U.S. Department of the Interior
Bureau of Land Management

BLM Alaska Open File Report 117
BLM/AK/ST-07/019+6700+040
May 2007

Peregrine Falcons
Falco Peregrinus in the Central Kuskokwim River Area, Alaska

Bruce E. Seppi

BLM

Alaska

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Authors

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Cover

Peregrine falcon chicks found on nests along Kuskokwim River. The author viewing peregrine falcon nests through spotting scopes on the Kuskokwim River. Photos by Bruce E. Seppi.

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222 W. 7th Avenue, #13
Anchorage, Alaska 99513

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Acknowledgements

This project was funded entirely by the Anchorage Field Office of the Bureau of Land Management. Thanks to Doug Gibson (2000), Shannan Roy (2001), Dave Doucet (2002), Brad Muir (2003), and Mark Deneke (2004) for assistance in conducting surveys and their help spotting birds and collecting field observations of falcon nest sites along the Kuskokwim.

In Aniak, I thank the Alaska State Troopers for winter storage of our skiff and Gene Fauser of A & G Acres for storage of the empty gas tanks and the use of his 1970s vintage Chevy pickups to haul the boat and gear to the river.

In McGrath, I thank the Alaska Department of Natural Resources, Division of Forestry, for winter storage of our skiff at their fire camp, and Sharin Griffith of the Takusko House for her hospitality, no matter what hour of the night we arrived in town, and for the use of her truck to get it all to and from the river. I also thank Mike Wilson of BLM Cadastral Survey for the "hand-me-down" Lund skiff in which we logged 1,500 miles on the river counting falcons.

Finally, thanks to Van Waggoner for contributing nesting data he collected in the 1980s and early 1990s for peregrines on the Middle Kuskokwim.

Abstract

Peregrine falcon nesting surveys were conducted along the Kuskokwim River between McGrath and Aniak from 2000 to 2004. These surveys were part of the peregrine recovery plan to monitor the birds for five years after they were removed from the U.S. Fish and Wildlife Service List of Threatened and Endangered Species. The study determined the abundance and productivity of peregrines in cliff nesting habitats along the Kuskokwim River. The number of peregrines and young produced were compared with data from 1976 when populations were first accurately assessed. The results of this study and comparisons with earlier data suggest that the peregrine population was at or near its lowest level in 1976, then steadily increased throughout the 1980s and early 1990s. In 2004, 20 pairs of peregrines occupied breeding territories, the highest recorded since 1976, indicating the breeding population may still be increasing.

Introduction

As land ownership changes occur in Alaska, and resource development and infrastructure increases throughout the State, land management agencies are faced with the responsibilities of managing resources under multiple land use objectives. Wildlife surveys, particularly those involving sensitive and threatened and endangered species, provide managers with information that is vital for making land use decisions on lands that remain in Federal ownership. Federal agencies are required by the Endangered Species Act (ESA) of 1973 to protect endangered species and their habitats, and to aid in endangered species recovery.

The peregrine falcon (*Falco peregrinus*) was listed as endangered in 1970 under the Endangered Species Conservation Act of 1969, a precursor to the ESA of 1973. Recovery plans were created for four regions of the United States, including a plan for the Alaska population of peregrines (USFWS 1982). Peregrines have since made a strong recovery, and were removed from the U.S. Fish and Wildlife Service List of Threatened and Endangered Species on August 25, 1999 (USFWS 2003). As a requirement of the ESA, the Fish and Wildlife Service (FWS), with the help of other Federal and State agencies, was mandated to monitor peregrines for not less than five years after delisting (USFWS 2003). This study was initiated and funded largely as a result of these requirements, and continued to track peregrine falcon abundance, distribution, and productivity in the Central Kuskokwim River as a continuance of the baseline information collected from 1979 through 1991 by the Anchorage District Office, Bureau of Land Management. This information is needed as a reference to measure the status of the Central Kuskokwim River peregrine over time and aid in its continued survival.

Peregrine falcon productivity along the Kuskokwim River has been studied since the late 1970s (Ritchie and Ambrose 1976, Dotson and Mindell 1979, Mindell 1983, Ambrose 1987, unpubl. Bureau of Land Management [BLM] reports and data 1985, 1986, 1988-91) and the suitability and importance of the cliff nesting habitats along the river were recognized earlier (Cade 1960). No comprehensive peregrine census was done on the Kuskokwim River prior to the widespread use of organochlorine pesticides in North America starting in the 1940s. Use of these pesticides resulted in the bioaccumulation of toxic residues in prey species, which in turn contaminated peregrine falcons, causing both lethal and sub-lethal effects (White et al. 2002). The most significant sub-lethal effect of organochlorine pesticide contamination in peregrine falcons, as well as other raptors, was the reproductive failures resulting from abnormally thin eggshells (Hickey and Anderson 1968, Cade et al. 1971, Peakall and Kiff 1988). After restrictions were imposed on use of DDT in Canada in 1970 and in the U.S. in 1972, peregrine populations throughout North America have increased and have been found to have reduced pesticide levels in prey and in eggs and body tissues, increased eggshell thickness, and increased productivity (Cade et al. 1988). Peregrine falcons in Alaska are known to have declined in the 1960s, stabilized in the mid 1970s, and began to increase in the late 1970s on the upper Yukon and Tanana rivers in Interior Alaska where the *F. p. anatum* subspecies are also known to breed (Ambrose et al. 1988).

Objectives

The objectives of this study were:

1. To locate single birds, pairs, and nesting sites of peregrine falcons and other raptors, in known cliff habitat along the Kuskokwim River between Aniak and McGrath.

2. To collect information for peregrine falcons and other raptors on the number of adult birds present and the number of young produced within the study area.

3. To compare the findings of this study with those from the literature to estimate the number of peregrine falcons present and the number of young produced since they were first accurately accessed on the Kuskokwim River in 1976.

Study Area and Methods

The Kuskokwim River is the second largest river in Alaska. The large crescent-shaped watershed encompasses an area of approximately 129,500 km^2, some of which is within the boundaries of BLM's Anchorage District, and includes 5,920,309 acres (23,958 km^2) of land currently under BLM management. The glacially turbid water of the rivers mainstem carries a heavy silt load and is approximately 869 km long, originating from the interior headwaters of the Kuskokwim Mountains on the north and west, and the western edge of the Alaska Range on the south and east (Brown, C. M. 1985). The Kuskokwim River flows in a southwest direction to the Bering Sea. The sparsely populated Kuskokwim drainage has population centers at Bethel, Aniak, and McGrath, in addition to numerous smaller villages along its length. The area is remote, with travel to the region usually by aircraft to one of the three previously mentioned hubs. There are no roads in the region, except within the cities and villages on the Kuskokwim River.

The study was conducted along the Kuskokwim River between McGrath and Aniak, a distance of approximately 465 kilometers (Figure 1). The villages of Stony River, Sleetmute, Crooked Creek, Napaimiut, and Chuathbaluk are found along the river survey route. Other small settlements include Red Devil and George Town. The average yearly precipitation is 43 cm, with 62% occurring between April and September. Average monthly ambient temperature ranges from –22 to 15 ^oC [1]. The river is typically ice free in May, and freeze-up commonly occurs by November (R. Seavoy, McGrath area biologist, Alaska Dept. of Fish and Game, personal communication). The geology, vegetation, and climate of the study area are generally described in Ritchie and Ambrose 1976, Dotson and Mindell 1979, and Mindell 1983. The river flows through the Kuskokwim Mountains approximately 80 river km south of McGrath, and has created a broad gorge, with cliffs

[1] 1939-2004 average monthly temperature and precipitation data from the McGrath Airport, Alaska, supplied by Western Regional Climate Center, Reno, Nevada.

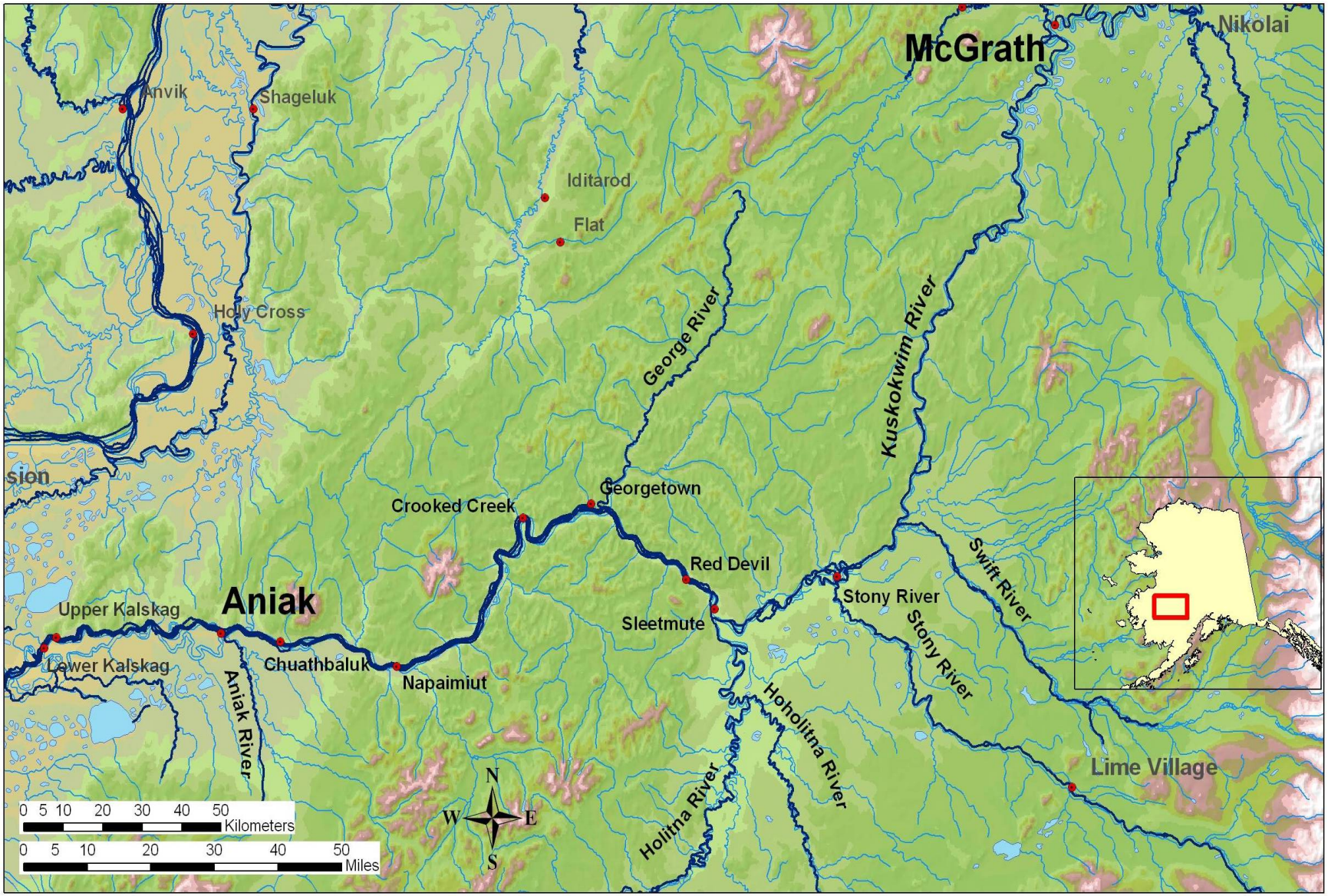

Figure 1. The Kuskokwim River study area showing villages and major rivers.

that extend intermittently past Aniak. The majority of the cliff nesting habitat for raptors lies within this section of the river (Figure 2).

Surveys were done using a 15-foot aluminum boat and 30 hp outboard motor. Surveys were conducted each year during the second or third week of July, before young birds fledged, starting in McGrath in 2000 and ending in Aniak in 2004 (Table 1).

Table 1. Central Kuskokwim River peregrine falcon survey itinerary 2000-2004.

Year	Survey Dates	Starting Point	Ending point
2000	7-15 to 7-19	McGrath	Aniak
2001	7-14 to 7-19	Aniak	McGrath
2002	7-22 to 7-26	McGrath	Aniak
2003	7-15 to 7-18	Aniak	McGrath
2004	7-12 to 7-15	McGrath	Aniak

Cliff habitats 3 km south of Aniak were also included in the survey each year. The surveys were conducted on only the main stem of the Kuskokwim River and did not include its tributaries. At each cliff site, we drifted past the cliff faces while scanning the cliffs with binoculars, watching for movement of birds, or white wash locations or actual nest sites. Repeated passes were done past larger cliff complexes, or observations were continued across the river from cliffs at good vantage points or on gravel bars to watch and scan the cliffs with binoculars and spotting scopes. When possible, the shorelines at the base of the cliffs were walked to potentially flush adult birds or elicit vocal responses from nesting falcons or other raptors. Observations at each cliff site were continued for 30 minutes to 2 hours, depending on the length of the cliff and the amount of potential nesting habitat. When birds or nest sites were found, global positioning system (GPS) locations were taken and raptor observation record cards were used to document the site. Information recorded on the data cards included date, time, number of adults, activities of adult birds, and habitat characteristics of eyries. When nest sites were found, spotting scopes and binoculars were used to attempt to determine the number of nestlings or fledglings present and their age according to Clum et al. (1996). Locations and data were also collected on single, pairs, and nesting birds for all species of raptors.

Results

On the Kuskokwim River, I observed 9 pairs and 18 young in 2000 and 8 pairs and 20 young in 2001. The number of young seen declined in the next two years, with 7 pairs and 8 young produced in 2002, and 6 pairs and only 4 young in 2003. In 2004, 19 pairs and 1 lone adult were counted on cliffs along the Kuskokwim, with 12 of these pairs producing 21 young (Table 2). Between 2000 and 2004, productivity ranged from 1.3 young per pair in 2003, to 2.9 young per pair in 2004 (Table 2). In the same time period, an average of 69% of pairs had young, or 2.06 young per successful pair.

Figure 2. Two typical peregrine cliff nesting habitats along the Middle Kuskokwim River.

Other raptors recorded during the 2000-04 peregrine surveys included 15 pairs of rough-legged hawks (*Buteo lagopus*) that produced 25 young, one breeding pair of bald eagles (*Haliaeetus leucocephalus*), and one pair of breeding osprey (*Pandion haliaetus*, Appendix B).

Discussion

In 1976, Richie and Ambrose (1976) found only 1 breeding pair and 2 lone adults on the Kuskokwim River between McGrath and Aniak. The population slowly increased between 1979 and 1983 when 2 to 5 pairs produced 2 to 3 young per year (Mindell 1983). An average of 79% of the pairs had young, or 2.68 young per successful pair (Table 2).

Table 2. Territory occupancy and productivity of peregrine falcons along the Kuskokwim River, Alaska 1976-2004[a].

	Occupancy			Nestling productivity				
Year	No. of pairs	No. of lone adults	% relative occupancy[b]	No. of pairs with young	% pairs with young	No. of young[c]	Young/ pair	Young/ succ. pair
1976[d]	1	2	15	1	100	1	1	1
1979[e f]	2	0	10	2	100	5	2.5	2.5
1980[f]	2	0	10	2	100	5	2.5	2.5
1981[f]	4	1	25	3	75	8	2	2.7
1982[f]	5	1	30	3	60	8	1.6	2.7
1983[f]	5	1	30	3	60	9	1.8	3
1985[g]	5	2	35	2	40	5	1	2.5
1986[g]	8	0	40	6	75	14	1.75	2.3
1987[h]	9	0	45	7	77	15	1.66	2.1
1988[g]	8	1	45	4	50	12	1.5	3
1989[g]	9	0	45	9	100	27	3	9
1991[g]	12	3	75	12	100	32	2.66	2.7
2000	9	1	50	8	89	18	2	2.3
2001	8	6	70	7	88	20	2.5	2.9
2002	7	7	70	4	57	8	1.14	2
2003	6	2	40	3	50	4	0.66	1.3
2004	19	1	100	12	63	21	1.11	1.8

[a] Table modified from Ambrose et al. 1988
[b] $\frac{\text{No. of occupied sites in survey year}}{\text{No. of occupied sites in 2004}} \times 100$
[c] chicks 3-6 weeks old
[d] Richie and Ambrose 1976
[e] Dotson and Mindell 1979
[f] Mindell 1983
[g] Waggoner 1985, unpublished report, 1986, 1988-91; unpublished file data, BLM Anchorage District Office
[h] Ambrose 1987

Further increases in occupancy and productivity were recorded between 1985 and 1991 when an annual average of 8.5 pairs produced 3.6 young per successful pair with 74% of the pairs producing young (Table 2).

The historical abundance of peregrines on the Kuskokwim prior to 1976 is not well documented and largely based on personal accounts (Mindell 1983). However, it is likely

the peregrine population on the Middle Kuskokwim declined to its lowest recorded level in 1976 (Richie and Ambrose 1976). The population stabilized in the late 1970s, then steadily increased throughout the 1980s (Table 2). These levels of occupancy and productivity are similar to the Upper Yukon River during the same time period, which is considered to be representative of peregrine population trends seen in Interior Alaska (Ambrose et al. 1988). In 2004, 20 pairs of peregrines occupied breeding territories, the highest recorded since 1976, indicating the breeding population is still increasing. The lower numbers of pairs recorded in 2002 and 2003 during this study may have been a result of the late survey date (Table 1), or an early spring and nesting phenology, where birds fledged before they could be counted.

It was also noted that peregrines were found nesting in abandoned rough-legged hawk stick nests, and in more open, exposed sites with less cover from weather and predation. Many nest sites were on lower cliff complexes on less steep terrain, increasing the potential for terrestrial predation. During this 5-year study, rough-legged hawk active nests declined from 10 in 2000 to only 2 in the period between 2001 and 2004 (Appendix B). This decline in nesting rough-legged hawks and the use of more marginal nest sites by peregrines may be an indication that peregrine numbers are increasing to a point they are out-competing rough-legged hawks for nest sites. Although White and Cade (1971) did report the dominance of peregrine falcons over rough-legged hawks for nest sites on the Colville River, the decline in rough-legged nests could be explained by fluctuations in rough-legged hawk prey abundance, particularly small mammals. Mindell (1983) also reported peregrines using relatively low portions of cliffs and exposed nest sites when the numbers of peregrine pairs occupying territories on the river was lower and more nest sites were available.

While the density of nesting peregrine falcons has undoubtedly increased on the Kuskokwim River since the late 1970s and was continuing to grow as of 2004, the relationship between peregrine falcons and rough-legged hawks relative to nest sites was beyond the scope of this project and will need further study.

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Appendix A. Peregrine falcons observed on the Kuskokwim River 2000-2004*

2000-McGrath to Aniak

PEFA-01-00	active nest	2 adults	3 chicks
PEFA-02-00	active nest	1 adults	3 chicks
PEFA-03-00	active nest	2 adults	2 chicks
PEFA-04-00	active nest	2 adults	2 chicks
PEFA-05-00	active nest	adults	1 chick
PEFA-06-00	active nest	1 adult	4 chicks
PEFA-07-00	active nest	2 adults	2 chicks
PEFA-08-00	active nest	2 adults	?
PEFA-09-00	pair	2 adults	
PEFA-10-00	single bird	1 adult	

2001-Aniak to McGrath

PEFA-01-01	active nest	2 adults	2 chicks
PEFA-02-01	active nest	1 adult	4 chicks
PEFA-03-01	single bird	1 adult	
PEFA-04-01	single bird	1 adult	
PEFA-05-01	active nest	2 adults	3 chicks
PEFA-06-01	active nest	2 adults	1 chick
PEFA-07-01	single bird	1 adult	
PEFA-08-01	single bird	1 adult	
PEFA-09-01	pair	2 adults	
PEFA-10-01	single bird	1 adult	
PEFA-11-01	active nest	2 adults	4 chicks
PEFA-12-01	active nest	2 adults	3 chicks
PEFA-13-01	active nest	1 adult	3 chicks
PEFA-14-01	single bird	1 adult	

2002-McGrath to Aniak

PEFA-01-02	pair	2 adults	
PEFA-02-02	single bird	1 adult	
PEFA-03-02	single bird	1 adult	
PEFA-04-02	single bird	1 adult	
PEFA-05-02	active nest	2 adults	2 chicks
PEFA-06-02	active nest	2 adults	2 chicks
PEFA-07-02	single bird	1 adult	
PEFA-08-02	active nest	2 adults	1 chick
PEFA-09-02	active nest	2 adults	3 chicks
PEFA-10-02	pair	2 adults	
PEFA-11-02	single bird	1 adult	
PEFA-12-02	single bird	1 adult	
PEFA-13-02	pair	2 adults	
PEFA-14-02	single bird	1 adult	

Appendix A. continued

2003-Aniak to McGrath

PEFA-01-03	active nest	2 adults	2 chicks
PEFA-02-03	single bird	1 adult	
PEFA-03-03	single bird	1 adult	
PEFA-04-03	pair	2 adults	
PEFA-05-03	active nest	2 adults	1 chick
PEFA-06-03	pair	2 adults	
PEFA-07-03	pair	2 adults	
PEFA-08-03	no nest	no birds	
PEFA-09-03	active nest	2 adults	1 chick

2004-McGrath to Aniak

PEFA-01-04	active nest	1 adult	2 chicks
PEFA-02-04	pair + 1 adult	3 adults	burned over by fire
PEFA-03-04	pair	2 adults	
PEFA-04-04	active nest	2 adults	1 chick
PEFA-04-05	active nest	2 adults	?
PEFA-04-06	active nest	2 adults	1 chick
PEFA-04-07	active nest	2 adults	3 chicks
PEFA-04-08	pair	2 adults	
PEFA-04-09	active nest	2 adults	2 chicks
PEFA-04-10	pair	2 adults	
PEFA-04-11	pair	2 adults	
PEFA-04-12	pair	2 adults	
PEFA-04-13	single bird	1 adult	
PEFA-04-14	pair	2 adults	
PEFA-04-15	active nest	2 adults	3 chicks
PEFA-04-16	active nest	1 adult	?
PEFA-04-17	active nest	1 adult	3 chicks
PEFA-04-18	active nest	2 adults	?
PEFA-04-19	active nest	2 adults	2 chicks
PEFA-04-20	active nest	1 adult	?

*PEFA = peregrine falcon

Appendix B. Other raptors seen during Peregrine Falcon surveys along the Kuskokwim River, Alaska 2000-2004[*]

2000-McGrath to Aniak

OSPR-01-00	active nest	pair	chicks ?
BAEA-01-00	active nest	pair	chicks ?
RLHA-01-00	active nest	pair	1 chick
RLHA-02-00	active nest	pair	3 chicks
RLHA-03-00	active nest	pair	1 chick
RLHA-04-00	active nest	pair	3 chicks
RLHA-05-00	active nest	pair	3 chicks
RLHA-06-00	active nest	pair	chicks ?
RLHA-07-00	active nest	pair	3 chicks
RLHA-08-00	active nest	pair	4 chicks
RLHA-09-00	active nest	1 adult	chicks ?
RLHA-10-00	active nest	pair	3 chicks

2001-Aniak to McGrath

RLHA-01-01	soaring	2 adults	
RLHA-02-01	soaring	1 adult	
RLHA-03-01	pair	2 adults-no nest	
BAEA-01-01	single bird	1 adult	
BAEA-02-01	single bird	1 immature	
BAEA-03-01	pair	2 adults-no nest	
OSPR-01-00	active nest	2 adults	chicks ?

2002-McGrath to Aniak

RLHA-01-02	single bird	1 juvenile	
RLHA-02-02	single bird	1 adult	
RLHA-03-02	single bird	1 adult	
RLHA-04-02	single bird	1 adult	
RLHA-05-02	single bird	1 juvenile	
RLHA-06-02	single bird	1 juvenile	
BAEA-01-02	single bird	1 adult	
BAEA-02-02	single bird	1 adult	
BAEA-03-02	single bird	1 adult	
BAEA-04-02	pair-no nest	2 adults	
BAEA-05-02	pair-no nest	2 adults	
BAEA-06-02	single bird	1 immature	

Appendix B. continued

2002-McGrath to Aniak			
OSPR-01-02	active nest	pair	1+chicks
2003-Aniak to McGrath			
BAEA-01-03	single bird	1 adult	
BAEA-02-03	single bird	1 adult	
RLHA-01-03	active nest	pair	2 chicks
RLHA-02-03	active nest	pair	2 chicks
RLHA-03-03	single bird	1 adult	
RLHA-04-03	single bird	1 adult	
OSPR-01-03	no birds-nest blown down-abandoned		
2004-McGrath to Aniak			
RLHA-01-04	single bird	1 adult	
RLHA-02-04	pair-no nest	2 adults	
RLHA-03-04	pair-no nest	2 adults	
RLHA-04-04	single bird	1 adult	
OSPR-01-04	no birds-nest blown down-abandoned		

* OSPR = ospreyBAEA = bald eagle RLHA = rough-legged hawk