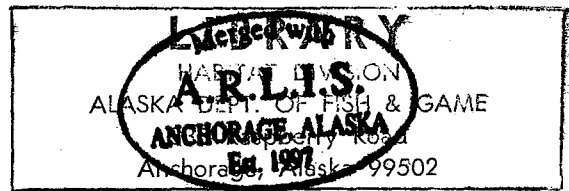


NUMBERS AND STATUS OF PEREGRINE
FALCONS (*Falco peregrinus*) ON
THE MIDDLE YUKON RIVER, LOWER
YUKON RIVER AND IN SELECTED
AREAS OF THE ARCTIC NATIONAL
WILDLIFE RANGE, ALASKA, 1980.

QL
696
.F34
S66
1980

— ROSENEAU —
QL
696
F34
SL6
1980



NUMBERS AND STATUS OF PEREGRINE FALCONS
(*Falco peregrinus*) ON THE MIDDLE YUKON RIVER,
LOWER YUKON RIVER AND IN SELECTED AREAS
OF THE ARCTIC NATIONAL WILDLIFE RANGE, ALASKA, 1980

A Report Prepared For The
U.S. Fish and Wildlife Service
Office of Endangered Species
Anchorage, Alaska

Contract No. 14-16-0007-80-5047

By

David G. Roseneau, Peter J. Bente and Alan M. Springer

29 September 1980

FALCO
Roseneau/Springer/Bente/Springer
S.R. Box 30096
Fairbanks, Alaska 99701

(907)479-2669

ARLIS
Alaska Resources
Library & Information Services
Anchorage, Alaska



TABLE OF CONTENTS

	PAGE
INTRODUCTION	1
OBJECTIVES	2
STUDY AREA	3
METHODS	6
RESULTS	9
Middle Yukon River	9
Lower Yukon River	12
Arctic National Wildlife Range	21
DISCUSSION	26
Yukon River	26
Arctic National Wildlife Range	28
LITERATURE CITED	30
APPENDICES	32

LIST OF TABLES

TABLE		PAGE
1	Site occupancy and numbers of Peregrine Falcons (<i>Falco peregrinus anatum</i>) on the middle Yukon River between Fort Hamlin and Tanana, Alaska, 1980.	10
2	Productivity of Peregrine Falcons (<i>Falco peregrinus anatum</i>) on the middle Yukon River between Fort Hamlin and Tanana, Alaska, 1979 and 1980.	11
3	Nesting phenology of Peregrine Falcons (<i>Falco peregrinus anatum</i>) on the middle Yukon River, Alaska, 1980.	13
4	Site occupancy and numbers of Peregrine Falcons (<i>Falco peregrinus anatum</i>) at new and previously occupied locations on the lower Yukon River between Tanana and St. Marys, Alaska, 1980.	16
5	Productivity of Peregrine Falcons (<i>Falco peregrinus anatum</i>) on the lower Yukon River between Tanana and St. Marys, Alaska, 1979 and 1980	18
6	Nesting phenology of Peregrine Falcons (<i>Falco peregrinus anatum</i>) on the lower Yukon River, Alaska, 1979 and 1980.	20

LIST OF FIGURES

FIGURE		PAGE
1	Locations of the middle Yukon River, lower Yukon River and Arctic National Wildlife Range study areas that were surveyed for nesting Peregrine Falcons in 1980.	4
2	Areas of northeastern Alaska that were surveyed for Peregrine Falcons in 1980.	5
3	Locations of cliffs along the lower Yukon River, Alaska, that were occupied by Peregrine Falcons (<i>Falco peregrinus anatum</i>) in 1980.	15

LIST OF APPENDICES

APPENDIX		PAGE
1	Status of nesting locations used by Peregrine Falcons (<i>Falco peregrinus anatum</i>) on the middle Yukon River between Fort Hamlin and Tanana, Alaska, 1980.	32
2	Status of nesting locations used by Peregrine Falcons (<i>Falco peregrinus anatum</i>) on the lower Yukon River between Tanana and St. Marys, Alaska, 1980.	33
3	Status of nesting locations used by cliff-nesting raptors in the Arctic National Wildlife Range in northeastern Alaska, 1980.	41
4	Peregrine Falcon (<i>Falco peregrinus anatum</i>) tissues collected from eyries along the Yukon River between Stevens Village and St. Marys, Alaska, 1980.	46
5	Peregrine Falcon (<i>Falco peregrinus anatum</i>) nestlings banded on the middle Yukon River in 1980.	49
6	Peregrine Falcon (<i>Falco peregrinus anatum</i>) nestlings banded on the lower Yukon River in 1980.	50
7	An evaluation of Arctic Slope river drainages in northeastern Alaska with regard to potential and known peregrine nesting habitat found in them.	52

INTRODUCTION

Peregrine Falcons (*Falco peregrinus anatum* and *F. p. tundrius*) are presently being banded to help identify the migration corridors and wintering areas of birds that breed in North America. During 1979 the banding effort was expanded to include Alaska, and summaries of these and related studies are given by Springer *et al.* (1979b). This year, 1980, the United States Fish and Wildlife Service (USFWS) continued a program to band nestling peregrines in Alaska. In addition to revealing movement patterns, data gathered during the banding program provides valuable information on the current numbers, distribution, productivity and food habits of Peregrine Falcons in Alaska.

Last year a total of 106 nestlings were banded in Alaska, and 103 of them were from five important nesting areas of the Colville River and the Yukon River drainages. In 1980, the program to band peregrines included these areas, and was expanded to include other areas of interior and arctic Alaska. A total of 148 nestlings were banded throughout the state this year, and these young falcons represent a major portion of the annual production of the *F. p. anatum* and *F. p. tundrius* populations in the state. Only one important area of habitat, the Tanana River drainage, was totally excluded in the banding program during 1980, and only five nestlings were produced in it (Roseneau and Bente 1980).

We report here the results of our activities in three areas of Alaska. These areas include the lower and middle sections of the Yukon River, and selected portions of the northeastern Arctic Slope between the Canning River and the U.S.-Canada border.

OBJECTIVES

The objectives of this study were to:

1. determine the location and productivity of nesting peregrines on the middle and lower sections of the Yukon River and in selected drainages of the northeastern Arctic Slope;
2. band as many nestling peregrines as practical;
3. collect addled peregrine eggs, eggshell fragments and/or dead chicks for pollutant analysis and shell thickness measurements;
4. collect prey remains from peregrine nest sites;
5. collect 1.5 cm of a fifth secondary feather from peregrine nestlings for heavy metal analysis;
6. take photographs of as many cliffs occupied by peregrines as possible;
7. record other raptor or raven nests encountered during the surveys.

STUDY AREA

The Yukon River below Stevens Village has two segments that contain nesting habitat adequate for Peregrine Falcons; the middle Yukon River section between Stevens Village and Tanana, and the lower Yukon River section between Ruby and St. Marys. The locations of both areas are illustrated in Figure 1. Figures 1 and 2 illustrate the locations of the areas surveyed for nesting peregrines in the Arctic National Wildlife Range on the northeastern Arctic Slope of Alaska.

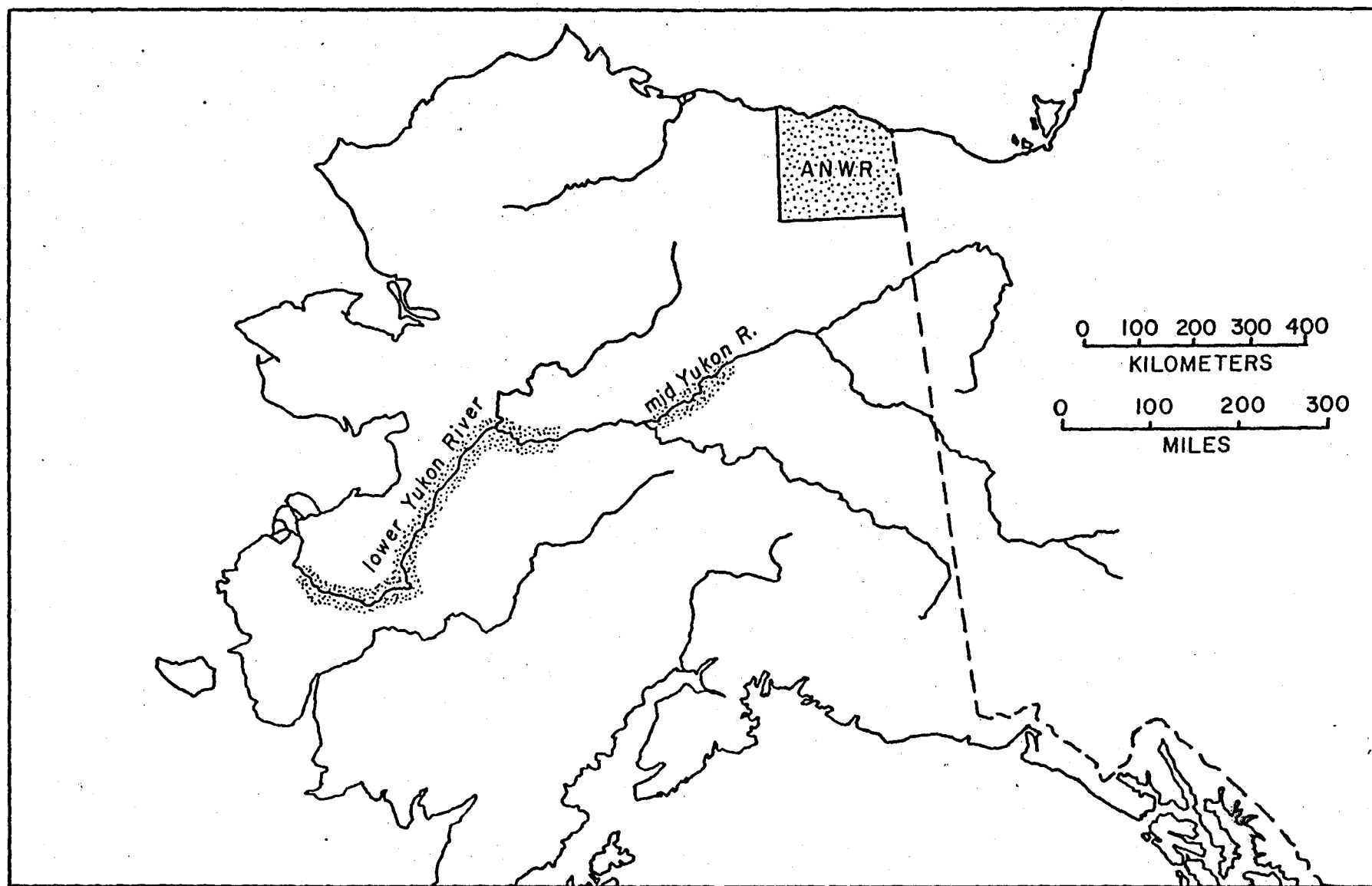


Figure 1. Locations of the middle Yukon River, lower Yukon River and Arctic National Wildlife Range study areas that were surveyed for nesting Peregrine Falcons in 1980.

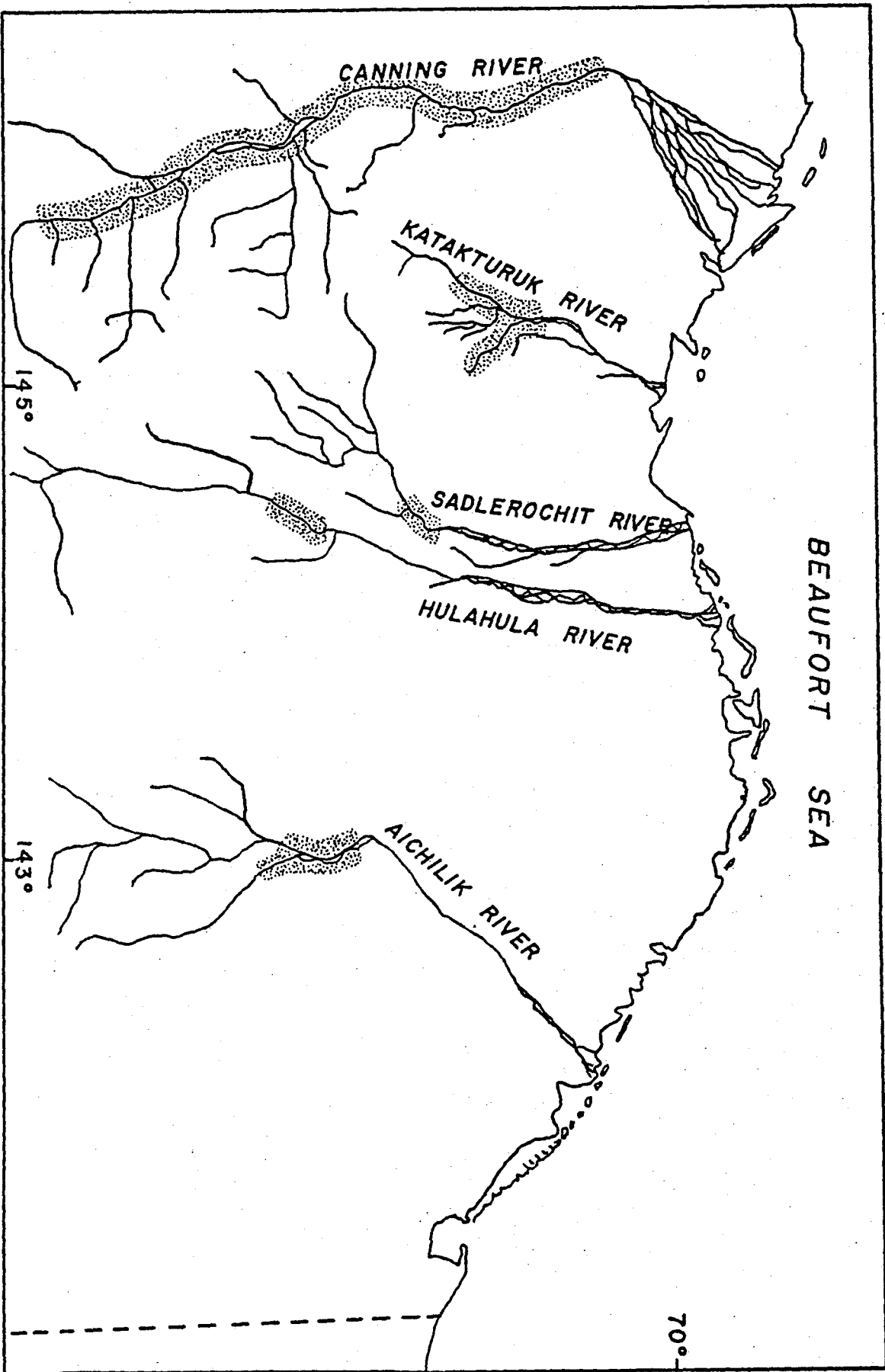


Figure 2. Areas of northeastern Alaska that were surveyed for Peregrine Falcons in 1980.

METHODS

The Yukon River study areas were surveyed by two observers in an inflatable raft during 8-21 June 1980 and 4-21 July 1980. The June survey was not funded by the USFWS. That independent effort was financed by FALCO with generous support from the National Audubon Society. We have included data from both surveys in this report. Locations where peregrines and other cliff-nesting raptors and ravens were found on the Yukon River were recorded on 1:250,000 scale USGS topographic maps. Additional information on these locations is given in Appendices 1 and 2. To aid in distinguishing the two sections of the Yukon River, all cliffs located on the middle Yukon River have been coded with the prefix MY; the nesting locations on the lower Yukon River have been coded with the prefix LY. The cliff numbers for the middle and lower Yukon River sections follow those established by Springer *et al.* (1979b). New observations at previously unnumbered cliffs have been added as decimal numbers (e.g., LY-22.1) which allows expansion of the existing number system.

Surveys for peregrines and other cliff-nesting raptors were also conducted in the Arctic National Wildlife Range (ANWR). This area has been recently redesignated the William O. Douglas National Wildlife Refuge, but will be referred to by its old designation in this report. These surveys were conducted by inflatable raft, light aircraft and on foot during 2-16 August. All known historical peregrine nesting locations in the survey areas were examined. The specific areas that were searched included:

1. approximately 128 km (80 miles) of the main Canning River between 68° 55' N and 69° 53' N, including several side tributaries, by raft and on foot during 3-9 August;
2. approximately 19 km (12 miles) of the Katakturuk River between 69° 40' N and 69° 46' N, including both the east and west forks, by Cessna 185 aircraft on 9 August;

3. approximately 16 km (10 miles) of the Sadlerochit River between Sadlerochit Springs and 69° 36' N by Cessna 185 and PA-18 Super Cub aircraft on 9 and 15 August;
4. the Kikiktat Mountain vicinity of the Hulahula River between 69° 28' N on foot on 10 August; and
5. approximately 13 km (8 miles) of the Aichilik River between 69° 26' N and 69° 31' N, and the unnamed east fork of the Aichilik River between 69° 23' N and its confluence with the Aichilik River on foot and by Cessna 185 aircraft on 11 August.

Within the above areas of the ANWR, all known historical nesting locations of peregrines, other cliff-nesting raptors and potential peregrine nesting habitat were marked on 1:250,000 scale USGS topographic maps. Additional information on those locations is given in Appendix 3.

Nestling peregrines were banded whenever appropriate. Standard techniques were employed and USFWS lock-on leg bands of appropriate size were used. Only those chicks were banded that were of an acceptable age and in locations where they were safe during our descent by rope. One nest site was inaccessible. It required a minimum rope length of 250 feet.

Addled eggs, eggshell fragments and dead chicks were collected from nest ledges whenever they were found. Our collections of those items are listed in Appendix 4. All samples were immediately wrapped in clean, heavy-gauge aluminum foil and sealed in Nasco Whirl-Pak plastic bags. Whole eggs have been forwarded to the USFWS, Anchorage, Alaska, for transfer to the Patuxent Wildlife Research Center in Laurel, Maryland, for pollutant residue analysis.

The distal 1.5 cm of a fifth secondary feather from the right wing was collected from 65 peregrine nestlings on the middle and lower Yukon River. These feather samples have been sent to Dr. F. P. Ward, Aberdeen Proving Ground, Maryland, for heavy metals analysis.

Prey remains were collected at peregrine nest sites along the Yukon River. All prey remains are being sorted and identifications will be made for each location at a later time. We will submit a comprehensive discussion of prey remains collected on the Yukon River during 1978, 1979 and 1980, and on the Colville River during 1979 as soon as all necessary comparative museum collections are inspected and final identifications of prey are completed.

Photographs of many peregrine nesting cliffs were taken with standard 35 mm cameras to show distant views of nest cliffs and, whenever possible, close-up views of eyrie ledges. These photographs have been developed and labeled and they accompany this report.

Raptor nest record forms and banding schedules provided by the USFWS have been completed, and these data accompany this report as an attachment.

RESULTS

Middle Yukon River

Eighteen cliff areas are described for this section of the Yukon River. These locations include 16 that were reported on by us in 1979 (see Springer *et al.* 1979b), and two additional locations that we now know provide peregrine nesting habitat because of nesting attempts at them in 1980, or because other evidence suggests they should be reclassified as potential nesting locations in the future. All these locations are listed in Appendix 1 and are shown on the attached USGS topographic maps (Maps No. 1 and 2). Nine of these cliff areas are now known to have been occupied by peregrines in one or more years. Only six of these locations have been occupied during any single year since 1974 (White 1974, Haugh and Halperin 1976, Springer *et al.* 1979b, this study).

In 1980 we found five pairs of peregrines defending nest sites between Fort Hamlin and Tanana. A sixth pair was reported to us by J. Modrow (personal communication, 6 July 1980). We did not find peregrines at this cliff, but we are confident of his identification. Furthermore, that non-defensive pair had been observed by Modrow on several occasions in June and early July at the same nest site (Location MY-6) where we had found several freshly killed and eaten American Wigeon (*Anas americana*) and one Gray Jay (*Perisoreus canadensis*) in June. Table 1 summarizes the 1980 cliff occupancy and numbers of peregrines present in this section of the Yukon River.

Four (67%) of the six pairs of peregrines present along the middle Yukon River in 1980 nested successfully and produced 11 nestlings. Two (33%) pairs failed in their attempts to nest. The average, near-fledging age brood size was 1.8 nestlings per attempt and 2.8 nestlings per successful pair. Table 2 summarizes peregrine productivity and compares these data with the productivity observed by us in 1979.

The breeding phenology of peregrines nesting along the middle Yukon River was determined from the estimated ages of the nestlings

Table 1. Site occupancy and numbers of Peregrine Falcons (*Falco peregrinus anatum*) on the middle Yukon River between Fort Hamlin and Tanana, Alaska, 1980.¹

Location Number	Adults	Nestlings
MY-1	-	-
MY-2	2	0
MY-3	-	-
MY-4	-	-
MY-5	-	-
MY-5.1	2	2
MY-6	2	0
MY-7	-	-
MY-8	2	4
MY-9	-	-
MY-9.1	-	-
MY-10	-	-
MY-11	-	-
MY-12	2	3
MY-13	-	-
MY-14	-	-
MY-15	-	-
MY-16	2	2
Total	6 pairs (4 pairs successfully produced nestlings)	11 nestlings

¹ - = not occupied.

Table 2. Productivity of Peregrine Falcons (*Falco peregrinus anatum*) on the middle Yukon River between Fort Hamlin and Tanana, Alaska, 1979 and 1980.

	1979 ¹	1980
Number chicks per successful attempt	1.0 (n = 1)	2.8 (n = 4)
Number chicks per attempt	0.3 (n = 4)	1.8 (n = 6)
Number failures	3 (75%)	2 (33%)

¹ Data are from Springer *et al.* (1979b).

observed at the nest sites during the July survey. Table 3 gives the mean and range of the events in the nesting cycle based on those estimates.

All 11 of the nestling peregrines found along the middle Yukon River in 1980 were banded. Banding information is listed in Appendix 5.

Lower Yukon River

Seventy-eight cliffs are described for this section of the Yukon River. These locations include 72 that were reported on by us in 1979 (see Springer *et al.* 1979b), and six additional locations that we now know provide peregrine nesting habitat, or that we have reclassified as potential peregrine nesting habitat because of other evidence. All these locations are listed in Appendix 2 and are shown on the attached USGS topographic maps (Maps No. 3-8). Forty-eight of these cliff areas are now known to have been occupied at least once by peregrines since 1977, but some of these locations probably represent alternative nesting locations for given pairs. Only seven of the locations with some history of occupancy in one or both of the two preceeding years, 1978 and 1979, were not active in 1980. Of these seven locations, LY-2, has a questionable history of occupancy (see Springer *et al.* 1979a, 1979b). Locations LY-14.1, LY-21 and LY-22 were themselves unoccupied but had peregrines nesting nearby at alternate locations (Locations LY-14.2, LY-21.1 and LY-22.1). Only two locations, LY-3.3 and LY-51.2, are newly occupied nesting locations. Both were occupied by peregrines in 1980, but neither location has a known history of use, and neither location is near other locations that could be considered likely alternates. Thirty-nine of the total reported, known and potential locations have been occupied during any single complete survey year, 1979-80.

Occupancy of nesting cliffs by peregrines on this section of the Yukon River was very high in 1980. Thirty-nine nesting locations were defended by 32 pairs of adult falcons and seven single adult falcons. Eight more of the locations were occupied in 1980 than in 1979, and nine more pairs were present (see Springer *et al.* 1979b). One of the nest

Table 3. Nesting phenology of Peregrine Falcons (*Falco peregrinus anatum*) on the middle Yukon River, Alaska, 1980.

Event	Mean Date ¹	Range
Begin egg laying	2 May	30 April - 9 May
Finish egg laying	9 May	7-16 May
Hatching	12 June	10-19 June
Fledging	22 July	20-29 July

¹ Dates were determined by back-dating from observations of chicks of estimated age: $n = 11$, $\bar{x} = 21.2$ days, s.d. = 3.3 days on 5 July. The mean time intervals used in these calculations are: 7 days required for a complete clutch to be laid; 34 days for incubation; and 40 days as nestlings.

sites (Location LY-6.1) with a successful pair at it was also defended by a male falcon in subadult plumage. In addition one other pair off of the main river course was reported to us by a resident of Anyik. That pair was said to be nesting at the first bluffs several miles up the Anyik River. We could not confirm that observation and do not include it here in our calculations. Table 4 summarizes the 1980 cliff occupancy and numbers of peregrines present in this section of the Yukon River.

The number of successful nesting attempts in 1980, as calculated on the basis of total occupied locations, was 27 (69%). Twelve (31%) of the 39 locations failed to produce young that year. Overall, 1980 failure rates were similar to those estimated in 1979, 31% vs. 30% respectively. Of the total pairs present in both years (excluding sites occupied by singles), 6 (26%) failed in their attempts to nest in 1979 and 5 (16%) failed in 1980 (see Springer *et al.* 1979b).

Productivity was also higher along the lower Yukon River in 1980 than in previous years. The 27 successful pairs produced a minimum of 69 nestlings to near fledging age (Table 3), but we were unable to definitely determine brood size for two of these pairs (Locations LY-28 and LY-32.1). Brood size for the remaining 25 pairs averaged 2.6 nestlings per successful attempt vs. 2.4 nestlings per successful attempt in 1979 (see Springer *et al.* 1979b). Calculated on the basis of all observed attempts, brood size averaged 1.8 nestlings of near-fledging age in 1980 and 1.3 nestlings in 1979 (see Springer *et al.* 1979b). Productivity data for both years, 1979 and 1980, in this section of the Yukon River are summarized in Table 5.

It is clear that the productivity of peregrines nesting along the lower Yukon River was excellent in 1980. Furthermore, nesting attempts were relatively evenly distributed among the available cliff locations (Figure 3). Productivity, however, was not evenly distributed throughout the study area. Downriver of Location LY-32.1, 12 nesting locations were occupied by peregrines, only six of which were

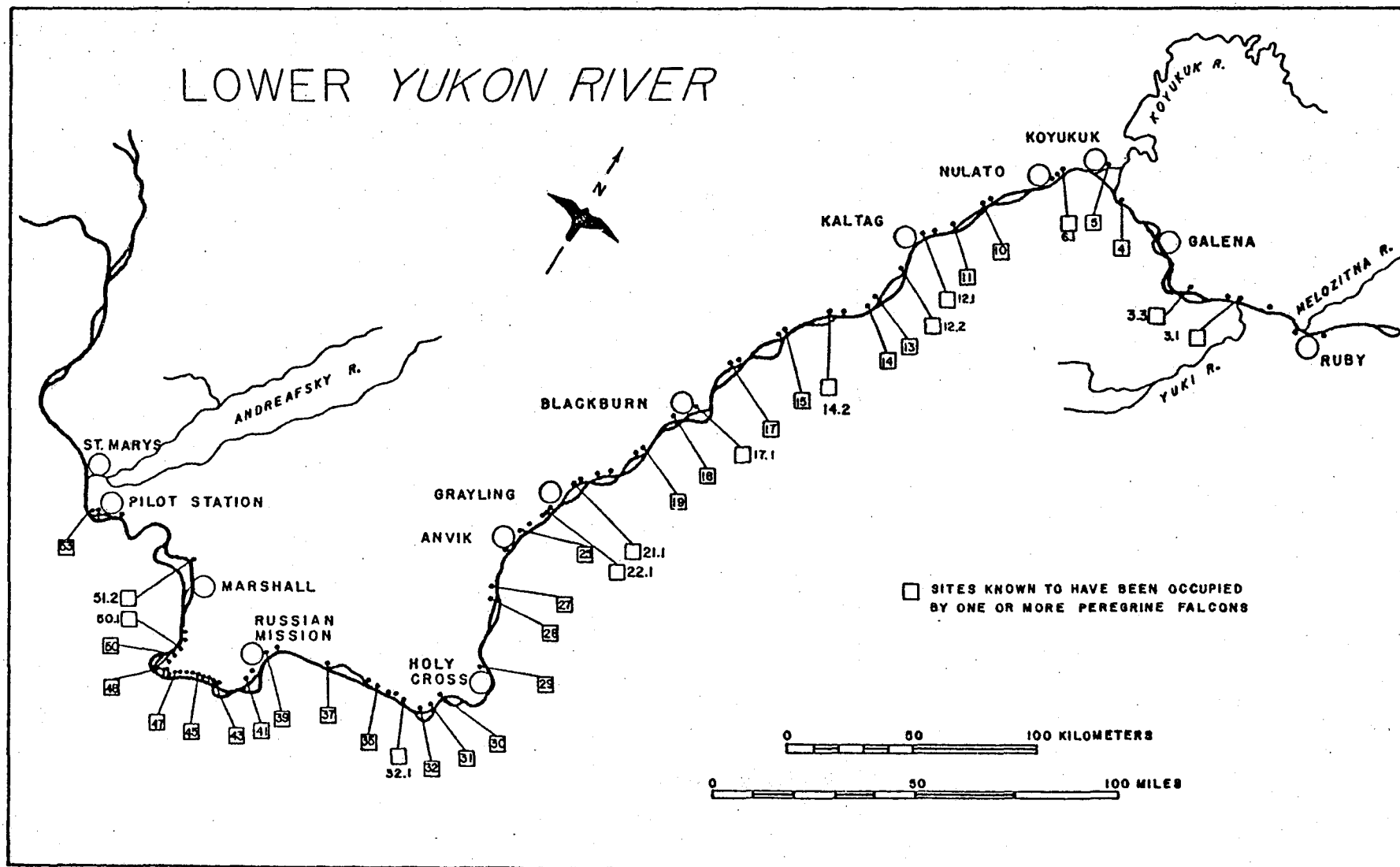


Figure 3. Locations of cliffs along the lower Yukon River, Alaska, that were occupied by Peregrine Falcons (*Falco peregrinus anatum*) in 1980.

Table 4. Site occupancy and numbers of Peregrine Falcons (*Falco peregrinus anatum*) at new and previously occupied locations on the lower Yukon River between Tanana and St. Marys, Alaska, 1980.¹

Location Number	Adults	Nestlings
LY-2	-	-
LY-3.1	2	4
LY-3.3	2	1 ²
LY-4	2	2
LY-5	2	4
LY-6	-	-
LY-6.1	2 ³	4
LY-8	-	-
LY-10	2	4
LY-11	2	3
LY-12.1	2	1
LY-12.2	2	0
LY-13	2	4
LY-14	2	2
LY-14.1	-	-
LY-14.2	2	3
LY-15	2	2 ⁴
LY-17	1	0
LY-17.1	2	0
LY-18	2	0
LY-19	2	3
LY-21	-	-
LY-21.1	2	3
LY-22	-	-
LY-22.1	2	3
LY-25	2	4
LY-26	-	-
LY-27	2	2
LY-28	2	2 ⁺
LY-29	2	1
LY-30	2	1
LY-31	2	2
LY-32	2	2
LY-32.1	2	3 ⁺
LY-35	2	2
LY-37	1	0
LY-38	-	-
LY-39	2	2
LY-41	2	0
LY-43	1	0
LY-44	-	-

Location Number	Adults	Nestlings
LY-45	2	3
LY-47	2	2
LY-48	1	0
LY-50	1	0
LY-50.1	2	0
LY-51.2	1	0
LY-52	-	-
LY-53	1	0
Total	32 pairs (27 pairs successfully produced nestlings) 7 single birds 1 subadult male with a producing pair	69 nestlings (minimum)

¹ - = not occupied; + = possible presence of additional individuals.

² Plus three dead nestlings (see text and Appendix 4).

³ A subadult male peregrine was also attending this nest location and defended the nest site in concert with the adult pair.

⁴ Plus one dead nestling (see text).

Table 5. Productivity of Peregrine Falcons (*Falco peregrinus anatum*) on the lower Yukon River between Tanana and St. Marys, Alaska, 1979 and 1980.

	1979 ¹	1980
Number chicks per successful attempt	2.4 (n = 16)	2.6 (n = 25)
Number chicks per attempt	1.3 (n = 29)	1.8 (n = 37)
Number failures	10 (30%)	12 (31%)
Number chicks at sites active in any two of the three study years 1978-1980	1.6 (n = 14)	2.3 (n = 18)
Number chicks at sites active in only one of the three study years 1978-1980	0.8 (n = 12)	1.4 (n = 19)

¹ Data are from Springer *et al.* (1979b).

confirmed pairs. Only four of these pairs produced nestlings (2.3 nestlings per successful attempt), for an average of only 0.8 nestlings per attempt. Upriver and including Location LY-32.1, the 27 remaining occupied locations were occupied by 26 pairs and one single individual. Productivity in that section of the river averaged 2.2 nestlings per attempt.

In general, peregrines nesting at locations with the longest known histories of occupation, 1977-1980, produced more nestlings on the average than did peregrines nesting at other locations (Tables 4 and 5, also see Springer *et al.* 1979b).

During July 1980, the breeding phenology of peregrines nesting along the lower Yukon River was determined from the estimated ages of the nestlings observed at nest sites. Table 6 compares the breeding phenology for the 1979 and 1980 nesting seasons, respectively. This year, peregrines that nested at locations that have been occupied in both of the previous survey years (1978 and 1979) appear to have laid eggs somewhat earlier ($\bar{x}$ = 4 May) than peregrines nesting at locations that were occupied only one of the previous two years ($\bar{x}$ = 7 May).

Fifty-seven of the 69 nestling peregrines found along the lower Yukon River were banded. One chick at Location LY-10 was inadvertently not banded, the nest ledge containing at least two chicks at LY-28 was inaccessible without a minimum rope length of about 250 feet, and nine chicks at Locations LY-30, LY-32.1, LY-45 and LY-47 could not be banded because of their advanced age. Banding information for the lower Yukon River area is listed in Appendix 6.

One whole, addled egg, one broken (unhatched) egg, several shell fragments from successfully hatched eggs and three dead nestlings were salvaged from the lower Yukon River study area in 1980 (Appendix 4). The three nestlings, siblings, were found at Location LY-3.3. Their deaths were attributed to a combination of over-crowding, a "false floor" of vegetation (*Artemisia* sp.) around the nest ledge perimeter and exposure to a wind storm (Appendix 4). A single, dead, badly

Table 6. Nesting phenology of Peregrine Falcons (*Falco peregrinus anatum*) on the lower Yukon River, Alaska, 1979 and 1980.¹

Event	Mean Date		Range	
	1979	1980	1979	1980
Begin egg laying	13 May	6 May	6-20 May	26 April-17 May
Finish egg laying	20 May	13 May	13-27 May	3-24 May
Hatching	23 June	16 June	16-30 June	6-27 June
Fledging	2 August	26 July	26 July-9 August	15 July-6 August

¹ Dates were determined by back-dating from observations of chicks of estimated age: 1979, $n = 39$, $\bar{x} = 13.3$ days, s.d. = 5.4 days on 5 July; 1980, $n = 69$, $\bar{x} = 20.5$ days, s.d. = 8.8 days on 5 July. Mean time intervals used in these calculations are 7 days required for a complete clutch to be laid, 34 days for incubation, and 40 days as nestlings.

decomposed nestling was also found at LY-15. The cause of that chick's death is unknown. We can only speculate that it was pushed from the nest ledge by siblings or fell of its own volition at least a week or more before our arrival.

The food habits of peregrines along the Yukon River were determined from a cursory examination of prey remains collected at nesting locations. Abundant prey items included Common Snipe (*Capella gallinago*), American Wigeon and passerines, particularly Gray Jay, Varied Thrush (*Ixoreus naevius*) and catharid thrushes (*Cathorus* sp.). These species were also common prey items during 1979 (Springer *et al.* 1979b). At least one new prey species, Belted Kingfisher (*Megaceryl alcyon*), was recorded this year at location LY-3.1. Characteristically, prey use varied from nest to nest and these differences probably reflect individual prey preferences of peregrines as well as local prey availability.

This year there was a high incidence of microtines among the prey remains. The relatively common occurrence of voles may indicate an abundance of these species in parts of the study area. On several occasions we saw voles as we traversed grassy areas near peregrine nesting areas.

We observed an adult female peregrine attempting to take a Gray Jay above the river at LY-30. The peregrine moved from perch to perch in trees above the nest cliff and then dove at the jay when it was directly in front of the nest cliff. These observations suggest that many avian prey species passing in front of nesting cliffs are simply picked up by the adult peregrines perching above. This hunting technique also has been reported for peregrines in other areas (Cade 1960).

Arctic National Wildlife Range

Surveys for cliff-nesting raptors, including Peregrine Falcons, have been conducted previously in the ANWR in northeastern Alaska. In 1971 the Canning River between the confluence of the Marsh Fork and the vicinity of Red Hill was floated by White and Spofford (C. M. White

personal communication 1974). In 1972 and 1973 aerial surveys were specifically conducted to identify raptor nesting locations along two proposed gas pipeline routes in this region (Roseneau 1973, 1974). During this study the Arctic Slope drainages between the Ivishak River and the U.S.-Canada border received relatively complete survey coverage. In 1973 and 1974, the Alaska Department of Fish and Game participated cooperatively in these and other raptor surveys in this region, and additional data were collected through 1975 (Roseneau *et al.* 1976). Roseneau *et al.* (1976) summarized all of the results pertaining to peregrines obtained in this region during 1972-1975. These data provided the basis for the selection of the specific areas surveyed by us in 1980.

All raptor locations found in 1980 in the selected survey areas within the ANWR are listed in Appendix 3 and are shown on the attached USGS topographic maps (Maps No. 9 and 10). No Peregrine Falcons were observed at any of the locations within the five areas surveyed in 1980. Our results are reported here by river drainage.

Canning River

Three peregrine nesting locations, CAN-3, CAN-5 and CAN-6, were discovered near the confluence of the Marsh Fork and Canning River in 1972-1973 (Roseneau 1974). Two of these locations, CAN-3 and CAN-5, were not occupied by any raptor species in 1980. The remaining location, CAN-6, was occupied by a pair of Gyrfalcons (*F. rusticolus*). However, that pair had apparently failed to successfully produce young; no evidence of a successful nesting attempt could be found on the cliff.

A single Gyrfalcon was observed at CAN-9, about 6 km upstream of Shublik Island. At this location the river flows between two opposing cliffs, both of which have been used by raptors in the past. Two empty stick nests and an unoccupied ledge were found in this area. One nest site on the east-facing cliff near its downstream end appears particularly favorable to peregrines. Rough-legged Hawks (*Buteo lagopus*) had nested at this location in 1972-1973, and at least one Gyrfalcon was

present in 1973, however, peregrines were not present in 1971-1975 (Roseneau 1974; Roseneau *et al.* 1976, White personal communication). Peregrines were reported to have nested in this vicinity in 1963 (M. D. Mangus personal communication to C. M. White 1975).

The west bank of the Canning River between the vicinities of Mount Copleston and Red Hill offers a number of locations suitable for cliff-nesting raptors. In 1980 we found only two active Rough-legged Hawk nests in this section of the river (Locations CAN-11 and CAN-12), and several unoccupied ledges and stick nests. In 1972-1973, one pair of Gyrfalcons and one pair of Rough-legged Hawks nested at or very near these locations each year, and one additional pair of Rough-legged Hawks nested both years opposite the mouth of Ignek Creek (CAN-13).

Peregrines were never observed nesting along this section of the Canning River in 1971-1975 (Roseneau 1974, Roseneau *et al.* 1976, White personal communication). A pair of peregrines was, however, reported to have nested at or in the immediate vicinity of CAN-11 and CAN-12 in 1963, and another pair was reported to have nested at or several kilometers to the north of CAN-13 in 1947 (M. D. Mangus personal communication to C. M. White 1975).

The remainder of the Canning River course between the Red Hill vicinity and the Staines River does not appear to offer potential nesting habitat to falcons, hawks or eagles. This section of the river contains a few soil and dirt banks. These locations, however, appear marginal at best, and no evidence of any current or past use by nesting raptors could be found at them in 1980, or in previous years (Roseneau 1974, Roseneau *et al.* 1976).

Katakturuk River

We know of only three nesting locations north of the Sadlerochit Mountains in the Katakuruk River drainage. All of these locations, KAT-1, KAT-2 and KAT-3, were unoccupied in 1980. Location KAT-1 was occupied by a pair of Rough-legged Hawks, and KAT-2 was occupied by Golden Eagles (*Aquila chrysaetos*) in 1973 (Roseneau 1974). A pair of

peregrines was reported to have nested at or very near Location KAT-2 in 1963 and 1966 (M. D. Mangus personal communication to C. M. White 1975). Location KAT-3 was not used by any species in 1972-1977, and was considered an unlikely nesting site (Roseneau 1974 personal observation). However, a pair of Gyrfalcons was reported to have nested there in 1966 (M. D. Mangus personal communication to C. M. White 1975).

Sadlerochit River

We surveyed a small section of concentrated nesting habitat in the Sadlerochit River drainage in 1980. This area was included because there have been occasional, though unconfirmed, reports of peregrines inhabiting it in recent years. Only four nesting locations, SAD-1, SAD-2, SAD-3 and SAD-4, occur in this area. All four locations were also documented by Roseneau (1974).

Only location SAD-2 may have had an active nest at it in 1980. An adult Golden Eagle was perched on the cliff near a stick nest that appeared to be empty (Appendix 3). Several other large stick nests occur on this cliff, however, and we may have missed seeing an active nest site because of local weather conditions.

Hulahula River

Only three nesting locations were found in the Kikiktat Mountain vicinity along the Hulahula River in 1980. None of these locations (HUL-1, HUL-2 and HUL-3) were occupied, and two of them, HUL-1 and HUL-3, had stick nests that had fallen from the cliff. Evidence was found that Gyrfalcons had used the Golden Eagle nest at HUL-1 before it slumped off the cliff (Appendix 3).

Aichilik River

Seven nesting locations or potential nesting locations, AIC-1, AIC-2, AIC-3, AIC-4, AIC-5, AIC-6 and AIC-7, occur in the section of the Aichilik River drainage we surveyed in 1980. Two of these locations, AIC-1 and AIC-7 could not be surveyed because of the local weather conditions that persisted during 12-14 August. Only two of the remaining five locations, AIC-4 and AIC-5 were occupied. A single adult Golden

Eagle was observed at AIC-4, and an unsuccessful nesting attempt was found at that cliff. At AIC-5 an abandoned clutch of three Gyrfalcon eggs was observed on a ledge. Adults were not present. The other locations were unoccupied (Appendix 3).

Two of the locations, AIC-2 and AIC-7, represent vicinities where pairs of peregrines were reported to have nested in 1966 and 1969 (M. D. Mangus personal communication to C. M. White 1975). At Location AIC-2, nesting habitat appeared marginal. Even though Location AIC-7 was not checked by us in 1980, we know nesting habitat is somewhat marginal there too, and peregrines were never observed at either location in 1972-1976 (Roseneau 1974 personal observation, Roseneau *et al.* 1976).

DISCUSSION

Yukon River

The numbers and productivity of peregrines nesting along the Yukon River between Stevens Village and St. Marys in 1980 were higher by about 35% and 100%, respectively, than in 1979. These figures represent a marked increase over levels already considered to be good (Springer *et al.* 1979a, b). This increased size of the subpopulation in the lower Yukon River study area probably influenced the distribution of occupied versus unoccupied nesting locations. Data obtained along this section of the river in 1978 and 1979 suggested that about one-third of the population was mobile (Springer *et al.* 1979b). In each of those years about the same number of locations were occupied, but in 1978 most of those locations were downriver of Grayling, while in 1979 most of them were upriver of Grayling. In 1980, when more birds were present, occupancy was distributed relatively uniformly throughout the length of the entire study area.

The 100% increase in productivity that we observed throughout most of the Yukon River below Stevens Village in 1980 was dramatic. Several factors contributed to that increase. The absolute number of adults increased by 32 individuals (34%), and 12 (32%) more pairs were present in 1980. Nesting failures, based on total occupied locations, decreased slightly over that of the previous year (16% in 1980 vs. 23% in 1979), and a much higher proportion (42%) of the total pairs present in 1980 nested successfully. Large brood sizes were also common in 1980. For example, of four successful nests in the middle section of the Yukon River, one contained a brood of four young and another contained a brood of three young. Similarly, the lower Yukon River study area had six pairs with broods of four young and eight other nests contained broods of three young. Thus, the increased mean number of young produced per nesting attempt and per successful pair also contributed to the doubled production observed this year.

Even though the distribution of occupied locations was relatively uniform in 1980 and overall productivity was higher than in past years, the nesting success of peregrine pairs inhabiting the lower Yukon River study area was not uniform. Below Holy Cross productivity was considerably lower than at nesting locations upriver of that village. The influence of coastal (maritime) weather may account for the differential success of birds nesting along this portion of the study area. Raptor surveys we made on the Seward Peninsula in early July indicated that inclement weather during June and early July may have reduced the productivity of Gyrfalcons. Numerous addled eggs, small and large dead nestlings and wet live nestlings prone to hypothermia were found at many nest sites. This evidence of mortality correlates with excessively unfavorable weather conditions in this region during most of June and early July (C. Gravogel personal communication). Along the lower Yukon River we found a nestling Gyrfalcon (Location LY-54) that had succumbed to exposure after a severe coastal storm. These same weather conditions, occurring during peregrine incubation and nestling periods, may have reduced the success of pairs that attempted to nest downstream of Holy Cross in 1980.

The reproductive phenology of peregrines nesting along the Yukon River between Stevens Village and St. Marys was about one week earlier than in 1978 and 1979 (Springer *et al.* 1979b). Similar phenological patterns were observed on the upper Yukon River, the Porcupine River and the Tanana River in 1980 (R. E. Ambrose personal communication, Roseneau and Bente 1980). These data suggest that the advanced breeding season for peregrines was a general state-wide phenomenon and may have been influenced by favorable climatic conditions during migration and arrival periods.

Despite the low nesting success and productivity in the downstream section of the lower Yukon River study area, the overall high numbers and excellent productivity in the remainder of the Yukon River drainage upstream to Stevens Village is extremely encouraging.

Our data from 1978-1980 indicates a continual increase in the numbers of peregrines in what already appeared to be a substantial sub-population. The increase in numbers that has occurred in this part of the Yukon River is matched by similar increases in much of the remainder of the Yukon drainage (Curatolo and Ambrose 1978, Ambrose 1979, Curatolo and Ritchie 1979, D. Mossop personal communication). All these data now suggest that a strong upward trend in both the numbers and productivity of northern *anatum* peregrines has developed over a broad region of their nesting range in the last four years.

Arctic National Wildlife Range

The absence of peregrines in the areas surveyed in the ANWR in 1980 is not particularly surprising considering the quality of the nesting habitat and the previous observations made in this region (Roseneau 1974, Roseneau *et al.* 1976). Roseneau *et al.* (1976) evaluated 21 Arctic Slope rivers east of the Sagavanirktok River, and for perspective we have included that information in Appendix 7.

It appears unlikely that a substantial number of peregrines have ever nested on the Arctic Slope of Alaska east of the Sagavanirktok River drainage, including the ANWR. There are no sections of habitat comparable to that used by peregrines on the western Arctic Slope (e.g. Sagavanirktok and Colville river drainages). The habitat that does exist in the ANWR is generally poor and either is restricted to limited sections of the Canning, Sadlerochit and Kongakut rivers, or occurs as scattered, individual nesting locations (Roseneau *et al.* 1976).

Even though nesting habitat and nesting locations for peregrines are not common in the ANWR, a limited number of pairs have been recorded nesting there in past years (Cade 1960, Roseneau *et al.* 1976). The current lack of nesting pairs in some of the better areas of available nesting habitat probably reflects the current depressed state of the *F. p. tundrius* population. We hypothesize that once pairs are lost, for what ever reason, in regions that contain only widely scattered nesting locations, much longer periods of time may be required for

repopulation than in areas of more concentrated nesting (e.g. the Colville River drainage).

Alternatively the complete lack of nesting peregrines in the areas surveyed this year may be the result of unfavorable nesting conditions in this region this year. All other cliff-nesting raptors appeared to experience poor nesting success in the areas we surveyed in the ANWR and in parts of the central Arctic Slope, and in parts of the Yukon Territory (D. Mossop personal communication). It is possible that a few peregrines, present earlier in the season in the ANWR, abandoned their attempts to nest and were absent by the time of our surveys.

LITERATURE CITED

- Ambrose, Robert E. 1979. Combined reports of the Yukon River Peregrine Falcon surveillance program, 1979. Unpubl. report submitted to U.S. Fish Wildl. Serv. Div. Law Enforcement, Fairbanks. 10 p.
- Cade, Tom J. 1960. Ecology of the peregrine and gyrfalcon populations in Alaska. Univ. Calif. Publ. Zool. 63:151-162.
- Curatolo, James A., and Robert Ambrose. 1978. A final report of the Peregrine Falcon surveillance program between Circle, Alaska, and the Alaska-Yukon border, 1978. Unpubl. report submitted to U.S. Fish Wildl. Serv., Div. Law Enforcement, Fairbanks, Alaska. 40 p.
- Curatolo, James A., and Robert J. Ritchie. 1979. Peregrine Falcon banding on the Porcupine River, Alaska, 1979. Unpubl. report submitted to U.S. Fish Wildl. Serv., Office of Endangered Species, Anchorage, Alaska. Contract No. 14-16-0007-79-0016. 28 p.
- Haugh, John R., and Keith C. Halperin. 1976. Evaluation of raptor populations: Portage Glacier area, Denali Highway area, Yukon River pipeline crossing area, and Yukon River and Porcupine River tributaries. Unpubl. report submitted to U.S. Dept. Interior, Bur. Land Mgmt., Anchorage, Alaska. 58 p.
- Roseneau, David G. 1973. Raptorial bird nesting sites along proposed pipeline routes in Alaska. Unpubl. report submitted to Northern Engineering Services Company, Ltd. and Canadian Arctic Gas Study Company, Ltd., Calgary, Alberta. 40 p.
- Roseneau, David G. 1974. A continuation of studies of raptorial bird nesting sites along proposed pipeline routes in Alaska. Unpubl. report submitted to Northern Engineering Services Company, Ltd. and Canadian Arctic Gas Study Company, Ltd., Calgary, Alberta. 68 p.
- Roseneau, David G., and Peter J. Bente. 1980. Peregrine Falcon surveys in selected areas of nesting habitat along the proposed Northwest Alaskan Pipeline Company route in Alaska, 1980. Report prepared for Northwest Alaskan Pipeline Company, Salt Lake City, Utah (administered by Fluor Northwest, Inc., Contract No. 478085-9-K127, Task 3).
- Roseneau, David G., Harry Reynolds III, and Clayton M. White. 1976. Northeastern Alaska. p. 243-245 In Richard W. Fyfe, Stanley A. Temple and Tom J. Cade. eds. The 1975 North American Peregrine Falcon survey. Can. Field-Nat. 90(3): 228-273.

Springer, Alan M., David G. Roseneau, and Peter J. Bente. 1979a. Numbers and status of Peregrine Falcons on portions of the Colville River and Yukon River, Alaska. Unpubl. report submitted to U.S. Fish Wildl. Serv., Office of Endangered Species, Anchorage, Alaska, P.O. No. 72100-0472. 36 p.

Springer, Alan M., David G. Roseneau, Peter J. Bente, Wayman Walker II, and Ronald G. Clarke. 1979b. Numbers and status of Peregrine Falcons on the Colville River, middle Yukon River and lower Yukon River, Alaska, 1979. Unpubl. report submitted to U.S. Fish Wildl. Serv., Office of Endangered Species, Anchorage, Alaska. Contract No. 14-16-0007-79-0015. 69 p.

White, Clayton M. 1974. The 1974 raptor survey of the Alaska pipeline between Franklin Bluffs and Big Delta. Unpubl. interim report submitted to U.S. Fish Wildl. Serv., Anchorage, Alaska. 10 p.

Appendix 1. Status of nesting locations used by Peregrine Falcons (*Falco peregrinus anatum*) on the middle Yukon River between Fort Hamlin and Tanana, Alaska, 1980.

Location

MY-1 1980--Unoccupied.

MY-2 1980--A single female peregrine was observed at this cliff on 9 June. Two adult peregrines were seen on 5 July. There was no evidence of successful nesting by this pair. Neither adult exhibited defensive behavior when we visited the cliff. Two newly formed but otherwise unused scrapes were located on the cliff.

MY-3 1980--Unoccupied.

MY-4 1980--Unoccupied.

MY-5 1980--Unoccupied.

MY-5.1 1980--A female peregrine was flushed from a nesting ledge on 10 June as we approached this cliff in a raft. On 5 July a pair was present and 2 young were observed and subsequently banded.

MY-6 1980--Peregrines were not at this cliff when we checked it on 10 June and 5 July. However, D. Modrow (personal communication) reported that he had seen a pair of peregrines at this cliff when he visited the nearby creek to get drinking water. His last observation was made several days before our arrival in July. Some fresh prey remains found on the beach during June also confirm the presence of peregrines at this cliff.

MY-7 1980--Unoccupied.

MY-8 1980--A defensive pair of peregrines was present at this cliff on 10 June. This pair produced four young which we banded on 6 July 1980.

MY-9 1980--Unoccupied.

MY-9.1 1980--This newly designated cliff was unoccupied by peregrines but offers good nesting potential. Close inspection of this cliff is warranted in future years.

MY-10 1980--Unoccupied.

MY-11 1980--Unoccupied.

MY-12 1980--A defensive pair of peregrines was observed at this cliff on 11 June and 6 July. This pair successfully produced three young. We banded these nestlings on our 6 July visit to it.

MY-13 1980--Unoccupied.

MY-14 1980--Unoccupied.

MY-15 1980--This cliff was occupied by a pair of ravens with four young that were nearly ready to fledge on 11 June.

MY-16 1980--A male peregrine was seen returning with food on 12 June, although its mate could not be located at that time. Some weak vocalizations from the cliff suggested the female was sitting tightly on the nest ledge. A mildly defensive pair was present on 7 July and two young were located near the scrape. While banding these birds, a maggot-infested injury was noticed on the wing of one otherwise healthy nestling. The wound was cleansed and chances of recovery seemed good but it is not known if this chick fledged successfully.

Appendix 2. Status of nesting locations used by Peregrine Falcons (*Falco peregrinus anatum*) on the lower Yukon River between Tanana and St. Marys, Alaska, 1980.

Location

- LY-1 1980--Unoccupied.
- LY-2 1980--Unoccupied.
- LY-3 1980--Unoccupied.
- LY-3.1 1980--A defensive adult female peregrine was seen on 14 June when she flushed from a probable ledge area. Four young were present in the same ledge used in 1979. These nestlings were banded on 9 July.
- LY-3.2 1980--A pair of ravens raised three young at this cliff. One young was out of the nest on 14 June.
- LY-3.3 1980--Peregrines were not observed at this cliff during our visit on 14 June but a successful nest was located here on 9 July. This pair hatched four young in a small unstable ledge area. Three nestlings about 20 days old were found dead in a narrow rock slide chute below the ledge. These chicks apparently died when they fell from the nest (Appendix 4). The remaining nestling was banded and the dead chicks were collected for pollutant residue analysis.
-
- LY-4 1980--A quiet adult male peregrine was perched on this cliff on 14 June. A pair with two young (at the same ledge used in 1979) was located on 10 July. While we were banding the two young a boat stopped to observe our activities. A fishwheel was located almost directly below the ledge used by the peregrines. We observed the pair defending the nest site and then they performed a food transfer while several people were working on the wheel at the base of the cliff. We concluded the birds were mildly disturbed by this fishing activity but were able to continue their normal activities (i.e. feeding) because people were at the fish wheel for only short periods of time.
- LY-5 1980--No peregrines were observed at this cliff on 14 June, but a pair with four young was located here on 10 July. We stopped in at a fish camp slightly upstream of this site and learned that peregrines are also sometimes present at LY-6. The pair was not defensive until we climbed close to the ledge in preparation to band the four nestlings. This pair occupied the same location where peregrines were observed in June 1979.

- LY-6 1980--No peregrines were observed at this cliff on either 14-15 June and 10 July. In June, a pair of ravens with four fledged young were present at the downstream end of this cliff. In July, a pair of Rough-legged Hawks with three large young was present at the upstream end of this cliff. A woman in the fish camp located near LY-5 reported that falcons occupy this cliff in some years.
- LY-6.1 1980--A non-defensive pair of adult peregrines was present on 15 June and performed much flying in front of, and above the cliff. On 11 July we located and banded four young on a ledge near another ledge that had been abandoned in 1979. A third, subadult male peregrine also defended this nest site while we were visiting the cliff.
- LY-7 1980--Unoccupied.
- LY-8 1980--Unoccupied.
- LY-9 1980--Unoccupied.
- LY-10 1980--A pair of peregrines engaged in a food transfer on 15 June as we watched the cliff. The female continued eating while we were present, and neither bird defended the cliff. This pair had four young on 12 July and three of them were banded. The adults were absent for most of our visit but defended loudly when they returned.
-
- LY-11 1980--No peregrines were seen at this cliff during rainy weather on 15 June, but a pair with three young was found here on 12 July. A small crevice in the rock, not very obvious from the river, was used as a ledge. The condition of the ledge suggested that it had been used in previous years.
- LY-12 1980--Unoccupied.
- LY-12.1 1980--Peregrines were not found at this location during rainy weather on 15 June. A pair of peregrines with one young on a very small rock ledge was present on 12 July. Both adults defended the nest site while this chick was banded. A new ledge, approximately 0.4 km downstream of the 1979 site, was used this year.
- LY-12.2 1980--A pair of adult peregrines was present on 15 June, although they did not defend the cliff while we were present. Calls by the birds included much mutual wailing. On 12 July, the pair was present, but nondefensive. These birds failed to nest successfully.

- LY-13 1980--A single adult female flushed from the cliff at our approach on 15 June. A food transfer and feeding of chicks was heard on 13 July while we were returning from inspecting the 1979 site. A ledge with four young was located approximately 0.4 km from the 1979 scrape areas. All nestlings were banded.
- LY-14 1980--A pair of quiet peregrines and a raven nest with four young were seen here on 16 June. When leaving the area we saw the female peregrine carefully walk into a ledge. On 13 July, a pair with two nestlings was found at this location. Both chicks were banded. The same ledge was used in 1979 and 1980.
- LY-14.1 1980--Unoccupied, but a pair of peregrines nested at a nearby alternate location (LY-14.2).
- LY-14.2 1980--A defensive pair of peregrines was present at this location on 16 June. The female walked into a scrape as we departed the area. Three young were banded at this location on 13 July.
- LY-15 1980--A defensive pair of peregrines occupied this location on 16 June. Two young were banded on 14 July, and the remains of another dead nestling was found at the ledge. The same ledge was used in both 1979 and 1980.
- LY-16 1980--Unoccupied.
- LY-16.1 1980--This location is a raven nest on a soil bank and should probably not be classed as a potential peregrine nesting location. Ravens successfully raised young at this site this year.
- LY-17 1980--A female peregrine was flushed from a new ledge area on 16 June. No birds were present on 14 July. The peregrines at this location failed to nest successfully; no evidence of a successful attempt was found.
- LY-17.1 1980--No peregrines were observed during poor weather on 16 June. An adult male peregrine was perched on the cliff on 14 July. The residents at Blackburn reported a pair defending the cliff approximately one week before our arrival but we could find no evidence of a successful nesting attempt.
- LY-18 1980--A poorly defensive pair of peregrines occupied this site on 16 June, but no birds were present on 14 July. No evidence of a nesting attempt was found.

- LY-19 1980--A pair of peregrines was present at this site on 16 June, and three young were banded at this location on 15 July. A new ledge area was used this year.
- LY-19.1 1980--Unoccupied.
- LY-19.2 1980--Unoccupied.
- LY-20 1980--Unoccupied.
- LY-21 1980--Unoccupied.
- LY-21.1 1980--A pair of peregrines conducted a food transfer at this location on 17 June, and we observed the female walk to the scrape area used in 1979. Three young were banded at this location on 15 July.
- LY-22 1980--Unoccupied.
- LY-22.1 1980--A female peregrine flushed from this cliff on 17 June and a pair with three young was present on 16 July. All nestlings were banded.
- LY-23 1980--Unoccupied.
- LY-24 1980--Unoccupied.
- LY-25 1980--On 17 June an adult male peregrine was perched near the ledge area that was used in 1979. Four young were banded on 16 July at a large ledge nearby the 1979 site. A large shell fragment was collected from the scrape area.
- LY-26 1980--Unoccupied.
- LY-27 1980--No peregrines were found at this cliff on 17 June, but a pair with two young were present on 16 July. One nestling had fallen below the nest ledge and was returned to the scrape during banding activities.
- LY-28 1980--A pair of peregrines was seen flying in front of this cliff (probably engaged in a food transfer) on 17 June. An inaccessible nest ledge contained at least two young on 17 July. These young were not banded.
- LY-29 1980--A pair of weakly defensive peregrines was present at this site on 18 June. A single nestling was banded and an addled egg collected on 17 July at a new ledge. The nestling was below the ledge and other young may

LY-29 (continued)

have fallen out of the nest. When we arrived in July we noticed a recent set of footprints indicating that somebody had climbed the cliff to observe the nest. No evidence suggested the person actually entered the nest.

- LY-30 1980--A pair of peregrines was seen at this location on 18 June and a single fledgling was observed on 17-18 July. This young bird was not banded.
- LY-31 1980--A pair of peregrines was present at this cliff on 18 June, and the adult female was observed feeding five day old nestlings on a small ledge. Two fledglings were located on the beach and banded on 18 July. Prey remains along the beachline showed that, like last year, the young fell from the nest prior to fledging. A pair of Rough-legged Hawks was also nesting at this location in June.
- LY-32 1980--A pair of peregrines with recently hatched young, and a pair of ravens with four young were present along this section of cliff on 18 June. Two young peregrines that were on the beach under an alder tree were banded on 18 July. These young had probably fallen from the nest prior to fledging. A new nesting location was used in 1980.
- LY-32.1 1980--A female was flushed from the ledge used in 1979 on 18 June, and at least three nearly fledged young were observed on 18 July. These young were not banded. While walking below the nest cliff we found the remains of a nestling peregrine that had fallen from the cliff during some previous year.
- LY-33 1980--Unoccupied.
- LY-34 1980--Unoccupied.
- LY-35 1980--A female peregrine was observed at a nest ledge on 18 June, and two young were banded at this location on 18 July. A new nest ledge was used this year. *(9 molted brown not feathers!!)*
- LY-36 1980--Unoccupied.
- LY-37 1980--On 18 June a female peregrine was observed incubating in the nest used in 1978. No peregrines were present on 19 July and the remains of a broken egg were collected from the scrape.

- LY-38 1980--Unoccupied.
- LY-39 1980--No peregrines were found at this cliff on 19 June, but two nestlings were banded on 19 July. The ledge used this year was not the same as the ledge used in 1978.
- LY-40 1980--Rough-legged Hawks were present at this location on 19 June. No peregrines were observed in either June or July.
- LY-41 1980--Rough-legged Hawks with at least one young and ravens with four young were found at this cliff on 19 June. No peregrines were observed in June but on 19-20 July a pair of nondefensive peregrines were present at the cliff. This pair failed in their attempt to nest.
- LY-42 1980--Unoccupied. This tree nest should not be considered as nesting potential for peregrines and will be removed from our list of sites.
- LY-42.1 1980--A Rough-legged Hawk was sitting on a nest during our visit on 19 June. At least two fledglings were present at this site when we passed it on 20 July.
- LY-43 1980--A single peregrine flushed from this cliff during windy and rainy weather on 19 June. No peregrines were present at this site on 20 June.
- LY-44 1980--Unoccupied.
- LY-44.1 1980--Unoccupied.
- LY-45 1980--A loudly defensive pair of peregrines was at this cliff on 19 June. A ledge with three nearly fledged young was found on 20 July. These young were not banded.
- LY-46 1980--Unoccupied.
- LY-46.1 1980--Unoccupied.
- LY-46.2 1980--Unoccupied.
- LY-47 1980--A pair of peregrines was present at this cliff on 20 June and two fledglings were seen flying with the adults on 20 July. These young birds were not banded.
- LY-47.1 1980--An adult Great Horned Owl flushed from this cliff on 20 July.

- LY-48 1980--A raven with at least two fledged young, and a Rough-legged Hawk brooding tightly on a nest were observed on 20 June. During our visit on 20 July a single adult female peregrine flushed from the cliff, and the Rough-legged Hawks had at least one large nestling in their nest. In 1979 we had flushed a single subadult female peregrine from this cliff.
- LY-49 1980--A pair of Rough-legged Hawks with three fledged young was present at this cliff on 20 July. No peregrines were present at this cliff in either June or July.
- LY-50 1980--A single peregrine was flushed from this cliff on 20 June, and no peregrines were found on 20 July.
- LY-50.1 1980--No peregrines were observed on 20 June, but on 20 July a pair was present at this cliff. This pair was not successful in their attempt to nest. A pair of ravens raised at least two young, and a pair of Rough-legged Hawks fledged three young from this cliff.
- LY-50.2 1980--Unoccupied.
- LY-51 1980--A pair of Rough-legged Hawks had fledged at least two young when we were present on 21 July.
- LY-51.1 1980--Unoccupied.
-
- LY-51.2 1980--No peregrines were observed at this location on 20 June but a single adult female was flushed from the cliff on 21 July. No young were raised at this location.
- LY-52 1980--Unoccupied.
- LY-53 1980--A single adult female peregrine was flushed from this cliff on 20 June and 21 July, but no evidence of successful nesting was found during either visit.
- LY-54 1980--This low riverfront hill contained a small ledge that was occupied by Gyrfalcons (*Falco rusticolus*) with two young on 20 June. One dead chick, found below the ledge, probably died in a heavy wind and rain storm on 18-19 June. Evidence at the site shows that it has been used in previous years. This location was checked by H. K. Springer in a previous year (Springer *et al.* 1979a, H. K. Springer personal communication).

Appendix 3. Status of nesting locations used by cliff-nesting raptors in the Arctic National Wildlife Range in northeastern Alaska, 1980.

Canning River

- CAN-1 1980--The south bank of this tributary creek contained two recently constructed Golden Eagle nests. Both nests were unoccupied this year.
- CAN-2 1980--The north bank of this tributary creek has an unoccupied ledge and an unoccupied Golden Eagle nest.
- CAN-3 1980--An unoccupied ledge was found on the south bank of this tributary creek. Falcons (either Gyrfalcons or Peregrine Falcons) were present at this location during 1972, and peregrines occupied a nest site here in 1973 (Roseneau 1974, Roseneau *et al.* 1976).
- CAN-4 1980--An empty Golden Eagle nest was found on a hillside rock outcrop that faces the Canning River. No evidence of recent use by raptors was observed.
- CAN-5 1980--An unoccupied ledge suitable for use by falcons was observed at this location. In 1972 this nesting location was used by peregrines, but it was unoccupied when checked in 1973 (Roseneau 1974, Roseneau *et al.* 1976).
- CAN-6 1980--A pair of unsuccessful Gyrfalcons was present at this location on 8 August. The north bank of the tributary creek contained a recently built stick nest and an old flattened Golden Eagle nest. No evidence of an attempted nesting by the Gyrfalcons was found. The weathered remains of a dead nestling Gyrfalcons were found opposite the Golden Eagle nest, indicating that falcons have used this site. Peregrine Falcons were observed nesting here in 1972, and one adult peregrine was seen in 1973. The remains of a dead nestling peregrine that was probably raised in 1973 was found at this site in 1974 (Roseneau 1974, Roseneau *et al.* 1976).
- CAN-7 1980--The north side of this slope contains good raptor nesting habitat. No active nests were located but this area should be considered good potential habitat.
- CAN-8 1980--An area of good potential habitat occurs along this tributary creek. No raptors were evident when we observed this location from the Canning River.

- CAN-9 1980--A single male Gyrfalcon was flushed from this section of the river on 5 August but no evidence of successful nesting was found. Both sides of the river offer nesting locations for raptors and a ledge and two empty Rough-legged Hawk nests were observed. Peregrines were reported to have nested in the vicinity of this location in 1963 (M. C. Mangus personal communication to C. M. White 1975). In 1972 and 1973, Rough-legged Hawks nested here, and in 1973 a pair of Gyrfalcons also attempted to nest at this location (Roseneau 1974).
- CAN-10 1980--Three unoccupied stick nests were seen at this location. One nest was probably constructed by Common Ravens and the others were made by Rough-legged Hawks.
- CAN-11 1980--An active Rough-legged Hawk nest with at least one fledged young was found on 5 August. A nest ledge that showed evidence of previous use by Gyrfalcons was also located in this area. In 1972 Rough-legged Hawks occupied a nest at this location, and in 1973 Gyrfalcons nested here (Roseneau 1974). A pair of peregrines was reported to have nested in this vicinity in 1963 (M. D. Mangus personal communication to C. M. White 1975).
- CAN-12 1980--A Rough-legged Hawk nest with two young near fledging age was located here on 5 August. One other weathered stick nest was found downstream of the active nest. In 1972 Gyrfalcons were present here, and in 1973 Rough-legged Hawks nested at this location (Roseneau 1974). A pair of peregrines was reported to have nested in this vicinity in 1963 (see CAN-11 above).
- CAN-13 1980--Five unoccupied Rough-legged Hawk nests were present along 2 km of dirt bluff in this area. None of the nests showed recent use, although some evidence of perching by raptors was found along the bluff. An adult Golden Eagle was observed soaring high above this area on 5 August. Rough-legged Hawks nested here in both 1972 and 1973 (Roseneau 1974). A pair of peregrines was reported to have nested at or near here in 1947 (M. D. Mangus personal communication to C. M. White 1975).

Katakturuk River

- KAT-1 1980--A small rock exposure on the east bank had an unoccupied Rough-legged Hawk nest on it. Rough-legged Hawks occupied a nest here in 1973 (Roseneau 1974).

- KAT-2 1980--An unoccupied Rough-legged Hawk nest was seen at this location on 9 August. Golden Eagles nested here in 1973 (Roseneau 1974). Peregrines were reported nesting at this location in 1963 and 1966 (M. D. Mangus personal communication to C. M. White 1975).
- KAT-3 1980--A small outcrop showing some potential for Rough-legged Hawks was observed at this location, but no raptors were present on 9 August. Some snow was still present at the base of the cliff and it is possible that this location was not snow free during the early nesting season. Gyrfalcons were reported at this location in 1966 (M. D. Mangus personal communication to C. M. White 1975). No raptors were present in 1973-1976 (Roseneau 1974, unpublished field notes).

Sadlerochit River

- SAD-1 1980--This location has two unoccupied Rough-legged Hawk nests and an excellent falcon ledge at the downstream portion of the cliff. No raptors were present during our survey on 9 and 15 August. Gyrfalcons have been observed at this location in 1969 (M. D. Mangus personal communication to C. M. White 1975). In 1972 it was occupied by Gyrfalcons, but in 1973 it was unoccupied (Roseneau 1974).
- SAD-2 1980--An adult Golden Eagle was perched at a nest during a rainstorm on 9 August but no evidence of a successful nesting attempt was observed. No eagles were present on 15 August. Roseneau (1974) observed Golden Eagles nesting at this location in 1973, and in 1972 it was occupied by a cliff-nesting species other than falcons.
- SAD-3 1980--An unoccupied Rough-legged Hawk nest was present at this location. In previous years, 1972, 1973 and 1976, this nesting location was used by Rough-legged Hawks (Roseneau 1974, Roseneau unpublished field notes).
- SAD-4 1980--No evidence of raptor use was found at this cliff on 9 and 15 August but J. Jacobsen (personal communication) reported seeing a peregrine near here during June 1980. A falcon (*Falco* sp.) was flushed from this cliff in 1977 and it is possible that it was a peregrine. In 1976 the remains of a collapsed Rough-legged Hawk nest was found here (Roseneau personal observation), and in 1972 and 1973 this location was unoccupied (Roseneau 1974).

Hulahula River

- HUL-1 1980--An old, slumped Golden Eagle nest with evidence of use by Gyrfalcons was present at this location. Until the nest is rebuilt it is unlikely that falcons will be able to nest here. No birds were present on 10 August.
- HUL-2 1980--An unoccupied Golden Eagle nest was observed at this location. An adult Golden Eagle was seen flying high above Kikiktat Mountain but no evidence of a nesting attempt was found in this area.
- HUL-3 1980--The remains of an old stick nest was present on the east bank of the Hulahula River. This location has not been used for nesting in recent years.

Aichilik River

- AIC-1 1980--This location was not surveyed because it was obscured by fog on 12-14 August 1980. An unoccupied stick nest was found here in 1973 (Roseneau 1974).
- AIC-2 1980--No nests, ledges, or suitable habitat were found here during aerial survey on 12 August. A pair of Peregrine Falcons was reported to have nested in this vicinity in 1966 and 1969 (M. D. Mangus personal communication to C. M. White 1975).
- AIC-3 1980--An unoccupied stick nest was present at a low river front cliff on the west bank. No raptors were observed in this area.
- AIC-4 1980--An unsuccessful Golden Eagle nest was found at this cliff on 13 August, and a single adult Golden Eagle was observed flying above and perching at this cliff.
- AIC-5 1980--This location contains several nests, and provides excellent habitat for raptors. An abandoned clutch of three Gyrfalcon eggs was present at one well-used ledge. No birds were present when we surveyed the area on 12-13 August. Gyrfalcons fledged three young at this location in 1973, but it was unoccupied in 1972 (Roseneau 1974).
- AIC-6 1980--This location contains at least two flattened stick nests that have been used by Gyrfalcons in previous years. One unoccupied Golden Eagle nest was also present. Raptors were not observed at this location on 12-13 August.

AIC-7 1980--This location was obscured by fog during 12-14 August and was not surveyed. A pair of peregrines was reported to have nested here in 1966 and 1969 (M. D. Mangus personal communication to C. M. White 1975). Peregrine Falcons were never observed in this vicinity during 1972-1977 (Roseneau unpublished field notes).

Appendix 4. Peregrine Falcon (*Falco peregrinus anatum*) tissues collected from eyries along the Yukon River between Stevens Village and St. Marys, Alaska, 1980.

PEREGRINE EGG (WHOLE)
Lower Yukon River, Alaska
17 July 1980
Cliff Location no. LY-29
Ident. no. P-LY-29-80

Nest produced one nestling estimated to be 32+ days old on 17 July:
banded female 987-47147.

Whole egg was in scrape, nestling was below on grassy ledges.

Collected by: Peter J. Bente and David G. Roséneau

PEREGRINE EGG SHELL FRAGMENTS
Lower Yukon River, Alaska
10 July 1980
Cliff Location no. LY-4
Ident. no. P-LY-4-80

Nest produced two nestlings estimated to be 28 days old on 10 July:
banded male 987-47113, banded female 987-47114.

Shell fragments were about 1 m from scrape.

Collected by: Peter J. Bente and David G. Roseneau

PEREGRINE EGG SHELL FRAGMENTS
Lower Yukon River, Alaska
13 July 1980
Cliff Location no. LY-14.2
Ident. no. P-LY-14.2-80

Nest produced three nestlings estimated to be 18 days old on 13 July:
banded male 987-47132, banded male 987-47133, banded male 987-47134.

Shell fragments were in scrape area and are from successfully hatched eggs; they appear to represent the ends of two different eggs.

Collected by: Peter J. Bente and David G. Roseneau

PEREGRINE EGG SHELL FRAGMENT

Lower Yukon River, Alaska

16 July 1980

Cliff Location no. LY-25

Ident. no. P-LY-25-80

Nest produced four nestlings estimated to be 30 days old on 16 July:
banded male 987-47143, banded female 987-47142, banded female 987-47144,
banded female 877-47442.

Shell fragment was near scrape and is from a successfully hatched egg;
it is the entire shell minus the cap end.

Collected by: Peter J. Bente and David G. Roseneau

PEREGRINE EGG SHELL FRAGMENTS

Lower Yukon River, Alaska

19 July 1980

Cliff Location no. LY-37

Ident. no. P-LY-37-80

Nest attempt failed completely. Adult female brooding on scrape
18 June but not present on 19 July. No male observed on either 18 June
or 19 July. This adult female appeared to be attending the nest site
alone.

One entire broken (crushed) egg with much membrane was lying in back of
scrape and there was no valid evidence that other eggs had been present.
It should be noted that this is the same location and same scrape where
we collected an addled whole egg on 7 August 1978 (pair with two fledged
young also present). Data from that egg are presented by Springer *et al.*
(1979b).

Collected by: David G. Roseneau and Peter J. Bente

PEREGRINE CHICKS

Lower Yukon River, Alaska

9 July 1980

Cliff Location no. LY-3.3

Ident. nos. P-LY-3.3-80 No. 1, No. 2 and No. 3

Nest produced four nestlings to estimated average age of 18-20 days old.
On our visit 9 July only one healthy male nestling, estimated at that
time to be 25 days old, was alive (banded male 987-47112). On entering
the nest ledge, a dead large downy nestling was observed lying on the

rocky scree slope about 15 m below the ledge. On descent, that nestling, a male, was collected. It had obviously died from injuries sustained in the fall (rock-gashed lower abdominal area and intestines extruding from the anal region). On further descent down the long, steep, rubble-filled chute below the eyrie, two additional dead female nestlings were discovered lying in the rocks, an estimated 75 m from the first dead nestling. Those two nestlings were collected and may have died from a combination of injuries sustained in their fall from the nest ledge and exposure. All three dead nestlings appeared to have died 3-5 days prior to 9 July. The male nestling, from state of decomposition, appeared to have died 1-2 days earlier than the two females. Several days prior to 9 July the Galena area had experienced a large storm and high winds. The nest ledge was very small (60 x 37 cm), exposed and in very unstable soil/rock. More importantly, it had a large, very flattened expanse of *Artemesia* sp. that formed a "false floor" around its perimeter. Any nestling attempting to walk out on, or pushed out on that vegetation would have almost certainly fallen through it to the rocks where the male nestling was indeed found. We believe a combination of those factors (small, over-crowded ledge with "false floor" exposed to winds and rain) were the elements that contributed to the deaths of these three nestlings.

Collected by: Peter J. Bente and David G. Roseneau

Appendix 5. Peregrine Falcon (*Falco peregrinus anatum*) nestlings banded on the middle Yukon River in 1980.

Location Number	Date	Sex	Band Number
MY-5.1	5 July	M	987-47101
		F	877-47447 ¹
MY-8	6 July	M	987-47102
		F	987-47103
		M	987-47104
		F	877-47433 ¹
MY-12	6 July	M	987-47105
		M	987-47106
		M	987-47107
MY-16	7 July	M	816-39601 ¹
		M	816-39602 ¹

¹ Bands transferred to the USFWS by Mr. Leonard J. Peyton, Institute of Arctic Biology, University of Alaska, Fairbanks, Alaska 99701.

Appendix 6. Peregrine Falcon (*Falco peregrinus anatum*) nestlings banded on the lower Yukon River in 1980.

Location Number	Date	Sex ¹	Band Number
LY-3.1	9 July	F	987-47108
		F	987-47109
		M	987-47110
		M	987-47111
LY-3.3	9 July	M	987-47112
LY-4	10 July	M	987-47113
		F	987-47114
LY-5	10 July	F	987-47115
		M	987-47116
		M	987-47117
		F	877-47434 ³
LY-6.1	11 July	M	987-47118
		M	987-47119
		M ²	987-47120
		M	987-47121
LY-10	12 July	M	987-47122
		F	987-47123
		F	987-47124
LY-11	12 July	M	987-47125
		M	987-47126
		F	877-47435 ³
LY-12.1	12 July	M	987-47127
LY-13	13 July	F	987-47128
		F	987-47129
		F	877-47436 ³
		F	877-47437 ³
LY-14	13 July	F	987-47130
		M	987-47131
LY-14.2	13 July	M	987-47132
		M	987-47133
		M	987-47134

Location Number	Date	Sex ¹	Band Number
LY-15	14 July	F	987-47135
		F	877-47438 ³
LY-19	15 July	F	987-47136
		M	987-47137
		F	877-47439 ³
LY-21.1	15 July	M	987-47138
		F	877-47440 ³
		F	877-47441 ³
LY-22.1	16 July	M	987-47139
		F	987-47140
		M	987-47141
LY-25	16 July	F	987-47142
		M	987-47143
		F	987-47144
		F	877-47442 ³
LY-27	16 July	F	987-47145
		M	987-47146
LY-29	17 July	F	987-47147
LY-31	18 July	F	987-47148
		M	987-47149
LY-32	18 July	M	987-47150
		F	987-47151
LY-35	18 July	M	987-47152
		F	987-47153
LY-39	19 July	F	987-47154
		F	877-47443 ³

¹ M = male, F = female.

² The male nestling carrying band number 987-47120 was found stunned, but otherwise in good condition, on a road in the State of Washington on 23 September 1980 (B. Anderson personal communication 24 September 1980).

³ Bands transferred to the USFWS by Mr. Leonard J. Peyton, Institute of Arctic Biology, University of Alaska, Fairbanks, Alaska 99701.

Appendix 7. An evaluation of Arctic Slope river drainages in northeastern Alaska with regard to potential and known peregrine nesting habitat found in them.

River drainage	Habitat classification ¹	Number of confirmed or reported nesting locations	Potential habitat (if present)
Ivishak	2-3	--	--
Echooka	2-3	--	--
Kadleroshilik	1	--	--
Shaviovik	2-3	--	Small portions of mid and upper Juniper Creek.
Kavik	2	1 reported ²	Small portion of headwaters and near 610 m asl.
Canning	6-7	3 confirmed ³ 3 reported ²	Midwaters between 69° 37' and 69° 29' N. Upper drainage, primarily between 69° 21' and 69° 00' N below 762 m asl. Best locations are generally at tributary valley entrances.
Tamayariak	2	--	--
Katakturuk	2-3	1 reported ²	Upper drainage - primarily the west fork between 244 and 610 m contour lines.
Marsh Creek	2-3	--	Upper main drainage between 305 and 610 m contour lines.
Carter Creek	2	--	Lower 4.8 - 6.4 km.

Appendix 7 (continued)

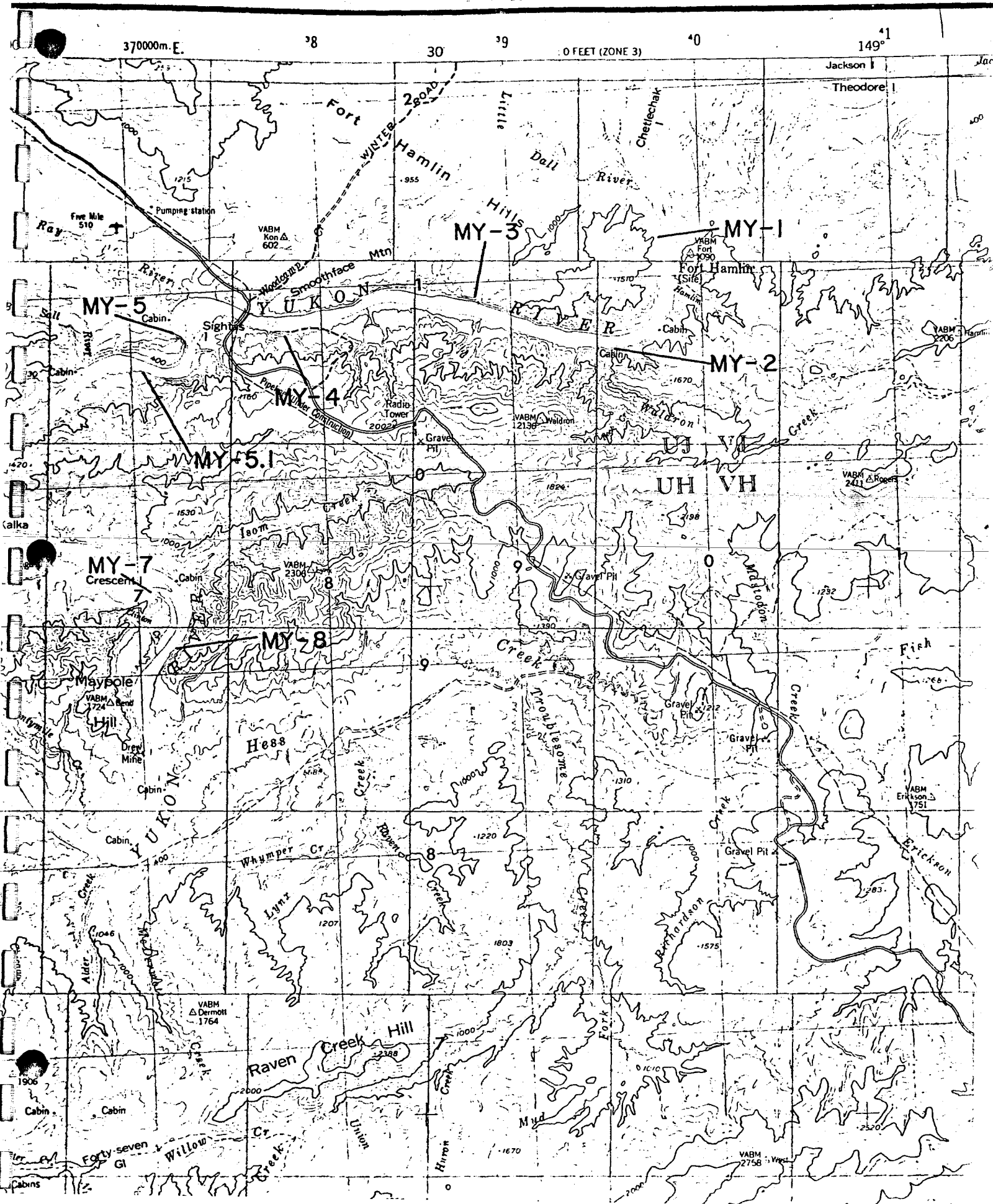
River drainage	Habitat classification ¹	Number of confirmed or reported nesting locations	Potential habitat (if present)
Sadlerochit	4-5	1 confirmed ⁴	Between 274 and 762 m contour lines, but centered in upper reaches and Sadlerochit Springs area.
Hulahula	2-3	1 reported ⁵	Kingak Hill vicinity or Kikiktat Mountain vicinity.
Okpilak	2	--	--
Jago	2-3	2 reported ⁶	VABM Bitty vicinity Marie Mountain vicinity
Aichilik	3-4	2 reported ²	Primarily between 69° 29' and 69° 20' N.
Egaksrak	3-4	--	Primarily between 69° 35' and 69° 25' N.
Ekaluakat	2-3	--	Headwaters area.
Siksikpalak	1	--	--
Kongakut	5-6	3 reported ²	Primarily between 69° 34' and 69° 00' N.
Clarence (Alaskan portion)	2-3	--	Between 69° 29' N and U.S.-Canada border.

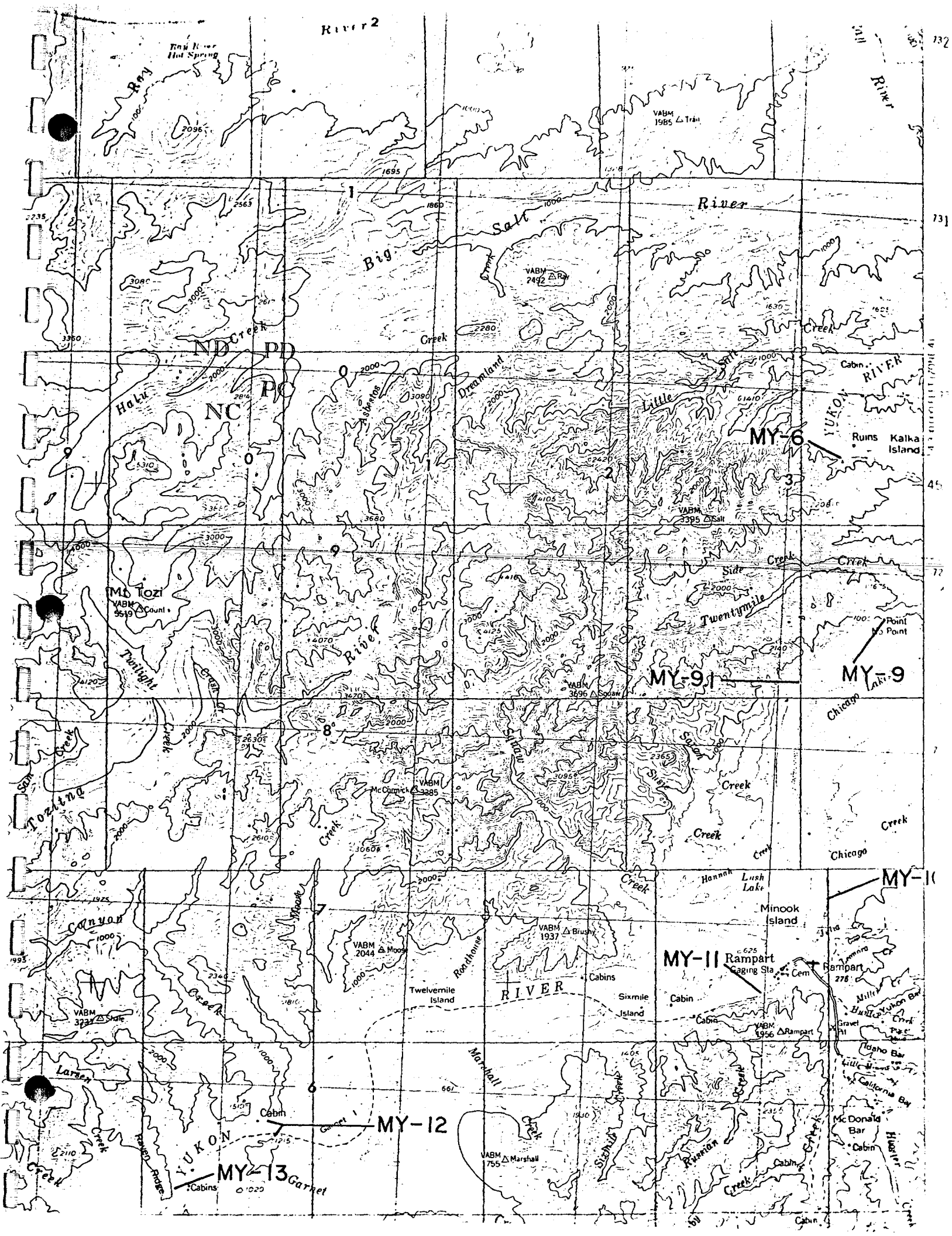
Appendix 7 (continued)

- ¹ Habitat was classified on a scale of 1-10: 1 = very poor, 5-6 = fair, 10 = excellent. Classifications were made on the basis of the total drainage. Even though a drainage may have a few potential nesting locations, its overall rating may be quite low.
- ² Peregrines were said to have nested at one location on the Kavik River in 1947; at two locations on the Canning River downstream of about 69° 18' N in 1963, and at one location downstream of about 69° 18' N in 1947; at one location on the Katakturuk River in 1963 and 1966; at two locations, simultaneously, on the Aichilik River in 1966 and 1969; and at three locations, simultaneously, on the Kongakut River in 1966 (M. D. Mangus personal communication to C. M. White 1975, memorandum C. M. White to T. J. Cade and D. G. Roseneau 1 November 1975).
- ³ Roseneau (1974).
- ⁴ Cade (1960) found a pair with 4 eggs at about the 670 m level in a headwater tributary on 4 June 1959. We have never been able to relocate that nest site. The site was definitely well upstream of the Sadlerochit Springs area (Cade personal communication 1976). We suspect the area may include a series of escarpments between Snow and Gravel creeks. No raptors were observed there in 1972-1975 (Roseneau 1974, Roseneau *et al.* 1976).
- ⁵ A nesting pair was reported present in 1975 (W. Mills personal communication 1975).
- ⁶ T. J. Cade received a report of two nesting pairs from J. Drew in 1957 (Cade personal communication 1976).

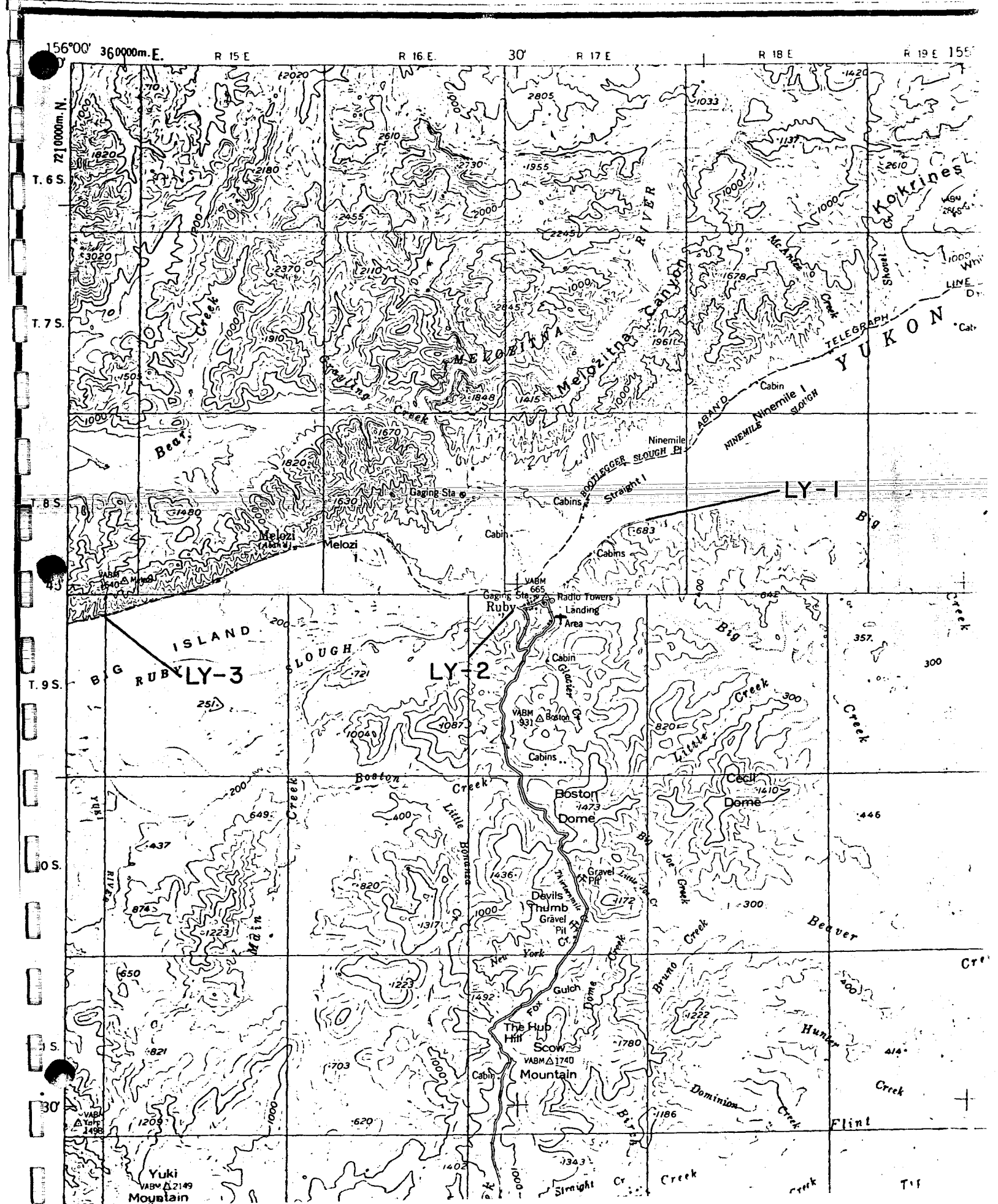
UNITED STATES
DEPARTMENT OF THE INTERIOR
BIOLOGICAL SURVEY

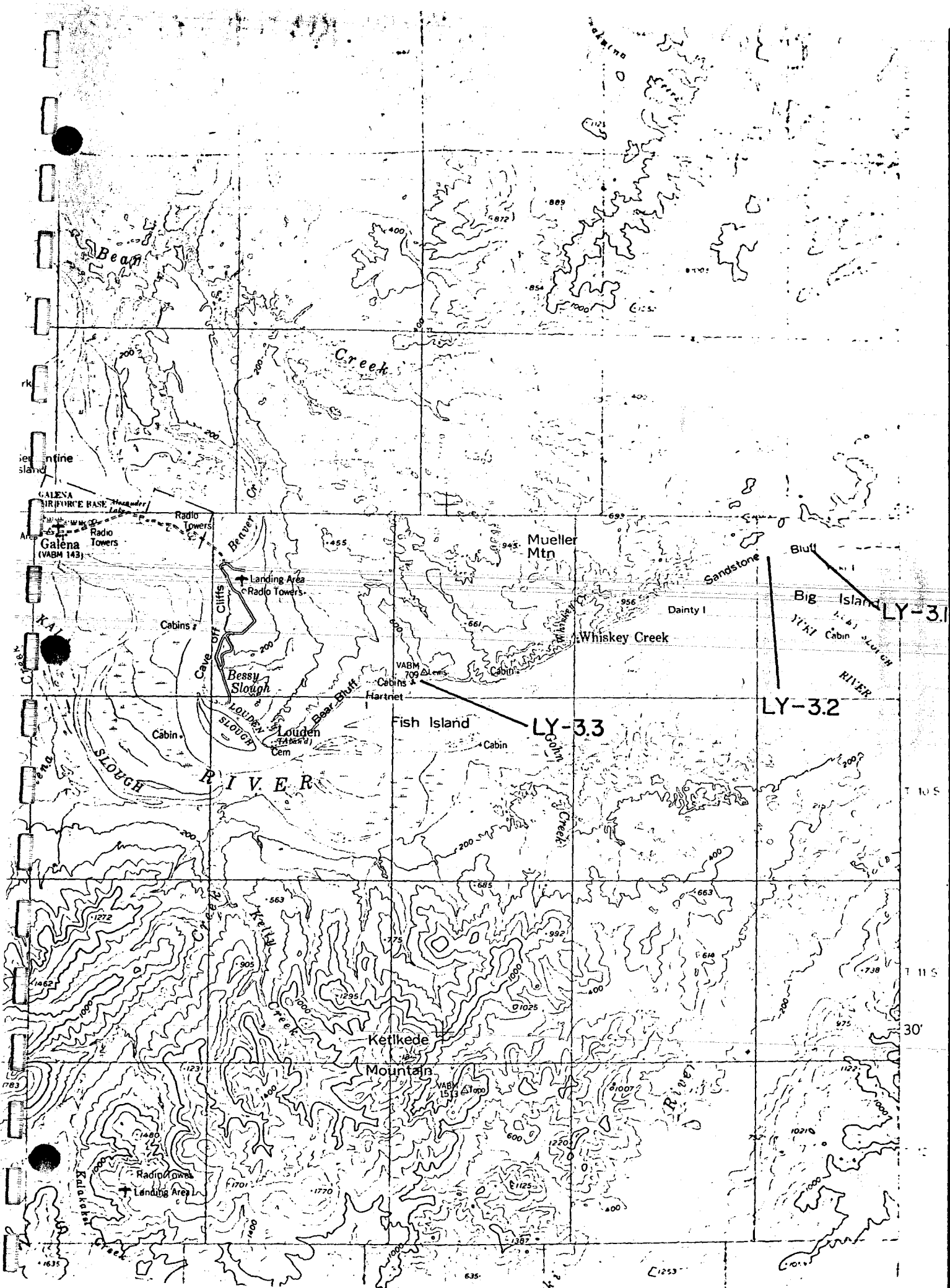
100

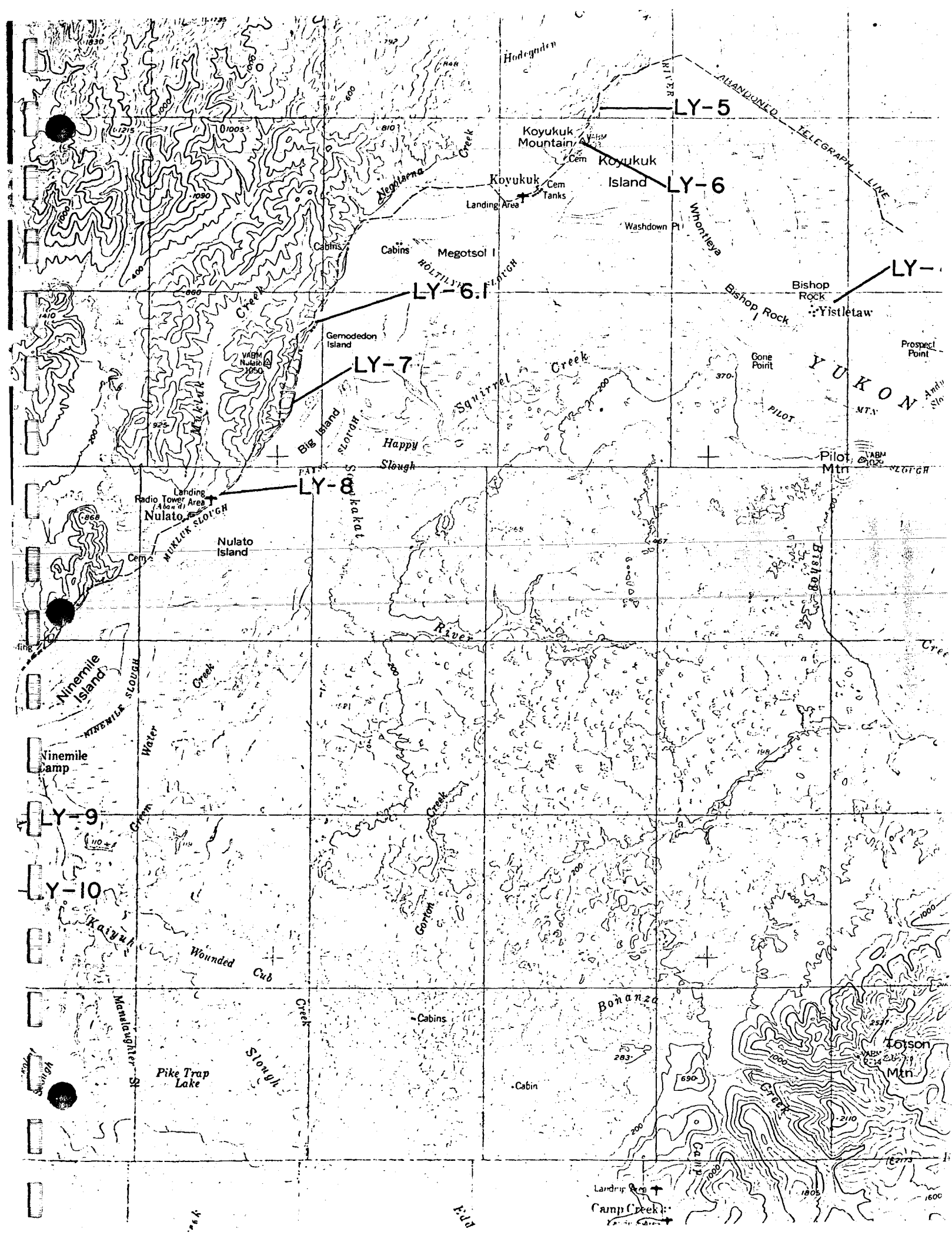


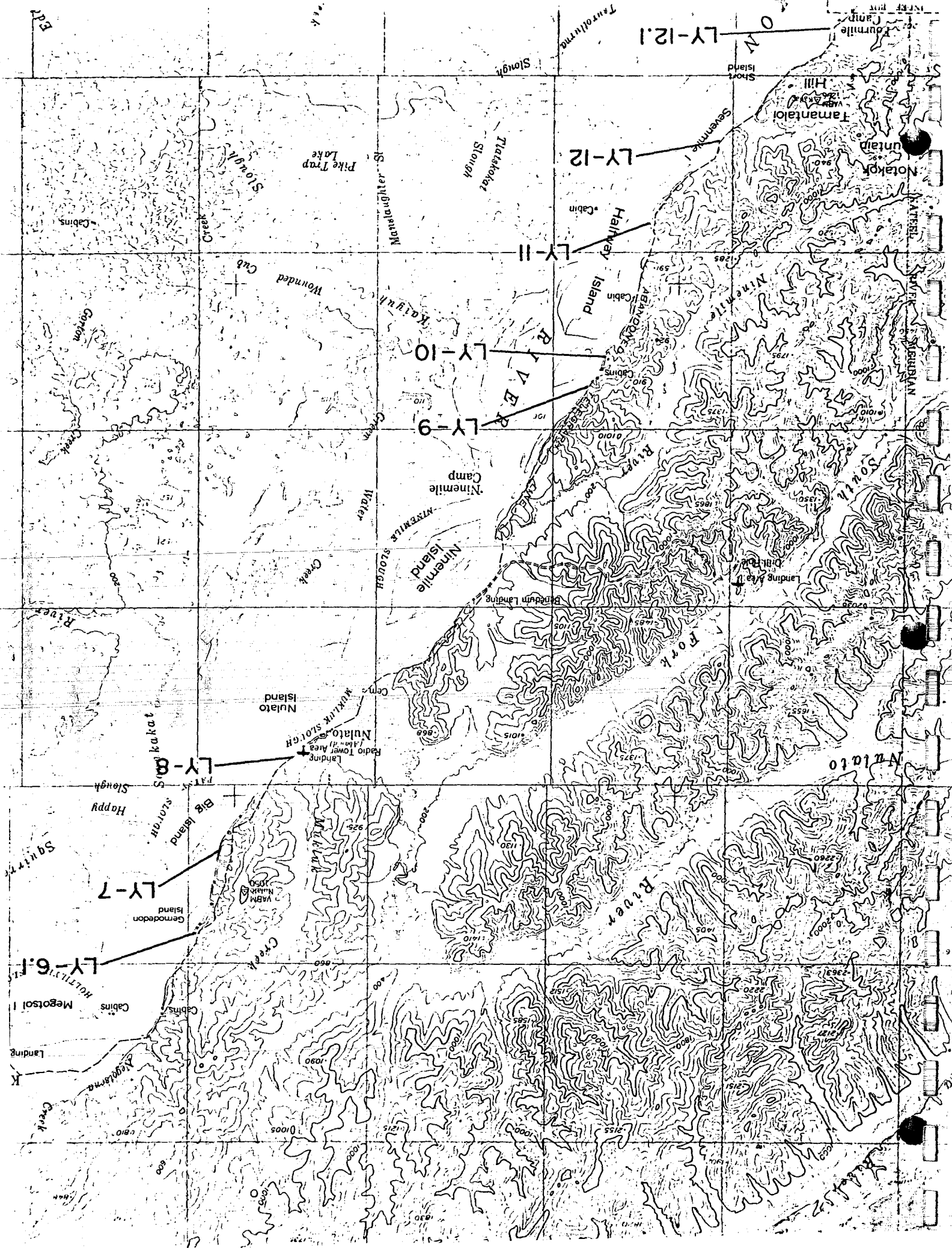


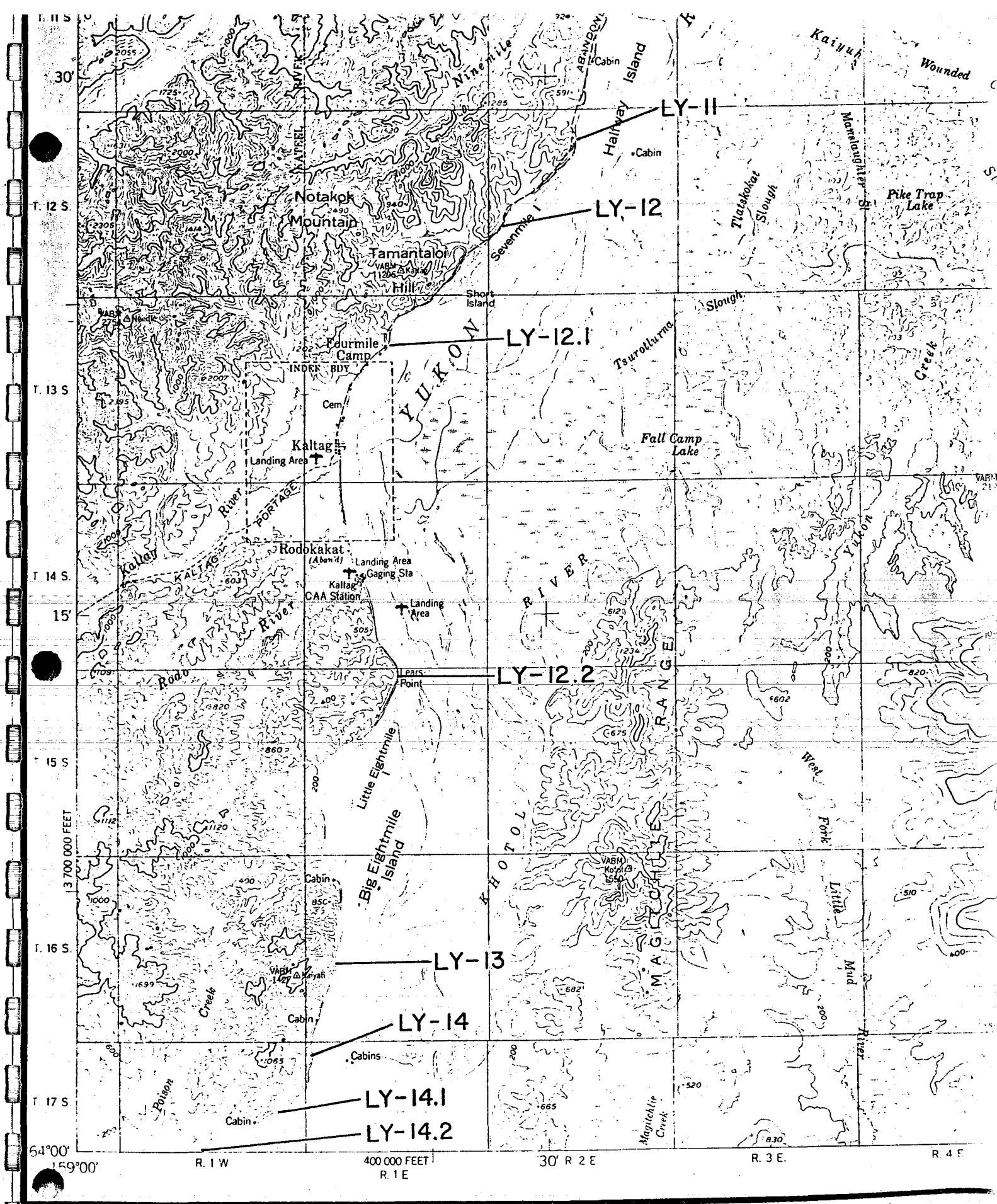
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY







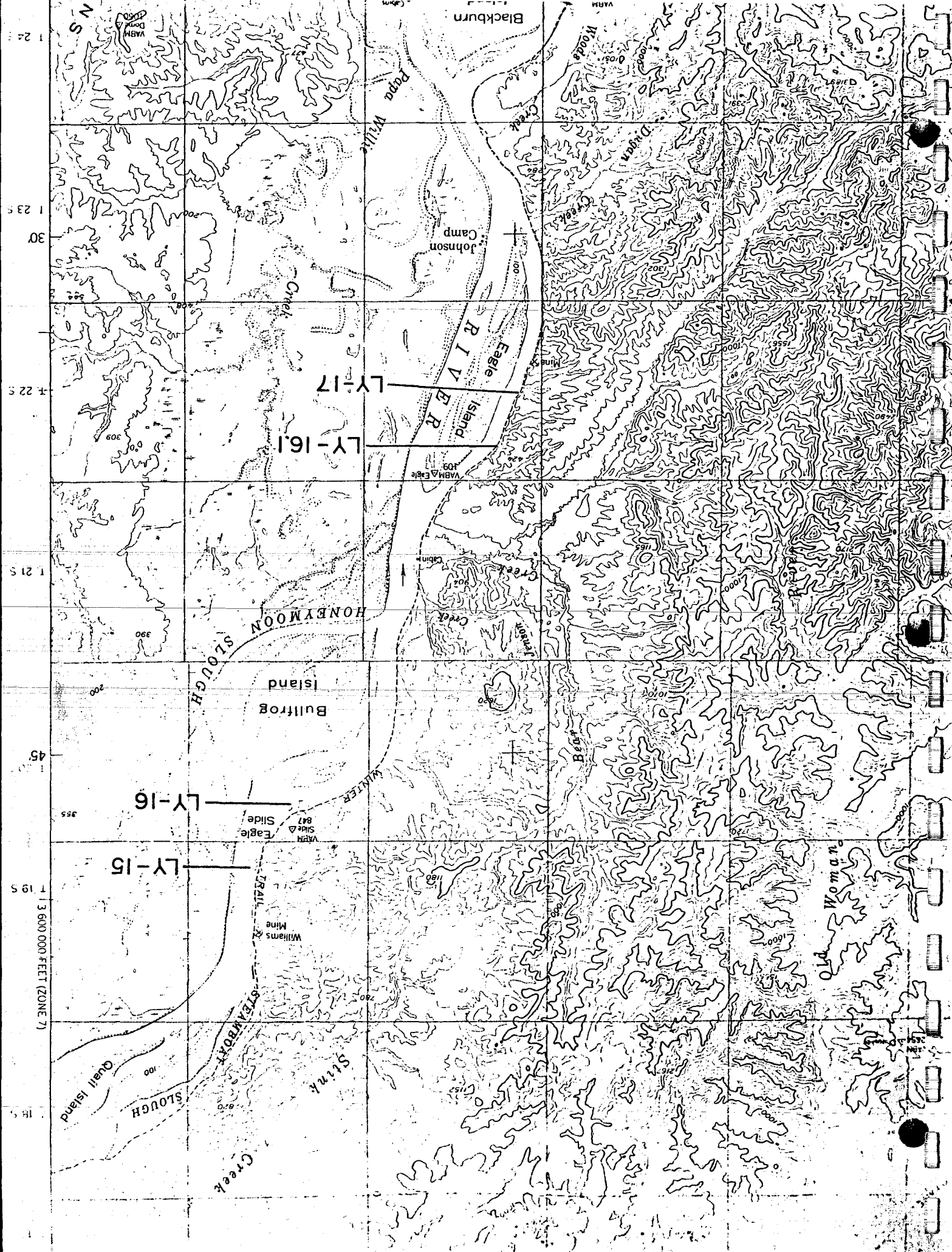




MAPPED, EDITED, AND PUBLISHED BY THE GEOLOGICAL SURVEY

CONTROL BY NOS, NOAA AND USCE

COMPILED IN 1956 FROM U.S. GEOLOGICAL SURVEY 1:63,460 SERIES
MAPS SURVEYED 1957



LY-17

LY-16

LY-16

LY-15

1:3 600 000 FEET (ZONE 7)

Blackburn

Johnson
Camp

Eagle
RIVER
Island

HONEYMOON
SLOUGH

Bullfrog
Island

Eagle
Slide

Williams
Mine

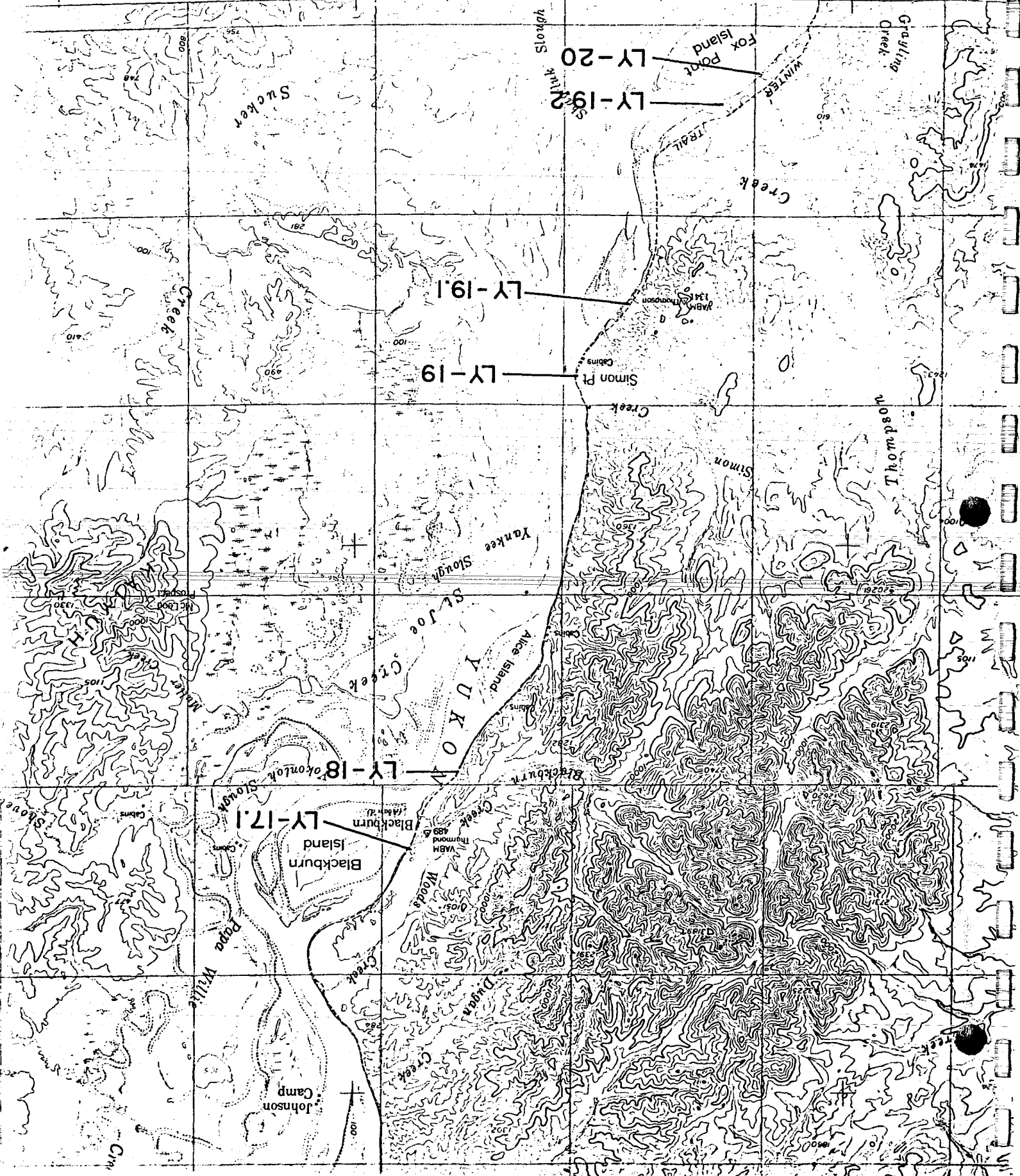
Stink
Creek

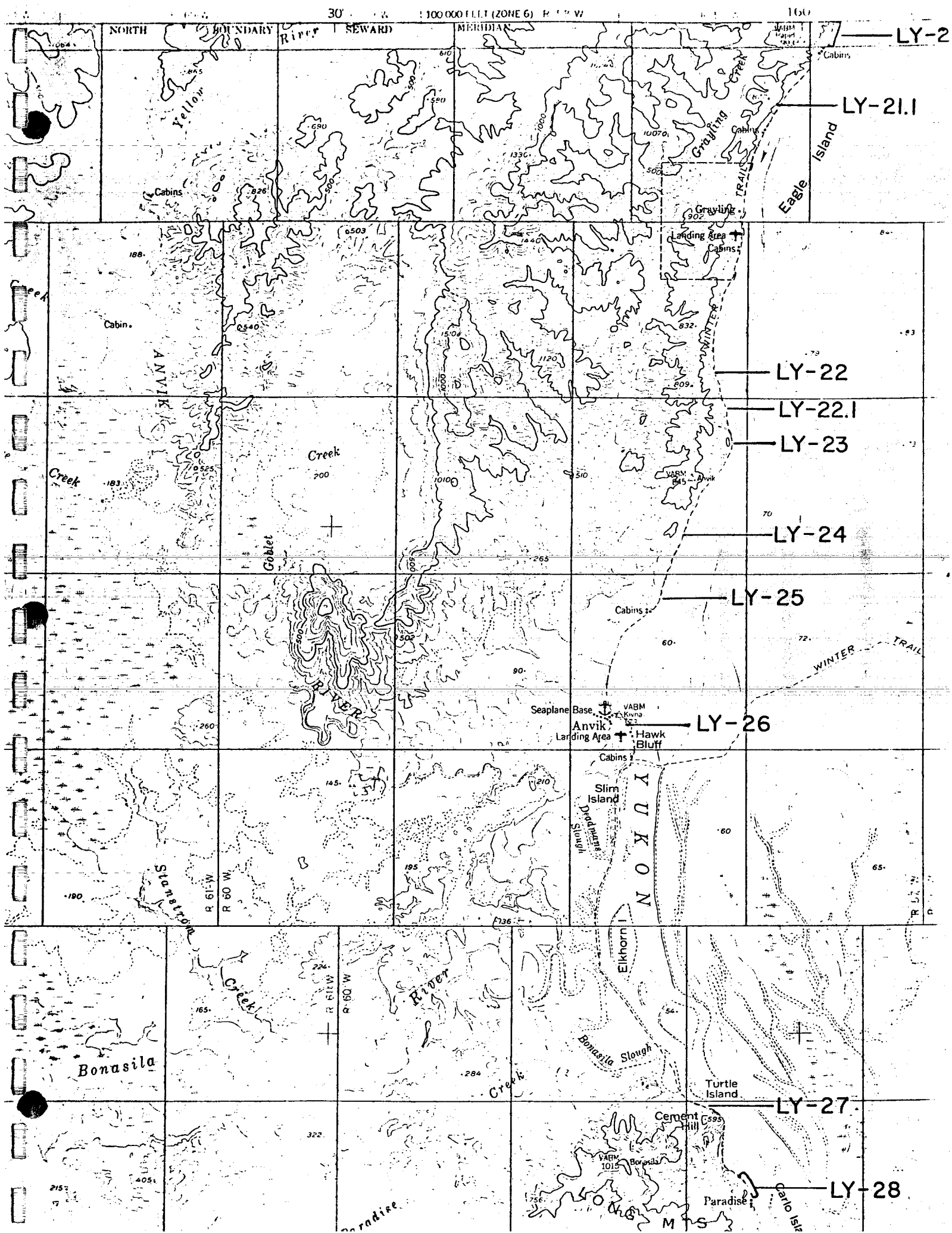
Slough

Quail Island

La Woman

160° 27' W R 6 W : 200 000 FEET (ZONE 6) R 5 N 30 R 4 W : 4900





NORTH BOUNDARY RIVER SEWARD MERIDIAN

LY-2

LY-21.1

Eagle Island

LY-22

LY-22.1

LY-23

LY-24

LY-25

LY-26

LY-27

LY-28

Yellow River

Cabin

Cabin

ANVIK

Creek

Goblet

Starvation

Bonasila

Paradise

Creek

+

+

+

+

+

+

River

Creek

Paradise

Seaplane Base
Anvik
Landing Area

VABM
Hawk Bluff

Cabin

Slim Island

YUKON

Elkhorn

Bonasila Slough

Turtle Island

Cement Hill

Paradise

Calo Isle

+

+

+

+

+

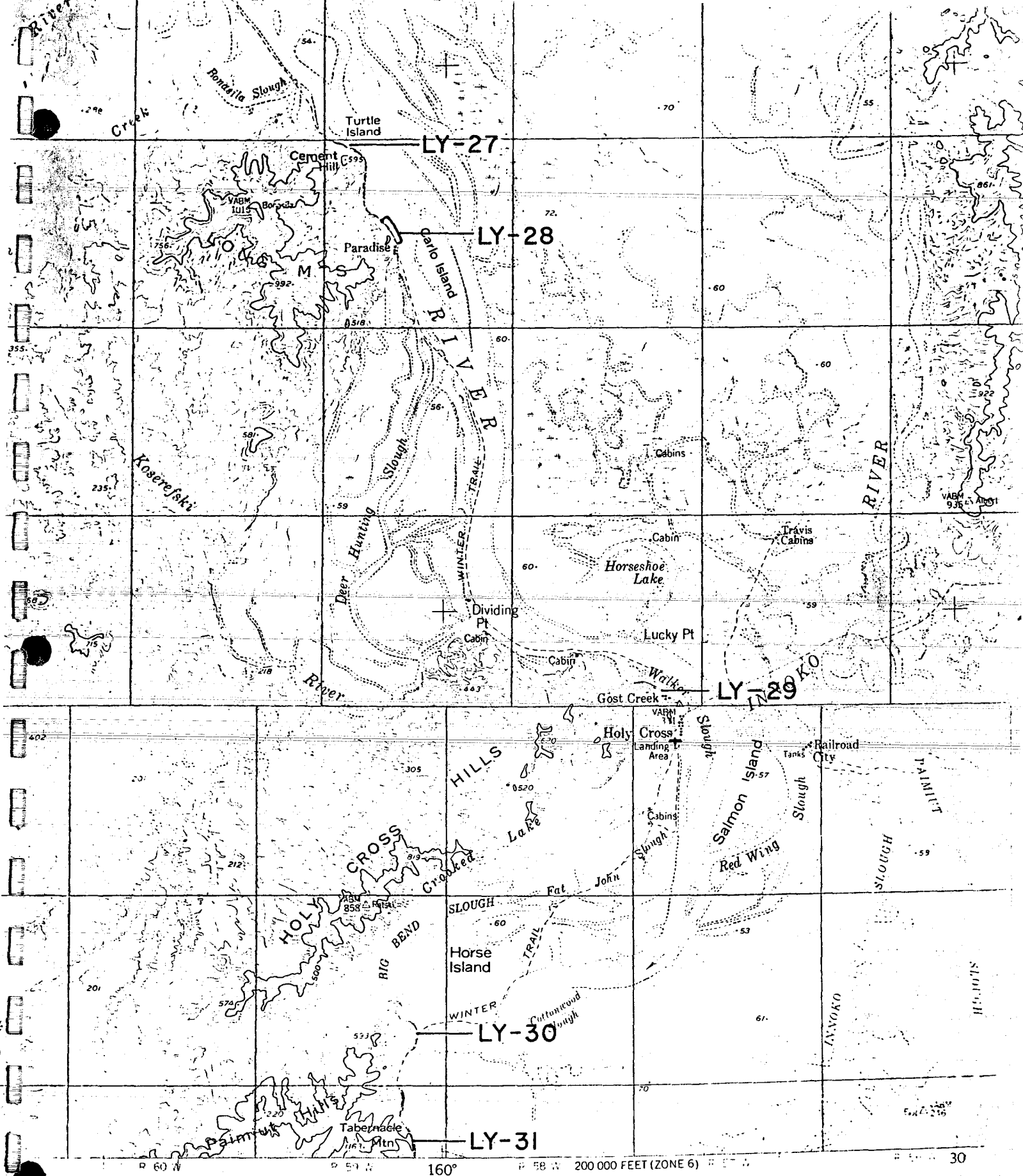
+

+

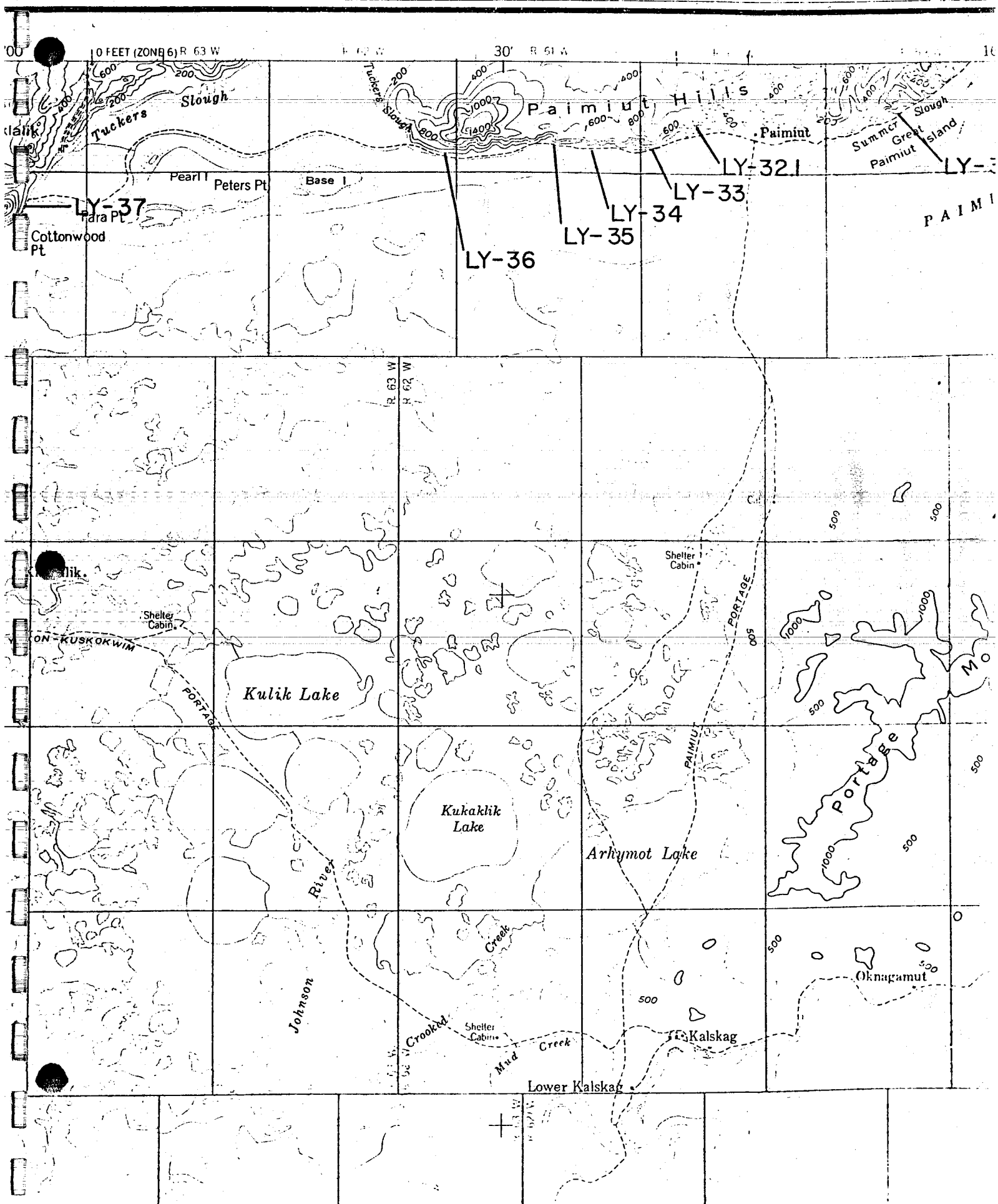
+

+

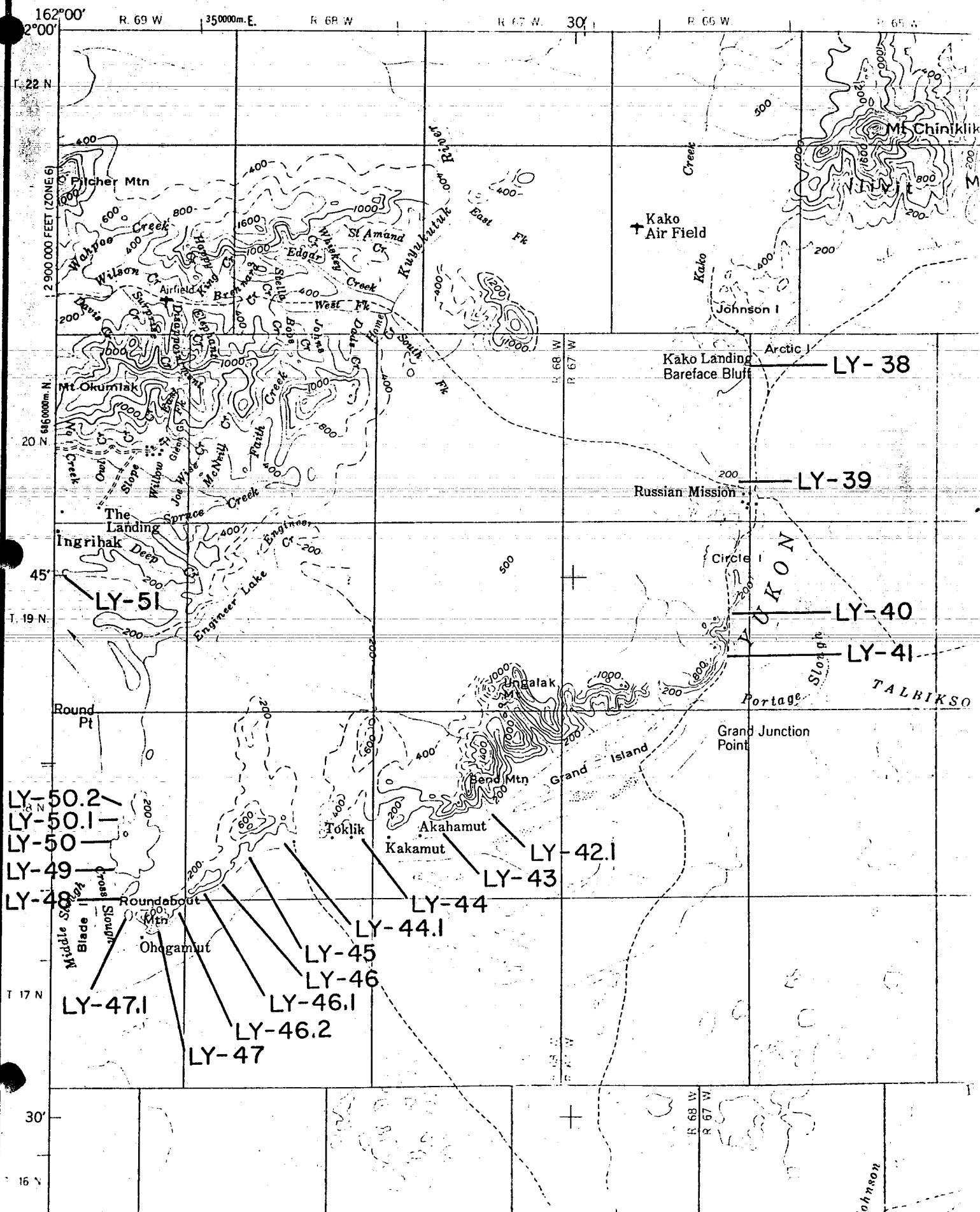
+

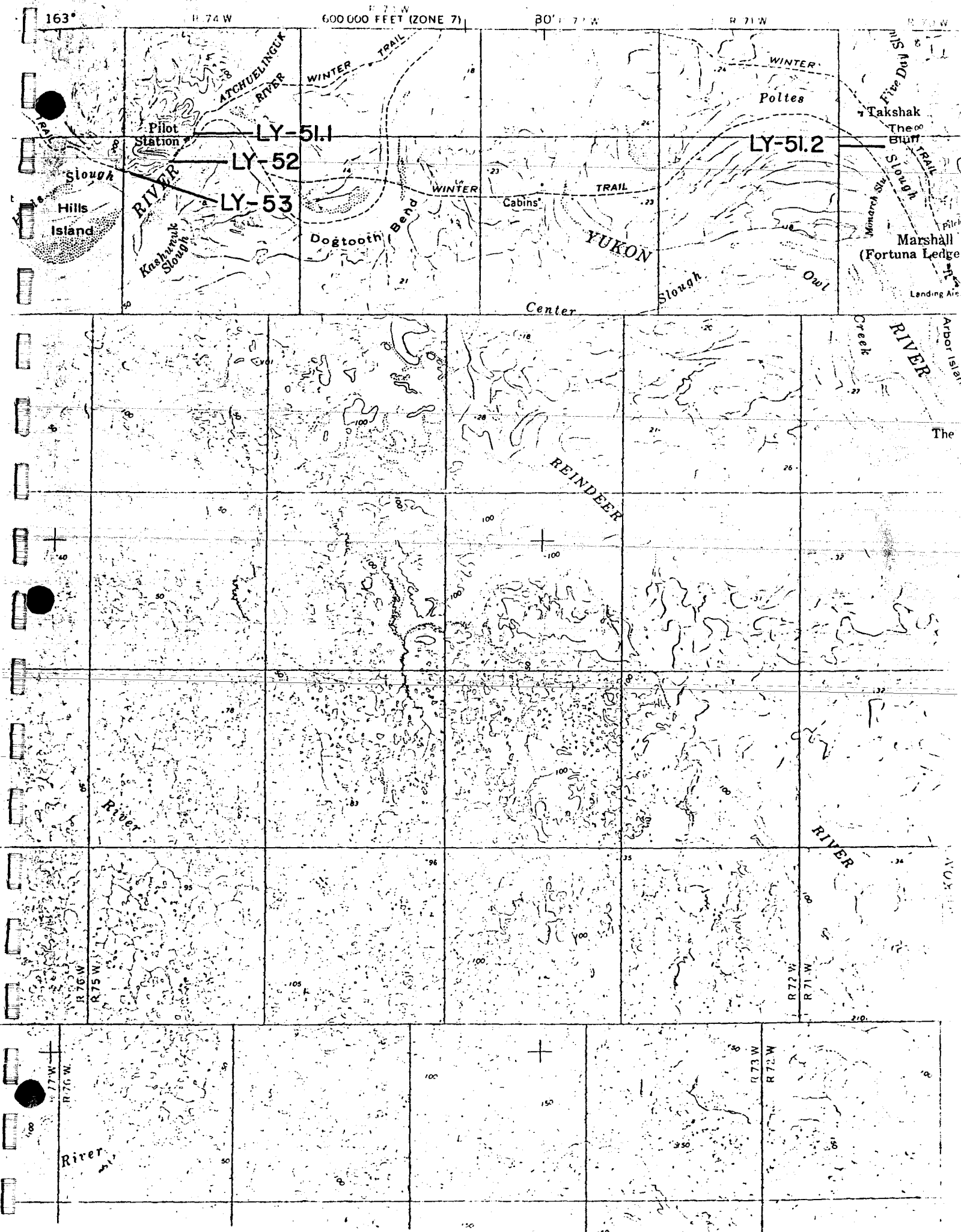


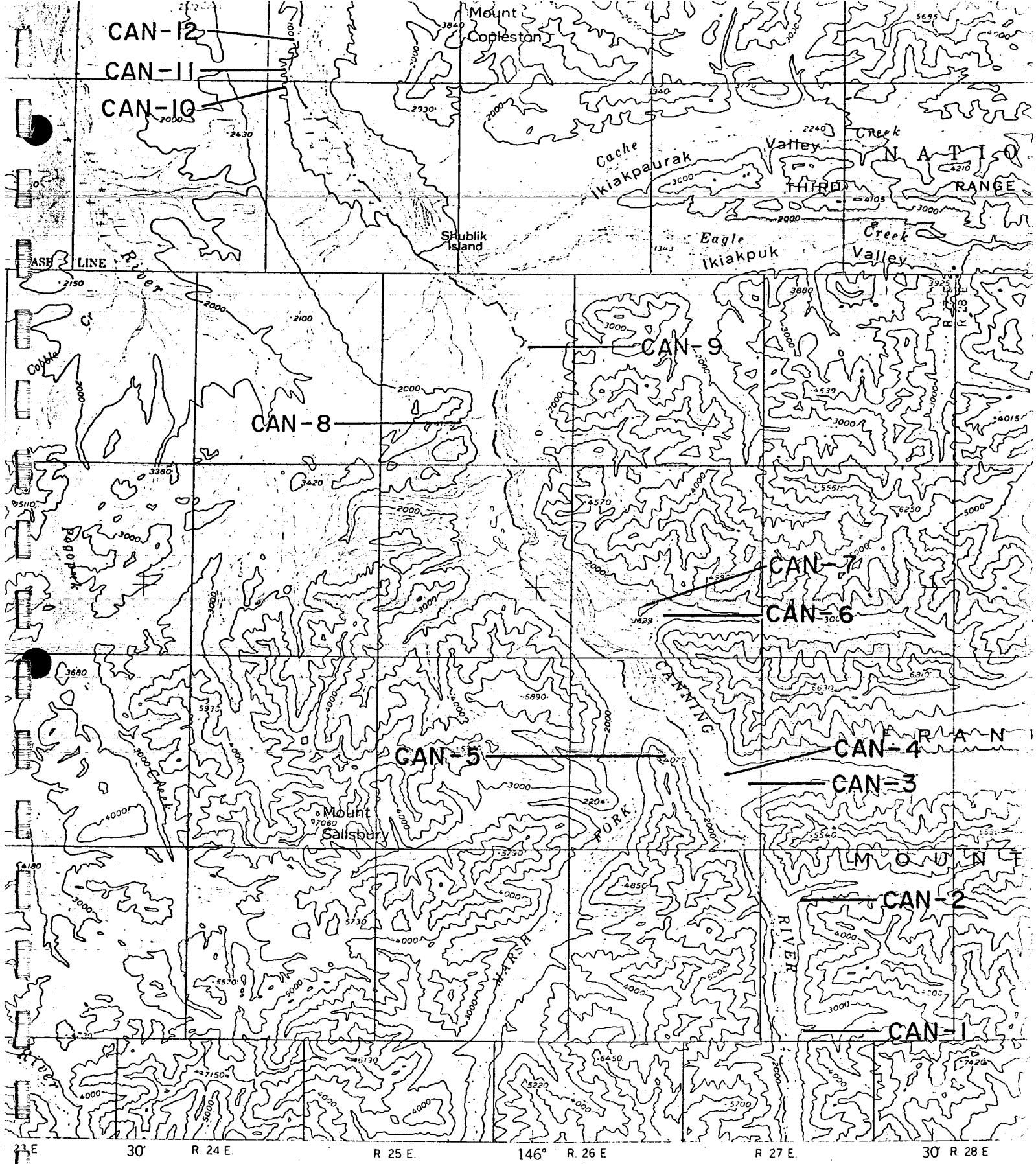
RUSSIAN MISSION



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



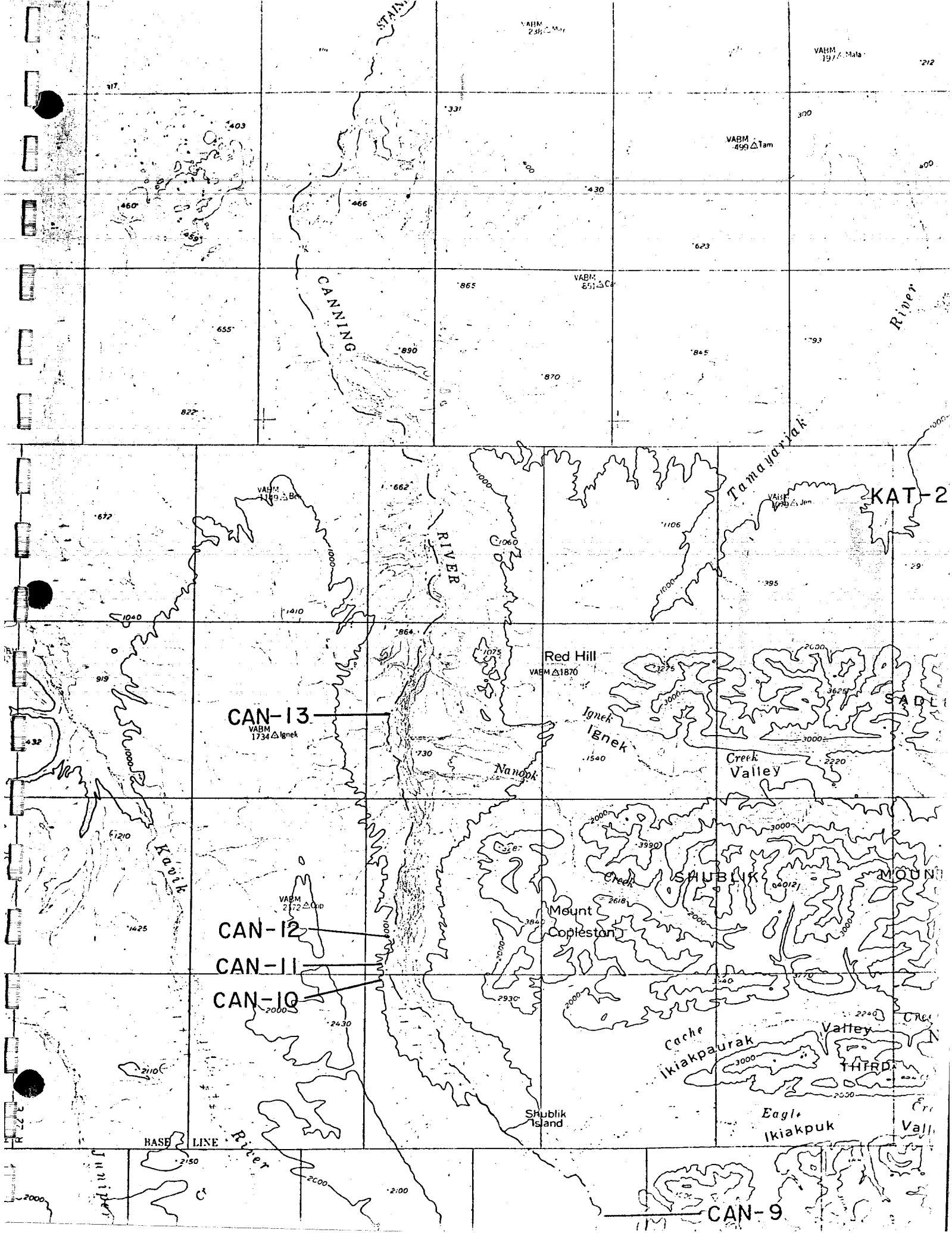


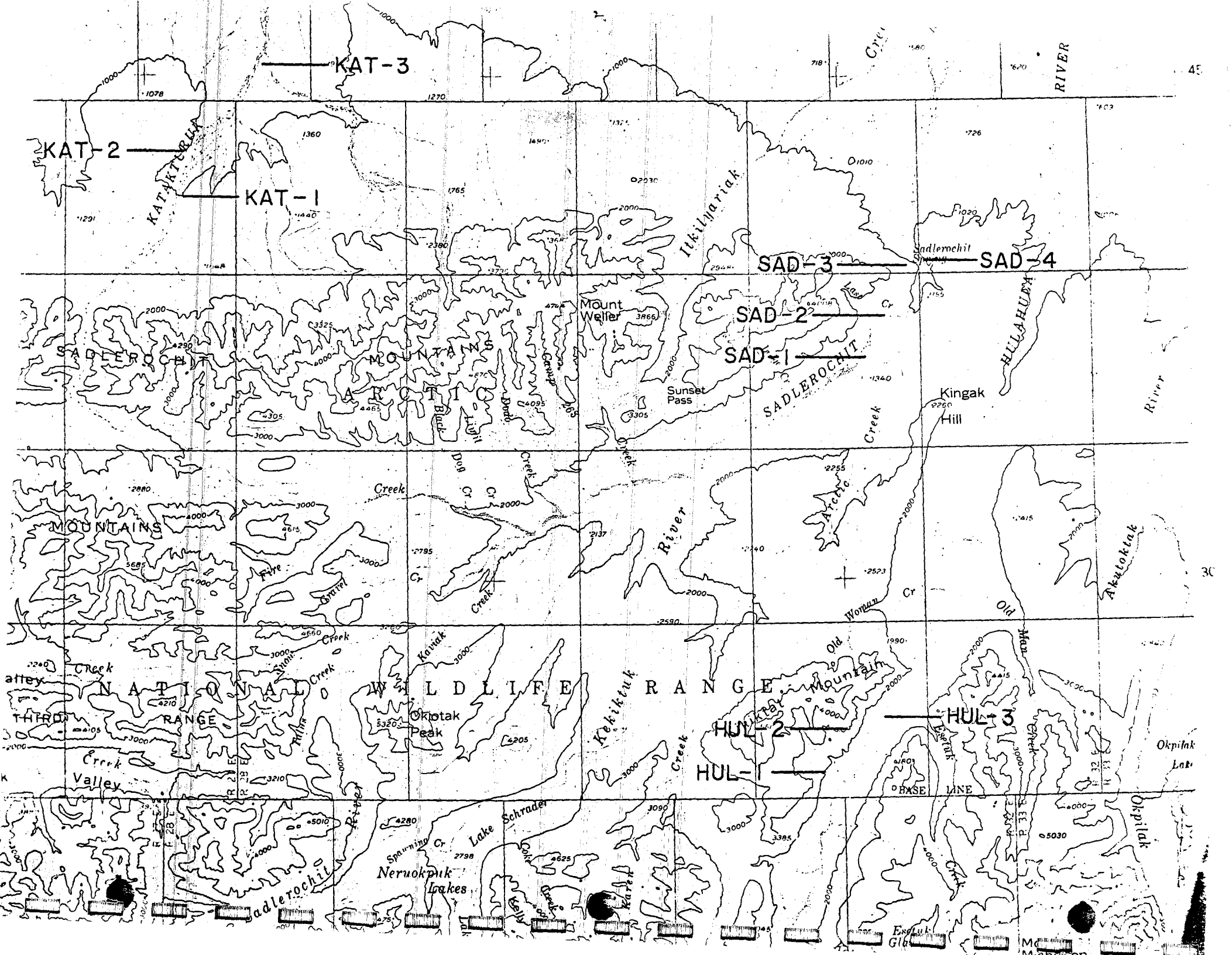


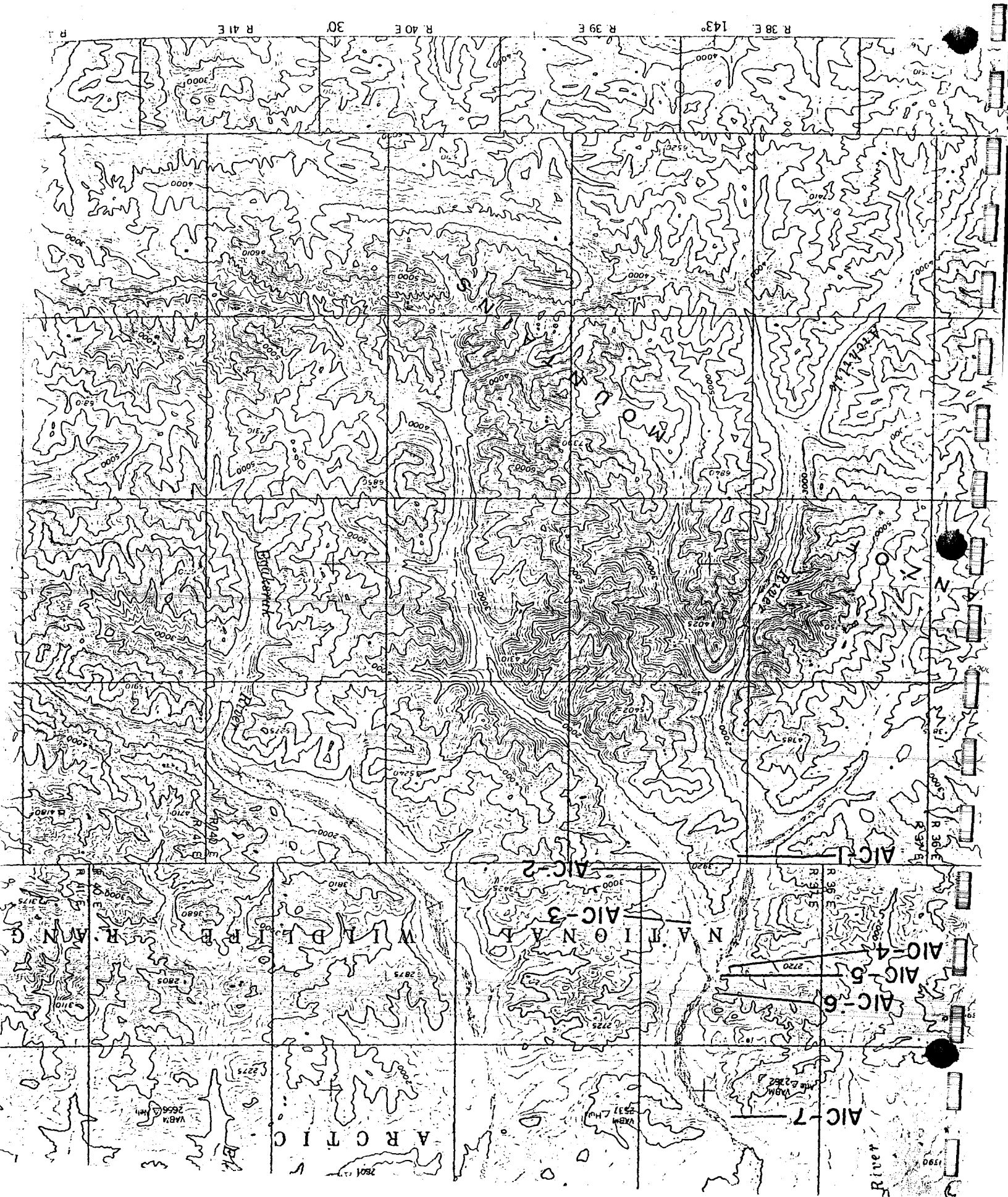
1:250 000

SCALE 1:250 000

1956







ADF&G HABITAT LIBRARY



32345000135195