



1987

NOATAK BIOSPHERE RESERVE

RAPTOR SURVEY

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1987 NOATAK RAPTOR SURVEY

A Summary of Cliff-Nesting Birds of
Prey Along the Noatak River, Alaska

by
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ABSTRACT

At least two pairs of threatened arctic peregrine falcons (F. p. tundrius) nested successfully on the Noatak River in 1987; similarly, two nesting pairs of peregrine falcons were also recorded in 1986 but at different locations. Seven young gyrfalcons were also banded at two different eyries. Identifying and preserving raptor habitat within the Noatak National Preserve and International Biosphere Reserve is vital for the long-term National Park Service management of unique arctic resources. More data is needed as we record the natural recolonization of the peregrine falcon in historic habitat located within the Noatak River drainage.

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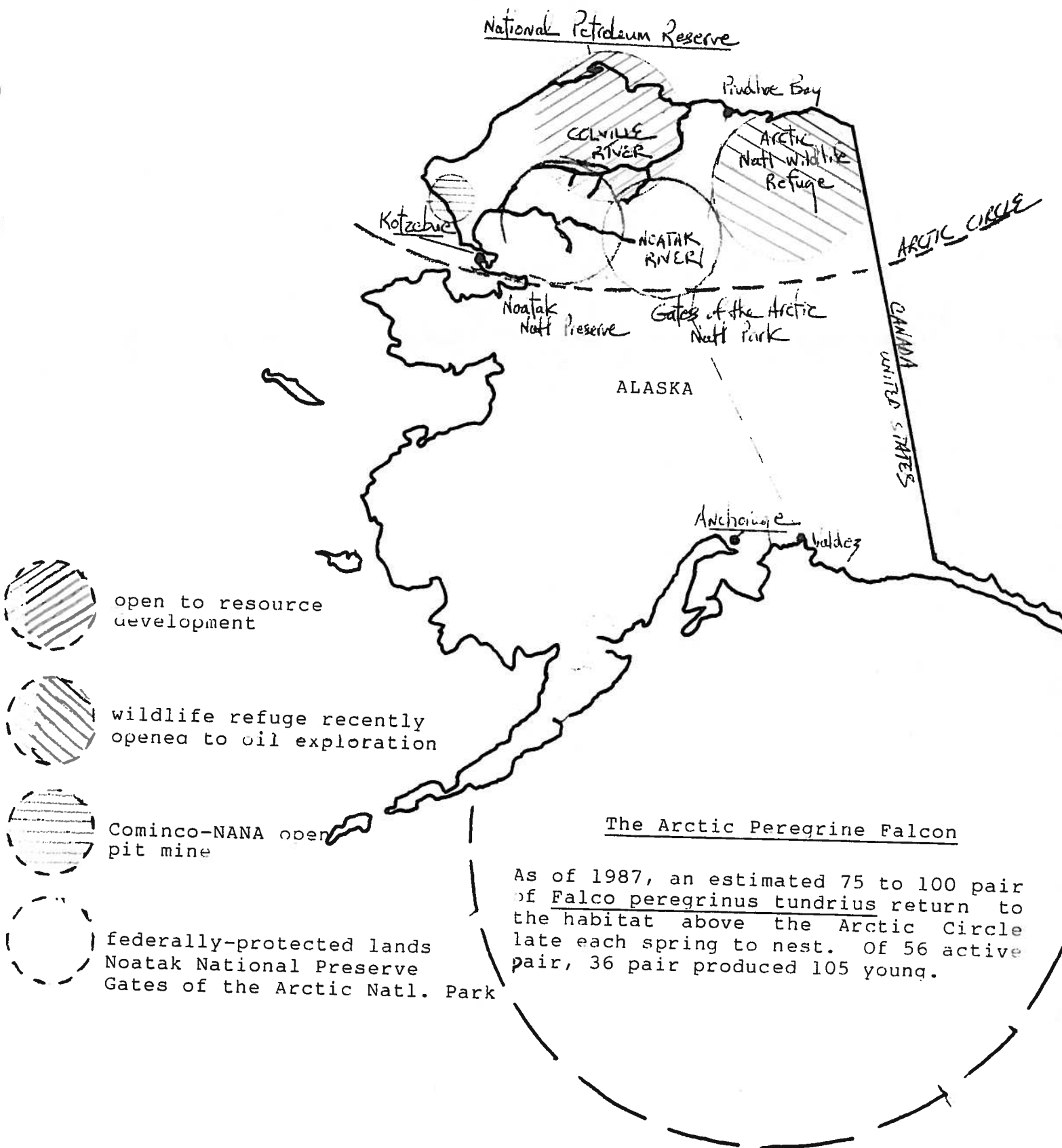
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FIGURE 1

STUDY AREA DEFINED



OVERVIEW

The Importance of the Noatak River

Noatak National Preserve was designated on 2 December 1980 (ANILCA, Public Law 96-487) to maintain the environmental integrity of the Noatak River and adjacent uplands within the basin, to assure the continuation of natural processes without adverse human disturbance, to protect populations and habitat for fish and wildlife, and to provide a reserve for scientific research. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) already recognized the Noatak Basin for its international importance as a "biosphere reserve"--designated as a unique and irreplaceable part of the Earth. Expanded in 1985 to include the headwaters of the Noatak River within Gates of the Arctic National Park, a purpose of the Noatak Biosphere Reserve¹ is the accumulation of baseline data which may be used in monitoring environmental changes in other ecosystems that may lack the political protection of resources afforded by National Preserve designation.

The Endangered Species Program

Passage of the Endangered Species Act of 1973 gave the United States one of the farthest reaching and most effective laws enacted by any country to prevent the extinction of imperiled plants and animals. The arctic and American peregrine falcon (Falco peregrinus tundrius and Falco peregrinus anatum) are two subspecies of the peregrine falcon protected by this legislation. Over the past forty years, researchers and U.S. Fish & Wildlife scientists have studied the nesting decline of the peregrine falcon throughout its Alaskan range, and monitored efforts by the species to repopulate native range during the past ten years. While decline of the peregrine falcon has been attributed to a variety of agents, most notably pesticide contamination, other influences include pressures induced by migration and loss of wintering habitat, seasonal prey fluctuations, and human disturbances previously unknown. A primary objective of the Alaskan Endangered Species Program is to identify and protect peregrine eyries and nesting habitat in Alaska, the last nesting stronghold for this species in the United States. The National Park Service administering the Noatak Biosphere Reserve participates in this program.

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Throughout this report the term Noatak Biosphere Reserve will be used to represent the Noatak River Basin within the Noatak National Preserve and Gates of the Arctic National Park.

Previous Raptor Surveys of the Noatak Biosphere Reserve

Prepared from field data prior to 1985, the Noatak General Management Plan considered the arctic peregrine falcon to be the only threatened species that may occur within the preserve, but concluded "No known federal or state-listed endangered or threatened plant or animal species occur in the preserve." Subsequently in 1986, the National Park Service (NPS) contracted the U.S. Fish & Wildlife Service (FWS) for A Survey for Cliff-Nesting Birds of Prey Along the Noatak River, Alaska (Amaral and Gardner, 1986). This comprehensive raptor survey of the mainstream of the Noatak River documented the presence of the threatened peregrine falcon at four separate locations previously unknown. Competent field investigations in 1971 and 1975 had not disclosed any peregrine falcon sightings (Haugh, 1975), although it was believed one or two pairs of peregrines were present on the Noatak in the 1960's (Fyfe et al., 1976). Recent nesting successes in the Noatak Biosphere Reserve have been attributed to the general recovery of peregrine falcon population levels following the banning of DDT in the United States in 1972. DDT and other pesticide use, however, continues in Central and South American habitats still used by the highly-migratory arctic peregrine falcon.

Significance of Study Within Noatak Biosphere Reserve

Discovery of peregrine falcons nesting in the Noatak Basin provides the NPS with an opportunity to inventory and manage critical habitat for a threatened species, as mandated by the Endangered Species Act of 1973. The natural recolonization by the arctic peregrine falcon indicates the historic nature of the Noatak Basin habitat for peregrine falcon nesting. While pesticide use continues in migration corridors and wintering habitat, each year additional demands are further stressing the peregrine falcon and its natural ability to maintain healthy population levels. Other demands include loss of wintering habitat due to urbanization of wetlands, human harassment (shooting & collecting), local extirpation of prey species along migration corridors, new diseases (including avian herpes), and a phenomena of global events we are only beginning to identify, let alone understand. While the Noatak Basin has only a few known pairs of nesting peregrine falcons that are far apart and geographically difficult to access, further recolonization efforts could lead to the discovery of additional peregrine falcon eyries and a determination of the carrying capacity model for species use. The presence of the gyrfalcon (Falco rusticolus) within the Noatak Basin could be used as a model to monitor for environmental changes, comparing the low-migratory gyrfalcon to high-migratory influences affecting the peregrine falcon. Noatak Biosphere Reserve offers federally-protected habitat, native recolonization by the peregrine falcon, and international recognition for pristine habitat--all ideal conditions for long-term field research. Given this precedent, the 1987 Noatak Raptor Survey continued the work begun by Amaral & Gardner in 1986.

Study Objectives

Pre-expedition goals of the 1987 Survey:

- * record all sightings of raptors by location, age, sex, and nesting status, where possible
- * investigate raptor nest locations, active & historical
- * determine the success of nesting attempts; band raptors as feasible
- * assess and record vulnerability of nests to human disturbance

Reinspection of nesting sites discovered by Amaral & Gardner (1986) and historic gyrfalcon eyries discussed by Haugh (1975) were of primary concern. Emphasis upon general exploration of potential nesting habitat was prescribed in 1987, given our first year of Noatak study and desire to achieve a familiarity with the Noatak Basin.

Study Area

The Noatak is the largest mountain-bordered river basin in America that is still virtually unaffected by human activities. The preserve is in a transition zone between the northern coniferous forests and the tundra biomes of North America and is almost completely enclosed by the Baird and DeLong Mountains of the Brooks Range, flowing westward for 435 miles to Kotzebue Sound on Alaska's northwest coast. Crossing more than one-third of arctic Alaska, the Noatak River drains an interior plateau valley of 12,600 square miles, affecting over 6.5 million acres of federally-protected land, including eleven rivers 35 to 100 miles in length and 37 named tributary creeks. (Sources: Noatak GMP 1985, Amaral 1986, and DOI 1974).

Historical

The Noatak and Colville Rivers are the primary streams draining arctic interior Alaska; hence, both are of significant importance as nesting habitat for the arctic peregrine falcon and gyrfalcon.

The Colville River

In an exhaustive study published in 1960, Cade stressed the importance of riparian river habitat for peregrine nesting, stating "Occasional pairs probably also nest on cliffs away from the immediate vicinity of water, as they are known to do at lower latitudes, but there is no known instance of such a nesting in Alaska" (Cade, 1960). As Alaska has now received more systematic exploration and discovered instances of non-riparian peregrine eyries (e.g.: Grapefruit Rocks north of Fairbanks), the importance

of river cliff habitat remains confirmed. The FWS has conducted annual raptor surveys on cliffs along the Colville River to determine peregrine falcon nesting chronology; in 1969 and 1970 the decline of the arctic peregrine falcon first became apparent. In 1976 it was doubtful if 50 pairs of peregrines were still producing young in northern Alaska, where Cade had estimated the breeding population at 200 to 300 pairs in the late 1950's (Fyfe et al, 1976). In 1983, however, 26 peregrine eyries were recorded on the Colville River, representing 81% of the targeted goal set by the Alaskan Peregrine Falcon Recovery Plan (USFWS, 1982). The fact that peregrines are once again occupying habitat in the nearby Noatak Biosphere Reserve is considered natural recolonization of historic habitat located 100 miles south of the Colville River.

The upper Colville River (Etivluk to Umiat) contains 235 km of habitat that parallels Noatak River habitat conditions. Surveys in 1983 noted 9 pairs of nesting peregrine falcons in this section of the Colville River (Dittrick & Moorehead, 1983). The Colville (615 km) and the Noatak (685 km) are of similar length, but the Colville has superior cliff-nesting conditions favoring peregrine occupation.

Cade (1960) also describes an informal elevational limit on arctic peregrine nesting at 2000', or at about 80 km from the headwaters of the Noatak at the base of Mt. Igikpak in the Brooks Range. Amaral & Gardner began the 1986 study at 105 km.

The Noatak River

The earliest reference to the Noatak Basin by McLenegan (1887) fails to mention the peregrine falcon as occurring within the valley. More recently, historical data suggests only a presence of peregrine falcons. Dr. E.S. Hall identified two possible pairs of peregrines during his anthropological work in the early 1960's. Manuwal (1974) considered the peregrine a resident, as well Dean & Chesemore (1974) observed peregrines in flight, but there are no historical records of eyries. Surveys by raptor biologist John Haugh in 1971 & 1975 revealed nesting gyrfalcons but no peregrines, leading him to conclude that "the species is not now a part of the nesting avifauna of the Noatak Valley" (Haugh, 1975; Fyfe et al, 1976).

In 1985, Kotzebue resident Brad Johnson photographed a banded adult female peregrine falcon at an eyrie located near Uyon Lakes on the Noatak River. This was the first documentation of a nesting peregrine falcon on the Noatak. Prompted by this finding and by other observations by NPS staff, the FWS was contacted to conduct the 1986 survey. Amaral concluded it is reasonable to estimate that 4 to 6 pairs of peregrine falcons are currently nesting along the Noatak River. Amaral also states that while the Colville River is by far the most important river system in arctic Alaska for nesting peregrine falcons, that the Noatak River should be considered second in importance only to the Colville River.

Methods and Materials

The 1987 survey was divided into five study segments:

- | | |
|-------------------|--|
| 22 May to 30 May | Arrival in Kotzebue, helicopter survey 525 km--685 km Noatak River. Literature review, map preparation, interview local sources of raptor & cultural data. |
| 31 May to 22 June | Trip I: Survey of Noatak River via kayak, from 105 km--525 km. |
| 26 June to 1 July | Helicopter survey of Eli River drainage, and hike exploration of Sekuiak Bluff (490 km). Return via outboard pickup NPS staff. |
| 4 July | Helicopter review Cape Krusenstern National Monument, focusing on Red Dog Corridor (see appendix). |
| 7 July to 27 July | Trip II: Survey of Noatak River via kayak, from 45 km--525 km. |

August and September were spent analyzing field notes, reviewing historical literature, analyzing peregrine falcon eggshell fragments collected on Trip II, studying museum skins at the Western Foundation for Vertebrate Zoology, and comparing photographs of peregrines observed on the Noatak River to specimens contained in archives. A rough draft of this manuscript was presented to the NPS and FWS in October for comment and review, and final draft prepared in January 1988.

On Trip I two researchers in a two-man Folbot kayak spent 22 days surveying 420 km of habitat. Observations were made with a Baush and Lomb 10 X 50 binocular and a Spacemaster 15-45 X 60 scope on tripod. Two 35 mm cameras were used to record events and location of eyries. Daily field notes were kept on a Sony micro-cassette recorder and transcribed to a journal each day. Camps were selected where viewing of distant peaks and/or bluffs was advantageous, or downriver a safe distance from discovered eyries. Great care was taken not to disturb sensitive falcon nesting. Most travel was according to weather; rainy days commonly led to river travel between 1400--2400. Selected canyons were hiked into and reviewed for nesting Falco, using Amaral and Haugh as a reference. Many hours were spent viewing distant cliff areas that appeared promising for signs of aerial raptor activity. The large number of golden eagles (Aquila chrysaetos) observed throughout the study area provided ample opportunity for defensive displays by nesting falcons. Trip II was accomplished in the same fashion but using two one-man kayaks (Folbot Sporty).

Due to the wide variation of nesting chronologies, gyrfalcons were banded on Trip I, and peregrines were banded on Trip II. Inventoried cliff habitat was examined for whitewash at perching or other obvious cliff ledges. Dominant buttes associated but adjacent from the Noatak were explored, given favorable weather and terrain. Generally, techniques described in author's Organizing Wild Peregrine Observations were utilized (Ball, 1987).

The 1987 Noatak Raptor Survey was conducted by two observers, and includes the observations of other field personnel in the study area during spring/summer 1987. References to cliff-nesting locations first discussed by Haugh or Amaral are reported in the Tables, thereby presenting a complete record of relevant data for future use in field research. Locations of raptor sites on the Noatak River were originally plotted by Amaral on USGS 1:250,000 scale topographical maps. An effort to maintain this code as a means of labeling raptor sites has been applied to the mapping locations.

Ropes were necessary for two of four Falco nests. The lower portion of the Noatak (525--685 km) was only briefly surveyed from a Bell Jet Ranger helicopter.

RESULTS

The following eight tables detail data collected in 1987.

Symbols

PF	Peregrine Falcon
GE	Golden Eagle
RLH	Rough-legged Hawk
M	Male
F	Female
AD	Adult
unk	unknown
w/w	whitewash
obs	observe, observation
SUB	Subadult
Pr.A	pair of adults
alt	alternate
sus	suspected
km	kilometer: Refers to distance from headwaters of Noatak River to point of observation



Figure 2: Adult female peregrine falcon perched at 133 km eyrie with single nestling.
First known active 1987. Female was wearing FWS AVISE band.

TABLE 1

Peregrine Falcons on the Noatak River

<u>location</u>	<u>date obs</u>	<u>status</u>	<u>sex</u>	<u>age</u>	<u>comments</u>
133 km	5 June87	eyrie	M	AD	Falcon perched on cliff. Not vocal, flew upon inspection.
	11 June				No defense, no sign F , no W/W.
	13 July		F	AD	R. Rawls obs both adults defensive at eyrie
			banded		One nestling banded at 15 days
	30 July				No eggshells found. Rope access.
					Inconsistent defense vocalizations.
					M. Salamacha (NPS: Gates) obs one nestling, and both adults in defense.
148 km	6 June	flying	M	unk	Obs susp. M chasing GE high above Noatak River; cliff revealed GE nest.
210 km	8 June	flying	M	AD	Above Noatak River.
258 km	9 June	eyrie	M	AD	Eyrie located on 60' dirt embankment.
			F	AD	Both adults defensive. W/W visible at perching areas only. No eggs located.
	18 July				Active RLH upriver (3 eggs). Two day-old nestlings and one pipping egg obs. M is large, dark-headed; no bands obs on adults.
		historical			Amaral (86) obs defensive pair but found no eggs.
340 km	12 June	historical			Active eyrie 86: obs fresh W/W on cliff but <u>no PF obs.</u> Cold & rainy.
	22 July				Trip 2: W/W appears fresh but no falcon sign.
375 km	15 June	W/W on cliff			Excellent site. K. Roney (NPS) obs perched PF in this area during Early August float trip.
	August	perched	unk		Nimiuktuk River conf. nearby.
397 km		historical			B. Johnson obs active eyrie 1985
420 km	16 June	historical			Excellent cliffs; this area contains two nesting gyrs. Amaral obs lone PF in flight here in 1986. <u>No PF obs.</u>
	24 July				
490 km	19 June	historical			Active eyrie 86: extensive cliff area with some W/W. Active GE nest upriver elicited no defensive reaction on GE flybys. Excellent cliffs.
	28 June--1 July				<u>No PF obs.</u>
	26 July				

TABLE 2

Peregrine Falcon Known Eyries

<u>location</u>	<u>85</u>	<u>86</u>	<u>87</u>	<u>observer</u>	<u># young</u>	<u>phenology</u>	<u>comments</u>
133 km	unk	no	yes	Ball	1	15 days @ 13 July 87	
258	unk	unk	yes	Ball	3	1 day @ 18 July (Amaral obs ad. pair present in 1986 but concluded eggs had been lost to landslide)	
340	unk	yes	no	Amaral	3	7-14 days @ 14 July 86	
397	yes	no	no	Johnson	--	---	
490	unk	yes	no	Amaral	3	7-14 days @ 18 July	
TOTALS							
5 eyries	over 3 years		2 successful each of last two years.				

Peregrine Falcon Suspected Territories

Cutler River	On the Colville River, many PF eyries occur just upriver of the confluence of another major river system (Etiviluk & Colville), yet on the tributary watershed: a similarity exists between the juncture of the Cutler River with the Noatak.
Nimiuktuk River	Sightings of lone falcons perched on cliffs or banks in this area (Haugh 75 and Roney 87) indicate a continued presence--perhaps upriver a short distance.
Sapun Creek	Historical sightings by Haugh and Amaral indicate continued <u>Falco</u> presence. The area from 410km to 455km is superior in all respects, and should be investigated in depth.

DISCUSSION PEREGRINE FALCONS

Peregrine falcons were observed at five locations along the Noatak River in 1987, with two active eyries at 133km and 258 km. Two PF were observed in flight at 148km (chasing a golden eagle) and at 210km (flying above the Noatak); a solitary PF was observed by Kate Roney in early August, perched on a cliff near 375km.

Peregrine eyrie 133km

Eyrie 133km is located in a canyon on a shale cliff overlooking a fast section of the Noatak River, with a SE exposure. The horizontally-layered rock is angled at 45 degrees, creating numerous ledging. Eyrie height is 70', with overall cliff height estimated at 120'. Only one nestling was observed at 133km. Originally, the female was not visible, vocal, nor did she defend the eyrie upon our first visit 5 June--only the male flew away from the cliff at our close inspection. We did not have eyrie confirmation until later, when we met another kayaker on the river (R. Rawls), who stated he was "bombarded by two falcons" as he traveled past the cliff of 11 June. Curiously, on Trip II we noted aggressive defensive behavior by the female as we approached the upriver turn to the eyrie still 100 yards from the cliff; yet in the 48 hours spent observing peregrine behavior approximately 200 yards downriver, we were ignored completely. When a party of two floaters rounded the corner one afternoon, and quickly headed for our beach camp, there was no indication from either falcon of any defensive behavior. Indeed, the female sat calmly next to her two-week old nestling. Following perhaps a twenty-minute conversation, the rafters departed downriver without any inclination of peregrine falcon presence.

The adult female was previously banded with a FWS AVISE lock-on band on her right leg, and did not appear to be very old, judging by the light coloration of tarsus and cere. Her immediate eye area was the pale color blue associated with mostly younger falcons. She was aggressive in her defense, landing within feet of the attendant banding the sole nestling. The male had no band, with dark orange leg and cere. He was also vocal and defensive during banding. We observed no sign of eggshell fragments, and do not know why only one nestling occupied this eyrie. We believe this to be a new peregrine eyrie, as no mention of this site appears in any previous literature. Given its prominent location, it will be easily monitored in the future. Haugh (75) did discuss a "pair of falcons" flying near Kavachurack Creek, which is not far from 133km; this may be evidence that this site could be of an historic nature.

Peregrine eyrie 258km

On 9 June the eyrie was located on a 60' dirt embankment; although no eggs were yet present, both adults defended the area with vigor. On 18 July we observed both peregrines to be vocal to our kayak approach. After a quick search of the highest dirt bluff, the

DISCUSSION (continued)

eyrie was located in a brief depression in substrate material between two bushes. Rope was not necessary. At the time of our visit, 2 day-old chicks had just pipped out--eyes closed, egg tooth prominent. Once pipping egg nearby gave every evidence of a normal hatch. An eggshell was collected; analysis by S. Sumida of the Western Foundation for Vertebrate Zoology revealed an average thickness of 0.358mm (measurement with membrane intact--see appendix for complete results). Pre-1947 eggshell thickness for 53 eggs collected from arctic/subarctic Alaska was 0.360, indicating normal eggshell reproduction for the 258km pair.(Anderson 1972).

Due to the age of nestlings, less than 90 seconds was spent at the eyrie. The female immediately returned to the scrape after our departure, and we were unable to investigate for a band due to her incubation posture. The male was unbanded, extremely large, and with a distinctive black head exceedingly darker than the mated female. A review of study skins and dated photographs within the Western Foundation museum indicates that all peregrines observed on the Noatak River to be the arctic subspecies, Falco peregrinus tundrius. While we were amazed by the size and dark head color of the 258km male, we attribute these characteristics to infinite variation among a species.

TABLE 3

Factors Affecting Peregrine Falcon Habitat Occupation

Geographical	The cliff or vertical dirt bank should offer an immediate proximity to water, standing within a protected niche of the river. Cliff height can range from 30 to 100 feet in height.
Elevational	In the Arctic few peregrine falcon nesting attempts (known) occur above 2000' (Cade, 1960).
Environmental	Migration stress is considered to affect the level of pesticide residues mobilized prior to arrival at nesting areas, affecting subsequent egg production. It is believed that increased stress, indicated by a late arrival, could lead to decreased egg productivity. <u>Wind stress</u> is another consideration: the Noatak experiences more continental climate than the maritime areas, but with greater seasonal variations in temperature & precipitation. Long cold winters & cool wet summers are the Noatak norm, with breakup of winter river ice normally occurring mid-late May. Even during the cool summer months, windchill temperatures have a major influence on biological systems. It has been noted that there is a turnover rate of 50% within observed adults at known PF eyries (Ambrose & Riddle, 1982). It would appear to be difficult to maintain consistent yearly production at traditional nesting sites without the presence of a "floating population" of lone PF for recruitment.
Food Supply	In 1987 both active PF eyries had large colonies of prey birds (bank swallows) nesting adjacent to or immediately below the cliff eyries. In 1987 no such prey activity was noted at eyries reported active in 1986.
Competition	The presence of other raptors may be a limiting force affecting successful occupation of nesting habitat by late-arriving PF. In 1985 the 397km PF nesting site became an active gyrfalcon eyrie in 1986 and 1987. No PF have been sighted in this area since 1985. In 1986 the 490km site was an active PF eyrie, while upriver a subadult GE tended an active territory in a non-productive nest. In 1987 the GE was observed incubating on her nest, and PF were not visible anywhere within the extensive cliff system.
Historical	Human disturbances, pesticides, loss of wintering habitat, and climatic irregularities.

TABLE 4

Gyrfalcons on the Noatak River

<u>location</u>	<u>date</u>	<u>obs</u>	<u>status</u>	<u>sex</u>	<u>age</u>	<u>comments</u>
48 km	hist.		sus.eyrie			(Liedberg NPS) Observe ad. pair harassing GE while flying by cliffs nearby Pingo Lakes area.
60	10 July		sus.eyrie			Observe family group defensive in air encounter with GE; cliff-area with <u>Falco</u> w/w noted.
105	2 June		flying	M	AD	Observe approaching low bluffs across river, disappearing behind cliffs.
	12 July		sus.eyrie			Second trip; inspection of area reveals w/w on far cliff against hill. Same area as Amaral 86 sighting of lone flying gyr.
397	15 June		eyrie			4 nestlings @ 21-24 days banded. Two males and two females. Obs the AD F once, with vocalization, then left area. Old raven nest with NE aspect, only 30' above river. Ptarmigan and jaegar prey remains. Active 1986 (Amaral).
	23 July					observe three gyrs have fledged: two males and one female. Flushed from eyrie area upon approach.
415	16 June		eyrie			3 nestlings @ 21-24 days banded. Two males and one female. Obs one defensive dive by the AD M while at eyrie, then no further obs. Rope necessary, as cliff is 80' SE-facing over an alder-type thicket. Approx. 1 mile from Noatak River on the north shore. Other excellent cliffs throughout long ridgeline. Sandpiper, ptarmigan remains obs.
430	17 June		historic			Haugh (75) reports gyr eyrie 2 miles up Nakolik River. Not checked 1987.
441	18 June		historic			Haugh reported gyr eyrie 1 mile up Akikukchiak River; we review, obs active raven nest in superior site.
490	19 June 28 June 26 July		historic			Haugh reported active 1975. No sightings of gyrs.

DISCUSSION GYRFALCONS

Gyrfalcons were observed at four locations along the Noatak River in 1987, with two active eyries at 397km and 415km. A family group of gyrfalcons was observed harassing a flying golden eagle at 60km; nearby, an excellent cliff with Falco-type whitewash appeared central to the heaviest defensive displays. A single sighting of a flying gyr led to the discovery of whitewash on another distant cliff structure at 105km, close to where Amaral observed a lone flying gyr in 1986.

Two eyries produced seven nestlings--all of which were banded at approximately 23 days of age (see Banding Schedule).¹ Evidences of ptarmigan and parasitic jaeger dominated prey remains at both eyries. Three of four young at 397km were observed to have fledged successfully by 23 July.

Discovery of the 415km eyrie was not referenced in any prior literature on the Noatak River. Selected areas for future gyrfalcon investigation include:

Tunukuchiak Creek (120km)	we observed w/w on cliffs
Nimiuktuk River (372km)	immediately south of Noatak
	excellent habitat in drainage
	located immediately south of
	confluence with Noatak.
410km--420km	multiple cliff situations
	in ideal habitat

Haugh lists four gyrfalcon eyries in his 1975 summary; Amaral discovered one active eyrie in 1986 but that survey was limited primarily to the mainstem of the Noatak. In 1987 we observed only two active eyries but with evidences of two additional locations. As gyrfalcons are resident in the Arctic, they are first to nest on the choicest cliffs, and first to fledge; with data provided from 1987, we anticipate more gyr eyrie findings in 1988, as we explore more of the tributary habitat comprising the Noatak basin.

Other areas include:

Kugrak & Igning Rivers (70km)	Historical sighting by R. Siglin (Amaral 86)
Douglas Creek (125km)	Observed two cliff sites with a SE exposure on the north hill on Trip 1.
450 km cliff gap in tributary	Unnamed creek that is immed. before bend in river, on north side. Not far from here, in 1975, Haugh reported an active eyrie at Mukachiak Ck.

¹ See Banding Information, Table 7

TABLE 5

Golden Eagles on the Noatak River

<u>location</u>	<u>date</u>	<u>obs</u>	<u>status</u>	<u>sex</u>	<u>age</u>	<u>comments</u>
45 km	8 July	w/w on cliff				Near Portage Creek; either hunting post or possible eyrie.
78	11 July	nest				Active nest with both adults obs. Three old nests present on same cliff wall; located in gorge with abundant sign of Dall sheep remains littered about entrance to canyon. Fresh w/w below active nest, could not confirm # young. Feathers (moulted) obs.
120	4 June	soaring	F	AD		Clear and windy, flying over camp.
	5 June	hunting	M	SUB		Small white patch under wing.
			M	SUB		Same bird as above
135	6 June	flying	unk			Nest downriver. Peregrine nesting at 133 km.
140	15 July	nest				Active nest with two young @ 25 days. Nest is located on steep hill near suckhole in river, approx. 30' above river. Ptarmigan and gr. squirrel remains were obs in the nest.
148	6 June	nest	F	SUB		Near a camp, we obs her sitting on nest and later harassed by M PF.
	15 July					Collected cold egg from abandoned nest, no sign SubA F. Obs young RLH feathers in GE nest (prey remains).
190	6 June	perched	unk			Suspect an adult on a hunting perch.
	16 July	same perch				AD M took off, after enduring harassment from an Arctic tern.
205	7 June	flying	M	AD		Appeared to be hunting
240	8 June	perched	M	AD		Did not flush as we passed by a tundra bluff perch
	17 July	flushed				Appeared to be same GE, flushed to our kayak approach and flew across hill side parallel with river.
282	10 June	flying	unk			Flush from black cliffs; snowing, no nest obs.

TABLE 5

Golden Eagles on the Noatak River (continued)

<u>location</u>	<u>date</u>	<u>obs</u>	<u>status</u>	<u>sex</u>	<u>age</u>	<u>comments</u>
292 km	11 June		flying	unk		Hunting abundant squirrels at Makpik cabin area
335	12 June		nest	SUB A		Two nests, both empty. Active territory with a subadult, adult.
400	15 June		nest			Two old GE nests without GE presence. Fresh w/w on one of the nests.
430	18 June		nests			Four or five old GE nests, no birds obs.
440	18 June		flying	unk		Hunting distant ridgeline
487	19 June		nest	Pr. A		Active nest. Four old nests visible, active approx. 100' above Noatak River in Sekuiak Cyn. Female incubating in cold, rainy weather.
	26 July					One nestling @ 21-28 days obs. Note: 3 nests show fresh green material lining nests and have w/w below, so green lining on an alt. nest is possible.

TABLE 6

Other Raptors on the Noatak River
Rough-legged Hawks (Buteo lagopus)

<u>location</u>	<u>date obs</u>	<u>status</u>	<u>sex</u>	<u>age</u>	<u>comments</u>
115 km	1 June	flying	unk		Obs in distance, hunting
148	6 June	soaring	unk		Against far blue sky
258	9 June	nesting	Pr.A		3 eggs on the edge of a bank large nest; adults defensive and attacked by peregrine nearby. hillside had slid into the river and new nest was under const. Adults not visible 2nd trip.
	18 July				
280	10 June	flushed	unk		Left bank area; no nest obs, not defensive.
292	10 June	flying	Pr.A		Hist. Amaral 86; no nest obs.
370	15 June	nest	F	AD	Defensive near old stick nest. Rainy & cold. no sign of current activity
	22 July				
410	16 June	nest	F	AD	Defensive to approach on 40' cliff directly over river. Very unstable dirt cliff. Two nestlings, no age est.
	23 July				
440	18 June	flying	unk		Old stick nests' about
450	18 June	nest	F	AD	New-looking nest with female on eggs (# unk). Raining nest appears abandoned
	26 July				
460	18 June	flying	unk		Not defensive. Windy.
485	19 June	flying	unk		Not defensive
115	1 June	northern harrier (<u>Circus cyaneus</u>)			
284	10 June	merlin (<u>Falco columbarius</u>)			
330	12 June	northern harrier AD F flying			

DISCUSSION GOLDEN EAGLES

Golden eagles were observed at fourteen locations along the Noatak River in 1987, with resident pairs present at five separate nesting cliffs. Three locations had productive nesting efforts: (78km) age and number of nestlings unknown, (140km) two nestlings observed at 25 days of age, and (483km) one nestling observed at an estimated 21-28 days of age. One location (148km) a female subadult incubated one infertile egg (later collected after abandoned), and another territory was held by a subadult male and adult female that sat next to an empty nest. Nine other locations were sightings of single golden eagles, two of those sites with eagles observed at identical locations on both float trips.

Amaral observed 15 eagles in flight in 1986, and identified two nesting efforts at 140km (successful: one nestling), and 487km (unsuccessful: subadult). Both of these locations continued to be active in 1987, and due to the maturity of the female at 487km, both nests were productive. Haugh found two active eagle nests along the Noatak and three in tributary streams in 1975. Previous surveys did not explore the higher waters of the Noatak contained in Gates of the Arctic NP; otherwise, 1987 findings exacting mirror previous field studies.

Given the maturity of the two subadult pairs in 1988, it will be interesting to record if all five pairs nest successfully, since two nests on the river appear to be the historical norm.

ROUGH-LEGGED HAWKS

Rough-legged hawks were observed at eleven locations along the Noatak River in 1987. On the first trip, female RLH were defensive in four nesting locations; on the second trip, only one nest was successful (210km) with two nestlings. At 258km, three eggs slid away with nest and entire hillside into the Noatak River, the same thing happened to this pair in 1986. Two sites--370km and 450 km--were abandoned by the second trip.

Haugh (75) reported three active nests in 1975 and none in 1971. Amaral noted four out of five active nests were successful for a total of nine young. On the Colville River, the Bureau of Land Management reported that a large percentage of RLH nests failed along the river between June and August, 1986, due to nest loss through erosion. Certainly the heavy rains of 1987 played a major role in hillside erosion of nesting habitat, and it will be interesting to see the related figures from the Colville for this year.

OTHER RAPTORS OBSERVED

The northern harrier was again observed in 1987, with two sightings at 115 km and 330 km. In 1986 harriers were observed in seven locations. Two sightings of a merlin were also recorded, without previous historical reference. The first sighting was at 284 km, the other sighting at 488 km. NPS Ranger Mark Holloman discovered a pair of ground-nesting merlins in a canyon across from Sekuiak Bluffs at 488 km.

Northern Raven

The cliff-nesting northern raven (Corvus corax) constructs stick nests that are often used by falcons and rough-legged hawks in subsequent seasons. An estimated 6 to 8 pairs of nesting ravens were observed active in separate territories during Trip I; by Trip II, all ravens had left the nesting area. While checking a gyrfalcon site mentioned by Haugh (1975) in Akikukchiak Creek, an active raven nest was located; oddly, a dead nestling was observed still intact and "fresh" at the base of the cliff. Cause of death was attributed to fledgling error at an estimated age of 5 weeks, discovered 18 June 1987.

Other Birds

Amaral assembled a bird list of 69 species during his survey in 1986 which we used as a checklist for our own observations. Some interesting notes of avian behavior are noted here:

The Mew gull (Larus canus) often perches at the edge of incoming rivers, studying the water as if watching for or at something. One river floater met en route, with 24 years of arctic experience, claimed the presence of Larus sp. to be the harbinger of good fishing: he claimed the gulls are "watching the fish go by." Application of this theory will still require further testing.

Sandpipers and Yellowlegs (Totanus flavipes) appear suddenly on the dike-like tussocks that bisect the knee-deep muskeg so common on those long stretches between river and cliffs. The ground-nesting yellowlegs perform an injured wing display similar to a kildeer; it was not surprising to find their feathers common at Falco eyries. The Arctic tern hovers over its nesting effort on the highest gravel bars, usually where the dirt and vegetation have begun the return amidst the rocks. The nestling we observed was extremely mobile, taken to running at an estimated ten days of age. Terns are very kestrel-like in flight appearance, harassing gulls in a predatory fashion.

HABITAT NOTES

Lower Noatak Canyon

Reports that subsistence hunters had flushed two separate gyrfalcon pairs on or about 1 April 1987 from south-facing cliffs located in lower Noatak Canyon were reviewed for sign of current occupation on 26 June 1987 by helicopter. The area is indeed suitable but requires ground investigation. The cliffs are not located inside NPS boundaries. As high winds buffeted the airship, preventing close access or inspection, we were unable to record any gyrfalcon sightings.

Eli River

The Eli River is located in what we concluded to be ideal habitat for nesting gyrfalcons, with abundant cliff situations in a protected niche east of the Maiyumerak Mountains. Located inside Noatak National Preserve, one historical gyrfalcon nest is known to occur on the Eli, a grey-phase adult pair who had been observed beginning incubation on 7 April 1987 by B. Johnson. We located what we believed to be the nesting cliff, a large cliff structure with southeastern aspects that are protected by a turn of the Eli River. Again, high winds prevented close inspection. Whitewash was obvious at the site. On neighboring Uvgoon Creek, Johnson flushed a white female, grey-phase male gyrfalcon pair from cliffs believed to have been a nesting site in 1985. Overall, we were extremely impressed by the suitability of this terrain for gyrfalcon habitation, and consider it an area due future exploration.

Cape Krusenstern

Historically, Cape Krusenstern National Monument contains two gyrfalcon nesting locations: a coastal nesting pair on a cliff over the lagoon (feeding upon seabirds), and a nesting pair on the only prominent point for ten miles within the Rabbit Creek drainage (Johnson, per. comm.). Helicopter review on 4 July 1987 of the lagoon area did not reveal sign of defensive gyrfalcons, but gyrs are not normally defensive. We did observe nesting rough-legged hawks, ravens, golden eagles, and a ground-nesting merlin with 3 young at 7 to 10 days of age.¹ As this habitat is not considered inside the Noatak Basin, raptor data has not been included in the Tables presented.

1

see Appendix, Red Dog Corridor Report

TABLE 7

1987 BANDING INFORMATION¹

<u>species: gyrfalcon</u>				
<u>band number</u>	<u>date banded</u>	<u>age</u>	<u>sex</u>	<u>condition</u>
877-85129	15 June 87	22 days	F	full crop
877-85128	15 June	21 days	F	full crop
877-85127	15 June	22 days	M	full crop
877-85130	15 June	22 days	M	half-crop
877-85126	16 June	23 days	M	1/4 crop
877-85133	16 June	23 days	F	1/4 crop
877-85134	16 June	22 days	M	1/4 crop

<u>species: peregrine falcon</u> ²				
987-71398	14 July	15 days	M	1/4 crop

¹all birds banded on right leg

²three additional peregrines observed at hatch and therefore unable to band

all peregrine falcon observations are the endangered arctic peregrine, or (Falco peregrinus tundrius).

TABLE8 : Raptors Observed Along the Noatak River (45km--525km) SUMMARY

species	sightings		confirmed eyries/nest		suspected eyries/nest		known total territories		yr	#	age(days)	fledglings observed	date
	1986	1987	86	87	86	87	86	87					
peregrine falcon	4	5	2	2	1	0	3	2	86 87 87	6 1 2+1	7-14 15 hatching	14-17 July 13 July 18 July	
gyrfalcon	2	4	1	2	-	2	1	4	86 87	3 7	42-45 21-24	16 July 15 June	
golden eagle	15	14	1	3	1	2	2	5	86 87	1 3	35 21-25	9 July 15-19 July	
rough-legged hawk	-	11	4	4	1	0	5	4	86 87	9 2	unknown "	13-16 July 23 July	
merlin	0	2	0	1	-	-	0	1					
northern harrier	7	2	-	-	-	-	-	-					
raven	10 nest	8 nest	2	1	-	1	2	2					

confirmed

Young observed in eyrie, or evidence of successful clutching

suspected

whitewash visible on a cliff, of a nature particular to species observed nearby, and/or defensive territorialisations against another raptor in the same area of w/w observed

CONCLUSIONS AND RECOMMENDATIONS

The Significance of the Noatak Biosphere Reserve

First recognized by UNESCO in 1976 and later acknowledged by the U.S. Congress in 1980 (ANILCA), the Noatak Biosphere Reserve contains a significant portion of the environmentally-pristine habitat remaining in the Arctic. As the spring and summer home for the threatened arctic peregrine falcon, the Noatak and Colville Rivers are the primary streams draining arctic interior Alaska. The importance of the Colville River is clear: peregrine falcon use of the Colville has been monitored since the 1950's and annually surveyed since 1979. The discovery of arctic peregrine falcons nesting on the Noatak River in 1985 was first indication of a natural recolonization by the once-endangered species. Studies conducted in 1986 and 1987 indicate a random but stable distribution of this falcon within the Noatak Basin: more data is needed to document new eyries potentially located in adjacent tributary Noatak River habitat.

Alaska remains the only area in the United States with substantial numbers of peregrine falcons breeding in the wild. Surveys completed in 1980 estimated 100 to 125 pairs of F.p. anatum and 45 to 50 pairs of F.p. tundrius within Alaska (Ambrose, 1980). In 1987 125 nesting pairs of anatum successfully raised 255 young; 36 active pairs of tundrius (out of 56 nesting pairs) successfully raised 105 young. Alaskan populations of anatum are now estimated at 175 to 200 pair, with estimates for the tundrius at 75 to 100 nesting pair (Ambrose, per. comm.).¹ There are still new eyries to be discovered if we are to reach estimates of breeding pairs for both subspecies.

The Noatak Biosphere Reserve is a unique home for the gyrfalcon and the migratory arctic peregrine falcon, probably one of the most severely-stressed migratory animals in the world. Traveling as far as 34 degrees south latitude in Argentina (White, 1981), studies of organochlorines in eggs collected from Alaskan tundrius eyries indicate a higher incidence of DDT than their anatum counterparts, with all eggs containing measurable amounts of PCB's, heptachlor epoxide, and dieldrin (Ambrose et al, 1987 in progress). Given these problems, close monitoring of tundrius breeding would appear proper; unfortunately, other demands upon limited arctic resources may threaten nesting opportunities for the tundrius peregrine. Diverse and increasing pressures for resource development of nesting habitats contained within the Arctic National Wildlife Reserve, the National Petroleum Reserve (Colville River location), and local mining projects (Cominco-NANA's Red Dog Mine located west of Noatak National Preserve) make the federally-protected habitat inside the Noatak Biosphere Reserve unique and priceless.

¹ Peregrine Falcon Surveys in Interior & No. Alaska 1987, and Comparisons with Recovery Plan Criteria, Ambrose, USFWS, draft 1988 (in progress).

Disadvantages to raptor studies within the Noatak Biosphere Reserve include the human effort required to survey 6.5 million acres, complete geographic isolation from human use, and the infrequency of known nesting efforts by gyrfalcons and peregrine falcons. As demonstrated in the successes of the 1986 and 1987 raptor surveys, however, the National Park Service has demonstrated its ability to overcome these problems. We now have new information indicating the natural recolonization by the peregrine falcon of historic habitat which was previously unknown for peregrine falcon nesting until 1985. As the Noatak now begins a period of new seasonal tourism (i.e.: kayaking, river-camping), much of this sensitive peregrine habitat will be severely impacted by the well-meaning recreational user. The highly-defensive peregrine will attract attention to nesting locations, prompting eager photographers to climb already-unstable cliffs. Accidental egg breakage by abrupt adult defensive postures, falling rocks, or loss of thermo-regulation to eggs by defending adults will ultimately cause local elimination of peregrine recovery efforts. Hence, identifying and preserving raptor habitat within the Noatak Biosphere Reserve is vital for the long-term National Park Service management of unique arctic resources.

Recommendations include:

- * Continue the raptor survey in 1988 through 1990. This will allow interim and final reports summarizing five years of consecutive field research, and the development of a model detailing the carrying capacity for raptor use within the Noatak Biosphere Reserve.
- * Keep the Noatak River intact as a study unit, using resources from both Gates of the Arctic N.P. and Noatak N.P. to conduct future studies.
- * Videotape raptors and nesting habitat for permanent archives, detailing habitat conditions that are now pristine for later referral.
- * Develop a study and management monitoring program in conjunction with other agencies, including the U.S. Fish & Wildlife Service, UNESCO, and the U.S. Arctic Research Commission.
- * Design program information for dissemination at both interpretive centers for Gates of the Arctic and Noatak National Park/Preserve.

DISCUSSION

Amaral and Gardner (1986) estimated 4 to 6 nesting pairs of peregrine falcons occupy the Noatak River; data over a three year period (since Johnson's first discovery of a peregrine eyrie at Uyon Lakes in 1985) indicates consistent if not scattered occupation of two nesting pairs on the Noatak per year. I agree with Amaral's estimate, concluding more research into adjacent tributary habitat is needed if additional peregrine falcons are to be discovered. I believe the resident gyrfalcon population to be quite larger than the known four territories, and anticipate future discoveries also related to foothill tributary habitat.

A three year extension of the previous two years of field research will provide for a solid base to estimate raptor populations in the Noatak Biosphere Reserve. Development of a raptor habitat capacity model should be possible after five years of consistent research, allowing the National Park Service to provide consistent long-term management of sensitive raptor resources. A study linking seasonal uses of the peregrine falcon, gyrfalcon, and potentially the merlin falcon would provide a wider base of data analysis for organochlorine residues. The Noatak Biosphere Reserve contains significant habitat for long-term baseline raptor research.



ACKNOWLEDGEMENTS

Of ten weeks spent in Alaska, seven were in the Backcountry. 1987 was the first time either I or my partner Randy (Rod) Stadler participated in an arctic field survey; we grew quite familiar with kayak use on the always-changing waters of the Noatak River. I attribute much of the success of the 1987 Raptor Survey to Rod, who was adept in spotting distant raptors, not-so-distant grizzly bears, and provided much of the camp management--all with a smile and good cheer through the sometimes overbearing conditions of rain, mosquitos, and confined quarters.

Brad Johnson is a Kotzebue resident familiar with much of the range of known gyrfalcon and peregrine falcon occupation of the arctic region. He has visited gyrfalcon eyries by plane and snowmachine in the frigid early days of April, when incubation begins. Much of the historical data presented herein may be attributed to personal communications with this personable researcher. Kate Roney, Management Resource Specialist for the NPS, is responsible for original and continued interest in raptor management in this region, provided funding for the expenses of our largely-volunteer effort, and is genuinely interested in the exploration of the Noatak River. Skip Ambrose of the USFWS is a recognized authority on arctic falcon endangered species, providing historical background and encouragement to participate in this study. Judy Liedberg of Gates of the Arctic N.P. is similarly involved in exploration of raptor habitat of the Noatak River, and we appreciate the re-supply at Makpik Cabin in July.

Other Kotzebue residents, including Pauline George, Bobby & Bernadette Lee, and Robert Rawls (and the staff of KOTZ) provided historical background on the Noatak River. Superintendent Ray Bane, Bob Martin, Richard (Capt. Action) Kemp, Bill Roberts, and John St. Germaine provided professional assistance in the transportation of our field studies. Thanks to the NPS Staff and seasonal employees, the Arctic Tours group (Murray, Amy, Wade, & Tracy) for sharing their facilities.

The Kelly Ranger Station, headed by Ranger Mark Holloman, and assisted by Dwayne and Charlene, was the terminus of our float trips, and provided a respite for the "reek brothers". Ranger Dan Stevenson's spring exploration of Trail Creek is a fine example of the work that awaits the future. Thanks also to fellow river rats Al, Wilts, Dave, The doctor, and R.A., who shared the Noatak with us on the second trip. I thank my friends and associates of Raptor Biotics--Bruce Handel, Dean Thompson, and Mark Prostor, for keeping an eye on on-going field projects in my absence, and a final thanks to KVA, for the heart and home.

APPENDIX

FIELD
ADDRESS

APPENDIX A

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30 July 87

RE: Red Dog Corridor monitoring
raptor uses observed 4 July 87

OVERVIEW

Development of an open-pit mining operation adjacent to the northern boundary of the Cape Krusenstern National Monument has created a strip of habitat known as the "Red Dog Corridor" which has come under increased scrutiny by both federal agencies and non-profit organizations observing for impacts upon known raptor nesting habitats. Extensive field and air surveys for nesting raptors have previously examined this area (see Rosenthal et. al), determining locations for all raptors, including any endangered species known nesting inside the Corridor. The NPS/NWA administers the responsibility for the continued monitoring of the Corridor.

METHODS

On 4 July two observers competent in raptor surveys flew by Jet Ranger to the Corridor for six hours of study. Consulting a map of known raptor sites prepared by Kate Roney from historical data, each area was walked by researchers after landing by helicopter nearby. Pilot duties were ably handled by Bill Roberts.

RESULTS Red Dog Corridor (see map)

Merlin (Falco columbarius) one ground-nesting pair 3 young est. 7 days old
1 addled egg (removed)

Rough-legged Hawk (Buteo lagopus) one cliff-nesting pair 3 young est. 14 days old

two unused nests with fresh lining (green) but
minimal whitewash

one sighting of an adult in flight

Gyrfalcons (Falco rusticolus) one active eyrie (suspected) due to typical whitewash pattern beneath protected cliff overhang Young would have fledged shortly if not already

Golden eagle (Aquila chrysaetos) one cliff-nesting pair 1 young in nest est. 21 days

DISCUSSION

Peregrine falcons were not observed this day of field examination; however, suitable riparian habitat was discovered within the Corridor, and historical literature reveals known occupation. Numerous Rough-legged stick nests were commonly observed throughout the study area, as were perching areas utilized by an unknown variety of raptors. A flyby at the Krusenstern Point revealed nesting by ravens and rough-leggeds, but occupation by gyrs at this historic eyrie was not discovered. Upon our return, a golden eagle territory was observed at Jade Creek: 4 nests discovered by researcher Matt Ganley revealed an active nesting effort.

[Handwritten signature]

APPENDIX B

Noatak 87, page 26

WESTERN FOUNDATION OF VERTEBRATE ZOOLOGY EGGSHELL FRAGMENT MEASUREMENTS

Species: FALCO peregrinus ~~caerulescens~~ tundrusDate measured: 21 August By: Sam SumidaWFFVZ Cat: # Other ID: Locality coll: Noatak #2 PF cyneDate coll: 18 July 87 Collector: JA ZAK BALLShell condition: (clean) dirty/cleanedMembrane: absent (present)

THICKNESS

<u>0.233</u>	mm	<u>0.276</u>	mm
<u>0.257</u>	mm	<u>0.257</u>	mm
<u>0.306</u>	mm	<u>0.310</u>	mm
<u>0.235</u>	mm	<u>0.267</u>	mm
<u>0.235</u>	mm	<u>0.310</u>	mm

WITHOUT MEMBRANE Ave 0.269

Species: (as above)Date measured: By: WFFVZ Cat: # Other ID: Locality coll: Date coll: Collector: Shell condition: clean dirty/cleanedMembrane: absent present

THICKNESS

<u>0.329</u>	mm	<u>0.368</u>	mm
<u>0.350</u>	mm	<u>0.330</u>	mm
<u>0.330</u>	mm	<u>0.361</u>	mm
<u>0.363</u>	mm	<u>0.391</u>	mm
<u>0.370</u>	mm	<u>0.384</u>	mm

WITH MEMBRANE Ave 0.358

Species: Date measured: By: WFFVZ Cat: # Other ID: Locality coll: Date coll: Collector: Shell condition: clean dirty/cleanedMembrane: absent present

THICKNESS

<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm

Species: Date measured: By: WFFVZ Cat: # Other ID: Locality coll: Date coll: Collector: Shell condition: clean dirty/cleanedMembrane: absent present

THICKNESS

<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm

Species: Date measured: By: WFFVZ Cat: # Other ID: Locality coll: Date coll: Collector: Shell condition: clean dirty/cleanedMembrane: absent present

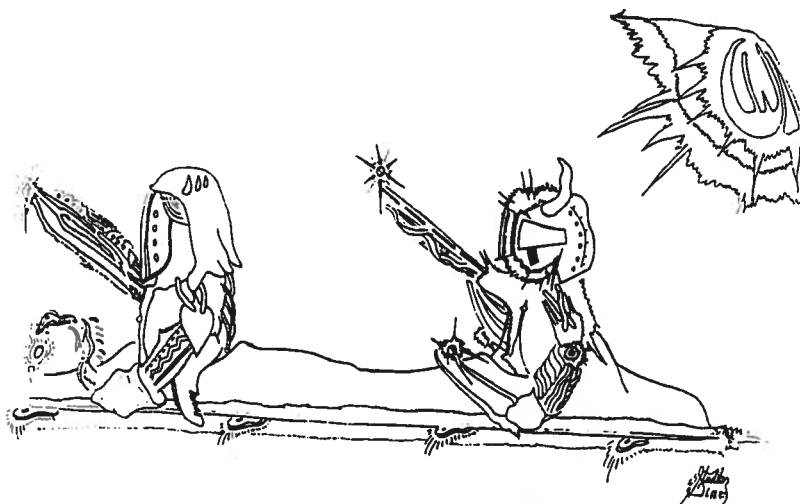
THICKNESS

<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm
<u> </u>	mm	<u> </u>	mm

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24 September 87

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re: 1987 Noatak Raptor Survey

Dear Kate:

Enclosed please find the final draft of my report summarizing field studies on the Noatak for 1987. Randy is still preparing some line drawings of each of the four active Falco eyries we visited, and I hope to include these in the final compilation of the report. Please advise me of any errors or omissions at your earliest convenience.

In July at Makpik Cabin you, Judy Liedberg, and I discussed the future of Noatak raptor surveys, and the importance of this river within the arctic raptor ecosystem. After extensively reviewing the background literature necessary to complete my report, I am even more convinced of the Noatak's importance to future raptor studies; the Colville has been the subject an intensive annual studies since the 1950's and, as a close neighbor to the Noatak only 100 miles north, offers us a tremendous opportunity to observe peregrine recolonization of a possible historic Noatak area. Given the importance of oil and mineral deposits and the volatile nature of international oil imports, it is only a matter of time before the arctic will be explored and harvested in a manner consistent with "national security". Now is the time to document the truly unique raptor features of the Noatak Biosphere Reserve.

A continuation of our study for three years would allow the development of a model identifying the carrying capacity of the Noatak habitat for resident and migratory raptors from consistent data accumulations representing five years of continuous field research. Working closely with you, I am ready to lead this survey into the next phase. If you agree with my analysis of the Noatak River and are desirous to implement these or other recommendations, please advise me of what funding would be available. I will draft a specific study plan based upon that funding amount; I anticipate funding in the neighborhood of \$25,000.00 per year for each of three years would allow two full-time personnel three months of Noatak research, including transportation expenses, fixed-wing surveys, and per diem.

I hope my report exceeds your expectations, and I look foreward to hearing from you soon. As always, thank you for your continued interest and support.

Respectfully,

enc: 1987 report

