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Peregrine falcon status and prey and obs

PEREGRINE FALCON STATUS AND PREY, AND OBSERVATIONS OF OTHER
RAPTORS ON THE MIDDLE AND LOWER YUKON RIVER, ALASKA, 1981

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Fairbanks, Alaska

October 1981

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BUREAU OF LAND
MANAGEMENT
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Prepared for the U.S. Fish and Wildlife Service
Office of Endangered Species
Anchorage, Alaska
Contract Number: 14-16-0007-81-5207

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INTRODUCTION AND OBJECTIVES

In 1979 the U.S. Fish and Wildlife Service initiated a population survey and banding of nestlings program for the endangered peregrine falcon, Falco peregrinus anatum, and F. p. tundrius, on the Yukon, Porcupine, and Colville Rivers in Alaska. Goals of the banding program are to learn about peregrine falcon migration patterns and to determine wintering areas. The wintering grounds are likely a major source of pesticide contamination for Alaska breeding peregrines and little is known of their location and the intensity of toxic chemical use in their vicinity. Current information on population sizes, productivity, and distribution are needed to reveal the welfare of the species and indicate whether or not any management techniques are necessary. At present the middle and lower Yukon River contains one of the largest nesting concentrations of F. p. anatum known in North America, and as such this area is important in helping to insure the continued survival of the species.

This paper reports results of activities on the middle and lower Yukon River, Alaska, during 1981. Pertinent previous reports include: White (1974), Haugh and Halperin (1976), and Springer et al. (1979a, 1979b), and Roseneau et al. (1980).

Objectives of the study were to:

- 1) determine numbers, locations, and productivity of nesting peregrine falcons on the middle and lower Yukon River
- 2) determine numbers and locations of non-nesting peregrines
- 3) band nestling peregrines

- 4) record sightings and nests of other raptor species
- 5) determine peregrine food habits through analysis of collected prey remains and castings
- 6) collect addled eggs and eggshell fragments for pollutant analysis and measurement of shell thickness
- 7) collect 1.5 cm of a fourth or fifth secondary feather from peregrine nestlings for heavy metals analysis
- 8) do all of the above with as little disturbance as possible to individual raptors

STUDY AREA

Surveys were conducted along the Yukon River in Alaska between Stevens Village (66°03' N, 149°20' W) and St. Marys (62°00' N, 162°20' W), a distance of 1200 km by boat. The section designated "middle Yukon River" extends 189 km between Stevens Village and Tanana. The "lower Yukon River" section extends 760 km between Ruby and St. Marys (Figure 1). The Yukon River study area (main channel) varies from 0.5 to 5 km wide and lies entirely within the boreal forest. The numerous riparian cliffs are mostly sedimentary with conglomerate and granite formations occurring less frequently.

METHODS

Two survey trips, 1-14 June and 1-20 July, were conducted along the middle and lower Yukon River in 1981, using a five meter long inflatable

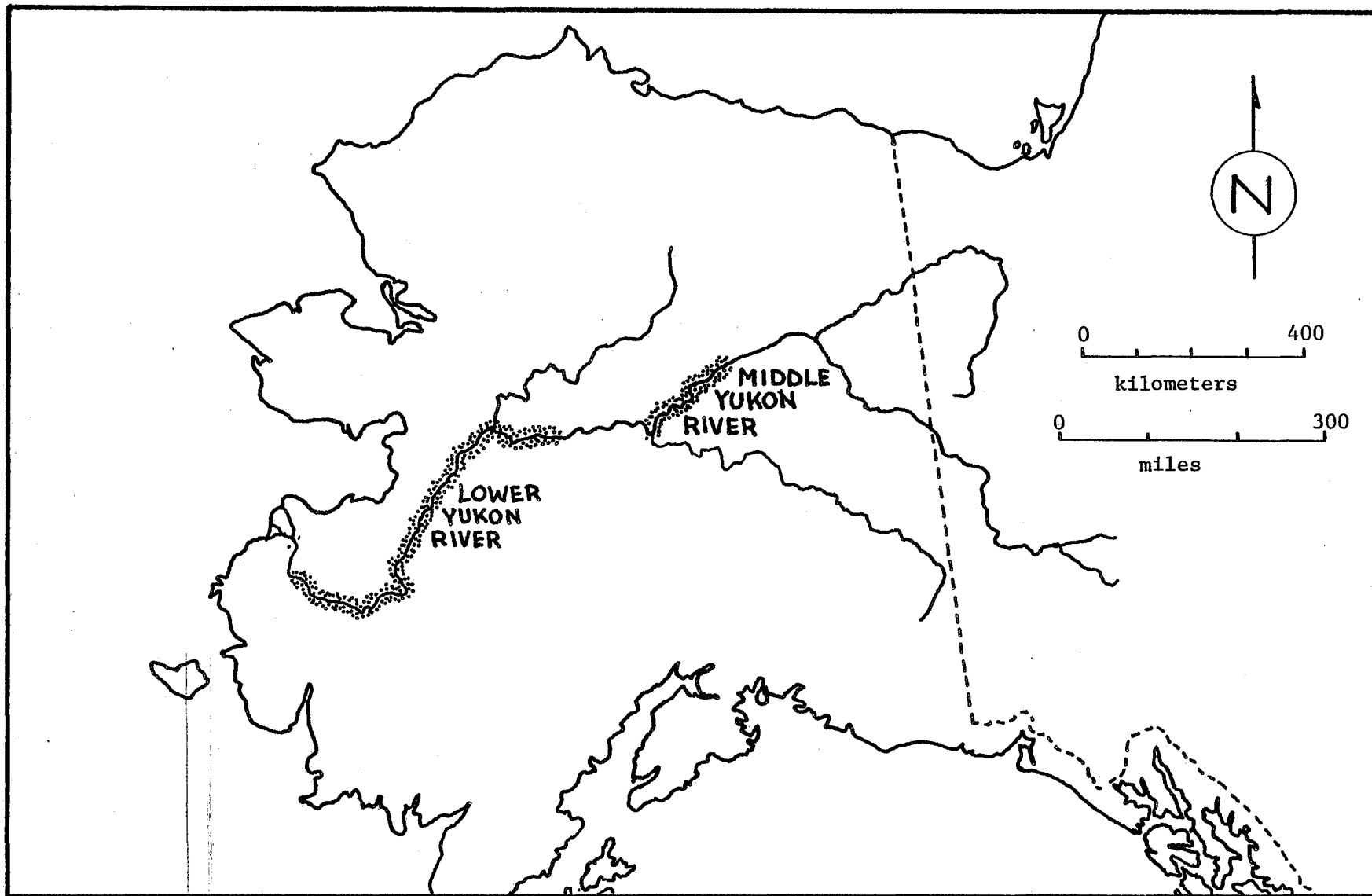


Figure 1. Study area map showing lower and middle Yukon River, Alaska, sections surveyed for nesting peregrines in 1981.

raft with a 35 horsepower motor. During the first trip we determined the number of peregrine falcon pairs and singles present, and location of occupied sites. To minimize disturbance, we left an area as soon as it was determined an active peregrine site. We drifted past each cliff encountered along the river while watching for perched or flying raptors, potential nest ledges or stick nests, and surfaces with an accumulation of bird excrement. This was repeated three or four times if no peregrines were located. Frequently, one or more observers walked along the base of the cliffs while others drifted by. When no peregrines were seen during the boat or walk passes at particularly promising sites, or at sites that had been active in the recent past, we waited and observed in the area for times varying from 30 minutes to four hours. We climbed to check previously known nest sites where possible. Binoculars and spotting scopes were used throughout.

During the second trip we looked for changes in the abundance and distribution of peregrines, using the same procedure described above, and banded nestlings. Climbing ropes (45 m long, 11 mm diameter) and ascenders were used where necessary to access nest ledges. Ledges were approached slowly to avoid startling nestlings, and addled eggs and eggshell fragments were searched for and collected first. Eggs and eggshell fragments were sent to Patuxent Wildlife Research Center in Maryland for analysis. Nestling peregrines were banded with size 7A, lock-on, aluminum U.S. Fish and Wildlife Service leg bands. The distal 1.5 cm of a fourth or fifth secondary feather was clipped from nestlings for heavy metals analysis. Nestling ages were estimated based on feather development and size.

All raptor nests and sightings were plotted on a 1:250,000 USGS topographic maps. Numbers for the cliffs follow those established by Springer et al. (1979a). U.S. Fish and Wildlife Service "Raptor Nest Record" forms and Banding Schedules have been completed and are submitted with this report.

Prey remains and castings were collected from the vicinity of nest ledges and feeding perches. Prey remains were identified by comparison with feathers, feet, beaks, and bones of known origin, museum skins (University of Alaska, Fairbanks, Oregon State University, Corvallis), photographs, drawings, and measurements (Godfrey 1966). Castings were pulled apart and visual estimates of percent hair and percent feathers were made. Prey species identified from castings were tabulated with the total findings from a nest only if they represented a new species or an additional individual.

RESULTS AND DISCUSSION

Middle Yukon River

On the middle Yukon River in 1981 seven cliff sites were occupied by peregrines, six by adult pairs and one by a lone adult (Table 1). Four pairs (66.6% of total pairs) were successful, raising a total of 14 young, for an average brood size of 3.5 young (Table 2).

Thirteen adults present in 1981 represent an increase of one over previous highs of 12 adults in 1980 (Roseneau et al. 1980) and 1976 (Haugh and Halperin 1976). Fourteen young observed is an increase of

Table 1. Peregrine falcon site occupancy and brood size along the middle Yukon River, between Stevens Village and Tanana, Alaska, 1981.

Location	Adults	Young	Remarks
MY2	2	0	
MY5	2	3	
MY6	1	0	
MY8	2	4	
MY12	2	4	4 eggs in nest on first trip
MY13	2	0	
MY16	2	3	
Total	13	14	All 14 young were leg-banded

Table 2. Number of peregrine falcon pairs and productivity on the middle Yukon River, between Stevens Village and Tanana, Alaska; recent history.

Year	1974 ¹	1975 ²	1976 ³	1979 ⁴	1980 ⁵	1981
Total number of pairs	5-6	3	6	3	6	6
Lone adults	0	1	0	1	0	1
Number of pairs with young	2	3	4	1	4	4
Total number of young observed	3	7	9	1	11	14
Young observed per pair	0.5-0.6	2.33	1.50	0.33	1.83	2.33
Young observed per breeding pair	1.50	2.33	2.25	1.00	2.75	3.50

¹White (1974)

²Haugh and Halperin (1976), Ambrose (pers. comm.)

³Haugh and Halperin (1976)

⁴Springer et al. (1979b)

⁵Roseneau et al. (1980)

three over 1980, 13 over 1979, five over 1976 and seven over 1975 (see Table 2 for references). The increase in number of young for 1981 in comparison with 1976 and 1980 is the result of larger brood sizes rather than more breeding pairs, as four pair raised young during each of these three years. All 14 young were banded on the middle Yukon River in 1981.

Density of occupied sites between cliffs MY1 and MY16 averaged one per 25.6 km of river, and was less than that found on the lower Yukon River. This difference does not appear related to availability of cliff sites as unused sites were distributed throughout each river section. Three sites on the middle Yukon have been occupied during each of the six years (1974-1976, 1979-1981) for which data is available. Two sites have been occupied only during 1980 and 1981, and one site which was occupied for the first time in 1981 was unsuccessful.

Lower Yukon River

On the lower Yukon River in 1981, 43 cliff sites were occupied by peregrines, 34 by adult pairs, eight by lone adults, and one by a pair including an immature (brown plumaged) bird (Table 3). Twenty-four pair (68.6% of total pairs) raised 68 young, for an average brood size of 2.83 young (Table 4). Sixty-seven young were banded on the lower Yukon River in 1981. The single young not banded was a fledgling.

Number of adults seen increased for the fourth consecutive year. However, percentage of total pairs observed with live young decreased 11% from 1980. This was balanced by a slightly larger average brood size in 1981. Total numbers of young observed for 1981 and 1980 differed

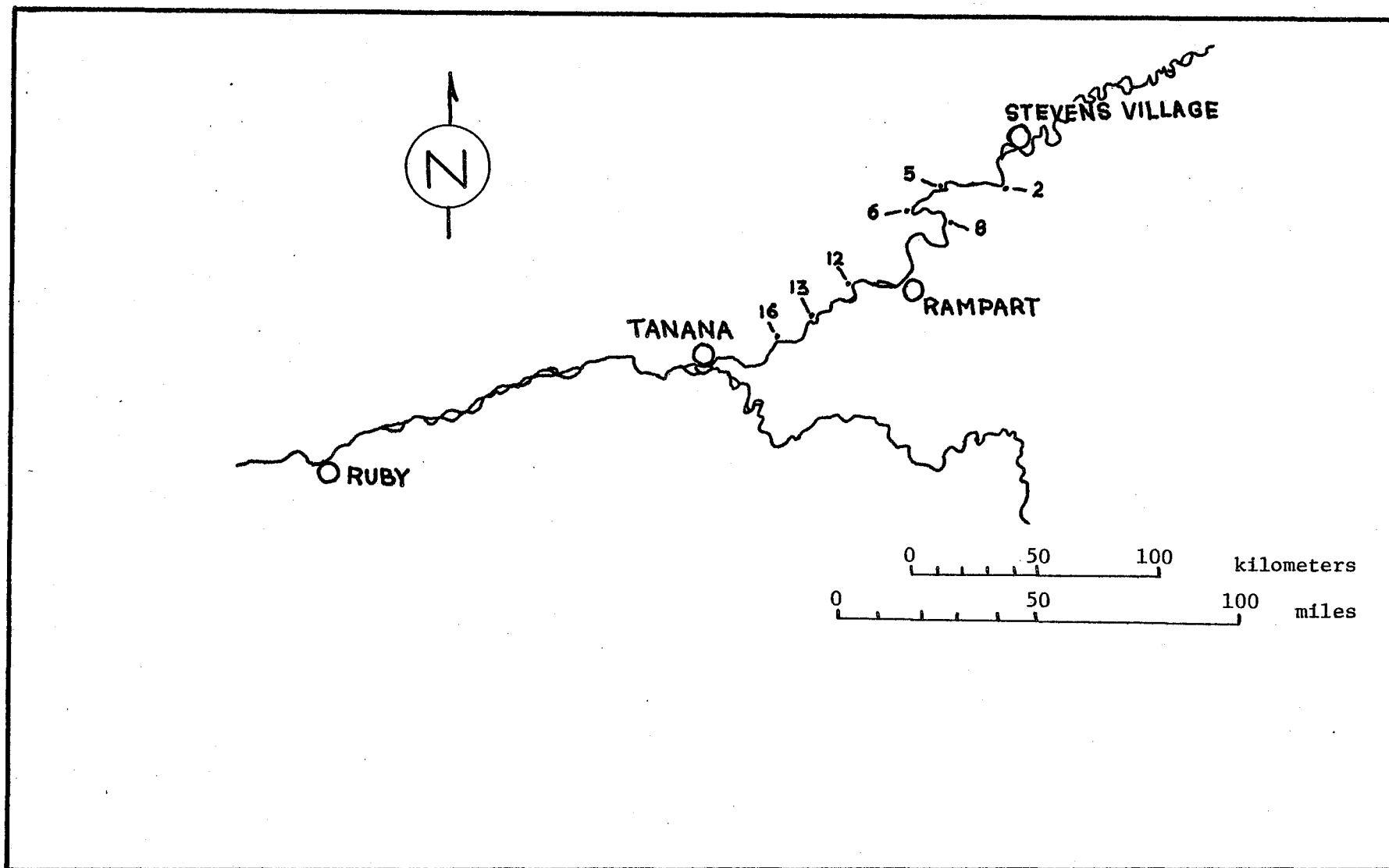


Figure 2. Map showing sites occupied by peregrines along the middle Yukon River, Alaska, 1981.

Table 3. Peregrine falcon site occupancy and brood size along the lower Yukon River, between Ruby and St. Marys, Alaska, 1981.

Site Number	Adults	Young	Remarks
LY2	2	0	P. Bente (pers. comm.) saw both adults; we saw only one
LY3.1	1	0	
LY3.3	2	3	
LY4	2	2	
LY6	1	0	
LY6.1	2	0	
LY7	1	0	
LY8	2	3	
LY10	2	3	
LY11	2	4	
LY12	1	0	
LY12.1	1	0	
LY12.2	2	1	2 eggs in nest on first trip
LY13	2	4	
LY14	2	3	
LY14.2	2	4	
LY15	2	3	
LY16	2	0	
LY17	2	0	
LY18	2	0	
LY18.1	2	0	
LY19	2	0	
LY21.1	2	4	
LY22.1	2	3	
LY25	2	4	
LY26	2	0	P. Bente (pers. comm.) saw both adults; we saw only one
LY27	2	1	2 addled eggs collected
LY28	2	3	1 addled egg collected
LY29	2	1	young found at base of cliff
LY30	2	1	1 live and 1 dead young found at base of cliff
LY31	2	1	1 live young in nest, 1 dead young at base of cliff 30 m downriver from nest ledge
LY32	2	2	
LY32.1	1	0	
LY35	2	4	
LY35.1	2	0	1 bird from this pair was immature (brown plumaged)
LY37	2	4	
LY39	2	0	2 dead chicks at base of cliff
LY41	2	0	
LY43	2	4	
LY45	1	0	
LY47	2	4	
LY50	2	2	1 young in nest, 1 at base of cliff
LY53	1	0	
Total	78	68	67 young were leg-banded

Table 4. Number of peregrine falcon pairs and productivity on the lower Yukon River, between Ruby and St. Marys, Alaska; recent history.

Year	1978 ¹	1979 ²	1980 ³	1981
Total number of pairs	20	23	32	35
Lone adults	9	8	7	8
Number of pairs with young	16	17	27	24 ⁴
Total number of young observed	27-28	39	69	68
Young observed per pair	1.40	1.70	2.16	1.94
Young observed per breeding pair	1.75	2.29	2.56	2.83

¹Springer et al. (1979a)

²Springer et al. (1979b)

³Roseneau et al. (1980)

⁴An additional pair raised two young that died at about 20 days of age

by only one, however number of young was not determined at two nests in 1980.

Density of occupied sites between cliffs 1 and 53, the entire lower Yukon River study area, averaged one per 17.7 km of river. Downstream from Grayling, sites 21.1 through 50, occupied sites (n=21) occurred at an average of one per 13.8 kilometers. These densities have apparently been increasing during recent years and in the section below Grayling have been comparable to nesting densities found during the 1950's and 1960's along the upper Yukon River (Cade 1960, Cade et al. 1968) at least since 1978 (Springer 1979a). The relatively high nesting densities on the lower Yukon in 1981 and the fact that number of successful pairs did not increase despite a slight increase in number of adults present suggests that the area may be saturated. However, in light of observed fluctuations in total number of adults during the past four years (Table 4), more data is needed to prove or disprove the hypothesis.

Peregrines are known for their site tenacity, and a tendency for consistent success, failure or unoccupancy of certain lower Yukon sites can be seen during the past four years. Of seven total sites where broods have been seen each year during 1978, 1979, and 1980, six were again successful in 1981. Of 28 sites occupied in 1979 and 1980 only 4 were not reoccupied in 1981, and peregrines at three of those four sites had consistently failed to raise young during previous years. Of the 24 sites reoccupied in 1981, 16 were successful. Five 1980 sites were not reoccupied in 1981; four of those five sites had been unsuccessful. Eight of nine cliffs occupied in 1981 but not 1980 were unsuccessful, and three of the eight cliffs were occupied by lone adults. These nine cliffs

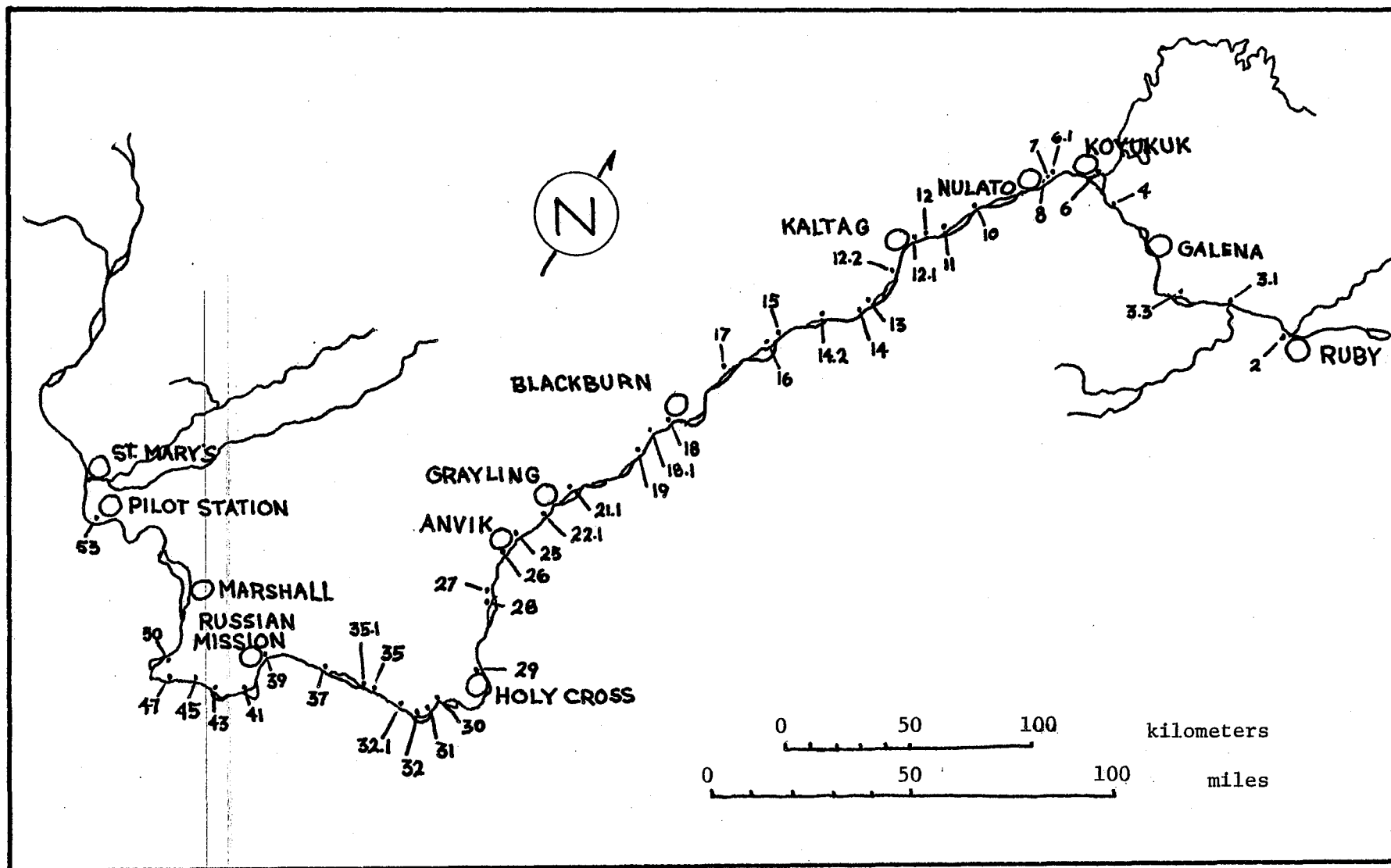


Figure 3. Map showing sites occupied by peregrines along the lower Yukon River, Alaska, 1981.

not occupied in 1980 were spread throughout the study area and different in location and distribution from "new" sites of previous years. The history of occupancy and success at specific sites suggests the presence of a population of mostly successful pairs at frequently reoccupied sites, with less successful pairs or single birds often occupying different sites during different years, perhaps until a more beneficial situation is found. This pattern is well known (Ratcliffe 1980) and has been noted previously (entirely or in part) in Alaska on the lower Yukon (Springer et al. 1979b) and upper Yukon (Cade et al. 1968).

Nest Site Parameters

Height of nests, above the cliff base, at successful sites (n=27) ranged from 105 m to 9 m, and averaged 41 meters. Height of the cliffs averaged 59 m, and ranged from 113 m to 22 meters. Average distance from the river to the vertical plane intersecting the nest was 18 m, with the greatest distance being 130 meters.

Nest ledge widths averaged 132 cm and ranged from 430 cm to 28 centimeters. Nest ledge ceilings were as high as 300 cm and as low as 31 centimeters. Two nest sites lacked protective overhangs entirely. The young at these sites appeared healthy, although several were wet to the skin.

These figures outline the tolerance range shown by middle and lower Yukon River peregrines and may have value in showing that marginal, low cliffs and relatively cramped breeding ledges are being used. This may reflect the general good health of the population, considering the peregrine trait of abandoning marginal sites first during periods of

severe population stress (Hickey 1942, Ratcliffe 1969, Porter and White 1973). In regions of increasingly dense human populations smaller cliffs have gradually been deserted by peregrines. This was the pattern in Britain (Ratcliffe 1980) as well as the eastern United States (Hickey 1942). The continued use of smaller cliffs on the middle and lower Yukon reflect the relatively low human population of the study area. The relatively low degree of human disturbance (including habitat disturbance) may be a contributing factor to the continued abundance of peregrines in portions of Alaska while peregrine populations elsewhere remain depressed.

Human interference has been suspected as the cause of site desertion by peregrines in Australia (White et al. 1981) and we strongly suspect that human disturbance locally has some negative effects on the lower Yukon. Six occupied sites were within 2.5 km of active villages, and four of these were unsuccessful. Three adult pairs occupied sites within 0.5 km of villages (Ruby, Anvik, and Russian Mission) and none were successful. A rough-legged hawk nest within 0.5 km of Anvik also failed. However, three successful pairs were within 60 m of active fish camps. P. Bente (pers. comm.) saw the adult pairs at Ruby and Anvik, while we saw only single birds. No nests were found for these pairs. At the site near Russian Mission, two dead chicks (approximately 20 days old) were found at the base of the cliff. The degree of actual disturbance is likely more critical than simply the proximity of human activity, although the likelihood of both incidental and intentional disturbance seems greater near villages.

Responses of adult peregrines to our nest visits for banding of young

are given in Appendix I. Reaction to other potential disturbances observed are listed in Appendix II.

Analysis of Prey Remains

A total of 445 individuals were identified from prey remains collected in the vicinity of 33 peregrine nest sites. Forty-nine different species (or species groups) of birds are represented and two classifications of mammalian prey (snowshoe hare and unidentified vole) are made. Peregrines on the middle and lower Yukon River use a wide prey base, however various categories of birds are not preyed upon equally (Table 5).

Waterfowl and grebes accounted for 36.92% of the total prey sample by weight. Shorebirds constituted 22.32%, followed by passerine birds at 16.12%, jaegers, gulls and terns, as a group at 14.26%, mammals at 5.46% and woodpeckers and kingfishers at 3.8 percent. Forty-six percent of the individuals identified were passerine birds, while only about 8% were waterfowl and grebes. In descending order the most frequently taken individuals were: common snipe, varied thrush, gray jay, Catharus sp., lesser yellowlegs, and solitary sandpiper. Prey analysis results reported by others (Cade 1960, Cade et al. 1968, Ritchie 1979) are similar to those found during the present study. Percent of total weight was somewhat lower for waterfowl and grebes and higher for passerines on the middle and lower Yukon River in 1981 than in the prey analyses mentioned above. Percent of total weight constituted by mammals was also higher during the present study. Number of mammalian prey represented is closely related to the quantity of castings analysed, as most small

Table 5. Prey analysis for peregrine falcons on the middle and lower Yukon River, Alaska, 1981.

Species ¹	Weight ¹ class in grams	No. ident.	% nests ³ represented	% total individuals	% total weight
Red-necked Grebe	500	1	3.03	0.23	1.02
Pintail	900	1	3.03	0.23	1.84
Green-winged Teal	300	2	6.06	0.45	1.23
Northern Shoveler	550	6	18.18	1.34	6.75
American Wigeon	550	4	12.12	0.89	4.50
Unident. scaup	600	2	6.06	0.45	2.45
Bufflehead	350	1	3.03	0.23	0.72
Unident. duck	500	18	45.45	4.05	18.41
Grebe and Waterfowl subtotal		35	66.66	7.87	36.92
Rock Ptarmigan	550	1	3.03	0.23	1.12
Galliformes subtotal		1	3.03	0.23	1.12
Hudsonian Godwit	250	2	6.06	0.45	1.02
Bar-Tailed Godwit	250	1	3.03	0.23	0.51
Whimbrel	300	9	27.27	2.02	5.52
Lesser Yellowlegs	80	16	36.36	3.60	2.62
Solitary Sandpiper	40	15	42.42	3.37	1.23
Spotted Sandpiper	40	8	24.24	1.80	0.65
Northern Phalarope	25	2	6.06	0.45	0.10
Common Snipe	100	33	57.57	7.42	6.75
Long-billed Dowitcher ⁴	100	6	18.18	1.34	1.23
Semipalmated Sandpiper	30	1	3.03	0.23	0.06
Least Sandpiper	25	2	6.06	0.44	0.10
Unident. <u>Calidris</u>	25	7	12.12	1.57	0.36
Pectoral Sandpiper	60	1	3.03	0.23	0.12
Unident. sandpiper	50	20	51.51	4.49	2.05
Shorebird subtotal		123	93.93	27.64	22.32
Unident. jaeger	500	3	9.09	0.67	3.07
Mew Gull	500	4	9.09	0.89	4.09
Bonaparte's Gull	250	8	21.21	1.80	4.09
Unident. gull	250	5	12.12	1.12	2.56
Arctic Tern	110	2	6.06	0.45	0.45
Gulls, Terns, Jaegers subtotal		22	39.39	4.93	14.26
Overall Charadriiformes subtotal		145	96.96	32.58	36.58
Belted Kingfisher	250	3	9.09	0.67	1.53
Common Flicker	90	10	24.24	2.25	1.84
Downy Woodpecker	50	3	9.09	0.67	0.31
Unident. <u>Picoides</u>	60	1	3.03	0.23	0.12
Piciformes, Coraciiformes subtotal		17	36.36	3.82	3.80

Table 5. continued

Species	Weight ¹ class in grams	No. ident.	% nests ³ represented	% total individuals	% total weight
Unident. <u>Empidonax</u>	10	3	9.09	0.67	0.06
Bank Swallow	10	2	3.03	0.45	0.04
Violet-green Swallow	15	1	3.03	0.23	0.03
Tree Swallow	10	1	3.03	0.23	0.02
Unident. swallow	10	5	15.15	1.12	0.10
Gray Jay	80	24	45.45	5.39	3.93
Unident. chickadee	10	11	30.30	2.47	0.22
American Robin	80	3	6.06	0.67	0.49
Varied Thrush	70	28	63.63	6.29	4.01
Unident. <u>Catharus</u>	30	22	45.45	4.94	1.35
Townsend's Solitaire	30	1	3.03	0.23	0.06
Bohemian Waxwing	60	5	15.15	1.12	0.61
Yellow Warbler	10	1	3.03	0.23	0.02
Yellow-rumped Warbler	10	12	30.30	2.69	0.25
Unident. Warbler	10	3	6.06	0.67	0.06
Rusty Blackbird	50	5	15.15	1.12	0.52
Pine Grosbeak	40	1	3.03	0.23	0.08
Unident. Redpoll	10	1	3.03	0.23	0.02
White-winged Crossbill	30	2	8.06	0.45	0.12
Dark-eyed Junco	15	10	24.24	2.25	0.32
Tree Sparrow	15	1	3.03	0.23	0.03
White-crowned Sparrow	25	1	3.03	0.23	0.05
Fox Sparrow	35	2	6.06	0.45	0.14
Lapland Longspur	15	2	6.06	0.45	0.06
Unident. <u>Fringillid</u>	25	3	9.09	0.67	0.15
Unident. passerine	30	55	78.79	12.36	3.38
Passerine subtotal		205	96.96	46.07	16.12
Unident. vole ⁵	30	39	39.39	8.77	2.39
Showshoe Hare	500	3	9.09	0.67	3.07
Mammal subtotal		42	51.51	9.44	5.46
Grand Total		445	100.00	100.00	100.00

¹Scientific name for species as listed in Appendix III

²Figures represent only approximate weights. Weight class for groups (i.e. Unident. passerines) are based on an average.

³Prey remains were collected from 33 different nest sites.

⁴Long-billed Dowitcher separated from Short-billed Dowitcher on the basis of range.

⁵Based on size of skulls and bones, voles were likely Clethrionomys sp. and the smaller species of Microtus

mammal individuals were identified from pellets.

Along the middle and lower Yukon, 107 castings were collected and analysed. Considering only amounts of hair or feathers per casting: 59% were entirely feathers, 13% were over 50% feathers, 13% were over 50% hair, 8% were entirely hair, and 7% were equal amounts of each. Several small bird crops, intact, were found in castings, and seeds and insect exoskeletons frequently encountered likely originated from crops of prey species, although invertebrates in the peregrine diet have been reported previously (Snyder and Wiley 1976). Small twigs and/or pebbles (up to 11 mm wide) were found in 21% of the castings. Items found in pellets consisting entirely of hair include an eggshell fragment (6.5 mm wide), a land snail (Gastropoda), and body parts from dark ground beetles (Coleoptera) (found in 10 different pellets).

OTHER RAPTORS, RAVENS AND NESTING PHENOLOGY

During the present study we spent most of our time watching, banding, and locating nests of peregrines, and were restricted, for the most part, to travelling along one side of the river; however, all raptors seen were identified with locations plotted on maps. Thirteen different species were observed (Table 6).

Goshawks and sharp-shinned hawks were seen at two sites. These two Accipiter species are primarily woodland birds and are known to be abundant within the study area.

Twenty-six red-tailed hawks were seen at 22 different locations, all on the lower Yukon River, between Kallands and Pilot Station. Four

Table 6. Observations and nests of ravens and raptor species other than peregrine falcons along the middle and lower Yukon River, Alaska, 1981. All nests mentioned were active.

Species	Location ¹	Date	Remarks
<u>Goshawk</u>			
	10 below MY8	6/5	immature seen
	Ingrihak	6/13	adult seen
<u>Sharp-shinned Hawk</u>			
	14 above Birches	6/6	adult seen
	9 below Kokrines	6/7	adult seen
<u>Red-tailed Hawk</u>			
	3.5 below Kallands	7/5	adult seen
	1 above Yuki Is.	7/6	adult seen
	14 above Whiskey Cr.	7/6	adult seen
	12 above Whiskey Cr.	7/6	adult seen
	3 above Whiskey Cr.	7/7	adult seen
	.5 below Whiskey Cr.	7/7	adult seen
	Hen Is.	7/7	NEST, female seen feeding young
	3 below Yistletaw	7/8	adult seen and heard defending
	8.5 below Yistletaw	7/8	adult seen
	.5 above LY14.2	6/9	NEST, nest tree leaning over river
	.5 above N end Quail Is.	6/9	NEST
		7/11	2 young seen from below
	12 above LY15	7/11	2 adults seen defending
	11 above LY15	7/11	immature plumaged bird seen
	12 above Blackburn	6/10	adult seen
	3 below Simon Pt.	6/10	adult seen
	2.5 below Grayling	6/10	adult seen
	7.5 above Anvik	6/11	immature plumaged bird seen
	3 above Paradise	6/11	adult seen and heard defending
	3.5 below Paradise	6/11	adult seen
	6 above Holy Cross	7/14	adult seen
	13 below Marshall	7/18	NEST, 3 young heard food begging
	3 above Pilot Station	7/19	adult seen and heard defending
<u>Rough-legged Hawk</u>			
	13 above Birches	6/7	adult seen
	11 above Birches	6/7	adult seen
	LY6	6/8	NEST
	LY9	6/8	NEST
	3.5 below LY10	6/8	NEST

Table 6. continued

Species	Location ¹	Date	Remarks
<u>Rough-legged Hawk (continued)</u>			
LY26		6/8	NEST, both adults defending
		7/13	nest empty, no hawks present
.7 above Paradise		6/11	NEST
LY31		6/11	NEST
5 below Russian Mission		6/12	NEST
7 below Russian Mission		6/12	NEST, female seen in incubation position
		7/16	2 young in nest, 1 fledgling seen
7.3 below Russian Mission		6/12	NEST
		7/16	1 fledgling seen
LY42.1		6/12	NEST
		7/16	2 fledglings seen
LY44		6/13	NEST
LY45		6/13	NEST
		7/18	3 young seen standing in and around nest
.2 below LY47		6/13	NEST
		7/18	2 young seen standing in nest
LY48		6/13	NEST
		7/18	5 young seen standing in nest
.2 below LY50		6/13	NEST
LY50.1		6/13	NEST
Ingrihak		6/14	adult seen
<u>Golden Eagle</u>			
.5 above MY6		7/2	adult seen, carrying nest building material
<u>Bald Eagle</u>			
1.5 above Tanana		7/4	adult seen
18 below Tanana		7/4	adult seen
2.5 above Kokrines		7/5	sub-adult seen
11 above Toklik		7/16	NEST
<u>Marsh Hawk</u>			
St. Marys		6/15	adult seen
<u>Osprey</u>			
6 above Pilot Station		7/19	adult seen

Table 6. continued

Species	Location ¹	Date	Remarks
<u>Merlin</u>			
	10 below Russian Mission	7/16	pair (1 adult, 1 immature) defending empty stick nest
<u>American Kestrel</u>			
	MY4	6/4	adult seen
<u>Great Horned Owl</u>			
	11 above Birches	6/6	adult seen
	.3 above Russian Mission	6/12	NEST, 2 nestlings seen from below
<u>Hawk Owl</u>			
	MY4	7/1	1 adult and 3 fledglings seen
<u>Great Grey Owl</u>			
	LY25	7/13	molted tail feather found
<u>Raven</u>			
	2 above MY3	6/2	NEST, 3 young seen from below
	MY4	6/4	family group, 5 fledglings seen
	MY5	6/4	NEST, 4 young seen from below
	3 below MY15	6/5	NEST, 2 young seen from below
	.5 below MY16	6/6	NEST, 1 nestling and 2 fledg- ings seen
	6 below MY16	6/6	NEST, 3 young seen from below
	14 above Ruby	6/7	NEST, 1 fledgling, 1 nestling seen
	2.5 above Ruby	6/7	NEST, 3 young seen from below
	LY3.2	6/7	NEST, with 4 young
	10 above Galena	6/7	congregation of fledgling ravens, 25+ seen
	1 above LY6	6/8	NEST, 3 young seen from below
	.7 below LY6	6/8	NEST, 4 young seen from below
	5 below LY6.1	6/8	NEST, 3 young seen from below
	1 below LY9	6/8	NEST, 3 young seen from below
	LY12	6/8	NEST, 2 nestlings seen from below
	.2 below LY14.2	6/9	NEST, young already fledged
	.3 above N end Quail Is.	6/9	NEST, fledgling seen
	LY15	6/9	NEST, 3 young seen from below

Table 6. continued

Species	Location ¹	Date	Remarks
<u>Raven</u> (continued)			
	LY16.1	6/9	NEST, located on a dirt bank
	LY18.1	6/10	NEST, 2 nestlings present
	16 below Simon Pt.	6/10	defending pair seen
	.5 below LY24	6/11	NEST, 3 fledglings seen from below
	LY30	6/11	family group with 2 fledglings seen
	8.5 above Paimiut	6/11	NEST, 4 nestlings seen from below
	.3 above Russian Mission	6/12	family group with 2 fledglings seen
	.5 above LY41	6/12	NEST, 4 fledglings seen from below
	.2 below LY48	6/13	family group with 5 fledglings seen

¹Distances given are in kilometers, MY = middle Yukon, LY = Lower Yukon

active tree nests were located, and defending adults were found at four additional sites. Certainly, these eight territories represent only a portion of the total present along one side of the river. However, red-tails appeared to be uncommon to fairly common locally (abundance designations after Kessel and Gibson 1978 p. 7) with large areas of suitable habitat unoccupied, particularly on the middle Yukon. Although breeding red-tails are known from the North River (Unalakleet vicinity) (Mindell in press) and elsewhere west of the Yukon River (H. Springer pers. comm.) the present study area lies within the periphery of the species' range and as such may be relatively prone to fluctuations in abundance. All red-tails seen at a range close enough to discern colors (n=15) along the lower Yukon River were either Buteo jamaicensis harlani or B. j. harlani hybrids. Red-tails with tails containing various combinations of white and dark brown, often with mottling and streaking, and lacking red color dorsally were recorded as B. j. harlani. Red-tails with tails containing more than a trace of red color, but still having light and/or dark streaking and mottling were classified as B. j. harlani hybrids. Birds with apparent immature plumage (n=1) were not further classified. The criteria outlined here are simplified although they were sufficient in most instances.

We found 16 rough-legged hawk nests and saw three lone adults at additional locations. None of these lone adults were defending or in the vicinity of potential breeding cliffs. We feel confident that all rough-legged hawk cliff nests present were found due to the care taken in searching each cliff for peregrines. All cliff nests and sightings occurred along the lower Yukon River, yielding an overall density there

of one nest per 47 km of river. Rough-legged hawk nests were concentrated between lower Yukon site 31 and Ingrihak where 11 nests occurred along 147 km of river for a density of one site per 13.4 kilometers. Greater densities have been found on the nearby Kuskokwim River even during years of rough-legged hawk lows (Mindell in press). However, nesting peregrines are much less dense on the Kuskokwim than on the lower Yukon. Potential breeding sites do not appear to be limiting on either river. Relatively low abundance of rough-legged hawks on the lower Yukon River may be influenced by the high abundance of peregrines. Favored nest sites for the two species are similar, and both are territorial in the vicinity of their nests. At two sites where rough-legged hawk and peregrine nests were within 60 m of each other, rough-legged hawk adults were reluctant to fly out and defend against us, perhaps not wanting to invite confrontation with peregrines.

One adult golden eagle was seen along the middle Yukon River. This bird was carrying a stick, presumably for addition to a nest. Bald eagles were seen at four locations, including one nest.

A single marsh hawk was seen at St. Marys and, similarly, only one osprey was seen. Although it is likely that some ospreys present were undetected, ospreys are generally uncommon along the middle and lower Yukon River. A merlin pair was found defending an approximately 70 m² area of white spruce (Picea glauca) - poplar (Populus sp.) forest along the river shore. An empty stick nest of sharp-shinned hawk size was found in an area of particularly strong defense. An adult American kestrel was seen within 1 km of the pipeline bridge over the middle Yukon River. A hawk owl family group was seen also in this area.

Great horned owls were seen at two sites, including one nest.

Twenty-two active raven nests were found and four additional family groups were seen. Nineteen of the stick nests were on cliffs, two were in trees and one was on a silt bluff. We likely found most of the raven cliff nests present along the river. The percentage of the raven population along the river using tree nests is not known, although certainly many were undetected.

Most of the young ravens seen during our first trip were nestlings. The first fledgling raven was seen on 7 June. Average estimated hatching date (n=8) for middle and lower Yukon River ravens was 5 May. Estimated hatching date for red-tailed hawks at the only nest where young were readily visible was 14 June. The average estimated hatching date was 7 June for rough-legged hawks (n=4) and 18 May (n=1) for great horned owls. Estimated dates for nesting activity of peregrines are given in Table 7.

Table 7. Nesting phenology of peregrine falcons on the middle and lower Yukon River, Alaska, 1981.

Event	Mean Date		Range	
	<u>mid Yukon</u>	<u>low Yukon</u>	<u>mid Yukon</u>	<u>low Yukon</u>
Begin egg-laying	9 May	13 May	7-15 May	9-19 May
Begin incubation	16 May	20 May	14-22 May	16-26 May
Hatching	19 June	23 June	17-25 June	19-29 June
Fledgling	29 July	2 Aug	27 July-4 Aug	30 July-8 Aug

SUMMARY

This report presents results of a population survey, food habits analysis and banding of nestlings program for peregrine falcons, along with observations of other raptor species, on the middle and lower Yukon River, Alaska during 1981. Six pairs and one single peregrine were present on the middle Yukon, and 35 pairs and eight singles were present on the lower Yukon. Numbers of live young seen were 14 and 68 on the middle and lower Yukon respectively. Fourteen is the largest number of young recorded for the middle Yukon. Average nest density of one per 17.7 (13.8 km (n=21) locally) on the lower Yukon is relatively high for Alaska, and, combined with the presence of a surplus group of adults, and numbers of young observed similar to 1980, suggest that the area may be nearly saturated. Eighty-one young were leg-banded.

Based on analysis of prey remains and castings (n=445 prey individuals) the peregrine diet, by weight, consisted of 36.92% waterfowl and grebes, 22.32% shorebirds, 16.12% passerines, 14.26% jaegers, gulls, and terns, 5.46% small mammals and 3.82% woodpeckers and kingfishers.

Thirteen other species of raptors were seen. Observations included 16 rough-legged hawk nests, four red-tailed hawk nests, one great horned owl nest and 22 raven nests.

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Appendix 1. Adult peregrine falcon behavioral response to nest visits for banding nestlings on the middle and lower Yukon River, Alaska, 1981.

Site	Duration of Disturbance ¹	Male Response	Female Response	Remarks
MY5	55 min.	vocal, moderate stooping	vocal, moderate stooping	3 young 14-15 days old
MY8	70 min.	not present	vocal, moderate stooping	4 young 14-17 days old
MY12	50 min.	vocal, moderate stooping	vocal, moderate stooping	4 young 7-10 days old
MY16	60 min.	vocal, occasional stooping	vocal, moderate stooping	3 young 15-18 days old
LY3.3	120 min.	vocal, circling	vocal, moderate stooping	3 young 15-18 days old
LY4	50 min.	very vocal, moderate stooping	very vocal, moderate stooping	2 young 15-18 days old
LY8	40 min.	vocal, moderate stooping	vocal, moderate stooping	3 young 10 days old
LY10	40 min.	vocal, moderate stooping	vocal, moderate stooping	3 young 10-12 days old
LY11	60 min.	vocal, moderate stooping	vocal, moderate stooping	4 young 15-18 days old
LY12.2	60 min.	not present	vocal, moderate stooping	1 young approx. 21 days old
LY13	70 min.	vocal, moderate stooping	very vocal, in- tense stooping	4 young approx. 16 days old
LY14	60 min.	not present	vocal, moderate stooping	3 young 16-17 days old
LY14.2	60 min.	vocal, moderate stooping	vocal, moderate stooping	4 young 15-16 days old
LY15	65 min.	very vocal, moderate stooping	very vocal, moderate stooping	3 young 18-21 days old

Appendix 1 (continued)

Site	Duration of Disturbance	Male Response	Female Response	Remarks
LY21.1	45 min.	very vocal, moderate stooping	very vocal, moderate stooping	4 young 19-23 days old
LY22.1	60 min.	vocal, moderate stooping	vocal, moderate stooping	3 young 18-20 days old
LY25	70 min.	vocal, moderate stooping	vocal, moderate stooping	1 young 14-15 and 3 young 19-21 days old
LY27	80 min.	very vocal, intense stooping	very vocal, intense stooping	1 young 17-18 days old
LY28	60 min.	very vocal, moderate stooping	very vocal, moderate stooping	3 young 20-24 days old
LY29	120 min.	vocal, circling flew away and then returned	vocal, circling flew away and then returned	1 young 21-23 days old at base of cliff
LY30	40 min.	vocal, some stooping, circling	vocal, some stooping, circling	1 young 24-25 days old at base of cliff. 1 dead young at base of cliff
LY31	120 min.	very vocal, moderate stooping	very vocal, moderate stooping	1 young 23-25 days old. 1 dead young on beach downstream.
LY32	60 min.	very vocal, moderate stooping	very vocal, moderate stooping	2 young 23-25 days old
LY35	50 min.	vocal, moderate stooping	vocal, moderate stooping	4 young 23-25 days old
LY37	32 min.	very vocal, moderate stooping	very vocal, moderate stooping	4 young 18-21 days old
LY39	30 min.	very vocal, moderate stooping	very vocal, moderate stooping	2 young recently dead (within 24 hrs.) at base of cliff
LY43	30 min.	very vocal, moderate stooping	very vocal, moderate stooping	4 young 26-28 days old

Appendix 1 (continued)

Site	Duration of ¹ Disturbance	Male Response	Female Response	Remarks
LY47	75 min.	very vocal, intense stooping	very vocal, intense stooping	4 young 26-29 days old
LY50	45 min.	very vocal, intense stooping	very vocal, intense stooping climber was struck once	2 young 24-27 days old, female in nest, male at base of cliff

¹Time used to climb, band young, and depart the cliff area by boat.

Appendix 2. Reactions of peregrine falcons to potential disturbances
lower Yukon River, Alaska, 1981.

Stimulus	Date	Location	Distance	Reaction
Children playing on beach below cliff, shouting	7 July	LY4	180 m	Adult male vocalized while circling. Adult female remained at nest.
Fish camp, no one present	9 July	LY8	70 m	Falcon flew in to nest with prey.
Ravens at nest	8 June	LY12	12 m	Adult female stooped several times at an adult raven near the raven's nest. As a man walked along the beach, the raven flew out to defend and the falcon stooped at the raven. The falcon was silent. There was no successful peregrine nest at this site.
Ravens at nest	10 June	LY18.1	10 m	Adult male peregrine stooped at an adult raven who was approaching its own nest on cliff below. No vocalizations.
Motor boat and raft	11 June	LY29	30 m	As motor boat approached from downstream the falcon left the scrape, vocalized, and circled. Raft was an equal distance upstream; falcon returned to nest ledge as the two boats passed in front.
Two motor boats passing	10 July	LY14	30 m	No visible reaction.

APPENDIX III. Scientific names for birds mentioned in this report.

Red-necked Grebe, Podiceps grisegena
Pintail, Anas acuta
Green-winged Teal, Anas crecca
Northern Shoveler, Anas clypeata
American Wigeon, Anas americana
Scaup, Aythya sp.
Bufflehead, Bucephala albeola
Goshawk, Accipiter gentilis
Sharp-shinned Hawk, Accipiter striatus
Red-tailed Hawk, Buteo jamaicensis
Rough-legged Hawk, Buteo lagopus
Golden Eagle, Aquila chrysaetos
Bald Eagle, Haliaeetus leucocephalus
Marsh Hawk, Circus cyaneus
Osprey, Pandion haliaetus
Peregrine Falcon, Falco peregrinus
Merlin, Falco columbarius
American Kestrel, Falco sparverius
Rock Ptarmigan, Lagopus mutus
Hudsonian Godwit, Limosa haemastica
Bar-tailed Godwit, Limosa lapponica
Whimbrel, Numenius phaeopus
Lesser Yellowlegs, Tringa flavipes
Solitary Sandpiper, Tringa solitaria
Spotted Sandpiper, Actitis macularia
Northern Phalarope, Phalaropus lobatus
Common Snipe, Gallinago gallinago
Long-billed Dowitcher, Limnodromus scolopaceus
Semipalmated Sandpiper, Calidris pusilla
Least Sandpiper, Calidris minutilla
Pectoral Sandpiper, Calidris melanotos
Jaeger, Stercorarius sp.
Mew Gull, Larus canus
Bonaparte's Gull, Larus philadelphia
Arctic Tern, Sterna paradisaea
Belted Kingfisher, Megasceryle alcyon
Common Flicker, Colaptes auratus
Downy Woodpecker, Picoides pubescens
Bank Swallow, Riparia riparia
Violet-green Swallow, Tachycineta thalassina
Tree Swallow, Iridoprocne bicolor
Gray Jay, Perisoreus canadensis
Chickadee, Parus sp.
American Robin, Turdus migratorius
Varied Thrush, Ixoreus naevius
Townsend's Solitaire, Myadestes townsendi
Bohemian Waxwing, Bombycilla garrulus
Yellow Warbler, Dendroica petechia

APPENDIX III (Continued)

Yellow-rumped Warbler, Dendroica coronata
Rusty Blackbird, Euphagus carolinus
Pine Grosbeak, Pinicola enucleator
Redpoll, Carduelis sp.
White-winged Crossbill, Loxia leucoptera
Dark-eyed Junco, Junco hyemalis
Tree Sparrow, Spizella arborea
White-crowned Sparrow, Zonotrichia leucophrys
Fox Sparrow, Passerella iliaca
Lapland Longspur, Calcarius lapponicus

