

2003 RAPTOR BREEDING SEASON REPORT

Gavin Emmons, Pinnacles National Monument, Research and Resource Management,
5000 Highway 146, Paicines, CA 95043 USA

Abstract: The 2003 breeding season was the 17th year of raptor monitoring at Pinnacles National Monument. Field observations began 6 January 2003 and ended 27 June 2003.

Pinnacles National Monument provides a diverse habitat for numerous cliff-nesting raptors, including sensitive species such as prairie falcons (*Falco mexicanus*) and golden eagles (*Aquila chrysaetos*), as well as a spectacular array of summits and cliff-wall routes for rock-climbers. Therefore, the behavioral and physical effect that climbers and off-trail hikers have on cliff-nesting raptors is studied.

The 2003 raptor-breeding season was successful, particularly for prairie falcons. Thirteen territories were occupied with nine active-breeding prairie falcon territories confirmed. Thirty-three to thirty-six prairie falcons hatched, with thirty-two possibly fledging and thirty confirmed. One territory failed (through predation), two territories were abandoned, and one pair occupied a territory without nesting for the season. Additionally, four adult prairie falcons were newly captured, banded, and fitted with radio-tracking equipment, and two adult falcons were recaptured, for the second year of a research project on foraging habitat and patterns.

Golden eagles were observed throughout the park. Five nests in two known territories in the park were not occupied this year. One known nest in a territory outside of the park produced three eaglets, a record for number of young produced in a nest in the study area, and all three likely fledged.

Additional raptor species active and nesting in the park included red-tailed hawks (*Buteo jamaicensis*), American kestrels (*Falco sparverius*), and Cooper's hawks (*Accipiter cooperii*). Red-tailed hawk pairs occupied four territories, hatched eight young, and produced six fledglings, with one territory likely failing to predation. American kestrels occupied twelve territories, with six fledglings confirmed from three territories. Cooper's hawks were observed occupying two territories, with one fledgling confirmed from one territory.

STUDY AREA AND METHODS

Pinnacles National Monument (PNM) is located in the Gabilan Mountains of the central Coast Range of California. PNM covers 24,252 acres with Elevation ranging from 244 to 982 meters. The climate is Mediterranean with hot, dry summers and cool, damp winters. Temperatures range from a mean of 8.2° C in January to 22.6° C in July. The majority of the rainfall occurs from November to April with average yearly rainfall of 44 cm (National Oceanic and Atmospheric Administration, NOAA, 1997).

PNM provides a diverse range of habitat types for birds and other species: volcanic rock formations and outcroppings; California mixed chaparral; pine-oak woodlands; grasslands; and riparian habitats.

Potential and established cliff-nesting raptor territories in high-use climbing areas and remote locations in the park were surveyed using spotting scopes (15-45x) and binoculars (8x40 and 10x42). Observations were made from the locations that provided the best view of an eyrie or territory. A Garmin III Plus GPS unit was used to plot every observation spot. Surveys typically lasted 1.5 to 6 hours, depending upon the raptor behavior and amount of data collection needed. For a survey to be classified as “no birds” a minimum watch time of 5 hours was required. Territories were revisited on a 7-21 day schedule based on visitor use, the progress and age of raptors at territories (to obtain the most critical data for each territory for that time period), and the number of territories to be monitored. High visitor use areas were monitored more frequently and during weekend days when climbers were more likely to be present. While other monitoring programs estimate fledging success at 90% fledge age, our protocol was to end surveys once all young raptors are confirmed fledged. For a territory to be classified as unoccupied, a minimum of three surveys of “no birds” confirmed over three different months was required. Survey duration was ultimately dependent upon visibility. When birds cooperated and needed data was collected in short survey duration, nearby territories were visited as well.

In January, late afternoon and evening surveys were conducted to locate territorial prairie falcons. Perching, flying, diving, interacting, and roosting locations were sought as evidence of territorial behaviors and territory establishment. By mid-January climbing advisories went into effect and territories were monitored to record courtship behaviors, territorial disputes, and disturbance. Advisories were used to inform visitors of areas likely to have breeding raptors. Generally these areas were occupied by raptors at least once during the preceding three years. Visitors were advised to avoid these areas.

In late winter and early spring, mating was observed and counted in seconds. Food-swapping and eyrie selection were also recorded. Surveys during this period focused on evening and late-afternoon surveys until eyrie selections were made.

Incubation of nesting prairie falcons was determined by female prairie falcons (and to a lesser extent male falcons during nest switches) flying into a nest hole and not reappearing for periods of time. Attempts to count eggs were made by surveying when the best light was available for visibility, and when the incubating falcons temporarily left the nest during food drops and nest switches. Soft incubation – the onset of incubation - was determined by a small number of eggs laid and the female incubating for short durations (15-75 minutes). Hard incubation was characterized by the adult falcons – primarily the females - incubating a full clutch of eggs for hours in duration. Surveys were done in early morning and late evening hours to catch periods of greatest raptor activity, such as food drops, and to have a maximum amount of time for observation.

Hatched young prairie falcons were aged by physical features using an aging guide (Moritsch 1983). Hatch date was determined by counting backwards from at least two – and preferably three or more - independent agings. Nestlings were observed from late spring to early summer, primarily during early morning and evening hours when they were most active, but observation periods at midday provided further data on nestling activity while prairie falcon adults were hunting for prey away from the nest sites. From early to mid summer, prairie falcon young were observed primarily in early to mid morning hours, when they were nearing fledging and most actively exercise flapping. Full fledging of falcon young was confirmed by all young being seen perched and / or in flight away from the nest site, with fledging dates determined by the coordination and strength of flight, the size of perches, and the amount of vocalization during flight.

Weather was always an important factor. During temperature extremes, heavy fog, or rain, most birds of prey were not active and therefore monitoring was not done during these periods.

RESULTS

Prairie Falcons, *Falco mexicanus*

The first pair of prairie falcons was observed at Drywall on 7 January 2003. Thirteen territories were occupied. Ten of these were previously used and three were newly documented: the Narrows, the High Peaks Trail West of Chalone Picnic Area, and South Chalone Peak. Additionally, eight of the nine eyries chosen by prairie falcons were used in previous years. The last confirmed pair was documented on 15 May in the new territory, the Narrows.

The Narrows territory was located up the east fork of Marion Canyon, with the nest site a large cavity hole on a cliff wall in a narrow series of eroded slot canyons. The territory and nest site were previously undocumented, due to the remoteness of the site hidden in the slot canyons, and the newly acquired park status of the land area in which the nesting territory was located. Four young falcons were successfully raised at the eyrie. Only two fledglings were confirmed – again due to lack of visibility in the slot canyons – but a full fledge is very likely. The two other new territories were at sites previously used by other raptors but never before by prairie falcons – the rocks along the High Peaks Trail west of Chalone Picnic Area, and the rocks on the south slopes of South Chalone Peak. Both had non-nesting falcon pairs occupying the territories, with the former abandoning the territory by early May and the latter occupying the territory in late June.

Several prairie falcons did not nest or produce young, in addition to the non-nesting pairs detailed above. A falcon pair at Drywall actively perched and flew to sleep roosts together early in the breeding season, but abandoned the territory by early March. Single, unpaired falcons occupied territories at Prescribed Burn Cliffs and Goat Rock / Resurrection Wall, and did not produce young.

Incubation was first observed at North Chalone Peak on 21 March 2003. The first hatching occurred before 21 April 2003 at North Chalone. Unfortunately, more specific hatching data at this site was not available because the nest later failed, likely due to predation before 22 May 2003. After North Chalone, the first specific hatching period occurred at Hawkins and Pig territories, both between 25-27 April 2003. The first fledging took place from 7-8 June 2003, also at Pig Canyon. The last young to fledge were the falcons at Canyon North of Willow Springs, from 19-22 June 2003. At least thirty-three chicks were produced (with North Chalone chick

numbers unconfirmed prior to predation) with thirty confirmed fledging, and two more (at the Narrows territory) likely fledging as well. Eggs were not successfully counted this season, due to nest site locations and egg placement within the nest sites during incubation. Chicks were successfully counted at eight territories with a mean of 4 chicks per eyrie and 4 fledglings per eyrie (including likely full fledging at the Narrows). However, taking into account the failed nest site at North Chalone, where 1-4 young were likely predated (with an additional unhatched egg observed at the site), potential means for all nine nesting territories are 3.67 - 4.0 chicks per eyrie and 3.56 fledglings per eyrie. (See Table 1 below for the 2003 summary of prairie falcon nesting at the park.)

This year, three adult male prairie falcons and three adult females were captured as part of the second year of a graduate research project through USGS, by former raptor monitor Shelley Buranek. Falcons were captured at six territories using a Great Horned Owl as lure and a dho-gaza net. The team collected data such as: length, tarsal length, primary feather length, mass, and a blood sample for DNA. Four of the falcons – two males and 2 females – were newly captured birds, and were outfitted with radio backpack transmitters with a life span of one year, and banded prior to release. The two remaining prairie falcons – a male and a female – were recaptured birds first banded in 2002. Data was collected on both birds, but the female was not re-outfitted with a radio backpack transmitter because she was caught within the one-year life span of the transmitters. The purpose of this auxiliary study is to better understand how the population of foraging prairie falcons relates to land uses on private lands surrounding PNM. Five birds were caught in late February, and the recaptured male was caught in late May. (See Table 1 below.)

Table 1: 2003 PNM Prairie Falcon Nest Sites

Territory	Nest Used/ Last Year Used	Adult Captured: Sex/ Date/ Capture Status	# Eggs Laid	# Young Hatched	# Young Known/ Possibly Fledged
Canyon North of Willow Springs Slide	CNWS-2/ 1994	Yes. Male/ 2-28- 03/ New.	Unknown.	2	2/ 2
Narrows	NARR-1/ NEW	No.	Unknown.	4	2/ 4
Pig Canyon	PIG-3/ 2000	Yes. Female/ 2- 19-03/ New.	Unknown.	4	4/ 4
Little Pinnacles	LP-8/ 2002	No.	Unknown.	3	3/ 3
Scout Peak	SP-3/ 1995	Yes. Male/ 2-27- 03/ New.	Unknown.	4	4/ 4
Hawkins Peak	HP-1/ 2002	Yes. Female/ 2- 20-03/ New.	Unknown.	5	5/ 5
South Balconies	SGB-4/ NEW	Yes. Male/ 5-27- 03/ Recapture.	Unknown.	5	5/ 5
Crowley Towers	CT-1/ 1997	Yes. Female/ 2- 25-03/ Recapture.	Unknown.	5	5/ 5
North Chalone	NC-1/ 2002	No.	1+	1+	0 Note: Likely Predation.

Golden Eagle, *Aquila chrysaetos*

Golden eagles were not observed nesting in PNM this year. However, golden eagle adults and juveniles were active at three territories throughout the nesting season. Two of these territories – Frog Canyon / South Chalone and Eagle Rock – were in the park, and contained five former nest sites observed in mid-winter through late spring, with no new greenery added to any of the nests. The one confirmed eagle nesting occurred in the third active territory, the Eucalyptus Grove off PNM's West Side. Incubation was confirmed, and three young eagles were seen perched at a new, previously undocumented nest site in the grove. Although fledging of the young was not confirmed, it is likely that all three eaglets fledged and quickly dispersed from the site, due to regular scolding and stooping by a pair of American kestrels nesting nearby in the Eucalyptus Grove. The nest attempt marks the first clutch of three golden eagle young observed in or near the park. Eagles were occasionally seen off the monument.

Red-tailed Hawk, *Buteo jamaicensis*

Four red-tailed hawk territories with nesting pairs were documented this year, at historic nest sites at Cemetery Gates, the Citadel, and the Western Front, and a newly discovered nest site at Guard Rock, at the foot of Pig Canyon. Incubation was observed at the Cemetery Gates and Citadel nest sites, with the Western Front and Guard Rock nests confirmed active later, after nestlings had hatched. The earliest hatching occurred at the Citadel from 20-24 April 2003, with the latest hatching of the season estimated at 14-17 May 2003 at the Guard Rock site. Nestlings were observed at all four nest sites, with 2 young in each nest. No young hawks were confirmed fledging, but full fledging of young is likely at 3 of the nests: the Citadel, Western Front, and Guard Rock sites. The Cemetery Gates nest likely failed due to predation by 10 June 2003, possibly due to an adult golden eagle seen in the area scolded and stooped by the territorial red-tailed hawk pair. Young at the Citadel, Western Front, and Guard Rock nests were observed just prior to potential fledging with full juvenile plumage. Assuming successful fledging at these three sites, the Citadel young would have fledged earliest from 2-7 June 2003, the Western Front young from 21-24 June 2003, and the Guard Rock young fledging latest after 27 June 2003.

American Kestrel, *Falco sparverius*

Kestrels were observed in twelve territories in and just outside of the park this year, with evidence of nesting observed in four of the territories: South Balconies, the Eucalyptus Grove, Marion Canyon, and Neglected Valley. The South Balconies and the Eucalyptus Grove territories contained new, previously undocumented nest sites. Each nest produced at least 2 fledglings, before 7 June and 5 June 2003, respectively. In the Marion Canyon territory, two recently fledged kestrel young were observed landing and walking clumsily in gray pines on 1 June 2003; although no nest was confirmed, an adult pair likely nested in or very near the gray pine grove in Marion Canyon. A nesting pair of kestrels was confirmed in the Neglected Valley territory incubating at an historic nest site, but no hatchlings or fledglings were confirmed. Other kestrel pairs not confirmed nesting were active at South Wilderness Rock, D. Soto Canyon, Frog Canyon, Drywall, and Crowley. Single kestrels were observed occupying territories at North Chalone, Hawkins, and Tea Pot Dome.

Cooper's Hawk, *Accipiter cooperii*

Cooper's hawks were active in the park throughout the breeding season; although no active nest sites were confirmed, at least one fledgling hawk and an adult were observed near the Balconies

Cave Trail in mid-June, with one to two adults active in the area throughout the breeding season. One to two Cooper's hawks were also active in the gray pine grove in upper Marion Canyon, with an adult carrying a stick or snake in its beak while circling above the grove in mid-May. A Cooper's hawk pair was also seen circling above Pig Canyon, and single hawks were observed above Willow Springs, the Crowley drainage, and in the South Wilderness along lower Chalone Creek.

Owls

There were no reports of owls nesting in PNM this season. Pairs of great horned owls, *Bubo virginianus*, were heard vocalizing at the Bear Gulch Reservoir, from Tiburcio's X to Hanging Valley, and at the base of General Balconies to Machete Ridge. Single great horned owls were heard in oak groves near South Wilderness Rock, and in the grove near Dry Creek crossing. A pair of western screech owls, *Otus kennicottii*, was regularly heard calling to each other near the Bear Gulch Visitor Center, and single western screech owls vocalized in the grove near the Dry Creek crossing, and in oaks just south of Drywall Slide. One barn owl, *Tyto alba*, was observed roosting in an old stick nest site in D. Soto Canyon. One long-eared owl, *Asio otus*, was heard vocalizing in an oak just east of the South Wilderness Trail / Bench Trail junction.

Other Raptors

One pair of red-shouldered hawks, *Buteo lineatus*, was seen near the Dry Creek / Chalone Creek junction, being chased by a red-tailed hawk, and through the first half of May 2003, a single red-shouldered hawk adult and a juvenile were observed flying and calling above lower Chalone Creek to the Pinnacles Campground just outside of the park.

A female northern harrier, *Circus cyaneus*, was observed soaring over Scout Peak, and a male harrier was seen outside of the park near the Eucalyptus Grove, coursing low over the grassy hill slopes.

A pair of white-tailed kites, *Elanus caeruleus*, was seen flying over the meadow near the east entrance to PNM, and a single white-tailed kite was observed flying west from near the North Chalone Peak lookout.

Single sharp-shinned hawks, *Accipiter striatus*, were seen soaring over Drywall Slide, south over the North Wilderness Trail near the creek outlet from Willow Spring, and north above Chalone Creek near the Balconies Cave Trail.

An adult female merlin, *Falco columbarius*, was seen flying above the hills in Grassy Canyon on 6 March 2003.

Human Interactions

Climbers and off-trail hikers did an excellent job of heeding climbing advisories this year. No nesting prairie falcons were seriously disturbed during incubation, feeding, and raising of young. Prairie falcon adults in the Scout, Crowley, South Balconies, and Hawkins territories did respond to the presence of hikers and raptor monitors by circling and wailing above their respective territories, but did not otherwise display significant and prolonged disturbance behavior threatening nest productivity and survivorship. The advisory signs for raptor area closures and postings at climbing accesses seem to be effective, especially given the evidence of full fledging of nestling falcons within the raptor advisory areas (see Appendix 2: Prairie Falcon Nesting Phenology and Success). This marked the second year of full compliance for our raptor advisories.

International Migratory Bird Day (10 May 2003) was celebrated at PNM with several days of interpretive talks and programs. On the evening of 9 May 2003, Ranger Wendy Artz led an evening program focusing on required avian habitats, passerine and raptor species, and the raptor-monitoring program at PNM. On 10 May 2003, Rangers Wendy Artz and Charles Ewing, GIS Specialist Patrick Flaherty, and Raptor Monitor Gavin Emmons led a birding walk in the Bench Trail to lower Chalone Creek area, documenting migrating and breeding raptors (including red-tailed and red-shouldered hawks), passerines, and near-passerines. Later in the day, Gavin Emmons also interpreted raptor nesting, monitoring, and management for visitors from a watchspot near the Hawkins prairie falcon eyrie. Rangers Wendy Artz and David Soto led a second bird walk on 11 May 2003, monitoring species diversity near the Chaparral Parking Area on the west side of the park.

DISCUSSION / RECOMMENDATIONS

Prairie falcon nest phenology for the 2003 breeding season followed the average rates documented through the previous 16 years of monitoring. The earliest hatch date range for this year was mid April (before 21 April 2003 at North Chalone), and the latest falcon fledge date was in mid to late June (19-22 June 2003 at Canyon North of Willow Springs). Prairie falcon nesting was unusual this year in the high success rate of fledglings produced per nest. From nine nest sites, the average rate of fledglings produced was 3.56, compared to the 16-year average of 3.4. Three nest sites – at Crowley, South Balconies, and Hawkins – produced 5 fledglings, higher than the prairie falcon average of 4 chicks per nest. Due to the lack of quantified data, it is difficult to determine specific factors leading to this higher rate of falcon breeding success and to falcon nest phenology this year in general. However, high rates of precipitation in December-January and April-May may have resulted in increased prey availability, providing falcons with greater food resources for nestlings. Park visitors adhering to raptor advisories and not disturbing nest sites likely supported the high fledgling success rates as well, allowing adults to focus on feeding and rearing of young rather than responding to human disturbances of nest sites and territories. (See Appendix 2: Falcon Nesting Phenology and Success, for more details.)

The nesting season at PNM was also unusual this year in regards to the high number of new and historic nest sites, for falcons as well as other raptor species including red-tailed hawks, American kestrels, and golden eagles. Over the course of the breeding season, 13 prairie falcon territories were monitored, with 3 sites (2 roosting and 1 nesting) newly documented. Four active red-tailed hawk nests – a park record for the amount of nesting territories active in a season – were documented, with 3 likely producing fledglings. Twelve American kestrel territories were observed, with confirmed fledging of young documented in 3 territories. One golden eagle nest, in the Eucalyptus Grove just outside the west entrance to the park, was documented, producing 3 nestlings (a record high for eagle young produced in a nest in or near the park). Although no nest sites were observed, Cooper's hawk fledglings were observed near the Balconies Cave Trail, and adults with food / nesting material were documented in Marion Canyon, strongly suggesting active nests in those areas.

Although certain factors, such as prey availability, lack of human disturbance, and low temperatures through late May, were likely significant in determining the high number of nesting raptor species and sites documented this year, I believe that the experience, training, and efforts of the raptor monitor and of other park staff also played invaluable roles. The survey protocols in place at PNM worked well and provided the raptor monitor with a comprehensive framework for documenting the priority raptor species – prairie falcons and golden eagles – as well as “non-target” species such as red-tailed hawks and American kestrels. Park staff conducting fieldwork in the backcountry of PNM, including the vegetation mapping crew, exotic plant management crew, interpretive rangers, and biological technicians, also provided excellent reports on raptor activity and nesting that allowed for the documentation of new nest sites and territories, and the more effective monitoring of non-sensitive raptor species including red-tailed hawks and Cooper's hawks, throughout the breeding season.

The importance of human observations, communication of raptor sightings, and effective monitoring was also revealed in the raptor species for which little or no breeding information was gathered this year. Although Cooper's, sharp-shinned, and red-shouldered hawks very likely bred in or near the park and produced fledglings this year, nest sites and documented fledging of young were not confirmed within the park. However, juvenile Cooper's hawks were seen by park staff in mid-June, at least pointing to the strong likelihood of successful breeding of these

accipiters. Owl species were heard throughout the breeding season, with pairs of great horned owls likely near the Bear Gulch Reservoir and Balconies Cave, and a pair of western screech-owls near the Bear Gulch Visitor Center, but no nests or fledglings were confirmed.

Primarily, the lack of breeding information on these raptor species was due not to lack of interest or capacity on the part of the raptor monitor, but because of the time constraints necessitated by the park management focus on prairie falcons and golden eagles, and the high-use, raptor advisory areas. For future monitoring efforts allowing for more detailed breeding observations of a greater diversity of the raptor species in the park, I would offer the following recommendations.

First, providing the raptor monitor with occasional assistance in the field would help to alleviate the time constraints described above, and would allow for more detailed coverage of “non-target” raptor species in the park. This could be accomplished through a resource staff “half-position” or the use of SCA (Student Conservation Association) volunteers / interns, trained and supervised directly by the raptor monitor to allow for consistent monitoring data and adherence to survey protocols. Second, continuing to make use of the efforts and enthusiasm of staff and visitors observing raptor activity in the field would allow for the broader documentation of nesting raptor species seen this year. This could be achieved through regular communication with park staff and visitors, bi-weekly monitoring updates on raptor status at the park, and reminders on filling out wildlife observation cards. Third, more detailed training and information on accipiters, owls, kestrels, and red-tailed hawks should be made available to raptor monitors and other park staff. Literature on nesting habits, observation methodologies, and nesting phenology for these species would be beneficial, as would basic instruction provided by organizations such as GGRO (Golden Gate Raptor Observatory), Hawkwatch International, or PRBO (Point Reyes Bird Observatory). Finally, a greater emphasis on the importance of raptor monitoring protocols for the park should be addressed. The survey protocols in place for the past 16 years are effective and detailed, but have primarily been passed on to incoming raptor monitors through “hands-on” training in the field, past annual reports and field notes, and brief textual information on protocol standards for the program. Although these sources of information are all essential, I strongly recommend a more standardized written set of raptor protocols to provide a framework for any questions or confusions that incoming monitors – and any other interested staff – might have, related to the following: raptor monitoring techniques; raptor identification skills; navigation and orientation in the park backcountry; appropriate use of GPS and monitoring equipment; backcountry safety skills; management of raptor advisory areas; and guidelines for database management of field notes, wildlife observation cards, and archived nest site photographs.

In regards to effective monitoring and a standardized set of protocols, two key aspects of raptor monitoring deserve further discussion because they are difficult to quantify but are essential for providing the monitor with successful data on nesting phenology – timing of raptor observations, and ideal locations for watching nests. Both factors vary as the breeding season proceeds and ultimately require self-motivation, adaptability, and a sensitivity to gaining effective data on the part of the raptor monitor. For the 2003 prairie falcon breeding season, I found that afternoon and evening surveys were ideal in winter when determining where falcons would roost for the night, and in locating potential eyries. The falcons were most active about two to three hours before sunset, and circled and perched visibly – occasionally inspecting potential nest sites - in their respective territories before retreating to sleeping roosts for the night. Evening surveys also had the benefit of providing initial data on locations of vocalizing owls within the park. As the season proceeded, I found that it was useful to check on nest sites in specific territories at different times of the day. Nestlings seemed most active near sunrise and sunset, but even observations during the high temperatures of midday provided useful data on nestling numbers while adults were out hunting. Near fledging, falcon and other raptor young seemed most active from sunrise to 1100

hours, when they were most consistently practice-flapping and later flying and perching near the nest sites. Depending on the aspect of nest sites, morning and evening lighting provided varying levels of visibility into the nests, as well. As stated above, my recommendation would be that raptor monitors cultivate a philosophy and work attitude of adaptability to the timing of observations, observing raptor activity in response to the particular physical and behavioral conditions at a given nest territory.

The same general recommendations would apply to locating effective observation points for monitoring raptor territories and nest sites; remaining attentive to the behavior and movement of falcons and other raptors within given territories, raptor monitors should be adaptable to moving to different vantage points within nesting territories to most effectively observe raptor behavior and nesting phenology. Based on 16 years of data, photo points, and GPS coordinates for certain watch spots over the past two years, raptor monitors should have the basic framework necessary to set up observation points as dictated by the behavior and nest selection of given raptor pairs and young in nest sites. Again, my further recommendation would be to provide a standardized set of protocols listing ideal watch spots and observation times for each nest site in each territory, as well as a comprehensive list of GPS coordinates for observation points entered into an ArcView database and available on topographic maps of the park. This standardized framework, in combination with a flexibility to the physical and behavioral conditions within a specific nest territory, should allow the raptor monitor to consistently and effectively observe raptor nesting throughout the breeding season.

In its second year, the telemetry project provided foraging range and habitat data on prairie falcons and allowed me to gain a broader perspective and awareness of the hunting movements of tracked birds. More significantly for my duties as a raptor monitor, the banding of adult falcons and the attachment of radio transmitters and antennas provided a certain and visible demarcation of male versus female birds (with blue bands on left legs for males and right legs for females). Provided this study continues into the future, capturing adult and young prairie falcons will allow for fewer errors in data when identifying falcons associated with certain territories as well as providing more insight into the range of the prairie falcon.

In regards to raptor monitoring at the park, I would strongly recommend the color banding of the entire prairie falcon population as a possibility, in addition to present telemetry efforts. Color banding of falcons in the park would provide much more extensive information on the raptors, including individual movements of single and paired falcons within breeding seasons and from year to year, rates on short- and long-term pair bonds, rates of birds returning to nest in the park annually, loyalty of individual falcons to specific territories, and fledgling survivorship and dispersal. Color banding could provide a valuable tool for continuing to broaden our experience and understanding of the prairie falcons as a sensitive species, a management concern for the park, and an amazing bird of prey that returns to breed at the park annually.

ACKNOWLEDGEMENTS

This project would not be as successful as it is without the eyes and ears of helpful PNM employees. Therefore, I would like to thank the park employees for their help, encouragement, and passion for the raptors and wildlife diversity at PNM. I would also like to extend my appreciation to the park visitors, for their reports and observations on raptor sightings in the park, and for their appreciation and value of the importance of monitoring, managing, and protecting the nesting sites and breeding productivity of raptors in the park.

I am grateful for the training, patience, and trust that my supervisor, Amy Fesnock, afforded me throughout the raptor nesting season. Her dedication and enthusiasm for Pinnacles' raptors are inspiring. Her communication of the importance of raptor monitoring was always balanced by a willing encouragement of my own motivation and passion for the monitoring program, and allowed me to excel in my work this season. In particular, I would also like to thank Andy Grant, Keir Morse, Sherry Bottoms, and Shauna Hee, for providing invaluable reports on new and historic raptor nest sites, including previously undocumented prairie falcon nesting in the Narrows and roosting at South Chalone. Shelley Buranek also provided me with insight on the raptor monitoring program, her ongoing telemetry work, and unique information regarding the tracked falcons. I also thank Wendy Artz for her coordination of the International Migratory Bird Day events and programs, for her reports on raptor activity in the park, and her passion for observing birds in general throughout PNM. The following staff shared their experience, excitement, and observations of raptors with me throughout the season, granting me a more complete picture of raptor breeding and diversity at the park, and assisted in the effective management of raptor advisory areas: Neal Labrie, Paul Johnson, David Soto, Patrick Flaherty, Charles Ewing, Peter Szydlowski, Brant Porter, and Kate Walsh.

Kristin Lalumiere, an SCA (Student Conservation Association) volunteer this year, also deserves my thanks and gratitude for assisting me in team observations of large raptor territories, reports on birds of prey in general and the prairie falcon pair among the rocks east of the Chalone Picnic Area in particular, and her efforts in the data management of past and present raptor indexing and surveys.

Finally, I would like to thank employees Amy Fesnock and Paul Johnson for their helpful editing on the initial drafts of this report!

REFERENCES

- Anderson, Stanley H. and John R. Squires, 1997. *The Prairie Falcon*. University of Texas Press. Austin, Texas.
- Baichich, Paul J. and Colin J. O. Harrison, 1997. *A Guide to the Nests, Eggs, and Nestlings of North American Birds*. Academic Press. San Diego, California.
- Moritsch, Marc Q., 1983a. *Photographic Guide for Aging Nesting Prairie Falcons*. United States Department of the Interior, BLM, Snake River Birds of Prey Project. Boise District, Idaho.
- Moritsch, Marc Q., 1983b. *Photographic Guide for Aging Nesting Red-tailed Hawks*. United States Department of the Interior, BLM, Snake River Birds of Prey Project. Boise District, Idaho.
- National Oceanic and Atmospheric Administration. 1997. *Pinnacles National Monument station. Climatological Data: California*. Vol. 101 No.1-13. National Oceanic and Atmospheric Administration, Washington D.C.
- Rechtin, J.A., 1984-1992. *Raptor Nesting at Pinnacles National Monument*. Unpublished report.
- Sibley, David Allen, 2000. *National Audubon Society The Sibley Guide to Birds*. Alfred A. Knopf, Inc. New York, New York.

APPENDIX 1

This season's full-time Raptor Monitor was Gavin Emmons, guided by Park Biologist Amy Fesnock. Fesnock assisted in occasional team-watches at large territories, and during the fledging of young at multiple territories on the same days. SCA students, park employee volunteers, and staff assisted me in the field as needed.

The total number of observation hours by staff was 853 hours. Volunteers' observation hours totaled 52. Total time in the field was 905 hours.