

**FALL 2000 RAPTOR MIGRATION STUDIES AT
BONNEY BUTTE, OREGON**

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INTRODUCTION

The Bonney Butte Raptor Migration Project in north-central Oregon is an ongoing effort to monitor long-term trends in populations of raptors using the northern portion of the Pacific Coast migratory flyway (Hoffman et al. in review). HawkWatch International (HWI) initiated standardized counts of the autumn raptor migration through this region in 1994, and began a trapping and banding program at the project site in 1995. To date, HWI observers have recorded 18 species of migratory raptors at the site, with counts typically ranging between 2,500 and 4,000 migrants per season. The 2000 season marked the 7th consecutive count and the 6th consecutive season of trapping and banding conducted at the site by HWI. This report summarizes the 2000 count and banding results.

The Bonney Butte project was 1 of 15 long-term, annual migration counts (12 fall, 3 spring) and 1 of 7 migration banding studies (6 fall, 1 spring) conducted or sponsored by HWI in North America during 2000. The primary objective of these efforts is to track long-term population trends of diurnal raptors throughout primarily western North America (see Smith and Hoffman 2000 for a comprehensive review of raptor migration monitoring in western North America). Raptors feed atop food pyramids, inhabit most ecosystems, occupy large home ranges, and are sensitive to environmental contamination and other human disturbances. Therefore, they serve as important biological indicators of ecosystem health (Cade et al. 1988; Bednarz et al. 1990a; Bildstein and Zalles 1995). Moreover, due to the remoteness and widespread distribution of most raptor populations, migration counts likely represent the most cost-effective and efficient method for monitoring the regional status and trends of multiple raptor species (Bednarz and Kerlinger 1989, Titus et al. 1989, Bildstein and Zalles 1995, Bildstein et al. 1995, Dunn and Hussell 1995, Dixon et al. 1998, Smith and Hoffman 2000).

The intensive counting and banding operations also provide valuable information about breeding and wintering distributions, migratory routes, migratory behavior, population demographics, mortality factors and longevity, morphometric variation, molt sequences and timing, and health assessments. This information enables us to better 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 HWI's mission. Accordingly, since 1996 the Bonney Butte field crew has included a trained educator dedicated to conducting environmental education programs at the site and facilitating interactions between visitors and the field biologists.

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; 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 shrubsteppe region lies immediately to the east.

Bonney Butte is a mostly bald knoll with a summit elevation of 1,754 m. The south and west slopes are steep, dropping approximately 725 m to the White River, whereas the east slope drops only 65 m to Bonney Meadows. The area within a 5-km radius of Bonney Butte is forested, except for Bonney Meadows and several clearcut tracts. Mountain Hemlock (*Tsuga spp.*), true firs (*Abies spp.*), and pines (*Pinus spp.*) are common in the surrounding forests. Several huckleberry species (*Vaccinium spp.*) also commonly occur in the area. 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.

Several other ridges to the north funnel migrants past the Bonney Butte lookout. Bennett Ridge and Surveyor's Ridge form a "Y" junction 2 km north of Bonney Butte. Bluegrass Ridge parallels Surveyor's Ridge to the west and terminates pointing into the Y. Barlow Ridge lies 2 km west of Bonney Butte, and Frog Lake Butte is immediately south of Barlow. Two long north-south ridges lie to the east of Bonney Butte. Boulder Ridge is 4 km due east, and the lower, closer "Meadow" ridge is 1.5 km due east. Migrants have been seen using all of these ridges, depending on weather conditions.

METHODS

COUNTS

Weather permitting, two official or designated observers conducted standardized daily counts of migrating raptors from a single, traditional observation site from late August through October. Observations typically began between 0800–0900 hrs and ended near 1700 hrs Pacific Standard Time (PST). Official observers Nick and Sue Vulgares had five and two full-seasons, respectively, of previous experience counting migratory raptors (see Appendix A for a complete history of observer participation). Visitors also occasionally assisted with spotting migrants.

The observers routinely recorded the following data:

1. Species, age, sex, and color morph of each migrant raptor, whenever possible and applicable (Appendix B lists common and scientific names for all species, information about the applicability of age, sex, and color morph distinctions, and two-letter codes used to identify species in some tables and figures).
2. Hour of passage for each migrant; e.g., the 1000 hr PST.
3. Wind speed and direction, air temperature, percent cloud cover, predominant cloud type(s), 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 mean number of observers (official observers plus any person that actively assisted with scanning and locating raptors for more than 10 minutes in a given hour) and visitors (all other guests) present during each hour.
6. Daily start and stop times for each observer.

The observers used high quality 7–10x binoculars to assist in spotting and identifying birds. Clark and Wheeler (1987), Dunne et al. (1988), and Wheeler and Clark (1995) served as primary identification references. Assessments of wind speed, cloud type, cloud cover, and flight altitude followed guidelines published by the Hawk Migration Association of North America (HMANA). Assessments of thermal lift conditions as poor, fair, good, or excellent involved subjective evaluations of solar intensity, wind speed, and migrant behavior. All weather variables were recorded on-site.

The observers classified as residents and excluded from daily counts any raptor that exhibited hunting, territorial display, or perching behaviors for extended periods. The observers occasionally recorded as migrants birds that were not moving in a southerly direction, if such birds otherwise displayed migrant characteristics; i.e., continuous flight without stopping or substantially changing directions for several kilometers. Such birds may be dispersing juveniles or adults dispersing relatively short-distances from

their nesting territories to favored wintering grounds in the same general region. However, we also know from recent satellite telemetry work that species such as Prairie Falcons and Ferruginous Hawks frequently migrate in non-standard directions to take advantage of favored post-breeding and wintering grounds (Watson and Pierce 2000, K. Steenhof personal communication).

For purposes of examining long-term variation in annual counts, it is often recommended that count data be standardized for sampling period and adjusted for daily variation in observation effort because seasonal and daily duration of observation effort can greatly affect count statistics (Hussell 1985, Kerlinger 1989, Bednarz et al. 1990b). For purposes of this report, I converted counts to passage rates (typically raptors/100 hours of observation) to adjust for daily variation in sampling effort, and present both raw counts and passage rates for comparison. In this report, I compare results from the 2000 season to means for previous seasons and examine trends in annual passage rates. In comparing 2000 annual statistics against means and 95% confidence intervals for previous seasons, I equate significance with a 2000 value falling outside the bounds of the confidence interval for the associated mean.

TRAPPING AND BANDING

Weather permitting, the trappers operated a single traditional banding station daily from late August through October, generally between 0900–1700 hrs PST. Capture devices included mist nets and remotely triggered bow nets (Meng 1963, Austing 1964). Trappers lured migrating raptors into the capture stations from camouflaged blinds using live, non-native Rock Doves (*Columba livia*; hereafter called pigeons), Ringed Turtle-doves (*Streptopelia risoria*), European Starlings (*Sturnus vulgaris*), and House Sparrows (*Passer domesticus*) attached to lure lines manipulated from the blinds. Unless already banded, all captured birds were fitted with a uniquely numbered USGS Biological Resources Division aluminum leg band. Processors identified species, subspecies, sexes, and ages using morphological characteristics described in the U.S. Bird Banding Laboratory (BBL) Manual, Clark and Wheeler (1985), Wheeler and Clark (1995), and Hoffman et al. (1990). Processors also recorded a series of standard morphometric, health, and molt data for each bird. All birds were released within 45 minutes from the time of capture.

RESULTS

WEATHER SUMMARY

In 2000, inclement weather entirely precluded observations on 18 of 66 potential observation days between 27 August and 31 October, severely restricted observations (≥ 2 hours) on two other days, and reduced observations to less than four hours on five more days (see Appendix C for daily weather records). A similar pattern occurred in 1997, but 1998 and 1999 featured 30–40% fewer inclement weather days. Moreover, compared to 1998 and 1999, 2000 featured a relatively low proportion of active observation days with fair (clear to partly cloudy) weather (37% vs. 53–58%), and proportionately more days with transitional weather (shifted from clear or partly cloudy to mostly cloudy or overcast by days end, or the reverse; 33% vs. 12–22%). The 1999 and 2000 seasons were similar, however, in featuring relatively high proportions of active observation days where fog or haze restricted visibility (56 and 46%, respectively). Much of the early season haze in 2000 was due to nearby wildfires. Otherwise, temperatures and wind patterns in 2000 were similar to the previous three years.

OBSERVATION EFFORT

The observers worked on 48 of 66 possible days between 27 August and 31 October (Table 1). Although 8–24% lower than in 1998 and 1999, the number of observation days and hours (328.50) are both within

1% of the 1995–1999 averages. The 2000 average of 2.0 observers per hour (including official and guest observers; value is mean of daily values, which are in turn means of hourly values) is the same as in 1999, but is 21% lower than the 1995–1999 average. The lower value for 2000 is at least partly indicative of the effects of inclement weather on visitation rates.

FLIGHT SUMMARY

The observers counted 3,382 migrant raptors of 17 species during the 2000 season (Table 1, and see Appendix D for daily count records). Counts reached record highs for Turkey Vulture, Osprey, Cooper's Hawk, Red-shouldered Hawk, Rough-legged Hawk, and Peregrine Falcon, and reached the second highest count for Broad-winged Hawk, Red-tailed Hawk, and Golden Eagle (see Appendix E for annual summaries). However, the count of Northern Harriers (13) reached a record low.

The 2000 flight was composed of 50% accipiters, 22% buteos, 16% vultures, 5% eagles, 3% falcons, 3% Ospreys, and <1% harriers and unidentified raptors. The 2000 season featured a significantly higher than average proportion of vultures and Ospreys, and significantly lower than average proportions of accipiters and harriers (Figure 2). As usual, Sharp-shinned and Red-tailed Hawks were the two most abundant species, followed by Turkey Vultures, Cooper's Hawks, and American Kestrels (Table 1, Appendix E).

Passage rates were significantly higher than average for 7 of 17 species seen this season (Turkey Vulture, Osprey, Cooper's Hawk, Red-shouldered Hawk, Rough-legged Hawk, Golden Eagle, and Peregrine Falcon), significantly lower than average for 2 species (Northern Harrier and Swainson's Hawk [not seen this season]), and not significantly different from average for the remaining 9 species (Sharp-shinned Hawk, Broad-winged Hawk, Red-tailed Hawk, Ferruginous Hawk, Bald Eagle, American Kestrel, Merlin, and Prairie Falcon; Table 1, Figures 3–7). Thus, the relatively high prevalence of inclement weather and foggy/hazy conditions did not appear to have a pronounced negative effect on the passage volume of most species nor the observers' ability to detect the migrants.

At this time, simple linear regression analyses of annual passage rates indicate no significant ($P < 0.05$) long-term trends (Figures 3–7), except for Red-shouldered Hawks (increasing; $P = 0.005$; Appendix E). However, the Osprey count has increased every year of the project (Appendix E) and the trend in passage rates is marginally significant ($P = 0.068$; Figure 3). Ospreys are showing increasing trends at many other western migration sites (HWI unpublished data) and other datasets have shown recent increasing trends in Oregon, as well (e.g., Henny and Kaiser 1995). Red-shouldered Hawks are too uncommon at this migration site to place much emphasis on the apparent trend; however, it may be indicative of continued northward expansion of the species breeding range, which began in the mid-1980s (Henny and Cornely 1985). Otherwise, it is not surprising that few significant trends are evident at this stage, because the datasets are still relatively short term. Other species that are showing possible but not yet statistically significant increasing trends include Broad-winged Hawk (Figure 5; and see Smith et al. in press), Rough-legged Hawk (Figure 5), Golden Eagle (Figure 6), and Merlin (Figure 7), whereas no species is showing a definite declining pattern.

The record high count of Peregrine Falcons included five confirmed immature birds (Table 2). The number of peregrines seen at this site is small, but the combination of a record-high total count and most of those confirmed as immature birds suggests that regional productivity was probably high for this species in 2000. The Golden Eagle was the only other species to show a significantly higher than average age ratio in 2000 (Table 2). In this case, we cannot be sure that the high age ratio implies high productivity in 2000, because the immature category includes up to four generations of young birds. Nevertheless, the higher than usual abundance of immature/subadult birds led to an above average passage rate (Table 1). Sharp-shinned Hawks and Northern Goshawks were the only species to show significantly lower than average age ratios in 2000, and for both species a substantial drop in the number

of immature birds contributed to the change, suggesting that productivity for these two species was below average in 2000 in the Pacific Northwest (Table 2).

At the species level, 8 of 13 species with sufficient data for robust comparisons showed significantly earlier than average (2–8 days) median passage dates in 2000 (Table 3). In addition, Broad-winged Hawks and Peregrine Falcons were 5 and 17 days earlier than in 1999 (Table 3), and sex–age specific data showed that adult Sharp-shinned Hawks and male American Kestrels also were significantly earlier than average (6 and 9 days, respectively). In contrast, only Golden and Bald Eagles were significantly later than average (3–4 days; Table 3). The preponderance of early passage dates is indicative of the fact that inclement weather precluded observations on 14 days in October and resulted in three distinct periods of below average activity (Figure 8).

RESIDENT RAPTORS

This season, local birds included at least one family group of light-morph Red-tailed Hawks (minimum two adults and two immatures) seen regularly through out the season; a pair of Golden Eagles seen displaying territorial behavior once and one subadult seen once; at least one family group each of Sharp-shinned and Cooper’s Hawks (at least one adult and two immatures seen of both species) seen regularly through late September; at least one immature Northern Goshawk seen twice in late September and early October; at least five Turkey Vultures seen regularly through late September; and at least one male American Kestrel seen only once on the first day of observations (about the same time a similar bird was seen in 1999). The Red-tailed Hawks, Golden Eagles, Sharp-shinned Hawks, and vultures are regular members of the local community, with the red-tails, eagles, and goshawks likely permanent residents.

TRAPPING EFFORT

Trapping occurred on 39 of 58 days between 28 August and 24 October, with effort totaling 239.75 hours (see Appendix F for daily trapping records). This ties the highest number of trapping days for the study and exceeds the previous high number of trapping hours by 18% (see Appendix G for annual trapping summaries).

TRAPPING AND BANDING SUMMARY

The 2000 capture total of 311 newly banded birds of 10 species, included the first Broad-winged Hawk and Peregrine Falcons (2) ever captured at this site (Table 4, Appendix G). The 2000 effort raises the total number of birds captured since project inception to 1,082, including two foreign recaptures (i.e., birds originally banded elsewhere and subsequently recaptured at Bonney Butte; Appendix G). As usual, the three most frequently captured species were Sharp-shinned Hawk (52% of captures), Cooper’s Hawk (22%), and Red-tailed Hawk (21%), all caught in record or near-record high numbers this season (Appendix G). The capture totals for Northern Goshawk and Golden Eagle also tied or exceeded previous highs.

For the three accipiters, Red-tailed Hawks, Golden Eagles, and the two species never before captured, the 2000 capture totals, rates, and successes were all above average, significantly so in most cases (Table 4). For all but Sharp-shinned Hawks and Northern Goshawks, the high capture totals and rates are consistent with high counts (Table 1). However, the high totals and rates for sharpies and goshawks despite average counts, and consistently high capture success for all of these species, suggest that trapping efficiency also was higher than average. In contrast, a low capture total, rate and success for Merlins, despite an average passage rate (Table 1), suggests that this species was less susceptible to capture in 2000 than in previous years.

Compared to the counts, banding yields unique and substantial sex–age specific data only for Sharp-shinned and Cooper’s Hawks. The 2000 and long-term average immature : adult capture ratios for

Sharp-shinned and Cooper's Hawks (Table 5) show essentially the same patterns as the age ratios derived from the count data (Table 2; low for Sharp-shinned Hawks and high for Cooper's Hawks). The capture data uniquely suggest that female : male ratios for these two species were significantly below average in 2000; however, a closer look reveals that only immature female Sharp-shinned Hawks were caught less frequently than usual (Table 5).

ENCOUNTERS WITH PREVIOUSLY BANDED BIRDS

Since banding began in 1995, 11 raptors banded at Bonney Butte have subsequently been encountered elsewhere ("foreign encounters") and two raptors banded elsewhere have been recaptured at Bonney Butte ("foreign recaptures"; Table 6). Only one new foreign encounter occurred in 2000, involving a Sharp-shinned Hawk found dead of unknown causes six months after banding near Columbia, California in the Sierra Nevada foothills. However, since we prepared our last report, we received new information about four late-1999 recoveries involving Red-tailed Hawks. Most interestingly, one hatch-year red-tail banded at Bonney Butte on 24 September 1999 was recaptured by a colleague while road-trapping near Tomales Bay, California on 27 November 1999, and was then found dead of unknown causes by another individual in the same general area on 16 December 1999. Another red-tail banded as a hatch-year bird at Bonney Butte on 28 September 1998 was found injured on 4 October 1999 just north of the U.S. border in southwestern British Columbia. Another young red-tail banded at Bonney Butte on 17 September 1999 was found injured one month later near Fort Bragg, California, and at the time of reporting was being held in captivity, presumably by a rehabilitation facility.

Thus far, the Bonney Butte foreign encounter and recapture data confirm that the site is part of the Pacific Coast flyway (Hoffman et al. in review). Based on our Bonney Butte data and extensive band-return data from Golden Gate Raptor Observatory (Scheuermann 1996), this flyway extends from southwestern British Columbia to northern Mexico primarily between the Cascade and Sierra Nevada ranges and the Pacific Coast.

VISITOR ATTENDANCE

In 2000, the daily number of observers averaged 2.0 (average of daily values, which in turn were averages of hourly records) and the daily average number of visitors was 1.8 visitors per hour of observation. The comparative averages for previous seasons are $2.5 \pm 95\%$ CI of 0.42 observers and 1.8 ± 0.69 visitors/hr. Visitor hours (including guest observers and other visitors) totaled approximately 716 in 2000, which is about 18% below average ($872 \pm 95\%$ CI of 400.3). Inclement weather undoubtedly contributed to this reduction in visitation. Nevertheless, 287 visits to the site occurred in 2000 (includes some repeat visits), including individuals from several local Forest Service districts, three Oregon/Washington Audubon societies, a seniors hiking club, and students from an environmental school in Troutdale, Oregon.

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Table 1. Annual counts and passage rates by species: 1994–1999 versus 2000.

| | 1994–1999 ¹ | 2000 | % CHANGE | 1994–1999 ¹ | 2000 | % CHANGE |
|------------------------|------------------------|--------|----------|------------------------|--------|----------|
| Start date | 31-Aug ± 2.1 | 27-Aug | | | | |
| End date | 29-Oct ± 2.8 | 30-Oct | | | | |
| Observation days | 48.5 ± 6.7 | 48 | -1 | | | |
| Observation hours | 325.37 ± 51.003 | 328.50 | +1 | | | |
| SPECIES | COUNT | | | RAPTORS / 100 HOURS | | |
| Turkey Vulture | 208 ± 62.4 | 553 | +166 | 64.2 ± 16.46 | 168.3 | +162 |
| Osprey | 56 ± 11.8 | 107 | +91 | 17.4 ± 3.18 | 32.6 | +87 |
| Northern Harrier | 37 ± 10.9 | 13 | -65 | 11.1 ± 2.17 | 4.0 | -64 |
| Sharp-shinned Hawk | 1058 ± 242.8 | 1105 | +4 | 325.1 ± 43.60 | 336.4 | +3 |
| Cooper's Hawk | 321 ± 43.5 | 456 | +42 | 102.5 ± 23.75 | 138.8 | +35 |
| Northern Goshawk | 30 ± 8.1 | 31 | +3 | 9.2 ± 2.60 | 9.4 | +2 |
| Unidentified accipiter | 98 ± 40.5 | 98 | 0 | 30.3 ± 12.16 | 29.8 | -2 |
| TOTAL ACCIPITERS | 1507 ± 285.5 | 1690 | +12 | 467.2 ± 64.86 | 514.5 | +10 |
| Red-shouldered Hawk | 0.7 ± 0.65 | 3 | +350 | 0.2 ± 0.17 | 0.9 | +403 |
| Broad-winged Hawk | 13.3 ± 24.19 | 10 | -25 | 3.3 ± 5.78 | 3.0 | -8 |
| Swainson's Hawk | 1.0 ± 0.72 | 0 | -100 | 0.3 ± 0.22 | 0.0 | -100 |
| Red-tailed Hawk | 610 ± 143.4 | 680 | +11 | 190.7 ± 38.77 | 207.0 | +9 |
| Ferruginous Hawk | 0.7 ± 0.41 | 1 | +50 | 0.2 ± 0.12 | 0.3 | +58 |
| Rough-legged Hawk | 14 ± 5.0 | 30 | +114 | 4.3 ± 1.47 | 9.1 | +113 |
| Unidentified buteo | 39 ± 11.0 | 26 | -33 | 12.1 ± 3.36 | 7.9 | -35 |
| TOTAL BUTEOS | 679 ± 177.0 | 750 | +10 | 211.1 ± 44.19 | 228.3 | +8 |
| Golden Eagle | 101 ± 31.5 | 132 | +31 | 30.8 ± 6.56 | 40.2 | +31 |
| Bald Eagle | 40 ± 5.9 | 37 | -8 | 12.6 ± 1.88 | 11.3 | -10 |
| Unidentified eagle | 3.5 ± 2.31 | 0 | -100 | 1.1 ± 0.82 | 0.0 | -100 |
| TOTAL EAGLES | 145 ± 35.5 | 169 | +17 | 44.4 ± 7.16 | 51.4 | +16 |
| American Kestrel | 25 ± 5.6 | 21 | -17 | 7.9 ± 1.89 | 6.4 | -19 |
| Merlin | 66 ± 21.1 | 65 | -2 | 20.5 ± 6.81 | 19.8 | -4 |
| Prairie Falcon | 5.3 ± 2.76 | 6 | +13 | 1.6 ± 0.69 | 1.8 | +17 |
| Peregrine Falcon | 3.0 ± 1.68 | 8 | +167 | 0.9 ± 0.56 | 2.4 | +166 |
| Unidentified falcon | 3.3 ± 2.13 | 0 | -100 | 1.1 ± 0.64 | 0.0 | -100 |
| TOTAL FALCONS | 103 ± 25.8 | 100 | -3 | 32.0 ± 8.20 | 30.4 | -5 |
| Unidentified Raptor | 43 ± 19.1 | 0 | -100 | 13.9 ± 7.21 | 0.0 | -100 |
| ALL SPECIES | 2777 ± 554.5 | 3382 | +22 | 861.4 ± 126.42 | 1029.5 | +20 |

¹ Mean of annual values ± 95% confidence interval.

Table 2. Counts by age class and immature : adult ratios for selected species: 1994–1999 versus 2000.

| | TOTAL AND AGE-CLASSIFIED COUNTS | | | | | | IMMATURE : ADULT | | | |
|--------------------|---------------------------------|------|-------|-------|------|-------|------------------------|------|------------------------|------|
| | 1994–1999 AVERAGE | | | 2000 | | | % UNKNOWN AGE | | RATIO | |
| | TOTAL | IMM. | ADULT | TOTAL | IMM. | ADULT | 1994–1999 ¹ | 2000 | 1994–1999 ¹ | 2000 |
| Northern Harrier | 37 | 19 | 6 | 13 | 4 | 2 | 31 ± 6.9 | 54 | 5.50 ± 4.431 | 2.00 |
| Sharp-shinned Hawk | 1058 | 228 | 347 | 1105 | 143 | 411 | 44 ± 8.9 | 50 | 0.70 ± 0.278 | 0.35 |
| Cooper's Hawk | 321 | 95 | 72 | 456 | 106 | 49 | 47 ± 8.1 | 66 | 1.85 ± 1.559 | 2.16 |
| Northern Goshawk | 30 | 13 | 6 | 31 | 9 | 10 | 37 ± 16.4 | 39 | 2.50 ± 1.207 | 0.90 |
| Broad-winged Hawk | 13 | 1 | 1 | 10 | 2 | 4 | 23 ± 44.4 | 40 | 0.79 ± 0.898 | 0.50 |
| Red-tailed Hawk | 610 | 173 | 318 | 680 | 163 | 409 | 20 ± 4.1 | 16 | 0.61 ± 0.217 | 0.40 |
| Golden Eagle | 101 | 50 | 30 | 132 | 81 | 17 | 20 ± 5.2 | 26 | 1.71 ± 0.455 | 4.76 |
| Bald Eagle | 40 | 7 | 29 | 37 | 6 | 30 | 10 ± 8.4 | 3 | 0.27 ± 0.135 | 0.20 |
| Peregrine Falcon | 3 | 1 | 1 | 8 | 5 | 0 | 31 ± 18.6 | 38 | 0.60 ± 0.480 | ≥5 |

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 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 2000, with a comparison of median passage dates for 2000 versus 1994–1999 means.

| SPECIES | 2000 | | | | 1994–1999 |
|---------------------|----------------|---------------|---------------------------------|----------------------------------|----------------------------------|
| | FIRST OBSERVED | LAST OBSERVED | BULK PASSAGE DATES ¹ | MEDIAN PASSAGE DATE ² | MEDIAN PASSAGE DATE ³ |
| Turkey Vulture | 28-Aug | 4-Oct | 12-Sep – 24-Sep | 20-Sep | 22-Sep ± 1.7 |
| Osprey | 28-Aug | 22-Oct | 1-Sep – 27-Sep | 12-Sep | 18-Sep ± 1.9 |
| Northern Harrier | 1-Sep | 24-Oct | 9-Sep – 23-Oct | 28-Sep | 28-Sep ± 6.7 |
| Sharp-shinned Hawk | 27-Aug | 30-Oct | 14-Sep – 17-Oct | 4-Oct | 5-Oct ± 3.0 |
| Cooper’s Hawk | 28-Aug | 22-Oct | 7-Sep – 7-Oct | 20-Sep | 25-Sep ± 3.0 |
| Northern Goshawk | 7-Sep | 30-Oct | 11-Sep – 19-Oct | 3-Oct | 2-Oct ± 5.5 |
| Red-shouldered Hawk | 9-Sep | 24-Sep | – | – | – |
| Broad-winged Hawk | 14-Sep | 16-Oct | 16-Sep 16-Oct | 24-Sep | 29-Sep ⁴ |
| Red-tailed Hawk | 27-Aug | 24-Oct | 12-Sep – 14-Oct | 23-Sep | 28-Sep ± 3.1 |
| Ferruginous Hawk | 14-Sep | 14-Sep | – | – | – |
| Rough-legged Hawk | 22-Sep | 30-Oct | 3-Oct – 30-Oct | 22-Oct | 21-Oct ± 2.7 |
| Golden Eagle | 29-Aug | 30-Oct | 15-Sep – 22-Oct | 14-Oct | 11-Oct ± 3.0 |
| Bald Eagle | 30-Aug | 30-Oct | 14-Sep – 24-Oct | 8-Oct | 4-Oct ± 4.4 |
| American Kestrel | 27-Aug | 28-Sep | 7-Sep – 17-Sep | 13-Sep | 19-Sep ± 4.3 |
| Merlin | 7-Sep | 24-Oct | 20-Sep – 22-Oct | 7-Oct | 9-Oct ± 3.3 |
| Prairie Falcon | 12-Sep | 3-Oct | 12-Sep – 3-Oct | 14-Sep | 22-Sep ± 6.3 |
| Peregrine Falcon | 5-Sep | 30-Oct | 5-Sep – 30-Oct | 12-Sep | 29-Sep ⁴ |
| All species | 2-Sep | 30-Oct | 12-Sep – 16-Oct | 24-Sep | 30-Sep ± 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; unless otherwise indicated, values are given only for species with annual counts ≥5 birds for ≥ 3 years.

⁴ Based on data for 1999 only.

Table 4. Median passage dates by age for selected species: 1994–1999 versus 2000.

| SPECIES | ADULT | | IMMATURE | |
|--------------------|------------------------|--------|------------------------|--------|
| | 1994–1999 ¹ | 2000 | 1994–1999 ¹ | 2000 |
| Sharp-shinned Hawk | 11-Oct ± 3.1 | 5-Oct | 22-Sep ± 3.1 | 23-Sep |
| Cooper’s Hawk | 30-Sep ± 3.8 | 28-Sep | 20-Sep ± 2.4 | 13-Sep |
| Northern Goshawk | 20-Oct ± 12.7 | 16-Oct | 28-Sep ± 9.5 | 3-Oct |
| Red-tailed Hawk | 2-Oct ± 5.1 | 24-Sep | 22-Sep ± 3.8 | 17-Sep |
| Golden Eagle | 11-Oct ± 1.6 | 16-Oct | 9-Oct ± 4.8 | 7-Oct |
| Bald Eagle | 6-Oct ± 7.1 | 6-Oct | 8-Oct ± 6.1 | 19-Oct |

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

Table 5. Capture totals, rates, and successes by species: 1995–2000.

| | CAPTURE TOTALS | | CAPTURE RATES ¹ | | CAPTURE SUCCESSES ² | |
|--------------------|------------------------|------|----------------------------|-------|--------------------------------|------|
| | 1995–1999 ³ | 2000 | 1995–1999 ³ | 2000 | 1995–1999 ³ | 2000 |
| Northern Harrier | 1 ± 0.7 | 1 | 0.5 ± 0.41 | 0.4 | 1.6 ± 1.39 | 7.7 |
| Sharp-shinned Hawk | 96 ± 49.7 | 161 | 62.2 ± 13.22 | 67.2 | 8.5 ± 4.92 | 13.7 |
| Cooper's Hawk | 21 ± 14.1 | 67 | 12.3 ± 7.04 | 27.9 | 6.3 ± 4.96 | 13.8 |
| Northern Goshawk | 4 ± 2.4 | 8 | 3.0 ± 1.39 | 3.3 | 11.8 ± 4.63 | 24.2 |
| Broad-winged Hawk | 0 ± 0.0 | 1 | 0.0 ± 0.00 | 0.4 | 0.0 ± 0.00 | 10.0 |
| Red-tailed Hawk | 24 ± 13.7 | 66 | 14.9 ± 6.91 | 27.5 | 3.7 ± 2.26 | 9.4 |
| Rough-legged Hawk | 0.4 ± 0.48 | 0 | 0.2 ± 0.29 | 0.0 | 1.8 ± 2.18 | 0.0 |
| Golden Eagle | 2 ± 1.0 | 3 | 1.0 ± 0.79 | 1.3 | 1.7 ± 1.49 | 2.3 |
| American Kestrel | 0.2 ± 0.39 | 0 | 0.1 ± 0.27 | 0.0 | 0.7 ± 1.31 | 0.0 |
| Merlin | 4 ± 3.5 | 1 | 2.8 ± 1.37 | 0.4 | 5.6 ± 4.00 | 1.5 |
| Prairie Falcon | 1 ± 1.5 | 1 | 0.5 ± 0.76 | 0.4 | 15.0 ± 18.77 | 16.7 |
| Peregrine Falcon | 0 ± 0.0 | 2 | 0.0 ± 0.00 | 0.8 | 0.0 ± 0.00 | 25.0 |
| All species | 154 ± 80.1 | 311 | 97.5 ± 25.59 | 129.7 | 6.2 ± 3.73 | 11.4 |

¹ Captures / 100 station hours.

² Number of birds captured / number of birds observed. The combined-species value was calculated excluding Ospreys, Turkey Vultures, Swainson's Hawks, Rough-legged Hawks, Ferruginous Hawks, 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. 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: 1995–1999 versus 2000.

| SPECIES | YEAR | FEMALE | | MALE | | FEMALE : MALE | IMMATURE : ADULT |
|--------------------|-----------|--------|-----|------|-----|---------------|------------------|
| | | HY | AHY | HY | AHY | RATIO | RATIO |
| Sharp-shinned Hawk | 1995–1999 | 37 | 19 | 28 | 13 | 1.4 ± 0.31 | 1.9 ± 1.14 |
| | 2000 | 34 | 47 | 38 | 42 | 1.0 | 0.8 |
| Cooper's Hawk | 1995–1999 | 8 | 7 | 5 | 1 | 2.2 ± 0.32 | 1.7 ± 0.62 |
| | 2000 | 31 | 12 | 21 | 3 | 1.8 | 3.5 |

Table 7. Foreign recaptures and foreign encounters: 1995–2000.

| BAND # | SPECIES ¹ | SEX | BANDING SITE | BANDING AGE ² | BANDING DATE | ENCOUNTER DATE | ENCOUNTER AGE ² | ENCOUNTER LOCATION | DISTANCE (KM) | STATUS |
|--------------|----------------------|-----|------------------------------------|--------------------------|--------------|----------------|----------------------------|---------------------------|---------------|---------------------|
| 1443 – 86178 | SS | F | Bonney Butte, OR | HY | 28-Oct-95 | 15-Dec-95 | HY | Drew, OR | 272.96 | found dead |
| 2003 – 29497 | SS | F | Diamond Head, WA | HY | 02-Sep-97 | 06-Sep-97 | HY | Bonney Butte, OR | 189.12 | recaptured/released |
| 2003 – 76971 | SS | F | Bonney Butte, OR | HY | 29-Sep-97 | 19-Oct-97 | HY | Madras, OR | 66.17 | window kill |
| 1387 – 80939 | RT | U | Bonney Butte, OR | HY | 19-Sep-97 | 26-Jan-98 | SY | Walnut Creek, CA | 690.37 | injured/euthanized |
| 2003 – 76986 | SS | F | Bonney Butte, OR | HY | 16-Oct-97 | 14-Feb-98 | SY | Central Point, OR | 310.37 | found dead |
| 1433 – 89898 | SS | F | Golden Gate Raptor Observatory, CA | HY | 24-Sep-93 | 13-Sep-98 | 6 th yr | Bonney Butte, OR | 681.32 | recaptured/released |
| 1142 – 77189 | SS | M | Bonney Butte, OR | AHY | 24-Oct-97 | 13-Mar-99 | ≥4 th yr | San Francisco, CA | 737.48 | car kill |
| 1705 – 35433 | CH | F | Bonney Butte, OR | HY | 20-Sep-98 | 24-Sep-99 | SY | San Simeon State Park, CA | 872.40 | recaptured/released |
| 1387 – 93602 | RT | U | Bonney Butte, OR | HY | 28-Sep-98 | 04-Oct-99 | SY | Abbotsford, BC | 353.89 | injured/died |
| 1177 – 02043 | RT | U | Bonney Butte, OR | HY | 24-Sep-99 | 27-Nov-99 | HY | near Tomales, CA | 660.04 | recaptured/released |
| 1177 – 02043 | RT | U | Bonney Butte, OR | HY | 24-Sep-99 | 16-Dec-99 | HY | Tomales, CA | 660.04 | found dead |
| 1177 – 02045 | RT | U | Bonney Butte, OR | HY | 29-Sep-99 | 03-Dec-99 | HY | Fort Bragg, CA | 591.52 | injured/captive |
| 1162 – 34006 | SS | M | Bonney Butte, OR | HY | 17-Sep-99 | 12-Mar-00 | SY | Columbia, CA | 661.62 | found dead |

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

² HY = hatch year; SY = second year; AHY = after hatch year.

Figure 1. Location of Bonney Butte study site near Mt. Hood, Oregon.

Figure 2. Flight composition by major species groups: 1994–1999 versus 2000.

Figure 3. Annual passage rates for Turkey Vultures, Ospreys, and Northern Harriers: 1994–2000.

Figure 4. Annual passage rates for Sharp-shinned Hawks, Cooper’s Hawks, and Northern Goshawks: 1994–2000.

Figure 5. Annual passage rates for Broad-winged, Red-tailed and Rough-legged Hawks: 1994–2000.

Figure 6. Annual passage rates for Golden and Bald Eagles: 1994–2000.

Figure 7. Annual passage rates for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons: 1994–2000.

Figure 8. Combined-species passage volume by five-day periods: 1994–1999 versus 2000.

Appendix A. A history of observer participation in the Bonney Butte raptor migration project: 1994–1998.

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).

¹ Numbers in parentheses indicate the number of years 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 raptor species observed during 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 | 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 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 |
| Swainson'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 | A 2 1 I/S U ⁴ | U | NA |
| Bald Eagle | <i>Haliaeetus leucocephalus</i> | BE | A 3 2 1 I/S 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 falcon | <i>Falco</i> spp. | UF | U | U | NA |
| Unknown raptor | Falconiformes | UU | U | U | NA |

¹ Age classification codes: A = adult, I = immature (HY), Br = brown (adult female or immature), U – unknown age.

² Sex classification codes: M = male, F = female, U = unknown.

³ Color morph classification codes: D = dark or rufous, L = light, U – unknown, NA = not applicable.

⁴ Golden Eagle age codes: A = adult - no white in wings or tail; 2 = plumage class 2 - no white patch in wings, obvious white in tail; 1 = plumage class 1- white wing patch visible below, small wing patch may be visible above, bold white in tail; I/S = unknown age immature or subadult - obvious white in tail, wings not adequately observed

⁵ Bald Eagle age codes: A = adult - completely white head and tail; 3 = plumage class 3 -head mostly white, with osprey-like dark eyeline; 2 = plumage class 2 - dark head, light belly, and/or upside-down white triangle on back; 1 = plumage class 1 - dark head, breast, and belly; I/S = unknown age immature or subadult - dark or mottled head, other plumage features not adequately observed.

Appendix C. Daily summaries of observation effort, visitation, predominant weather conditions, and raptor passage rates: 2000.

| DATE | OBS. HOURS | AVERAGE OBSERVERS | AVERAGE VISITORS | SKY CONDITION ¹ | WIND SPEED ³ | WIND DIRECT | THERMAL LIFT ² | AVG. TEMP. (°C) | BARO. PRESS. (IN HG) | AVG. VISIB. E (KM) | AVG. VISIB. W (KM) | FLIGHT DIST. ⁴ | RAPTORS / HOUR |
|--------|------------|-------------------|------------------|----------------------------|-------------------------|---------------|---------------------------|-----------------|----------------------|--------------------|--------------------|---------------------------|----------------|
| 27-Aug | 7.00 | 2.0 | 0.1 | clr, haze PM | 1 | ws-w | 1 | 14.2 | | 100 | 100 | 2 | 0.6 |
| 28-Aug | 7.50 | 2.0 | 0.3 | clr/haze | 0 | ne-ene, sw-nw | 1 | 16.2 | | 100 | 100 | 2 | 1.9 |
| 29-Aug | 7.00 | 2.0 | 0.0 | clr-ovc, haze | 1 | sw-wnw | 3 | 17.0 | | 100 | 100 | 2 | 1.4 |
| 30-Aug | 7.50 | 1.0 | 0.0 | mc-ovc, haze | 0 | nw-e | 3 | 17.0 | | 100 | 100 | 2 | 4.7 |
| 31-Aug | 1.00 | 1.0 | 0.0 | fog/rain | 3 | se | 4 | 10.0 | | 0 | 0 | | 0.0 |
| 1-Sep | 7.50 | 2.0 | 0.0 | ovc, haze, scat snow | 1 | sw-wnw | 4 | 12.4 | 24.22 | 100 | 100 | 2 | 2.9 |
| 2-Sep | 0.00 | | | fog/rain/snow | | | | | | | | | |
| 3-Sep | 2.50 | 1.8 | 0.0 | fog/rain/snow | 1 | ne-s | 4 | 12.5 | 24.41 | 75 | 20 | 3 | 0.4 |
| 4-Sep | 5.50 | 2.8 | 1.5 | pc-ovc, rain/snow | 0 | w-nw | 3 | 9.0 | 24.53 | 87 | 84 | 3 | 2.4 |
| 5-Sep | 5.50 | 1.0 | 0.0 | mc-ovc | 2 | w-nw | 2 | 11.7 | 24.58 | 96 | 86 | 3 | 1.6 |
| 6-Sep | 8.00 | 1.4 | 0.0 | ovc/fog-pc | 1 | sw-nw | 3 | 13.7 | 24.66 | 98 | 87 | 3 | 5.4 |
| 7-Sep | 8.50 | 2.0 | 1.0 | clr-ovc | 1 | sw-w | 2 | 12.8 | 24.43 | 100 | 93 | 3 | 7.3 |
| 8-Sep | 0.50 | 2.0 | 0.0 | fog/rain | 3 | var | 4 | 7.0 | 24.33 | 0 | 0 | | 0.0 |
| 9-Sep | 7.50 | 2.0 | 0.8 | pc-mc, fog AM | 1 | ws-w-wnw | 3 | 10.0 | 24.38 | 100 | 92 | 2 | 3.7 |
| 10-Sep | 0.00 | | | fog/rain | | | | | | | | | |
| 11-Sep | 8.50 | 2.0 | 0.9 | pc | 0 | sw-nw | 2 | 15.4 | 24.54 | 100 | 98 | 3 | 5.4 |
| 12-Sep | 9.00 | 2.0 | 0.7 | clr | 1 | ssw-wnw | 1 | 15.6 | 24.51 | 100 | 100 | 3 | 20.3 |
| 13-Sep | 8.50 | 2.0 | 1.8 | clr-pc, ovc late | 0 | ne-ese | 1 | 16.8 | 24.57 | 100 | 100 | 3 | 19.1 |
| 14-Sep | 7.00 | 2.0 | 0.0 | clr/haze | 1 | ene, sw | 2 | 17.8 | 24.47 | 100 | 100 | 3 | 15.6 |
| 15-Sep | 7.50 | 2.0 | 10.8 | fog/rain-mc | 1 | sw-wnw | 3 | 15.3 | 24.53 | 84 | 66 | 3 | 10.0 |
| 16-Sep | 8.50 | 2.0 | 5.1 | clr-pc, haze PM | 0 | n-ne, w-nw | 2 | 14.4 | 24.56 | 100 | 72 | 3 | 8.7 |
| 17-Sep | 8.00 | 1.8 | 5.4 | clr | 0 | sw-nw | 1 | 16.1 | 24.65 | 100 | 100 | 3 | 12.3 |
| 18-Sep | 8.50 | 2.1 | 3.2 | pc-ovc, dust PM | 1 | sw-nw | 2 | 16.2 | 24.69 | 100 | 93 | 3 | 13.2 |
| 19-Sep | 5.50 | 2.3 | 2.0 | ovc/fog-pc | 0 | sw-nw | 2 | 17.4 | 24.62 | 100 | 81 | 3 | 11.5 |
| 20-Sep | 6.75 | 2.0 | 1.1 | clr-ovc/fog | 1 | sw-wnw | 2 | 16.3 | 24.42 | 79 | 64 | 3 | 15.9 |
| 21-Sep | 0.00 | | | fog/rain | | | | | | | | | |
| 22-Sep | 7.00 | 2.5 | 1.1 | clr/haze | 2 | ne | 3 | 3.0 | 24.33 | 100 | 100 | 3 | 17.0 |
| 23-Sep | 8.00 | 3.0 | 3.6 | clr/haze | 1 | ne | 2 | 4.5 | 24.51 | 100 | 100 | 3 | 21.9 |
| 24-Sep | 8.00 | 2.5 | 6.0 | clr-mc, haze | 2 | ene-ese | 3 | 10.6 | 24.59 | 100 | 100 | 3 | 24.3 |
| 25-Sep | 8.00 | 2.1 | 2.3 | clr/haze | 0 | ene, w-nw | 1 | 12.8 | 24.56 | 100 | 100 | 3 | 15.6 |
| 26-Sep | 8.00 | 1.9 | 1.1 | clr/haze | 0 | e, w-nw | 1 | 13.1 | 24.54 | 100 | 100 | 3 | 16.9 |
| 27-Sep | 8.00 | 2.0 | 1.0 | clr-mc, haze | 0 | ene, w/var | 1 | 19.0 | 24.55 | 100 | 100 | 3 | 6.5 |
| 28-Sep | 8.00 | 1.9 | 1.1 | clr-ovc, haze | 1 | sw-w | 2 | 16.0 | 24.54 | 100 | 100 | 3 | 13.8 |
| 29-Sep | 3.50 | 1.6 | 0.0 | ovc/fog/rain | 1 | sw-nne | 4 | 12.9 | 24.55 | 67 | 24 | 3 | 4.9 |
| 30-Sep | 0.00 | | | fog/rain | | | | | | | | | |
| 1-Oct | 0.00 | | | fog/rain | | | | | | | | | |
| 2-Oct | 3.50 | 1.5 | 0.5 | fog | 0 | ws-w-wnw | 4 | 6.5 | 24.50 | 8 | 3 | | 0.0 |
| 3-Oct | 8.00 | 2.7 | 1.3 | clr-pc, haze | 0 | ne, ws-w-wnw | 1 | 7.3 | 24.50 | 100 | 100 | 3 | 15.5 |
| 4-Oct | 8.00 | 2.0 | 0.5 | clr/haze | 0 | ne | 1 | 8.2 | 24.53 | 100 | 100 | 3 | 15.9 |
| 5-Oct | 7.25 | 2.3 | 3.0 | clr-pc, haze | 3 | ne | 4 | 6.6 | 24.57 | 100 | 100 | 3 | 11.7 |
| 6-Oct | 7.50 | 2.0 | 0.5 | clr/haze | 2 | ne | 3 | 7.4 | 24.51 | 100 | 100 | 3 | 10.5 |
| 7-Oct | 8.50 | 1.9 | 13.8 | clr/haze | 1 | ne-e | 2 | 12.9 | 24.52 | 100 | 100 | 3 | 22.1 |
| 8-Oct | 8.50 | 2.0 | 9.2 | clr-mc, haze | 0 | s-w | 1 | 11.6 | 24.47 | 100 | 100 | 3 | 16.7 |
| 9-Oct | 0.00 | | | fog/rain | | | | | | | | | |
| 10-Oct | 0.00 | | | fog/snow | | | | | | | | | |
| 11-Oct | 0.00 | | | fog/rain | | | | | | | | | |
| 12-Oct | 0.00 | | | fog/rain | | | | | | | | | |
| 13-Oct | 0.00 | | | fog/rain | | | | | | | | | |
| 14-Oct | 7.50 | 2.0 | 1.0 | pc-mc | 1 | sw-wnw | 2 | 5.2 | 24.51 | 100 | 80 | 3 | 8.0 |

Appendix C. continued

| DATE | OBS. HOURS | AVERAGE OBSERVERS | AVERAGE VISITORS | SKY CONDITION ¹ | WIND SPEED ³ | WIND DIRECT | THERMAL LIFT ² | AVG. TEMP. (°C) | BARO. PRESS. (IN HG) | AVG. VISIB. E (KM) | AVG. VISIB. W (KM) | FLIGHT DIST. ⁴ | RAPTORS / HOUR |
|--------|------------|-------------------|------------------|----------------------------|-------------------------|-------------|---------------------------|-----------------|----------------------|--------------------|--------------------|---------------------------|----------------|
| 15-Oct | 3.00 | 1.8 | 3.5 | ovc/fog | 1 | sw-wnw | 4 | 6.7 | 24.42 | 50 | 25 | 3 | 0.7 |
| 16-Oct | 7.00 | 2.0 | 0.6 | mc | 1 | sw-w | 3 | 11.8 | 24.47 | 100 | 98 | 3 | 11.7 |
| 17-Oct | 7.50 | 2.0 | 0.0 | ovc | 2 | sw-wnw | 3 | 11.7 | 24.43 | 100 | 100 | 3 | 8.5 |
| 18-Oct | 0.00 | | | fog/rain | | | | | | | | | |
| 19-Oct | 7.50 | 2.0 | 0.9 | pc-ovc, scat haze | 0 | sw-w | 2 | 7.0 | 24.48 | 100 | 100 | 3 | 8.9 |
| 20-Oct | 0.00 | | | rain/snow | | | | | | | | | |
| 21-Oct | 0.00 | | | fog/snow | | | | | | | | | |
| 22-Oct | 8.00 | 3.0 | 2.0 | clr-pc | 1 | ne | 2 | 2.6 | 24.64 | 100 | 100 | 3 | 9.9 |
| 23-Oct | 7.50 | 2.0 | 0.0 | clr | 3 | ne | 4 | 3.3 | 24.51 | 100 | 100 | 3 | 3.9 |
| 24-Oct | 7.00 | 2.0 | 0.0 | pc-ovc | 1 | w-nw | 1 | 7.9 | 24.44 | 100 | 100 | 3 | 6.0 |
| 25-Oct | 5.00 | 2.0 | 0.0 | ovc/haze, rain PM | 4 | ne-ene | 4 | 6.3 | 24.35 | 86 | 93 | 3 | 0.4 |
| 26-Oct | 0.00 | | | fog/rain | | | | | | | | | |
| 27-Oct | 0.00 | | | fog | | | | | | | | | |
| 28-Oct | 0.00 | | | rain/snow | | | | | | | | | |
| 29-Oct | 0.00 | | | fog/rain/snow | | | | | | | | | |
| 30-Oct | 5.50 | 2.0 | 0.0 | ovc, fog AM | 0 | ne, sw-nw | 3 | 5.1 | 24.46 | 60 | 53 | 3 | 2.4 |
| 31-Oct | 0.00 | | | fog/rain | | | | | | | | | |

¹ 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 = thunder storms.

² Average of hourly ratings 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.

³ Average of hourly categorical ratings: 0 = less than 1 km/h; 1 = 1–5 km/h; 2 = 6–11 km/h; 3 = 12–19 km/h; 4 = 20–28 km/h; 5 = 29–38 km/h, etc.

⁴ Average of hourly line-of-sight ratings concerning 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 raptor counts: 2000.

| DATE | HOURS | SPECIES ¹ | | | | | | | | | | | | | | | | | | | | RAPTORS | | | | |
|--------|-------|----------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------|----|-----|-------|-------|
| | | TV | OS | NH | SS | CH | NG | UA | RS | BW | SW | RT | FH | RL | UB | GE | BE | UE | AK | ML | PR | PG | UF | UU | TOTAL | /HOUR |
| 27-Aug | 7.00 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 0.6 |
| 28-Aug | 7.50 | 2 | 2 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 1.9 |
| 29-Aug | 7.00 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1.4 |
| 30-Aug | 7.50 | 12 | 2 | 0 | 6 | 7 | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 4.7 |
| 31-Aug | 1.00 | 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 |
| 1-Sep | 7.50 | 1 | 6 | 1 | 2 | 7 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 22 | 2.9 |
| 2-Sep | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 2.50 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 |
| 4-Sep | 5.50 | 0 | 5 | 0 | 3 | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 2.4 |
| 5-Sep | 5.50 | 1 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 9 | 1.6 | |
| 6-Sep | 8.00 | 3 | 0 | 0 | 2 | 16 | 0 | 2 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 43 | 5.4 | |
| 7-Sep | 8.50 | 4 | 9 | 0 | 5 | 17 | 1 | 3 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 1 | 0 | 2 | 2 | 0 | 1 | 0 | 0 | 62 | 7.3 | |
| 8-Sep | 0.50 | 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 |
| 9-Sep | 7.50 | 7 | 1 | 1 | 5 | 7 | 0 | 0 | 1 | 0 | 0 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 3.7 | |
| 10-Sep | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 8.50 | 12 | 5 | 0 | 7 | 8 | 3 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 46 | 5.4 | |
| 12-Sep | 9.00 | 33 | 22 | 1 | 17 | 26 | 0 | 2 | 0 | 0 | 0 | 74 | 0 | 0 | 0 | 2 | 1 | 0 | 3 | 0 | 1 | 1 | 0 | 183 | 20.3 | |
| 13-Sep | 8.50 | 32 | 1 | 1 | 37 | 33 | 4 | 4 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 2 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 162 | 19.1 | |
| 14-Sep | 7.00 | 10 | 2 | 0 | 23 | 26 | 3 | 4 | 0 | 1 | 0 | 34 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 109 | 15.6 | |
| 15-Sep | 7.50 | 10 | 1 | 0 | 17 | 11 | 0 | 4 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 5 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 75 | 10.0 | |
| 16-Sep | 8.50 | 15 | 1 | 0 | 15 | 10 | 1 | 6 | 0 | 2 | 0 | 14 | 0 | 0 | 3 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 74 | 8.7 | |
| 17-Sep | 8.00 | 44 | 3 | 0 | 10 | 11 | 0 | 6 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 98 | 12.3 | |
| 18-Sep | 8.50 | 40 | 3 | 0 | 21 | 21 | 0 | 0 | 1 | 1 | 0 | 23 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 112 | 13.2 | |
| 19-Sep | 5.50 | 25 | 4 | 0 | 11 | 9 | 0 | 3 | 0 | 0 | 0 | 9 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 63 | 11.5 | |
| 20-Sep | 6.75 | 47 | 19 | 0 | 7 | 13 | 0 | 3 | 0 | 0 | 0 | 13 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 107 | 15.9 | |
| 21-Sep | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 7.00 | 79 | 3 | 0 | 15 | 4 | 0 | 4 | 0 | 0 | 0 | 12 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 119 | 17.0 | |
| 23-Sep | 8.00 | 58 | 0 | 0 | 48 | 16 | 0 | 8 | 0 | 0 | 0 | 37 | 0 | 0 | 1 | 3 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 175 | 21.9 | |
| 24-Sep | 8.00 | 73 | 1 | 0 | 68 | 15 | 0 | 1 | 1 | 1 | 0 | 31 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 194 | 24.3 | |
| 25-Sep | 8.00 | 6 | 0 | 0 | 65 | 28 | 2 | 6 | 0 | 1 | 0 | 14 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 125 | 15.6 | |
| 26-Sep | 8.00 | 16 | 0 | 2 | 52 | 34 | 0 | 5 | 0 | 1 | 0 | 19 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 135 | 16.9 | |
| 27-Sep | 8.00 | 5 | 4 | 0 | 20 | 5 | 1 | 6 | 0 | 2 | 0 | 4 | 0 | 0 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 6.5 | |
| 28-Sep | 8.00 | 12 | 4 | 1 | 29 | 18 | 0 | 4 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 4 | 0 | 0 | 0 | 110 | 13.8 | |
| 29-Sep | 3.50 | 3 | 0 | 0 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 17 | 4.9 | |
| 30-Sep | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |

Appendix D. continued

| DATE | HOURS | SPECIES ¹ | | | | | | | | | | | | | | | | | | | | RAPTORS | | | | |
|--------|--------|----------------------|-----|----|------|-----|----|----|----|----|----|-----|----|----|----|-----|----|----|----|----|----|---------|----|----|-------|--------|
| | | TV | OS | NH | SS | CH | NG | UA | RS | BW | SW | RT | FH | RL | UB | GE | BE | UE | AK | ML | PR | PG | UF | UU | TOTAL | / HOUR |
| 1-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Oct | 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 |
| 3-Oct | 8.00 | 2 | 1 | 1 | 55 | 17 | 2 | 4 | 0 | 0 | 0 | 30 | 0 | 2 | 1 | 3 | 0 | 0 | 0 | 4 | 1 | 1 | 0 | 0 | 124 | 15.5 |
| 4-Oct | 8.00 | 1 | 3 | 0 | 55 | 12 | 3 | 3 | 0 | 0 | 0 | 32 | 0 | 0 | 3 | 10 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 127 | 15.9 |
| 5-Oct | 7.25 | 0 | 0 | 0 | 48 | 8 | 0 | 3 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 85 | 11.7 |
| 6-Oct | 7.50 | 0 | 0 | 0 | 45 | 5 | 1 | 3 | 0 | 0 | 0 | 16 | 0 | 2 | 1 | 2 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 79 | 10.5 |
| 7-Oct | 8.50 | 0 | 0 | 0 | 140 | 20 | 0 | 2 | 0 | 0 | 0 | 15 | 0 | 1 | 1 | 3 | 1 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 188 | 22.1 |
| 8-Oct | 8.50 | 0 | 1 | 1 | 85 | 16 | 1 | 4 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 4 | 2 | 0 | 0 | 10 | 0 | 1 | 0 | 0 | 142 | 16.7 |
| 9-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Oct | 7.50 | 0 | 0 | 0 | 8 | 1 | 0 | 3 | 0 | 0 | 0 | 26 | 0 | 0 | 2 | 15 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 8.0 |
| 15-Oct | 3.00 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.7 |
| 16-Oct | 7.00 | 0 | 0 | 0 | 49 | 8 | 2 | 0 | 0 | 1 | 0 | 9 | 0 | 0 | 1 | 9 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 82 | 11.7 |
| 17-Oct | 7.50 | 0 | 0 | 0 | 31 | 6 | 3 | 1 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 64 | 8.5 |
| 18-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Oct | 7.50 | 0 | 0 | 1 | 38 | 3 | 1 | 0 | 0 | 0 | 0 | 7 | 0 | 1 | 1 | 8 | 3 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 67 | 8.9 |
| 20-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Oct | 8.00 | 0 | 1 | 1 | 25 | 5 | 1 | 2 | 0 | 0 | 0 | 11 | 0 | 7 | 2 | 18 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 79 | 9.9 |
| 23-Oct | 7.50 | 0 | 0 | 1 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 7 | 1 | 3 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 29 | 3.9 |
| 24-Oct | 7.00 | 0 | 0 | 1 | 16 | 0 | 1 | 0 | 0 | 0 | 0 | 9 | 0 | 5 | 0 | 3 | 5 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 42 | 6.0 |
| 25-Oct | 5.00 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.4 |
| 26-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Oct | 5.50 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 2 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 13 | 2.4 |
| 31-Oct | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 328.50 | 553 | 107 | 13 | 1105 | 456 | 31 | 98 | 3 | 10 | 0 | 680 | 1 | 30 | 26 | 132 | 37 | 0 | 21 | 65 | 6 | 8 | 0 | 0 | 3382 | 10.3 |

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

Appendix E. Annual summaries of observation effort and raptor counts by species: 1994–2000.

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | MEAN |
|------------------------|---------------|--------|--------|--------|--------|--------|--------|--------|
| Start date | 2-Sep | 4-Sep | 1-Sep | 1-Sep | 1-Sep | 27-Aug | 27-Aug | 30-Aug |
| End date | 25-Oct | 31-Oct | 2-Nov | 3-Nov | 30-Oct | 28-Oct | 30-Oct | 29-Oct |
| Observation days | 47 | 38 | 46 | 45 | 52 | 63 | 48 | 48 |
| Observation hours | 327.74 | 251.51 | 285.82 | 286.25 | 384.91 | 416.00 | 328.50 | 325.82 |
| Raptors / 100 hours | 688.0 | 941.5 | 959.7 | 953.7 | 631.8 | 993.5 | 1029.5 | 885.4 |
| SPECIES | RAPTOR COUNTS | | | | | | | |
| Turkey Vulture | 204 | 235 | 165 | 133 | 160 | 349 | 553 | 257 |
| Osprey | 32 | 49 | 55 | 60 | 67 | 74 | 107 | 63 |
| Northern Harrier | 25 | 22 | 39 | 30 | 56 | 49 | 13 | 33 |
| Sharp-shinned Hawk | 858 | 873 | 1027 | 912 | 1018 | 1660 | 1105 | 1065 |
| Cooper's Hawk | 280 | 310 | 420 | 317 | 266 | 331 | 456 | 340 |
| Northern Goshawk | 25 | 12 | 40 | 34 | 33 | 36 | 31 | 30 |
| Unidentified accipiter | 27 | 67 | 85 | 156 | 99 | 155 | 98 | 98 |
| TOTAL ACCIPITERS | 1190 | 1262 | 1572 | 1419 | 1416 | 2182 | 1690 | 1533 |
| Red-shouldered Hawk | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 1 |
| Broad-winged Hawk | 1 | 3 | 1 | 0 | 0 | 75 | 10 | 13 |
| Swainson's Hawk | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 1 |
| Red-tailed Hawk | 516 | 528 | 649 | 626 | 411 | 932 | 680 | 620 |
| Ferruginous Hawk | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| Rough-legged Hawk | 12 | 12 | 4 | 20 | 15 | 21 | 30 | 16 |
| Unidentified buteo | 23 | 30 | 40 | 52 | 30 | 58 | 26 | 37 |
| TOTAL BUTEOS | 553 | 573 | 695 | 702 | 460 | 1090 | 750 | 689 |
| Golden Eagle | 96 | 81 | 65 | 106 | 81 | 176 | 132 | 105 |
| Bald Eagle | 33 | 40 | 42 | 33 | 40 | 53 | 37 | 40 |
| Unidentified eagle | 3 | 2 | 1 | 9 | 4 | 2 | 0 | 3 |
| TOTAL EAGLES | 132 | 123 | 108 | 148 | 125 | 231 | 169 | 148 |
| American Kestrel | 29 | 18 | 18 | 35 | 22 | 30 | 21 | 25 |
| Merlin | 36 | 49 | 46 | 104 | 78 | 83 | 65 | 66 |
| Prairie Falcon | 5 | 4 | 0 | 5 | 10 | 8 | 6 | 5 |
| Peregrine Falcon | 3 | 5 | 0 | 1 | 4 | 5 | 8 | 4 |
| Unidentified falcon | 8 | 3 | 2 | 3 | 4 | 0 | 0 | 3 |
| TOTAL FALCONS | 81 | 79 | 66 | 148 | 118 | 126 | 100 | 103 |
| Unidentified raptor | 38 | 25 | 43 | 90 | 30 | 32 | 0 | 37 |
| GRAND TOTAL | 2255 | 2368 | 2743 | 2730 | 2432 | 4133 | 3382 | 2863 |

Appendix F. Daily raptor capture totals: 2000.

| DATE | STATION | | SPECIES ¹ | | | | | | | | | | | CAPTURES | | |
|--------|---------|--|----------------------|----|----|----|----|----|----|----|----|----|----|----------|-------|-------|
| | HOURS | | NH | SS | CH | NG | BW | RT | RL | GE | AK | ML | PR | PG | TOTAL | /HOUR |
| 28-Aug | 3.75 | | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1.1 |
| 29-Aug | 6.25 | | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.2 |
| 30-Aug | 6.50 | | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0.6 |
| 31-Aug | 0.00 | | | | | | | | | | | | | | | |
| 01-Sep | 7.25 | | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0.7 |
| 02-Sep | 0.00 | | | | | | | | | | | | | | | |
| 03-Sep | 0.00 | | | | | | | | | | | | | | | |
| 04-Sep | 6.00 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 05-Sep | 5.00 | | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.6 |
| 06-Sep | 6.50 | | 0 | 1 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0.9 |
| 07-Sep | 7.50 | | 0 | 1 | 5 | 1 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 1.7 |
| 08-Sep | 0.00 | | | | | | | | | | | | | | | |
| 09-Sep | 6.00 | | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.3 |
| 10-Sep | 0.00 | | | | | | | | | | | | | | | |
| 11-Sep | 7.50 | | 0 | 2 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0.7 |
| 12-Sep | 7.00 | | 0 | 4 | 5 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 1.9 |
| 13-Sep | 5.25 | | 0 | 5 | 4 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 2.3 |
| 14-Sep | 7.00 | | 0 | 5 | 4 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 2.1 |
| 15-Sep | 6.75 | | 0 | 2 | 4 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 1.3 |
| 16-Sep | 6.25 | | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.3 |
| 17-Sep | 7.00 | | 0 | 3 | 2 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1.1 |
| 18-Sep | 7.75 | | 0 | 4 | 4 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 1.7 |
| 19-Sep | 4.50 | | 0 | 1 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1.1 |
| 20-Sep | 6.50 | | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0.5 |
| 21-Sep | 0.00 | | | | | | | | | | | | | | | |
| 22-Sep | 4.50 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.2 |
| 23-Sep | 6.50 | | 0 | 2 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0.8 |
| 24-Sep | 6.50 | | 0 | 9 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 2.2 |
| 25-Sep | 7.00 | | 0 | 9 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 1.9 |
| 26-Sep | 7.00 | | 0 | 9 | 4 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 2.1 |
| 27-Sep | 7.25 | | 0 | 7 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 1.5 |
| 28-Sep | 6.25 | | 0 | 5 | 4 | 0 | 0 | 6 | 0 | 0 | 0 | 1 | 0 | 0 | 16 | 2.6 |
| 29-Sep | 0.00 | | | | | | | | | | | | | | | |
| 30-Sep | 0.00 | | | | | | | | | | | | | | | |
| 01-Oct | 0.00 | | | | | | | | | | | | | | | |
| 02-Oct | 0.00 | | | | | | | | | | | | | | | |
| 03-Oct | 6.50 | | 0 | 14 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 18 | 2.8 |
| 04-Oct | 6.50 | | 0 | 7 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1.5 |
| 05-Oct | 4.00 | | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.5 |
| 06-Oct | 4.00 | | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1.3 |

Appendix F. continued

| DATE | STATION | SPECIES ¹ | | | | | | | | | | | | TOTAL | CAPTURES /HOUR |
|--------|---------|----------------------|-----|----|----|----|----|----|----|----|----|----|----|-------|-------------------|
| | HOURS | NH | SS | CH | NG | BW | RT | RL | GE | AK | ML | PR | PG | | |
| 07-Oct | 6.50 | 0 | 6 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1.2 |
| 08-Oct | 7.00 | 0 | 12 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 2.1 |
| 09-Oct | 0.00 | | | | | | | | | | | | | | |
| 10-Oct | 0.00 | | | | | | | | | | | | | | |
| 11-Oct | 0.00 | | | | | | | | | | | | | | |
| 12-Oct | 0.00 | | | | | | | | | | | | | | |
| 13-Oct | 0.00 | | | | | | | | | | | | | | |
| 14-Oct | 6.00 | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 0.8 |
| 15-Oct | 0.00 | | | | | | | | | | | | | | |
| 16-Oct | 6.50 | 0 | 15 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 2.8 |
| 17-Oct | 5.50 | 0 | 6 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 9 | 1.6 |
| 18-Oct | 0.00 | | | | | | | | | | | | | | |
| 19-Oct | 6.50 | 0 | 10 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 13 | 2.0 |
| 20-Oct | 0.00 | | | | | | | | | | | | | | |
| 21-Oct | 0.00 | | | | | | | | | | | | | | |
| 22-Oct | 4.50 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.7 |
| 23-Oct | 5.50 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.2 |
| 24-Oct | 5.50 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1.1 |
| Total | 239.75 | 1 | 161 | 67 | 8 | 1 | 66 | 0 | 3 | 0 | 1 | 1 | 2 | 311 | 1.3 |

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

Appendix G. Annual trapping effort and capture totals by species: 1995–2000.

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | MEAN | TOTAL |
|--------------------|---------------------------|--------|--------|--------|--------|--------|--------|-------|
| First trapping day | 7-Oct | 18-Sep | 31-Aug | 6-Sep | 5-Sep | 28-Aug | | |
| Last trapping day | 28-Oct | 10-Oct | 1-Nov | 30-Oct | 24-Oct | 24-Oct | | |
| Number of stations | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Station days | 10 | 21 | 39 | 34 | 22 | 39 | 28 | |
| Station hours | 44.50 | 127.20 | 202.80 | 199.95 | 142.75 | 239.75 | 159.49 | |
| SPECIES | NUMBER OF CAPTURES | | | | | | | |
| Northern Harrier | 0 | 1 | 0 | 2 | 1 | 1 | 1 | 5 |
| Sharp-shinned Hawk | 18 | 80 | 139 | 163 | 82 | 161 | 107 | 643 |
| Cooper's Hawk | 0 | 20 | 29 | 43 | 14 | 67 | 29 | 173 |
| Northern Goshawk | 1 | 7 | 7 | 3 | 3 | 8 | 5 | 29 |
| Broad-winged Hawk | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Red-tailed Hawk | 2 | 14 | 39 | 29 | 36 | 66 | 31 | 186 |
| Rough-legged Hawk | 0 | 0 | 1 | 0 | 1 | 0 | 0.3 | 2 |
| Golden Eagle | 0 | 3 | 2 | 1 | 2 | 3 | 2 | 11 |
| American Kestrel | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Merlin | 1 | 2 | 5 | 11 | 3 | 1 | 4 | 23 |
| Prairie Falcon | 0 | 0 | 1 | 4 | 0 | 1 | 1 | 6 |
| Peregrine Falcon | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| All species | 22 | 127 | 223 | 256 | 143 | 311 | 180 | 1082 |
| Recaptures | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Foreign Recaptures | 0 | 0 | 1 | 1 | 0 | 0 | <1 | 2 |
| Foreign Encounters | 1 | 0 | 1 | 2 | 4 | 1 | 2 | 9 |