

**FALL 2005 RAPTOR MIGRATION STUDY IN THE
BRIDGER MOUNTAINS, MONTANA**



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

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TABLE OF CONTENTS

List of Tables	iii
List of Figures	iii
Introduction.....	1
Study Site.....	1
Methods	1
Results and Discussion	2
Weather Summary.....	2
Observation Effort	3
Flight Summary.....	3
Resident Raptors	4
Visitation.....	4
Acknowledgments.....	5
Literature Cited.....	5
Tables.....	6
Figures	9
Appendix A. Common and scientific names, species codes, and regularly applied age, sex, and color-morph classifications for all diurnal raptor species observed during fall migration in the Bridger Mountains, MT.....	18
Appendix B. A history of primary observers for the Bridger Mountains Raptor Migration Project.....	19
Appendix C. Daily observation effort, visitor disturbance ratings, weather records, and flight summaries for the Bridger Mountains Raptor Migration Project: 2005.....	20
Appendix D. Daily observation effort and fall raptor migration counts by species in the Bridger Mountains, MT: 2005.....	22
Appendix E. Annual observation effort and fall raptor migration counts by species in the Bridger Mountains, MT: 1991–2005.....	24

LIST OF TABLES

Table 1.	Observation effort, annual fall-migration counts, and adjusted passage rates (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) by species in the Bridger Mountains, MT: 1992–2004 versus 2005.....	6
Table 2.	Fall counts by age class and immature : adult ratios for selected species of migrating raptors in the Bridger Mountains, MT: 1992–2004 versus 2005.....	7
Table 3.	First and last observation, bulk passage, and median passage dates by species for migrating raptors in the Bridger Mountains, MT in 2005, with a comparison of 2005 and 1992–2004 average median passage dates.....	8

LIST OF FIGURES

Figure 1.	Location of the Bridger Mountains Raptor Migration Project study site.....	9
Figure 2.	Composition of the fall raptor migration in the Bridger Mountains by major species groups: 1992–2004 versus 2005.....	10
Figure 3.	Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Turkey Vultures, Ospreys, and Northern Harriers in the Bridger Mountains, MT: 1992–2005. Dashed lines indicate significant ($P \leq 0.10$) regressions.	11
Figure 4.	Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Sharp-shinned Hawks, Cooper’s Hawks, and Northern Goshawks in the Bridger Mountains, MT: 1992–2005. Dashed lines indicate significant ($P \leq 0.10$) regressions.	13
Figure 6.	Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Golden and Bald Eagles in the Bridger Mountains, MT: 1992–2005. Dashed lines indicate significant ($P \leq 0.10$) regressions.....	15
Figure 7.	Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons in the Bridger Mountains, MT: 1992–2005. Dashed lines indicate significant ($P \leq 0.10$) regressions.	16
Figure 8.	Passage volume by five-day periods for migrating Golden and Bald Eagles in the Bridger Mountains, MT: 1992–2004 versus 2005.	17

INTRODUCTION

The Bridger Mountains Raptor Migration Project in southwestern Montana is an ongoing effort to monitor long-term population trends of raptors using this northern portion of the Rocky Mountain Flyway (Hoffman et al. 2002, Hoffman and Smith 2003). HawkWatch International (HWI) initiated full-season counts at the site in 1991, with standardized annual monitoring commencing in 1992. This flyway is noted for large concentrations of Golden Eagles (see Appendix A for scientific names of all raptor species observed at the site). To date, 18 species of raptors have been observed migrating along the Bridger Mountains, with annual counts typically ranging between 2,000 and 3,500 migrants. This report summarizes results of the 2005 count, which marked the 14th consecutive full-season autumn count of migratory raptors at the site.

STUDY SITE

The Bridger Mountains are a relatively small range that runs primarily along a north–south axis. From Sacagawea Peak (2,950 m elevation), the range extends southward for 40 km before meeting the Gallatin Valley 5 km northeast of Bozeman, Montana. Consistent westerly winds collide with the Bridger range and create the lift that attracts southbound migrating raptors each fall. The observation site was a helicopter-landing platform atop the Bridger Bowl Ski Area at an elevation of 2,610 m (45° 49.022' N, 110° 55.778' W; Figure 1). The site lies within the Gallatin National Forest on the east slope of the mountain range, about 25 km north of Bozeman and 3 km north of Saddle Peak. The helicopter pad is a 5 m x 5 m wooden platform located approximately 50 m north of an avalanche cache/ski patrol hut. The site is accessed by following a primitive dirt road for 2.5 km (780 m rise in elevation) to the top of the Bridger chairlift, then continuing a short way along a footpath to the observation site at the top of the ridge.

METHODS

Weather permitting, one or two official or designated observers conducted standardized daily counts of migrating raptors from a single, traditional observation site from late August through late October. Observations typically began between 0830–1000 hrs and ended between 1600–1700 hrs Mountain Standard Time (MST). This was the first full season of migration counting for both official observers (see Appendix B for a complete observer history). Official observer Corey Michel attended preseason training and completed the season. Unfortunately, official observer Beau Fairchild abandoned the project midway through the season and no replacement could be found for him. This meant that through most of October only a single observer conducted the count, and due to complications arising from Mr. Fairchild's sudden departure combined with mixed weather, there was an eight-day period in early October where no counts occurred. Local volunteers also occasionally assisted with spotting migrants. 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 A 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 or 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 (high, moderate, low, none) 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 2005 annual statistics against means and 95% confidence intervals for previous seasons, I equate significance with a 2005 value falling outside the bounds of the confidence interval for the associated mean.

RESULTS AND DISCUSSION

WEATHER SUMMARY

Compared to the past eight seasons (the period during which detailed weather records have been compiled and analyzed), inclement weather appeared to hamper observations at an average level, precluding at least 8 full days of observation (1997–2004 average of 10 days) and reducing observations to less than 4 hours on four other days (average 6 days; Appendix C for daily weather records). This comparison is confounded by uncertainty as to what transpired on 10 days in October when no observations occurred but for which inadequate record keeping by the remaining official observer precluded knowing whether he simply did not observe on those days or weather kept him from observing. Two of these days were likely taken as days off with no substitute observers available. In addition, a period of eight consecutive days in early October when no official-observer counts occurred (one day filled in by a colleague from Yellowstone National Park with experience at the site that happened to visit during this time) at least began with a heavy snow storm that also largely curtailed HWI counts in Nevada and Wyoming. The range of predominant sky conditions during active observation days also ranked very close to average, however, with 38% of the active days featuring predominantly fair skies, 31% featuring transitional skies (i.e., could cover changed from clear or partly cloudy to mostly cloudy or overcast during the day, or vice versa), and 31% featuring mostly cloudy or overcast skies. The comparable 1997–2004 averages are 36%, 34%, and 30%.

Data collected in 2005 during active observations also indicated an average array of wind speeds (81% of days with predominantly light winds [<12 kph], 19% with moderate winds [12–29 kph], and none with stronger winds, compared to average s of 79%, 19%, and 3%); however, steady west winds were far more common than usual, predominating on 65% of the active observation days compared to the 1997–2004 average of 22%. Another 25% of the active days featured more variable SW–W winds (average 37%), 4% featured even more variable SE–SW winds (average 3%), and the remainder featured winds that shifted during the day from an E–S pattern to a SW–NW pattern (average 2%). Notably absent were variable W–NW winds (average 17%) and variable NE–SE winds (average 8%).

Uncertainties concerning the temperature and barometric pressure records kept by the 2005 observers preclude confident discussion of these metrics.

In summary, record-keeping inadequacies confound confident assessments of the overall weather conditions in 2005 in comparison to previous years, but for the most part conditions appeared fairly average with the exception of higher than usual prevalence of steady west winds.

OBSERVATION EFFORT

Observations occurred on 48 of 66 possible observation days between 27 August and 31 October. The number of observation days and hours (300.83) were 6% and 10% below the 1992–2004 averages of $51 \pm 95\%$ CI of 4.7 days and 335.14 ± 33.90 hours; however, this was the lowest level of observation effort since 1997 when HWI adopted a standardized observation period of 27 August through 31 October. Last year's effort also was well below average due to an unusually high prevalence of inclement weather, with 2004 and 2005 standing in stark contrast to effort having been the highest to date in 2003 due to especially mild weather. The 2005 average of 1.5 observers per hour (including official and guest observers; value is mean of daily values, which are in turn means of hourly values) also was a highly significant 21% below average ($1.9 \pm 95\%$ CI of 0.11 observers per hour) due to the mid-season departure of one official observer.

FLIGHT SUMMARY

The observers tallied 2,030 migrant raptors of 16 species during the 2005 season (Table 1, and see Appendix D for daily count records). The total count was a significant 21% below average, similar to 2004 (see Appendix E for annual summaries). For the third year in a row, the count of Golden Eagles fell to a new record low (Appendix E). No other record low or high counts occurred in 2005.

The flight was composed of 56% eagles, 26% accipiters, 9% buteos, 5% falcons, 1% harriers, <1% each of Ospreys and vultures, and 3% unidentified raptors. The proportions of eagles and Ospreys were significantly below average, whereas the proportions of all other species groups except harriers were significantly above average (Figure 2). The most numerous species were the Golden Eagle (52% of the total count), Sharp-shinned Hawk (11%), Cooper's Hawk (8%), Red-tailed Hawk (5%), and Bald Eagle (4%). All other species each comprised 1% or less of the total.

Adjusted 2005 passage rates were significantly below average for Ospreys, Golden Eagles, and American Kestrels, but were significantly above average for Red-tailed Hawks, Rough-legged Hawks, and the other three commonly occurring falcons (Table 1, Figures 3–7). Regression analyses of data through 2005 revealed a significant ($P \leq 0.05$), currently declining, quadratic trend for Ospreys (Figure 3); a highly significant ($P \leq 0.01$) linear decreasing trend for Golden Eagles, primarily reflecting a significant declining trend for immatures/subadults (Figure 6); a significant concave quadratic trend for Prairie Falcons reflecting a slight decline between 1992 and 1997, relative stability through 2004, and a sharp jump in 2005 (Figure 7); and no significant trends for other species except Swainson's Hawks. For the latter, a significant linear declining trend was indicated; however, although a slight declining trend is apparent subsequent to 1992, the significance of the overall trend is driven largely by a very high rate in 1992, the first year of analyzed data, and therefore may be misleading (Figure 5).

Among seven species for which relevant age-specific data were available, counts of immature birds were below average for all species, whereas counts of identified adults were at least slightly above average for four species (Table 2). This translated to significantly below-average immature : adult ratios for Sharp-shinned Hawks, Cooper's Hawks, Red-tailed Hawks, and Bald Eagles, suggesting that juvenile recruitment among Rocky Mountain source populations may have been low in 2005 for these species. For Golden Eagles and Northern Goshawks, the relative abundance of immature/subadult birds was

significantly above average, but low overall counts of young birds suggest that this may be misleading as a potential indicator of regional productivity (Table 2). Moreover, for most species, significant variation in the proportions of unknown-age birds further confounds the comparisons (Table 2).

Changes in effort before 1997 may confound interpretation of the overall trends because passage rates tend to decline with increasing effort; nevertheless, there is little doubt that the passage rates of young Golden Eagles dropped steadily between 1997 and 2004 before rebounding slightly in 2005 (Figure 6). Moreover, although a slight overall declining tendency is also evident in the annual passage rates of adults (though significantly ameliorated by a high rate in 2004), on an annual basis the passage rates of adults and immatures/subadults often have fluctuated in the opposite directions. The recent decline in abundance of younger birds likely reflects a decline in productivity among eagles nesting at northern latitudes where a cyclical low in the abundance of snowshoe hares recently occurred (Sherrington 2003, C. McIntyre personal communication). Conversely, patterns in the abundance of adult migrants may be more strongly related the effects of winter severity, whereby relatively sedentary adults tend to remain farther north or migrate later during mild winters. In this regard, the spike in adult numbers in 2004 is consistent with this hypothesis, in that weather conditions turned unusually cold and snowy by late October and a marked spike in eagle activity occurred just before heavy snow shut the count down prematurely. In contrast, the late fall weather in 2005 was relatively mild and, though somewhat confounded by limited observer effort, the count of adults was comparatively low in 2005.

The median passage date for Golden Eagles was a significant 7 days later than average (Table 2). This undoubtedly reflects in part reduced observation effort in early October, but may also reflect the effects of mild weather delaying the southward passage of northern migrants. Five other species also showed significantly late median passage dates (Cooper's Hawks, Rough-legged Hawks, Bald Eagles, American Kestrels, and Merlins) and contributed to a significantly late combined-species median date (Figure 8), whereas only Sharp-shinned Hawks and Peregrine Falcons showed significantly early dates (Table 2). The only consistent multi-species pattern, however, was the fact that all three species with the latest average median passage dates were significantly late in 2005: both eagle species and Rough-legged Hawks.

RESIDENT RAPTORS

Resident birds noted around the count site through September (no records kept after that) included Red-tailed Hawks, Golden Eagles, Cooper's Hawks, Sharp-shinned Hawks, American Kestrels, and Prairie Falcons. This is a fairly typical assemblage for the site.

VISITATION

The observers failed to keep good visitor logs this season as directed, so unfortunately we are unable to provide a robust tally of visitation for the season. Nevertheless, we can report that a very large crowd of folks attended the annual Bridger Raptor Festival again this year, with HWI's Executive Director, Thom Benedict in attendance. An estimated 400–500 people attended the festival, which was considerably more than usual in part because the festival purposefully coincided with the opening weekend for purchasing season passes to the Bridger Bowl ski area, and this brought in lots of new folks that might otherwise not have sought to participate in the festival. Although marginal weather kept many people from actually hiking up to the watchsite, at least 30–40 hearty souls did make the hike on the primary field trip day and were treated a solid flight of 71 birds.

In 2005, 317 hourly assessments by the primary observers of visitor disturbance resulted in the following ratings: 91% none, 4% low, 3% moderate, and 2% high.

ACKNOWLEDGMENTS

Funding for the 2005 project was provided by Gallatin National Forest, New Belgium Brewing Company, the Fanwood Foundation, and HWI private donors and members. Gallatin National Forest and Bridger Bowl Ski Area provided essential logistical support. Special thanks to Jeff Pentel, Steve Hoffman, John Parker, Karla Sartor, John Bell, Bev Dixon, and Randy Elliot for their observational and/or logistical assistance.

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Table 1. Annual fall-migration counts and adjusted passage rates (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) by species in the Bridger Mountains, MT: 1992–2004 versus 2005.

SPECIES	COUNTS			RAPTORS/100HRS		
	1992–2004 ¹	2005	%CHANGE	1992–2004 ¹	2005	%CHANGE
Turkey Vulture	0.7 ± 0.93	1	+44	0.4 ± 0.47	0.7	+102
Osprey	6 ± 2.4	2	-68	2.2 ± 0.84	0.8	-61
Northern Harrier	52 ± 30.7	22	-58	16.3 ± 9.98	8.2	-50
Sharp-shinned Hawk	351 ± 65.3	228	-35	130.8 ± 23.41	130.0	-1
Cooper's Hawk	170 ± 44.6	153	-10	128.3 ± 31.60	142.0	+11
Northern Goshawk	36 ± 13.1	22	-39	12.8 ± 5.35	10.3	-19
Unknown small accipiter ²	18 ± 14.9	92	+411	–	–	–
Unknown large accipiter ²	4 ± 3.6	4	-6	–	–	–
Unknown accipiter	29 ± 9.5	27	-8	–	–	–
TOTAL ACCIPITERS	594 ± 111.1	526	-11	–	–	–
Broad-winged Hawk	10 ± 5.5	3	-70	5.0 ± 2.83	2.2	-57
Swainson's Hawk	3 ± 1.7	0	-100	1.3 ± 0.99		-100
Red-tailed Hawk	108 ± 30.8	108	0	40.0 ± 10.66	51.4	+28
Ferruginous Hawk	2 ± 1.2	2	-16	0.9 ± 0.38	1.2	+40
Rough-legged Hawk	35 ± 12.0	40	+13	26.8 ± 8.47	37.0	+38
Unidentified buteo	12 ± 3.1	26	+117	–	–	–
TOTAL BUTEOS	170 ± 42.3	180	+6	–	–	–
Golden Eagle	1,519 ± 130.1	1,061	-30	600.1 ± 47.40	539.2	-10
Bald Eagle	84 ± 14.2	75	-10	34.9 ± 6.12	38.7	+11
Unidentified eagle	8 ± 4.4	1	-88	–	–	–
TOTAL EAGLES	1,610 ± 135.0	1,137	-29	–	–	–
American Kestrel	80 ± 22.2	20	-75	70.4 ± 18.49	33.9	-52
Merlin	10 ± 3.4	7	-27	6.7 ± 2.15	10.7	+58
Prairie Falcon	13 ± 1.9	20	+60	8.4 ± 1.50	19.8	+137
Peregrine Falcon	8 ± 2.9	8	-5	6.5 ± 2.20	11.2	+71
Gyr Falcon	0.1 ± 0.15	0	-100	–	–	–
Unknown small falcon ²	1 ± 1.5	27	+3500	–	–	–
Unknown large falcon ²	2 ± 1.5	13	+643	–	–	–
Unknown falcon	5 ± 2.3	13	+149	–	–	–
TOTAL FALCONS	117 ± 29.1	108	-8	–	–	–
Unidentified raptor	28 ± 6.1	54	+92	–	–	–
GRAND TOTAL	2578 ± 280.9	2030	-21	–	–	–

¹ Mean ± 95% confidence interval.

² Designations used for the first time in 2001.

Table 2. Fall counts by age class and immature : adult ratios for selected species of migrating raptors in the Bridger Mountains, MT: 1992–2004 versus 2005.

	TOTAL AND AGE-CLASSIFIED COUNTS						IMMATURE : ADULT			
	1992–2004 AVERAGE			2005			% UNKNOWN AGE		RATIO	
	TOTAL	IMM.	ADULT	TOTAL	IMM.	ADULT	1992–2004 ¹	2005	1992–2004 ¹	2005
Northern Harrier	52	26	11	22	2	16	32 ± 6.6	18	4.2 ± 4.45	0.1
Sharp-shinned Hawk	351	68	132	228	14	105	43 ± 7.8	48	0.6 ± 0.12	0.1
Cooper’s Hawk	170	50	53	153	8	80	39 ± 6.9	42	1.0 ± 0.29	0.1
Northern Goshawk	36	14	15	22	3	1	20 ± 8.0	82	1.6 ± 0.64	3.0
Broad-winged Hawk	10	2	4	3	0	0	36 ± 20.8	100	1.1 ± 1.02	–
Red-tailed Hawk	108	37	49	108	16	50	22 ± 4.9	39	0.8 ± 0.43	0.3
Golden Eagle	1519	579	561	1061	337	241	25 ± 4.9	46	1.1 ± 0.21	1.4
Bald Eagle	84	29	52	75	16	54	2 ± 17.0	7	0.6 ± 0.11	0.3
Peregrine Falcon	8	1	5	8	0	0	45 ± 17.0	100	0.23 ± 0.32	–

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 immatures and adults. Discrepancies in the two values reflect high annual variability in the observed age ratio.

Table 3. First and last observation, bulk passage, and median passage dates by species for migrating raptors in the Bridger Mountains, MT in 2005, with a comparison of 2005 and 1992–2004 average median passage dates.

SPECIES	2005				1992–2004
	FIRST OBSERVED	LAST OBSERVED	BULK PASSAGE DATES ¹	MEDIAN PASSAGE DATE ²	MEDIAN PASSAGE DATE ³
Turkey Vulture	9-Sep	9-Sep	–		19-Sep ±
Osprey	21-Sep	1-Oct	–		16-Sep ± 3.4
Northern Harrier	6-Sep	25-Oct	6-Sep – 19-Oct	21-Sep	23-Sep ± 5.3
Sharp-shinned Hawk	28-Aug	30-Oct	18-Sep – 21-Oct	26-Sep	02-Oct ± 1.8
Cooper’s Hawk	12-Sep	29-Oct	19-Sep – 21-Oct	30-Sep	22-Sep ± 2.7
Northern Goshawk	18-Sep	29-Oct	29-Sep – 25-Oct	13-Oct	09-Oct ± 6.3
Broad-winged Hawk	22-Sep	15-Oct	–		20-Sep ± 2.4
Red-tailed Hawk	27-Aug	24-Oct	14-Sep – 12-Oct	22-Sep	21-Sep ± 2.8
Ferruginous Hawk	17-Oct	18-Oct	–		29-Sep ± 15.7
Rough-legged Hawk	14-Oct	29-Oct	14-Oct – 25-Oct	17-Oct	11-Oct ± 2.7
Golden Eagle	28-Aug	30-Oct	26-Sep – 26-Oct	17-Oct	11-Oct ± 2.4
Bald Eagle	6-Sep	30-Oct	29-Sep – 25-Oct	22-Oct	15-Oct ± 2.7
American Kestrel	29-Aug	25-Oct	15-Sep – 13-Oct	30-Sep	21-Sep ± 2.4
Merlin	1-Oct	26-Oct	1-Oct – 26-Oct	13-Oct	01-Oct ± 2.4
Prairie Falcon	27-Aug	18-Oct	1-Sep – 14-Oct	21-Sep	23-Sep ± 5.3
Peregrine Falcon	19-Sep	19-Oct	19-Sep – 19-Oct	21-Sep	25-Sep ± 3.1
All species	6-Sep	30-Oct	19-Sep – 26-Oct	12-Oct	07-Oct ± 1.6

¹ Dates between which the central 80% of the flight passed; values are given only for species with annual counts ≥5 birds.

² Date by which 50% of the flight had passed; values are given only for species with annual counts ≥5 birds.

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

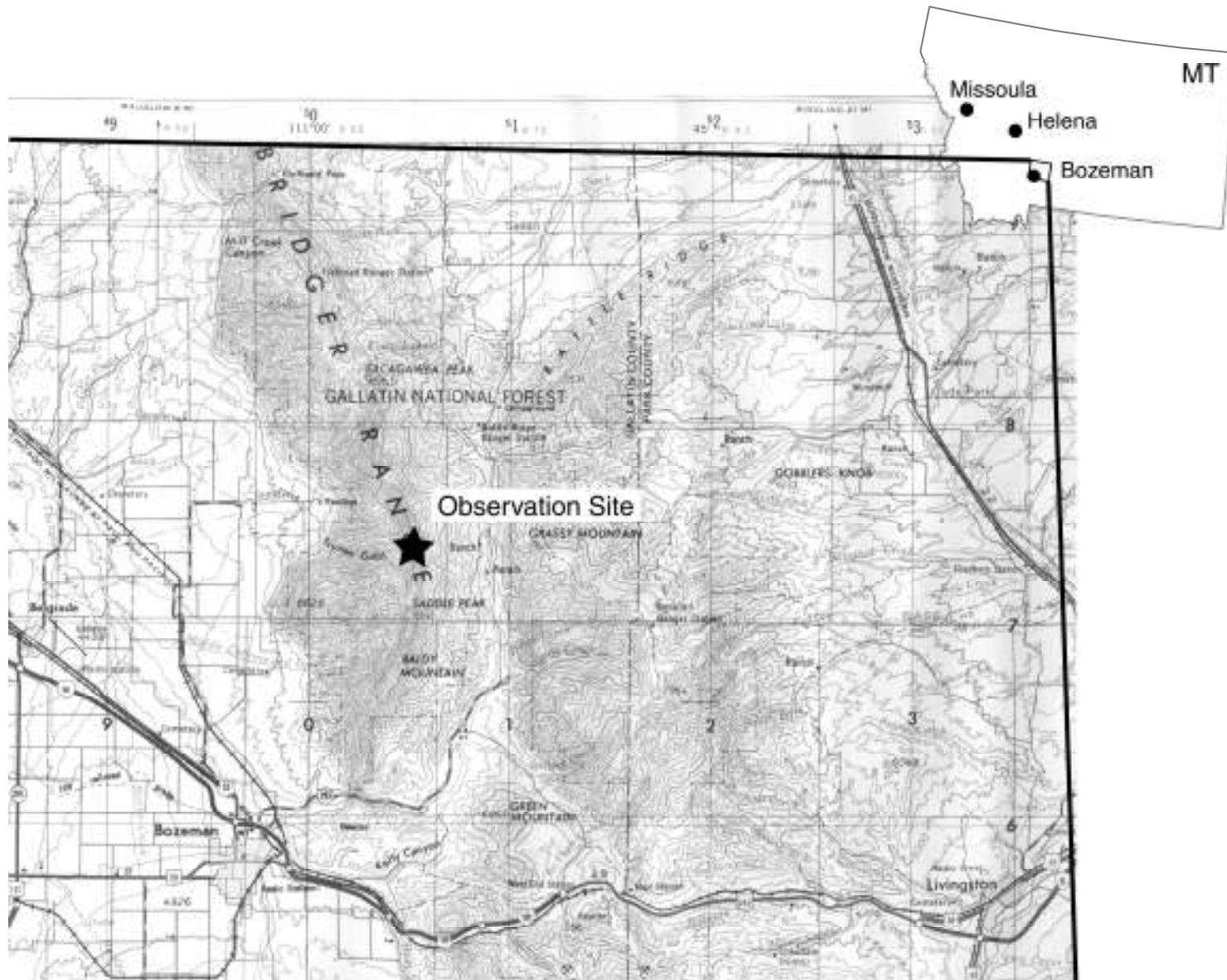


Figure 1. Location of the Bridger Mountains Raptor Migration Project study site.

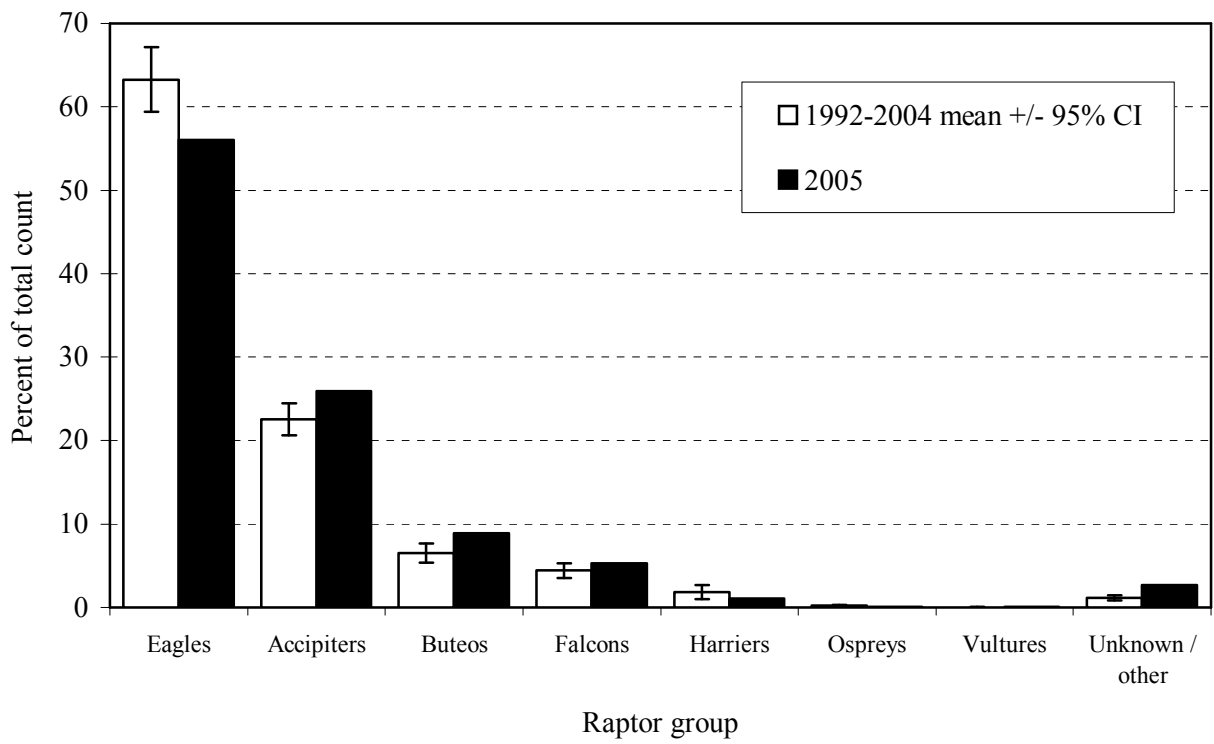


Figure 2. Composition of the fall raptor migration in the Bridger Mountains by major species groups: 1992–2004 versus 2005.

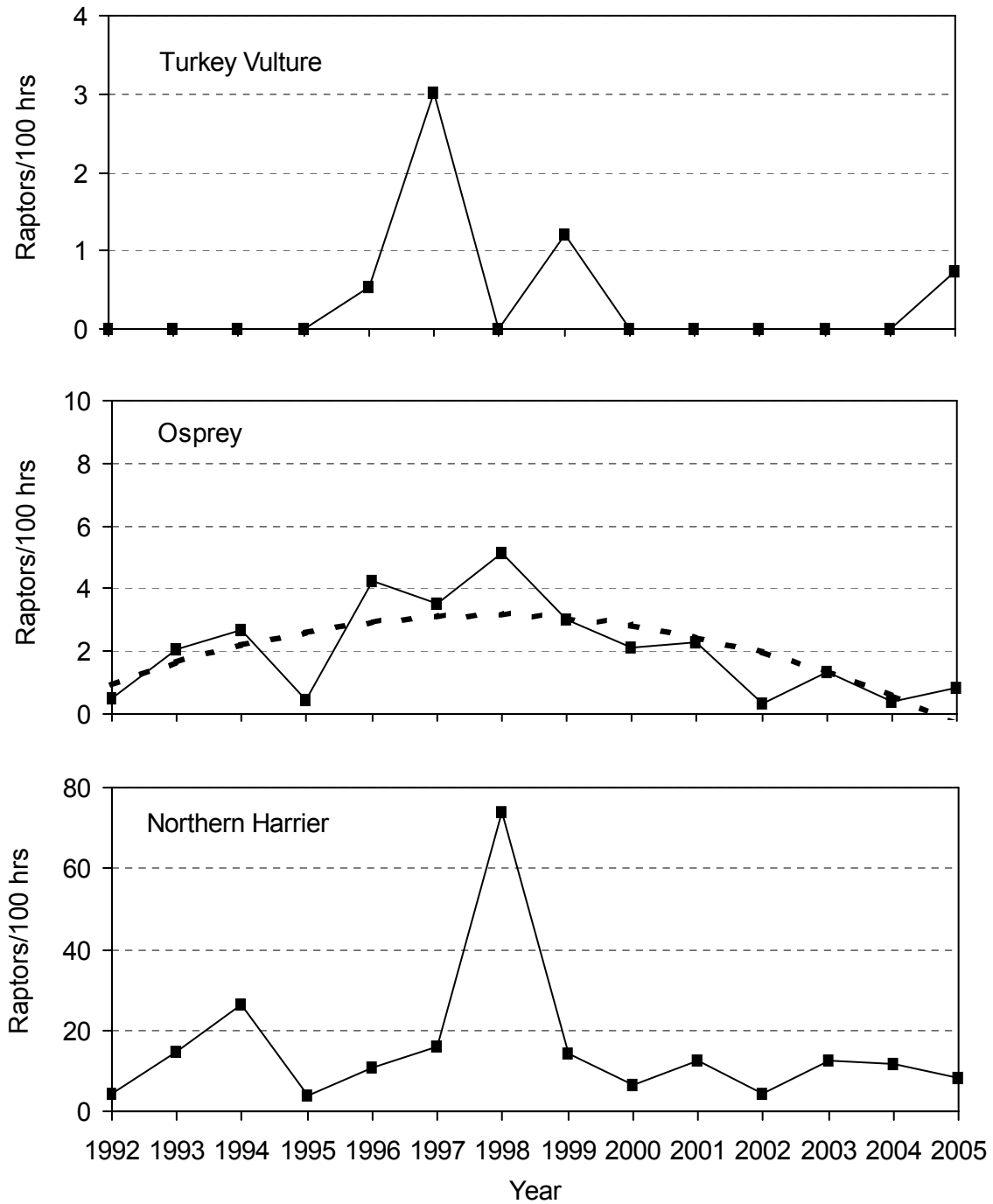


Figure 3. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Turkey Vultures, Ospreys, and Northern Harriers in the Bridger Mountains, MT: 1992–2005. Dashed lines indicate significant ($P \leq 0.10$) regressions.

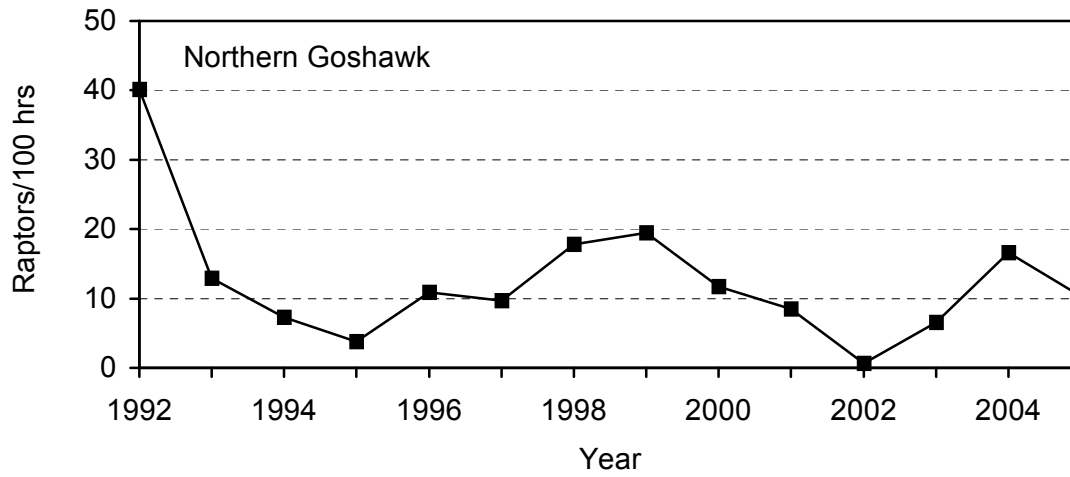
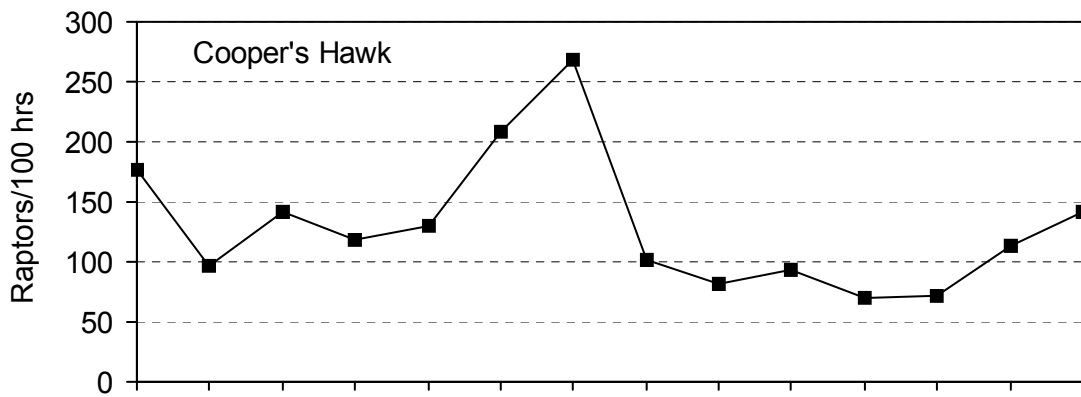
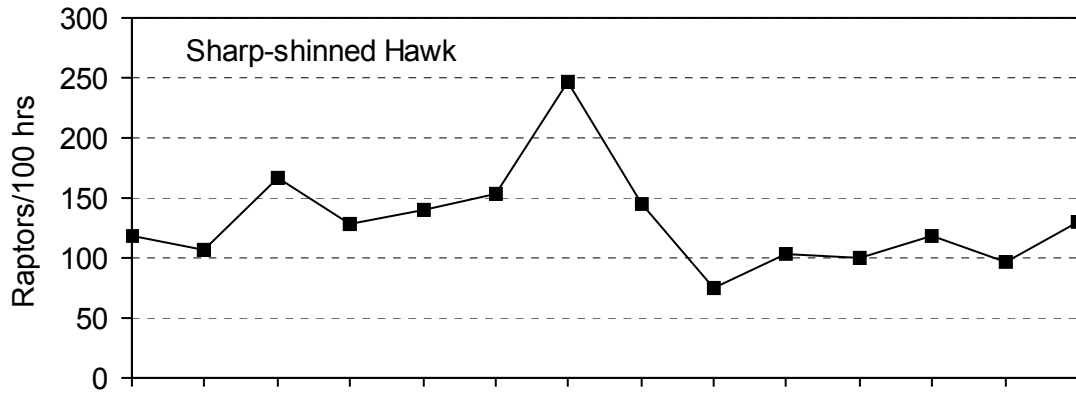


Figure 4. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Sharp-shinned Hawks, Cooper's Hawks, and Northern Goshawks in the Bridger Mountains, MT: 1992–2005. Dashed lines indicate significant ($P \leq 0.10$) regressions.

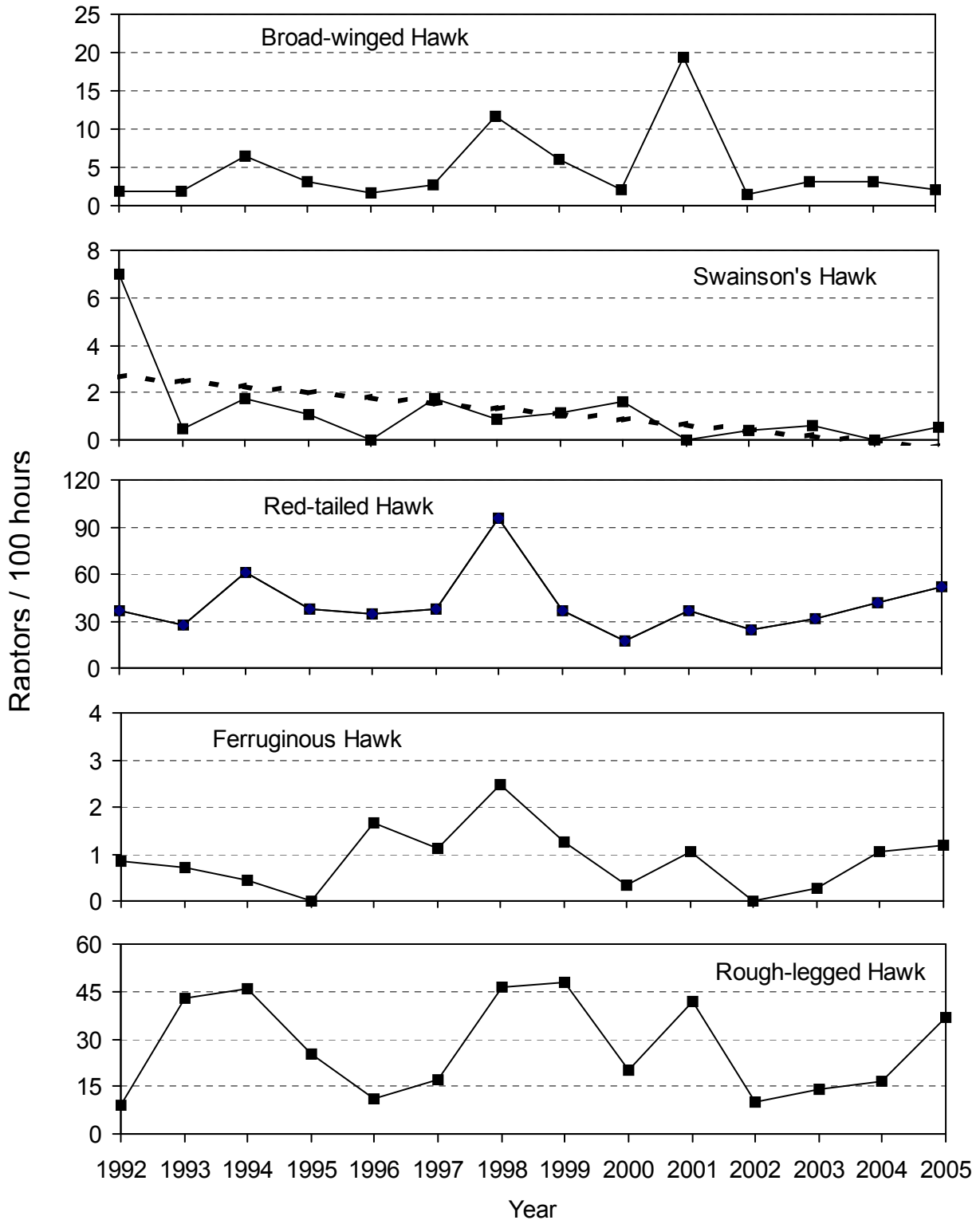


Figure 5. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Broad-winged, Swainson's, Red-tailed, Ferruginous, and Rough-legged Hawks in the Bridger Mountains, MT: 1992–2005. Dashed lines indicate significant ($P \leq 0.10$) regressions.

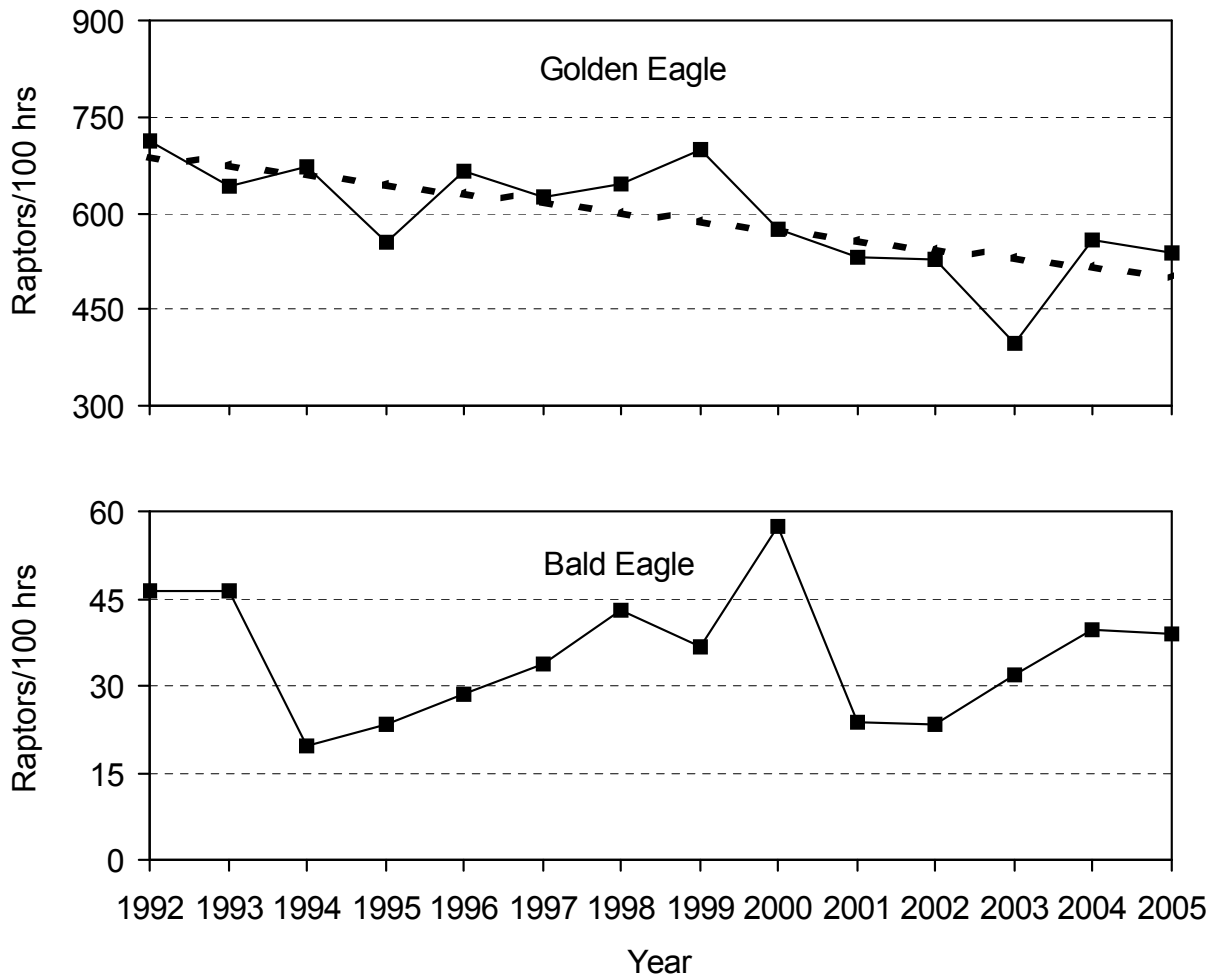


Figure 6. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for Golden and Bald Eagles in the Bridger Mountains, MT: 1992–2005. Dashed lines indicate significant ($P \leq 0.10$) regressions.

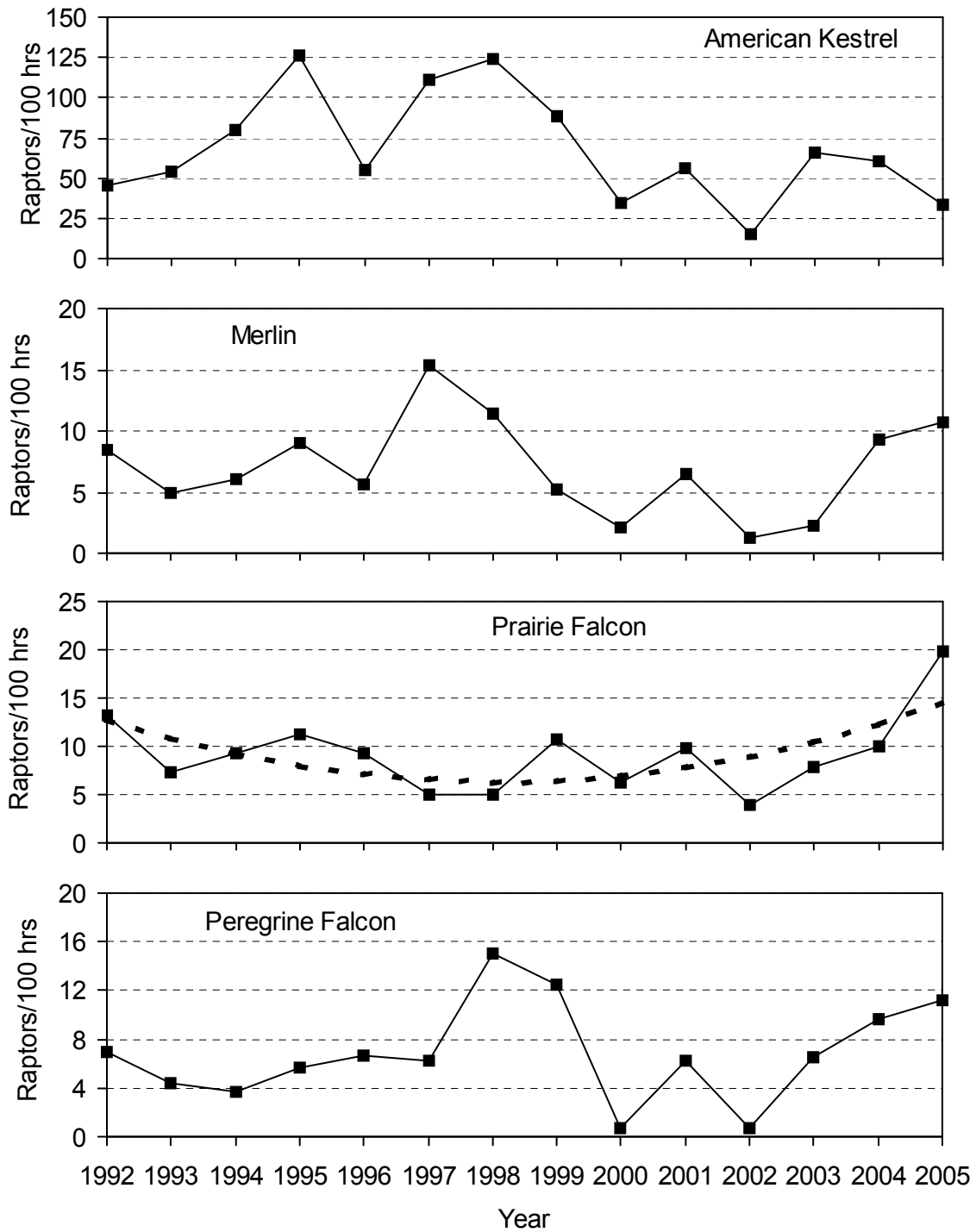


Figure 7. Adjusted (truncated to standardized annual sampling periods and adjusted for incompletely identified birds) fall-migration passage rates for American Kestrels, Merlins, Prairie Falcons, and Peregrine Falcons in the Bridger Mountains, MT: 1992–2005. Dashed lines indicate significant ($P \leq 0.10$) regressions.

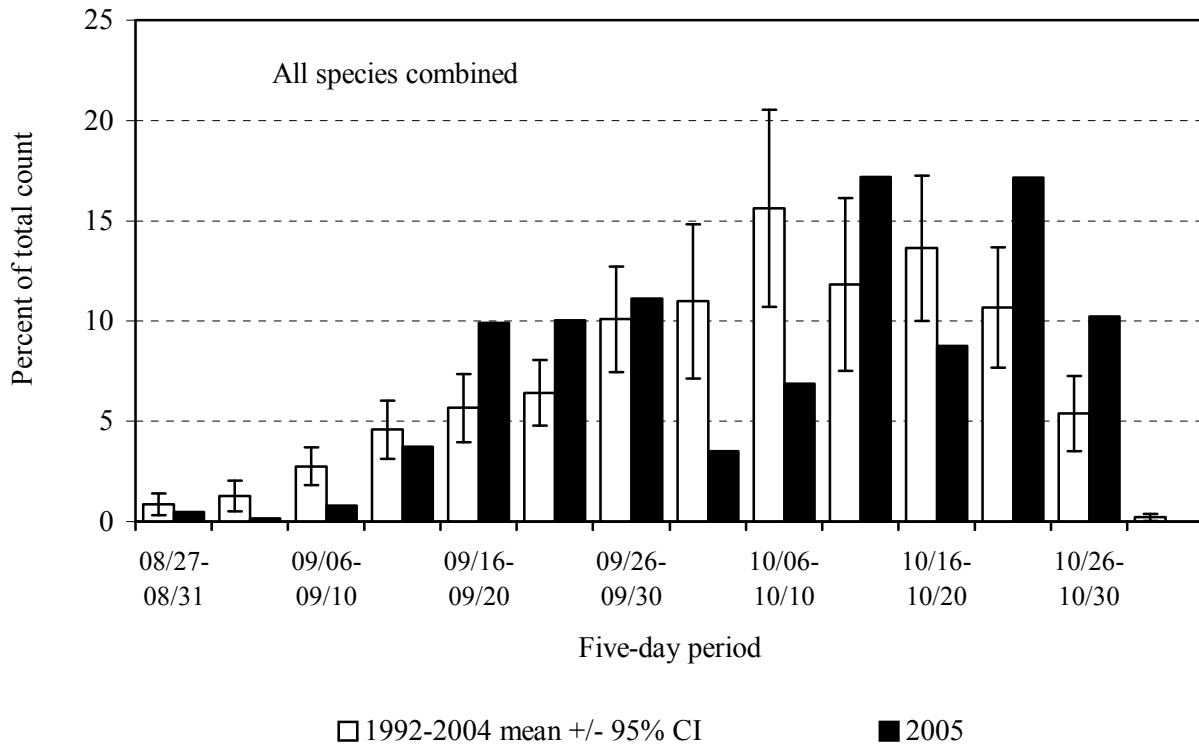


Figure 8. Passage volume by five-day periods for migrating Golden and Bald Eagles in the Bridger Mountains, MT: 1992–2004 versus 2005.

Appendix A. Common and scientific names, species codes, and regularly applied age, sex, and color-morph classifications for all diurnal raptor species observed during fall migration in the Bridger Mountains, MT.

COMMON NAME	SCIENTIFIC NAME	SPECIES CODE	AGE ¹	SEX ²	COLOR MORPH ³
Turkey Vulture	<i>Cathartes aura</i>	TV	U	U	NA
Osprey	<i>Pandion haliaetus</i>	OS	U	U	NA
Northern Harrier	<i>Circus cyaneus</i>	NH	A I Br U	M F U	NA
Sharp-shinned Hawk	<i>Accipiter striatus</i>	SS	A I U	U	NA
Cooper's Hawk	<i>Accipiter cooperii</i>	CH	A I U	U	NA
Northern Goshawk	<i>Accipiter gentilis</i>	NG	A I U	U	NA
Unknown small accipiter	<i>A. striatus</i> or <i>cooperii</i>	SA	U	U	NA
Unknown large accipiter	<i>A. cooperii</i> or <i>gentilis</i>	LA	U	U	NA
Unknown accipiter	<i>Accipiter</i> spp.	UA	U	U	NA
Broad-winged Hawk	<i>Buteo platyterus</i>	BW	A I U	U	D L U
Swanson's Hawk	<i>Buteo swainsoni</i>	SW	U	U	D L U
Red-tailed Hawk	<i>Buteo jamaicensis</i>	RT	A I U	U	D L U
Ferruginous Hawk	<i>Buteo regalis</i>	FH	A I U	U	D L U
Rough-legged Hawk	<i>Buteo lagopus</i>	RL	U	U	D L U
Unknown buteo	<i>Buteo</i> spp.	UB	U	U	D L U
Golden Eagle	<i>Aquila chrysaetos</i>	GE	I, S, NA, A, U ⁴	U	NA
Bald Eagle	<i>Haliaeetus leucocephalus</i>	BE	I, S1, S2, NA, A, U ⁵	U	NA
Unknown eagle	<i>Aquila</i> or <i>Haliaeetus</i> spp.	UE	U	U	NA
American Kestrel	<i>Falco sparverius</i>	AK	U	M F U	NA
Merlin	<i>Falco columbarius</i>	ML	AM Br	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
Gyr Falcon	<i>Falco rusticolus</i>	GY	A I U	U	W G D
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, G = gray; L = light, W = white; 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 B. A history of primary observers for the Bridger Mountains Raptor Migration Project.

1991: Kristian Shawn Omland (0), Phil West (1), LisaBeth Daly (2), Craig Limpach (1)

1992: Emily Teachout (1), Phil West (2)

1993: Adam Kaufman (0), Anne-Marie Gillesberg (0)

1994: Chris Gill (0), Stephanie Schmidt (1)

1995: Scott Harris (0), Sue Thomas (0)

1996: Jason Beason (0), Niels Maumenee (0)

1997: Jason Beason (1), Patty Scifres (0)

1998: Jason Beason (2), Mike Neal (0)

1999: Mike Neal (2), Greg Levandoski (1)

2000: Ryan Wagner (1), Tracy Elsey (0)

2001: Ryan Wagner (2), Jeff Maurer (4)

2002: Matt Proett (0), Marg Lomow (2; half season), and Maureen Essen (0; half season)

2003: Samantha Burrell (0) and Carl Bullock (0)

2004: Allison Peterson (0) and John Bell (0)

2005: Corey Michell (0) and Beau Fairchild (0)

Note: Numbers in parentheses indicate number of full-seasons of previous raptor migration monitoring experience.

Appendix C. Daily observation effort, visitor disturbance ratings, weather records, and flight summaries for the Bridger Mountains Raptor Migration Project: 2005.

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	
27-Aug	7.00	2.0	0	clr/haze	4.7	w	34.4	32.00	2	61	21	2	0.3
28-Aug	6.50	2.1	2	clr, haze	2.1	sw, calm	39.7	30.97	4	65	16	2	0.6
29-Aug	7.50	2.0	0	mc-pc	6.4	s	33.1	30.52	3	80	79	2	0.4
30-Aug	0.00			weather day									
31-Aug	6.50	1.0	0	clr	5.1	w	22.2	30.76	3	80	80	2	0.2
1-Sep	6.50	2.0	0	clr-pc	0.8	calm, sw	32.0	30.80	4	70	57	3	0.2
2-Sep	6.75	1.0	0	pc	1.1	sw-w	26.1	30.77	4	80	80	3	0.1
3-Sep	3.75	2.0	0	pc	0.0	sw	36.0	30.76	4	93	58	-	0.3
4-Sep	5.00	1.0	0	mc-ovc, AM haze	0.6	sw-wnw, calm	26.6	30.66	4	78	40	-	0.0
5-Sep	6.17	2.0	0	pc-mc/haze	2.0	sw-w	21.2	30.79	4	62	38	-	0.0
6-Sep	7.00	2.0	0	clr-pc	0.4	w	21.0	30.88	3	80	60	2	1.0
7-Sep	6.50	1.0	0	clr-pc	6.8	w	25.5	30.89	3	80	66	2	0.2
8-Sep	7.00	1.0	0	clr/haze	4.5	wsw	24.6	30.68	4	81	51	3	0.4
9-Sep	6.75	1.0	0	pc-mc	8.3	sw	24.9	30.31	3	86	61	3	0.7
10-Sep	0.00			weather day									
11-Sep	0.00			weather day									
12-Sep	6.50	2.0	0	ovc-pc	3.0	calm, w	17.1	30.55	4	86	86	3	2.5
13-Sep	6.50	2.0	0	pc-ovc	3.0	w	12.4	30.63	3	80	90	2	2.2
14-Sep	7.50	1.8	0	ovc-pc	7.0	w	17.0	30.61	3	90	100	2	2.5
15-Sep	7.00	1.0	0	pc	3.7	w	18.9	30.60	3	82	69	2	3.9
16-Sep	0.00			weather day									
17-Sep	0.00			weather day									
18-Sep	6.50	1.0	0	mc-ovc	1.9	w	20.3	30.60	3	80	86	2	4.3
19-Sep	6.50	2.0	0	mc-clr	15.3	w	21.6	30.81	3	90	80	3	12.5
20-Sep	6.50	2.0	0	clr	11.6	w	19.8	30.73	3	90	86	3	14.2
21-Sep	5.50	2.0	0	ovc	2.1	se-s, w	19.1	30.66	4	61	57	2	23.3
22-Sep	5.42	2.0	0	clr-ovc	6.8	w	20.4	30.63	2	90	80	2	14.0
23-Sep	0.00			weather day									
24-Sep	0.00			weather day									
25-Sep	0.00			weather day									
26-Sep	6.00	1.0	0	clr	6.0	w	17.1	30.67	2	90	90	3	10.7
27-Sep	6.75	2.0	0	mc-ovc	3.0	w	19.1	30.67	3	90	90	2	4.7
28-Sep	6.00	2.0	0	clr-mc	16.1	w	11.1	30.81	3	90	83	3	4.2
29-Sep	6.75	2.3	0	mc-ovc	14.0	sw		30.68	3	90	90	2	12.1
30-Sep	6.50	1.0	0	ovc	24.0	w	19.5	30.53	4	90	90	3	3.5
1-Oct	7.00	2.6	2	pc-ovc	18.3	ssw	16.6	30.21	3	77	70	3	10.1
2-Oct	0.00			missed day									
3-Oct	0.00			missed day									
4-Oct	0.00			missed day									
5-Oct	0.00			missed day									
6-Oct	0.00			missed day									
7-Oct	5.50	2.2	0	mc-ovc	mod	sw-w	~4-10	-	-	-	-	-	22.2
8-Oct	0.00			missed day									
9-Oct	0.00			missed day									
10-Oct	6.50	1.0	0	clr	1.7	e-s, w	6.9	30.70	3	100	100	1	2.8
11-Oct	5.25	1.0	0	mc-ovc	10.3	w	6.5	30.61	4	100	100	1	5.0
12-Oct	3.75	1.0	0	mc	12.0	w	7.8	30.74	3	70	70	1	16.3
13-Oct	7.25	1.5	0	mc-ovc	19.0	w	9.4	30.64	4	100	100	2	10.1

Appendix C. continued

DATE	OBS. HOURS	OBSRVR / HOUR ¹	MEDIAN	PREDOMINANT WEATHER ³	WIND		TEMP (°C) ¹	BAROM. PRESS. (IN HG) ¹	MEDIAN	VISIB. WEST (KM) ¹	VISIB. EAST (KM) ¹	MEDIAN	BIRDS / HOUR
			VISITOR DISTURB ²		SPEED (KPH) ¹	WIND DIRECTION			THERMAL LIFT ⁴			FLIGHT DISTANCE ⁵	
14-Oct	7.50	1.8	0	clr	2.3	w	14.5	30.82	1	100	100	1	12.9
15-Oct	8.00	1.6	0	mc-pc	4.0	sw-w	14.8	30.50	1	94	94	1	11.5
16-Oct	0.00			missed day									
17-Oct	7.25	1.0	0	pc-mc	16.1	w	10.0	30.63	3	100	100	2	5.2
18-Oct	6.25	1.0	0	mc-pc	1.3	w	12.9	30.63	1	100	100	2	5.4
19-Oct	6.50	1.0	0	pc-ovc	5.3	w	12.6	30.51	3	100	54	1	8.8
20-Oct	6.50	1.0	0	ovc	3.0	w	7.4	30.70	4	80	88	2	7.5
21-Oct	6.50	1.0	0	clr-pc	11.1	w	6.0	30.81	2	90	100	1	6.0
22-Oct	7.00	1.0	0	clr	5.4	w	5.6	30.69	2	100	100	1	4.7
23-Oct	7.00	1.0	0	clr	1.9	w	9.5	30.73	1	100	100	1	10.9
24-Oct	6.25	1.6	0	clr	2.3	w	13.5	30.88	1	100	100	1	8.6
25-Oct	6.50	1.0	0	mc	0.9	se, w	15.3	30.71	1	100	80	2	22.5
26-Oct	7.00	1.0	0	clr-mc	7.5	w	12.6	30.57	2	80	58	2	23.7
27-Oct	0.00			missed day									
28-Oct	0.00			missed day									
29-Oct	1.50	1.0	0	ovc	6.0	w	5.8	30.52	4	73	43	1	6.0
30-Oct	7.00	1.0	0	ovc	14.3	w	-0.3	30.72	4	100	80	-	4.7
31-Oct	2.00	1.0	0	ovc	9.0	w	0.5	30.60	4	60	40	-	0.0

¹ Average of hourly records.

² Median hourly visitor-disturbance rating (subjective assessment by observers): 0 = none, 1 = low, 2 = moderate, 3 = high.

³ Predominant sky condition during day: clr = clear (0-15% cloud cover); pc = partly cloudy (16-50% cover); mc = mostly cloudy (51-75% cover); ovc = overcast (76-100% cover); ts = thunderstorms.

⁴ Median hourly rating concerning prevalence of lift-generating thermals, based on subjective assessments of solar intensity, wind speeds, and migrant behavior: 1 = excellent, 2 = good, 3 = fair, 4 = poor.

⁵ Median hourly rating concerning line-of-sight distance of flight from observation site: 1 = close, detection and identification possible with naked eye; 2 = moderate, detection possible with naked eye, but binoculars needed for identification; 3 = far, binoculars needed for both detection and identification; 4 = distant, birds detected and identified only with excellent binoculars or spotting scope and by experienced observers.

Appendix D. Daily observation effort and fall raptor migration counts by species in the Bridger Mountains, MT: 2005.

DATE	HOURS	SPECIES ¹																								BIRDS				
		TV	OS	NH	SS	CH	NG	SA	LA	UA	BW	SW	RT	FH	RL	UB	GE	BE	UE	AK	ML	PR	PG	GY	SF	LF	UF	UU	TOTAL	/ HOUR
27-Aug	7.00	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0.3
28-Aug	6.50	0	0	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	4	0.6	
29-Aug	7.50	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0.4	
30-Aug	0.00																													
31-Aug	6.50	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	1	0.2	
01-Sep	6.50	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	1	0.2	
02-Sep	6.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.1	
03-Sep	3.75	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	0	1	0.3	
04-Sep	5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
05-Sep	6.17	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	
06-Sep	7.00	0	0	5	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	7	1.0	
07-Sep	6.50	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	1	0.2	
08-Sep	7.00	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0.4	
09-Sep	6.75	1	0	0	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	5	0.7	
10-Sep	0.00																													
11-Sep	0.00																													
12-Sep	6.50	0	0	1	4	2	0	4	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	16	2.5	
13-Sep	6.50	0	0	0	2	1	0	3	0	0	0	1	0	0	2	5	0	0	0	0	0	0	0	0	0	0	0	14	2.2	
14-Sep	7.50	0	0	0	2	0	0	3	1	0	0	5	0	0	0	6	0	0	0	0	0	0	0	0	0	1	1	19	2.5	
15-Sep	7.00	0	0	0	6	4	0	4	0	0	0	1	0	0	1	8	1	0	1	0	0	0	0	0	0	0	1	27	3.9	
16-Sep	0.00																													
17-Sep	0.00																													
18-Sep	6.50	0	0	3	6	3	1	2	1	0	0	3	0	0	0	7	0	0	1	0	0	0	0	1	0	0	0	28	4.3	
19-Sep	6.50	0	0	1	12	8	0	2	2	5	0	10	0	0	0	14	0	0	1	0	5	2	0	8	3	0	8	81	12.5	
20-Sep	6.50	0	0	0	20	12	0	11	0	6	0	9	0	0	0	18	0	0	0	0	2	1	0	7	1	1	4	92	14.2	
21-Sep	5.50	0	1	3	39	30	0	11	0	0	0	9	0	0	0	19	1	0	1	0	2	1	0	1	0	3	7	128	23.3	
22-Sep	5.42	0	0	0	12	2	0	7	0	0	1	0	10	0	0	2	22	2	1	2	0	2	0	2	1	2	8	76	14.0	
23-Sep	0.00																													
24-Sep	0.00																													
25-Sep	0.00																													
26-Sep	6.00	0	0	0	10	5	0	6	0	2	0	13	0	0	2	15	0	0	0	0	2	0	0	0	1	0	8	64	10.7	
27-Sep	6.75	0	0	0	9	1	0	2	0	1	0	1	0	0	1	10	2	0	0	0	1	0	0	3	0	1	0	32	4.7	
28-Sep	6.00	0	0	1	0	1	1	1	0	0	0	6	0	0	0	11	0	0	0	0	0	0	0	0	0	0	4	25	4.2	
29-Sep	6.75	0	0	0	3	5	2	1	0	1	0	12	0	0	3	49	1	0	2	0	0	0	0	0	1	1	1	82	12.1	
30-Sep	6.50	0	0	0	2	4	1	1	0	0	0	1	0	0	0	11	1	0	1	0	0	1	0	0	0	0	0	23	3.5	

Appendix D. continued

DATE	HOURS	SPECIES ¹																								BIRDS				
		TV	OS	NH	SS	CH	NG	SA	LA	UA	BW	SW	RT	FH	RL	UB	GE	BE	UE	AK	ML	PR	PG	GY	SF	LF	UF	UU	TOTAL	/ HOUR
01-Oct	7.00	0	1	1	9	10	0	14	0	2	0	0	0	0	3	7	2	0	2	3	0	1	0	3	1	4	8	71	10.1	
02-Oct	0.00																													
03-Oct	0.00																													
04-Oct	0.00																													
05-Oct	0.00																													
06-Oct	0.00																													
07-Oct	5.50	0	0	0	10	3	1	0	0	3	0	0	2	0	1	95	3	0	4	0	0	0	0	0	0	0	0	122	22.2	
08-Oct	0.00																													
09-Oct	0.00																													
10-Oct	6.50	0	0	1	1	0	0	0	0	0	0	4	0	0	7	3	0	1	0	0	0	0	1	0	0	0	18	2.8		
11-Oct	5.25	0	0	1	4	1	2	0	0	0	0	3	0	0	15	0	0	0	0	0	0	0	0	0	0	0	26	5.0		
12-Oct	3.75	0	0	0	3	2	2	0	0	1	0	0	3	0	0	49	1	0	0	0	0	0	0	0	0	0	61	16.3		
13-Oct	7.25	0	0	0	1	2	1	0	0	0	0	1	0	0	2	61	1	0	1	1	1	0	0	1	0	0	73	10.1		
14-Oct	7.50	0	0	1	23	17	3	6	0	0	1	0	2	0	5	2	33	2	0	0	0	2	0	0	0	0	97	12.9		
15-Oct	8.00	0	0	0	11	6	0	3	0	1	1	0	1	0	0	61	7	0	1	0	0	0	0	0	0	0	92	11.5		
16-Oct	0.00																													
17-Oct	7.25	0	0	1	2	5	0	1	0	2	0	0	1	0	1	22	1	0	0	0	0	1	0	0	0	1	38	5.2		
18-Oct	6.25	0	0	0	7	6	1	1	0	0	0	0	1	3	0	13	1	0	0	0	1	0	0	0	0	0	34	5.4		
19-Oct	6.50	0	0	1	2	6	1	0	0	0	0	1	0	7	0	35	2	0	0	1	0	1	0	0	0	0	57	8.8		
20-Oct	6.50	0	0	0	0	2	0	0	0	0	0	0	0	1	1	41	1	0	0	0	0	0	0	0	2	0	49	7.5		
21-Oct	6.50	0	0	0	3	3	0	1	0	0	0	1	0	3	0	23	4	0	0	0	0	0	0	0	1	0	39	6.0		
22-Oct	7.00	0	0	0	3	0	0	0	0	0	0	0	0	4	0	12	14	0	0	0	0	0	0	0	0	0	33	4.7		
23-Oct	7.00	0	0	0	1	2	1	1	0	0	0	2	0	3	3	56	7	0	0	0	0	0	0	0	0	0	76	10.9		
24-Oct	6.25	0	0	1	5	2	0	0	0	0	0	1	0	8	0	31	5	0	0	0	0	0	0	0	1	0	54	8.6		
25-Oct	6.50	0	0	1	5	7	2	3	0	0	0	0	0	4	0	117	6	0	1	0	0	0	0	0	0	0	146	22.5		
26-Oct	7.00	0	0	0	6	2	0	0	0	2	0	0	0	0	0	149	5	0	0	2	0	0	0	0	0	0	166	23.7		
27-Oct	0.00																													
28-Oct	0.00																													
29-Oct	1.50	0	0	0	1	1	1	0	0	0	0	0	0	2	0	4	0	0	0	0	0	0	0	0	0	0	9	6.0		
30-Oct	7.00	0	0	0	1	0	0	1	0	0	0	0	0	0	0	30	1	0	0	0	0	0	0	0	0	0	33	4.7		
31-Oct	2.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0		
Total	300.83	1	2	22	228	153	22	92	4	27	3	0	108	2	40	27	1061	75	1	20	7	20	8	0	27	13	13	54	2030	6.7

¹ See Appendix A for interpretation of species codes.

Appendix E. Annual observation effort and fall raptor migration counts by species in the Bridger Mountains, MT: 1991–2005.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	MEAN
Start date	15-Sep	6-Sep	9-Sep	13-Sep	10-Sep	1-Sep	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	31-Aug
End date	3-Nov	28-Oct	31-Oct	30-Oct	2-Nov	30-Oct	31-Oct	31-Oct	31-Oct	31-Oct	31-Oct	31-Oct	31-Oct	27-Oct	31-Oct	29-Oct
Observation days	32	39	46	36	42	53	62	56	57	52	58	52	64	48	48	50
Observation hours	191.1	242.58	298.50	239.25	269.17	378.25	422.92	339.33	358.24	335.40	347.49	365.84	443.18	316.70	300.83	323.25
Raptors / 100 hours	926.7	1000.1	872.0	1025.3	824.0	808.5	796.1	1040.9	871.8	630.9	636.3	556.0	517.6	655.2	674.8	789.2
SPECIES	RAPTOR COUNTS															
Turkey Vulture	3	0	0	0	0	1	6	0	2	0	0	0	0	0	1	1
Osprey	2	2	5	5	1	14	12	13	9	6	6	2	5	1	2	6
Northern Harrier	19	13	41	59	10	38	66	230	52	20	36	15	54	39	22	48
Sharp-shinned Hawk	88	248	279	364	304	436	480	612	442	190	274	288	416	229	228	325
Cooper's Hawk	87	175	124	134	131	206	347	343	149	109	120	103	132	142	153	164
Northern Goshawk	27	96	39	17	10	37	36	50	61	34	26	2	23	41	22	35
Unknown small accipiter ¹	-	-	-	-	-	-	-	-	-	-	0	11	29	32	92	33
Unknown large accipiter ¹	-	-	-	-	-	-	-	-	-	-	0	4	4	9	4	4
Unknown accipiter	70	35	27	20	33	51	53	49	39	35	27	5	0	7	27	32
TOTAL ACCIPITERS	272	554	469	535	478	730	916	1054	691	368	447	413	604	460	526	568
Broad-winged Hawk	0	2	3	11	5	5	5	20	13	3	38	3	9	6	3	9
Swainson's Hawk	1	11	0	3	2	0	6	2	3	3	0	1	2	0	0	2
Red-tailed Hawk	26	67	65	110	79	106	130	277	121	45	117	78	113	100	108	103
Ferruginous Hawk	3	1	1	1	0	5	4	7	4	1	3	0	1	3	2	2
Rough-legged Hawk	9	10	54	48	29	17	23	66	77	26	57	11	22	20	40	34
Unidentified buteo	14	8	19	15	18	13	20	13	3	8	6	9	6	18	27	13
TOTAL BUTEOS	53	99	142	188	133	146	188	385	221	86	221	102	153	147	180	163
Golden Eagle	1280	1579	1699	1500	1322	1871	1844	1516	1870	1429	1330	1359	1226	1196	1061	1472
Bald Eagle	43	95	124	41	57	79	93	95	91	128	58	55	93	79	75	80
Unidentified eagle	5	2	17	0	25	14	0	15	5	3	2	15	4	2	1	7
TOTAL EAGLES	1328	1676	1840	1541	1404	1964	1937	1626	1966	1560	1390	1429	1323	1277	1137	1560
American Kestrel	33	38	54	67	117	82	146	141	113	39	62	16	102	65	20	73
Merlin	2	10	7	7	12	9	26	17	8	3	9	2	4	11	7	9
Prairie Falcon	9	14	10	10	14	16	10	12	20	9	14	6	15	12	20	13
Peregrine Falcon	1	7	6	4	7	10	10	18	18	1	8	1	10	10	8	8
Gyr Falcon	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Unknown small falcon ¹	-	-	-	-	-	-	-	-	-	-	0	0	0	3	27	6
Unknown large falcon ¹	-	-	-	-	-	-	-	-	-	-	0	1	3	3	13	4
Unknown falcon	5	3	2	4	2	5	17	8	6	4	3	4	1	9	13	6
TOTAL FALCONS	50	72	79	92	152	122	209	196	166	56	96	30	135	113	108	112
Unidentified raptor	44	10	27	33	40	43	33	28	16	20	15	43	20	38	54	31
GRAND TOTAL	1771	2426	2603	2453	2218	3058	3367	3532	3123	2116	2211	2034	2294	2075	2030	2488

¹ Designations used for the first time in 2001.