Monitoring Raptors During Autumn Migration in Southwestern and Southcentral Idaho

1998 Annual Summary

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INTRODUCTION

Raptor migration counts (RMCs) can sample a wide variety of species, many in large numbers, over a relatively short period of time and are a useful and economical survey technique for detecting long-term trends in species across regions (Titus and Fuller 1990, Bednarz et al. 1990). RMCs can be particularly useful for species that otherwise cannot be easily surveyed using other techniques. Raptor migration counts are conducted at monitoring locations throughout the continental United States (Robbins 1975, Heintzelrnan 1986, Kerlinger 1989). Most monitoring sites are located along coastlines or mountain ridges where migrating raptors tend to concentrate (Allen and Peterson 1936, Kerlinger and Gauthreaux 1985, Kerlinger 1989). The majority of these locations are located in the eastern half of the country, predominantly in the Great Lakes region, Gulf Coast, Atlantic Coast, and Appalachian Mountains. In the Intermountain West there are only a handful of raptor migration monitoring sites. Specifically, in Idaho and Nevada there are only two monitoring sites, one in each state. During the 1997 autumn migration period, we conducted a pilot raptor monitoring effort at sites in southwestern and southcentral Idaho (Bates 2000). In autumn 1998 we continued our pilot raptor monitoring with increased sampling effort at one primary site, that we sampled in 1997, and two other sites on a limited basis. Also, we identified, accessed, and sampled three other locations to assess their utility for monitoring raptors during autumn migration.

STUDY AREA

Raptor monitoring locations are located within southwestern and south central Idaho. Cinnabar Mountain, located in the Owyhee Mountains at an elevation of 2,536 meters (m) and approximately 82 kilometers (km) south/southwest from Boise, Idaho, was our primary monitoring site. Other monitoring sites were Danskin Peak (elevation 2,040 m) and West Mountains (elevation 2,490 m) located 50 km east/southeast and 87 km north, respectively, from Boise, Idaho. Dollarhide Pass (elevation 2,680 m), Galena Summit (elevation 2,650 m), and Bell Mountain (elevation 2,410 m), located 120 km east, 120 km east/northeast, and 140 km east, respectively, from Boise, Idaho, were monitored to a lesser extent.

METHODS

We conducted counts of raptors at monitoring sites from late August through late October 1998. Cinnabar Mountain was our primary monitoring site. Other monitoring sites were Danskin Peak and West Mountains. Dollarhide Pass, Galena Summit, and Bell Mountain were locations that we accessed to assess their potential as raptor monitoring sites on a limited basis. At each location we spent time assessing where the best monitoring site was located based on site-specific small-scale topography, habitat features, and visibility. None of this time was included in the observation period minutes. Once we identified the best location, based on the above criteria, it was used as our monitoring site. We used binoculars to count and identify raptors to species, as well as age and/or sex class if possible. When doubt existed about a raptors' species identification, we only identified it to raptor type (i.e., unknown falcon, unknown buteo,

etc.) and if that category was doubtful, then we classified it as an unknown raptor. We only counted raptors if they flew in a southward direction past an imaginary east/west line oriented through our observation point at each monitoring site. Weather conditions were recorded at the beginning of each observation period and then hourly thereafter, or more frequently whenever a change in weather was detected.

In addition to observation, we set up and operated a temporary raptor trapping and banding station at West Mountain on several occasions to conduct more intensive monitoring. Raptors were trapped using bow-nets, mist-nets, and dho-gazzas. Each trapped raptor was marked with an official band issued by the U.S. Geological Survey (USGS) Biological Resources Division (BRD) -formerly the National Biological Service. Raptor banding was conducted under an Idaho Department of Fish and Game (IDFG) banding permit, issued by the BRD. Various morphometric measurements, including weight, were obtained from each trapped raptor before they were released.

RESULTS

We counted raptors at six different monitoring sites between late August and late October 1998. Among all sites we counted a total of 1,349 raptors during 309.76 hours (hrs) of observation. On Cinnabar Mountain we conducted raptor counts during 35 sampling days between 31 August and 30 October 1998. We counted a total of 754 raptors, composed of 12 different species (Table 1), during 211.26 total observation hrs, resulting in an average of3.57 raptors/ hour (hr). Observation periods for each day ranged from 1.50 to 8.02 hrs. American kestrels (*Falco sparverius*) and Turkey vultures (*Cathartes aura*) were the most numerous species, accounting for 19.63% (148) and 19.36% (146), respectively, of all raptors observed. Our highest single day count occurred on 1 September when we counted 63 raptors in 6.50 hrs for an average of 9.69 raptors/hr.

Table 1. Total number of raptors and species composition observed at Cinnabar Mountain during autumn 1998.

Species	**Number Observed**	**Percentage of Total**
American kestrel	148	19.63
Merlin	2	0.27
Prairie falcon	2	0.27
Red tailed hawk	76	10.08
Swainson's hawk	1	0.13
Sharp-shinned hawk	97	12.86
Cooper's hawk	26	3.45
Northern goshawk	3	0.40
Northern harrier	34	4.51
Golden eagle	65	8.62
Osprey	2	0.27
Turkey vulture	146	19.36
Unidentified accipiter	41	5.44
Unidentified buteo	6	0.80
Unidentified falcon	8	1.06
Unidentified raptor	97	12.86
Total	754	100%

At Danskin Peak we conducted raptor counts during 13 sampling days between 12 September and 24 October 1998. We counted a total of 425 raptors, composed of 11 different species (Table 2), during 56.28 total observation hrs, resulting in an average of 7.55 raptors/hr. Observation periods for each day ranged from 3.00 to 6.58 hrs. Sharp-shinned hawks (*Accipiter striatus*) and Cooper's hawks (*Accipiter cooperii*) were the most numerous species, accounting for 27.53% (117) and 10.82% (46), respectively, of all raptors observed. Our highest single day count occurred on 12 September when we counted 92 raptors during 4.12 hrs for an average of 22.33 raptors/hr.

Table 2. Total number of raptors and species composition observed at Danskin Peak during autumn 1998.

Species	**Number Observed**	**Percentage of Total**
American kestrel	45	10.59
Prairie falcon	1	0.24
Red tailed hawk	32	7.53
Swainson's hawk	3	0.71
Sharp-shinned hawk	117	27.53
Cooper's hawk	46	10.82
Northern goshawk	1	0.24
Northern harrier	3	0.71
Golden eagle	13	1.06
Osprey	14	3.29
Turkey vulture	40	9.41
Unidentified accipiter	43	11.29
Unidentified buteo	11	2.59
Unidentified falcon	2	0.47
Unidentified raptor	49	11.53
Tota1	425	100%

At the West Mountains site we conducted raptor counts during seven sampling days between 20 September and 27 October 1998. We counted a total of 142 raptors, composed of 10 different species (Table 3), during 36.72 total observation hrs, resulting in an average of 3.87 raptors/hr. Observation periods for each day ranged from 3.55 to 7.67 hrs. Sharp-shinned hawks (*Accipiter striatus*) and red-tailed hawks (*Buteo jamaicensis*) were the most numerous species, accounting for 43.66% (62) and 22.54% (32), respectively, of all raptors observed. Our highest single day count occurred on 12 September when we counted 38 raptors during 6.50 hrs for an average of 5.85 raptors/hr.

Table 3. Total number of raptors and species composition observed at West Mountain during autumn 1998.

Species	**Number Observed**	**Percentage of Total**
American kestrel	15	10.56
Prairie falcon	1	0.70
Red tailed hawk	32	22.54
Sharp-shinned hawk	62	43.66
Cooper's hawk	7	4.93
Northern goshawk	2	1.41
Northern harrier	1	0.70
Golden eagle	3	2.11
Merlin	5	3.52
Rough-legged hawk	1	0.70
Unidentified accipiter	3	2.11
Unidentified buteo	1	0.70
Unidentified falcon	1	0.70
Unidentified raptor	8	5.63
Total	142	100%

Also, at the West Mountains site we set up and operated a temporary raptor trapping and banding station during the same seven sampling days that we conducted raptor counts. Over this period we trapped a total of 23 raptors composed of 14 sharp-shinned hawks (*Accipiter striatus*), 4 Cooper's hawks (*Accipiter cooperii*), 1 northern goshawk (*Accipiter gentilis*), 1 American kestrel (*Falco sparverius*), and 3 red-tailed hawks (*Buteo jamaicensis*) (Table 4). Each trapped raptor was marked with an official band issued by BRD and various morphometric measurements, including weight, were recorded before they were released.

Tab1e 4. Raptors trapped and banded at West Mountain during autumn 1998.

Species	**Number Trapped and Banded**
Sharp-shinned hawk	14
Cooper's hawk	4
Northern goshawk	1
American kestrel	1
Red-tailed hawk	1
Total	23

On 17 September we accessed Dollarhide Pass to assess the raptor monitoring potential of this site. After assessing several adjacent potential sites we selected a slope approximately 200 m south of the pass and counted a total of 12 raptors during 3.00 observation hrs, resulting in an average of 4.00 raptors/hr. This total was composed of 3 red-tailed hawks (*Buteo jamaicensis*), 3 sharp-sbinned hawks (*Accipiter striatus*), 1 Cooper's hawk (*Accipiter cooperii*), 1 northern goshawk (*Accipiter gentilis*), 1 American kestrel (*Falco sparverius*), 1 golden eagle (*Aquila chrysaetos*), 1 northern harrier (*Circus cyaneus*), and 1 unidentified accipiter.

On 18 September we accessed Galena Summit to assess the raptor monitoring potential of this site. We counted a total of 14 raptors during 1.00 observation hr, resulting in an average of 14.00 raptors/hr. This total was composed of 8 sharp-shinned hawks (*Accipiter striatus*), 1 Cooper's hawk (*Accipiter cooperii*), 1 northern goshawk (*Accipiter gentilis*), 3 American kestrels (*Falco sparverius*), and 1 red-tailed hawk (*Buteo jamaicensis*).

On 19 September we accessed Bell Mountain to assess the raptor monitoring potential of this site. We counted a total of two raptors during 1.50 total observation hrs, resulting in an average of 1.33 raptors/hr. These two raptors were one sharp-shinned hawk (*Accipiter striatus*) and one northern harrier (*Circus cyaneus*).

DISCUSSION

In autumn 1998 we continued to conduct a raptor monitoring effort at Cinnabar Mountain. Also, we continued to explore other locations to assess their potential as monitoring sites during the autumn migration period. At Cinnabar Mountain we counted a total of 754 raptors in 1998 compared to 367 in 1997. Sampling effort was greater in 1998 than in 1997 at Cinnabar Mountain. We sampled a total of 211.26 hrs during 35 days compared to 109.77 hrs during 23 days in 1997. This represents a 92.46% increase in sampling effort from 1997 to 1998. Raptor counts at this site averaged 3.57 raptors/hr in 1998 compared to 3.34 raptors/hr in 1997. The average number of raptors/hr is very similar (3.57 vs.3.34) even though effort was almost two-fold greater in 1998 than in 1997. Based on only two seasons of data, the similarity of these averages suggest that they could be representative of the average number of raptors/hr during the fall migration period. Applying these averages over our entire 60 day sampling period at 6.5 hrs per day (60 days x 6.0 hrs = 390 hrs; 390 hrs x [3.34 to 3.57 raptors/hr] = 1,303 to 1,392 raptors) suggests that we may expect to count between approximately 1,300 to 1,400 raptors per autumn at this location. Cinnabar Mountains' expected autumn count and its unique location within the Intermountain West establish it as an important raptor migration monitoring site in western North America.

At Danskin Peak we counted a total of 425 raptors, during 56.28 total observation hrs, resulting in an average of 7.55 raptors/hr. In 1996 at Danskin Peak we conducted raptor counts during five sampling days between 24 August to 1 October, counting 120 raptors during 18.27 hrs of observation for an average of 6.57 raptors/hr (Bates 2000). These 1996 and 1998 results suggest that Danskin Peak is a productive location to conduct counts of migrating raptors.

At the West Mountains site our total count of 142 raptors, during 36.72 total observation hrs, resulting in an average of 3.87 raptors/hr. Also, we trapped and banded a total of 23 raptors at this site. These area shows promise as a raptor monitoring location and we plan to further investigate the potential of this location.

Counts at Dollarhide Pass of 12 raptors, at Galena Summit of 14 raptors, and at Bell Mountain of 2 raptors are probably not representative of the raptor migration that occurs at these locations due to the low number of hrs we sampled, 3.00 hrs, 1.00 hr, and 1.50 hrs, respectively. Also, these single day totals must be viewed with caution since they are from only one sampling period, and the effects of site-specific weather are unknown. However, all three of these sites merit further investigation as potential monitoring locations.

Our methods of identification for each observed raptor were conservative by some raptor migration monitoring site standards. This explains the relatively high number of unidentified raptors (i.e., unidentified accipiter, unidentified buteo, unidentified falcon, and unidentified raptor) detected. We chose to be conservative with our identification since over-enthusiasm to identify a given raptor to

species when it may be a couple kilometers away can skew results, making them incomparable from year to year.

Raptor population trend data obtained from migration monitoring sites has demonstrated that counts can reflect true regional population changes (Titus and Fuller 1990). In the western United States, Hoffman et al. (1992) found that long-term migration count data from monitoring sites suggest potential region-wide population declines for northern goshawks (*Accipiter gentilis*) and golden eagles (*Aquila chrysaetos*).

Many sampling regime variables can influence results at raptor monitoring sites. Sampling season length and a difference in sampling effort at the beginning, core period, or end of a migration season can affect the overall raptor count and average number of raptors/hour. The migration season at monitoring sites can be site-specific and/or species-specific. Many raptor species migrate at different periods within an autumn migration season at a given site and some sites are known for particular species. For example, at the Bridger Mountains in Montana, golden eagles (*Aquila chrysaetos*) account for greater than 50% of the total number of raptors, 1,844 of 3,367 in 1997 (Scifres 1998). Raptor migration monitoring sites need to be assessed on a site-specific and species-specific basis.

Since we were unable to sample all sites at the same time, we cannot overlook the possibility that our sampling regime affected the results. Ideally, all sites should have been sampled simultaneously on the same days. During the study design phase of this project we realized that with our limited resources (i.e., funding, personnel, 4WD vehicles, etc.) we would have to identify this lack of simultaneous sampling as a potential variable that could affect our results. However, even if simultaneous sampling among all sites was achieved, site-specific weather could affect our results since different climatological conditions can exist among sites on the same day, due to distances between locations and elevational differences.

By comparison with other established raptor migration monitoring locations in western North America, the Diamond Head raptor migration count site in central Washington produced yearly averages ranging from 4.8 to 6.2 raptors/hour during the 1991-1996 fall migration period (Namitz and Fletcher 1997). In 1995, fall raptor migration monitoring sites in the Bridger Mountains, Montana and at Mount Washburn, Wyoming, averaged 6.0 and 5.1 raptors/hour, respectively (Tilly and Sherrington 1996). At the upper end of the scale, the Goshutes Mountains monitoring site in Nevada records the greatest number of raptors in the western United States of any mountain ridge site. Their numbers have ranged from 11.3 to 31.2 raptors/hour during the 1983-1995 fall migration period (Salafsky et al. 1995).

Current hypotheses suggest the Snake River Plain may function as a geographic barrier to many species of migrant raptors. Whether there are major raptor migration routes or corridors across this semi-arid expanse of land during autumn is currently unknown. In Idaho and Nevada there are a total of only two other locations where raptor migration counts are conducted. In Idaho, the Boise Ridge monitoring site is located on the northern edge of the Snake River Plain. In Nevada,

the Goshute Mountain monitoring site is located in the northeastern corner of the state, approximately 150 kilometers south of the Plain (Salafsky et al. 1995), and approximately 350 kilometers south/southeast of the Boise Ridge site. Both areas are thought to be along the same raptor migration flyway. However, out of approximately 2,300 raptors that were banded from 1993-1996 along the Boise Ridge, as of May 1997 only two have been retrapped at the Goshutes (Steve Hoffman, pers. comm. 1997).

The Danskin Peak site is located on the northern edge of the Snake River Plain approximately 40 kilometers southeast of the Boise Ridge monitoring site. Both of these sites are located along the Boise Front. However, the Cinnabar Mountain site is unique in that it is located on the opposite, or southwestern, edge of the Snake River Plain.

Through establishment of the Cinnabar Mountain location as a raptor migration monitoring site, and additional sites, we may greatly increase our knowledge of migrant raptor movements across large semi-arid expanses of land and throughout the Intermountain West. We may then be able to more thoroughly understand the effects of weather and other environmental factors that affect migratory raptors and more fully understand what important habitat types are associated with their movements. Furthermore, important raptor population baseline information and long-term trend data can be obtained from these sites. Monitoring sites can provide site-specific data for analyses, and permit pooled analyses of two or more sites. Additionally, differential age and sex class migration by different species could be further investigated along with a host of other factors. such as hormonal and contaminant issues.

Currently we have not been notified of any band recoveries from our limited trapping and banding efforts in 1996, 1997, and 1998 from the Federal Bird Banding Laboratory. However, band recovery rates for raptors are low and range from less than 1% to approximately 3% depending on the species and the monitoring site where they were marked. Band recoveries will help us to understand the routes, timing, and important habitats for raptors during migration.

In conclusion. the establishment of a long-term raptor migration monitoring program will provide invaluable information on raptor migration in general, and specifically in the Intermountain West. Avian population data acquired through standardized long-term monitoring is essential to establishing baseline population information and understanding trends. Our project could provide crucial population trend data for those raptor species that migrate south during autumn from northern boreal forests to Idaho, and further south to the Neotropics. as well as back north during spring. This information will be critical to government agencies making management decisions for avian species and associated important habitats throughout the Intermountain West.

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