

**SPRING 2007 RAPTOR MIGRATION STUDY IN THE
SANDIA MOUNTAINS OF CENTRAL NEW MEXICO**



*Hawk*WATCH
INTERNATIONAL

**HawkWatch International, Inc.
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SPRING 2007 RAPTOR MIGRATION STUDY IN THE SANDIA MOUNTAINS OF CENTRAL NEW MEXICO

Report prepared by:

Jeff P. Smith and Mike C. Neal

Counts by:

Graeme Davis, Shaun Thietten, and Ken Babcock

Banding conducted by:

Sacha Mkheidze, Dan Sherman, and Walt Lehman

On-site education by:

Jennifer Good

Project coordinated by:

HawkWatch International, Inc.

Principal Investigator: Dr. Jeff P. Smith

1800 South West Temple, Suite 226

Salt Lake City, UT 84115

(801) 484-6808

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INTRODUCTION

The Sandia Mountains Raptor Migration Project 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 22 species of migratory raptors at the site, with counts typically ranging between 3,000 and 5,000 migrants per season. The 2007 season marked the 23rd consecutive migration count and the 16th season of trapping and banding conducted at the site. This report summarizes the 2007 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°05'12" N, 106°25'57" 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 Pistolas 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 Pistolas Canyon. This season, one banding station (Upper Station) was situated ~1.0 km northeast of the 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

Two official or designated observers conducted standardized daily counts of migrating raptors from a single traditional observation site between 24 February and 5 May 2006. This was the first full season of migration counting for both official, full-time observers, Graeme Davis and Shawn Thietten; however, their efforts were routinely supplemented and overseen by local volunteer and veteran HWI observer, Ken Babcock (see Appendix A for a complete history of observer participation). Experienced site-educator and part-time observer, Jennifer Good, also regularly assisted with the counts. Other local volunteers and visitors also 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 2007 annual statistics against means and 95% confidence intervals for previous seasons, we equate significance with a 2007 value falling outside the bounds of the confidence interval for the associated mean.

RESULTS AND DISCUSSION

WEATHER SUMMARY

Unlike during the last couple of seasons, inclement weather severely hampered observations slightly more often than average in 2007 (see Appendix C for daily weather summaries), with an above-average 6 full days of observation entirely precluded and a slightly below average 2 days reduced to less than 4 hours of observation (1998–2006 averages of 3.9 and 3.1 days, respectively). In addition, the proportion of active observation days that featured mostly cloudy to overcast skies was above average (27 vs. 14%) in 2007, while the proportion of active days that featured predominantly fair skies was about average (43 vs. 44%), and the proportion that featured transitional skies (i.e., conditions changed from fair to mostly cloudy or overcast during the day, or vice versa) was below average (29 vs. 43%). On the other hand, the proportions of active observation days that featured substantial visibility reducing fog/haze (12%) or rain/snow (14%) were well below average (36 and 20%, respectively). The low prevalence of fog/haze resulted in significantly higher than average visibility to the east (96 vs. average of 62 km) and slightly higher visibility to the west (82 vs. 78 km).

Moderate wind speeds (12–28 kph) were more prevalent than usual in 2007, predominating on 42% of the active observation days (average 29%), while lighter winds were significantly less common than usual (57% vs. average of 67%) and stronger winds were slightly less common than usual (2% vs. average of 3%). In the Sandias, westerly winds usually prevail; in 2007 W-NW and SW-W winds prevailed on average to slightly below average proportions of the active observation days (25% and 14% vs. averages of 29% and 14%, respectively), while more variable SW-NW winds were considerably more prevalent than usual (37% vs. average of 20% of the active days). In addition, each of these summary statistics incorporates higher than average proportions of days where calm/variable periods intervened for portions of the day (5–6% of the active days within each category compared to averages of 1–3%). Otherwise, NW-NE, NE-SE, and overall calm/variable winds did not prevail on any of the active days in 2007, compared to averages of 4%, 1%, and 11%, respectively. In contrast, E-SE and SE-SW winds prevailed at close to average levels (11% and 7% vs. averages of 9% and 7%, respectively).

The temperature during active observation periods averaged 14.1°C (the average of daily values, which in turn were averages of hourly readings), with hourly readings ranging from 2.8 to 20.0°C. The overall mean was roughly 2° higher than average (1985–2006 average 12.3°C; range of annual means 9.1–15.5°C) and the minimum hourly reading was the second highest recorded since 1998; however, the maximum hourly reading tied for the third lowest. The barometric pressure during active observations

averaged 30.11 in Hg (the average of daily values, which in turn were averages of hourly readings), with hourly readings ranging from 29.67 to 30.71 in Hg. The overall mean matched the 2001–2006 average (the period of record for these data), but the minimum and maximum hourly readings both ranked on the high side.

Good to excellent thermal-lift conditions predominated on a near record low 22% of the active observation days, compared to the 1998–2006 average of 50%. A higher than usual prevalence of moderate winds and unsettled weather undoubtedly contributed to this variation.

In summary, compared to the last nine seasons, 2007 featured more unsettled and inclement weather than usual but less visibility reducing fog/haze and rain/snow during active observation periods, higher winds speeds, a higher prevalence of variable SW-NW winds as opposed to steadier SW-W and W-NW winds, generally warmer temperatures, above-average visibility, and poorer than average thermal-lift conditions.

OBSERVATION EFFORT

The observers worked on 65 of 71 possible days between 24 February and 5 May, which is the standard count period for the project. The number of observation days was a significant 7% below the 1985–2006 average of $70 \pm 95\%$ CI of 2.7 days, and the number of observation hours (509.42) was a significant 6% below average ($541.96 \pm 95\%$ CI of 24.01 hrs). The 2007 average of 2.3 observers per hour (including official and guest observers; value is mean of daily values, which are in turn means of hourly values) was a significant 11% above average ($2.1 \pm 95\%$ CI of 0.13 observers/hr).

FLIGHT SUMMARY

The observers counted 2,292 migrant raptors of 17 species during the 2007 season, with the total count a new record low and a highly significant 43% below the 1985–2006 average (Table 1; and see Appendix D for daily count records and Appendix E for annual summaries). Record low counts occurred for five commonly encountered species (Turkey Vulture, Sharp-shinned Hawk, Ferruginous Hawk, and Golden and Bald Eagles), and this was only the sixth season since 1985 that no Zone-tailed Hawks were recorded (Appendix E). No record-high counts occurred in 2007.

The 2007 flight consisted of 46% accipiters, 22% vultures, 13% buteos, 5% eagles, 9% falcons, 2% Ospreys, 3% harriers, and 2% unidentified raptors. These values represent significantly below average proportions of vultures and eagles, and significantly above average proportions of all other species groups (Figure 2). The Cooper's Hawk was the most commonly encountered species, followed by the Turkey Vulture, Red-tailed Hawk, Sharp-shinned Hawk, Golden Eagle, and American Kestrel; all other species comprised <3% each of the total count (Table 1).

Passage Rate Trends

Among 17 species seen in most years, adjusted passage rates were significantly above average only for Northern Harriers and Prairie and Peregrine Falcons, whereas passage rates were significantly below average for 13 of 14 remaining species (Table 1, Figures 3–7). The 1985–2007 regression analyses of adjusted passage rates indicated a significant ($P \leq 0.05$) linear increasing for Swainson's Hawks (Figure 5), a highly significant ($P \leq 0.01$) linear increasing trend for Peregrine Falcons (Figure 7), and marginally ($P \leq 0.10$) to highly significant quadratic trends for Turkey Vultures and Ospreys (Figure 3), Cooper's Hawks (Figure 4), Broad-winged, Red-tailed and Ferruginous Hawks (Figure 5), and American Kestrels and Merlins (Figure 7). These quadratic trends consistently tracked increasing patterns through the mid-to-late 1990s followed by recent stabilization or more commonly declines. The increasing patterns from the late 1980s through mid-1990s correlate with a wet El Niño period, with the subsequent declines correlating with the onset of widespread drought throughout much of the interior West after 1998

(Hoffman and Smith 2003). The only species that clearly may have shown a degree of recent recovery from the apparent drought effects is the Cooper's Hawk, whose passage rates increased noticeably the past two years (Figure 4). Age-specific analyses also revealed a significant ($P \leq 0.05$) linear decline for adult Northern Goshawks, but no long-term trend for immature goshawks (Figure 4).

Age Ratios

Immature: adult ratios were above average in 2007 for 6 of 9 species with data suited to comparisons, but significantly so only for Cooper's and Ferruginous Hawks (Table 2). For both of the latter two species, however, counts of immature birds were either lower than average (Cooper's Hawk) or only marginally higher than average (Ferruginous Hawk), with substantial declines in the average numbers of identified adults the primary reason for the high age ratios. In fact, counts of identified immature birds were below average for all species except the Ferruginous Hawk, and counts of adult birds were below average for all species. Proportionately low immature counts resulted in significantly below average age ratios for Northern Harriers and Golden and Bald Eagles.

It is also important to recognize that this year's comparisons were confounded by significant variation in the proportions of unaged birds for all species except Ferruginous Hawks and Golden Eagles (Table 2).

Seasonal Timing

Similar to the case in 2006, the overall combined-species median passage date of 4 April was a marginally significant 2 days earlier than average; however, 11 of 17 species for which a comparison was possible showed significantly earlier than average timing in 2007 (Table 3). Only the Northern Harrier, Red-tailed Hawk, and Swainson's Hawk showed later than average median passage dates in 2007 (all significant differences). The combined-species distribution of seasonal activity illustrates the general pattern that applied to most species, with no obvious, overall early or late shifts in the activity pattern but substantial variation from the average pattern for several five-day periods, especially from mid-March through early April when several weather events intervened (Figure 8).

TRAPPING EFFORT

The trapping crew operated Upper Station on 44 days (304.5 hrs) between 9 March and 1 May (see Appendix F for daily effort and capture totals by species). The number of station days matched the long-term average for the site (44 ± 5.6 days) and the number of station hours was a non-significant 4% below average (318.0 ± 45.33 hrs; see Appendix G for annual summaries).

TRAPPING AND BANDING SUMMARY

The 2006 capture total of 181 birds included five species and, for the first time since the first year of the banding project, no previously banded birds (Table 5, Appendix G). The 2007 effort raises the capture total since project inception to 3,732 birds of 12 species, including 25 Sandia recaptures and 31 foreign recaptures (i.e., birds originally banded elsewhere and subsequently recaptured in the Sandias; Appendix G). Captured species included the Cooper's Hawk (81% of all captures), Sharp-shinned Hawk (16%), Peregrine Falcon (2%), Red-tailed Hawk (1%), and Merlin (1%).

Among the 12 species ever captured at the site, the 2007 capture totals and capture rates were below average for all but Merlins (non-significant increases) and Peregrine Falcons (significant increases), with the differences significant for 6 species (Table 5). A similar pattern applied to estimates of capture success, except that the increase in capture success was non-significant for Peregrine Falcons, capture success was significantly above average for Sharp-shinned Hawks and Merlins, and no captures of Northern Harriers translated to only a non-significant reduction in capture success. These statistics are

generally consistent with changes in relative passage totals, but indicate that trapping efficiency also was low for most species except Sharp-shinned Hawks and Merlins.

Sharp-shinned and Cooper's Hawks captured in 2007 tended have emptier crops, less wing-pit fat, but reasonably healthy keel muscles compared to long-term averages (Table 5). All other captured birds had empty crops, except for 1 Peregrine Falcon (of 4 captured). Otherwise, two Red-tailed Hawks showed poor to fair body condition (as measured by comparison of wing-pit fat loads and keel-muscle thickness), whereas a Merlin and 4 Peregrine Falcons all showed average to above average body condition.

ENCOUNTERS WITH PREVIOUSLY BANDED BIRDS

Excluding recaptures at HWI's nearby autumn migration-banding site in the Manzano Mountains (45 exchanges between the two sites to date), 15 Sandia-banded Cooper's Hawks, 4 Sharp-shinned Hawks, 1 Red-tailed Hawk, and 1 Prairie Falcon have subsequently been encountered elsewhere. One new encounter occurred since our last annual report, involving a 10-year-old, female Cooper's Hawk (banded as a second-year bird in 1998) that was found in January 2007 in a building near Tijeras, New Mexico (~13 km from the project site). The bird was captured, removed from the building, and released apparently unharmed.

RESIDENT BIRDS

The 2006 resident raptor community included a typical assemblage for the site.

As usual, a pair of adult Golden Eagles resided throughout the season around the shields area; however, unlike in past years, no unique white feathers could be seen on the underwing of the apparent female. Whether or not this can be considered proof-positive that "Ethel" was replaced by another female is unknown, but suggestive. The pair was routinely observed acting territorial and "escorting" other migrants through the territory. They were observed together throughout the season and were seen copulating late into April.

Two adult and one immature, light-morph Red-tailed Hawks were recorded as locals during the season. The immature bird was seen primarily early in the season, occasionally with an adult, while the two adults were seen throughout the season, often hunting together.

Resident Sharp-shinned and Cooper's Hawks were observed throughout the season, but no clear understanding of age representations and overall numbers of individuals were obtained. A second-year Sharp-shinned Hawk was observed early in the season. Most sightings of resident sharpshins involved birds that disappeared low and out of site to the west, southwest, and south of the observation point.

Prairie Falcons have not been regular, or at least not readily apparent, members of the resident community for the past several years. The first sighting of an apparently resident bird occurred on 5 March. By 18 March, it appeared that a pair had begun nesting on "red cliff" above the observation point, with the pair seen aggressively pursuing other birds that flew through their apparent territory. After that, though, further sightings were limited, with the last recorded on 14 April. Whether or not this means that the pair did not nest successfully is unknown; however, the last sighting followed shortly after at least one Peregrine Falcon took up residence in the same basic area and remained throughout the rest of the season. This has been the pattern for the last several years, and suggests that the peregrines have successfully usurped the territory from the Prairie Falcons that used to be the common resident falcon.

The first sightings of resident Turkey Vultures occurred on 15 April, similar to most years, and then continued through the remainder of the season. Most often, two birds were seen together patrolling the "west ridge," with up to four birds were seen together at various times.

SITE VISITATION AND PUBLIC OUTREACH

A total of more than 350 individuals signed the site visitor log during the 2007 season, with repeat visitors common. This year's visitors hailed from 11 states (NM, AZ, UT, CO, FL, IN, KY, LA, OR, ME, and NE), British Columbia, Mexico. Visitors included 150 individuals as part of 7 organized groups, including students from Bosque Prep School (5 classes), two local scout troops, and 1 Youth Corps group. During the season, Educator Jennifer Good also conducted 32 off-site educational programs in local schools and at other community venues, further augmenting the work she did previously as HWI's NM Education Intern. The off-site programs reached an additional 1,420 individuals. Jenny also reported being very pleased to see a variety of individuals visit the site this season for the first time after having been introduced to HWI through a series of library "Hawk Talk" programs she gave in local communities in 2006. Unfortunately, though, inclement weather often coincided with peak-season weekends this year, which undoubtedly reduced overall visitation to a below-average level for the site.

As alluded to above, many of the groups and individuals that visited the site this season had previously participated in classroom or other community programs hosted by HWI educators in the Albuquerque area. 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 2007, 548 hourly assessments of visitor disturbance resulted in the following ratings: 99% none, 0% low, <1% moderate, and 0% high. We consider this strong additional proof that our site educator, often assisted by a cadre of 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: 1985–2006 versus 2007.

SPECIES	COUNTS			RAPTORS / 100 HOURS ¹		
	1985–2006 ²	2007	% CHANGE	1985–2006 ²	2007	% CHANGE
Turkey Vulture	1407 ± 250.3	496	-65	442.5 ± 78.6	169.7	-62
Osprey	65 ± 11.5	44	-32	21.4 ± 3.7	17.3	-19
Northern Harrier	58 ± 6.0	61	+5	13.1 ± 1.4	15.5	+19
White-tailed Kite	0.05 ± 0.09	0	-100	–	–	–
Mississippi Kite	0.2 ± 0.2	0	-100	–	–	–
TOTAL KITES	0.2 ± 0.2	0	-100	–	–	–
Sharp-shinned Hawk	509 ± 101.8	209	-59	119.5 ± 22.1	65.0	-46
Cooper's Hawk	768 ± 119.8	574	-25	212.0 ± 31.2	229.0	+8
Northern Goshawk	12 ± 3.0	4	-65	2.3 ± 0.6	0.8	-64
Unknown small accipiter ³	15 ± 14.1	177	+1093	–	–	–
Unknown large accipiter ³	4 ± 2.8	5	+25	–	–	–
Unknown accipiter	67 ± 18.6	74	+11	–	–	–
TOTAL ACCIPITERS	1361 ± 183.1	1043	-23	–	–	–
Common Black Hawk	0.05 ± 0.09	0	-100	–	–	–
Broad-winged Hawk	6 ± 2.5	2	-67	1.3 ± 0.6	0.7	-45
Swainson's Hawk	55 ± 8.9	33	-40	20.1 ± 2.7	16.9	-16
Zone-tailed Hawk	2.4 ± 1.0	0	-100	0.5 ± 0.2	0.0	-100
Red-tailed Hawk	346 ± 53.1	223	-36	75.8 ± 10.2	54.5	-28
Ferruginous Hawk	12 ± 2.0	4	-67	2.5 ± 0.4	0.9	-66
Rough-legged Hawk	0.5 ± 0.3	1	+100	0.2 ± 0.1	0.4	+97
Unidentified buteo	12 ± 4.1	25	+111	–	–	–
TOTAL BUTEOS	434 ± 62.4	288	-34	–	–	–
Golden Eagle	365 ± 67.2	124	-66	71.3 ± 12.2	25.7	-64
Bald Eagle	14 ± 3.4	2	-86	3.9 ± 0.9	0.6	-84
Unidentified eagle	0.6 ± 0.5	0	-100	–	–	–
TOTAL EAGLES	380 ± 69.1	126	-67	–	–	–
American Kestrel	204 ± 37.0	75	-63	51.7 ± 8.8	22.9	-56
Merlin	10 ± 3.2	4	-61	2.2 ± 0.7	1.0	-57
Prairie Falcon	25 ± 4.6	33	+34	4.8 ± 0.9	7.9	+63
Peregrine Falcon	44 ± 12.8	62	+40	8.8 ± 2.5	16.2	+84
Aplomado Falcon	0.05 ± 0.09	0	-100	–	–	–
Unknown small falcon ³	1.3 ± 2.2	2	+50	–	–	–
Unknown large falcon ³	1.7 ± 1.5	10	+500	–	–	–
Unknown falcon	2 ± 0.9	9	+288	–	–	–
TOTAL FALCONS	286 ± 47.8	195	-32	–	–	–
Unidentified raptor	40 ± 14.4	39	-3	–	–	–
GRAND TOTAL	4032 ± 532.9	2292	-43	–	–	–

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: 1990–2006 versus 2007.

	TOTAL AND AGE-CLASSIFIED COUNTS						IMM. : ADULT			
	1990–2006 AVERAGE			2007			% UNKNOWN AGE		RATIO	
	TOTAL	IMM.	AD.	TOTAL	IMM.	AD.	1990–2006 ¹	2007	1990–2006 ¹	2007
Northern Harrier	58	12	31	61	3	23	29 ± 5.0	57	0.45 ± 0.202	0.13
Sharp-shinned Hawk	509	58	275	209	20	66	34 ± 4.7	59	0.24 ± 0.070	0.30
Cooper's Hawk	790	75	498	574	65	142	29 ± 5.9	64	0.18 ± 0.076	0.46
Northern Goshawk	11	3	6	4	1	1	22 ± 9.1	50	0.91 ± 0.689	1.00
Broad-winged Hawk	7	<1	5	2	0	0	25 ± 11.2	100	0.21 ± 0.250	–
Red-tailed Hawk	374	60	253	223	32	118	16 ± 3.4	33	0.25 ± 0.065	0.27
Ferruginous Hawk	12	1	5	4	2	0	45 ± 12.0	50	0.74 ± 0.691	2.00
Golden Eagle	382	177	128	124	43	61	21 ± 7.9	16	1.62 ± 0.499	0.70
Bald Eagle	14	7	6	2	0	2	9 ± 7.1	0	1.42 ± 0.455	0.00
Peregrine Falcon	54	13	30	62	7	13	21 ± 6.4	68	0.44 ± 0.118	0.54

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 2007 with a comparison of 2007 and 1985–2006 average median passage dates.

SPECIES	2007				1985–2006
	FIRST OBSERVED	LAST OBSERVED	BULK PASSAGE DATES ¹	MEDIAN PASSAGE DATE ²	MEDIAN PASSAGE DATE ^{2,3}
Turkey Vulture	15-Mar	5-May	22-Mar – 26-Apr	2-Apr	04-Apr ± 1.3
Osprey	14-Mar	2-May	31-Mar – 27-Apr	12-Apr	13-Apr ± 1.6
Northern Harrier	17-Mar	29-Apr	21-Mar – 22-Apr	8-Apr	06-Apr ± 1.9
Sharp-shinned Hawk	24-Feb	4-May	14-Mar – 2-May	14-Apr	18-Apr ± 2.0
Cooper's Hawk	25-Feb	4-May	25-Mar – 23-Apr	11-Apr	11-Apr ± 1.0
Northern Goshawk	25-Feb	12-Apr	–	–	05-Apr ± 5.2
Broad-winged Hawk	21-Apr	29-Apr	–	–	23-Apr ± 2.8
Swainson's Hawk	2-Apr	4-May	3-Apr – 26-Apr	20-Apr	17-Apr ± 1.6
Red-tailed Hawk	24-Feb	3-May	10-Mar – 16-Apr	28-Mar	25-Mar ± 1.2
Ferruginous Hawk	3-Mar	27-Apr	–	–	18-Mar ± 5.3
Rough-legged Hawk	1-Apr	1-Apr	–	–	–
Golden Eagle	24-Feb	28-Apr	4-Mar – 20-Apr	14-Mar	20-Mar ± 3.4
Bald Eagle	25-Feb	26-Feb	–	–	08-Mar ± 3.9
American Kestrel	9-Mar	4-May	25-Mar – 26-Apr	8-Apr	12-Apr ± 1.7
Merlin	14-Apr	18-Apr	–	–	09-Apr ± 3.9
Prairie Falcon	26-Feb	27-Apr	3-Mar – 18-Apr	19-Mar	20-Mar ± 3.6
Peregrine Falcon	4-Mar	5-May	21-Mar – 23-Apr	8-Apr	12-Apr ± 2.8
All species	24-Feb	5-May	16-Mar – 26-Apr	4-Apr	06-Apr ± 1.4

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: 1990–2006 versus 2007.

SPECIES	CAPTURE TOTALS		CAPTURE RATE ¹		% CAPTURE SUCCESS ²	
	1990–2006 ³	2007	1990–2006 ³	2007	1990–2006 ³	2007
Northern Harrier	1 ± 0.5	0	0.2 ± 0.17	0.0	1.1 ± 1.13	0.0
Sharp-shinned Hawk	45 ± 19.0	28	14.2 ± 5.03	9.2	7.9 ± 1.87	10.1
Cooper's Hawk	161 ± 29.9	146	53.6 ± 9.96	47.9	19.5 ± 5.20	19.1
Northern Goshawk	1 ± 0.6	0	0.5 ± 0.26	0.0	12.7 ± 6.86	0.0
Broad-winged Hawk	0.1 ± 0.1	0	0.03 ± 0.06	0.0	1.6 ± 3.06	0.0
Swainson's Hawk	0.3 ± 0.2	0	0.1 ± 0.08	0.0	0.4 ± 0.42	0.0
Red-tailed Hawk	8 ± 2.8	2	2.8 ± 0.97	0.7	2.0 ± 0.75	0.8
Zone-tailed Hawk	0.1 ± 0.2	0	0.04 ± 0.05	0.0	6.9 ± 9.39	0.0
American Kestrel	7 ± 3.7	0	2.1 ± 1.03	0.0	2.7 ± 1.26	0.0
Merlin	1 ± 0.6	1	0.2 ± 0.17	0.3	4.9 ± 3.47	25.0
Prairie Falcon	1 ± 0.7	0	0.5 ± 0.22	0.0	6.8 ± 3.80	0.0
Peregrine Falcon	3 ± 1.1	4	0.8 ± 0.35	1.3	4.5 ± 2.30	5.6
Total	228 ± 49.5	181	75.1 ± 13.81	59.4	10.1 ± 2.44	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 5. Comparisons by species of crop-fullness, wing-pit-fat, and keel-muscle-thickness ratings for migrating raptors trapped in the Sandia Mountains, NM: 1991–2006 versus 2007.

SPECIES	PERIOD	CROP ^{1,2}					KEEL MUSCLE ^{1,3}			WING-PIT FAT ^{1,4}			
		EMPTY	1/4	1/2	3/4	FULL	0	1	2	0	1	2	3
Sharp-shinned Hawk	1991–06 avg	73	8	5	4	9	2	54	44	4	23	39	34
	2007	82	14	4	0	0	0	50	50	18	36	32	14
Cooper’s Hawk	1991–06 avg	88	4	3	2	3	5	66	29	7	31	31	32
	2007	91	5	3	0	1	0	71	29	18	42	32	8
Red-tailed Hawk	1991–06 avg	93	1	6	0	0	20	70	9	54	40	5	1
	2007	100	0	0	0	0	50	50	0	50	50	0	0
Merlin	1991–06 avg	83	0	17	0	0	0	81	19	17	14	42	28
	2007	100	0	0	0	0	0	0	100	0	0	100	0
Peregrine Falcon	1991–06 avg	87	8	2	1	3	10	53	38	41	33	18	8
	2007	75	25	0	0	0	0	50	50	25	75	0	0

¹ Values are percentages of birds trapped.

² Subjective visual and tactile assessment of relative crop fullness.

³ Subjective visual and tactile assessment of the relative thickness of the keel muscle, with 0 = skinny – “sharp” keel bone; 1 = average – moderately padded keel bone; and 2 = robust – keel bone solidly padded with muscle.

⁴ Subjective visual assessment of the relative volume of fat deposited in the “wing-pit” area, with 0 = none; 1 = light deposit; 2 = moderate deposit – wing pit approaching or more than half full; and 3 = heavy deposit – bulging from wing-pit area.

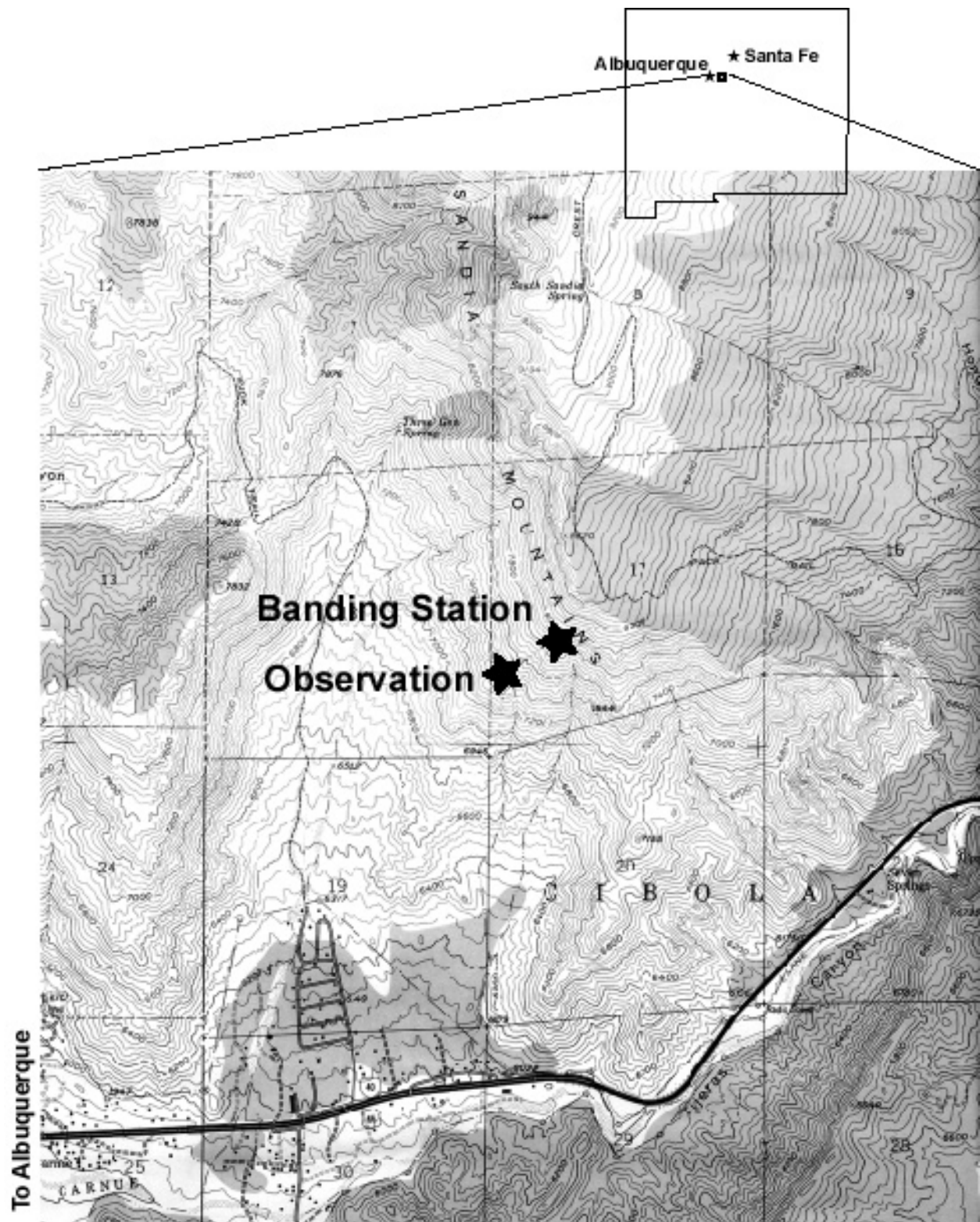


Figure 1. Map of Sandia Mountains Raptor Migration Project study site.

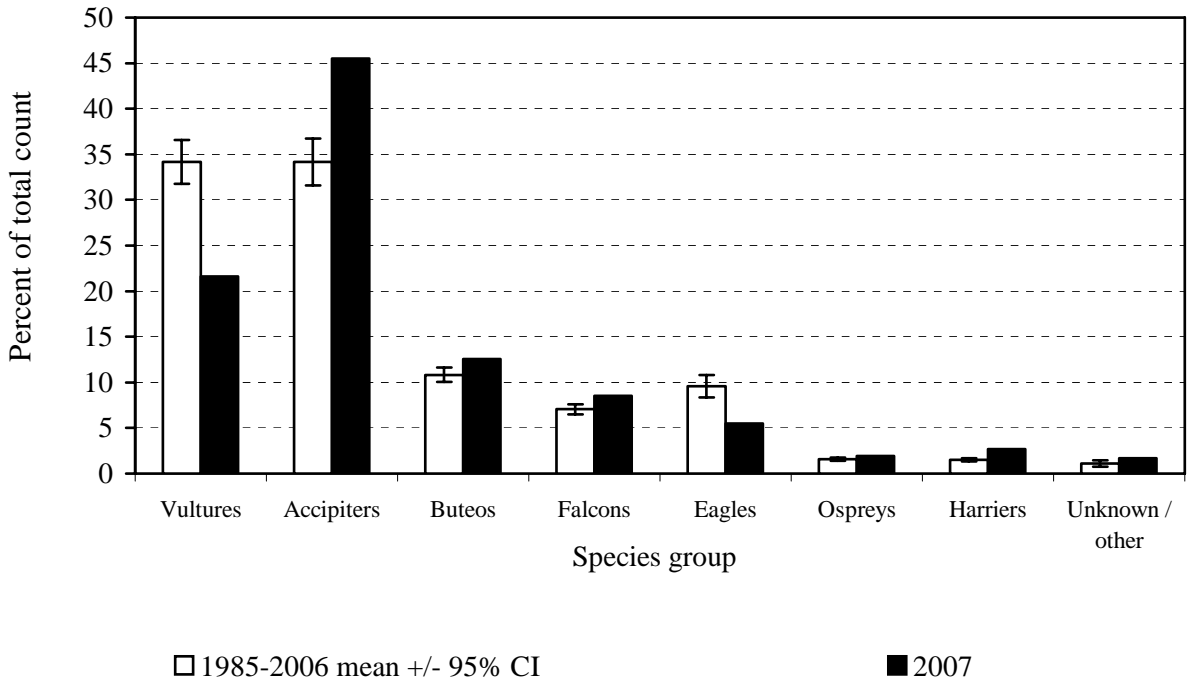


Figure 2. Spring raptor-migration flight composition by major species groups in the Sandia Mountains, NM: 1985–2006 versus 2007.

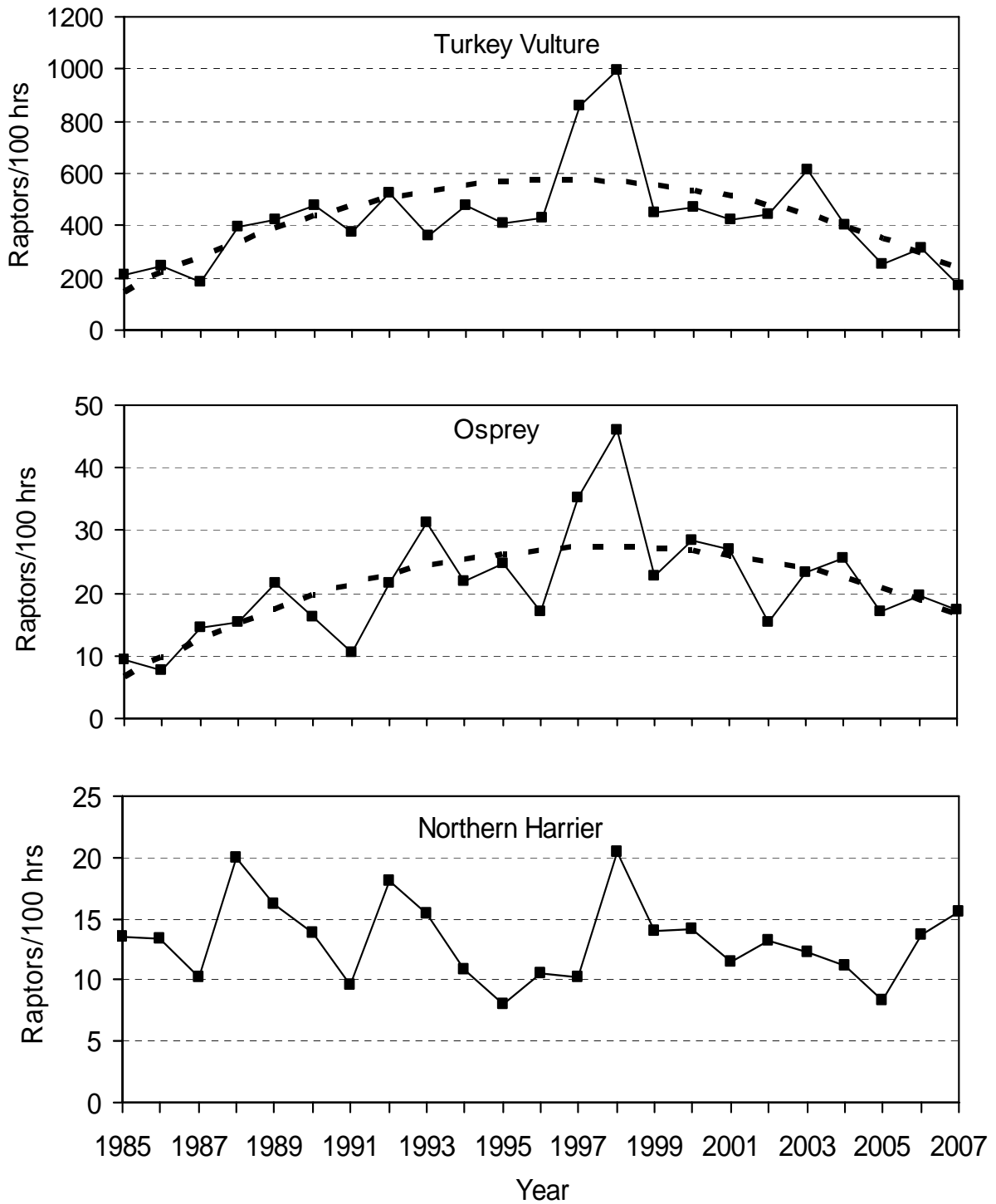


Figure 3. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) spring-migration passage rates for Turkey Vultures, Ospreys, and Northern Harriers in the Sandia Mountains, NM: 1985–2007. Dashed lines indicate significant ($P \leq 0.10$) linear or quadratic regressions.

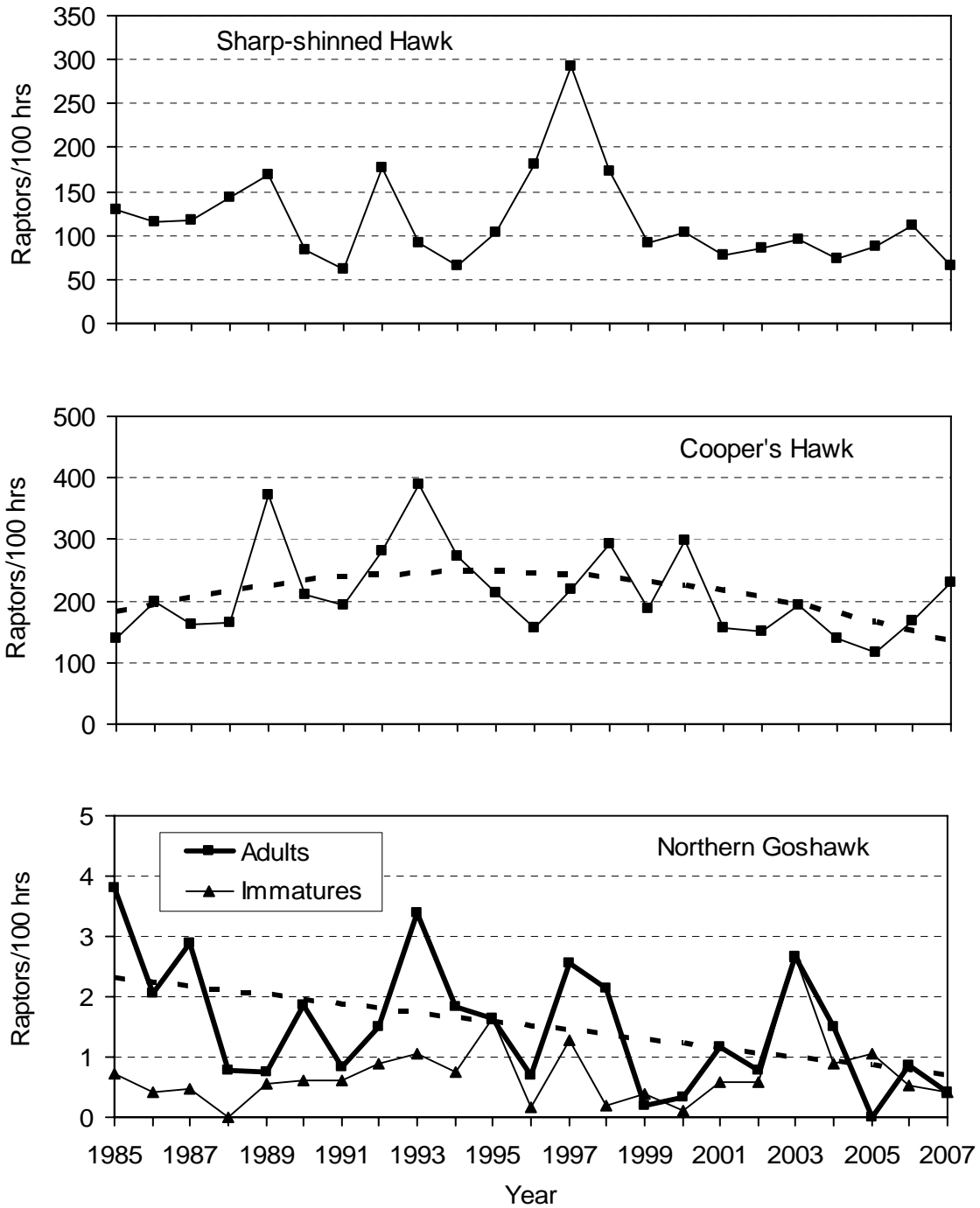


Figure 4. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) spring-migration passage rates for Sharp-shinned Hawks, Cooper's Hawks, and Northern Goshawks in the Sandia Mountains, NM: 1985–2007. Dashed lines indicate significant ($P \leq 0.10$) linear or quadratic regressions.

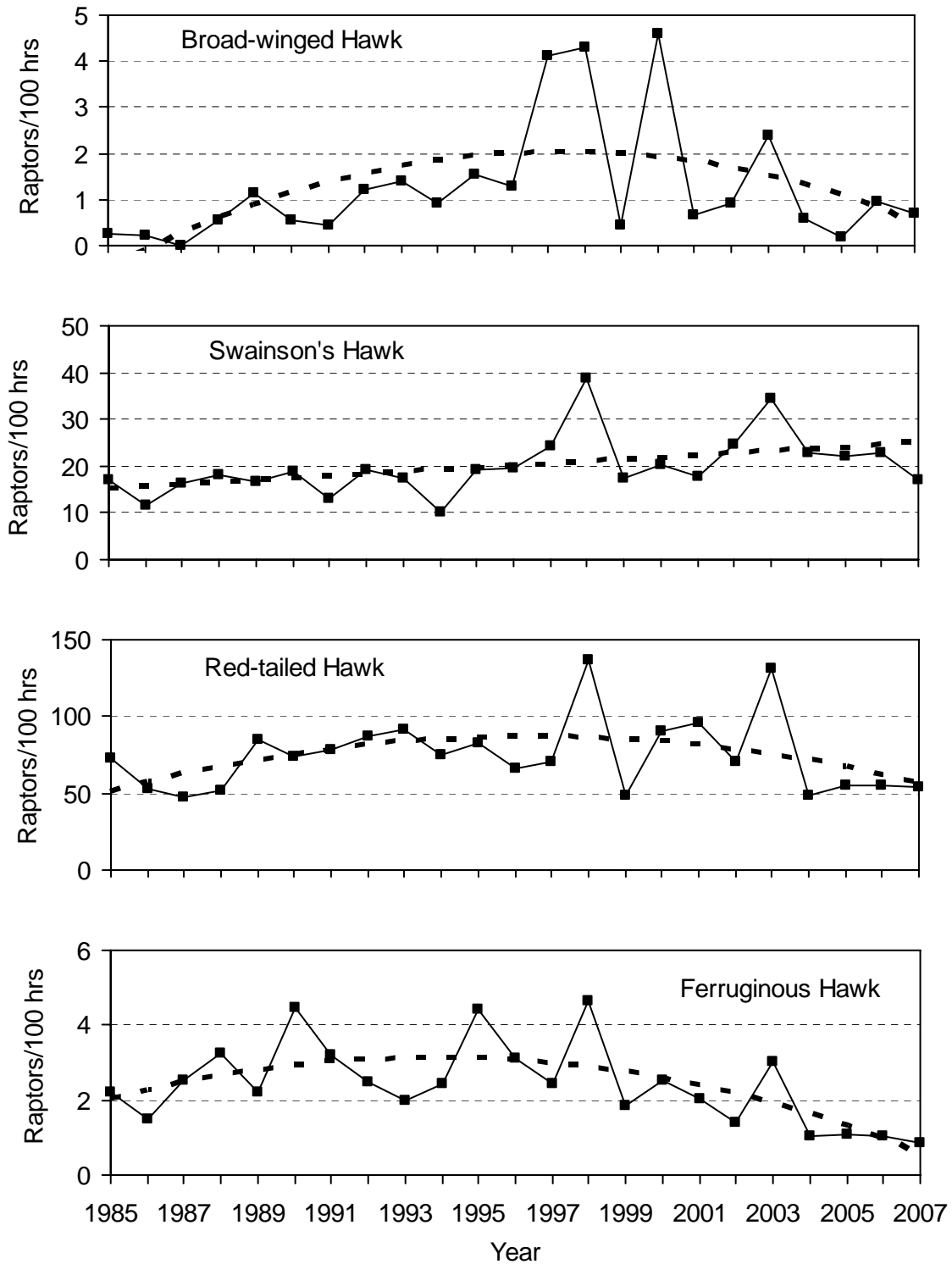


Figure 5. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) spring-migration passage rates for Broad-winged, Swainson's, Red-tailed, and Ferruginous Hawks in the Sandia Mountains, NM: 1985–2007. Dashed lines indicate significant ($P \leq 0.10$) linear or quadratic regressions.

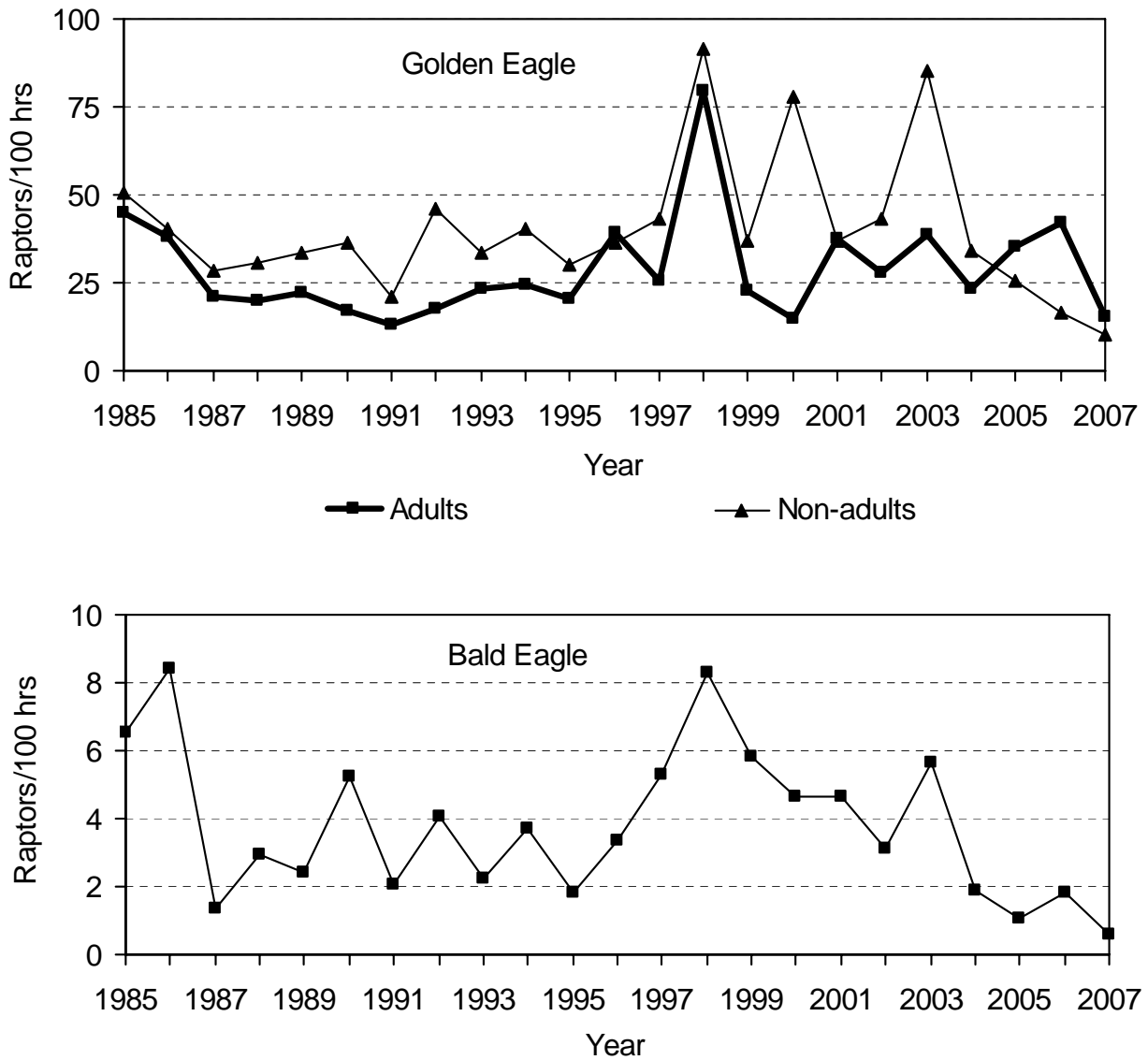


Figure 6. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) spring-migration passage rates for Golden and Bald Eagles in the Sandia Mountains, NM: 1985–2007. Dashed lines indicate significant ($P \leq 0.10$) linear or quadratic regressions.

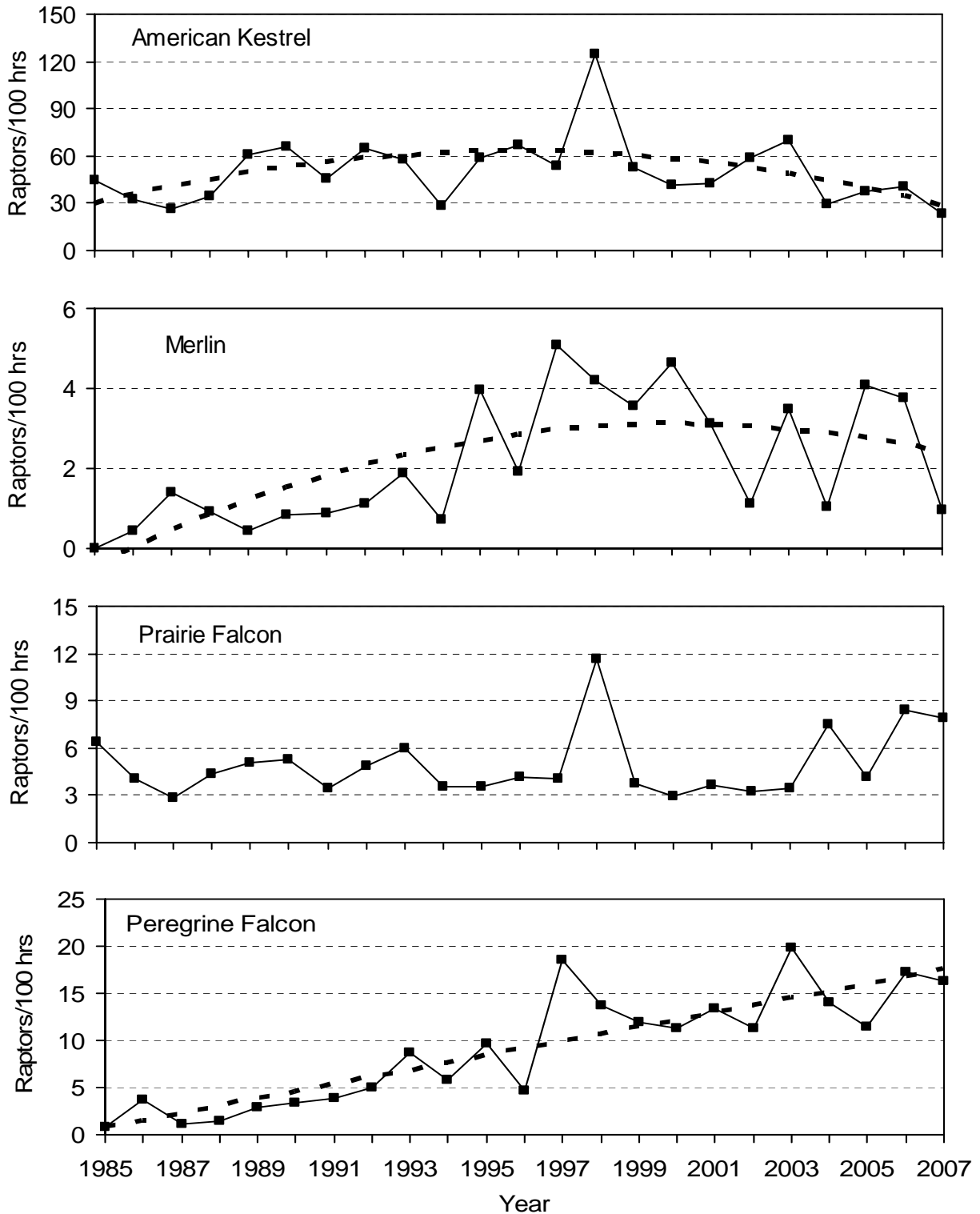


Figure 7. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) spring-migration passage rates for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons in the Sandia Mountains, NM: 1985–2007. Dashed lines indicate significant ($P \leq 0.10$) linear or quadratic regressions.

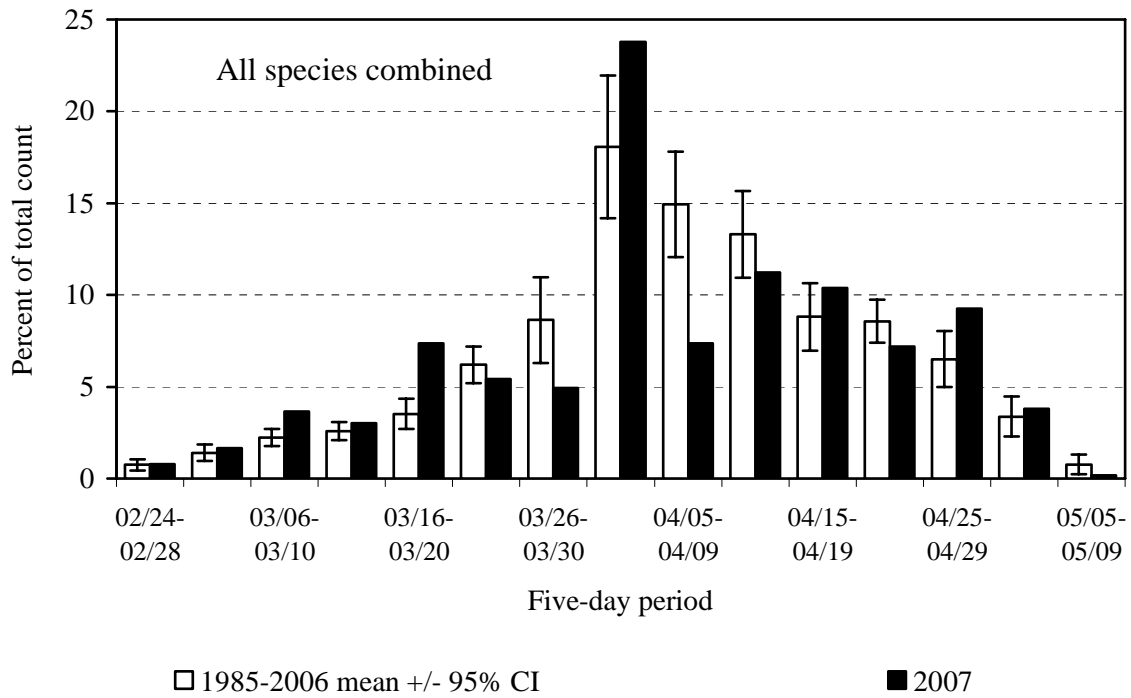


Figure 8. Combined-species, spring-migration passage volume by five-day periods for raptors in the Sandia Mountains, NM: 1985–2006 versus 2007.

Appendix A. History of official observer participation in the Sandia Mountains Raptor Migration Project: 1985–2007.

- 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)
- 2005 Two observers throughout: Ken Babcock (3), Eileen Müller (1), Octavio Cruz (2)
- 2006 Two observers throughout: Alberto Martinez (3), Ingrid Verhoeckx (0), and Ken Babcock (4; substitute throughout)
- 2007 Two observers throughout: Graeme Davis (0), Shawn Thietten (0), and Ken Babcock (4+)

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
Common Black Hawk	<i>Buteogallus anthracinus</i>	CB	A I U	U	NA
Broad-winged Hawk	<i>Buteo platypterus</i>	BW	A I U	U	D L U
Swanson's Hawk	<i>Buteo swainsoni</i>	SW	U	U	D L U
Red-tailed Hawk	<i>Buteo jamaicensis</i>	RT	A I U	U	D L U
Ferruginous Hawk	<i>Buteo regalis</i>	FH	A I U	U	D L U
Rough-legged Hawk	<i>Buteo lagopus</i>	RL	U	U	D L U
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: 2007.

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
24-Feb	7.67	3.0	0	clr, dust, PM rain	27.6	w-wnw	4.0	30.65	4	100	93	1	0.4
25-Feb	8.25	2.6	0	clr-ovc	9.3	sw-wnw	9.9	30.66	4	100	88	2	1.0
26-Feb	8.00	2.0	0	clr, dust	14.0	sw-wnw	13.3	30.71	3	100	77	2	0.8
27-Feb	8.17	1.9	0	clr-pc, dust	12.8	sw-wnw	14.1	30.68	3	100	83	2	0.1
28-Feb	8.25	1.8	0	clr-pc, dust	27.1	sw-wnw	7.0	30.43	4	24	39	-	0.0
1-Mar	8.00	3.0	0	clr-pc	20.9	w-wnw	2.8	29.76	3	100	94	2	0.3
2-Mar	8.25	1.5	0	clr-ovc	20.2	wsw-nw	3.4	29.81	4	100	99	2	0.7
3-Mar	8.00	2.1	0	clr	11.0	sw-wnw	4.8	30.14	2	100	94	2	1.3
4-Mar	8.50	2.3	0	clr	4.0	se/calm, w-wnw	10.8	30.46	3	100	94	2	1.6
5-Mar	8.00	1.8	0	clr-ovc	0.4	sw-w/calm	14.6	30.32	4	94	83	2	0.8
6-Mar	8.17	1.9	0	clr-mc	9.2	w	16.4	30.23	3	99	92	2	2.4
7-Mar	8.00	2.1	0	clr-ovc	11.2	w-wnw	19.2	30.24	2	96	93	2	1.9
8-Mar	8.00	1.8	0	ovc-pc, scat fog/rain	13.3	calm, w-nw	14.1	30.08	4	94	89	2	1.4
9-Mar	8.00	2.0	0	clr	4.3	sw-w	17.6	30.18	3	99	87	2	1.4
10-Mar	8.00	3.2	0	ovc	12.7	wsw-wnw	15.1	30.11	4	100	95	2	3.4
11-Mar	7.50	2.3	0	clr-ovc	10.8	ese-se	13.4	30.24	4	100	96	2	0.4
12-Mar	8.00	2.4	0	clr-ovc	8.1	se-sse/var	15.9	30.23	3	99	87	2	1.0
13-Mar	9.00	1.9	0	clr	9.0	w-nw	15.4	30.09	3	95	74	2	1.6
14-Mar	8.00	1.8	0	clr-ovc	14.6	wsw-nw	19.8	30.12	3	100	100	2	3.3
15-Mar	8.17	2.0	0	clr-pc	17.8	w-wnw	19.1	30.19	3	98	89	2	2.2
16-Mar	8.00	2.8	0	clr	7.9	calm/var, wsw-wnw	17.1	30.36	2	88	72	2	4.4
17-Mar	8.00	2.6	0	clr	7.4	calm, sw-nw	18.3	30.25	2	99	87	2	5.8
18-Mar	8.08	3.2	0	clr-ovc	5.0	sw-w/calm	18.2	30.09	3	98	80	2	5.9
19-Mar	8.25	1.8	0	ovc	2.9	calm/var, sw-w	19.4	30.12	3	100	83	2	2.4
20-Mar	9.08	1.9	0	clr-pc	10.6	sw-wsw	16.6	30.12	3	92	80	2	2.2
21-Mar	7.50	2.1	0	clr-ovc	8.6	ssw-wsw	17.0	30.07	4	99	81	2	2.7
22-Mar	8.00	2.5	0	pc-ovc, scat rain	9.3	calm, wsw-wnw	11.4	30.09	4	82	65	2	3.6
23-Mar	0.00			weather day									
24-Mar	0.00			weather day									
25-Mar	8.25	3.4	0	clr	5.3	sw-wnw	12.6	30.19	2	99	91	2	9.1
26-Mar	8.08	2.0	0	clr-pc	11.3	sw-wnw	13.4	30.09	3	100	95	2	2.6
27-Mar	8.17	1.8	0	clr	7.9	sw-w, ene-se	16.4	29.93	3	99	94	2	5.1
28-Mar	8.17	1.9	0	pc-ovc, scat snow	15.0	sw-w	7.3	29.81	4	97	77	2	2.1
29-Mar	8.08	3.1	0	pc-mc	10.6	sw-wnw	10.4	30.00	3	100	92	2	4.0
30-Mar	3.50	2.6	0	ovc, fog, blowing snow	17.0	e-se	4.7	30.02	4	67	67	3	0.3
31-Mar	8.17	2.9	0	clr	27.0	w-wnw	10.7	29.98	4	100	96	1	7.0
1-Apr	8.00	2.8	0	clr	7.9	sw-wnw	16.4	30.04	2	100	91	2	14.8
2-Apr	8.58	3.2	0	clr-ovc	18.5	sw-w	17.3	30.06	3	100	90	2	28.4
3-Apr	8.00	1.9	0	pc-ovc	5.4	sw-wnw	18.1	30.22	3	99	87	2	6.5
4-Apr	8.00	2.0	0	clr-pc	7.6	se-ssw, wsw-w	17.7	30.26	1	97	88	2	9.3
5-Apr	8.00	1.8	0	pc-ovc	12.1	wsw-wnw	16.8	30.14	3	100	80	2	9.3
6-Apr	5.00	1.9	0	mc-ovc	19.5	e-se	12.8	30.13	4	47	33	2	1.0
7-Apr	0.00			weather day									
8-Apr	8.17	3.2	0	mc-ovc	11.8	wsw-wnw	13.0	29.88	4	97	78	2	11.0
9-Apr	0.00			weather day									
10-Apr	8.00	2.0	0	ovc-clr, dust/snow	37.0	wnw-nw	11.2	29.74	4	97	58	2	2.8
11-Apr	7.92	1.9	0	clr-ovc	15.2	wnw-nw	9.0	29.91	4	100	98	2	4.9
12-Apr	6.67	2.4	0	ovc, PM snow	10.8	se-s/var	10.6	29.73	4	89	66	2	19.4
13-Apr	0.00			weather day									

Appendix C. continued

DATE	OBS. HOURS	OBSRVR / HOUR ¹	MEDIAN	PREDOMINANT WEATHER ³	WIND	WIND DIRECTION	TEMP (°C) ¹	BAROM.	MEDIAN	VISIB.	VISIB.	MEDIAN	BIRDS / HOUR
			VISITOR DISTURB ²		SPEED (KPH) ¹			PRESS. (IN HG) ¹	THERMAL LIFT ⁴	WEST (KM) ¹	EAST (KM) ¹	FLIGHT DISTANCE ⁵	
14-Apr	8.00	4.7	0	ovc-clr	8.6	w-wnw	8.4	30.17	3	79	62	2	8.4
15-Apr	8.17	4.1	0	clr	5.7	wsw/calm, se	15.7	30.01	2	100	96	3	15.2
16-Apr	8.00	1.8	0	clr-ovc	15.7	se-sse	16.2	29.92	4	99	77	2	2.9
17-Apr	8.00	1.9	0	clr-pc	16.3	sw-wnw	11.3	30.02	3	99	92	2	4.1
18-Apr	8.00	1.9	0	clr-pc	8.7	sw-wnw	16.8	29.97	1	100	92	2	3.9
19-Apr	8.33	1.9	0	clr	17.7	w-nw	13.2	29.92	3	94	74	2	3.2
20-Apr	8.17	2.0	0	clr-pc	6.2	sw-w, se/var	18.6	29.97	1	99	83	2	6.7
21-Apr	6.83	3.8	0	mc-ovc, PM snow	15.3	se/var, wsw-wnw	12.8	29.86	4	86	68	2	4.0
22-Apr	8.67	3.8	0	clr-ovc	5.0	sw-wsw	14.1	30.03	2	97	81	2	5.9
23-Apr	8.17	1.8	0	pc-ovc	12.1	se	16.8	29.92	4	100	94	2	3.9
24-Apr	0.00			weather day									
25-Apr	8.33	1.8	0	clr-pc	16.3	w-wnw	12.8	30.08	3	99	98	2	3.8
26-Apr	8.00	2.6	0	clr-pc	4.0	sw-w	17.2	30.01	1	100	93	2	10.0
27-Apr	8.25	1.9	0	clr-pc	6.0	calm, w-nw	19.4	30.19	1	99	89	2	6.8
28-Apr	8.00	2.4	0	pc-mc, AM fog	18.0	e-se	18.3	30.36	4	81	52	2	2.4
29-Apr	8.17	3.4	0	pc-ovc	12.9	se	18.8	30.25	4	89	51	2	3.1
30-Apr	8.00	1.8	0	ovc-pc	11.4	sw-wnw	19.8	30.04	3	97	77	2	2.5
1-May	5.00	1.8	0	clr-ovc, PM rain	19.0	e-se	20.0	30.10	3	99	84	-	1.0
2-May	3.75	1.0	0	ovc, PM rain	9.4	w-wnw	15.0	30.00	4	99	55	2	7.5
3-May	8.00	1.8	0	clr-pc	8.8	var, wsw	17.7	29.94	2	98	78	2	2.9
4-May	8.00	1.8	0	pc-ovc	11.8	wsw-w/var	18.4	29.81	3	98	84	2	1.4
5-May	8.00	2.3	0	ovc, AM snow	17.4	sw-wnw	9.3	29.67	4	81	52	1	0.5

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: 2007.

DATE	OBSERV.		SPECIES ¹																								BIRDS								
	HOURS	TV	OS	NH	WK	MK	SS	CH	NG	SA	LA	UA	CB	BW	SW	ZT	RT	FH	RL	UB	GE	BE	UE	AK	ML	PR	PG	AF	SF	LF	UF	UU	TOTAL	/HOUR	
24-Feb	7.67	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.4
25-Feb	8.25	0	0	0	0	0	1	1	1	2	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	8	1.0	
26-Feb	8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	1	0	0	0	1	0	0	0	0	0	0	0	6	0.8	
27-Feb	8.17	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	0	0	0	0	0	0	1	0.1	
28-Feb	8.25	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	8.00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.3	
02-Mar	8.25	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	6	0.7	
03-Mar	8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	1	3	0	0	0	0	1	0	0	0	0	0	0	10	1.3		
04-Mar	8.50	0	0	0	0	0	2	0	0	0	0	1	0	0	0	2	0	0	0	7	0	0	0	0	1	1	0	0	0	0	0	14	1.6		
05-Mar	8.00	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	6	0.8		
06-Mar	8.17	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	13	0	0	0	0	1	1	0	0	1	0	1	20	2.4		
07-Mar	8.00	0	0	0	0	0	1	2	0	0	0	0	0	0	0	3	0	0	0	6	0	0	0	0	2	0	0	0	0	0	1	15	1.9		
08-Mar	8.00	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	7	0	0	0	0	1	0	0	0	0	0	0	11	1.4		
09-Mar	8.00	0	0	0	0	0	0	1	0	2	0	0	0	0	0	3	0	0	1	2	0	0	1	0	0	0	0	0	1	0	0	11	1.4		
10-Mar	8.00	0	0	0	0	0	2	1	0	1	0	1	0	0	0	8	0	0	1	9	0	0	1	0	0	1	0	1	0	0	1	27	3.4		
11-Mar	7.50	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0.4		
12-Mar	8.00	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	8	1.0		
13-Mar	9.00	0	0	0	0	0	0	3	0	2	0	0	0	0	0	6	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	14	1.6		
14-Mar	8.00	0	1	0	0	0	6	5	0	3	0	2	0	0	0	4	0	0	0	3	0	0	0	0	1	1	0	0	0	0	0	26	3.3		
15-Mar	8.17	3	0	0	0	0	4	1	0	1	0	0	0	0	0	5	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	18	2.2		
16-Mar	8.00	5	0	0	0	0	4	6	0	7	0	1	0	0	0	8	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	35	4.4		
17-Mar	8.00	10	0	1	0	0	2	9	0	3	0	0	0	0	0	10	0	0	1	6	0	0	1	0	2	0	0	0	0	0	1	46	5.8		
18-Mar	8.08	18	0	2	0	0	1	5	0	4	0	3	0	0	0	11	0	0	0	2	0	0	0	0	1	0	0	0	0	1	0	48	5.9		
19-Mar	8.25	2	0	1	0	0	1	4	0	1	0	0	0	0	0	8	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	20	2.4		
20-Mar	9.08	3	0	1	0	0	0	3	0	3	0	0	0	0	0	5	0	0	0	2	0	0	1	0	0	1	0	0	0	0	1	20	2.2		
21-Mar	7.50	6	0	2	0	0	0	1	0	1	0	0	0	0	0	7	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	20	2.7		
22-Mar	8.00	11	1	0	0	0	3	2	0	0	0	0	0	0	0	6	0	0	0	1	0	0	1	0	0	3	0	0	0	0	1	29	3.6		
23-Mar	0.00																																		
24-Mar	0.00																																		
25-Mar	8.25	36	0	2	0	0	2	13	1	8	0	0	0	0	0	3	0	0	0	4	0	0	3	0	0	1	0	0	0	0	2	75	9.1		
26-Mar	8.08	0	0	2	0	0	4	9	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	21	2.6		
27-Mar	8.17	15	0	1	0	0	2	7	0	3	0	1	0	0	0	4	0	0	0	3	0	0	4	0	0	1	0	0	0	0	1	42	5.1		
28-Mar	8.17	2	1	0	0	0	1	4	0	1	0	0	0	0	0	3	0	0	0	2	0	0	1	0	0	0	0	0	0	1	1	17	2.1		
29-Mar	8.08	2	0	3	0	0	5	14	0	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	32	4.0		
30-Mar	3.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3		
31-Mar	8.17	25	2	0	0	0	2	4	1	5	0	4	0	0	0	4	0	0	0	4	0	0	0	0	0	4	0	0	0	2	0	57	7.0		

Appendix D. continued

DATE	OBSERV.		SPECIES ¹																								BIRDS									
	HOURS	TV	OS	NH	WK	MK	SS	CH	NG	SA	LA	UA	CB	BW	SW	ZT	RT	FH	RL	UB	GE	BE	UE	AK	ML	PR	PG	AF	SF	LF	UF	UU	TOTAL	/HOUR		
01-Apr	8.00	70	2	0	0	0	5	18	0	4	0	1	0	0	0	7	0	1	3	1	0	0	0	0	0	1	0	0	0	0	5	118	14.8			
02-Apr	8.58	121	4	0	0	0	5	45	0	22	0	5	0	0	2	0	22	0	0	0	2	0	0	5	0	4	2	0	0	1	1	3	244	28.4		
03-Apr	8.00	2	1	5	0	0	4	20	0	3	0	1	0	0	2	0	5	0	0	1	2	0	0	3	0	1	2	0	0	0	0	0	52	6.5		
04-Apr	8.00	10	1	5	0	0	3	14	0	5	0	9	0	0	1	0	5	0	0	1	0	0	0	15	0	2	1	0	0	0	0	2	74	9.3		
05-Apr	8.00	2	1	4	0	0	5	29	0	14	0	3	0	0	0	5	0	0	0	1	0	0	1	0	1	4	0	0	1	1	2	74	9.3			
06-Apr	5.00	1	0	1	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1.0			
07-Apr	0.00																																			
08-Apr	8.17	6	2	1	0	0	6	51	0	5	0	1	0	0	0	7	0	0	0	0	0	0	0	1	0	1	7	0	0	2	0	0	90	11.0		
09-Apr	0.00																																			
10-Apr	8.00	1	2	0	0	0	0	8	0	4	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	22	2.8			
11-Apr	7.92	1	1	1	0	0	6	24	0	2	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	39	4.9		
12-Apr	6.67	6	5	10	0	0	10	58	1	18	0	7	0	0	1	0	5	0	0	1	2	0	0	1	0	0	2	0	1	0	0	1	129	19.4		
13-Apr	0.00																																			
14-Apr	8.00	4	1	2	0	0	10	26	0	7	0	0	0	0	2	0	8	0	0	0	1	0	0	4	1	0	1	0	0	0	0	0	67	8.4		
15-Apr	8.17	11	3	5	0	0	10	46	0	12	0	2	0	0	6	0	7	0	0	5	3	0	0	7	2	0	2	0	0	0	0	3	124	15.2		
16-Apr	8.00	0	1	0	0	0	1	11	0	2	0	1	0	0	1	0	3	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	23	2.9		
17-Apr	8.00	13	0	1	0	0	1	11	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	0	33	4.1		
18-Apr	8.00	4	2	0	0	0	1	14	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	0	0	0	0	0	3	31	3.9		
19-Apr	8.33	6	0	1	0	0	6	7	0	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	2	0	0	0	0	1	27	3.2		
20-Apr	8.17	14	1	1	0	0	2	16	0	2	0	3	0	0	4	0	4	0	0	0	1	0	0	2	0	0	3	0	0	0	2	0	55	6.7		
21-Apr	6.83	0	3	0	0	0	6	5	0	2	0	0	0	1	2	0	0	0	0	2	2	0	0	2	0	0	2	0	0	0	0	0	27	4.0		
22-Apr	8.67	7	3	5	0	0	6	10	0	2	2	2	0	0	4	0	3	0	0	1	2	0	0	2	0	0	1	0	0	1	0	0	51	5.9		
23-Apr	8.17	7	0	0	0	0	4	8	0	1	0	0	0	0	3	0	2	0	0	1	0	0	0	0	0	4	0	0	1	0	1	32	3.9			
24-Apr	0.00																																			
25-Apr	8.33	14	0	1	0	0	5	5	0	1	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	1	32	3.8		
26-Apr	8.00	13	1	1	0	0	24	11	0	1	0	5	0	0	2	0	3	0	0	2	3	0	0	11	0	1	0	0	0	0	0	2	80	10.0		
27-Apr	8.25	6	1	1	0	0	7	18	0	4	2	6	0	0	1	0	1	1	0	1	2	0	0	3	0	1	1	0	0	0	0	0	56	6.8		
28-Apr	8.00	9	1	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	1	2	0	0	0	0	0	1	0	0	0	0	1	19	2.4		
29-Apr	8.17	16	1	1	0	0	1	1	0	2	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	3.1	
30-Apr	8.00	2	1	0	0	0	4	8	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	20	2.5		
01-May	5.00	3	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1.0		
02-May	3.75	5	1	0	0	0	10	4	0	0	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	28	7.5		
03-May	8.00	0	0	0	0	0	9	5	0	4	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	23	2.9			
04-May	8.00	1	0	0	0	0	4	1	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	11	1.4		
05-May	8.00	3	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	0	0	0	0	4	0.5		
Total	509.42	496	44	61	0	0	209	574	4	177	5	74	0	2	33	0	223	4	1	25	124	2	0	75	4	33	62	0	2	10	9	39	2292	4.5		

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: 1985–2007.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
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
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
Days of observation	73	78	69	65	56	61	83	84	75	69	67	68	70	68	66
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
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
SPECIES	Raptor Counts														
Turkey Vulture	641	814	559	1070	1380	1322	1246	1785	1327	1463	1217	1552	2531	3245	1427
Osprey	27	24	39	38	64	38	34	70	100	67	71	62	103	138	67
Northern Harrier	55	59	42	71	72	50	46	85	75	46	35	55	47	94	62
White-tailed Kite	0	0	1	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
TOTAL KITES	0	0	2	0	0	0	0	0	1	0	0	0	1	0	0
Sharp-shinned Hawk	473	476	435	498	664	283	294	807	428	280	448	905	1280	772	386
Cooper's Hawk	454	709	521	498	1277	620	718	1050	1562	956	771	655	836	1157	670
Northern Goshawk	22	14	14	4	6	10	7	12	24	12	16	5	18	12	3
Unknown small accipiter ¹	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Unknown large accipiter ¹	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Unknown accipiter	90	56	88	70	123	65	59	201	95	55	61	73	70	5	30
TOTAL ACCIPIERS	1039	1255	1058	1070	2070	978	1078	2070	2109	1303	1296	1638	2204	1946	1089
Common Black-Hawk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Broad-winged Hawk	1	1	0	2	5	2	2	6	7	4	7	7	19	20	2
Swainson's Hawk	47	32	41	43	38	40	42	60	52	30	50	61	59	114	45
Zone-tailed Hawk	1	2	0	3	5	4	2	3	1	0	0	0	3	2	2
Red-tailed Hawk	280	241	183	182	357	289	353	390	461	325	377	356	338	662	220
Ferruginous Hawk	11	8	11	13	9	18	16	12	11	12	20	17	11	23	7
Rough-legged Hawk	0	2	0	1	1	0	0	0	1	0	0	0	0	1	0
Unidentified buteo	6	4	10	9	40	3	15	32	5	5	14	9	6	2	15
TOTAL BUTEOS	346	290	245	253	455	356	430	503	538	376	468	450	436	824	291
Golden Eagle	441	432	213	205	255	218	198	338	300	310	255	441	352	897	304
Bald Eagle	20	37	5	7	7	13	18	17	9	12	7	14	22	27	18
Unidentified Eagle	4	0	0	1	0	0	4	2	0	0	0	0	0	0	2
TOTAL EAGLES	465	469	218	213	262	231	220	357	309	322	262	455	374	924	324
American Kestrel	147	127	96	118	225	209	182	275	250	112	226	308	233	497	198
Merlin	0	2	5	3	2	3	4	5	9	3	18	10	24	19	15
Prairie Falcon	29	27	17	16	23	21	21	28	33	16	17	23	19	59	18
Peregrine Falcon	5	18	6	7	13	13	20	25	47	26	47	27	91	72	56
Aplomado Falcon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown small falcon ¹	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Unknown large falcon ¹	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Unknown falcon	2	0	5	2	5	2	5	3	3	0	0	1	7	1	4
TOTAL FALCONS	183	174	129	146	268	248	232	336	342	157	308	369	374	648	291
Unidentified raptor	44	27	54	45	82	65	45	142	29	28	53	30	14	7	10
ALL SPECIES	2800	3112	2346	2906	4653	3288	3331	5348	4830	3762	3710	4611	6084	7826	3561

Appendix E. continued

	2000	2001	2002	2003	2004	2005	2006	2007	Mean
Start date	23-Feb	22-Feb	22-Feb	22-Feb	26-Feb	24-Feb	24-Feb	24-Feb	19-Feb
End date	5-May	5-May	3-May	5-May	5-May	8-May	5-May	5-May	5-May
Days of observation	67	67	67	69	65	73	70	65	70
Hours of observation	476.50	543.17	527.75	590.00	552.92	611.51	621.42	509.42	541.96
Raptors / 100 hours	832.7	685.1	624.0	937.8	586.2	508.7	596.9	449.9	746.7
SPECIES	RAPTOR COUNTS								
Turkey Vulture	1305	1328	1227	2128	1285	921	1151	496	1407
Osprey	76	81	38	79	77	64	70	44	65
Northern Harrier	56	52	55	59	55	44	69	61	58
White-tailed Kite	0	0	0	0	0	0	0	0	0
Mississippi Kite	0	0	0	0	0	1	0	0	0
TOTAL KITES	0	0	0	0	0	1	0	0	0
Sharp-shinned Hawk	391	311	337	459	372	390	540	209	509
Cooper's Hawk	922	556	506	797	561	486	677	574	768
Northern Goshawk	2	9	7	31	12	8	8	4	12
Unknown small accipiter ¹	–	0	8	6	2	44	29	177	15
Unknown large accipiter ¹	–	1	1	1	5	7	9	5	4
Unknown accipiter	96	90	16	3	6	82	35	74	67
TOTAL ACCIPITERS	1411	967	875	1297	958	1017	1298	1043	1361
Common Black-Hawk	0	0	0	0	0	1	0	0	0
Broad-winged Hawk	19	3	4	12	4	2	5	2	6
Swainson's Hawk	50	43	54	111	62	66	68	33	55
Zone-tailed Hawk	10	1	3	3	0	4	4	0	2
Red-tailed Hawk	353	451	321	663	224	282	296	223	346
Ferruginous Hawk	11	12	7	17	5	6	6	4	12
Rough-legged Hawk	1	0	1	2	0	1	0	1	1
Unidentified buteo	21	10	1	3	14	16	20	25	12
TOTAL BUTEOS	465	520	391	811	309	378	399	288	434
Golden Eagle	417	391	366	689	307	348	351	124	365
Bald Eagle	13	18	12	23	6	4	7	2	14
Unidentified Eagle	0	1	0	0	0	0	0	0	1
TOTAL EAGLES	430	410	378	712	313	352	358	126	380
American Kestrel	143	165	205	299	128	163	181	75	204
Merlin	19	14	5	17	5	20	22	4	10
Prairie Falcon	13	20	16	20	35	21	47	33	25
Peregrine Falcon	49	64	52	105	73	62	97	62	44
Aplomado Falcon	1	0	0	0	0	0	0	0	0
Unknown small falcon ¹	–	–	0	0	0	7	1	2	1
Unknown large falcon ¹	–	–	0	0	3	3	4	10	2
Unknown falcon	0	6	2	0	0	0	3	9	2
TOTAL FALCONS	225	269	280	441	244	276	355	195	286
Unidentified raptor	0	94	49	6	0	58	9	39	40
ALL SPECIES	3968	3721	3293	5533	3241	3111	3709	2292	4032

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: 2007.

DATE	HOURS	SS ¹	CH	RT	ML	PG	TOTAL	CAPTURES/HR
09-Mar	6.75	1	0	0	0	0	1	0.1
10-Mar	7.50	0	0	0	0	0	0	0.0
11-Mar	4.00	0	0	0	0	0	0	0.0
12-Mar	6.50	0	0	0	0	0	0	0.0
13-Mar	8.25	3	3	0	0	0	6	0.7
14-Mar	7.00	0	3	0	0	0	3	0.4
15-Mar	8.00	0	3	0	0	0	3	0.4
16-Mar	7.75	1	1	0	0	0	2	0.3
17-Mar	7.50	0	2	0	0	0	2	0.3
18-Mar	8.00	0	1	0	0	0	1	0.1
19-Mar	7.00	0	0	1	0	0	1	0.1
20-Mar	8.00	0	5	0	0	1	6	0.8
21-Mar	6.00	0	0	0	0	0	0	0.0
22-Mar	2.50	0	0	0	0	0	0	0.0
23-Mar	0.00							
24-Mar	0.00							
25-Mar	8.75	2	4	0	0	0	6	0.7
26-Mar	8.25	1	4	0	0	0	5	0.6
27-Mar	7.25	0	3	0	0	0	3	0.4
28-Mar	4.00	0	2	0	0	0	2	0.5
29-Mar	8.00	0	3	0	0	0	3	0.4
30-Mar	0.00							
31-Mar	0.00							
1-Apr	7.75	2	13	0	0	0	15	1.9
2-Apr	9.00	0	11	0	0	0	11	1.2
3-Apr	6.25	0	5	0	0	0	5	0.8
4-Apr	8.50	0	10	0	0	0	10	1.2
5-Apr	8.00	1	12	0	0	0	13	1.6
6-Apr	0.00							
7-Apr	0.00							
8-Apr	5.25	0	6	0	0	2	8	1.5
9-Apr	0.00							
10-Apr	1.00	0	0	0	0	0	0	0.0
11-Apr	7.00	1	9	0	0	0	10	1.4
12-Apr	0.00							
13-Apr	0.00							
14-Apr	6.25	0	7	1	0	0	8	1.3
15-Apr	7.75	1	7	0	0	0	8	1.0
16-Apr	6.50	0	2	0	0	0	2	0.3
17-Apr	7.50	0	3	0	0	0	3	0.4
18-Apr	8.25	1	7	0	1	0	9	1.1
19-Apr	8.00	1	2	0	0	0	3	0.4
20-Apr	8.00	0	4	0	0	0	4	0.5
21-Apr	6.25	0	0	0	0	0	0	0.0
22-Apr	9.00	2	4	0	0	0	6	0.7
23-Apr	7.50	0	1	0	0	1	2	0.3
24-Apr	0.00							
25-Apr	6.50	0	0	0	0	0	0	0.0
26-Apr	8.25	6	4	0	0	0	10	1.2
27-Apr	7.50	4	1	0	0	0	5	0.7
28-Apr	6.50	0	1	0	0	0	1	0.2
29-Apr	6.00	0	0	0	0	0	0	0.0
30-Apr	7.00	1	3	0	0	0	4	0.6
1-May	4.00	0	0	0	0	0	0	0.0
Total	363.80	28	146	2	1	4	181	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: 1990–2007.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
First day	21-Mar	17-Mar	–	14-Mar	10-Mar	10-Mar	10-Mar	10-Mar	10-Mar	10-Mar
Last day	8-May	7-May	–	3-May	26-Apr	28-Apr	29-Apr	5-May	3-May	2-May
Number of stations	1	1	0	1	1	1	1	1	2	2
Trapping days	36	45	0	43	34	40	46	48	46	47
Station days	36	45	0	43	34	40	46	48	65	63
Station hours	249.42	269.05	0	300.03	235.60	319.83	372.58	377.58	486.28	453.33
SPECIES	RAPTOR CAPTURES									
Northern Harrier	0	0	–	0	0	3	0	1	3	2
Sharp-shinned Hawk	21	22	–	33	32	44	132	139	100	56
Cooper’s Hawk	83	66	–	211	243	197	259	195	200	165
Northern Goshawk	2	0	–	1	3	2	2	4	1	0
Broad-winged Hawk	0	0	–	0	1	0	0	0	0	0
Swainson’s Hawk	1	0	–	0	0	0	0	1	1	0
Red-tailed Hawk	3	3	–	9	16	13	16	5	9	2
Zone-tailed Hawk	0	0	–	0	0	0	0	0	1	0
American Kestrel	2	0	–	3	2	2	26	14	22	10
Merlin	0	0	–	0	0	2	2	3	3	2
Prairie Falcon	0	0	–	1	1	2	3	3	2	0
Peregrine Falcon	1	0	–	0	2	6	4	7	2	2
All species	113	91	–	258	300	271	444	372	344	239
Captures / 100 stn hrs	45.3	33.8	–	86.0	127.3	84.7	119.2	98.5	70.7	52.7
Recaptures ¹	0	1	–	1	2	3	4	2	3	3
Foreign recaptures ²	0	0	–	2	3	0	4	2	6	5
Foreign encounters ³	2	1	0	0	2	0	5	2	3	3

Appendix G. continued

	2000	2001	2002	2003	2004	2005	2006 ⁴	2007	TOTAL	MEAN
First day	12-Mar	10-Mar	10-Mar	16-Mar	13-Mar	–	12-Mar	9-Mar	–	11-Mar
Last day	28-Apr	27-Apr	27-Apr	21-Apr	28-Apr	–	2-May	1-May	–	29-Apr
Number of stations	1	1	1	1	1	0	1	1	–	1
Trapping days	41	53	41	19	41	0	50	44	669	42
Station days	41	44	45	19	41	0	50	44	704	44
Station hours	278.65	314.92	320.76	115.54	309.57	0	366.05	304.50	5073.69	317.11
SPECIES	RAPTOR CAPTURES									
Northern Harrier	0	0	0	0	0	–	0	0	9	1
Sharp-shinned Hawk	30	28	32	4	20	–	31	28	751	47
Cooper's Hawk	164	206	194	48	114	–	141	146	2633	165
Northern Goshawk	0	1	3	2	1	–	0	0	22	1
Broad-winged Hawk	0	0	0	0	0	–	0	0	1	0
Swainson's Hawk	0	1	0	0	0	–	0	0	4	0
Red-tailed Hawk	3	20	8	4	7	–	4	2	124	8
Zone-tailed Hawk	0	0	1	0	0	–	0	0	2	0
American Kestrel	5	4	14	1	1	–	4	0	110	7
Merlin	1	0	0	0	0	–	0	1	14	1
Prairie Falcon	2	5	2	0	1	–	0	0	22	1
Peregrine Falcon	1	4	0	2	0	–	5	4	40	3
All species	206	269	254	61	144	–	185	181	3732	233
Captures / 100 stn hrs	73.9	85.4	79.2	52.8	46.5	–	50.5	59.4	73.6	72.9
Recaptures ¹	2	4	0	0	1	–	0	0	25	2
Foreign recaptures ²	1	3	1	1	2	–	1	0	31	2
Foreign encounters ³	1	3	5	4	2	0	3	1	39	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 recovered elsewhere.