

**SPRING 2004 RAPTOR MIGRATION STUDIES IN THE
SANDIA MOUNTAINS OF CENTRAL NEW MEXICO**



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

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INTRODUCTION

The Sandia Mountains raptor migration study in north-central New Mexico is an ongoing effort to monitor long-term trends in populations of raptors using the southern portion of the Rocky Mountain migratory flyway (Hoffman et al. 2002, Hoffman and Smith 2003). HawkWatch International (HWI) initiated standardized counts of the spring raptor migration through this region in 1985, and began a trapping and banding program at the project site in 1990. To date, HWI observers have recorded 21 species of migratory raptors at the site, with counts typically ranging between 3,000 and 8,000 migrants per season. The 2004 season marked the 20th consecutive count and the 15th season of trapping and banding conducted at the site. This report summarizes the 2004 count and banding results.

STUDY SITE

The Sandia Mountains form a 41-km long ridge that runs north–south just east of Albuquerque in north-central New Mexico (35° 05' N, 106° 26' W; Figure 1). The study site is located at the southern end of the range within the Sandia Wilderness Area of the Cibola National Forest (Sandia Ranger District). The site is about 3 km north of Interstate 40 and Tijeras Canyon, and 18 km east of downtown Albuquerque. The site is reached by a steep, 2.5-km spur trail that originates at the U.S. Forest Service Tres Pisas Canyon fence. The observation post, located at 2,196 m elevation, provides an expansive view of the Manzano Mountains to the south, the western plains, and northern Tres Pisas Canyon. This season, one banding station (Upper Station) was situated 1.0 km east of the main observation post.

One-seeded juniper (*Juniperus monosperma*), mountain mahogany (*Cercocarpus montanus*), shrub live oak, (*Quercus turbinella*), tree cholla (*Opuntia imbricata*), and banana yucca (*Yucca baccata*) are the predominant plant species near the lookout, which is typical of the Upper Sonoran life zone. Ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambelii*) also occur at higher elevations.

METHODS

STANDARDIZED COUNTS

Two official or designated observers conducted standardized daily counts of migrating raptors from a single traditional observation site between 26 February and 5 May 2004. Before this season, primary observers Ken Babcock and Dane Ferrell both had one season of previous experience counting migratory raptors for HWI (see Appendix A for a complete history of observer participation). Other experienced, local volunteers and other visitors occasionally assisted with the counts. Weather permitting, observations usually began between 0800 and 0900 hrs Mountain Standard Time (MST) and ended between 1700 and 1800 hrs.

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 some tables and figures).
2. Hour of passage for each migrant; e.g., the 1000–1059 hrs MST.
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, 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 (none, low, moderate, high) 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 follows Hoffman and Smith (2003). In comparing 2004 annual statistics against means and 95% confidence intervals for previous seasons, I equate significance with a 2004 value falling outside the bounds of the confidence interval for the associated mean.

TRAPPING AND BANDING

One to two trappers operated a single trapping station in a traditional location (Upper Station) on 41 days between mid-March and late April. The crews generally trapped between 0800–0900 and 1600–1700 hrs MST. Capture devices included mist nets, dho-gaza nets, and remotely triggered bow nets. Trappers lured migrating raptors into the capture stations from camouflaged blinds using live, non-native avian lures attached to lines manipulated from the blinds. Unless already banded, all captured birds were fitted with a uniquely numbered USGS Biological Resources Division aluminum leg band. Data gathering and recording followed standardized protocols used at all HWI migration-banding sites (Hoffman et al. 2002). All birds were released within 45 minutes of capture.

RESULTS AND DISCUSSION

WEATHER SUMMARY

Compared to the last six seasons, inclement weather severely hampered observations more than usual in 2004 (see Appendix C for daily weather summaries), with 4 potential days of observation entirely precluded and 5 days reduced to less than 4 hours of observation (1998–2003 averages of 4.3 and 2.8 days, respectively). Additionally, the proportion of active observation days where fair skies prevailed was below average (42% versus average of 49%), whereas an above-average proportion of days featured predominantly mostly cloudy to overcast weather (32% versus 25%). Transitional weather (i.e., conditions changed from fair to mostly cloudy or overcast during the day, or vice versa) prevailed on the remaining 26% of the active observation days, which matches the 1998–2003 average. The proportion of active observation days that featured some rain and/or snow also was above average (21% versus average of 14%). In fact, the National Weather Service reported in a local news article that April 2004 was the wettest April on record for the Albuquerque area since 1905, with six times the usual precipitation, and both February and March also saw above average precipitation.

The increase in inclement weather also resulted in stronger than usual winds during the 2004 season; 65% of the active observation days featured predominantly light winds (<12 kph), 31% moderate winds (12–28 kph), and 5% predominantly stronger winds, compared to averages of 71%, 26%, and 3%, respectively. In the Sandias, westerly winds usually prevail. In last year’s report, we indicated that there had been a noticeable shift from more northwesterly to more southwesterly winds during the past six

years. In 2004, conditions shifted back slightly towards favoring more W–NW winds again, but more importantly, days with some easterly to southeasterly winds were much more common than usual in 2004 (40% of active days versus 1998–2003 average of 20%).

The temperature during active observation periods averaged 15.5°C (the average of daily values, which in turn were averages of hourly readings), with hourly readings ranging from 1.8–25.5°C. The average is the highest recorded since 1998 (mean 11.5, range 9.1–13.7°C), and the minimum and maximum are the second highest in both categories. The barometric pressure during active observation periods averaged 29.76 in Hg (average of daily values, which in turn were averages of hourly readings). The overall average and the maximum hourly reading of 30.21 in Hg were both moderate compared to the last three years (the period of record for this measure), whereas the minimum hourly reading of 28.26 was much lower than the minimums for the last three years (range 29.25–29.41).

Good to excellent thermal-lift conditions predominated on only 35% of the active observation days, which is much lower than the 1998–2003 average of 62%.

In summary, compared to the previous six seasons, 2004 featured more stormy weather than usual, including much higher precipitation than normal; stronger winds and proportionately more east to southeasterly winds than usual, and more northwesterly winds than during the past couple of years; warmer than average temperatures; wider variation in barometric pressure readings than during the past three years; and, due to stronger winds and more unsettled weather, much poorer thermal lift conditions than usual.

OBSERVATION EFFORT

The observers worked on 65 of 71 possible days between 24 February and 5 May, not beginning the count until 26 February due to heavy snowfall that precluded access to the site for the first two days of the season (Table 1). The number of observation days was a significant 7% lower than the 1985–2003 average of $70 \pm 95\%$ CI of 3.0 days, while the number of observation hours (552.92) was an insignificant 4% higher than average ($533.5 \pm 95\%$ CI of 25.2 hrs). The 2004 average of 2.1 observers per hour (including official and guest observers; value is mean of daily values, which are in turn means of hourly values) matched the 1985–2003 average of $2.1 \pm 95\%$ CI of 0.14 observers/hr.

FLIGHT SUMMARY

The observers counted 3,234 migrant raptors of 16 species during the 2004 season, with the total count a significant 22% below average (see Appendix D for daily count records and Appendix E for annual summaries). The count of Ferruginous Hawks dropped to a record low of 5 birds, and this was the first season since 1996 that no Zone-tailed Hawks were seen migrating through the area (Appendix E).

The 2004 flight was composed of 40% vultures, 30% accipiters, 10% buteos, 10% eagles, 8% falcons, 2% Ospreys, 2% harriers, and no unidentified raptors. These values represent significantly below average proportions of accipiters, buteos, and unidentified raptors, and significantly above average proportions of vultures, falcons, Ospreys, and harriers (Figure 2). The Turkey Vulture was the most abundant species, followed by Cooper's Hawk, Sharp-shinned Hawk, Golden Eagle, Red-tailed Hawk, and American Kestrel (Table 1).

Passage Rate Trends

Adjusted passage rates were significantly above average only for Prairie and Peregrine Falcons, whereas passage rates were significantly below average for 12 of 18 species typically seen at the site (Table 1, Figures 3–7). The 1985–2004 regression analyses of adjusted passage rates indicated highly significant ($P \leq 0.01$) linear increasing trends for Swainson's Hawks (Figure 5) and Peregrine Falcons (Figure 7),

and significant ($P \leq 0.05$) to highly significant quadratic trends for Turkey Vultures, Ospreys (Figure 3), Cooper's Hawks (Figure 4), Broad-winged Hawks, Ferruginous Hawks (Figure 5), and Merlins (Figure 7). These quadratic trends consistently track increasing patterns through the mid-to-late 1990s followed by recent stabilization or more commonly declines. The recent declines correlate with the onset of widespread drought throughout much of the interior West after 1998 (Hoffman and Smith 2003).

The unusual weather patterns seen this season may have affected the low passage rates recorded for most species. A high number of days hampered by inclement weather may have increased the proportion of the flight that the observers missed; however, it is more typically believed that heavy local storm activity keeps both observers and the birds from operating normally, and therefore generally affects only the timing of passage rather than altering detectable flight volume (e.g., Allen et al. 1996). Strong winds and rainy/snowy weather also may hamper the ability of observers to remain vigilant and may reduce the detectability of migrants by affecting binocular stability and general visibility. On the other hand, however, strong winds and low thermal lift potential tend to keep migrants closer to the ridge and therefore more visible to observers, and increased cloud cover also tends to make migrants more visible to observers by providing a high contrast backdrop. Accordingly, it seems more likely that the unusual weather conditions had a neutral or perhaps slightly beneficial effect on the count rather than a negative impact.

For Golden Eagles, a marginally significant ($P \leq 0.10$) increase was indicated for non-adult birds only, reflecting recent high counts of immature/subadult birds in 1998, 2000, and 2003 (Figure 6). For Northern Goshawks, no significant long-term passage rate trends were indicated at the species level or separately for adults or immatures (Figure 4); however, a significant increase in the immature : adult ratio was indicated. Passage rates of adult goshawks showed a significant declining pattern through 1999, while passage rates of immature goshawks increased through 1995 then declined through 1999. Since then, however, both adults and immatures have generally shown increasing patterns, although passage rates of both adults and immatures dropped substantially in 2004 compared to 2003. As discussed in detail in last year's annual report (Smith 2003) and in Hoffman and Smith (2003), complex migration ecology complicates interpreting trends in Golden Eagle and Northern Goshawk passage rates. In fact, unlike for most other species, trends in passage rates of these two species may reflect primarily changes in migration activity as opposed to actual population trends. This may be especially true for adults, which across much of the lower 48 states are largely sedentary unless low prey abundance drives them to disperse more widely to find suitable fall/winter forage. Accordingly, for these species, increasing migratory abundance at lower-latitude sites like the Sandias may in fact reflect declining habitat quality rather than increasing populations.

Age Ratios

Immature : adult ratios were below average for 6 of 10 species with data suited to comparisons, significantly so for Northern Goshawks, Bald Eagles, and Peregrine Falcons (Table 2). For most such species, low counts of immature birds contributed to the low age ratios; however, the low age ratio for Peregrine Falcons was due to a proportional increase in the abundance of adults rather than a decrease in immature birds. Only Northern Harriers and Ferruginous Hawks showed significantly above average age ratios in 2004, in both cases partly due to high counts of immature birds. Red-tailed Hawks also showed a slightly above-average age ratio, but counts of both immature and adult birds were well below average. Thus, as potential indicators of annual productivity along the southern Rocky Mountain Flyway, age-specific data and age ratios suggested a mixed bag in 2004, with 60% of the applicable species showing reduced abundance of younger birds (all three accipiters, Red-tailed Hawk, and Golden and Bald Eagles), 20% average abundance (Broad-winged Hawk and Peregrine Falcon), and 20% high abundance (Ferruginous Hawk and Northern Harrier).

Seasonal Timing

Four of 15 species common enough to allow for comparisons showed earlier than average median passage dates in 2004, with the differences significant for Northern Goshawks and Ferruginous Hawks (Table 3). Conversely, 10 species showed later than average timing, with the differences significant for Ospreys, Northern Harriers, Sharp-shinned, Cooper's and Swainson's Hawks, and Peregrine Falcons. The combined-species median passage date of 8 April also was a significant two days later than average (Table 3); however, rather than showing a distinct overall late shift in seasonal activity, plotting flight volume by five-day periods revealed depressed activity during the first half of April and relatively high activity both just before and especially after this period (Figure 8). The depressed activity pattern in early April corresponds to periods of inclement weather that entirely precluded observations for three days during the first week of April and severely reduced observations for two and half days the following week. Age-specific timing data revealed added complexity for some species, but no obvious additional consistencies across species.

TRAPPING EFFORT

The trapping crew operated Upper Station for 309.6 hours on 41 days between 13 March and 21 April (see Appendix F for daily effort and capture totals by species). This level of effort closely matches the long-term averages for the site (41 ± 4.3 days and 314.9 ± 53.00 hours; see Appendix G for annual summaries).

TRAPPING AND BANDING SUMMARY

The 2004 capture total of 144 birds included six species and three recaptured Cooper's Hawks (Table 5, Appendix G). The 2004 effort raises the total number of birds captured since project inception to 3,366 birds of 12 species, including 25 Sandia recaptures and 30 foreign recaptures (i.e., birds originally banded elsewhere and subsequently recaptured in the Sandias; Appendix G). Captured species included the Cooper's Hawk (79% of all captures), Sharp-shinned Hawk (14%), Red-tailed Hawk (5%), Northern Goshawk (<1%), American Kestrels (<1%), and Prairie Falcons (<1%).

All 2004 combined-species and species-specific capture totals, rates, and successes were below average, except that capture success for Red-tailed Hawks was slightly above average (Table 5). Significant differences were generally the rule for Northern Harriers, Sharp-shinned, Cooper's and Swainson's Hawks, and all falcons except Prairie Falcons (Table 5). Besides heavy, early season snow cover and the continuing impact of more inclement weather than usual, stronger than average winds were a particular problem for the trapping operation.

For the three accipiters and American Kestrels, higher than average proportions of the birds captured in 2004 had empty crops, whereas for Red-tailed Hawks and Prairie Falcons, higher than average proportions of the birds captured had at least half full crops. With regard to wing-pit fat loads and keel muscle mass, however, Prairie Falcons generally showed poorer than average ratings while all of the other species generally showed at least slightly better than average ratings.

ENCOUNTERS WITH PREVIOUSLY BANDED BIRDS

The 2004 trappers recaptured three previously banded Cooper's Hawks. One female was originally banded by HWI as a hatch-year (HY) bird in 1997 in the nearby Manzano Mountains. Another female was originally banded by HWI in the Sandia Mountains in 1997 as an after-second-year (ASY) adult. The third recaptured bird was originally banded by someone else and we have not yet received a report from the Bird Banding Laboratory to determine its origin. During fall 2003, two Sandia-banded Cooper's Hawks (one male originally banded as an ASY adult in 2001 and one female originally banded as an ASY

adult in 1999) were recaptured in the Manzano Mountains. This brings the total number of Sandia–Manzano exchanges to 43, all involving Sharp-shinned and Cooper’s Hawks.

To date, 12 Sandia-banded Cooper’s Hawks, 3 Sharp-shinned Hawks, 1 Red-tailed Hawk, and 1 Prairie Falcon have subsequently been encountered elsewhere outside of the Manzano Mountains. Four new encounters occurred subsequent to the 2003 spring migration season, all involving female Cooper’s Hawks. The first bird was originally banded as a third-year (TY) bird in April 1999 and was recovered dead (cause unknown) in June 2003, ~326 km southeast of the project site near Nathrop, Colorado. The second bird was originally banded as a second-year (SY) bird in March 2002 and was recovered dead (cause unknown) in August 2003, ~102 km north of the project site near Abiquiu, New Mexico. The third bird was originally banded as a SY bird in March 2001 and was recovered dead (cause unknown) in January 2004, ~10 km northwest of the project site. The fourth bird was originally banded as a SY bird in April 2000 and was recovered dead (cause unknown) in April 2004, ~94 km northwest of the project site near Cuba, New Mexico. These new recoveries generally conform well to previous distributional data gathered for NM migrants (Hoffman et al. 2002).

RESIDENT BIRDS

The 2004 resident raptor community included a fairly typical assemblage for the site.

The usual resident pair of Golden Eagles (dubbed “Fred” and “Ethel”, with Ethel easily identified from year to year by several white or partially white secondaries and wing/tail coverts) was present throughout the season. In addition, for the first time in recent years, beginning on 13 March, around the time sightings of Ethel began to diminish (possibly having begun to incubate eggs), a subadult bird also was regularly seen accompanying Fred. The interactions between the two suggested that the young bird was an offspring from a previous year that Fred may have still been “training,” with both birds routinely acting territorial and “escorting” other migrants through the territory.

At least three different resident, light-morph Red-tailed Hawks (two adults and one immature-plumage second-year bird) were seen throughout the season in the Tijeras Canyon area below and south of the project site. These birds were frequently seen escorting other migrants through the area. Unlike last year, no obvious resident dark or rufous morph birds were seen farther southeast over the gravel pits.

At least two probable resident Cooper’s Hawks (one adult and one second-year bird) were seen regularly after 13 March. One possible resident Sharp-shinned Hawk was seen on 29 April moving south through the project area; unlike in some years, however, no regular pattern of local Sharp-shinned Hawk activity was documented this season. Beginning on 22 April, several sightings suggested that at least one immature-plumage Northern Goshawk and one adult bird were resident in the project area.

In the past several years, Prairie Falcons have not been regular, or at least not readily apparent, members of the resident community; however, beginning in early March 2004, two birds were seen regularly acting territorial around the “shields” area above the count site. Once three local Peregrine Falcons arrived on the scene in mid-April, however, sightings of apparently local Prairie Falcons mostly ceased, with only one additional sighting on 4 May. Beginning 12 April, at least one immature-plumage and most likely two adult Peregrine Falcons appeared to establish a local territory around the shields area. Thereafter through the remainder of the season, the immature bird, in particular, was very active and was frequently seen aggressively interacting with migrants of several species. A single male American Kestrel appeared to set-up a territory around the project site on 24 March, and a probable local female was first seen on 25 March. Sightings of these local kestrels were not as common as in 2003, but both sexes were seen periodically through the remainder of the season, with a likely territory center along the ridge to the east of the count site.

Beginning on 20 April, 5 Turkey Vultures were seen regularly patrolling the area, primarily along the ridge to the west of the project site.

SITE VISITATION AND PUBLIC OUTREACH

Inclement weather undoubtedly reduced visitation to the site this year, especially since many of the storm events hit on weekends when visitation is typically highest. Nevertheless, 323 individuals visited the project site during the season, which is about 60% of the 2003 total. Visitors included a variety of organized groups chaperoned by education specialist Melanie Keithley, who served double duty for HWI during the season as both our Sandias on-site educator and Albuquerque-area classroom and community educator. Eleven organized groups visited during the season (two other groups had to cancel due to bad weather), including students from the Southwest Indian Polytechnic Institute and Bosque Prep School (4 classes), a home school group from Edgewood, NM, two local cub scout troops, an Audubon Society group, a group from the Roots and Shoots program, and David Wilson's French group. Many of the groups that visited the site this season had previously participated in classroom or other community programs that Melanie hosted in town. After learning about raptor ecology and conservation through classroom presentations, many students in particular derive great benefit from a follow-up visit to the project site where they can experience live, wild raptors up close and in person before our banders release the birds to continue their migratory journey. Such experiences frequently galvanize the interest of young students to continue studying and appreciating raptors, ultimately contributing to development of a life-long passion for conservation.

In 2004, 589 hourly assessments of visitor disturbance resulted in the following ratings: 82% none, 15% low, 3% moderate, and <1% high. We consider this strong additional proof that educator Melanie Keithley, often assisted by other local volunteers, did an excellent job of chaperoning visitors in a way that both provided them with a rich experience and largely precluded unnecessary distraction of the observers.

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Table 1. Annual raptor migration counts and adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) annual passage rates by species in the Sandia Mountains, NM: 1985–2003 versus 2004.

SPECIES	COUNTS			RAPTORS / 100 HOURS ¹		
	1985–2003 ²	2004	% CHANGE	1985–2003 ²	2004	% CHANGE
Turkey Vulture	1451 ± 284.2	1285	-11	461.1 ± 87.60	404.4	-12
Osprey	64 ± 13.2	77	+20	22.0 ± 4.40	25.3	+15
Northern Harrier	59 ± 6.7	55	-6	13.3 ± 1.52	11.0	-17
White-tailed Kite	0.1 ± 0.10	0	-100	0.01 ± 0.02	0.0	-100
Mississippi Kite	0.2 ± 0.17	0	-100	0.03 ± 0.03	0.0	-100
TOTAL KITES	0.2 ± 0.24	0	-100	–	–	–
Sharp-shinned Hawk	522 ± 116.0	372	-29	124.4 ± 25.25	73.1	-41
Cooper's Hawk	802 ± 132.4	561	-30	226.8 ± 33.79	141.2	-38
Northern Goshawk	12 ± 3.4	12	0	2.4 ± 0.67	2.6	+6
Unknown small accipiter ³	5 ± 4.7	2	-57	–	–	–
Unknown large accipiter ³	1 ± 0.0	5	+400	–	–	–
Unknown accipiter	71 ± 20.2	6	-92	–	–	–
TOTAL ACCIPITERS	1408 ± 202.5	958	-32	–	–	–
Broad-winged Hawk	6 ± 2.9	4	-38	1.4 ± 0.63	0.6	-57
Swainson's Hawk	53 ± 10.2	62	+16	19.7 ± 3.13	22.8	+16
Red-tailed Hawk	358 ± 59.4	224	-37	79.4 ± 10.89	49.0	-38
Ferruginous Hawk	13 ± 2.0	5	-61	2.7 ± 0.43	1.0	-62
Rough-legged Hawk	0.5 ± 0.31	0	-100	0.2 ± 0.13	0.0	-100
Zone-tailed Hawk	2.4 ± 1.05	0	-100	0.5 ± 0.23	0.0	-100
Unidentified buteo	11 ± 4.6	14	+27	–	–	–
TOTAL BUTEOS	445 ± 70.8	309	-31	–	–	–
Golden Eagle	370 ± 78.0	307	-17	73.2 ± 14.00	57.3	-22
Bald Eagle	16 ± 3.6	6	-62	4.3 ± 0.93	1.9	-56
Unidentified eagle	0.7 ± 0.60	0	-100	–	–	–
TOTAL EAGLES	386 ± 80.1	313	-19	–	–	–
American Kestrel	211 ± 41.9	128	-39	54.8 ± 9.87	28.9	-47
Merlin	9 ± 3.3	5	-46	2.1 ± 0.74	1.1	-48
Prairie Falcon	23 ± 4.6	35	+53	4.4 ± 0.85	7.3	+64
Peregrine Falcon	39 ± 13.1	73	+87	7.8 ± 2.53	13.8	+78
Aplomado Falcon	0.1 ± 0.10	0	-100	0.01 ± 0.02	0.0	-100
Unknown small falcon ³	0.2 ± 0.4	0	-100	–	–	–
Unknown large falcon ³	0.0 ± 0.0	3	–	–	–	–
Unknown falcon	2 ± 1.0	0	-100	–	–	–
TOTAL FALCONS	285 ± 54.9	244	-14	–	–	–
Unidentified raptor	43 ± 15.7	0	-100	–	–	–
GRAND TOTAL	4140 ± 602.2	3234	-22	–	–	–

¹ Based on data truncated to standardized, species-specific sampling periods and adjusted for incompletely identified birds.

² Mean ± 95% CI.

³ Designations used regularly for the first time in 2002.

Table 2. Annual raptor migration counts by age classes and immature (second-year birds for most species, all non-adults for eagles) : adult age ratios for selected species in the Sandia Mountains, NM: 1992–2003 versus 2004.

	TOTAL AND AGE-CLASSIFIED COUNTS						IMM. : ADULT			
	1992–2003 AVERAGE			2004			% UNKNOWN AGE		RATIO	
	TOTAL	IMM.	AD.	TOTAL	IMM.	AD.	1992–2003 ¹	2004	1992–2003 ¹	2004
Northern Harrier	60	11	33	55	21	15	26 ± 5.1	35	0.36 ± 0.192	1.40
Sharp-shinned Hawk	567	60	304	372	30	181	35 ± 4.9	43	0.20 ± 0.053	0.17
Cooper's Hawk	870	78	552	561	36	253	29 ± 6.9	48	0.15 ± 0.045	0.14
Northern Goshawk	13	4	7	12	1	5	21 ± 10.9	50	0.44 ± 0.154	0.20
Broad-winged Hawk	9	0.4	6	4	1	3	27 ± 13.5	0	0.19 ± 0.326	0.33
Red-tailed Hawk	410	66	274	224	39	132	16 ± 4.1	24	0.26 ± 0.088	0.30
Ferruginous Hawk	13	1	5	5	4	1	55 ± 10.0	0	0.53 ± 0.801	4.00
Golden Eagle	422	217	127	307	163	102	16 ± 4.3	14	1.82 ± 0.511	1.60
Bald Eagle	16	8	6	6	3	3	7 ± 6.3	0	1.53 ± 0.511	1.00
Peregrine Falcon	55	13	31	73	13	44	19 ± 8.8	22	0.47 ± 0.164	0.30

¹ Mean ± 95% confidence interval. For age ratios, note that the long-term mean immature : adult ratio is an average of annual ratios and may differ from the value obtained by dividing long-term average numbers of immature and adult birds. 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 in the Sandia Mountains, NM in 2004 with a comparison of 2004 and 1985–2003 average median passage dates.

SPECIES	2004				1985–2003
	FIRST OBSERVED	LAST OBSERVED	BULK PASSAGE DATES ¹	MEDIAN PASSAGE DATE ²	MEDIAN PASSAGE DATE ^{2, 3}
Turkey Vulture	19-Mar	5-May	26-Mar – 19-Apr	5-Apr	4-Apr ± 1.5
Osprey	24-Mar	5-May	5-Apr – 25-Apr	16-Apr	12-Apr ± 1.4
Northern Harrier	11-Mar	5-May	23-Mar – 26-Apr	9-Apr	6-Apr ± 1.7
Sharp-shinned Hawk	26-Feb	5-May	28-Mar – 3-May	21-Apr	17-Apr ± 1.9
Cooper's Hawk	3-Mar	5-May	28-Mar – 26-Apr	13-Apr	10-Apr ± 1.0
Northern Goshawk	27-Feb	22-Apr	8-Mar – 22-Apr	19-Mar	3-Apr ± 3.5
Broad-winged Hawk	25-Apr	4-May	–	–	22-Apr ± 2.7
Swainson's Hawk	31-Mar	4-May	8-Apr – 2-May	22-Apr	16-Apr ± 1.6
Red-tailed Hawk	26-Feb	5-May	8-Mar – 24-Apr	25-Mar	25-Mar ± 1.5
Ferruginous Hawk	3-Mar	27-Apr	3-Mar – 27-Apr	13-Mar	19-Mar ± 5.1
Golden Eagle	26-Feb	5-May	8-Mar – 26-Apr	18-Mar	21-Mar ± 3.3
Bald Eagle	9-Mar	19-Mar	9-Mar – 19-Mar	10-Mar	9-Mar ± 4.4
American Kestrel	7-Mar	5-May	21-Mar – 1-May	12-Apr	11-Apr ± 1.6
Merlin	3-Mar	21-Apr	3-Mar – 21-Apr	7-Apr	8-Apr ± 4.5
Prairie Falcon	26-Feb	27-Apr	1-Mar – 16-Apr	19-Mar	18-Mar ± 4.3
Peregrine Falcon	3-Mar	4-May	23-Mar – 28-Apr	18-Apr	10-Apr ± 2.6
All species	26-Feb	5-May	19-Mar – 26-Apr	8-Apr	6-Apr ± 1.3

¹ Dates between which the central 80% of the flight passed the lookout; calculated only for species with counts ≥5 birds.

² Date by which 50% of the flight passed the lookout; calculated only for species with counts ≥5 birds.

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

Table 4. Capture totals, rates, and successes for migrating raptors in the Sandia Mountains, NM, excluding Lower Station capture results from 1998 and 1999: 1990–2003 versus 2004.

SPECIES	CAPTURE TOTALS		CAPTURE RATE ¹		% CAPTURE SUCCESS ²	
	1990–2003 ³	2004	1990–2003 ³	2004	1990–2003 ³	2004
Northern Harrier	1 ± 0.6	0	0.2 ± 0.19	0.0	1.1 ± 1.00	0.0
Sharp-shinned Hawk	50 ± 22.8	20	15.2 ± 5.61	6.5	8.8 ± 1.80	5.3
Cooper's Hawk	167 ± 35.9	114	56.1 ± 10.91	36.8	20.9 ± 5.66	20.0
Northern Goshawk	2 ± 0.7	1	0.6 ± 0.29	0.3	14.8 ± 7.85	8.3
Broad-winged Hawk	0.1 ± 0.15	0	0.0 ± 0.06	0.0	1.9 ± 3.77	0.0
Swainson's Hawk	0.3 ± 0.26	0	0.1 ± 0.08	0.0	0.6 ± 0.52	0.0
Red-tailed Hawk	9 ± 3.3	7	3.0 ± 1.09	2.3	2.2 ± 0.84	3.0
Zone-tailed Hawk	0.2 ± 0.20	0	0.0 ± 0.06	0.0	8.3 ± 11.16	0.0
American Kestrel	8 ± 4.3	1	2.3 ± 1.14	0.3	3.1 ± 1.46	0.8
Merlin	1 ± 0.7	0	0.3 ± 0.19	0.0	6.0 ± 4.05	0.0
Prairie Falcon	2 ± 0.8	1	0.5 ± 0.25	0.3	8.2 ± 4.35	2.8
Peregrine Falcon	2 ± 1.2	0	0.8 ± 0.38	0.0	5.1 ± 2.62	0.0
Total	241 ± 58.7	144	79.1 ± 14.72	46.5	9.5 ± 2.16	7.9

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.

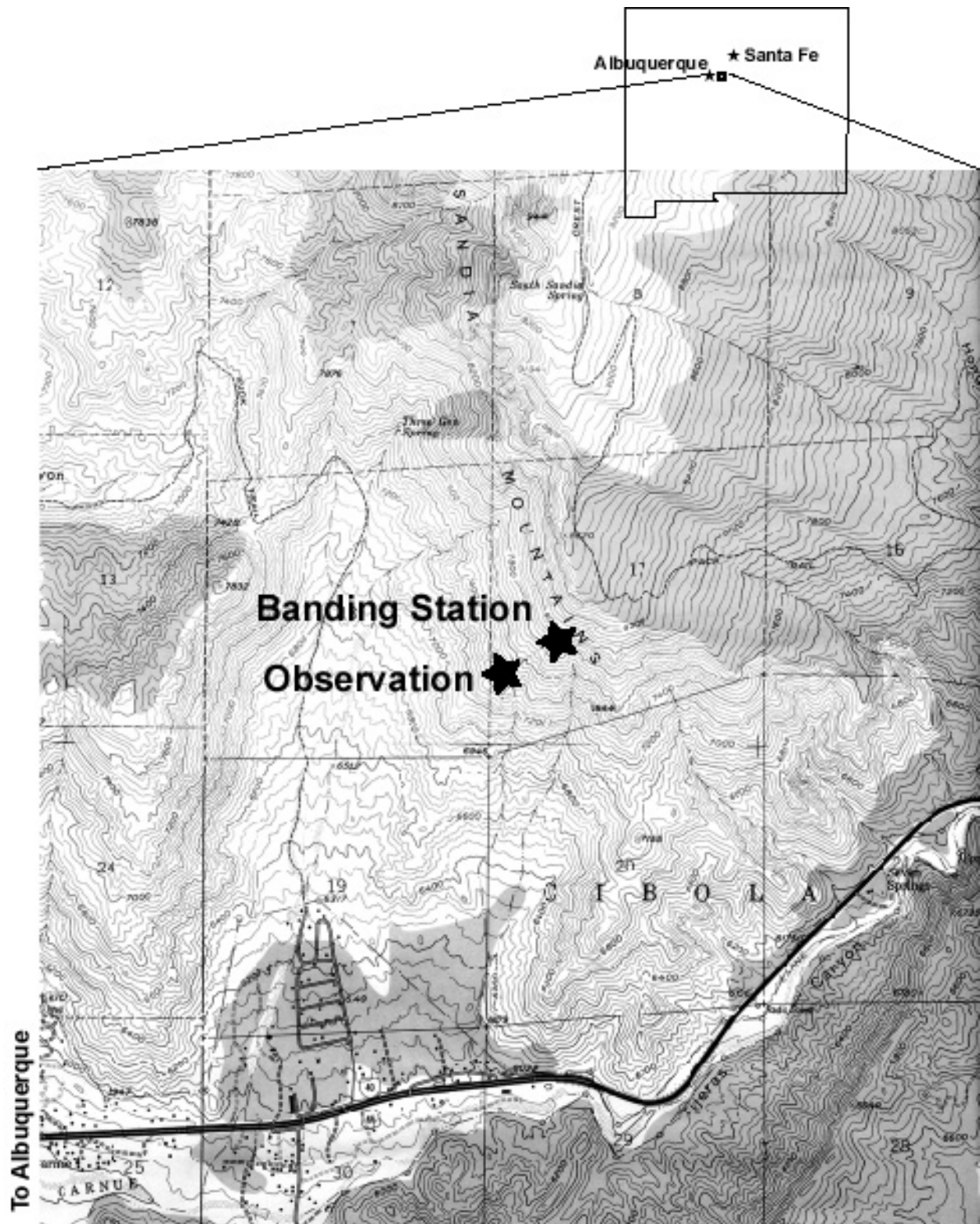


Figure 1. Map of Sandia Mountains Raptor Migration Project study site.

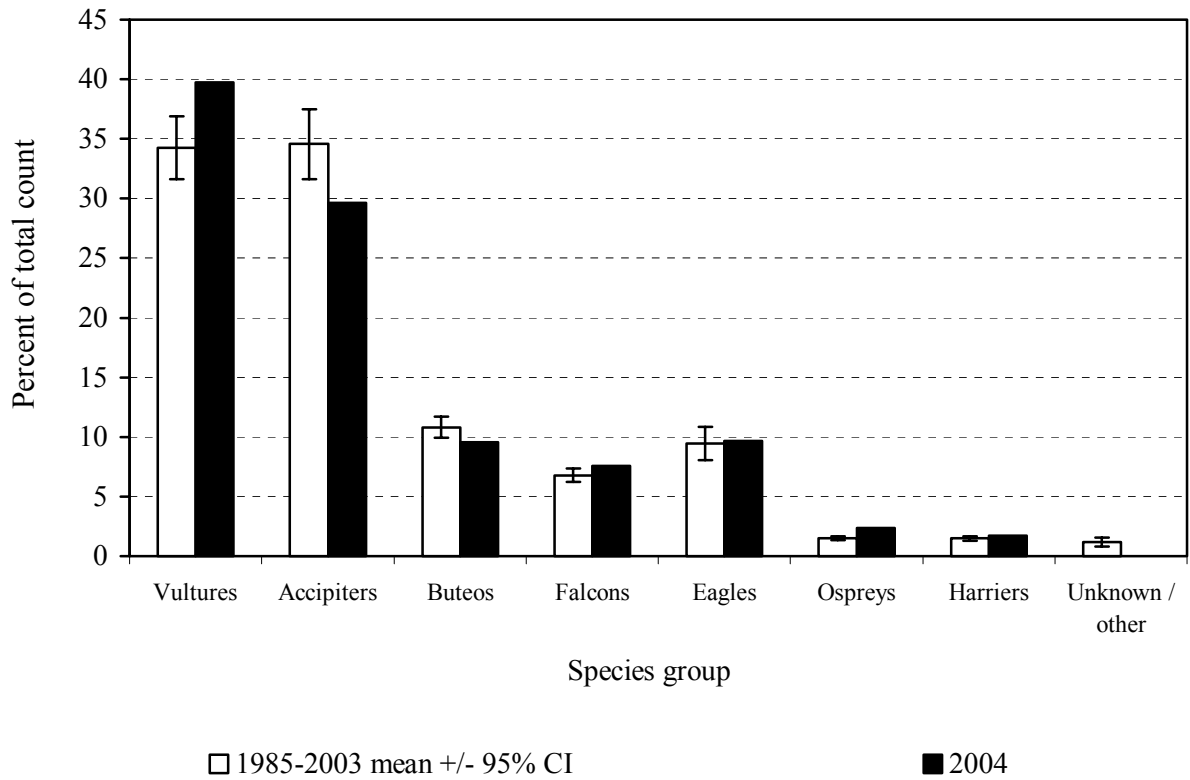


Figure 2. Spring raptor-migration flight composition by major species groups in the Sandia Mountains, NM: 1985–2003 versus 2004.

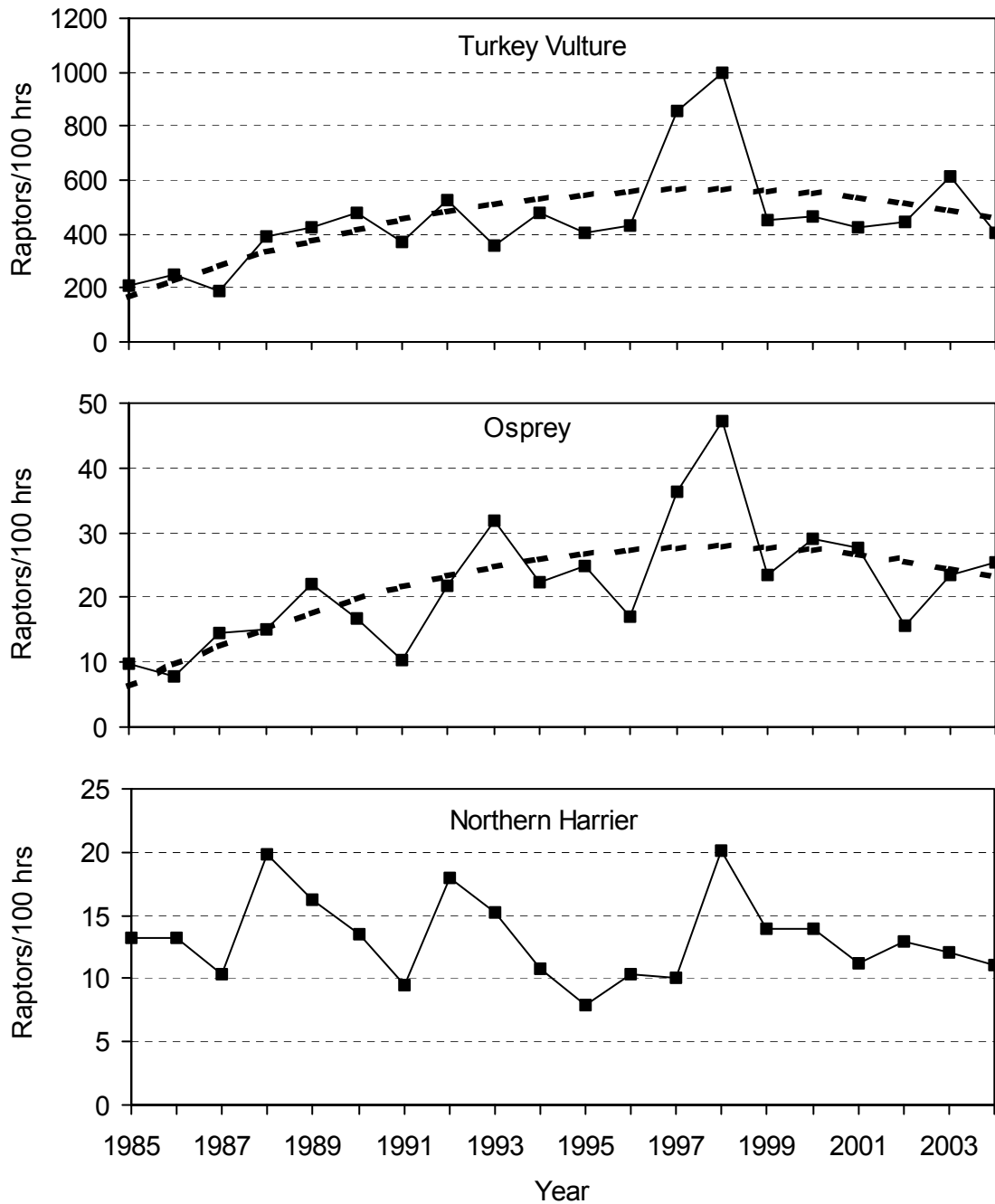


Figure 3. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) spring-migration passage rates for Turkey Vultures, Ospreys, and Northern Harriers in the Sandia Mountains, NM: 1985–2004. Dashed lines indicate significant ($P \leq 0.10$) linear or quadratic regressions.

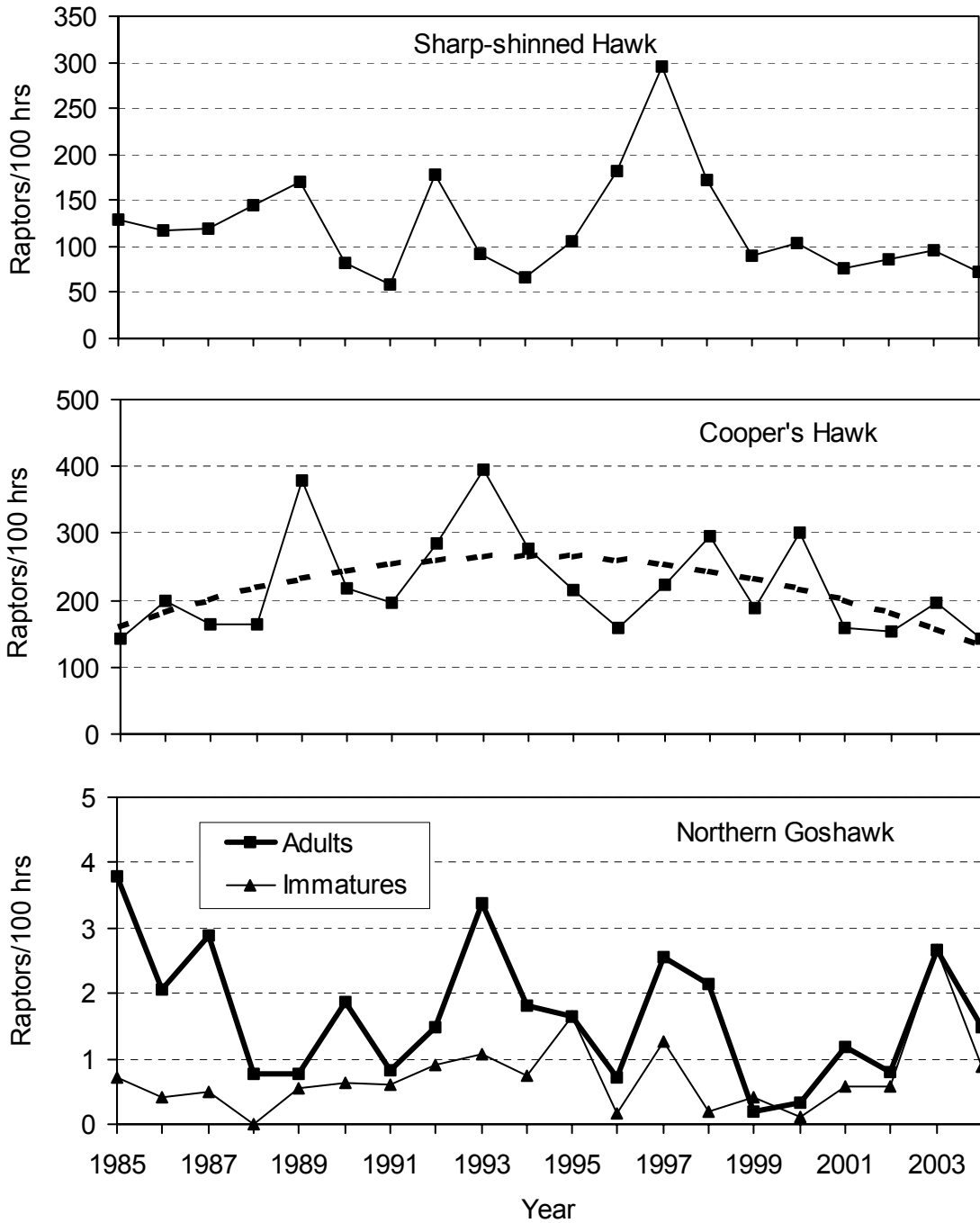


Figure 4. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) spring-migration passage rates for Sharp-shinned Hawks, Cooper's Hawks, and Northern Goshawks in the Sandia Mountains, NM: 1985–2004. Dashed lines indicate significant ($P \leq 0.10$) linear or quadratic regressions.

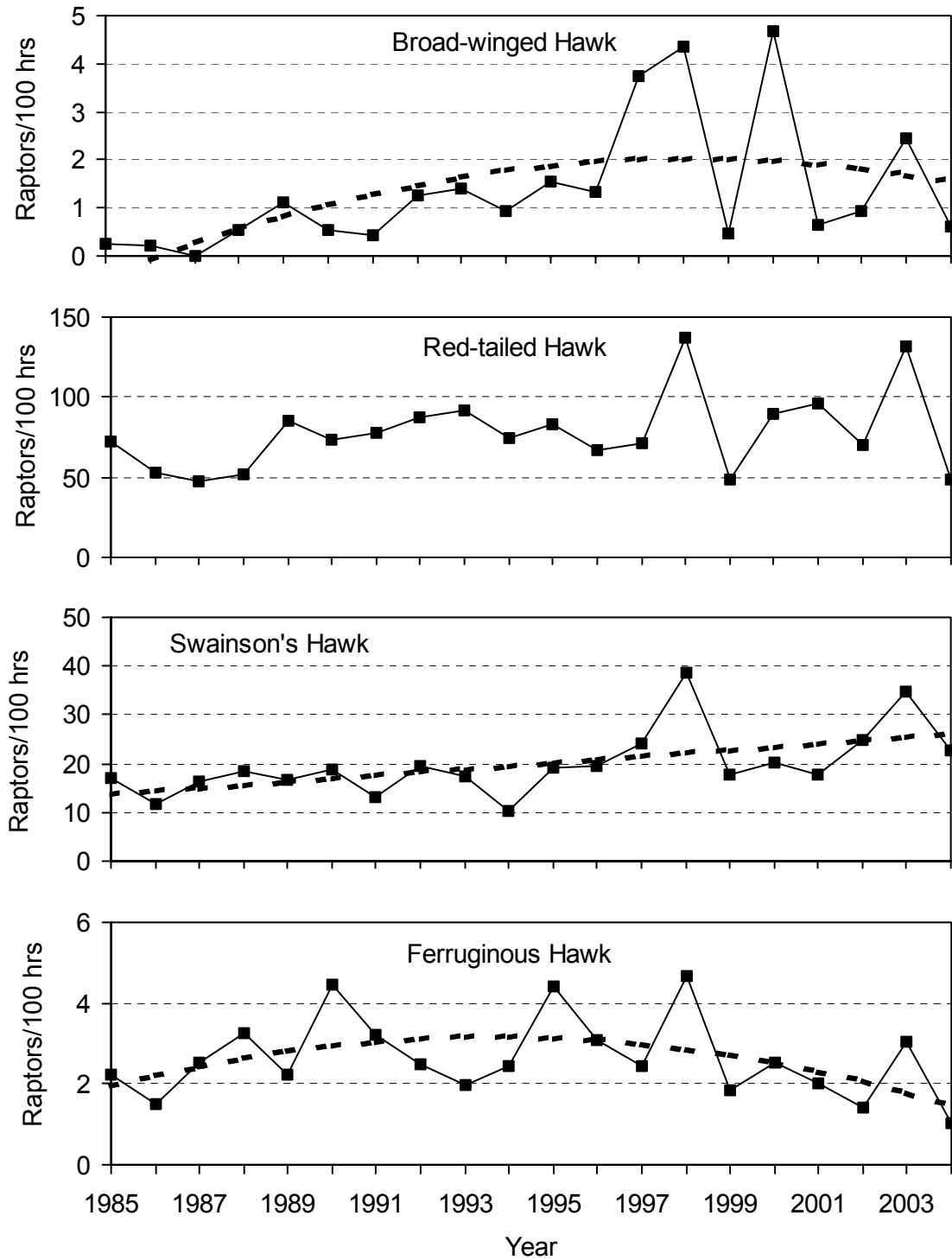


Figure 5. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) spring-migration passage rates for Broad-winged, Swainson's, Red-tailed, and Ferruginous Hawks in the Sandia Mountains, NM: 1985–2004. Dashed lines indicate significant ($P \leq 0.10$) linear or quadratic regressions.

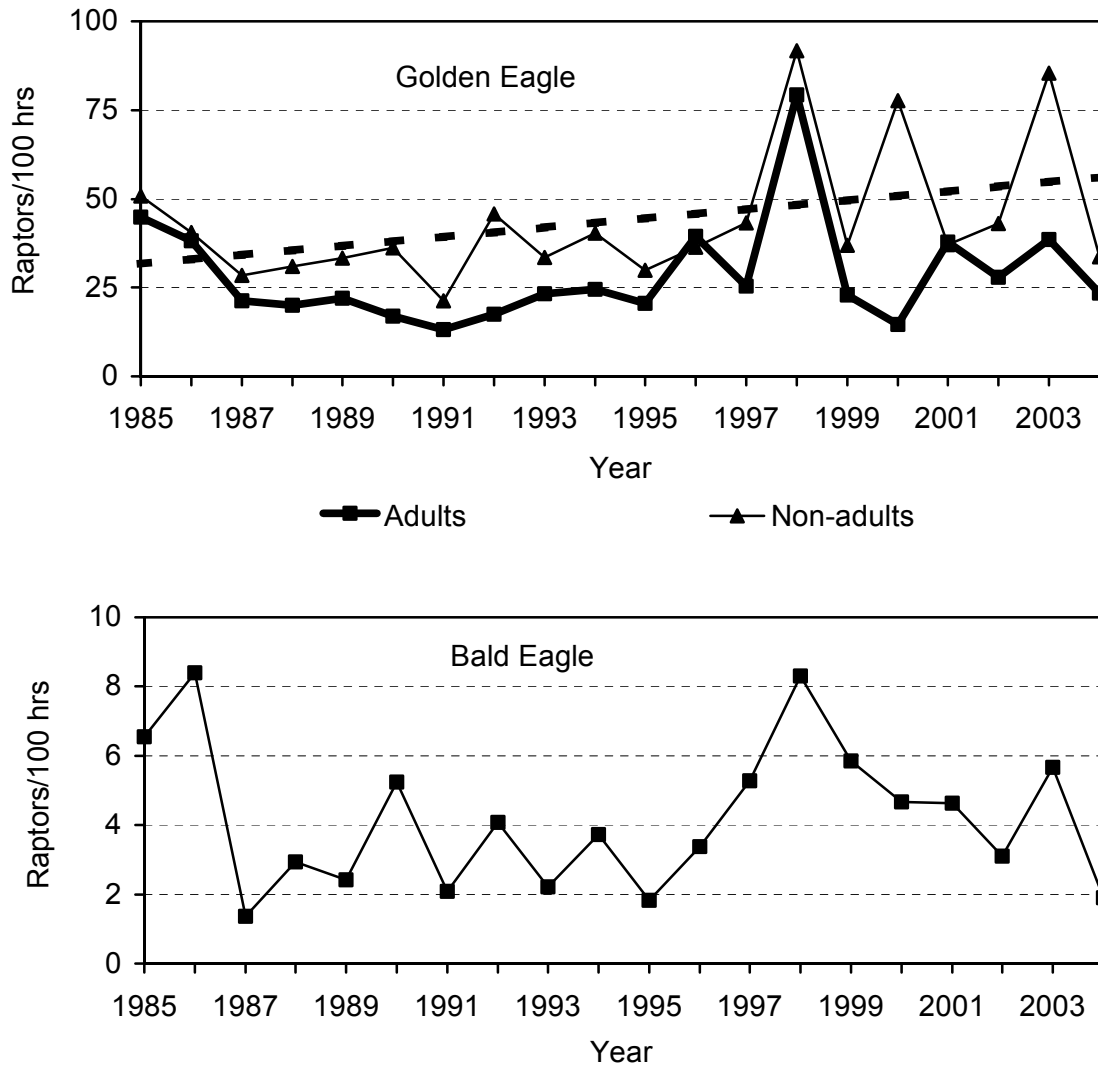


Figure 6. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) spring-migration passage rates for Golden and Bald Eagles in the Sandia Mountains, NM: 1985–2004. Dashed lines indicate significant ($P \leq 0.10$) linear or quadratic regressions.

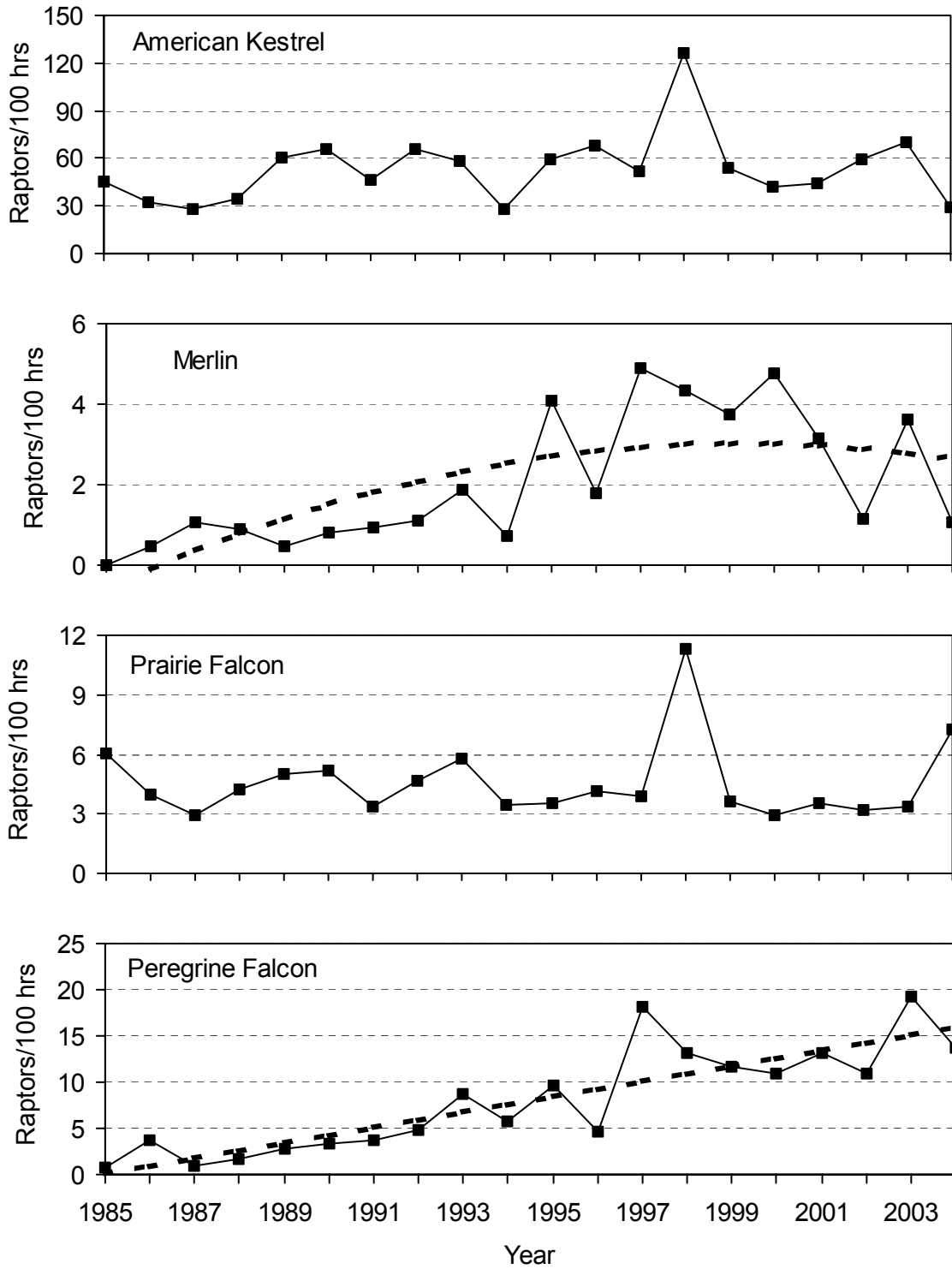


Figure 7. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) spring-migration passage rates for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons in the Sandia Mountains, NM: 1985–2004. Dashed lines indicate significant ($P \leq 0.10$) linear or quadratic regressions.

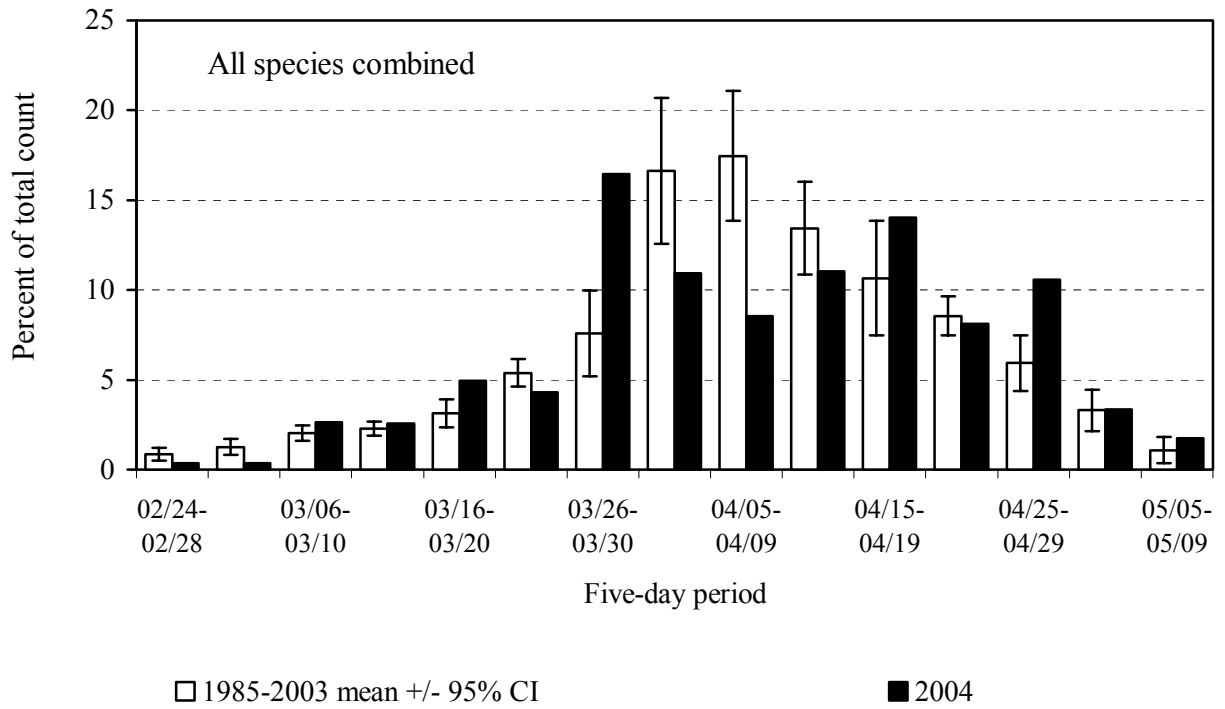


Figure 8. Combined-species, spring-migration passage volume by five-day periods for raptors in the Sandia Mountains, NM: 1985–2003 versus 2004.

Appendix A. History of official observer participation in the Sandia Mountains Raptor Migration Project: 1985–2004.

- 1985 Single observer throughout: Jim Daly–primary (1), Penny Rodefer (0)¹
- 1986 Single observer throughout: Jim Daly (3)
- 1987 Single observer throughout, rotating crew: LisaBeth Daly (2), Tom Davis (0), Bill Howe (0), Gordon Vickrey (0), Ann Cole (0)
- 1988 Single observer throughout: Gordon Vickrey (1)
- 1989 Single observer throughout, two observers during 30-day peak period: Rick Watson–primary (0), Rich Besser (0), Ann Cole (1), LisaBeth Daly (2), Gordon Vickrey (3)
- 1990 Single observer throughout, two observers during 30-day peak period: LisaBeth Daly–primary (3), Joe Kelly (0)
- 1991 Single observer throughout, two observers during 30-day peak period: LisaBeth Daly–primary (4), Eric Meyer (0)
- 1992 Two observers throughout: LisaBeth Daly (5), Mark Cantrell (1), Eric Meyer (2)
- 1993 Two observers throughout: LisaBeth Daly (6), Jessie Jewell (1), Daniel Perry (1)
- 1994 Two observers throughout: Jessie Jewell (3), Daniel Perry (3)
- 1995 Two observers throughout: Jessie Jewell (5), Tim Meehan (0), Sherry Swanson (0)
- 1996 Two observers throughout: Jessie Jewell (7), Sherry Swanson (1), Aaron Barna (0)
- 1997 Two observers throughout: Aaron Barna (2), Sean O’Connor (3)
- 1998 Two observers throughout: Jerry Liguori (11), Brian Sullivan (10)
- 1999 Two observers throughout: Jason Beason (3), Nikos Vulgares (2)
- 2000 Two observers throughout: Nikos Vulgares (3), Sue Vulgares (1)
- 2001 Two observers throughout: Craig Fosdick (4), Allison Cebula Benedict (0)
- 2002 Two observers throughout: Craig Fosdick (6; full season), Geoff Evans (1; first two weeks and later substitute), Rigo Mendoza-Rebolledo (2; full-time after first two weeks)
- 2003 Two observers throughout: Bob Diebold (4), Teresa Lorenz (1)
- 2004 Two observers throughout: Ken Babcock (1), Dane Ferrell (1)

¹ Numbers in parentheses indicate previous full seasons of raptor migration observation experience.

Appendix B. Common and scientific names, species codes, and regularly applied age, sex, and color-morph classifications for all diurnal raptor species observed during spring migration in the Sandia Mountains, NM.

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
White-tailed Kite	<i>Elanus caeruleus</i>	WK	U	U	NA
Mississippi Kite	<i>Ictinia mississippiensis</i>	MK	A I U	U	NA
Sharp-shinned Hawk	<i>Accipiter striatus</i>	SS	A I U	U	NA
Cooper's Hawk	<i>Accipiter cooperii</i>	CH	A I U	U	NA
Northern Goshawk	<i>Accipiter gentilis</i>	NG	A I U	U	NA
Unknown small accipiter	<i>A. striatus</i> or <i>cooperii</i>	SA	U	U	NA
Unknown large accipiter	<i>A. cooperii</i> or <i>gentilis</i>	LA	U	U	NA
Unknown accipiter	<i>Accipiter</i> spp.	UA	U	U	NA
Broad-winged Hawk	<i>Buteo 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
Zone-tailed Hawk	<i>Buteo albonotus</i>	ZT	A I U	U	NA
Unknown buteo	<i>Buteo</i> spp.	UB	U	U	D L U
Golden Eagle	<i>Aquila chrysaetos</i>	GE	I, S, NA, A, U ⁴	U	NA
Bald Eagle	<i>Haliaeetus leucocephalus</i>	BE	I, S1, S2, NA, A, U ⁵	U	NA
Unknown eagle	<i>Aquila</i> or <i>Haliaeetus</i> spp.	UE	U	U	NA
American Kestrel	<i>Falco sparverius</i>	AK	U	M F U	NA
Merlin	<i>Falco columbarius</i>	ML	AM Br	AM U	NA
Prairie Falcon	<i>Falco mexicanus</i>	PR	U	U	NA
Peregrine Falcon	<i>Falco peregrinus</i>	PG	A I U	U	NA
Aplomado Falcon	<i>Falco femoralis</i>	AF	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 or older immature: 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 Sandia Mountains Raptor Migration Project: 2004.

DATE	OBS. HOURS	OBSRVR / HOUR ¹	MEDIAN	PREDOMINANT WEATHER ³	WIND		TEMP (°C) ¹	BAROM.	MEDIAN	VISIB.	VISIB.	MEDIAN	BIRDS / HOUR
			VISITOR DISTURB ²		SPEED (KPH) ¹	WIND DIRECTION		PRESS. (IN HG) ¹	THERMAL LIFT ⁴	WEST (KM) ¹	EAST (KM) ¹	FLIGHT DISTANCE ⁵ / HOUR	
24-Feb	0.00			rain/snow									
25-Feb	0.00			fog									
26-Feb	6.00	2.0	0	mc-ovc	3.1	wsw-wnw, var	12.1	28.39	3	30	64	2	1.2
27-Feb	7.00	2.5	0	mc-ovc	4.0	e-se	20.6	28.28	4	25	45	3	0.7
28-Feb	0.00			snow		nw							
1-Mar	4.00	1.8	0	ovc, snow PM	13.2	sw, wnw	2.2	28.26	4	30	100	-	0.0
2-Mar	7.75	2.1	0	clr-pc	7.2	wnw-nw	8.7	29.22	4	98	93	2	0.8
3-Mar	1.00	1.5	0	ovc, snow	26.7	w	2.7	29.65	4	20	26	-	0.0
4-Mar	8.00	1.7	0	ovc	8.7	nw, se	9.8	29.65	4	44	36	2	0.8
5-Mar	0.00			rain/snow									
6-Mar	3.50	1.0	0	ovc-pc, snow	29.6	w	1.8	29.63	3	74	50	2	2.9
7-Mar	8.00	1.9	0	pc-clr, haze early/late	14.0	wnw	10.0	29.90	4	87	83	2	0.8
8-Mar	8.50	2.4	0	clr	4.1	var	16.8	30.21	3	83	77	2	2.6
9-Mar	10.00	1.8	0	pc, haze	6.6	sse, wnw	16.4	30.14	2	74	62	2	3.7
10-Mar	9.00	2.2	0	clr, haze	13.3	ese	15.2	30.09	3	91	76	2	1.1
11-Mar	9.50	2.9	0	ovc, haze	4.3	wnw	19.1	29.82	2	76	48	2	5.4
12-Mar	8.00	1.7	0	mc-ovc, snow PM	26.5	ene-ese	7.1	29.98	4	25	40	2	0.5
13-Mar	4.00	2.0	0	ovc, fog/rain	11.8	e-ene	8.6	29.83	4	5	37	-	0.0
14-Mar	8.75	1.8	0	mc-ovc, fog AM	7.9	wnw	13.8	29.74	4	6	44	2	0.9
15-Mar	9.67	3.3	1	pc-ovc	10.8	e, wsw-w	14.0	29.97	3	56	60	2	2.1
16-Mar	9.00	2.0	0	pc-ovc	16.3	w-wnw	14.5	29.84	3	7	66	2	2.7
17-Mar	8.67	3.0	0	pc	23.7	w-wnw	17.0	29.83	3	46	90	2	2.3
18-Mar	9.00	1.9	0	clr	16.7	w-wnw	17.6	29.75	3	27	64	2	3.7
19-Mar	9.25	2.4	0	clr	9.1	wsw-w	20.4	29.86	2	40	59	2	3.6
20-Mar	9.00	2.0	0	clr, haze	6.8	w	21.5	29.98	2	26	60	2	5.6
21-Mar	9.00	2.5	1	pc, dust PM	16.9	wnw, ese-se	21.9	30.15	3	27	61	2	2.8
22-Mar	9.50	3.2	0	pc, haze	8.4	e, w	17.2	30.13	3	25	37	2	2.2
23-Mar	9.50	2.1	0	clr, haze	4.4	sw	22.1	29.89	1	29	55	2	2.7
24-Mar	7.75	2.4	0	ovc-clr, fog/haze	6.3	n-ne	19.4	29.79	3	24	47	2	1.3
25-Mar	10.00	2.2	0	clr-pc, haze AM	9.4	sw-wnw	19.3	29.81	2	27	54	2	5.8
26-Mar	9.50	2.0	1	pc-mc	5.9	wsw-wnw	21.6	29.86	2	26	56	2	10.1
27-Mar	10.00	1.8	1.5	pc-clr	8.9	se, s, w	21.1	29.73	3	25	53	3	5.9
28-Mar	10.00	3.4	1.5	pc-clr	17.3	sw-wnw	16.4	29.65	3	27	70	3	6.4
29-Mar	9.75	3.2	0	clr	20.7	w	14.1	29.92	3	28	73	3	14.7
30-Mar	9.50	2.6	0	clr	4.4	e, s, w	17.5	30.09	2	26	62	2	18.0
31-Mar	9.75	2.4	0	clr-pc	6.3	e, wsw	19.0	30.05	2	23	68	3	19.9
1-Apr	9.50	2.4	0	clr-pc	4.6	w	19.2	29.88	2	27	54	2	7.8
2-Apr	9.00	1.8	0	ovc-pc, haze AM	6.5	s-sw	19.5	29.70	3	23	53	3	9.6
3-Apr	0.00			rain									
4-Apr	0.00			rain									
5-Apr	0.00			rain/ts									
6-Apr	8.25	2.0	0	ovc, fog AM	7.2	sw-wnw	9.9	29.70	4	22	38	2	2.8
7-Apr	8.50	2.0	0	mc-ovc	17.8	w-wnw	11.2	29.66	4	23	44	2	6.8
8-Apr	9.67	2.9	0	clr-pc/haze AM, mc-ovc PM	8.6	s, wsw-w	17.3	29.71	3	20	58	3	11.1
9-Apr	8.42	2.0	0	mc-ovc	10.5	s, wsw-w	12.9	29.68	4	21	54	2	10.6
10-Apr	6.50	1.8	1.5	ovc/fog AM, rain/ts PM	12.6	wsw-wnw	11.6	29.64	4	13	60	4	20.2
11-Apr	3.00	2.0	0	ovc, fog	29.3	e	3.3	29.74	4	3	50	3	1.7
12-Apr	2.00	1.0	1.5	ovc, snow PM	16.3	se	2.5	29.69	4	24	38	3	0.5

Appendix C. continued

DATE	OBS. HOURS	OBSRVR / HOUR ¹	MEDIAN	PREDOMINANT WEATHER ³	WIND		TEMP (°C) ¹	BAROM. PRESS. (IN HG) ¹	MEDIAN	VISIB. WEST (KM) ¹	VISIB. EAST (KM) ¹	MEDIAN	BIRDS / HOUR
			VISITOR DISTURB ²		SPEED (KPH) ¹	DIRECTION			THERMAL LIFT ⁴			FLIGHT DISTANCE ⁵	
13-Apr	9.25	2.7	0	pc-mc, haze	8.5	ese, wsw-w	11.2	29.78	3	25	63	2	13.6
14-Apr	10.50	1.8	0	clr, haze AM	5.8	sw-nw, s	16.4	29.94	2	24	57	3	9.0
15-Apr	10.50	2.5	0	clr-ovc	7.8	s-sw	17.2	29.83	2	27	61	2	11.0
16-Apr	10.50	2.1	0	clr	12.8	wsw-w, s	18.6	29.84	3	25	62	3	12.8
17-Apr	10.50	2.3	0	clr-pc	4.1	sw	19.3	29.88	2	28	63	2	11.4
18-Apr	9.50	1.8	0	ovc, rain PM	16.5	s	19.3	29.80	4	20	50	3	5.2
19-Apr	10.25	2.5	0	clr	19.1	w	14.4	29.82	3	27	50	2	3.6
20-Apr	9.50	2.0	0	ovc-mc	10.4	se-sw	20.3	29.82	3	19	51	3	4.6
21-Apr	9.50	2.3	0	clr-mc	32.8	wnw	13.7	29.69	3	27	47	2	6.7
22-Apr	10.00	2.5	0	clr, haze AM	17.1	sw-w	18.3	29.53	2	25	61	2	4.9
23-Apr	10.25	1.9	1	clr-ovc	13.3	s-sw, se, nw	18.3	29.46	3	25	47	2	10.1
24-Apr	3.00	1.0	0	mc-ovc, rain/snow	11.8	ese-sse	10.6	29.73	4	18	47	2	0.7
25-Apr	9.75	1.9	1	ovc-mc, fog AM	8.9	w	13.8	29.78	3	26	72	2	5.4
26-Apr	9.75	2.0	0	clr-pc	17.6	sw-w	15.3	29.91	3	27	61	2	11.3
27-Apr	9.50	1.9	0	clr-pc	6.8	ese-se, s-wsw	20.3	30.15	2	27	59	3	10.0
28-Apr	9.50	2.0	0	pc-mc	5.7	sw	20.1	30.04	2	27	54	2	5.7
29-Apr	9.00	2.4	0	clr-ovc	7.4	sw-w	21.1	29.60	3	25	55	2	3.4
30-Apr	8.50	1.9	0	pc-ovc, haze, dust PM	11.6	ese-se	19.0	29.57	3	24	45	2	2.0
1-May	8.50	1.0	0	mc-ovc	10.5	w	13.2	29.75	4	22	55	3	0.6
2-May	9.00	1.9	0	pc-ovc	7.8	ese, s-w	13.5	30.00	3	27	60	2	2.1
3-May	10.00	1.8	0	clr	5.3	sw	18.3	30.05	2	28	68	3	4.1
4-May	9.50	2.7	0	clr	6.4	sw-wsw	21.3	29.99	2	28	59	2	2.8
5-May	10.00	1.0	0	clr-mc	6.8	wsw-w	23.3	29.90	2	27	58	2	2.5

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 spring raptor migration counts by species in the Sandia Mountains, NM: 2004.

DATE	OBS.		SPECIES ¹																								BIRDS								
	HOURS	TV	OS	NH	WK	MK	SS	CH	NG	SA	LA	UA	BW	SW	RT	FH	RL	ZT	UB	GE	BE	UE	AK	ML	PR	PG	AF	SF	LF	UF	UU	TOTAL	/ HOUR		
26-Feb	6.00	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	7	1.2	
27-Feb	7.00	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0.7	
28-Feb	0.00																																		
29-Feb	4.00	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	0	0	0	0	0	0	0	0.0
01-Mar	7.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	6	0.8	
02-Mar	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	0	0	0	0	0	0	0.0	
03-Mar	8.00	0	0	0	0	0	0	1	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	6	0.8		
04-Mar	0.00																																		
05-Mar	3.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	10	2.9		
06-Mar	8.00	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	6	0.8			
07-Mar	8.50	0	0	0	0	0	0	1	0	0	0	0	0	9	1	0	0	0	8	0	0	1	0	2	0	0	0	0	0	0	22	2.6			
08-Mar	10.00	0	0	0	0	0	2	0	1	0	0	1	0	9	0	0	0	1	22	0	0	0	0	1	0	0	0	0	0	0	37	3.7			
09-Mar	9.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7	2	0	0	0	0	0	0	0	0	0	0	10	1.1				
10-Mar	9.50	0	0	0	0	0	0	1	0	0	0	0	0	8	0	0	0	2	38	1	0	1	0	0	0	0	0	0	0	51	5.4				
11-Mar	8.00	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	4	0.5					
12-Mar	4.00	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	0	0	0	0	0	0.0		
13-Mar	8.75	0	0	0	0	0	1	2	0	0	0	0	0	0	1	0	0	0	2	1	0	0	0	0	1	0	0	0	8	0.9					
14-Mar	9.67	0	0	0	0	0	1	1	1	0	0	0	0	5	0	0	0	0	9	0	0	1	0	0	0	0	0	2	20	2.1					
15-Mar	9.00	0	0	0	0	0	1	3	1	0	0	0	0	7	0	0	0	0	5	0	0	1	0	4	1	0	0	1	24	2.7					
16-Mar	8.67	0	0	0	0	0	0	1	0	0	0	0	0	7	0	0	0	0	9	0	0	0	0	2	1	0	0	0	20	2.3					
17-Mar	9.00	0	0	0	0	0	0	0	0	1	1	0	0	6	0	0	0	0	24	0	0	1	0	0	0	0	0	0	33	3.7					
18-Mar	9.25	0	0	0	0	0	1	1	1	0	0	1	0	15	0	0	0	0	13	0	0	1	0	0	0	0	0	0	33	3.6					
19-Mar	9.00	12	0	2	0	0	5	0	1	0	0	0	0	8	0	0	0	0	14	1	0	2	0	5	0	0	0	0	50	5.6					
20-Mar	9.00	2	0	1	0	0	1	1	0	1	0	1	0	5	0	0	0	3	5	0	0	4	0	1	0	0	0	25	2.8						
21-Mar	9.50	3	0	1	0	0	1	2	0	0	0	0	0	7	0	0	0	0	2	0	0	3	0	2	0	0	0	21	2.2						
22-Mar	9.50	3	0	0	0	0	4	2	0	0	1	0	0	3	0	0	0	0	3	0	0	6	0	2	2	0	0	26	2.7						
23-Mar	7.75	0	0	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	10	1.3						
24-Mar	10.00	30	1	0	0	0	2	3	0	0	0	0	0	15	0	0	0	1	5	0	0	1	0	0	0	0	0	58	5.8						
25-Mar	9.50	57	0	3	0	0	2	10	0	0	0	0	0	15	0	0	0	1	2	0	0	3	0	1	2	0	0	96	10.1						
26-Mar	10.00	34	0	3	0	0	3	9	0	0	0	0	0	5	1	0	0	0	2	0	0	1	0	1	0	0	0	59	5.9						
27-Mar	10.00	37	3	1	0	0	4	10	0	0	0	0	0	3	0	0	0	2	3	0	0	0	0	1	0	0	64	6.4							
28-Mar	9.75	104	2	0	0	0	7	9	0	0	0	0	0	10	0	0	0	0	9	0	0	0	0	2	0	0	143	14.7							
29-Mar	9.50	114	0	3	0	0	6	17	0	0	0	1	0	3	0	0	0	1	11	0	0	12	0	1	2	0	171	18.0							
30-Mar	9.75	149	0	1	0	0	3	15	1	0	0	1	0	6	0	0	0	0	5	0	0	12	0	1	0	0	194	19.9							
31-Mar	9.50	31	1	1	0	0	4	24	0	0	1	0	0	6	0	0	0	0	2	0	0	1	1	0	1	0	74	7.8							
01-Apr	9.00	62	0	1	0	0	2	11	0	0	0	0	0	2	3	0	0	0	1	0	0	2	0	1	1	0	86	9.6							

Appendix D. continued

DATE	OBS.		SPECIES ¹																								BIRDS											
	HOURS		TV	OS	NH	WK	MK	SS	CH	NG	SA	LA	UA	BW	SW	RT	FH	RL	ZT	UB	GE	BE	UE	AK	ML	PR	PG	AF	SF	LF	UF	UU	TOTAL	/ HOUR				
02-Apr	0.00																																					
03-Apr	0.00																																					
04-Apr	0.00																																					
05-Apr	8.25	11	1	2	0	0	1	7	1	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	23	2.8		
06-Apr	8.50	38	3	0	0	0	4	7	0	0	0	0	0	1	2	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	58	6.8		
07-Apr	9.67	35	6	2	0	0	10	34	0	0	0	0	0	2	6	0	0	0	0	3	0	0	2	1	0	6	0	0	0	0	0	0	0	107	11.1			
08-Apr	8.42	23	12	4	0	0	12	26	0	0	0	0	0	2	1	0	0	0	0	4	0	0	1	0	4	0	0	0	0	0	0	0	0	89	10.6			
09-Apr	6.50	87	1	1	0	0	10	26	0	0	0	0	0	0	1	0	0	0	0	3	0	0	0	1	0	1	0	0	0	0	0	0	0	131	20.2			
10-Apr	3.00	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1.7			
11-Apr	2.00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5			
12-Apr	9.25	60	3	1	0	0	10	40	0	0	2	0	0	0	2	0	0	0	0	1	0	0	6	0	1	0	0	0	0	0	0	0	0	126	13.6			
13-Apr	10.50	48	2	5	0	0	8	25	0	0	0	0	0	1	0	0	0	0	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	95	9.0			
14-Apr	10.50	52	1	1	0	0	8	33	1	0	0	0	0	4	0	0	0	0	9	0	0	3	0	1	2	0	0	0	0	0	0	0	0	115	11.0			
15-Apr	10.50	90	2	1	0	0	14	17	0	0	0	0	1	4	0	0	0	0	2	0	0	0	0	0	3	0	0	0	0	0	0	0	0	134	12.8			
16-Apr	10.50	41	2	4	0	0	10	38	0	0	0	0	0	6	6	0	0	0	2	0	0	10	0	1	0	0	0	0	0	0	0	0	0	120	11.4			
17-Apr	9.50	16	4	0	0	0	9	11	1	0	0	0	0	3	2	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	49	5.2				
18-Apr	10.25	12	1	0	0	0	7	11	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	2	1	0	0	0	0	0	0	0	37	3.6				
19-Apr	9.50	8	0	2	0	0	3	7	0	0	0	0	0	7	4	0	0	0	1	0	0	8	0	0	4	0	0	0	0	0	0	0	44	4.6				
20-Apr	9.50	30	4	0	0	0	11	9	0	0	0	0	0	1	2	0	0	0	2	0	0	0	0	0	5	0	0	0	0	0	0	0	64	6.7				
21-Apr	10.00	9	5	1	0	0	12	10	0	0	0	0	0	1	0	0	0	0	5	0	0	0	1	0	5	0	0	0	0	0	0	0	49	4.9				
22-Apr	10.25	28	6	1	0	0	11	19	2	0	0	1	0	10	3	0	0	0	1	7	0	0	12	0	0	3	0	0	0	0	0	0	104	10.1				
23-Apr	3.00	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.7				
24-Apr	9.75	4	2	2	0	0	18	14	0	0	0	0	0	1	3	0	0	0	6	0	0	2	0	0	1	0	0	0	0	0	0	0	53	5.4				
25-Apr	9.75	6	8	0	0	0	52	30	0	0	0	0	1	1	5	0	0	0	3	0	0	1	0	0	3	0	0	0	0	0	0	0	110	11.3				
26-Apr	9.50	16	2	4	0	0	18	21	0	0	0	0	0	7	6	0	0	0	8	0	0	9	0	0	4	0	0	0	0	0	0	0	95	10.0				
27-Apr	9.50	17	0	0	0	0	8	12	0	0	0	0	0	4	5	1	0	0	2	0	0	1	0	1	3	0	0	0	0	0	0	0	54	5.7				
28-Apr	9.00	4	0	1	0	0	10	11	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	31	3.4				
29-Apr	8.50	2	0	0	0	0	6	3	0	0	0	0	0	4	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	17	2.0				
30-Apr	8.50	2	1	0	0	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	0	0	5	0.6				
01-May	9.00	1	2	2	0	0	4	2	0	0	0	0	0	0	0	0	0	0	3	0	0	4	0	0	1	0	0	0	0	0	0	0	19	2.1				
02-May	10.00	1	1	0	0	0	19	8	0	0	0	0	2	1	0	0	0	0	3	0	0	4	0	0	2	0	0	0	0	0	0	0	41	4.1				
03-May	9.50	0	0	0	0	0	13	0	0	0	0	0	0	4	1	0	0	0	6	0	0	3	0	0	0	0	0	0	0	0	0	0	27	2.8				
04-May	10.00	2	0	0	0	0	9	2	0	0	0	0	1	2	1	0	0	0	5	0	0	1	0	0	2	0	0	0	0	0	0	0	25	2.5				
05-May	10.00	1	1	1	0	0	16	10	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	32	3.2				
Total	552.92	1285	77	55	0	0	372	561	12	2	5	6	4	62	224	5	0	0	14	307	6	0	128	5	35	73	0	0	3	0	0	3241	5.9					

¹ See Appendix B for explanations of species codes.

Appendix E. Annual observation effort and raptor migration counts by species (unadjusted data) in the Sandia Mountains, NM: 1985–2004.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Mean
Start date	17-Feb	11-Feb	15-Feb	16-Feb	2-Mar	24-Feb	14-Feb	11-Feb	7-Feb	19-Feb	22-Feb	25-Feb	10-Feb	24-Feb	24-Feb	23-Feb	22-Feb	22-Feb	22-Feb	26-Feb	19-Feb
End date	13-May	9-May	10-May	9-May	30-Apr	6-May	10-May	11-May	5-May	5-May	5-May	5-May	7-May	5-May	3-May	5-May	5-May	3-May	5-May	5-May	5-May
Days of observation	73	78	69	65	56	61	83	84	75	69	67	68	70	68	66	67	67	67	69	65	69
Hours of observation	540.28	581.47	501.40	452.57	459.92	411.33	614.00	601.08	582.50	511.17	524.17	604.75	551.33	547.00	516.92	476.50	543.17	527.75	590.00	552.92	534.51
Raptors / 100 hours	518.2	535.2	467.9	642.1	1011.7	799.4	542.5	889.7	829.2	736.0	707.8	762.5	1103.5	1430.7	688.9	832.7	685.1	624.0	937.8	586.2	766.5
SPECIES	RAPTOR COUNTS																				
Turkey Vulture	641	814	559	1070	1380	1322	1246	1785	1327	1463	1217	1552	2531	3245	1427	1305	1328	1227	2128	1285	1443
Osprey	27	24	39	38	64	38	34	70	100	67	71	62	103	138	67	76	81	38	79	77	65
Northern Harrier	55	59	42	71	72	50	46	85	75	46	35	55	47	94	62	56	52	55	59	55	59
White-tailed Kite	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mississippi Kite	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
TOTAL KITES	0	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
Sharp-shinned Hawk	473	476	435	498	664	283	294	807	428	280	448	905	1280	772	386	391	311	337	459	372	515
Cooper's Hawk	454	709	521	498	1277	620	718	1050	1562	956	771	655	836	1157	670	922	556	506	797	561	790
Northern Goshawk	22	14	14	4	6	10	7	12	24	12	16	5	18	12	3	2	9	7	31	12	12
Unknown small accipiter ¹	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0	8	6	2	4
Unknown large accipiter ¹	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	5	2
Unknown accipiter	90	56	88	70	123	65	59	201	95	55	61	73	70	5	30	96	90	16	3	6	68
TOTAL ACCIPITERS	1039	1255	1058	1070	2070	978	1078	2070	2109	1303	1296	1638	2204	1946	1089	1411	967	875	1297	958	1386
Broad-winged Hawk	1	1	0	2	5	2	2	6	7	4	7	7	19	20	2	19	3	4	12	4	6
Swainson's Hawk	47	32	41	43	38	40	42	60	52	30	50	61	59	114	45	50	43	54	111	62	54
Red-tailed Hawk	280	241	183	182	357	289	353	390	461	325	377	356	338	662	220	353	451	321	663	224	351
Ferruginous Hawk	11	8	11	13	9	18	16	12	11	12	20	17	11	23	7	11	12	7	17	5	13
Rough-legged Hawk	0	2	0	1	1	0	0	0	1	0	0	0	0	1	0	1	0	1	2	0	1
Zone-tailed Hawk	1	2	0	3	5	4	2	3	1	0	0	0	3	2	2	10	1	3	3	0	2
Unidentified buteo	6	4	10	9	40	3	15	32	5	5	14	9	6	2	15	21	10	1	3	14	11
TOTAL BUTEOS	346	290	245	253	455	356	430	503	538	376	468	450	436	824	291	465	520	391	811	309	438
Golden Eagle	441	432	213	205	255	218	198	338	300	310	255	441	352	897	304	417	391	366	689	307	366
Bald Eagle	20	37	5	7	7	13	18	17	9	12	7	14	22	27	18	13	18	12	23	6	15
Unidentified Eagle	4	0	0	1	0	0	4	2	0	0	0	0	0	0	2	0	1	0	0	0	1
TOTAL EAGLES	465	469	218	213	262	231	220	357	309	322	262	455	374	924	324	430	410	378	712	313	382
American Kestrel	147	127	96	118	225	209	182	275	250	112	226	308	233	497	198	143	165	205	299	128	207
Merlin	0	2	5	3	2	3	4	5	9	3	18	10	24	19	15	19	14	5	17	5	9
Prairie Falcon	29	27	17	16	23	21	21	28	33	16	17	23	19	59	18	13	20	16	20	35	24
Peregrine Falcon	5	18	6	7	13	13	20	25	47	26	47	27	91	72	56	49	64	52	105	73	41
Aplomado Falcon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Unknown small falcon ¹	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0	0	0	0
Unknown large falcon ¹	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0	0	3	1
Unknown falcon	2	0	5	2	5	2	5	3	3	0	0	1	7	1	4	0	6	2	0	0	2
TOTAL FALCONS	183	174	129	146	268	248	232	336	342	157	308	369	374	648	291	225	269	280	441	244	283
Unidentified raptor	44	27	54	45	82	65	45	142	29	28	53	30	14	7	10	0	94	49	6	0	41
ALL SPECIES	2800	3112	2346	2906	4653	3288	3331	5348	4830	3762	3710	4611	6084	7826	3561	3968	3721	3293	5533	3241	4096

¹ Designations used regularly for the first time in 2002.

Appendix F. Daily trapping effort and capture totals of migrating raptors by species in the Sandia Mountains, NM: 2004.

DATE	HOURS	SS ¹	CH	NG	RT	AK	PR	TOTAL	CAPTURES/HR
13-Mar	3.25	0	1	0	0	0	0	1	0.3
14-Mar	6.17	0	0	1	0	0	0	1	0.2
15-Mar	6.00	0	0	0	1	0	0	1	0.2
16-Mar	6.67	0	0	0	1	0	0	1	0.1
17-Mar	7.00	0	0	0	0	0	0	0	0.0
18-Mar	7.95	0	0	0	1	0	0	1	0.1
19-Mar	7.12	0	0	0	0	0	0	0	0.0
20-Mar	6.25	0	0	0	0	0	0	0	0.0
21-Mar	8.67	0	0	0	0	0	0	0	0.0
22-Mar	7.83	1	1	0	0	0	0	2	0.3
23-Mar	7.00	0	1	0	0	0	0	1	0.1
24-Mar	8.00	0	0	0	0	0	0	0	0.0
25-Mar	8.83	0	0	0	0	0	0	0	0.0
26-Mar	8.67	0	3	0	0	0	0	3	0.3
27-Mar	7.00	0	2	0	0	0	0	2	0.3
28-Mar	8.33	0	3	0	1	0	0	4	0.5
29-Mar	9.00	0	10	0	0	0	0	10	1.1
30-Mar	8.75	0	5	0	0	1	0	6	0.7
31-Mar	8.50	2	9	0	0	0	0	11	1.3
1-Apr	7.00	0	2	0	0	0	0	2	0.3
2-Apr	0.00								
3-Apr	0.00								
4-Apr	0.00								
5-Apr	4.00	0	1	0	0	0	0	1	0.3
6-Apr	7.75	0	2	0	0	0	0	2	0.3
7-Apr	8.83	0	7	0	1	0	0	8	0.9
8-Apr	7.83	0	8	0	0	0	0	8	1.0
9-Apr	6.25	0	8	0	0	0	0	8	1.3
10-Apr	0.00								
11-Apr	0.00								
12-Apr	8.50	0	8	0	2	0	0	10	1.2
13-Apr	9.42	1	8	0	0	0	0	9	1.0
14-Apr	8.25	1	4	0	0	0	1	6	0.7
15-Apr	8.75	1	3	0	0	0	0	4	0.5
16-Apr	10.00	1	11	0	0	0	0	12	1.2
17-Apr	6.83	0	0	0	0	0	0	0	0.0
18-Apr	6.75	0	0	0	0	0	0	0	0.0
19-Apr	8.50	0	2	0	0	0	0	2	0.2
20-Apr	6.00	0	0	0	0	0	0	0	0.0
21-Apr	8.00	2	2	0	0	0	0	4	0.5
22-Apr	7.75	1	2	0	0	0	0	3	0.4
23-Apr	0.00								
24-Apr	7.42	4	3	0	0	0	0	7	0.9
25-Apr	8.75	2	2	0	0	0	0	4	0.5
26-Apr	8.00	4	3	0	0	0	0	7	0.9
27-Apr	7.00	0	1	0	0	0	0	1	0.1
28-Apr	7.00	0	2	0	0	0	0	2	0.3
Total	309.57	20	114	1	7	1	1	144	0.5

¹ See Appendix B for explanation of species codes.

Appendix G. Annual trapping and banding effort and capture totals of migrating raptors by species in the Sandia Mountains, NM: 1990–2004.

	1990	1991	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	TOTAL	MEAN
First day	21-Mar	17-Mar	14-Mar	10-Mar	10-Mar	10-Mar	10-Mar	10-Mar	10-Mar	12-Mar	10-Mar	10-Mar	16-Mar	13-Mar		11-Mar
Last day	8-May	7-May	3-May	26-Apr	28-Apr	29-Apr	5-May	3-May	2-May	28-Apr	27-Apr	27-Apr	21-Apr	28-Apr		29-Apr
Number of stations	1	1	1	1	1	1	1	2	2	1	1	1	1	1		1
Trapping days	36	45	43	34	40	46	48	46	47	41	53	41	19	41	575	41
Station days	36	45	43	34	40	46	48	65	63	41	44	45	19	41	610	44
Station hours	249.42	269.05	300.03	235.60	319.83	372.58	377.58	486.28	453.33	278.65	314.92	320.76	115.54	309.57	4403.14	314.51
SPECIES	RAPTOR CAPTURES															
Northern Harrier	0	0	0	0	3	0	1	3	2	0	0	0	0	0	9	1
Sharp-shinned Hawk	21	22	33	32	44	132	139	100	56	30	28	32	4	20	692	49
Cooper's Hawk	83	66	211	243	197	259	195	200	165	164	206	194	48	114	2346	168
Northern Goshawk	2	0	1	3	2	2	4	1	0	0	1	3	2	1	22	2
Broad-winged Hawk	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.1
Swainson's Hawk	1	0	0	0	0	0	1	1	0	0	1	0	0	0	4	0.3
Red-tailed Hawk	3	3	9	16	13	16	5	9	2	3	20	8	4	7	118	8
Zone-tailed Hawk	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2	0.1
American Kestrel	2	0	3	2	2	26	14	22	10	5	4	14	1	1	106	8
Merlin	0	0	0	0	2	2	3	3	2	1	0	0	0	0	13	1
Prairie Falcon	0	0	1	1	2	3	3	2	0	2	5	2	0	1	22	2
Peregrine Falcon	1	0	0	2	6	4	7	2	2	1	4	0	2	0	31	2
All species	113	91	258	300	271	444	372	344	239	206	269	254	61	144	3366	240
Captures / 100 stn hrs	45.3	33.8	86.0	127.3	84.7	119.2	98.5	70.7	52.7	73.9	85.4	79.2	52.8	46.5	76.4	75.4
Recaptures ¹	0	1	1	2	3	4	2	3	3	2	4	0	0	1	25	2
Foreign recaptures ²	0	0	2	3	0	4	2	6	5	1	3	1	1	2	30	2
Foreign encounters ³	2	1	0	2	0	5	2	3	3	1	3	5	4	2	33	2

¹ Birds banded and later recaptured in the Sandias—totals included in capture tally above.

² Birds banded elsewhere and later recaptured in the Sandias—totals included in capture tally above.

³ Birds banded in the Sandias and later recaptured or otherwise recovered elsewhere.