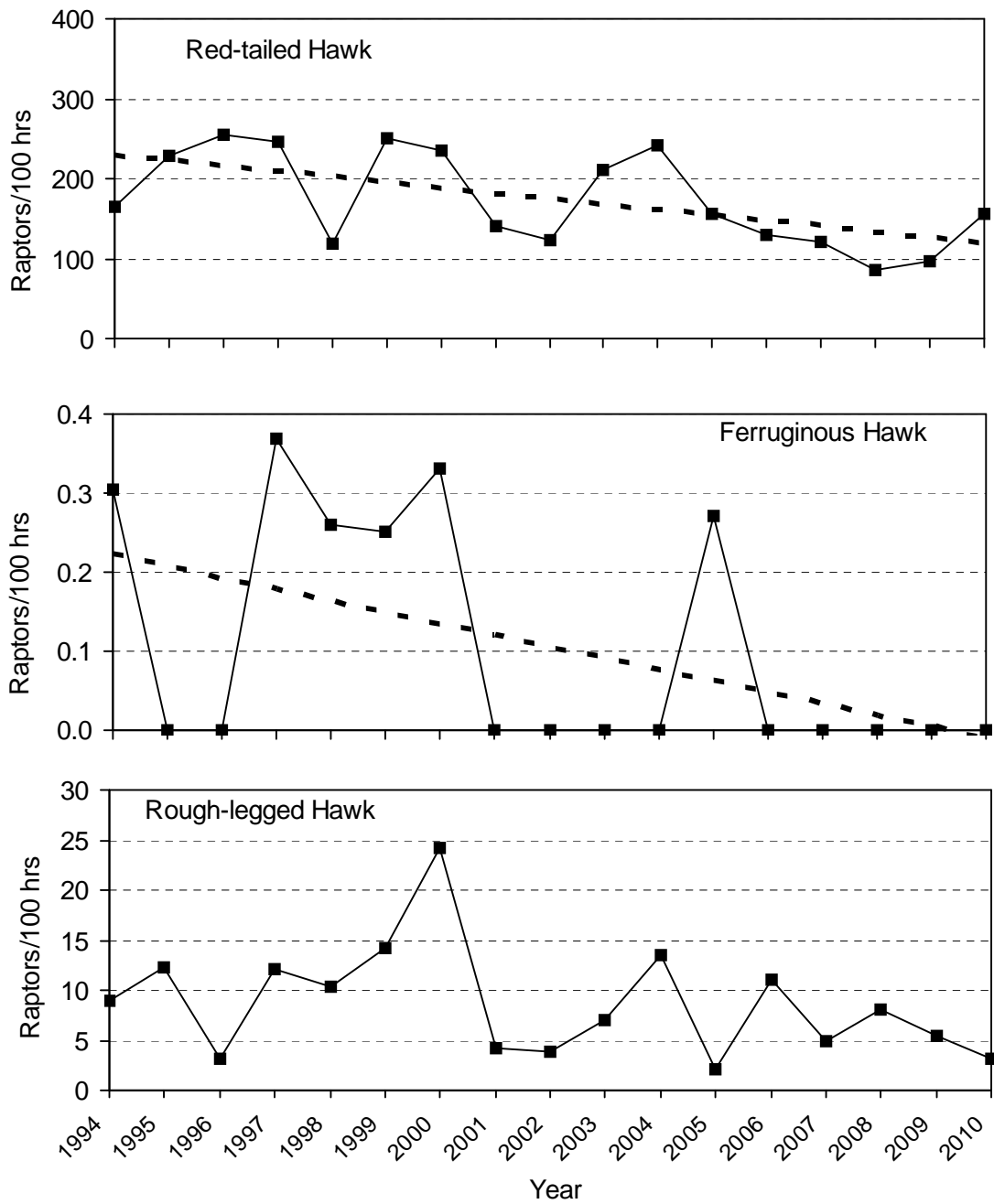


Figure 6. Adjusted, fall-migration passage rates for Red-tailed, Ferruginous, and Rough-legged Hawks at Bonney Butte, Oregon: 1994–2010. Dashed lines indicate significant ($P < 0.10$) regressions.

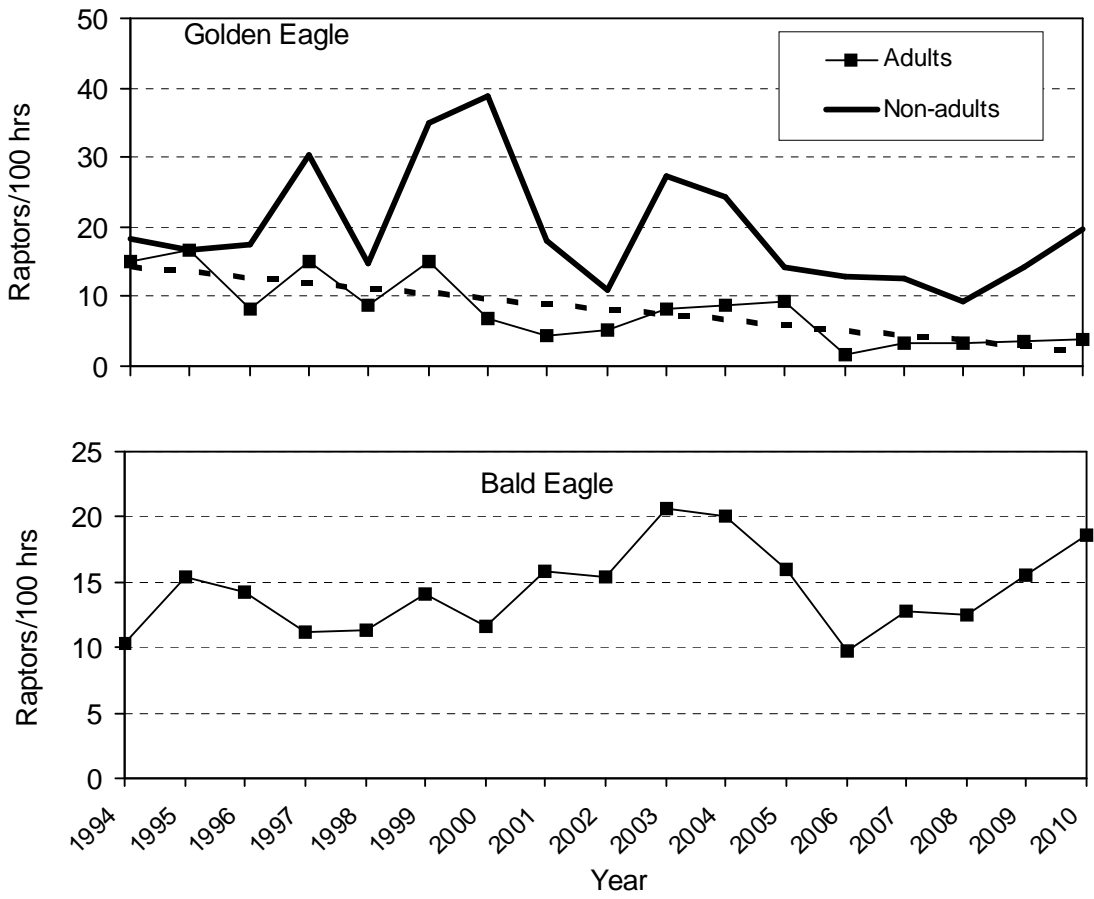


Figure 7. Adjusted, fall-migration passage rates for Golden and Bald Eagles at Bonney Butte, Oregon: 1994–2010. Dashed lines indicate significant ($P < 0.10$) regressions.

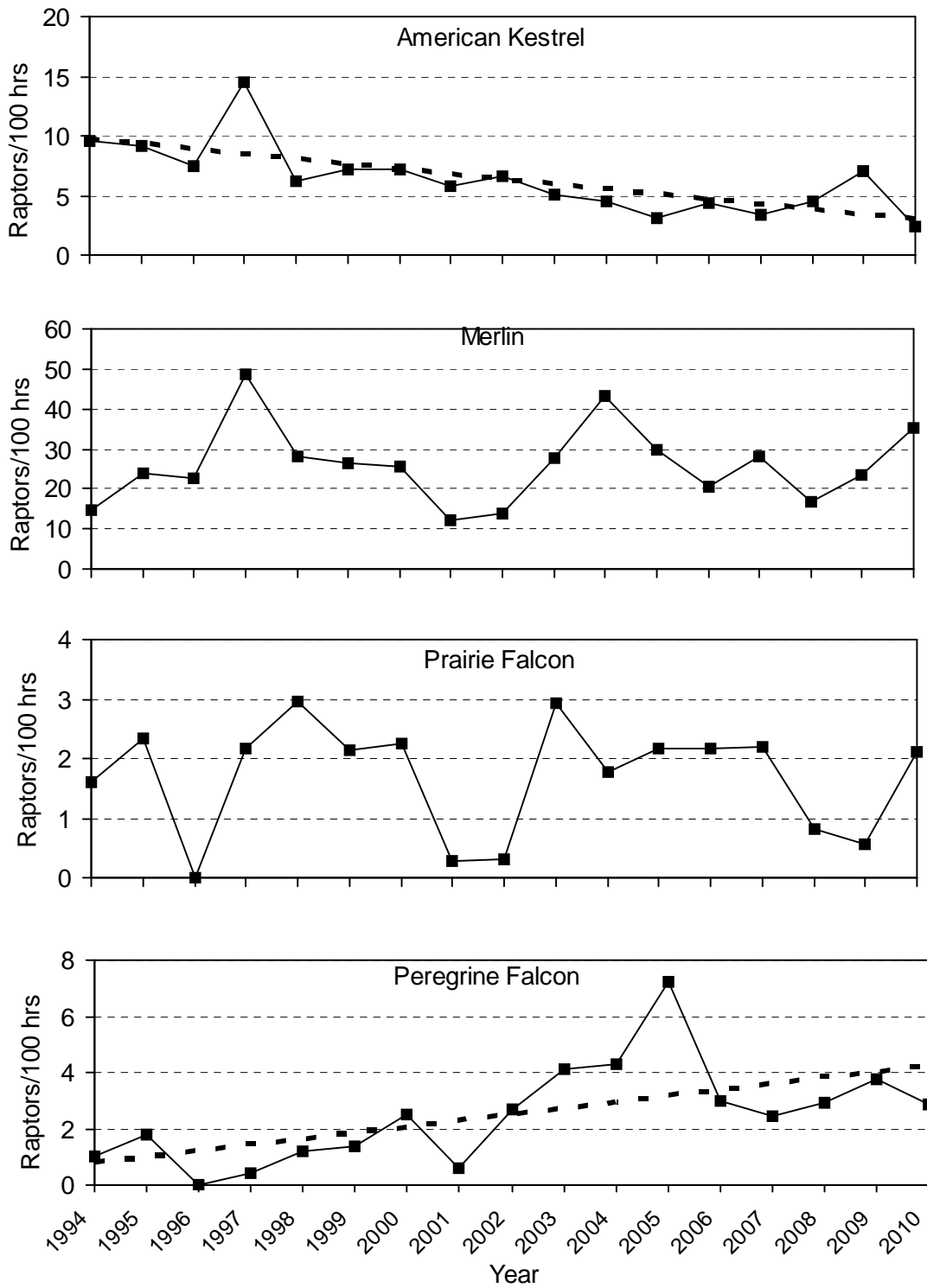


Figure 8. Adjusted, fall-migration passage rates for American Kestrels, Merlins, Prairie Falcons, Peregrine Falcons at Bonney Butte, Oregon: 1994–2010. Dashed lines indicate significant ($P < 0.10$) regressions.

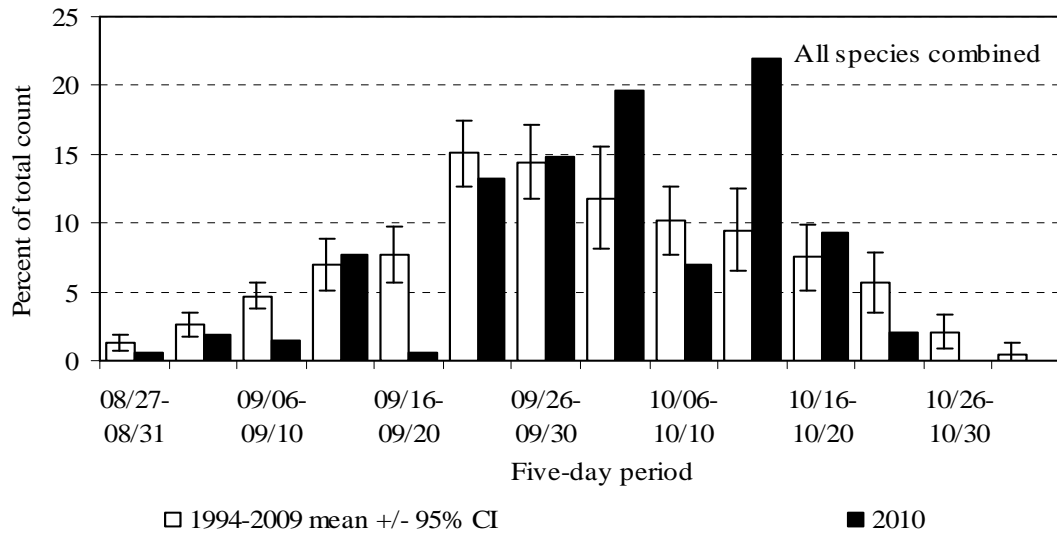


Figure 9. Combined-species passage volume by five-day periods for migrating raptors at Bonney Butte, Oregon: 1994–2009 versus 2010.

Appendix A. A history of observer participation in the Bonney Butte Raptor Migration Project in northern Oregon.

- 1994:** Single observer throughout: David Schuetze (0) and Sean O'Connor (0)¹.
- 1995:** Two observers throughout: David Schuetze (1) and Alison Clark (0).
- 1996:** Two observers throughout: David Schuetze (2) and Alison Clark (1).
- 1997:** Two observers throughout: Rose Jaffe (0) and Sean Donaghy (0).
- 1998:** Two observers throughout: Nick Vulgares (1) and Jeremy Davit (0).
- 1999:** Two observers throughout: Nick Vulgares (3) and Sue Vulgares (0).
- 2000:** Two observers throughout: Nick Vulgares (5) and Sue Vulgares (2).
- 2001:** Two observers throughout: Alison Cebula Benedict (1) and Eric Hallingstad (0).
- 2002:** Two observers throughout: Eric Hallingstad (1) and Sue Bruner (1).
- 2003:** Two observers throughout: David Haines (0) and Lindsay Reynolds (0).
- 2004:** Two observers throughout: David Haines (1) and Amy Scarpignato (+).
- 2005:** Two observers throughout: Sean Wolfe (0) and Jim DeStaebler (0)
- 2006:** Two observers throughout: Justin Feld (0) and Juliet Lamb (0).
- 2007:** Two observers throughout: Mary Coolidge (1) and Sue Bruner (2)
- 2008:** Two observers throughout: Aaron Viducich (1) and James Butch (0)
- 2009:** Two observers throughout: James Butch (2) and Glen McHargue (0)
- 2010:** Two observers throughout: Juliet Lamb (1), Yvan Satge (0), and Andrew Tillinghast (0)

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

Appendix B. Common and scientific names, species codes, and regularly applied age, sex, and color-morph classifications for all diurnal raptor species observed during fall migration at Bonney Butte, Oregon.

| 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 | AM AF I Br U | AM AF 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 U | AM Br 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 for the Bonney Butte Raptor Migration Project in northern Oregon: 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. EAST (KM) ¹ | VISIB. WEST (KM) ¹ | MEDIAN FLIGHT DISTANCE ⁵ / HOUR | BIRDS |
|--------|------------|----------------------------|-------------------------------------|----------------------------------|-------------------------------|----------------|------------------------|------------------------------------|----------------------------------|-------------------------------|-------------------------------|--|-------|
| 27-Aug | 9.00 | 2.4 | 0 | pc-mc, haze | 2.9 | sw, wsw, w | 15.3 | 29.63 | 2 | 0.0 | 0.0 | 0 | 0.7 |
| 28-Aug | 9.00 | 2.0 | 0 | pc-mc | 1.5 | sw, w | 13.3 | 29.45 | 3 | 0.0 | 0.0 | 0 | 0.3 |
| 29-Aug | 9.00 | 3.0 | 0 | mc-ovc, fog | 4.6 | sw, w | 10.5 | 29.51 | 4 | 0.0 | 0.0 | 0 | 0.3 |
| 30-Aug | 7.42 | 2.7 | 0 | mc-ovc | 1.7 | sw | 11.0 | 29.59 | 3 | 0.0 | 0.0 | 0 | 0.8 |
| 31-Aug | 5.50 | 2.7 | 0 | ovc, rain | 5.2 | w | 10.7 | 29.76 | 4 | 0.0 | 0.0 | 0 | 0.0 |
| 1-Sep | 2.67 | 2.0 | 0 | pc-mc | 5.8 | wsw | 13.4 | 29.85 | 3 | 0.0 | 0.0 | 0 | 0.0 |
| 2-Sep | 9.00 | 2.0 | 0 | pc | 8.7 | ene | 16.3 | 29.86 | 1 | 100.0 | 100.0 | 1 | 2.3 |
| 3-Sep | 9.00 | 2.0 | 0 | clr, haze | 6.4 | wsw, w | 22.4 | 29.81 | 1 | 100.0 | 100.0 | 2 | 3.4 |
| 4-Sep | 9.00 | 2.3 | 0 | clr-ovc, fog | 8.0 | sw, wsw | 11.5 | 29.76 | 3 | 81.8 | 24.5 | 1 | 1.2 |
| 5-Sep | 5.83 | 2.0 | 0 | pc-ovc, fog | 12.6 | wsw, w | 8.3 | 29.76 | 4 | 79.4 | 38.8 | 0 | 0.2 |
| 6-Sep | 9.00 | 3.0 | 0 | clr-pc | 6.4 | wsw, w | 13.3 | 29.69 | 2 | 100.0 | 100.0 | 2 | 3.3 |
| 7-Sep | 5.75 | 2.0 | 0 | ovc, fog/rain | 4.4 | wsw, w | 11.0 | 29.46 | 4 | 50.0 | 14.6 | 0 | 0.0 |
| 8-Sep | 6.50 | 2.5 | 0 | ovc, fog | 4.8 | wsw, w | 8.8 | 29.49 | 3 | 58.1 | 6.9 | 0 | 0.0 |
| 9-Sep | 0.00 | | | weather day: fog/rain | | | | | | | | | |
| 10-Sep | 9.00 | 2.0 | 0 | mc-ovc | 6.7 | wsw | 10.5 | 29.75 | 3 | 80.0 | 40.0 | 2 | 1.9 |
| 11-Sep | 9.00 | 3.0 | 0 | clr | 4.2 | wsw, w | 13.7 | 29.77 | 1 | 100.0 | 100.0 | 2 | 6.0 |
| 12-Sep | 9.00 | 2.9 | 1 | clr | 5.5 | wsw, w | 16.2 | 29.80 | 1 | 100.0 | 100.0 | 2 | 7.4 |
| 13-Sep | 9.00 | 2.0 | 0 | clr-pc | 1.7 | e, wsw | 19.3 | 29.76 | 1 | 100.0 | 100.0 | 2 | 4.3 |
| 14-Sep | 9.00 | 2.4 | 0 | clr | 3.4 | wsw | 18.5 | 29.76 | 1 | 100.0 | 100.0 | 2 | 7.4 |
| 15-Sep | 9.00 | 2.9 | 0 | pc-ovc, rain | 7.5 | sw, wsw | 15.8 | 29.70 | 3 | 85.5 | 76.4 | 1 | 3.7 |
| 16-Sep | 7.50 | 2.0 | 0 | ovc, fog/rain | 4.7 | wsw, w | 13.8 | 29.71 | 4 | 72.7 | 47.7 | 0 | 0.5 |
| 17-Sep | 4.50 | 2.0 | 0 | mc-ovc, fog | 10.0 | ene | 15.9 | 29.61 | 3 | 60.6 | 46.3 | 2 | 3.1 |
| 18-Sep | 5.00 | 3.0 | 2 | ovc, fog/rain | 5.4 | e, ese | 14.6 | 29.62 | 4 | 2.1 | 1.4 | 0 | 0.2 |
| 19-Sep | 0.00 | | | weather day: fog/rain | | | | | | | | | |
| 20-Sep | 0.00 | | | weather day: fog/rain | | | | | | | | | |
| 21-Sep | 9.00 | 3.0 | 0 | mc-ovc | 1.0 | w | 17.0 | - | 3 | 79.5 | 65.5 | 2 | 15.7 |
| 22-Sep | 9.00 | 2.0 | 1 | mc-ovc | 2.6 | w | - | - | 3 | 92.7 | 60.9 | 2 | 11.1 |
| 23-Sep | 3.50 | 1.5 | 0 | ovc, fog/rain | 4.6 | w | - | - | 4 | 23.0 | 6.0 | 0 | 0.0 |
| 24-Sep | 9.00 | 2.0 | 0 | pc-mc | 3.4 | w | - | - | 2 | 100.0 | 100.0 | 1 | 6.7 |
| 25-Sep | 9.00 | 2.9 | 2 | clr, haze | 2.9 | ssw, sw, wsw | - | - | 1 | 100.0 | 100.0 | 2 | 16.2 |
| 26-Sep | 9.00 | 2.0 | 0 | ovc, rain | 5.9 | wsw, w | - | - | 4 | 79.1 | 30.1 | 2 | 4.9 |
| 27-Sep | 9.00 | 2.0 | 0 | pc, haze | 1.9 | wsw | - | - | 1 | 100.0 | 91.8 | 2 | 9.2 |
| 28-Sep | 9.00 | 2.0 | 0 | cclr-pc | 5.3 | w | - | - | 1 | 100.0 | 40.9 | 3 | 22.7 |
| 29-Sep | 9.00 | 2.7 | 0 | clr, haze | 1.5 | e, se, w | - | - | 1 | 100.0 | 100.0 | 2 | 13.0 |
| 30-Sep | 9.00 | 2.0 | 1 | clr, haze | 6.3 | ene, e | 16.5 | - | 2 | 100.0 | 100.0 | 1 | 6.1 |
| 1-Oct | 9.00 | 3.0 | 1 | clr | 2.9 | wsw, w | 18.0 | - | 1 | 100.0 | 100.0 | 2 | 17.8 |
| 2-Oct | 9.00 | 3.0 | 1 | clr-pc | 1.0 | se, wsw | 19.3 | - | 1 | 100.0 | 100.0 | 2 | 24.8 |
| 3-Oct | 8.50 | 2.0 | 1 | mc-ovc | 5.4 | wsw | 12.7 | - | 3 | 64.0 | 17.0 | 1 | 6.8 |
| 4-Oct | 8.50 | 3.0 | 0 | pc-ovc | 6.3 | w | 7.8 | - | 2 | 69.0 | 42.5 | 2 | 22.4 |
| 5-Oct | 9.00 | 3.2 | 1 | clr | 2.8 | nne, e | 10.6 | - | 1 | 100.0 | 89.1 | 1 | 4.0 |
| 6-Oct | 9.00 | 4.4 | 0 | pc-mc, haze | 4.9 | ene, e | 11.3 | - | 2 | 78.2 | 71.8 | 2 | 11.2 |
| 7-Oct | 6.00 | 2.7 | 1 | ovc, snow | 8.1 | sw, w | 8.9 | - | 3 | 52.5 | 35.6 | 2 | 13.8 |
| 8-Oct | 7.00 | 2.6 | 1 | pc-ovc, fog/haze | 8.3 | wsw | 10.2 | - | 3 | 49.4 | 41.7 | 2 | 7.6 |
| 9-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |
| 10-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |
| 11-Oct | 9.00 | 2.9 | 0 | clr-pc | 1.0 | wsw, w | 8.3 | - | 2 | 84.5 | 62.7 | 2 | 19.7 |
| 12-Oct | 9.00 | 2.6 | 0 | pc-mc | 6.4 | e, se | 8.9 | - | 2 | 100.0 | 100.0 | 2 | 19.8 |
| 13-Oct | 10.00 | 2.9 | 0 | pc, haze | 7.7 | ese, w | 14.5 | - | 1 | 100.0 | 100.0 | 2 | 15.5 |
| 14-Oct | 9.00 | 2.6 | 0 | clr-mc, haze | 5.5 | wsw, wnw | 13.2 | - | 1 | 80.0 | 72.7 | 3 | 18.8 |

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. EAST (KM) ¹ | VISIB. WEST (KM) ¹ | MEDIAN FLIGHT DISTANCE ⁵ / HOUR | BIRDS |
|--------|------------|----------------------------|-------------------------------------|----------------------------------|-------------------------------|----------------|------------------------|------------------------------------|----------------------------------|-------------------------------|-------------------------------|--|-------|
| 15-Oct | 9.00 | 2.0 | 0 | clr-pc, haze | 3.0 | e, wsw | 6.3 | - | 2 | 100.0 | 77.3 | 1 | 7.2 |
| 16-Oct | 9.00 | 2.9 | 1 | pc-mc | 2.2 | e, sw | 7.5 | - | 2 | 97.3 | 100.0 | 2 | 12.0 |
| 17-Oct | 9.00 | 2.0 | 0 | clr, haze | 3.5 | ene, e | 7.0 | - | 1 | 97.3 | 98.2 | 2 | 6.3 |
| 18-Oct | 9.00 | 2.0 | 0 | pc-mc, haze | 0.9 | wsw | 12.6 | - | 1 | 80.9 | 84.1 | 2 | 6.4 |
| 19-Oct | 9.00 | 2.7 | 0 | clr, haze | 2.8 | ene | 12.5 | - | 2 | 97.3 | 97.3 | 2 | 5.1 |
| 20-Oct | 9.00 | 2.0 | 0 | clr, haze | 1.9 | ene, e, w | 14.9 | - | 2 | 78.6 | 75.9 | 2 | 5.0 |
| 21-Oct | 8.50 | 2.0 | 0 | clr-ovc | 4.6 | e, w | 12.2 | - | 1 | 72.5 | 77.0 | 2 | 4.9 |
| 22-Oct | 3.75 | 3.0 | 0 | ovc, fog | 16.2 | wsw | 7.2 | - | 3 | 94.0 | 65.0 | 2 | 7.7 |
| 23-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |
| 24-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |
| 25-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |
| 26-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |
| 27-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |
| 28-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |
| 29-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |
| 30-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |
| 31-Oct | 0.00 | | | weather day: fog/snow | | | | | | | | | |

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 at Bonney Butte, Oregon: 2010.

| DATE | OBS | SPECIES ¹ | | | | | | | | | | | | | | | | | | | | | | | | | BIRDS | | | | |
|-----------|-------|----------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|----|-------|--------|-----|
| | HOURS | 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 | |
| 27-Aug-10 | 9.00 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0.7 |
| 28-Aug-10 | 9.00 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.3 |
| 29-Aug-10 | 9.00 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.3 | |
| 30-Aug-10 | 7.42 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0.8 | |
| 31-Aug-10 | 5.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | |
| 01-Sep-10 | 2.67 | 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 | |
| 02-Sep-10 | 9.00 | 4 | 1 | 0 | 5 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 2.3 | |
| 03-Sep-10 | 9.00 | 13 | 0 | 0 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 3.4 | |
| 04-Sep-10 | 9.00 | 1 | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 1.2 | |
| 05-Sep-10 | 5.83 | 0 | 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 | 1 | 0.2 | |
| 06-Sep-10 | 9.00 | 7 | 1 | 0 | 2 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 11 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 3.3 | |
| 07-Sep-10 | 5.75 | 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 | |
| 08-Sep-10 | 6.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | |
| 09-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep-10 | 9.00 | 4 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 1.9 | |
| 11-Sep-10 | 9.00 | 10 | 5 | 0 | 20 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 54 | 6.0 | |
| 12-Sep-10 | 9.00 | 8 | 1 | 0 | 39 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 67 | 7.4 | |
| 13-Sep-10 | 9.00 | 5 | 2 | 0 | 8 | 9 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 7 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 39 | 4.3 | |
| 14-Sep-10 | 9.00 | 12 | 4 | 0 | 21 | 4 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 67 | 7.4 | |
| 15-Sep-10 | 9.00 | 3 | 3 | 0 | 7 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 3.7 | |
| 16-Sep-10 | 7.50 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0.5 | |
| 17-Sep-10 | 4.50 | 2 | 0 | 0 | 2 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 3.1 | |
| 18-Sep-10 | 5.00 | 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 | 0 | 1 | 0.2 | |
| 19-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep-10 | 9.00 | 65 | 17 | 0 | 22 | 12 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 141 | 15.7 | |
| 22-Sep-10 | 9.00 | 35 | 8 | 3 | 17 | 16 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 11.1 | |
| 23-Sep-10 | 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | |

Appendix D. continued

| DATE | OBS | | SPECIES ¹ | | | | | | | | | | | | | | | | | | | | | | | | BIRDS | | | |
|-----------|-------|----|----------------------|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|-----|-------|-------|
| | HOURS | 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 |
| 24-Sep-10 | 9.00 | 18 | 2 | 0 | 16 | 12 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 6.7 |
| 25-Sep-10 | 9.00 | 57 | 7 | 4 | 40 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 5 | 0 | 1 | 0 | 0 | 0 | 146 | 16.2 | |
| 26-Sep-10 | 9.00 | 1 | 1 | 0 | 22 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 44 | 4.9 | |
| 27-Sep-10 | 9.00 | 24 | 0 | 0 | 21 | 13 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 83 | 9.2 | |
| 28-Sep-10 | 9.00 | 69 | 4 | 1 | 43 | 30 | 2 | 0 | 0 | 7 | 0 | 1 | 0 | 35 | 0 | 0 | 2 | 1 | 2 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 204 | 22.7 | |
| 29-Sep-10 | 9.00 | 16 | 1 | 1 | 54 | 26 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 117 | 13.0 | |
| 30-Sep-10 | 9.00 | 15 | 0 | 0 | 12 | 6 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 1 | 54 | 6.0 |
| 01-Oct-10 | 9.00 | 15 | 6 | 2 | 60 | 31 | 1 | 2 | 0 | 2 | 0 | 1 | 1 | 28 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 6 | 2 | 0 | 0 | 0 | 0 | 160 | 17.8 | |
| 02-Oct-10 | 9.00 | 38 | 1 | 2 | 86 | 40 | 5 | 0 | 0 | 2 | 0 | 0 | 0 | 29 | 0 | 0 | 0 | 4 | 4 | 0 | 1 | 9 | 0 | 2 | 0 | 0 | 0 | 223 | 24.8 | |
| 03-Oct-10 | 8.50 | 5 | 1 | 0 | 23 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 58 | 6.8 | |
| 04-Oct-10 | 8.50 | 8 | 5 | 0 | 82 | 46 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 5 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 190 | 22.4 | |
| 05-Oct-10 | 9.00 | 0 | 0 | 0 | 17 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 36 | 4.0 | |
| 06-Oct-10 | 9.00 | 0 | 1 | 0 | 71 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 101 | 11.2 | |
| 07-Oct-10 | 6.00 | 3 | 0 | 0 | 54 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 83 | 13.8 | |
| 08-Oct-10 | 7.00 | 0 | 0 | 0 | 33 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 53 | 7.6 | |
| 09-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Oct-10 | 9.00 | 0 | 2 | 1 | 92 | 23 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 5 | 12 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 177 | 19.7 | |
| 12-Oct-10 | 9.00 | 1 | 1 | 0 | 109 | 14 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 0 | 4 | 6 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 178 | 19.8 | |
| 13-Oct-10 | 10.00 | 1 | 1 | 1 | 112 | 11 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 155 | 15.5 | |
| 14-Oct-10 | 9.00 | 2 | 0 | 0 | 97 | 13 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 15 | 6 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 169 | 18.8 | |
| 15-Oct-10 | 9.00 | 0 | 0 | 0 | 30 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 65 | 7.2 | |
| 16-Oct-10 | 9.00 | 0 | 1 | 1 | 61 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 7 | 2 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 108 | 12.0 | |
| 17-Oct-10 | 9.00 | 0 | 0 | 1 | 26 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 1 | 0 | 5 | 2 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 57 | 6.3 | |
| 18-Oct-10 | 9.00 | 0 | 0 | 0 | 30 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 3 | 6 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 58 | 6.4 | |
| 19-Oct-10 | 9.00 | 0 | 1 | 0 | 22 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 46 | 5.1 | |
| 20-Oct-10 | 9.00 | 0 | 0 | 0 | 30 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 2 | 0 | 2 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 45 | 5.0 | |
| 21-Oct-10 | 8.50 | 0 | 0 | 0 | 24 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 42 | 4.9 | |

Appendix D. continued

| DATE | OBS | SPECIES ¹ | | | | | | | | | | | | | | | | | | | | | | | | BIRDS | | | | | |
|-----------|--------|----------------------|----|----|------|-----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|-----|----|----|----|-------|----|----|-------|-------|-----|
| | HOURS | 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 | |
| 22-Oct-10 | 3.75 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 7.7 |
| 23-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 421.42 | 446 | 81 | 18 | 1438 | 420 | 47 | 10 | 10 | 27 | 0 | 2 | 4 | 588 | 0 | 5 | 7 | 80 | 68 | 1 | 9 | 108 | 8 | 10 | 0 | 0 | 0 | 3 | 3390 | 8.0 | |

¹ See Appendix B for full names associated with species codes.

Appendix E. Annual observation effort and fall raptor migration counts by species at Bonney Butte, Oregon: 1994–2010.

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|--------------------------------------|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Start date | 2-Sep | 4-Sep | 1-Sep | 1-Sep | 1-Sep | 27-Aug | 27-Aug | 27-Aug | 27-Aug | 27-Aug |
| End date | 25-Oct | 31-Oct | 2-Nov | 3-Nov | 30-Oct | 28-Oct | 30-Oct | 28-Oct | 31-Oct | 31-Oct |
| Observation days | 47 | 38 | 46 | 45 | 52 | 63 | 48 | 58 | 59 | 51 |
| Observation hours | 327.74 | 251.51 | 285.82 | 286.25 | 384.91 | 416.00 | 328.50 | 415.75 | 423.67 | 402.65 |
| Raptors / 100 hours | 688.4 | 939.9 | 959.7 | 953.7 | 631.8 | 993.5 | 1029.5 | 601.1 | 453.7 | 948.0 |
| SPECIES | RAPTOR COUNTS | | | | | | | | | |
| Turkey Vulture | 204 | 235 | 165 | 133 | 160 | 349 | 553 | 338 | 286 | 488 |
| Osprey | 32 | 49 | 55 | 60 | 67 | 74 | 107 | 78 | 50 | 97 |
| Northern Harrier | 25 | 22 | 39 | 30 | 56 | 49 | 13 | 7 | 27 | 28 |
| Sharp-shinned Hawk | 857 | 871 | 1027 | 912 | 1018 | 1660 | 1105 | 957 | 600 | 1578 |
| Cooper's Hawk | 282 | 310 | 420 | 317 | 266 | 331 | 456 | 256 | 233 | 473 |
| Northern Goshawk | 25 | 12 | 40 | 34 | 33 | 36 | 31 | 10 | 8 | 29 |
| Unknown small accipiter ¹ | – | – | – | – | – | – | – | 84 | 11 | 33 |
| Unknown large accipiter ¹ | – | – | – | – | – | – | – | 0 | 1 | 1 |
| Unknown accipiter | 27 | 67 | 85 | 156 | 99 | 155 | 98 | 0 | 21 | 1 |
| TOTAL ACCIPITERS | 1191 | 1260 | 1572 | 1419 | 1416 | 2182 | 1690 | 1307 | 874 | 2115 |
| Red-shouldered Hawk | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 0 | 0 | 1 |
| Broad-winged Hawk | 1 | 3 | 1 | 0 | 0 | 75 | 10 | 0 | 1 | 6 |
| Swainson's Hawk | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 |
| Red-tailed Hawk | 516 | 528 | 649 | 626 | 411 | 932 | 680 | 513 | 425 | 744 |
| Ferruginous Hawk | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| Rough-legged Hawk | 12 | 11 | 4 | 20 | 15 | 21 | 30 | 7 | 6 | 10 |
| Unidentified buteo | 23 | 30 | 40 | 52 | 30 | 58 | 26 | 29 | 48 | 18 |
| TOTAL BUTEOS | 553 | 572 | 695 | 702 | 460 | 1090 | 750 | 549 | 480 | 779 |
| Golden Eagle | 96 | 81 | 65 | 106 | 81 | 176 | 132 | 75 | 56 | 108 |
| Bald Eagle | 33 | 40 | 42 | 33 | 40 | 53 | 37 | 52 | 55 | 68 |
| Unidentified eagle | 3 | 2 | 1 | 9 | 4 | 2 | 0 | 6 | 7 | 0 |
| TOTAL EAGLES | 132 | 123 | 108 | 148 | 125 | 231 | 169 | 133 | 118 | 176 |
| American Kestrel | 29 | 18 | 18 | 35 | 22 | 30 | 21 | 23 | 21 | 19 |
| Merlin | 36 | 49 | 46 | 104 | 78 | 83 | 65 | 33 | 38 | 84 |
| Prairie Falcon | 5 | 4 | 0 | 5 | 10 | 8 | 6 | 1 | 1 | 8 |
| Peregrine Falcon | 3 | 4 | 0 | 1 | 4 | 5 | 8 | 3 | 9 | 14 |
| Unknown small falcon ¹ | – | – | – | – | – | – | – | 0 | 1 | 0 |
| Unknown large falcon ¹ | – | – | – | – | – | – | – | 0 | 0 | 0 |
| Unknown falcon | 8 | 3 | 2 | 3 | 4 | 0 | 0 | 7 | 2 | 2 |
| TOTAL FALCONS | 81 | 78 | 66 | 148 | 118 | 126 | 100 | 67 | 72 | 127 |
| Unidentified raptor | 38 | 25 | 43 | 90 | 30 | 32 | 0 | 20 | 15 | 7 |
| GRAND TOTAL | 2256 | 2364 | 2743 | 2730 | 2432 | 4133 | 3382 | 2499 | 1922 | 3817 |

Appendix E. continued

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | MEAN |
|--------------------------------------|---------------|--------|--------|--------|--------|--------|--------|--------|
| Start date | 27-Aug | 27-Aug | 28-Aug | 27-Aug | 28-Aug | 27-Aug | 27-Aug | 28-Aug |
| End date | 29-Oct | 27-Oct | 31-Oct | 31-Oct | 31-Oct | 25-Oct | 22-Oct | 28-Oct |
| Observation days | 46 | 49 | 57 | 51 | 60 | 51 | 52 | 51 |
| Observation hours | 341.25 | 392.92 | 459.92 | 397.00 | 481.83 | 425.75 | 421.42 | 376.26 |
| Raptors / 100 hours | 1119.7 | 699.6 | 577.5 | 571.5 | 514.5 | 649.9 | 804.4 | 770.95 |
| SPECIES | RAPTOR COUNTS | | | | | | | |
| Turkey Vulture | 326 | 389 | 232 | 281 | 269 | 469 | 446 | 305 |
| Osprey | 70 | 60 | 38 | 47 | 70 | 101 | 81 | 66 |
| Northern Harrier | 29 | 38 | 33 | 13 | 19 | 33 | 18 | 29 |
| Sharp-shinned Hawk | 1790 | 1067 | 1015 | 921 | 1003 | 1110 | 1438 | 1093 |
| Cooper's Hawk | 485 | 269 | 418 | 249 | 316 | 339 | 420 | 339 |
| Northern Goshawk | 33 | 24 | 40 | 16 | 33 | 18 | 47 | 26 |
| Unknown small accipiter ¹ | 27 | 14 | 7 | 52 | 111 | 71 | 10 | 36 |
| Unknown large accipiter ¹ | 2 | 13 | 2 | 10 | 12 | 6 | 10 | 5 |
| Unknown accipiter | 0 | 46 | 60 | 12 | 37 | 0 | 27 | 59 |
| TOTAL ACCIPITERS | 2337 | 1433 | 1542 | 1260 | 1512 | 1544 | 1952 | 1541 |
| Red-shouldered Hawk | 7 | 0 | 0 | 3 | 3 | 1 | 0 | 1 |
| Broad-winged Hawk | 2 | 2 | 1 | 0 | 5 | 10 | 2 | 7 |
| Swainson's Hawk | 1 | 0 | 0 | 1 | 0 | 0 | 4 | 1 |
| Red-tailed Hawk | 725 | 562 | 531 | 388 | 359 | 361 | 588 | 559 |
| Ferruginous Hawk | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rough-legged Hawk | 17 | 3 | 27 | 6 | 16 | 8 | 5 | 13 |
| Unidentified buteo | 9 | 4 | 30 | 40 | 16 | 3 | 7 | 29 |
| TOTAL BUTEOS | 761 | 572 | 589 | 438 | 399 | 383 | 606 | 611 |
| Golden Eagle | 93 | 72 | 56 | 52 | 52 | 63 | 80 | 85 |
| Bald Eagle | 61 | 55 | 44 | 45 | 46 | 55 | 68 | 47 |
| Unidentified eagle | 2 | 1 | 1 | 2 | 8 | 5 | 1 | 3 |
| TOTAL EAGLES | 156 | 128 | 101 | 99 | 106 | 123 | 149 | 136 |
| American Kestrel | 14 | 9 | 17 | 7 | 16 | 27 | 9 | 20 |
| Merlin | 105 | 80 | 69 | 71 | 62 | 71 | 108 | 67 |
| Prairie Falcon | 5 | 3 | 7 | 6 | 3 | 2 | 8 | 5 |
| Peregrine Falcon | 14 | 14 | 10 | 5 | 11 | 11 | 10 | 7 |
| Unknown small falcon ¹ | 1 | 2 | 0 | 5 | 0 | 0 | 0 | 1 |
| Unknown large falcon ¹ | 0 | 10 | 1 | 3 | 0 | 2 | 0 | 2 |
| Unknown falcon | 0 | 6 | 1 | 1 | 2 | 0 | 0 | 3 |
| TOTAL FALCONS | 139 | 124 | 105 | 98 | 94 | 113 | 135 | 104 |
| Unidentified raptor | 3 | 5 | 16 | 33 | 10 | 1 | 3 | 23 |
| GRAND TOTAL | 3821 | 2749 | 2656 | 2269 | 2479 | 2767 | 3390 | 2814 |

¹ Designations used for the first time in 2001.

Appendix F. Daily capture totals of migrating raptors at Bonney Butte, Oregon: 2010.

| DATE | STATION | | SPECIES ¹ | | | | | | | | | | | | | TOTAL | CAPTURES/HR | |
|-----------|---------|--|----------------------|----|----|----|----|----|----|----|----|----|----|----|----|-------|-------------|-----|
| | HOURS | | NH | SS | CH | NG | RS | BW | RT | RL | GE | BE | AK | ML | PR | | | PG |
| 27-Aug-10 | 3.50 | | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.9 |
| 28-Aug-10 | 7.00 | | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.4 |
| 29-Aug-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 30-Aug-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 31-Aug-10 | 1.75 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.6 | |
| 01-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 02-Sep-10 | 7.00 | | 0 | 5 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 10 | 1.4 |
| 03-Sep-10 | 8.00 | | 0 | 2 | 1 | 2 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1.3 |
| 04-Sep-10 | 5.00 | | 0 | 1 | 1 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1.2 |
| 05-Sep-10 | 4.50 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.2 |
| 06-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 07-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 08-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 09-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 10-Sep-10 | 8.00 | | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1.0 |
| 11-Sep-10 | 7.50 | | 0 | 5 | 4 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 13 | 1.7 |
| 12-Sep-10 | 7.75 | | 0 | 10 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 1.8 |
| 13-Sep-10 | 8.25 | | 0 | 5 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 1.1 |
| 14-Sep-10 | 8.00 | | 0 | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1.3 |
| 15-Sep-10 | 7.00 | | 0 | 7 | 3 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 2.0 |
| 16-Sep-10 | 7.00 | | 0 | 5 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1.4 |
| 17-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 18-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 19-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 20-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 21-Sep-10 | 6.00 | | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.3 |
| 22-Sep-10 | 8.00 | | 0 | 5 | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1.3 |
| 23-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 24-Sep-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 25-Sep-10 | 6.75 | | 0 | 20 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 24 | 3.6 |
| 26-Sep-10 | 8.00 | | 0 | 8 | 4 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 15 | 1.9 |
| 27-Sep-10 | 8.25 | | 0 | 7 | 5 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 2.1 |
| 28-Sep-10 | 8.00 | | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1.0 |
| 29-Sep-10 | 7.50 | | 0 | 11 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 2.3 |
| 30-Sep-10 | 7.50 | | 0 | 0 | 7 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 1.2 |
| 01-Oct-10 | 7.75 | | 0 | 9 | 5 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 2.1 |
| 02-Oct-10 | 8.00 | | 0 | 11 | 2 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 18 | 2.3 |
| 03-Oct-10 | 5.50 | | 0 | 9 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 12 | 2.2 |
| 04-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 05-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 06-Oct-10 | 6.00 | | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.5 |
| 07-Oct-10 | 6.00 | | 0 | 7 | 3 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 2.0 |
| 08-Oct-10 | 6.25 | | 0 | 7 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1.6 |
| 09-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 10-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | |
| 11-Oct-10 | 0.00 | | | | | | | | | | | | | | | | | |

Appendix F. Daily capture totals of migrating raptors at Bonney Butte, Oregon: 2010.

| STATION | | SPECIES ¹ | | | | | | | | | | | | | | TOTAL | CAPTURES/HR |
|-----------|-------|----------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|-------------|
| DATE | HOURS | NH | SS | CH | NG | RS | BW | RT | RL | GE | BE | AK | ML | PR | PG | | |
| 12-Oct-10 | 6.50 | 0 | 19 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 3.4 |
| 13-Oct-10 | 7.25 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 0.6 |
| 14-Oct-10 | 7.75 | 0 | 9 | 1 | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 16 | 2.1 |
| 15-Oct-10 | 7.50 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.3 |
| 16-Oct-10 | 7.75 | 0 | 5 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1.0 |
| 17-Oct-10 | 7.25 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0.6 |
| 18-Oct-10 | 7.25 | 0 | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 | 0.7 |
| 19-Oct-10 | 7.50 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0.5 |
| 20-Oct-10 | 7.50 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.3 |
| 21-Oct-10 | 7.25 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.4 |

¹ See Appendix B for full names associated with species codes.

Appendix G. Annual trapping effort and capture totals by species for migrating raptors at Bonney Butte, Oregon: 1995–2010.

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Mean | Total |
|---------------------------------|--------------|-------------------|------------|--------------|--------------|-------------------|--------|--------|--------|--------|------------|------------|------------|------------|------------|------------|--------|-------|
| First trapping day | 7-Oct 28- | 18- Sep 10- | 31- Aug | 6-Sep 30- | 5-Sep 24- | 28- Aug 24- | 25-Aug | 27-Aug | 26-Aug | 27-Aug | 27- Aug | 27- Aug | 27- Aug | 28- Aug | 27- Aug | 27- Aug | | |
| Last trapping day | Oct | Oct | 1-Nov | Oct | Oct | Oct | 28-Oct | 27-Oct | 27-Oct | 15-Oct | Oct | 28-Oct | Oct | Oct | Oct | Oct | | |
| Number of stations | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Station days | 10 | 21 | 39 | 34 | 22 | 58 | 50 | 55 | 47 | 36 | 48 | 49 | 45 | 56 | 49 | 38 | 45 | |
| Station hours | 44.50 | 127.20 | 202.80 | 199.95 | 142.75 | 239.75 | 320.50 | 357.75 | 345.35 | 263.00 | 342.25 | 354.25 | 317.25 | 406.00 | 359.50 | 263.25 | 293.88 | |
| Captures / 10 hours | 4.9 | 10.0 | 11.0 | 12.8 | 10.0 | 13.0 | 10.3 | 10.4 | 12.5 | 15.0 | 15.3 | 13.9 | 10.5 | 10.5 | 13.9 | 13.5 | 12.3 | |
| Species | | | | | | | | | | | | | | | | | | |
| Northern Harrier | 0 | 1 | 0 | 2 | 1 | 1 | 0 | 6 | 4 | 2 | 7 | 2 | 1 | 3 | 3 | 0 | 2.3 | 33 |
| Sharp-shinned Hawk | 18 | 80 | 139 | 163 | 82 | 161 | 171 | 172 | 268 | 219 | 310 | 259 | 200 | 247 | 337 | 199 | 209.1 | 2826 |
| Cooper's Hawk | 0 | 20 | 29 | 43 | 14 | 67 | 74 | 71 | 64 | 90 | 101 | 88 | 74 | 100 | 98 | 68 | 70.1 | 933 |
| Northern Goshawk | 1 | 7 | 7 | 3 | 3 | 8 | 11 | 7 | 12 | 14 | 12 | 11 | 3 | 15 | 3 | 21 | 9.3 | 117 |
| Red-shouldered Hawk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.1 | 2 |
| Broad-winged Hawk | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.1 | 2 |
| Red-tailed Hawk | 2 | 14 | 39 | 29 | 36 | 66 | 66 | 108 | 73 | 61 | 67 | 106 | 42 | 45 | 39 | 57 | 59.6 | 793 |
| Rough-legged Hawk | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0.4 | 6 |
| Golden Eagle | 0 | 3 | 2 | 1 | 2 | 3 | 2 | 0 | 2 | 1 | 3 | 6 | 0 | 1 | 2 | 1 | 1.9 | 28 |
| Bald Eagle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0.2 | 3 |
| American Kestrel | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 0.6 | 7 |
| Merlin | 1 | 2 | 5 | 11 | 3 | 1 | 4 | 5 | 4 | 4 | 13 | 12 | 9 | 8 | 12 | 8 | 7.1 | 94 |
| Prairie Falcon | 0 | 0 | 1 | 4 | 0 | 1 | 0 | 1 | 3 | 4 | 3 | 4 | 2 | 1 | 1 | 0 | 1.8 | 25 |
| Peregrine Falcon | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 4 | 1 | 0 | 1 | 0 | 0 | 0.6 | 9 |
| All species | 22 | 127 | 223 | 256 | 143 | 311 | 330 | 371 | 430 | 395 | 522 | 492 | 333 | 425 | 498 | 355 | 363.1 | 4878 |
| Recaptures ¹ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0.3 | 4 |
| Foreign Recaptures ² | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 2 | 2 | 3 | 1 | 1 | 1 | 2 | 1 | 1.1 | 15 |
| Foreign Encounters ³ | 1 | 0 | 1 | 2 | 6 | 3 | 2 | 6 | 8 | 5 | 9 | 6 | 7 | 3 | 8 | 0 | 4.7 | 67 |

¹ Recaptures at Bonney Butte of birds originally banded at Bonney Butte.

² Recaptures at Bonney Butte of birds originally banded elsewhere.

³ Birds originally banded at Bonney Butte and subsequently encountered elsewhere.