FALL 2015 RAPTOR MIGRATION ANNUAL REPORT: MANZANOS HAWKWATCH, CENTRAL NEW MEXICO

HawkWatch International, Inc.

Salt Lake City, Utah

May 2016

FALL 2015 RAPTOR MIGRATION ANNUAL REPORT:

MANZANOS HAWKWATCH, CENTRAL NEW MEXICO

Report prepared by:

Dave Oleyar, Jesse Watson, and Neil Paprocki

Counts conducted by:

Olivia DeRugna, Istvan Balasz, Phil Kavouriaris, Keelan Dann, Roger Grimshaw, and Steve deLaPena

Trapping and banding efforts led by:

James Butch and Walt Lehman,

Project coordinated by:

HawkWatch International, Inc.

Principal Investigator: Dr. Dave Oleyar

2240 South 900 East, Salt Lake City, UT 84106

(801) 484-6808

May 2016

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The Manzanos HawkWatch in central New Mexico is an ongoing effort to monitor long-term regional population trends of diurnal raptors that migrate through the southern portion of the Rocky Mountain flyway (Hoffman et al. 2002, Hoffman and Smith 2003, Smith et al. 2008a). HawkWatch International (HWI) initiated standardized counts of the autumn raptor migration at the Manzanos in 1985, and began a trapping and banding program in 1990. To date, HWI observers have recorded 18 species of migratory raptors at the site, with counts typically ranging between 4,000 and 7,000 migrants per season. The 2015 season marked the 31st consecutive count and the 26th consecutive season of trapping and banding efforts. This report summarizes the 2015 fall raptor migration season for the Manzanos HawkWatch.

The Manzanos HawkWatch was 1 of 8 long-term, annual migration counts and 1 of 4 migration-banding studies conducted or co-sponsored by HWI in North America during 2015 (Fig.1). The primary objective of these efforts is to track long-term population trends of diurnal raptors in western North America and around the Gulf Coast region (Hoffman and Smith 2003; Smith et al. 2001, 2008a, b). Raptors can serve as important biological indicators of ecosystem health (Bildstein 2001) and long-term migration counts are one of the most cost effective and efficient methods for monitoring the regional status and trends of multiple raptor species (Zalles and Bildstein 2000).

In addition to long-term counting and banding efforts, HWI conducts and supports other studies to further knowledge about the biology of migrating raptors. Some of these efforts include: telemetry work to identify species' ranges, migratory routes and connectivity; and blood and feather sampling to track changes in raptor health and populations (e.g., Hoffman et al. 2002, Lott and Smith 2006, Goodrich and Smith 2008, DeLong and Hoffman 2004, McBride et al. 2004).

Beyond having scientific and conservation value, each site in HWI's migration network offers unique opportunities for the public to learn about raptors and the natural environment. Providing such opportunities is another important component of the Manzanos HawkWatch and outreach efforts here reach hundreds of people from the Albuquerque area, central New Mexico, and beyond each season.

STUDY SITE

The HawkWatch is located in the Manzano Wilderness Area of the Cibola National Forest (Mountainair Ranger District) near Capilla Peak, approximately 56 km south-southeast of Interstate 40 (34°42.25' N, 106°24.67' W; Fig. 2). The observation point sits at an elevation of 2,805 m (9,195 ft) on a northwest-southeast facing outcrop of a limestone ridge. It is reached by walking up a 1.2 km trail from the main road leading up to Capilla Peak (FS 522). The vegetation on the slopes of the ridge consists of Gambel oak (Q*uercus gambelli*), Douglas-fir (*Pseudotsuga menziesii*), White fir (*Abies concolor*), Ponderosa pine (*Pinus ponderosa*), Pinyon pine (*Pinus edulis*), New Mexico locust (*Robinia neomexicana*), and Bigtooth maple (*Acer grandidentatum*).

Two banding stations were operated within 0.25–1 km of the observation point (Fig. 1). **North** station, operated every year since 1990, is located 100 m east and 50 m north of the observation point at an elevation of 2,790 m. **West** station, operated every year since 1991, is located 0.5 km southwest of the observation point at an elevation of 2,684 m.

Many factors make the Manzano Lookout well suited for observing consistent flights of fall migrating raptors. Several mountain ranges to the north serve as leading lines (Bildstein 2006), which cause raptors to funnel into the area. The Manzano Mountains are also a relatively narrow and well-defined north–south range, which creates beneficial updrafts and serves as a distinct flight path for migrating raptors. Capilla Peak provides an excellent source of orographic lift, with two other peaks located 10–15 km north of the observation site also attract southbound migrants that benefit from strong ridge updrafts. The

concentration effect of the Manzano range is further enhanced by the absence of parallel ranges nearby to serve as alternate flight paths.

METHODS

STANDARDIZED COUNTS

Weather permitting; two designated observers conducted standardized daily counts of migrating raptors from late August through late October. Observations typically began between 0800–0900 hrs and ended near 1700 hrs Pacific Standard Time (PST). Visitors occasionally assisted with the count.

Data collection followed standardized protocols used at all HWI migration sites (Hoffman and Smith 2003). The observers routinely recorded the following data:

1. Species, age, sex, and color morph of each migrant raptor, whenever possible and applicable (Appendix B lists common and scientific names for all species, information about the applicability of age, sex, and color morph distinctions, and two-letter codes used to identify species in tables and figures).
2. Hour of passage for each migrant; e.g., the 1000–1059 hrs PST.
3. Wind speed and direction, air temperature, percent cloud cover, predominant cloud type(s), presence of precipitation, visibility, and an assessment of thermal-lift conditions were recorded for each hour of observation on the half hour.
4. Predominant direction, altitude, and distance from the lookout of the flight during each hour.
5. Total minutes observed and the mean number of observers present during each hour (included designated observers plus volunteers/visitors who actively contributed to the count [active scanning, pointing out birds, recording data, etc.] for more than 10 minutes in a given hour), recorded on the hour.
6. A subjective visitor-disturbance rating for each hour, recorded on the hour.
7. Daily start and end times for each official observer.

In comparing 2015 counts against means and 95% confidence intervals for previous seasons, we consider a count value falling outside the 95% confidence interval of the historic site means as significantly different. Linear and quadratic regression was used on effort-adjusted annual passage rates (raptors/100hrs) to identify long-term trends in migrating raptors.

TRAPPING AND BANDING

Similar to the counts, trapping and banding efforts began late August and continued through late October at the two banding stations, generally between 0900–1700 hrs MST. Capture devices included mist nets and remotely triggered bow nets. Trappers lured migrating raptors into the capture stations from camouflaged blinds using live, non-native avian lures attached to lines manipulated from the blinds. Unless already banded, all captured birds were fitted with a uniquely numbered USGS Biological Resources Division aluminum leg band. Data collection followed standardized protocols used at all HWI migration-banding sites (Hoffman et al. 2002). All birds are released within 45 minutes of capture.

2015 RESULTS AND DISCUSSION

OBSERVATION EFFORT AND WEATHER SUMMARY

The Manzanos HawkWatch standard season runs 27 August—5 November; in 2015 observers counted on 66 of 71 possible days during this period for a total of 553.38 hours (Appendix C). Weather led to shortened counts (<4 hrs) on three days. Weather varies throughout every season, in 2015 based on hourly recording of conditions during observation it was clear 28% of the time; partly cloudy 21% of the time; mostly cloudy 26% of the time; overcast 24% of the time; hazy 24% of the time; foggy 7% of the time; and raining or snowing 6% of the time.

2015 FLIGHT SUMMARY

Overall Flight:

A total of 3,500 migrating raptors representing 17 species were counted in 2015, 35% lower than the site long-term average (Table 1). Highlights of the flight included a high season total for Broad-winged Hawks (18).

The flight consisted of 55% accipiters, 23% buteos, 10% falcons, 8% vultures, 2% harriers 1% eagles, and 1% Ospreys. The relative proportions of accipiters, ospreys, and harriers was high in 2015 compared to historic values; buteos and vultures were counted in proportions similar to historic averages; while falcons and eagles made up less of the flight than they typically do (Fig. 3). Sharp-shinned Hawks were the most abundant species (44% of the total), followed by Cooper's Hawks (13%), Red-tailed Hawks (11%), Swainson's Hawks (11%), Turkey Vultures (8%), and American Kestrels (8%). The remaining species each accounted for 1% or less of the total count (Table 1).

The following sections summarize the 2015 count relative to historic means at the site, and any statistically significant ($p < 0.05$) population trends based on first and second order regression analysis. HWI only depicts significant trends for species with a historic average count rate greater than or equal to 10 individuals per 100 hours. The rationale is that trends for counts below this point likely do not contain biologically useful information on regional populations—species with counts this low likely have a dispersed migration, another primary migration route, or large portions of the population that are resident. We do include count information in the reports, as occurrences of rarer species are of interest to both managers and the general public, and could represent the beginning of meaningful long-term changes.

Total Flight (Fig.4):

The 633 raptors counted per 100 hours of observation at the Manzanos HawkWatch in 2015 was significantly low from the site average of 1032 and was the lowest rate since 2009—the 2015 total flight (3500 birds) was also significantly below the site average (5375 birds) and was the lowest since 2009 (Table 1).

Vultures, Osprey, and Harriers (Fig. 5a):

Seasonal counts were average for Ospreys and Northern Harriers but below average for Turkey Vultures (Table 1). Effort-adjusted passage rates (raptors/100hrs) were average for Ospreys but below average for both Turkey Vultures and Northern Harriers. Long-term passage rates for these species are stable (no significant trend over time).

Accipiters (Fig. 5b):

Counts and passage rates for Cooper's Hawks and Northern Goshawks fell below historic averages while Sharp-shinned Hawks were average (Table 1). Cooper's Hawks are the only accipiter species with a significant trend in passage rates, increasing from 1985 to 1998, but declining in recent years ($F_{2,28} = 9.12$, $r^2 = 0.39$, $p = 0.005$).

Buteoine Hawks (Fig. 5c):

Crews counted above average numbers of Broad-winged Hawks in 2015 and effort-adjusted passage rates were also high. Swainson's Hawk counts and passage rates were consistent with the historic average. Count and passage rates for Feruginous Hawks, Red-tailed Hawks, and Rough-legged Hawks were all below average (Table 1). Long –term regression analysis indicates that Red-tailed Hawks counted during fall migration have been declining since 2003 ($F_{2,28} = 4.7$, $r^2 = 0.25$, $p = 0.039$.) No long-term trends were found for other Buteo species with mean passage rates >10 birds/100hrs. A single Zone-tailed Hawk was counted for the third consecutive season.

Eagles (Fig.5d):

Golden Eagle and Bald Eagle counts and passage rates were low compared to historic site average (Table 1). Although Golden Eagle passage rates have been stable over the life of the site, 2015 had the lowest Golden Eagle count and passage rate in Manzanos HawkWatch history.

Falcons (Fig. 5e):

The Merlin count and passage rate was above average in for the second season in a row, while Peregrine Falcon, Prairie Falcon, and American Kestrel rates were below average (Table 1). Peregrine Falcon counts and passage rates were the lowest since 1992. Prairie Falcon counts and passage rates were the lowest in Manzanos HawkWatch history (Appendix C). The American Kestrel count and effort-adjusted passage rate increased slightly from 2014 (the site record low) but numbers were still considerably low and have been below average since 2005 (Appendix C). Moreover, regional populations are declining based on fall migration passage rates (slope = -3.04, $r^2 = 0.52$, $p < 0.001$). Similar declines have been documented for this species across the HWI network and at other count sites. In response, HWI, along with many other North American researchers and Citizen Scientists are working to understand American Kestrel declines both locally (www.hawkwatch.org/our-work/kestrels) and at the continental scale and have partnered under the umbrella of the American Kestrel Partnership (http://kestrel.peregrinefund.org/).

TRAPPING EFFORT

Crews trapped for 59 days (totaling 440.8 hrs) between 28 August and 31 October, and captured 397 raptors of eight different species (Table 2). Both the number of hours trapped and capture totals were low compared to historic site averages (Appendix D). Season highlights included the capture of a hatch-year male Golden Eagle and 6 Peregrine Falcons (5 hatch-year and one after-second-year).

RECAPTURES

There were no in-house (HWI banded birds) or "foreign recaptures" (recaptures of birds banded elsewhere) at the site in 2015.

FOREIGN ENCOUNTERS WITH PREVIOUSLY BANDED BIRDS

A total of 183 birds banded at Manzano Mountains have been recovered/recaptured elsewhere and reported to the Bird Banding Laboratory (Fig. 6). In 2015 we received notice of four recoveries: one male Cooper's Hawk (banded as a hatch-year in 2014), and three, female Sharp-shinned Hawks (Table 3) (banded as hatch-years birds in 2002, 2012, and 2014). The Cooper's Hawk's band was reported in Jalisco, Mexico in early August but the bird's status was unknown. This bird was originally banded as a hatch-year in 1998. Two of the Sharp-shinned Hawks were found dead in New Mexico, one was killed by an unknown predator in January and the other died from an unkown cause in early May. The final Sharp-

shinned Hawk was captured in Puebla, Mexico in late March and it is unknown whether or not she was released.

SITE VISITATION

During the season, a total of 128 individuals visited the site, primarily from New Mexico. Visitors also traveled from Arizona, California, Florida, Illinois, Massachusetts, Tennessee, Texas, and Vermont. Visitors to the site get to see raptors in flight and in hand prior to release post- banding, learn to identify raptors in flight and also about raptor migration ecology and what banding and counting efforts can tell us about regional raptor populations and the health of the landscapes they use. They also learn about the ecosystems found around the Manzanos HawkWatch and are introduced/reminded about leave no trace outdoor ethics. The Jesuit Prep School from Dallas, Texas (12 students, 2 teachers) also visited the site to learn not only about raptor migration ecology, but also banding, counting and using data from HWI's sites to learn about science and statistics.

2015 FALL MIGRATION ACROSS HWI'S NETWORK

HawkWatch International and partners operated 8 fall count sites in 2015(Fig. 1). During the 4,252 hours of standardized observation we counted 700,457 migrating birds of prey. The power and utility of HWI's network of fall count sites, and long-term monitoring in general, lies in that it allows identification of patterns in regional raptor populations, both over time at a single site and also network-wide. Declines in counts or passage rates for a species or group of species at the regional level can highlight the need for more focused research or management attention at local scales, while increases may indicate the success of management and conservation efforts. While each site in HWI's network varied in terms of individual species or group counts, notable network-wide patterns in 2015 included (Table 2):

- Above average or average counts at 6 of 8 sites
    - Exceptions were Chelan Ridge and Manzano Mountain sites which had significantly low counts.
- Below average Golden Eagle counts at 6 of 8 sites—only above average count was at Commissary Ridge, WY
- Below historic average American Kestrel counts at 6 of 9 sites
- Significantly low counts of all accipiter species at both Pacific Northwest sites
- Significantly high Turkey Vulture counts at 5 of 7 sites where counted (record set at 3 sites: Chelan Ridge, Goshute Mountains, and Corpus Christi-where 170,976 were counted!)
- Above average or average Broad-winged Hawk numbers at all sites with record numbers at 3 sites (Chelan Ridge, Goshute Mountains, and Yaki Point).

HWI partners with Hawk Mountain Sanctuary, the Hawk Migration Association of North America (HMANA), and Bird Studies Canada (BSC) to provide western US data for the Raptor Population Index (RPI), a collaborative standardized effort to monitor raptor migration across North America.

.

ACKNOWLEDGMENTS

Financial support was provided by the USDA Forest Service – Cibola National Forest and Region 3, New Mexico Department of Game and Fish: Share with Wildlife Fund, REI, Hawk Migration Association of

North America, and HWI private donors and members. As always, we especially want to thank Zach Parsons, Karen Lessard, and Beverly DeGruyter of the U.S. Forest Service for providing financial and ongoing logistical support.

Special thanks to our local New Mexico community of volunteers for providing their long-term community and logistical support: Walt and Jennifer Lehman, Roger Grimshaw, Steve deLaPena, Renee Freeman, Sue Chavez & Peter Neils, Helen Haskell & Morris Albert, and Steve and Nancy Cox. These individuals not only give their personal time and financial support, but also do wonderful things for our crews. We also thank Wes Anderson and Steve & Nancy Cox for providing lure birds for our banding operations. Bobbie Posey, our New Mexico Office Administrator, deserves special thanks for the tremendous work she puts into local outreach and communication, and for her administrative and logistical support.

Finally, enormous thanks go to our 2015 field crew: James Butch, Olivia DeRugna, Phil Kavouriaris, Keelan Dann, Istvan Balasz, and Walt Lehman. Without your skill, dedication, and willingness to brave the elements over the course of a long field season these efforts would not be possible.

LITERATURE CITED

Bildstein, K. L. 2001. Why migratory birds of prey make great biological indicators. Pages 169–179 *in* K. L. Bildstein and D. Klem (Editors). Hawkwatching in the Americas. Hawk Migration Association of North America, North Wales, Pennsylvania, USA.

DeLong, J. P., and S. W. Hoffman. 2004. Fat stores of migrating Sharp-shinned and Cooper's Hawks in New Mexico. Journal of Raptor Research 38:163–168.

Farmer, C. J., L. J. Goodrich, E. Ruelas Inzunza, and J. P. Smith. 2008. Conservation status of North America's birds of prey. Pages 303–420 *in* K. L. Bildstein, J. P. Smith, E. Ruelas Inzunza, and R. R. Veit (Editors), State of North America's birds of prey. Series in Ornithology No. 3. Nuttall Ornithological Club, Cambridge, Massachusetts, and American Ornithologists' Union, Washington, DC.

Goodrich, L. J., and J. P. Smith. 2008. Raptor migration in North America. Pages 37–150 *in* K. L. Bildstein, J. P. Smith, E. Ruelas Inzunza, and R. R. Veit (Editors), State of North America's birds of prey. Series in Ornithology No. 3. Nuttall Ornithological Club, Cambridge, Massachusetts, and American Ornithologists' Union, Washington, DC.

Hoffman, S. W., and J. P. Smith. 2003. Population trends of migratory raptors in western North America, 1977–2001. Condor 105:397–419.

Hoffman, S. W., J. P. Smith, and T. D. Meehan. 2002. Breeding grounds, winter ranges, and migratory routes of raptors in the Mountain West. Journal of Raptor Research 36:97–110.

Katzner, T., B.W. Smith, T.A. Miller, D. Brandes, J. Cooper, M. Lanzone, D. Brauning, C. Farmer, S. Harding, D.E. Kramar, C. Koppie, C. Maisonneuve, M. Martell, E.K. Mojica, C. Todd, J.A. Tremblay, M. Wheeler, D.F. Brinker, T.E. Chubbs, R. Gubler, K. O'Malley, S. Mehus, B. Porter, R.P. Brooks, R.D. Watts, and K.L. Bildstein. 2012. Status, biology, and conservation priorities for North America's eastern Golden Eagle (*Aquila chrysaetos*) population. Auk 129:168-176.

Lott, C. A., and J. P. Smith. 2006. A geographic-information-system approach to estimating the origin of migratory raptors in North America using hydrogen stable isotope ratios in feathers. The Auk 123:822–835.

McBride, T. J., J. P. Smith, H. P. Gross, and M. Hooper. 2004. Blood-lead and ALAD activity levels of Cooper's Hawks (*Accipiter cooperii*) migrating through the southern Rocky Mountains. Journal of Raptor Research 38:118–124.

Smith, J. P., C. J. Farmer, S. W. Hoffman, G. S. Kaltenecker, K. Z. Woodruff, and P. Sherrington. 2008a. Trends in autumn counts of migratory raptors in western North America. Pages 217–252 *in* K. L. Bildstein, J. P. Smith, E. Ruelas Inzunza, and R. R. Veit (Editors), State of North America's birds of prey. Series in Ornithology No. 3. Nuttall Ornithological Club, Cambridge, Massachusetts, and American Ornithologists' Union, Washington, DC.

Smith, J. P., C. J. Farmer, S. W. Hoffman, C. A. Lott, L. J. Goodrich, J. Simon, C. Riley, and E. Ruelas Inzunza. 2008b. Trends in autumn counts of migratory raptors around the Gulf of Mexico, 1995–2005. Pages 253–278 *in* K. L. Bildstein, J. P. Smith, E. Ruelas Inzunza, and R. R. Veit (Editors), State of North America's birds of prey. Series in Ornithology No. 3. Nuttall Ornithological Club, Cambridge, Massachusetts, and American Ornithologists' Union, Washington, DC.

Zalles, J. I., and K. L. Bildstein (Editors). 2000. Raptor watch: a global directory of raptor migration sites. BirdLife Conservation Series No. 9. BirdLife International, Cambridge, United Kingdom, and Hawk Mountain Sanctuary Association, Kempton, Pennsylvania, USA.

Table 1. Historic fall migration counts (mean±95% CI), counts from fall 2015, and site records at the Manzano Mountains, NM.

		1985-2014					All-time Historic Records	
	Species	**Mean Count**	**±**	**95 % CI**	**2015**	**% Change**	**Season**	**Daily**
	Turkey Vulture	385.5	±	81.8	292	-24.3	1116 (1998)	256 (2012)
	Osprey	30.3	±	5.9	30	-0.9	86 (2003)	26 (2003)
	Northern Harrier	57.1	±	9.1	51	-10.6	133 (1998)	14 (1998)
Accipiters								
	Sharp-shinned Hawk	1464.7	±	151.6	1420	-3.1	2585 (1998)	194 (1996)
	Cooper's Hawk	964.4	±	122.6	469	-51.4	2025 (1998)	239 (1996)
	Northern Goshawk	16.3	±	3.1	3	-81.6	42 (2000)	6 (2x)
	Unidentified accipiter	112.8	±	19.6	39	-65.4	266 (1993)	
	TOTAL ACCIPITERS	2558.1	±	259.1	1931	-24.5	4736 (1998)	
Buteos								
	Broad-winged Hawk	8.2	±	1.8	18	120.4	19 (2012)	8 (2008)
	Swainson's Hawk	948.5	±	584.2	388	-59.1	7301 (1993)	5006 (1993)
	Red-tailed Hawk	615.1	±	61.1	384	-37.6	1151 (1998)	138 (1997)
	Ferruginous Hawk	11.9	±	1.7	2	-83.1	25 (1991)	4 (1991)
	Rough-legged Hawk	0.4	±	0.3	0	-100.0	3 (2014)	2 (2013)
	Unidentified buteo	22.6	±	7.8	16	-29.3	106 (2001)	
	TOTAL BUTEOS	1606.6	±	581.1	809	-49.6	7916 (1993)	
Eagles								
	Golden Eagle	115.1	±	11.3	43	-62.6	172 (1994)	19 (1994)
	Bald Eagle	3.5	±	0.9	1	-71.4	9 (1994)	2 (10x)
	Unknown eagles	1.3	±	0.8	1	-21.1	9 (2007)	
	TOTAL EAGLES	119.8	±	11.4	45	-62.4	181 (1994)	
Falcons								
	American Kestrel	479.4	±	65.7	267	-44.3	905 (1996)	158 (1993)
	Merlin	29.1	±	5.5	37	27.1	64 (2012)	8 (2014)
	Prairie Falcon	18.2	±	3.8	5	-72.5	58 (1998)	5 (1998)
	Peregrine Falcon	49.5	±	11.2	23	-53.6	127 (2002)	14 (2003)
	Unidentified falcon	4.3	±	1.7	3	-30.2	21 (2002)	
	TOTAL FALCONS	580.5	±	68.8	335	-42.3	1033 (1996)	
	Unidentified Raptor	36.6	±	13.8	7	-80.9	142 (1992)	
	GRAND TOTAL	**5375.3**	**±**	**705.6**	**3500**	**-34.9**	**11895 (1993)**	**5196 (1993)**

Table 2. Capture totals and rates for fall migrating raptors at the Manzanos HawkWatch in central New Mexico: 1991–2014 versus 2015.

	Capture Totals				Capture Rate[1]			
	1991-2014[2]		2015	Seasonal Record	1991-2014[2]		2015	Seasonal Record
Northern Harrier	3.7	± 1.3	3	14	0.5	± 0.1	0.7	1.0
Sharp-Shinned Hawk	438.3	± 79.6	227	987	57.6	± 5.5	51.5	79.4
Coopers Hawk	321.0	± 59.9	139	772	42.2	± 4.6	31.5	69.9
Northern Goshawk	4.4	± 1.4	0	16	0.6	± 0.2	0.0	2.0
Broad-winged Hawk	0.3	± 0.2	0	1	0.0	± 0.0	0.0	0.2
Swainson's Hawk	0.3	± 0.3	0	3	0.0	± 0.0	0.0	0.4
Red-tailed Hawk	43.8	± 9.4	14	112	5.8	± 0.9	3.2	9.6
Zone-Tailed Hawk	0.0	± 0.1	0	1	0.0	± 0.0	0.0	0.1
Golden Eagle	3.7	± 0.9	1	9	0.5	± 0.1	0.2	1.5
Bald Eagle	0.0	± 0.1	0	1	0.0	± 0.0	0.0	0.2
American Kestrel	28.8	± 9.5	2	92	3.5	± 0.9	0.5	8.9
Merlin	4.6	± 1.4	5	12	0.7	± 0.2	1.1	1.6
Prairie Falcon	3.3	± 1.1	0	13	0.4	± 0.1	0.0	1.0
Peregrine Falcon	5.2	± 1.6	6	13	0.7	± 0.2	1.4	1.8
All species	857.1	± 156.2	397	2005	112.4	± 10.5	90.1	163.0

[1]Captures / 100 station hours.

[2]Mean of annual values ± 95 % confidence interval.

Table 3. Foreign encounters with raptors originally banded at the Manzanos HawkWatch in central New Mexico: 2015.

Band #	Species[1]	Sex	Banding Date	Banding Age[2]	Encounter Location	Encounter Date	Distance (KM)[3]	Status
1783-90754	SSHA	F	23-Oct-14	HY	Las Cruces, New Mexico	7-Jan-15	268	Found dead - Killed by predator (other than cat)
1523-70643	SSHA	F	8-Sep-02	HY	San Francisco De Asis, Puebla, Mexico	28-Mar-15	1932	Caught by hand - Unknown whether released or in captivity
1623-22140	SSHA	F	15-Sep-12	HY	Angel Fire, New Mexico	10-May-15	201	Found dead - Unknown cause
1204-50755	COHA	M	8-Sep-98	HY	Cienega, Jalisco, Mexico	1-Aug-15	1562	Band reported - Bird status unknown

[1] Species: SSHA = Sharp-shinned Hawk; COHA = Cooper's Hawk.

[2] HY = hatch year.

[3] Straight-line distance from banding location.

Table 4. Summary of the 2015 fall flight of migrating raptors across HWI's monitoring network. Values are counts ; green indicates a count significantly higher (outside the 95% confidence interval) than the historic site average, red indicates a count significantly lower than average, and black indicates a count that does not differ from the site average. Asterisks denote a record high count. *In 2015 HWI*

	Bonney Butte, OR	Chelan Ridge, WA	Bridger Mtn, MT	Commissary Ridge, WY	Goshute Mts, NV	Yaki Pt, AZ	Manzano Mts, NM	Corpus Christi, TX
	Hours Counted in 2015							
Species	**365.7**	**338.8**	**399.1**	**532.5**	**679.8**	**568.3**	**553.4**	**814.8**
Black Vulture								186
Turkey Vulture	494	*81*	5	90	*1102*		292	*170976*
Osprey	67	28	*22*	39	162	*75*	30	194
Northern Harrier	24	73	141	*64*	239	55	51	169
Crested Caracara								4
Common Black Hawk								0
Harris' Hawk								2
Accipiters								
Sharp-shinned Hawk	964	367	*655*	1321	6769	2209	1420	1914
Cooper's Hawk	226	179	306	526	4418	1538	469	1094
Northern Goshawk	19	15	38	48	100	3	3	0
Unidentified accipiter	44	41	94	71	43	*728*	39	69
TOTAL ACCIPITERS	1253	602	*1093*	1966	11330	*4478*	1931	3077
Buteos								
Red-shouldered Hawk	1	0	0	0	0	0	0	23
Broad-winged Hawk	4	*16*	29	30	*336*	*47*	18	472276
Short-tailed Hawk								2
Swainson's Hawk	1	14	2	202	*2856*	138	388	2941
White-tailed Hawk								43
Zone-tailed Hawk							1	13
Red-tailed Hawk	614	139	*382*	1070	*6988*	*1723*	384	68
Ferruginous Hawk	0	0	6	3	21	8	2	4
Rough-legged Hawk	1	35	*96*	11	11	0	0	0
Unidentified buteo	3	30	29	47	15	68	16	9
TOTAL BUTEOS	624	234	*544*	1363	*10227*	*1984*	809	475379
Eagles								
Golden Eagle	56	60	1134	*359*	170	1	43	2
Bald Eagle	78	*16*	81	169	15	11	1	14
Unknown eagles	1	1	2	9	0	0	1	0
TOTAL EAGLES	135	77	1217	537	185	12	45	16
Falcons								
American Kestrel	8	16	*180*	189	1881	595	267	1171
Merlin	69	34	*36*	19	73	10	37	*117*
Prairie Falcon	4	7	6	11	37	6	5	4
Peregrine Falcon	12	7	21	8	45	9	23	146
Aplomado Falcon								0
Unidentified falcon	7	2	7	11	1	17	3	11
TOTAL FALCONS	100	66	*250*	238	2037	637	335	1449
Kites								
Hook-billed Kite								0
Swallow-tailed Kite								89
White-tailed Kite								5
Mississippi Kite								8506
Unidentified Kites								0
TOTAL KITES								8600
Unidentified Raptor	7	31	9	12	0	49	7	137
GRAND TOTAL	2704	1192	3281	4309	25282	*7290*	3500	660189

Figure 1. Locations of fall HawkWatch sites operated by HWI and partners (symbols with borders represent banding sites in 2015).

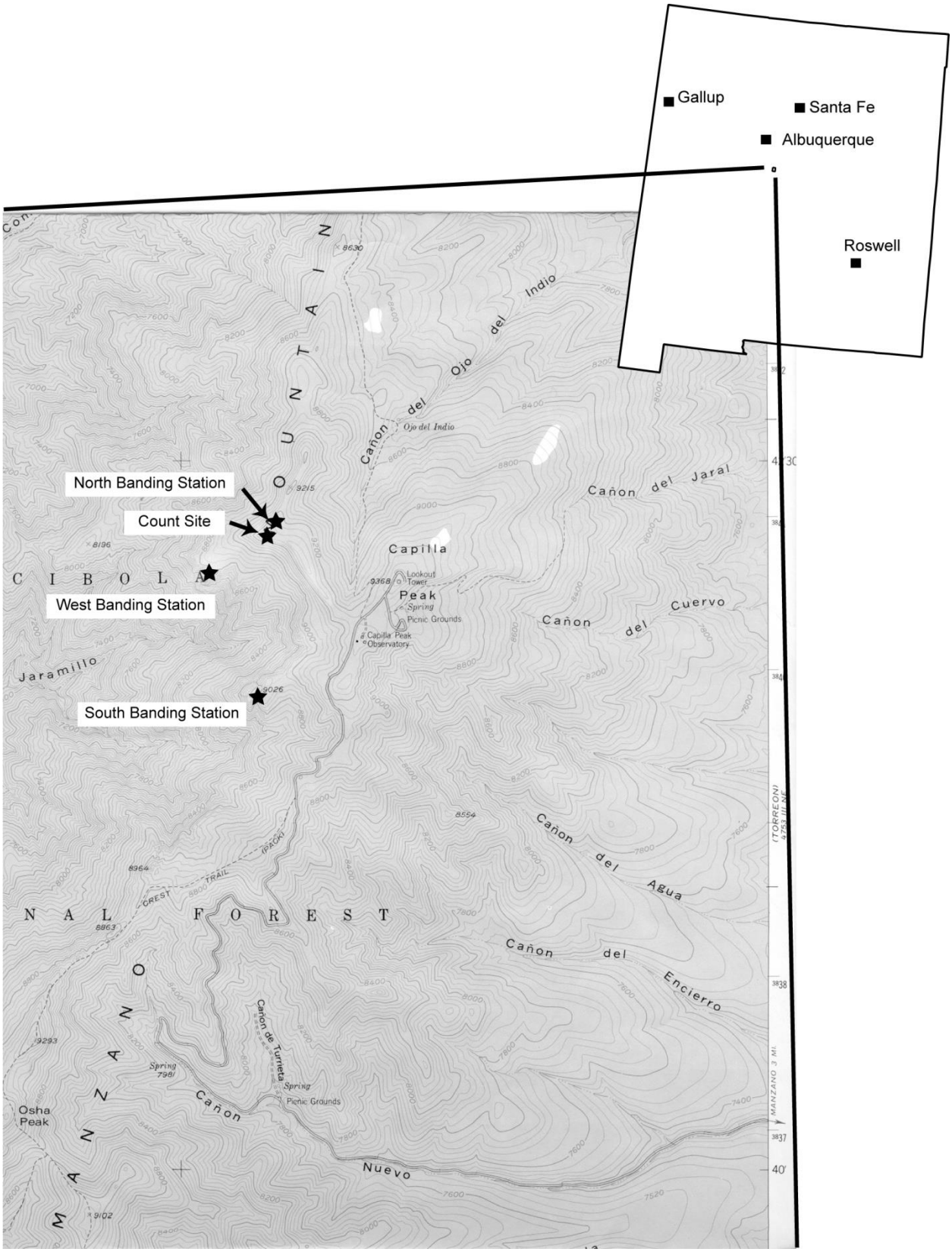

Figure 2. Location of the Manzanos HawkWatch in central New Mexico.

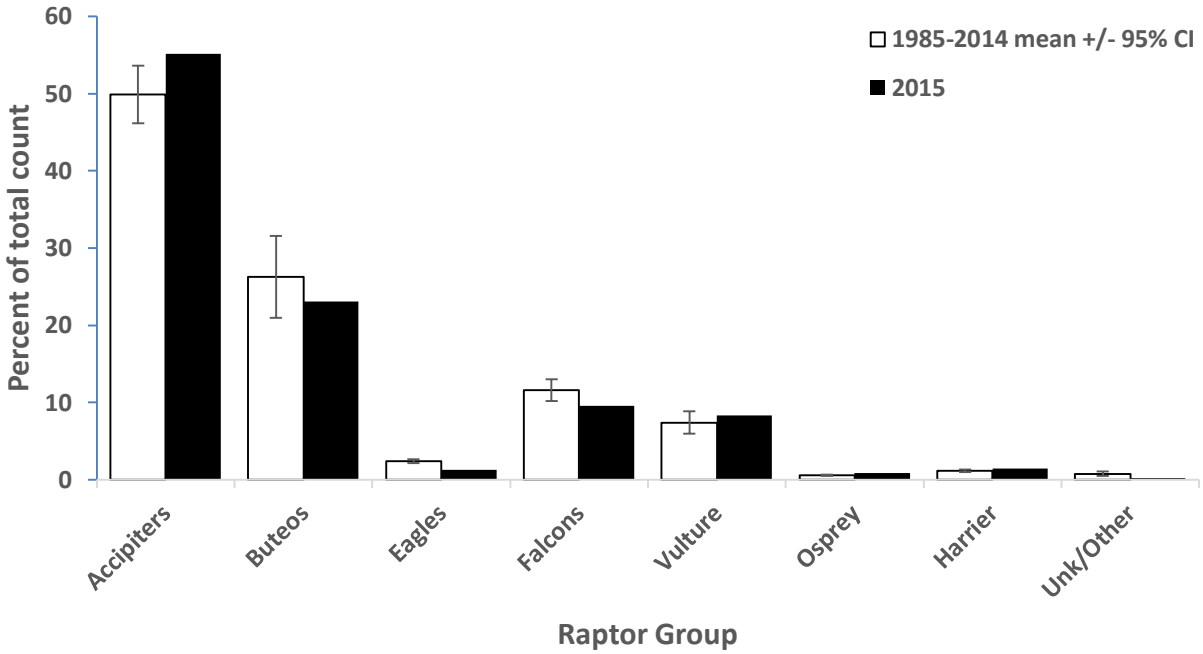

Figure 3. Fall raptor-migration flight composition by major species groups at the Manzanos HawkWatch in central New Mexico: 1985–2014 versus 2015.

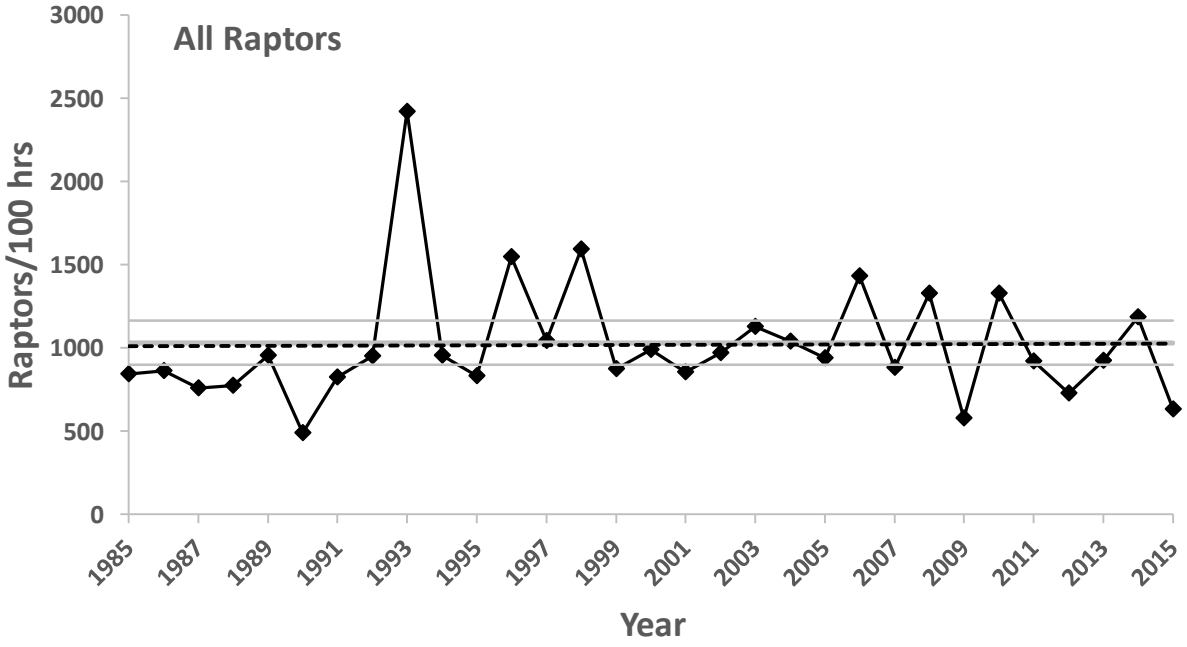

Figure 4. Fall migration passage rates at Manzanos HawkWatch in central New Mexico for all migrating raptors: 1985-2015. Solid grey lines represent mean (thick) and upper and lower 95% confidence intervals (thin) of historic counts (1985-2014) at the Manzanos.

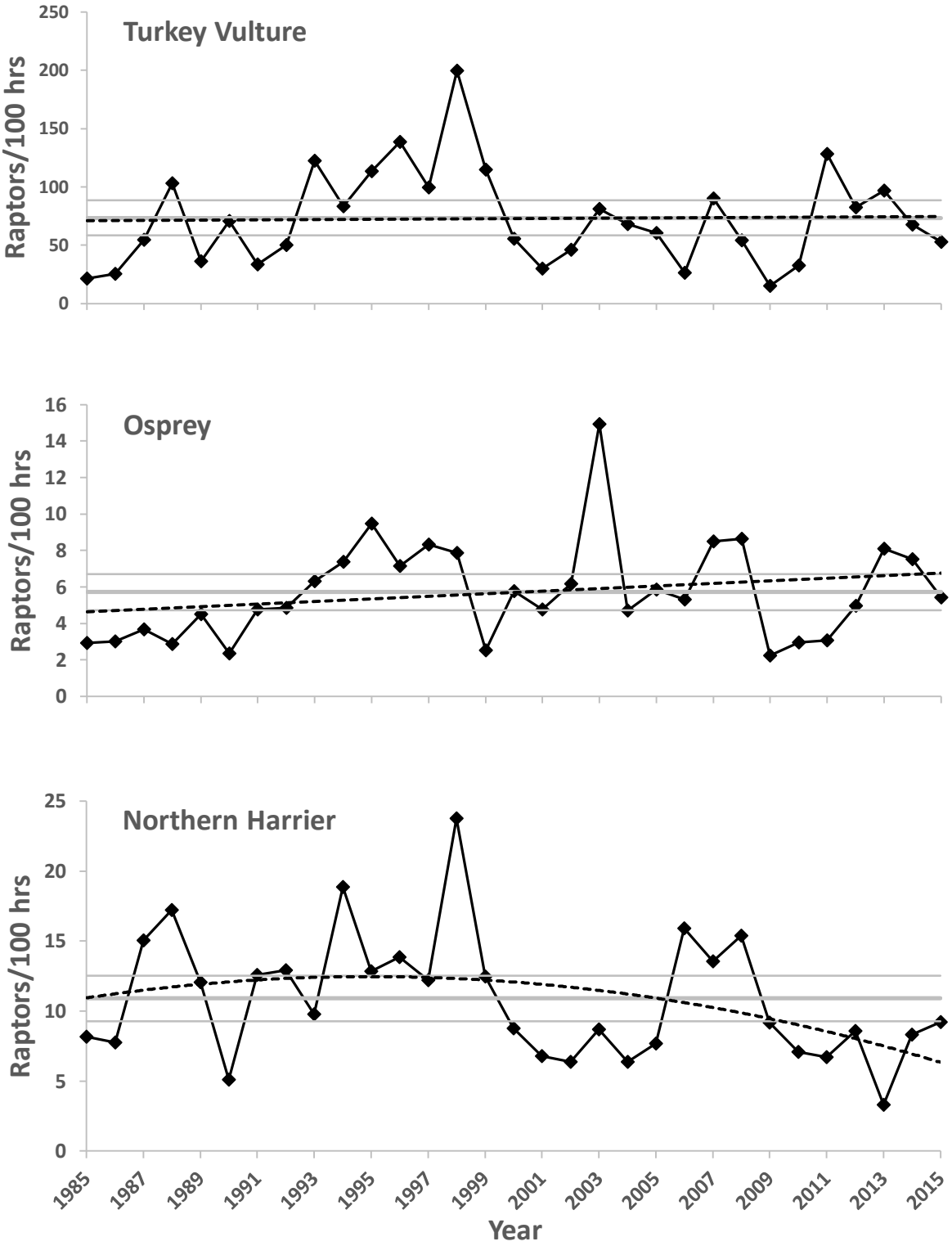

Figure 5a. Effort-adjusted fall-migration passage rates at the Manzanos HawkWatch in central New Mexico for Turkey Vultures, Ospreys, and Northern Harriers: 1985–2015. Solid grey lines represent mean (thick) and upper and lower 95% confidence intervals (thin) of historic counts (1985-2014) at the Manzano Mountains.

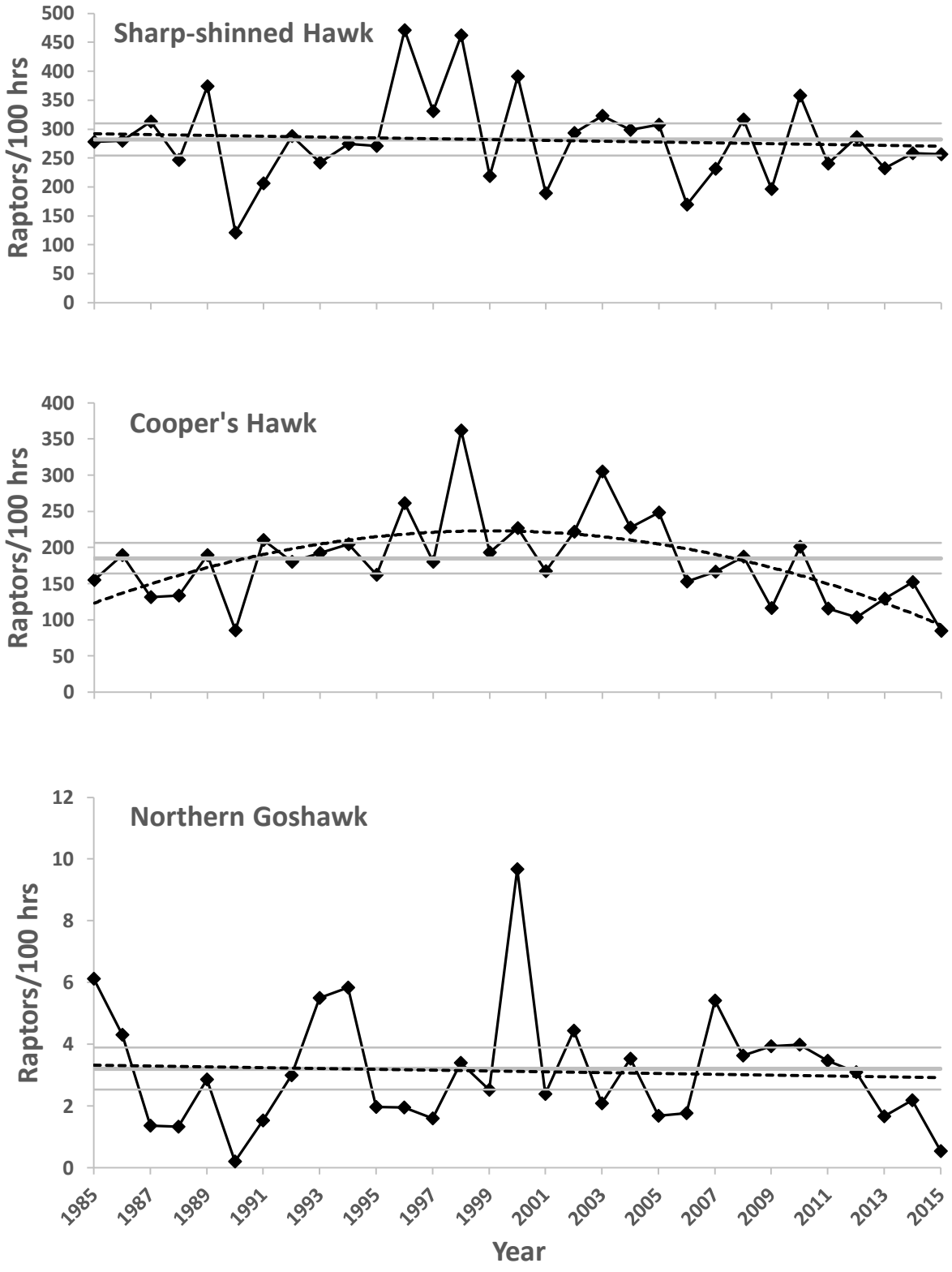

Figure 5b. Effort-adjusted fall-migration passage rates at the Manzanos HawkWatch in central New Mexico for Accipiters: 1985–2015. Dashed lines indicate trends for significant ($p < 0.05$) linear or quadratic regressions. Solid grey lines represent mean (thick) and upper and lower 95% confidence intervals (thin) of historic counts (1985-2014).

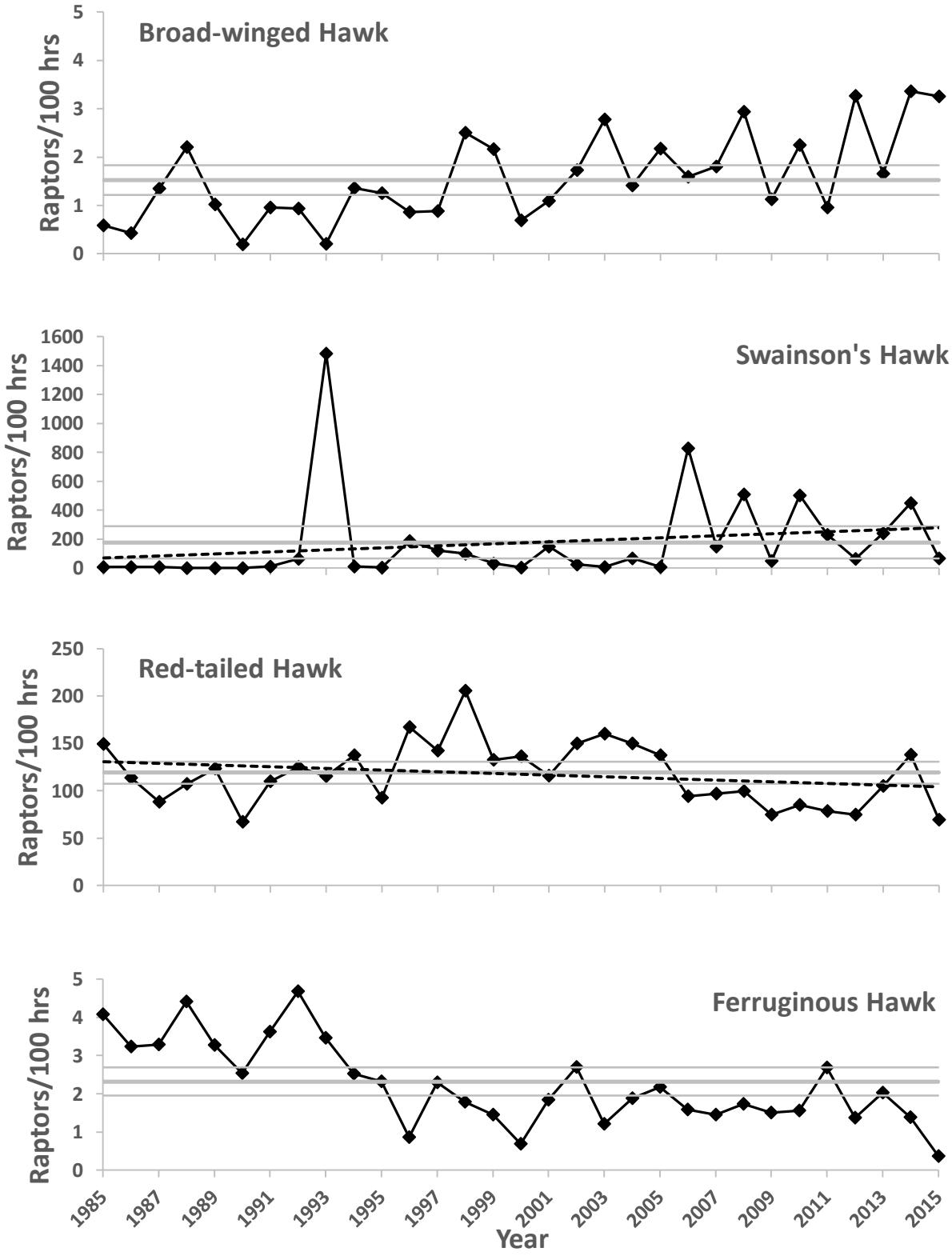

Figure 5c. Effort-adjusted fall-migration passage rates at the Manzanos HawkWatch in central New Mexico for buteoine hawks: 1985–2015. Dashed lines indicate significant ($p < 0.05$) population trends based on linear or quadratic regressions. Solid grey lines represent mean (thick) and upper and lower 95% confidence intervals (thin) of historic counts (1985-2014).

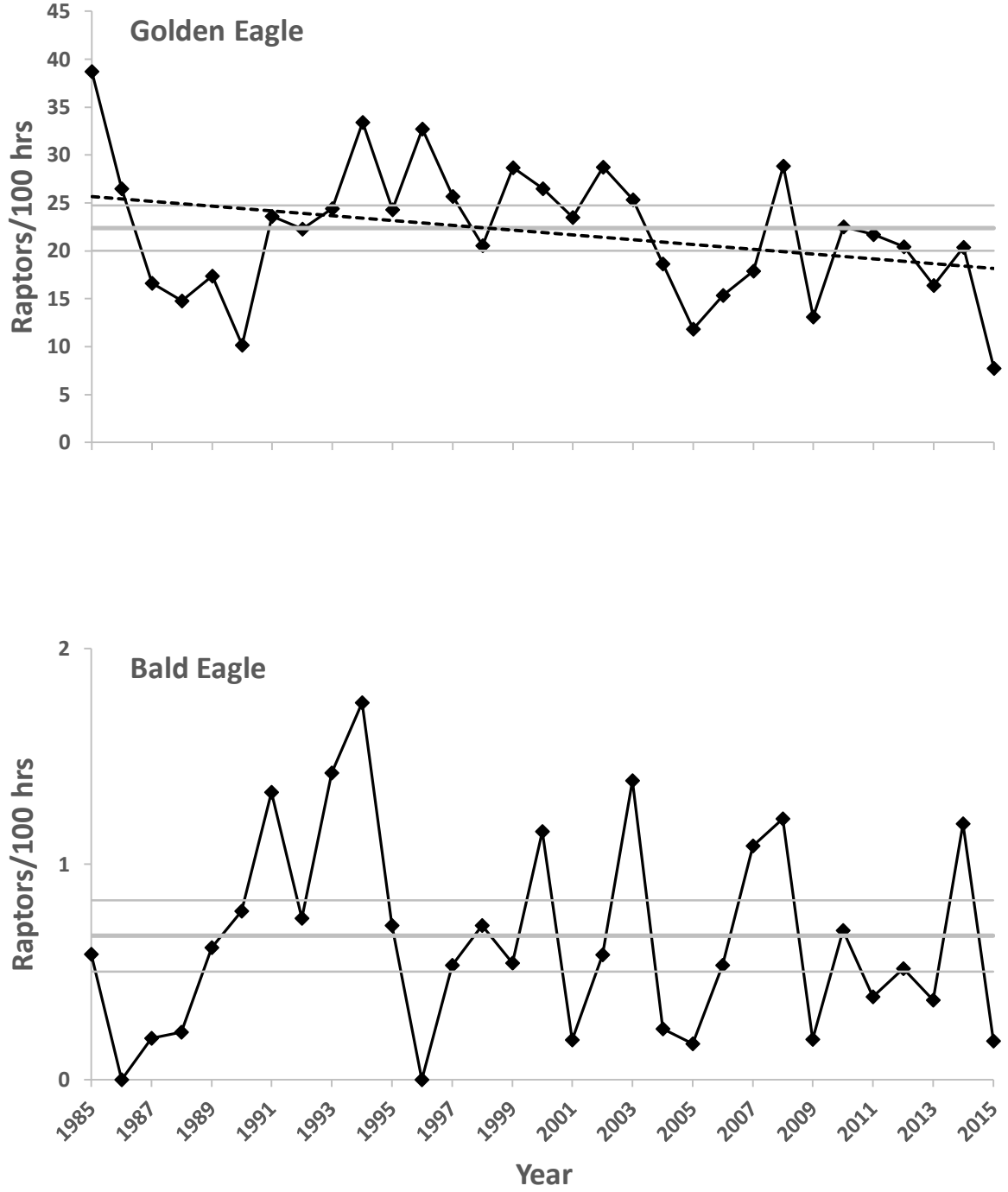

Figure 5d. Effort-adjusted fall-migration passage rates at the Manzanos HawkWatch in central New Mexico for Golden and Bald Eagles: 1985–2015. Solid grey lines represent mean (thick) and upper and lower 95% confidence intervals (thin) of historic counts (1985-2014).

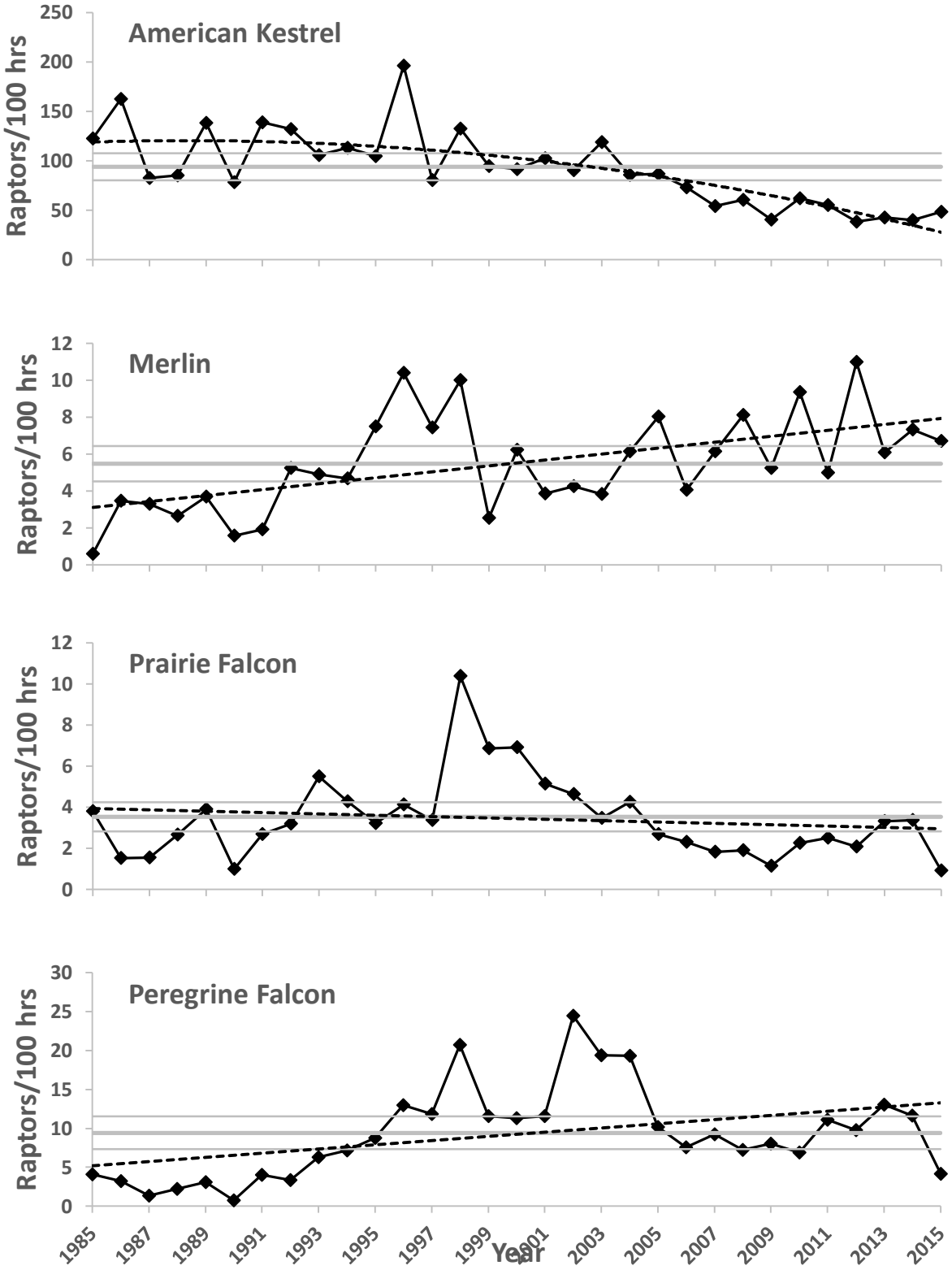

Figure 5e. Effort-adjusted fall-migration passage rates at the Manzanos HawkWatch in central New Mexico for falcons: 1985–2015. Dashed lines indicate significant ($p < 0.05$) population trends based on linear. Solid grey lines represent mean (thick) and upper and lower 95% confidence intervals (thin) of historic counts (1985-2014).

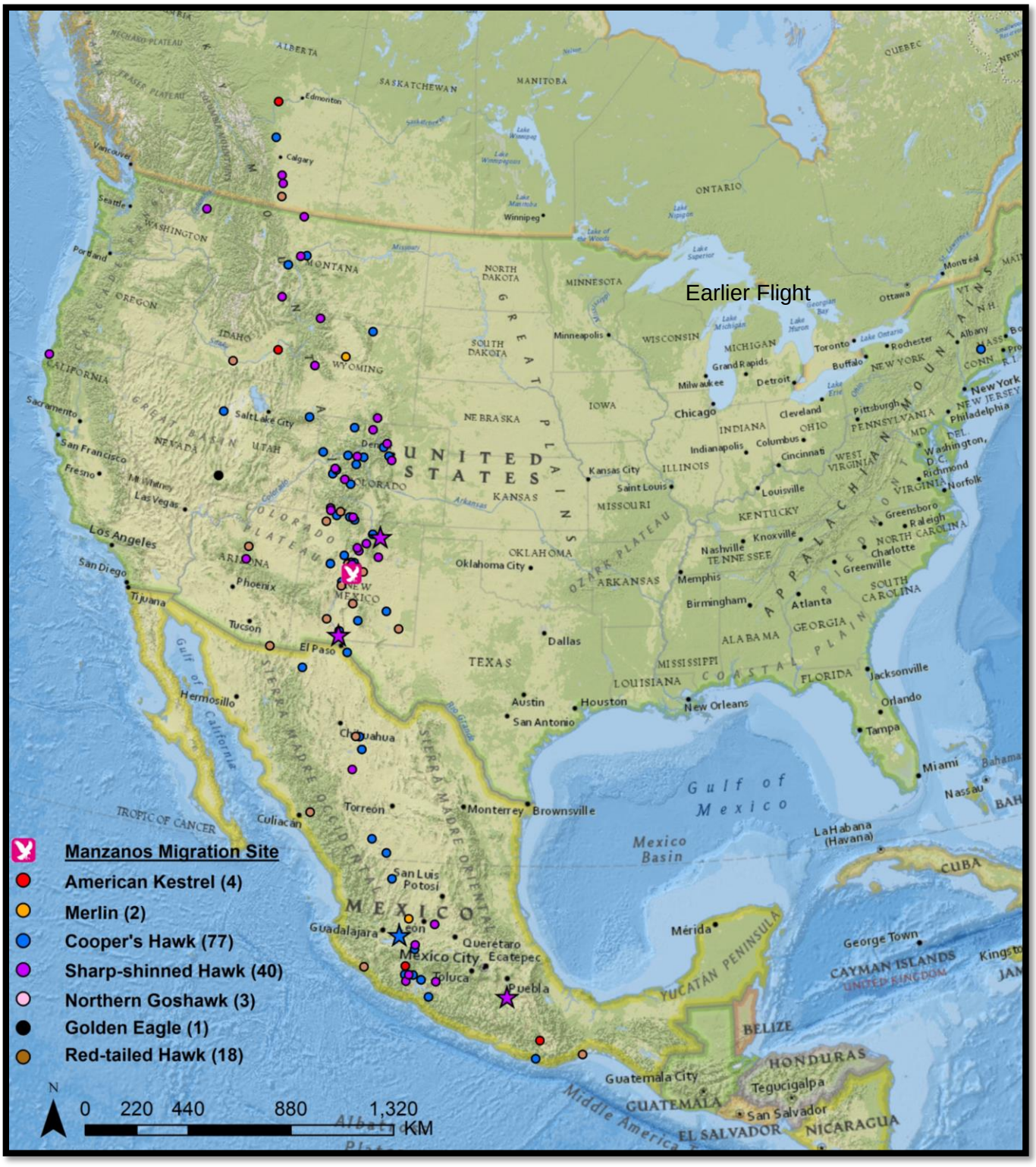

Figure 6. Foreign encounters of raptors banded at the Manzanos HawkWatch in central New Mexico. Circles represent recaptures from 1990 to 2014, stars represent 2015 recoveries.

Appendix A. History of official observer participation at the Manzanos HawkWatch: 1985–2014.

1985 Single observer throughout, shared duty: Gary Cress (0)[1], Jim Daly (1), Allen Hale (1)

1986 Single observer throughout: Jim Daly (2)

1987 Single observer throughout: Jim Daly (3)

1988 Single observer throughout: Gordon Vickrey (1)

1989 Two observers during peak 3/4 of the season, one observer otherwise: Brett Ewald (2), Tim Menard (0)

1990 Two observers during peak 3/4 of the season, one observer otherwise: David Curson (0), Gary Cress (1)

1991 Two observers throughout: Eric Meyer (1), Tylan Dean (0)

1992 Two observers throughout: Eric Meyer (3), Jessie Jewell (0)

1993 Two observers throughout: Jessie Jewell (2), John Haskell (0)

1994 Two observers throughout: Jessie Jewell (4), Jeff Ogburn (1)

1995 Two observers throughout: Jessie Jewell (6), Jeff Ogburn (2)

1996 Two observers throughout: Jessie Jewell (8), Sean O'Connor (3)

1997 Two observers throughout: Jeff Ogburn (4), Sean O'Connor (4)

1998 Two observers throughout: Dan Rossman (1), Lawry Sager (0)

1999 Two observers throughout: Jason Beason (4), Lawry Sager (1)

2000 Two observers throughout: Jorge Canaca (1), Laura Lutz (1)

2001 Two observers throughout: Tim Meehan (1), Carrie Hisaoka (0)

2002 Two observers throughout: Carrie Hisaoka (1), Richard Sim (0)

2003 Two observers throughout: Carrie Hisaoka (2), Tim Hanks (1)

2004 Two observers throughout: Paula Shannon (3), Frank Mayer (2)

2005 Two observers throughout: Tim Hanks (2), Geoff Gould (0)

2006 Two observers throughout: Tim Hanks (3), Greg Levandoski (3)

2007 Two observers throughout: Tim Hanks (4), Aldo Raul Coutreras Reyes (4)

2008 Two observers throughout: Tim Hanks (5), Aldo Raul Coutreras Reyes (5), Roger Grimshaw (1)

2009 Two observers throughout: Kimberly Cullen (1), Amber Wingert (1), Roger Grimshaw (2)

2010 Two observers throughout: Tim Hanks (6+), Russell Seeley (0), Roger Grimshaw (3+)

2011 Two observers throughout: Tim Hanks (7+), Russell Seeley (1), Roger Grimshaw (4+)

2012 Two observers throughout: Robert Baez (3), Ian Dolly (+), Dan D. Tempest (0), Roger Grimshaw (5+), Steve deLaPena (+)

2013 Two observers throughout: Robert Baez (4), Sarah Dudek (0), Ian Dolly (1+), Roger Grimshaw (6+), Steve deLaPena (+)

2014 Two observers throughout: Robert Baez (5), Olivia DeRugna (1), Stephen Brenner (+), Roger Grimshaw (7+), Steve deLaPena (+)

2015 Two observers throughout: Olivia DeRugna(3), Phil Kavouriaris (1), Keelan Dann (1), Istvan Balasz (0), Roger Grimshaw (7+), Steve deLaPena (+)

---

[1] Numbers in parentheses indicate previous full seasons of 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 fall migration at the Manzanos HawkWatch in central New Mexico.

Common Name	Scientific Name	Species Code	Age[1]	Sex[2]	Color Morph[3]
Turkey Vulture	*Cathartes aura*	TV	U	U	NA
Osprey	*Pandion haliaetus*	OS	U	U	NA
Northern Harrier	*Circus cyaneus*	NH	A I Br U	M F U	NA
Sharp-shinned Hawk	*Accipiter striatus*	SS	A I U	U	NA
Cooper's Hawk	*Accipiter cooperii*	CH	A I U	U	NA
Northern Goshawk	*Accipiter gentilis*	NG	A I U	U	NA
Unknown accipiter	*Accipiter* spp.	UA	U	U	NA
Broad-winged Hawk	*Buteo platypterus*	BW	A I U	U	D L U
Swanson's Hawk	*Buteo swainsoni*	SW	U	U	D L U
Red-tailed Hawk	*Buteo jamaicensis*	RT	A I U	U	D L U
Ferruginous Hawk	*Buteo regalis*	FH	A I U	U	D L U
Rough-legged Hawk	*Buteo lagopus*	RL	U	U	D L U
Zone-tailed Hawk	*Buteo albonotus*	ZT	A I U	U	NA
Unknown buteo	*Buteo* spp.	UB	U	U	D L U
Golden Eagle	*Aquila chrysaetos*	GE	I, S, NA, A, U[4]	U	NA
Bald Eagle	*Haliaeetus leucocephalus*	BE	I, S1, S2, NA, A, U[5]	U	NA
Unknown eagle	*Aquila* or *Haliaeetus spp.*	UE	U	U	NA
American Kestrel	*Falco sparverius*	AK	U	M F U	NA
Merlin	*Falco columbarius*	ML	AM Br	AM U	NA
Prairie Falcon	*Falco mexicanus*	PR	U	U	NA
Peregrine Falcon	*Falco peregrinus*	PG	A I U	U	NA
Unknown falcon	*Falco* spp.	UF	U	U	NA
Unknown raptor	Falconiformes	UU	U	U	NA

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

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

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

[4] Golden Eagle age codes: I = Immature: juvenile or first-year bird, bold white wing patch visible below, bold white in tail, no molt; S = Subadult: white wing patch variable or absent, obvious white in tail and molt or tawny bar visible on upper wing; NA = Not adult: unknown age immature/subadult; A = Adult: no white in wings or tail; U = Unknown.

[5] Bald Eagle age codes: I = Immature: juvenile or first-year bird, dark breast and tawny belly; S1 = young Subadult: Basic I and II plumages, light belly, upside-down triangle on back; S2 = older Subadult: Basic III plumage, head mostly white with osprey-like dark eye line and dark band on tail; NA = Not adult: unknown age immature/subadult; A = Adult: includes near adult with dark flecks in head and dark tail tip, and adult with white head and tail; U = Unknown.

Appendix C. Annual observation effort and fall raptor migration counts by species at the Manzanos HawkWatch in central NM: 1985–2015.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Start date	6-Sep	23-Aug	25-Aug	30-Aug	28-Aug	27-Aug	27-Aug	25-Aug	25-Aug	25-Aug
End date	2-Nov	31-Oct	4-Nov	31-Oct	31-Oct	31-Oct	5-Nov	5-Nov	5-Nov	2-Nov
Days of observation	50	63	65	60	63	62	67	70	68	66
Hours of observation	343.33	464.5	517.92	453.08	489.75	510.75	524.58	537.25	489.67	508.75
Raptors / 100 hours	843.2	863.9	758.6	772.3	955.4	494.6	825.6	946.3	2429.2	966.5
SPECIES	RAPTOR COUNTS									
Turkey Vulture	74	118	283	466	178	295	176	268	601	430
Osprey	10	14	19	13	22	12	24	26	31	38
Northern Harrier	28	36	78	78	59	27	66	69	48	97
Mississippi Kite	0	0	0	0	0	0	0	0	0	0
Sharp-shinned Hawk	956	1300	1622	1118	1834	688	1080	1540	1193	1415
Cooper's Hawk	531	881	679	604	929	471	1105	961	944	1054
Northern Goshawk	21	20	7	6	14	3	8	16	27	30
Unknown accipiter	78	104	119	111	121	133	156	117	266	118
TOTAL ACCIPITERS	1586	2305	2427	1839	2898	1186	2349	2634	2430	2617
Broad-winged Hawk	2	2	7	10	5	2	5	5	1	7
Swainson's Hawk	27	33	44	3	16	9	58	344	7301	67
Red-tailed Hawk	513	527	457	486	604	329	577	667	566	707
Ferruginous Hawk	14	15	17	20	16	13	19	25	17	13
Rough-legged Hawk	0	0	0	1	1	0	0	0	0	0
Zone-tailed Hawk	0	0	0	0	0	0	0	2	0	1
Unknown buteo	21	12	11	16	4	19	30	11	31	22
TOTAL BUTEOS	577	589	536	536	646	372	689	1054	7916	817
Golden Eagle	133	123	86	67	85	52	124	119	120	172
Bald Eagle	2	0	1	1	3	4	7	4	7	9
Unknown Eagle	0	0	0	4	0	4	0	0	0	0
TOTAL EAGLES	135	123	87	72	88	60	131	123	127	181
American Kestrel	421	755	426	385	677	409	728	704	520	582
Merlin	2	16	17	12	18	9	10	28	24	24
Prairie Falcon	13	7	8	12	19	9	14	17	27	22
Peregrine Falcon	14	15	7	10	15	5	21	18	31	37
Unknown falcon	4	0	1	0	3	7	3	1	0	1
TOTAL FALCONS	454	793	459	419	732	437	776	768	602	666
Unknown raptor	31	35	40	76	56	41	120	142	140	71
TOTAL	2895	4013	3929	3499	4679	2526	4331	5084	11895	4917

Appendix C. continued

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Start date	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	28-Aug
End date	08-Nov	05-Nov	5-Nov	5-Nov	5-Nov	2-Nov	4-Nov	3-Nov	5-Nov	30-Oct
Days of observation	70	59	68	65	70	57	68	65	69	57
Hours of observation	560.00	461.67	565.08	559.58	553.77	434.33	545.47	518.50	577.25	424.08
Raptors / 100 hours	832.9	1545.9	1044.8	1594.2	873.1	991.6	855.8	972.0	1126.4	1039.9
SPECIES	RAPTOR COUNTS									
Turkey Vulture	636	640	563	1116	637	241	164	239	468	289
Osprey	53	33	47	44	14	25	26	32	86	20
Northern Harrier	72	64	69	133	69	38	37	33	50	27
Mississippi Kite	0	0	0	0	0	0	0	0	0	0
Sharp-shinned Hawk	1519	2174	1872	2585	1212	1698	1032	1524	1861	1268
Cooper's Hawk	907	1205	1018	2025	1069	984	913	1149	1758	964
Northern Goshawk	11	9	9	19	14	42	13	23	12	15
Unknown accipiter	44	147	76	107	51	29	86	202	215	201
TOTAL ACCIPITERS	2481	3535	2975	4736	2346	2753	2044	2898	3846	2448
Broad-winged Hawk	7	4	5	14	12	3	6	9	16	6
Swainson's Hawk	32	867	679	572	194	19	815	139	53	291
Red-tailed Hawk	519	771	803	1151	733	591	632	778	924	636
Ferruginous Hawk	13	4	13	10	8	3	10	14	7	8
Rough-legged Hawk	0	0	0	1	1	0	1	0	0	0
Zone-tailed Hawk	1	0	1	2	0	3	1	1	0	0
Unknown buteo	9	11	3	28	5	2	106	32	30	69
TOTAL BUTEOS	581	1657	1504	1778	953	621	1571	973	1030	1010
Golden Eagle	136	151	145	115	159	115	128	149	146	79
Bald Eagle	4	0	3	4	3	5	1	3	8	1
Unknown Eagle	0	0	0	0	0	1	0	0	1	0
TOTAL EAGLES	140	151	148	119	162	121	129	152	155	80
American Kestrel	584	905	455	742	525	397	560	470	686	362
Merlin	42	48	42	56	14	27	21	22	22	26
Prairie Falcon	18	19	19	58	38	30	28	24	20	18
Peregrine Falcon	49	60	67	116	64	49	63	127	112	82
Unknown falcon	0	1	0	12	2	1	5	21	6	7
TOTAL FALCONS	693	1033	583	984	643	504	677	664	846	495
Unknown raptor	8	24	15	11	11	4	20	49	21	41
TOTAL	4664	7137	5904	8921	4835	4307	4668	5040	6502	4410

Appendix C. continued

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Start date	27- Aug	27- Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug
End date	5-Nov	5-Nov	5-Nov	5-Nov	5-Nov	4-Nov	4-Nov	5-Nov	4-Nov	03-Nov
Days of observation	69	68	63	69	68	70	68	70	67	65
Hours of observation	599.58	566.41	553.58	579.00	535.68	578.00	521.00	582.42	542.92	506.13
Raptors / 100 hours	937.8	1433.4	883.2	1327.5	577.0	1327.7	919.4	729.4	923.7	1184.1
SPECIES	RAPTOR COUNTS									
Turkey Vulture	363	150	499	315	82	189	668	481	527	343
Osprey	35	30	47	50	12	17	16	29	44	38
Northern Harrier	46	90	75	89	49	41	35	50	18	42
Mississippi Kite	0	0	0	0	0	0	1	0	0	0
Sharp-shinned Hawk	1842	958	1283	1836	1051	2067	1252	1665	1263	1304
Cooper's Hawk	1486	865	922	1084	620	1162	602	603	703	770
Northern Goshawk	10	10	30	21	21	23	18	18	9	11
Unknown accipiter	135	127	91	83	118	114	36	73	74	51
TOTAL ACCIPITERS	3473	1960	2326	3024	1810	3366	1908	2359	2049	2136
Broad-winged Hawk	13	9	10	17	6	13	5	19	9	17
Swainson's Hawk	52	4695	841	2952	274	2906	1204	371	1317	2279
Red-tailed Hawk	823	534	537	575	398	491	410	435	570	696
Ferruginous Hawk	13	9	8	10	8	9	14	8	11	7
Rough-legged Hawk	0	0	0	1	0	0	0	1	2	3
Zone-tailed Hawk	1	0	0	0	0	1	4	0	1	1
Unknown buteo	33	23	19	11	57	22	10	9	13	7
TOTAL BUTEOS	935	5270	1415	3566	743	3442	1647	843	1923	3010
Golden Eagle	71	87	99	167	70	130	113	119	89	103
Bald Eagle	1	3	6	7	1	4	2	3	2	6
Unknown Eagle	4	1	9	2	4	4	5	0	0	0
TOTAL EAGLES	76	91	114	176	75	138	120	122	91	109
American Kestrel	520	412	298	350	216	359	288	224	230	200
Merlin	48	23	34	47	28	54	26	64	33	37
Prairie Falcon	16	13	10	11	6	13	13	12	18	17
Peregrine Falcon	61	43	51	42	43	40	58	57	71	59
Unknown falcon	13	5	3	4	9	7	5	3	3	2
TOTAL FALCONS	658	496	396	454	302	473	390	360	355	315
Unknown raptor	37	32	17	12	18	8	5	4	8	0
TOTAL	5623	8119	4889	7686	3091	7674	4790	4248	5015	5993

Appendix C. continued

	2015	Mean
Start date	27-Aug	27-Aug
End date	4-Nov	3-Nov
Days of observation	66	65.29
Hours of observation	553.4	521.21
Raptors / 100 hours	632.5	1019.61
RAPTOR SPECIES		
Turkey Vulture	292	380.4
Osprey	30	30.2
Northern Harrier	51	56.9
Mississippi Kite	0	0.0
Sharp-shinned Hawk	1420	1465.5
Cooper's Hawk	469	949.6
Northern Goshawk	3	15.9
Unknown accipiter	39	110.4
TOTAL ACCIPITERS	1931	2537.9
Broad-winged Hawk	18	8.5
Swainson's Hawk	388	930.4
Red-tailed Hawk	384	607.2
Ferruginous Hawk	2	11.5
Rough-legged Hawk	0	0.4
Zone-tailed Hawk	1	0.7
Unknown buteo	16	22.3
TOTAL BUTEOS	809	1581.1
Golden Eagle	43	112.7
Bald Eagle	1	3.4
Unknown Eagle	1	1.3
TOTAL EAGLES	45	117.5
American Kestrel	267	472.8
Merlin	37	29.4
Prairie Falcon	5	17.9
Peregrine Falcon	23	48.7
Unknown falcon	3	4.3
TOTAL FALCONS	335	573.0
Unknown raptor	7	35.6
TOTAL	3500	5315.6

Appendix D. Annual trapping and banding effort and capture totals of migrating raptors by species at the Manzanos HawkWatch in central NM: 1990–2015.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Start Date	28-Aug	5-Sep	31-Aug	3-Sep	1-Sep	4-Sep	2-Sep	31-Aug	29-Aug	31-Aug
End Date	27-Oct	29-Oct	30-Oct	24-Oct	25-Oct	31-Oct	19-Oct	28-Oct	29-Oct	16-Oct
Blinds in operation	1	3	3	3	3	4	4	4	3	3
Trapping days	47	54	57	50	48	53	45	54	58	46
Station days	47	95	131	120	121	136	132	151	114	86
Station hours	511	693	967	889	926	1,041	1,030	1,211	1,352.6	663.8
Captures / 100 hours	47.7	72.4	108.2	100.8	110.7	85.6	137.0	94.9	148.2	115.6
Species	Raptor Captures									
Northern Harrier	1	2	2	3	9	2	1	8	14	0
Sharp-shinned Hawk	124	262	589	430	502	493	778	611	987	320
Cooper's Hawk	95	195	335	374	353	309	460	427	772	323
Northern Goshawk	1	7	6	6	7	1	5	3	6	6
Broad-winged Hawk	0	0	0	0	0	0	0	0	1	0
Swainson's Hawk	0	0	0	0	0	0	0	0	0	0
Red-tailed Hawk	8	18	61	55	83	50	50	46	112	56
Zone-tailed Hawk	0	0	0	0	0	0	0	0	1	0
Golden Eagle	1	3	4	4	4	4	6	4	5	2
Bald Eagle	0	0	0	0	0	0	0	0	0	0
American Kestrel	10	13	42	14	59	28	92	32	75	44
Merlin	1	0	2	4	1	1	11	6	7	2
Prairie Falcon	1	1	3	5	3	1	3	5	13	6
Peregrine Falcon	2	1	2	1	4	2	5	7	12	8
All Species	244	502	1,046	896	1,025	891	1,411	1,149	2,005	767
Recaptures[1]	0	0	1	1	2	2	1	2	4	4
Foreign Recaptures[2]	2	1	1	1	2	0	5	1	2	2

Appendix D. continued

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Start Date	2-Sep	1-Sep	3-Sep	7-Sep	5-Sep	4-Sep	4-Sep	2-Sep	3-Sep	3-Sep
End Date	27-Oct	25-Oct	25-Oct	24-Oct	28-Oct	28-Oct	24-Oct	27-Oct	30-Oct	27-Oct
Blinds in operation	3	3	3	3	3	2	2	2	2	2
Trapping days	49	55	50	45	47	51	48	46	56	48
Station days	91	102	92	83	90	99	94	65	80	61
Station hours	791.4	1,036.7	956.9	632.5	756.2	707.8	677.7	453.0	586.0	390.3
Captures / 100 hours	121.7	86.0	135.6	152.9	136.0	163.0	96.5	83.4	104.3	138.6
Species	Raptor Captures									
Northern Harrier	5	7	6	3	0	3	6	3	4	2
Sharp-shinned Hawk	495	426	636	459	566	562	299	196	313	274
Cooper's Hawk	330	338	512	400	378	495	280	143	246	200
Northern Goshawk	16	1	10	1	2	3	3	3	3	8
Broad-winged Hawk	0	0	1	1	1	0	1	1	0	0
Swainson's Hawk	0	1	3	0	0	0	1	0	0	0
Red-tailed Hawk	76	39	56	38	43	35	35	9	20	34
Zone-tailed Hawk	0	0	0	0	0	0	0	0	0	0
Golden Eagle	4	5	7	8	2	2	1	1	9	0
Bald Eagle	0	0	0	0	0	0	0	0	0	0
American Kestrel	25	56	37	43	18	37	10	9	4	18
Merlin	8	2	12	3	10	3	2	5	8	2
Prairie Falcon	3	7	5	4	3	4	4	2	1	1
Peregrine Falcon	1	10	13	7	5	10	12	6	3	2
All Species	963	892	1,298	967	1,028	1,154	654	378	611	541
Recaptures[1]	3	2	3	2	2	3	2	0	1	1
Foreign Recaptures[2]	0	0	3	2	0	0	1	0	0	1

Appendix D. continued

	2010	2011	2012	2013	2014	2015	Mean	Total
Start Date	2-Sep	1-Sep	31-Aug	29-Aug	28-Aug	28-Aug	1-Sep	---
End Date	27-Oct	28-Oct	28-Oct	30-Oct	29-Oct	31-Oct	26-Oct	---
Blinds in operation	2	2	2	2	2	2	2.6	---
Trapping days	52	46	56	60	55	59	51.3	1,135
Station days	61	58	76	79	73	68	92.5	2,405
Station hours	408.7	397.0	495.3	527.8	500.5	440.8	732.4	19,402.6
Captures / 100 hours	93.2	80.6	121.6	134.0	76.5	90.1	109.0	---
Species								
Northern Harrier	2	2	2	2	0	3	3.5	92
Sharp-shinned Hawk	183	171	362	387	218	227	418.1	10,870
Cooper's Hawk	160	105	171	257	140	139	305.3	7,937
Northern Goshawk	2	1	2	3	1	0	4.1	107
Broad-winged Hawk	0	0	1	0	0	0	0.3	7
Swainson's Hawk	0	0	0	2	1	0	0.3	8
Red-tailed Hawk	22	27	41	31	13	14	41.2	1,072
Zone-tailed Hawk	0	0	0	0	0	0	0.0	1
Golden Eagle	1	1	4	3	1	1	3.3	87
Bald Eagle	0	0	0	0	1	0	0.0	1
American Kestrel	5	8	9	10	2	2	27.0	702
Merlin	2	3	8	5	3	5	4.5	116
Prairie Falcon	3	0	0	1	0	0	3.0	79
Peregrine Falcon	1	2	2	6	3	6	5.1	133
All Species	381	320	602	707	383	397	815.8	21,212
Recaptures[1]	2	1	1	1	1	0	1.6	42
Foreign Recaptures[2]	0	0	0	0	1	0	1.0	25

[1] Recaptures in the Manzanos of birds originally banded in the Manzanos.

[2] Recaptures in the Manzanos of birds originally banded elsewhere.

[3] Birds originally banded in the Manzanos and subsequently encountered elsewhere.