

AN INVESTIGATION OF PEREGRINE FALCON  
... ACTIVITY AND HABITAT FOR CLIFF  
NESTING RAPTORS ON THE KUSKOKWIM  
RIVER, MCGRATH TO ANIAK

AN INVESTIGATION OF PEREGRINE  
FALCON (FALCO PEREGRINUS ANATUM)  
ACTIVITY AND HABITAT FOR  
CLIFF NESTING RAPTORS  
ON THE KUSKOKWIM RIVER,  
MCGRATH TO ANIAK

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for  
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## INTRODUCTION

The Kuskokwim River has been suspected as having suitable habitat for the peregrine falcon, Falco peregrinus anatum (Cade 1960). Actual records of peregrines are few however. The early biologist Dice (1920) located only one aerie on the North Fork of the Kuskokwim, although he traveled the river's length to near Bethel. R. E. Wallace's bird list of the central Kuskokwim includes the peregrine, but is not specific as to abundance or location (Cady et al 1955). Gabrielson and Lincoln's text on Birds of Alaska does not make special mention of the peregrine along the Kuskokwim. The optimistic reports of F. C. Hinkley (1900), a biologist on the Spurr expedition, that peregrines were "common all along the Kuskokwim on rugged bluffs", were not referenced by researchers such as Gabrielson and Lincoln (1959) and Cade (1960); we assume that this avoidance might suggest that his observations lacked some reliability. His identification of peregrines as F. p. pealei and other species not known to the area leaves many unanswered questions. More recently Pete Shephard, with the Alaska Department of Fish and Game, McGrath, has identified a few cliffs with peregrine utilization within the entire drainage.

Recognizing this potential we undertook a peregrine and cliff-nesting raptor survey of the Kuskokwim River between McGrath and Aniak. Our investigations were confined to cliffs adjacent to the river.

## STUDY AREA

The study area included a corridor along the Kuskokwim River from McGrath to Aniak of approximately 460 km. The river, meanders slowly through the northeast trending Kuskokwim Mountains, composed chiefly of mesozoic sandstone and shale. This homogeneity of rolling uplands with peaks from 460 m to 610 m is intersected by three lowland provinces (Wahrfatig 1965) covered with quaternary surficial deposits: Tanana-Kuskokwim Lowlands (McGrath to Vinasale Mountain, south side of the river), Holitna Lowland (plains drained by the Stony, Swift and Holitna Rivers, south side of the river from Devil's Elbow to the Holitna River), and the Yukon-Kuskokwim Coastal Lowland (Holokuk west on the south side of the river).

Climatologically the study area is interior or continental near McGrath changing to transition as one proceeds south toward Aniak. The transitional zone is slightly milder and wetter than the continental (Johnson and Hartman 1969).

Floodplains are generally covered with white spruce, Picea glauca, and deciduous trees, especially large poplars, Populus balsamifera. Riparian willow and alder communities are extensive. Alpine tundra is found at approximately 760 m near McGrath and less than 300 m near Aniak. Specifically for this report the cliffs have been grouped into four sections: Section I, McGrath-Swift Fork (composed of cutbanks and talus slopes rarely exceeding 30 m in height), Section II, Swift Fork-Holitna, Northside (cliffs exceed 30 m and include rock outcrops), Section III, Holitna-Crooked Creek Gorge (steep rock outcrops, narrow canyon), and

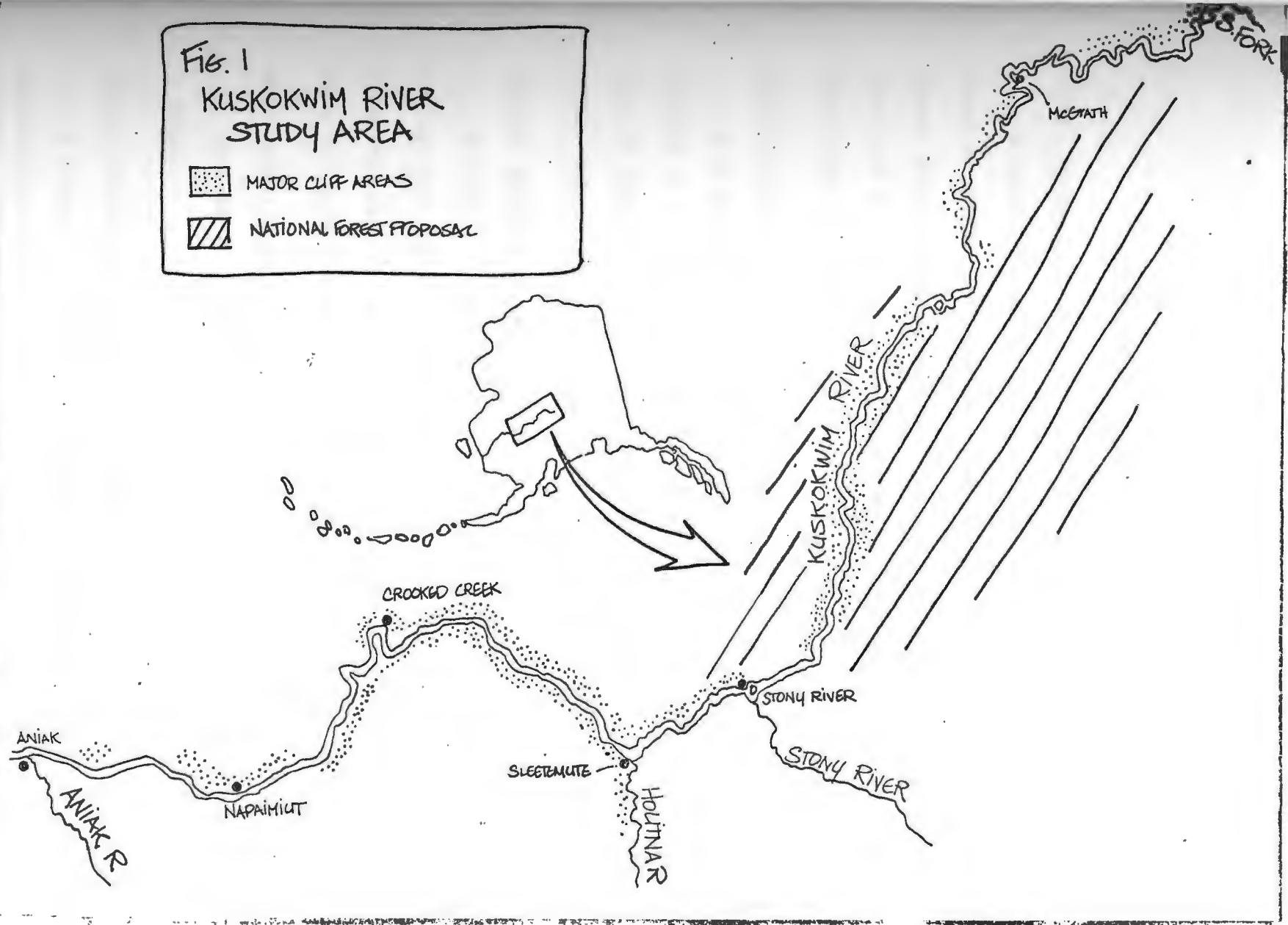
Section IV, Crooked Creek-Aniak, Northside (rock slides and outcrops, some spectacular up to 125 m). Figure 1 maps the study area.

#### METHODS

Using a canoe with a small outboard and towing an avon raft we travelled from McGrath to Aniak between 23 July and 3 August, 1976, occasionally splitting up to float two channels and reduce possibilities of overlooking raptors. Ideally we drifted under all cliffs, stopping to walk or glass them more closely if size or appearance warranted it. Time of observation for cliffs ranged from a cursory overview of less than an hour to the major portion of a day. Raptor observations were mapped on 1:64,000 series topographical maps and keyed in notebooks. Cliffs were described and classified. Residents were contacted regarding their observations. Historic references to raptor nests, especially peregrines, were gathered from the literature and Alaska Department of Fish and Game personnel. Included as appendices are an annotated list of birds seen (Appendix A) and a brief summary of a flight taken over the North Fork of the Kuskokwim in May 1975 (Appendix B).

Fig. 1  
KUSKOKWIM RIVER  
STUDY AREA

- MAJOR CLIFF AREAS
- NATIONAL FOREST PROPOSAL



## RESULTS

Annotated List of Raptor Observations<sup>1</sup>Raven, Corvus corax

Groups of ravens were observed regularly along the Kuskokwim and noted at cliffs at Vinasale Mountain, Devil's Elbow, Swift Fork, Stony River, Willis Creek, Georgetown, Napaimiut and Aniak. Possible nests of the year were located at Devil's Elbow (8), Eight Mile Creek (16), George Creek (20) and Central Creek (23).

Bald Eagle, Haliaeetus leucocephalus

Only two observations of eagles were made. A lone adult was seen perched in a poplar near the confluence of the Swift Fork and the Kuskokwim 26 July. An immature was seen near the Oskawalik cliffs (26) 31 July. Bald eagles are common in the Holitna drainage (Shephard pers. comm.).

Osprey, Pandion haliaetus

Ospreys are regular breeders in the Holitna. Only a single pair of ospreys was seen crossing the Kuskokwim near the Holitna River, 28 July. Recorded nests on the Kuskokwim have included Vinasale Mountain, Swift Fork and near Sleetemute (Alaska Department of Fish and Game Files, Fairbanks).

Marsh Hawk, Circus cyaneus

At least one female marsh hawk was observed downriver from Napaimiut 1 August.

Sharp-shinned hawk, Accipiter striatus

A single sharp-shinned hawk was observed near cliffs above Little Russian Mission on 1 August (31).

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<sup>1</sup> numbers in parentheses refer to cliff numbers listed on Table 1



Goshawk; Accipiter gentilis

Three observations of goshawks were made. An adult was observed crossing the Kuskokwim near the Holitna on 28 July. Another was seen near Willis Creek on 29 July (14). A third was seen flying near Eight Mile (17).

Red-tail and Harlan hawks, Buteo jamaicensis

These buteos were the most common raptor observed. A total of 20 adults and at least 6 fledged young were seen at 17 locations. Most adults were highly vocal and appeared to be nesting. Family groups with fledged young were identified at Tower Bluffs (13), California Creek (19), and Horn Mountain (26). Although these birds were observed near or on cliffs, sticks nests were not observed at these locations. A single nest on the top of a spruce near California Creek was identified on 30 July. A pair of harlan hawks was flushed from a sturdy but inactive stick nest on a low outcrop below the mouth of George Creek, near Steamboat Creek. ~~All red-tail observations have been mapped on the accompanying topographical maps.~~

Roughlegged hawk, Buteo lagopus

Roughlegged hawks were the next most common raptor. At least 14 individuals were identified between Eight Mile Creek and Aniak at five locations. Active nests were located at California Creek (18 and 19), Napaimiut (28) and above Little Russian Mission (29). Four buteos observed at three other locations might also have been roughlegged hawks.

Merlin, Falco columbarius

A single dark merlin was seen on 31 July, beneath the mouth of the Oskawalik River. Remains of passerines were found on the branches of a low spruce at the cliff where the merlin was seen flying.

Peregrine, Falco peregrinus anatum

As many as five individual peregrines were observed. A lone (possibly female) adult was observed below Napaimiut (29). Another single bird was seen at the east end of cliff #31, while a pair and at least one fledged young was identified at the west end of the same cliff series.

Cliff Descriptions

Thirty-four cliffs or cliff series were identified between McGrath and Aniak. All cliffs were adjacent to the Main Fork of the Kuskokwim. Only one cliff was known to have a history of peregrine activity - Vinasale Mountain (2). During our survey peregrines were observed at cliffs #29 and 31. Nearly all cliffs, especially downriver from the Holitna (14 through 34) had some evidence of raptor utilization such as whitewash, stick nests or actual occupation.

Cliffs were evaluated for their potential as substrates for cliff-nesting raptors, especially peregrines. First they were described according to a general class (Hickey 1942): first class corresponding to steep, high cliffs, second class corresponding with medium size cliffs, and third class corresponding with low cliffs and cutbanks. For this report cliffs greater than 50 meters were generally considered first class; those between 25 and 50 meters, second class; and those beneath 25 meters, third class. Descriptions also included height, length, substrate type and exposure.

Two added dimensions are arbitrary additions of the investigators: 1) degree of seclusion (most secluded = high and off the main channel, distant from settlements) and, 2) overall potential for nesting raptors (including characteristics such as ledge potential). Both have been

organized on a scale of one to five, where one equals the greatest potential.

Table 1 includes our descriptions for cliffs between McGrath and Aniak.

Maps locating these cliff sites have been arranged in Appendix C.

TABLE 1.

EVALUATION AND DESCRIPTION OF CLIFFS ON THE  
KUSKOKWIM RIVER BETWEEN MCGRATH AND ANIAK

Cliff No.	Location	Description	Class	Exposure	Degree of Seclusion	Potential	Remarks/Species Utilization
1	T32N; R34W; Sec. 7 23 km downriver from McGrath	1.2 km of low steep rock slides, less than 15 m high	3	E-SE	5	5	No raptor evidence
2	T30N; R34W; Sec. 18 66 km downriver from McGrath	.8 km rubble banks and scattered outcrops 12-30 m	2	W	5	4	Peregrine use 1972
3	T30N; R34W; Sec. 5 68 km downriver from McGrath	4 km fine vertical strata, less than 23 m high	2	W	4	4	Raven
4	T28N; R35W; Sec. 14 2.5 km upriver from Selatna mouth	Ridge of rock rubble in spruce 8 m wide by less than 23 m high	3+	E	5	5	No activity obvious
5	T28N; R36W; Sec. 31 7 km downriver from Selatna mouth	Steep rock bank and talus .4 km long	3+	S	5	5	
6	T28N; R36W; Sec. 4 20 km downriver from Selatna mouth	Less than .8 km rubble cutbanks/ steep rock banks 15 m high	3	E	5	5	Fishwheel/cabin; mentioned bird 24 km downriver
7	R24N; R38W; Sec. 28, 33 13 km upriver from Devil's Elbow	.4 km blocky, rock bank, 15-23 m	2	E	5	4	
8	T24N; R38W Devil's Elbow	1.6 km of talus slopes, rock outcrops less than 50 m high	2+	E	3-5	4+	Whitewash; harlans (1)
9	T21N; R38W; Sec. 4, 5, 8 Across from Swift Fork mouth	2.4 km steep wooded slope with scattered rock high, less than 75 m	(2?)	E-SE	3	3-4?	Did not investigate
10	T20N; R39W; Sec. 14 8.8 km downriver from Swift Fork mouth	4 km of rock faces, scattered outcrops 15-75 m	2	E-SE	4	3	Fishwheel, Family; mention of birds
11	T20N; R20W 13 km downriver from Swift Fork mouth	1.6km wooded slope with scattered rock less than 30m, good outcrops	2	SE	3	4+	Whitewash; fish camp
12	T20N; R41W; Sec. 32 12 km downriver from Stony River mouth	1.6km steep, flakey rock, less than 38 m high	2+	SE	5	5	Whitewash; harlans (1)
13	T19N; R42W; Sec. 30 26 km downriver, Stony River mouth	2.4 km wooded slopes with scattered ridges of rubble 25 m high	2	SE	3	3	Whitewash; harlans (1 & 2)

EVALUATION AND DESCRIPTION OF CLIFFS ON THE  
KUSKOKWIM RIVER BETWEEN MCGRATH AND ANIAK, CONT'D.

Cliff No.	Location	Description	Class	Exposure	Degree of Seclusion	Potential	Remarks/Species Utilization
14	T20N; R45W; Sec. 21 9.5 km downriver from Red Devil	Less than .8 km rock outcrops, 23-46km amidst scree	2-3	S	4	3-4	
15	T20N; R45W; Sec. 19,20 13 km downriver from Red Devil	.4-.8 km , steep rubble and rock, 12-18 m high	3+	S	5	4	Some whitewash
16	T20N; R46W; Sec. 14 16 km downriver from Red Devil	Less than .8 km , rubble/ outcrops, 15-30 m high	2-3	E	5	3	3 stick nests, lots of whitewash; buteo (rough leg?) (1)
17	T20N; R46W; Sec. 4 19 km downriver from Red Devil	1.2 km steep, loose, fragmented rock slopes, less than 30 m high	3+	S	5	4+	Some whitewash, ledges near 700'; (goshawk)
18	T20N; R46W; Sec. 26 22.5 km downriver from Red Devil	Series of outcroppings or steep rocky banks, 8-15 m high	3+	E	5	3	2 stick nests, one active 76; rough legged (1:1m.)
19	T21N; R46W; Sec. 21 27 km downriver from Red Devil	Less than 1.6km, mod. to steep talus, an occasional outcropping, 15-45 m	2+	SW	5	3	Stick nests, whitewash; rough legged (2 + 4)
20	T21N; R46W; Sec. 23 Mouth of George River	Less than .4 km , fragmented, rock banks, 30 m high	2	SE	5	4+	Raven nest; whitewash
21	T21N; R47W; Sec. 31 6.5 km downriver from George River mouth	Less than 2.4 km , forest slopes with large areas of outcropping/scree, less than 90 m high	2+	SE	4	3+	Stick nests; harlans (1)
22	T21N; R47W; Sec. 27 9.5 km downriver from George River mouth	Single bluff 90 m wideby less than 15m high	3+	S	5	4	
23	T21N; R47W; Sec. 12 14.5 km downriver from George River mouth	.8 km rock cliffs, 23-46 m high	2	SE	5	2	Stick nests; buteo (1)
24	T20N; R49W; Sec. 10, 11 24 km downriver from George River mouth	.8 km steep wooded slopes with occasional rock outcrops/scree, less than 60 m high	2+	E	4	4+	Stick nest
25	T20N; R49W; Sec. 4, 9 3.2 km downriver from Crooked Creek	Less than 2.4 km of series of fragmented steep bank interspersed with woods, less than 46 m high	2	E-NE	4	3	Stick nests; buteo (2)

EVALUATION AND DESCRIPTION OF CLIFFS ON THE  
KUSKOKWIM RIVER BETWEEN MCGRATH AND ANIAK, CONT'D.

Cliff No.	Location	Description	Class	Exposure	Degree of Seclusion	Potential	Remarks/Species Utilization
26	T19N; R49W; Sec. 25 17.5 km downriver from Crooked Creek	180 m wide by 23 m high	2	W	3	3	Whitewash; rough legged (2 + 0)
27	T19N; R49W; Sec. 30 4 km downriver from Oskawalick River	.1.6 km of cutbanks, 8-15m high, fragmented rock	3+	E	3	4+	Stick nests
28	T17N; R52W; Sec. 13, 14 3.2 km upriver from Napaimiut	2 sections of cliffs totalling 1.6 km of rock outcrops/steep scree, 15-46 m high	2	S-SE	5	3	Stick nests; whitewash; rough legged (1 + 2):
29	T17N; R53W 9.5 km downriver from Napaimiut	Large rock cliffs, steep, scree, less than .4 km long, 23-90 m high	1	S	3-5	1-2	Stick nests; peregrine (1 adl.); roughleg (1 + 1)
30	T17N; R54W; Sec. 1 21 km downriver from Napaimiut	3.2 km of cutbanks, rock outcrops, steep slopes, 15-23 m high	3+	S	5	4	Whitewash; harlans (1); "mines"
31	T17N; R54W; Sec. 3 .24 km downriver from Napaimiut	1.6km steep cliff/scree, 15-46 m high	2	S	5	3-4	A few ledges; peregrine (2 + 1) (Perhaps 1 pere. +)
32	T17N; R54W; Sec. 9 25.5 km downriver from Napaimiut	Less than .8 km fragmented rock cliffs, less than 30 m high	2	S	5	3+	
33	T17N; R54W; Sec. 8 27.5 km downriver from Napaimiut	Less than .4 km rock outcrops/steep scree, less than 30 m high	2	S	3	3+	
34	T17N; R56W; Sec. 4, 5 5 km upriver from Aniak	Less than 1.2 km steep rock cliffs, outcrops, less than 38 m high	2	S	5	3?	Did not investigate; raptor screaming (?)

NUMBERS IN PARENTHESES REFER TO NUMBER OF PARTICULAR SPECIES SEEN; 1<sup>ST</sup> NUMERAL = ADULT, 2<sup>ND</sup> = IMMATURE

## DISCUSSION

## Peregrine Nesting Potential

It is very likely that the upper and middle Kuskokwim, between McGrath and Aniak never supported a large population of peregrine falcons. All historical references but one (Hinkley 1900) support this hypothesis. Cliffs are noticeably limited in size and number on the Main Fork of the Kuskokwim downriver from McGrath to the Kuskokwim's junction with the Swift Fork. Cliffs and associated raptor utilization of those cliffs increases downriver from approximately Stony River. The bluff series which seem to have the most potential extend from near Crooked Creek downriver to slightly below Aniak. This small section seems the most suitable for peregrines and all observations of falcons were made there. Moreover, cliff dimensions, stability of cliffs and prey habitat appeared to be improved over the remainder of the river surveyed.

For comparative purposes most of our study area can be compared to portions of the Yukon drainage which are well known for their peregrine values. Section I, with its cutbanks and isolated cliffs, cannot be compared with the Yukon satisfactorily. Cliff sections II and III, however are similar to that part of the Yukon between Stevens Village and Tanana described in White (1974) and Haugh and Halperin (1976). Both areas are narrow and defined. Physiographically the same, the Yukon section has supported up to six pairs of peregrines, producing over 1.5 young per pair (Ambrose, unpubl. notes), while the peregrine was absent from the similar stretch of the Kuskokwim during our survey. In view of the fact that those birds on the Yukon are on high, secluded and even the back side of bluffs, and given the low and exposed nature of the Kuskokwim bluffs, the absence of

birds on this portion of the Kuskokwim is understandable. River traffic is high on both the Yukon and Kuskokwim in these areas.

The lowest section, IV, from Crooked Creek to near Aniak (we did not survey the distance this series extends below Aniak) is similar to that part of the upper Yukon described in a number of papers, notably Cade (1960), from Tacoma Bluffs to Circle on the Yukon. The bluffs are similar in size and number; on both river sections, bluffs border the north bank, while the south side is covered with floodplain habitat, and likely areas of high prey densities. Likewise peregrine aeries have been located on both of these river sections.

There are, however, many physical and biological differences between the upper Yukon and the study area which might affect the potential for peregrine nesting; some are subtle and others distinct. Many are directly related to climatic differences. The mid to lower Kuskokwim is influenced by the transition zone; the Yukon is dominated by the more extreme, dry continental climatic zone. Table 2 lists some of these differences.

Biological and consequently cultural differences also distinguish two environments. Most of the Yukon floodplains are a mosaic of spruce-deciduous woodlands, interspersed with broad tussock muskeg and ponds. Waterfowl densities are similar to the productive Yukon Flats. Due to a milder climate, more sporadic permafrost, and physical features of the Kuskokwim valley, its floodplain is covered with a more homogenous spruce canopy and fewer ponds and lakes; waterfowl densities probably reflect this habitat difference.

Secondly, although both rivers have experienced a multitude of impacts by man, cultural and developmental differences exist. Prior to white inroads



Table 2. A Comparison of Selected Climatic Features of the Upper Yukon River and the Kuskokwim Study Area

	Upper Yukon	Study Area
wet days ( 2.5 mm prec.)	30-40 days	40-60 days
total precipitation	21-31 cm	41-62 cm
mean July minimum temp.	8-9° C	8-9° C
mean July maximum temp.	22-23° C	19-20° C
mean annual temp.	-8 to -5° C	-4 to -1° C
seasonal lag	18-21 days	21-26 days

source: Johnson and Hartman 1969

for mining, trapping, and trading, both rivers had sparse native populations. The upper Yukon supported small villages before the gold rush (Osgood 1971). Likewise members of expeditions on the Kuskokwim mentioned the scarcity of inhabitants, especially in the upper reaches (Spurr 1900; Gordon 1912). Gold rushes brought thousands of miners to these drainages accompanied by steamboats, forest fires and market hunters. Yet even with these impacts a biological investigation reported a peregrine falcon population more dense than that found in recent years along the Yukon River (Osgood and Bishop 1900). Coincidentally this was in the same period that Hinkley noted peregrines as common along the Kuskokwim River (1900).

Today the upper Yukon has reverted to its premining human occupation, although recreational use is increasing. The Kuskokwim population, on the other hand has increased significantly. Settlements and small communities upriver from Aniak are developing. Few cliffs on sections II, III, and IV are distant from fishwheels, houses and river traffic.

Finally, a particularly discouraging feature of human use on the Kuskokwim there is the evidence of conflicts with raptors. Four examples from 1976 are probably not exceptions:

- 1) a resident mentioned shooting at a bird which stooped and screamed at her, while she stopped beneath a cliff to have tea.
- 2) a resident mentioned that "short-necked" birds had nested on the cliffs behind his home, until he took up residence there.
- 3) discharged shotgun shells beneath a roughlegged hawk nest.
- 4) and an empty box of 30-06 shells directly above the one active peregrine aerie located.

Developments adjacent to higher classed cliffs near Aniak might be the greatest factor in realizing peregrine potential there.

## SUMMARY AND CONCLUSIONS

The Kuskokwim, often regarded as having suitable habitat for peregrines, was investigated from 23 July to 3 August, 1976. This extensive survey of 452 km of river gathered the following data:

1) presence of 34 cliffs, cutbanks and bluffs adjacent to the river, at least marginally available for cliff nesting raptors.

2) location of cliff nesting raptors including at least 14 roughlegged hawks at five cliffs (possibly 18 at 8 sites), at least four peregrines at two locations (possibly five at two sites), and at least 26 red-tailed or harlan <sup>W</sup> hawks on, or more typically, near these cliffs and adjacent river banks,

3) cliff series separated into four sections based on physiography and nesting potential:

Section I - McGrath to Swift Fork, 197 km, 9 low cliffs and cutbanks, generally low for cliff nesters; at least 4 cliffs with moderate potential; Vinasale Mountain (2) used previously by peregrines,

Section II - Swift Fork to Holitna, 69 km, 5 cliffs, moderate potential for cliff nesters,

Section III - Holitna to Crooked Creek, 84 km, 10 cliffs with moderate to good potential for cliff nesters,

Section IV - Crooked Creek to Aniak, 108 km, 10 cliffs with moderate to excellent potential for cliff nesters; 4+ peregrines located here.

4) overall, cliff habitat is available, but this habitat is probably much more restricted than other productive interior drainages such as the upper Yukon River.

upper Yukon River.

5) furthermore, the potential might be limited by other physical and biological factors including:

- a. climatic differences
- b. vegetational, and consequently, prey abundance differences
- c. increased human use and possible harassment.

6) tributaries of the Kuskokwim might hold more potential than the Main Kuskokwim.

Finally a more intensive survey from the onset of breeding, especially from slightly below Aniak upriver to the Holitna, and selected tributaries, would permit one to evaluate the Kuskokwim's potential more completely.

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## APPENDIX A

Annotated Bird List from the Kuskokwim River, 1976Red-throated loon, Gavia stellata

At least three of this species was identified on the Kuskokwim River near McGrath; another loon seen flying near Aniak was probably this species observed near McGrath, 23 July.

Unidentified Loons, Gavia sp.

On at least one other occasion members of our party observed loons flying at a distance which could have been the above or probably the Arctic loon, Gavia arctica.

Horned grebe, Podiceps auritus

A single bird of this species was observed on the Kuskokwim River near the village of Crooked Creek on 31 July; it was swimming with a small group of surf scoters.

White-fronted goose, Anser albifrons

Sightings of small groups of four to seven geese occurred between McGrath and Stony River, 22 to 25 of July.

Canada goose, Branta canadensis

No positive identifications of Canada geese were made; observations of distant flocks near McGrath, might have included this species

Mallard, Anas platyrhynchos

A single female mallard was observed on 28 July, swimming on the Kuskokwim River beneath the Holitna River.

Pintail, Anas acuta

A single female of this species was seen flying near Willis Creek on the 28 of July.

Green-winged teal, Anas crecca

Four female plumaged teal were seen near Beaver Creek on the Kuskokwim River, 23 July.

Wigeon, Anas americana

Two male wigeon were observed in a slough of the Kuskokwim, above little Russian Mission, 1 August.

Bufflehead, Bucephala albeola

Two male plumaged birds identified slightly upriver from Napaimiut on the Kuskokwim, 31 July; another group of 10+ ducks flying near Vinasale Mountain, 23 July, could also have been this species:

White-winged scoter, Melanitta deglandi

A single male of this species was noted downriver from Sterlings Landing 23 July.

Surf scoters, Melanitta perspicillata

Only one group of five scoters was recorded near Crooked Creek, in association with a horned grebe, 31 July.

Red-breasted merganser, Mergus serrator

Two birds of this species were first seen near Beaver Creek, on the upper Kuskokwim, 23 July; two others were observed near the mouth of the Holitna River 27 July.

Goshawk, Accipiter gentilis

Three adult goshawks were observed between the Holitna River and George Creek on the Kuskokwim: one each at the Holitna River, 28 July, Willis Creek, 29 July, and near 8 Mile, 29 July. All were seen flying adjacent to the river, near heavily wooded banks.

Sharp-shinned hawk, Accipiter striatus

A single hawk of this species was seen darting in and out of birch spruce woods at the top of a cliff above Little Russian Mission, 1 August.

Red-tail and Harlan Hawks, Buteo jamaicensis

Twenty-six buteos mostly described as dark or mottled birds without red tails were observed at seventeen locations along the Kuskokwim; many appeared to be nesting; six of the above total were identified as fledged birds of the year (see Results)

Roughleg hawk, Buteo lagopus

At least fourteen roughlegs (six adults and eight young) were observed at five locations beneath the Holitna River and above Aniak (see Results) between 30 July and 1 August.

Bald eagle, Haliaeetus leucocephalus

A single adult was observed 26 July perched in a poplar near the mouth of the Swift Fork; one immature, heavily mottled, was noted near the mouth of the Oskawalik River 31 July.

Marsh Hawk, Circus cyaneus

At least one female of this species was observed crossing the Kuskokwim beneath Napaimiut 1 August.

Osprey, Pandion haliaetus

Two or three ospreys were seen flying across the Kuskokwim and up the Holitna River 28 July; birds were harrassed by ravens.

Peregrine falcon, Falco peregrinus

Four and possibly five falcons were observed between Napaimiut and Aniak on the 1 August. A pair and one fledged young were present near and above Little Russian Mission and a single adult was observed halfway between Napaimiut and Little Russian Mission. A fifth bird seen was an adult and might have been a member of the pair described above.

Merlin, Falco columbarius

a lone individual was observed beneath the Oskawalik river mouth 31 July, adjacent to wooded banks.

Sandhill Crane, Grus canadensis

At least two adults were observed 25 July on the banks of the Kuskokwim near Deacon's Landing; other cranes were heard the evening of the 24 July.



Semipalmated plover, Charadrius semipalmatus

Fairly common on islands along the river; adult and three day old young were seen on a sandy island near Napaimiut, 31 July.

Semipalmated sandpiper, Calidris pusillus

small flocks of five to 20 of this species were observed feeding on mud banks beneath Deacons Landing; some of these peeps could have been western sandpipers, Calidris mauri; one member of our party was quite sure westerns were present.

Greater yellowlegs, Tringa melanoleuca

A total of five yellowleg sightings were made between McGrath and Aniak; the first two were unidentified as to greater or lesser and seen at a distance; the remaining three, one at Devils Elbow and two at Napaimiut were of the greater variety, 26 July and 31 July.

Spotted sandpiper, Actitis macularia

Spotted sandpipers were the most obvious and common shorebird, seen daily at nearly all suitable sandbars and banks; downy, partly feathered young were observed at devils elbow, 26 July, and near Napaimiut, 1 August.

Glaucous winged gull, Larus glaucescens

A lone g.w. gull adult was seen in McGrath 22 July; a flock of thirteen g.w. gulls was observed on the Kuskokwim upriver from the mouth of the Oskawalik 31 July; many of these were in various immature plumages; a single adult was also observed near Aniak, 1 August.

Herring gull, Larus argentatus

Herring gulls were seen at four locations along the Kuskokwim including Beaver Creek, 23 July, Black River 24 July, Deacon's Landing, 25 July, and a pair at Willis Creek, 28 July. All were seen associated with gravel to rubble bars.

Mew gull, Larus canus

Lone mew gulls were noted at Beaver Creek, 23 July, Deacon's Landing, 25 July, Crooked Creek, 31 July and at Aniak, 2 August.

Arctic tern, Sterna paradisaea

Arctic terns were regularly seen or heard the entire length of the river between McGrath and Aniak, but were most common between McGrath and the Holitna River mouth. More than 35 terns were observed in groups ranging from 4-10+; immatures were present.

Great Horned Owl, Bubo virginianus

Three large owls, all probably B. virginianus were seen on the Kuskokwim. One each at Stony River, 27 July, near Steamboat Creek, 30 July and five miles downriver from Steamboat, 30 July.

Belted kingfisher, Megaceryle alcyon

Occasionally seen or heard along the river including near McGrath, 23 July, Devils Elbow, 26 July, mouth of the Holitna, 28 of July, and Steamboat Creek, 30 July.

Woodpecker, genus and species unknown

Only one woodpecker was heard in a large poplar stand near Devils Elbow, 26 July.

Olive sided flycatcher, Nuttallornis borealis

A single individual of this species was observed feeding near the cliffs by Eight Mile, 29 July. Spruce and willow vegetation predominated.

Trail's flycatcher, Epidomax traillii

Occasionally heard adjacent to the river in willow flats and sloughs downriver to the mouth of the Holitna.

Violet green swallows, Tachycineta thalassina

First observed near the cliffs by Deacons Landing 25 July, then again on cliffs near the Stony River, Swift Fork, Napaimiut and Aniak; seemed fairly common.

Bank swallow, Riparia riparia

The most common swallow and one of the most common bird species, seen wherever there was a mud bank, between McGrath and Aniak; most common between McGrath and the Swift Fork.

Tree swallow, Iridoprocne bicolor

Probably missed, since only one possible identification was made Sleetemute, 28 July; bird houses constructed at Stony River and Sleetemute were probably for this species.

Gray jay, Perisoreus canadensis

Seen or heard only a few times; did not seem to be as common as it is on the Tanana and Yukon Rivers. Seen at Beaver Creek, 23 July, Deacons Landing, 25 July, Willis Creek, 29 July, and Crooked Creek, 31 July.

Common raven, Corvus corax

Regularly seen in close association with fish camps and cliffs from McGrath to Aniak; nests of the year located (see Results); At least twenty-five ravens seen along this section of the river.

Black-capped chickadee, Parus atricapillus

A single observation of this species was made in willows and poplar on a small island across from Aniak, 2 August; chickadees were regularly heard in spruce near cliffs, and these were probably boreal chickadees, Parus hudsonicus.

Robin, Turdus migratorius

Robins were not heard or seen more than three separate occasions; the only sighting from the notes of Bob Ritchie occurred at Beaver Creek in a spruce stand, 23 July.

Varied thrush, Ixoreus naevius

A single varied thrush was observed near a cliff by Devils Elbow, 26 July; singing birds were encountered occasionally between Devils Elbow and Napaimiut.

Swainson's Thrush, Catharsis ustulatus

One individual was heard on 26 July in spruce adjacent to the Kuskokwim River at Devil's Elbow.

Gray-cheeked thrush, Catharsis minimus

Observed at two locations near Eight Mile, 29 July; feeding on ground amongst small birch at base of cliff faces.

Ruby-crowned kinglet, Regulus calendula

Four seen feeding in spruce near Devil's Elbow 26 of July.

Water pipit, Anthus spinoletta

Four observed on a sand bar near Willis Creek, 29 July; at least three appeared to be immature birds.

Bohemian waxwing, Bombycilla garrulus

Ten seen crossing the Kuskokwim just below McGrath on 23 July; flying into black spruce-tamarack bog.

Northern shrike, Lanius excubitor

At least two immature plumaged birds observed on a poplar covered island above California Creek on the Kuskokwim 30 July.

Orange-crowned warbler, Vermivora celata

Heard only once on the Kuskokwim in willow covered banks near the Swift Fork, 27 July.

Yellow Warbler, Dendroica petechia

Heard occasionally on willow covered islands, but only observed twice; once near McGrath, 23 July, and a few (5+) were noted near Aniak feeding in willows, 2 August.

Yellow-rumped warbler, Dendroica coronata

Two were seen near Devil's Elbow in a mature spruce grove adjacent to cliffs, 26 July.

Northern water thrush, Seiurus noveboracensis

Individual birds were seen at Willis Creek, 28 July and a second near the Oskawalik River mouth 31 July.

Rusty blackbird, Euphagus carolinus

One flock of 15+ in willows and equisetum were recorded near Willis Creek 29 July.

Pine Grosbeak, Pinicola enucleator

One male seen 24 July in spruce woods on steep bank near Nunivak Bar, Kuskokwim River; heard singing on two other locations near cliffs by Little Russian Mission, 1 August.

Redpolls, Acanthis spp.

Frequently heard or seen flying over river between McGrath and Aniak on the Kuskokwim.

Dark-eyed junco, Junco hyemalis

Once seen near Vinasale Mountain, 24 July, then common on cliffs beneath the Holitna River.

White-crowned sparrow, Zonotrichia leucophrys

Occasionally heard and seen on willow bars and the river edge between McGrath and Aniak.

Fox sparrow, Passerella iliaca

A single bird was noted 28 July, near grassy areas by Sleetemute.

Savannah sparrow, Passerculus sandwichensis

Observed once near Willis Creek, 29 July, and once near Aniak; both instances birds were in thick willows.

## APPENDIX B

Flight Survey of the North Fork of the Kuskokwim River

Date: May 1975

Observer: Bob Ritchie

Flew from Minchumina down North Fork of the Kuskokwim. No raptors observed. However six series of cliffs noted. Two bluffs noted beneath Medfra on the Kuskokwim. A third approximately 80 km upriver from Medfra on the North Fork (long slope greater than 5 km long on the south side of the river). Three remaining cliffs off river, one to five miles in the mid North Fork; all are on the north side of the river.

## APPENDIX C

Mapping of Cliffs between McGrath and Aniak

All cliffs described in the text of this report and listed in Table 1 (pp.9-11) are located on the following excerpts from 1:250,000 topographical maps (portions of U.S.G.S. quadrangles, McGrath, Sleetemute, Iditarod and Aniak). They are organized in the order that cliffs appear downstream from McGrath (that is the first page represents that portion of the McGrath quadrangle in the study area); north is distinguished on each map page.

The following scale applies to each map page.



