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BLACK BEAR MOVEMENTS AND
HOME RANGE STUDY

By: Ronald D. Modafferi

Volume II

Project Progress Report

Federal Aid in Wildlife Restoration

Project W-17-11, Job 17.2R

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JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperator: Ronald D. Modafferi

Project No.: W-17-11 Project Title: Big Game Investigations

Job No.: 17.2R Job Title: Black Bear Movements and Home Range Study

Period Covered: July 1, 1978 to June 30, 1979

SUMMARY

In August 1978, one black bear was captured with an Aldrich spring-activated foot snare. A maximum of 71 foot snares were set along four streams in the Blackstone and Cochrane Bay area of western Prince William Sound.

The bear was tagged with roto tags and colored vinyl flagging and fitted with a radio-transmitting collar. The bear had not been previously captured.

In contrast to August 1976 and 1977, bears appeared to spend little time feeding on salmon along streams. In view of poor success in snaring bears and evidence gained in previous years, different capturing procedures are considered.

The utility of expandable and fixed-size collars and various collar materials is evaluated in view of previous experiences.

Twenty-four radio-tracking flights were conducted from a light fixed-wing airplane (PA-18).

In view of data gathered, movements of bears are related to various ecological factors.

Recommendations for future research are made.

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BACKGROUND

Widely distributed and apparently abundant, black bears (*Ursus americanus*) provide a full spectrum of recreational opportunities for people throughout most of Alaska. Statewide hunter harvest data and personal communications indicate that the black bear is rapidly becoming an important "primary" game species, in addition to being a "secondary" species taken incidental to the harvest of other game animals. A recent increase in hunter harvest can be attributed, in part, to a greater number of hunters, a decrease in the availability of other big game species, promotional efforts of guides or air taxi operators and perhaps the realization by many hunters that black bears provide aesthetically pleasing hunts, a respectable trophy and very flavorful meat.

Although recreational use of black bears has greatly increased in recent years, present knowledge about the biology and population ecology of this species in Alaska is still somewhat limited. Noteworthy published material on black bears in Alaska includes results of studies by: Rausch (1961) on dentition and growth, Erickson (1965) on general life history, Hatler (1967 and 1972) on food habits, McIlroy (1970 and 1972) on ecology and hunter harvest and Frame (1974) on predation of salmon. A black bear hide and skull sealing program, initiated in many Game Management Units in July 1973, provides data on characteristics of the sport harvest and the individual bears harvested.

The general increase in hunting pressure on populations of black bears is statewide. Populations in Prince William Sound, in particular, have experienced a tremendous increase in hunting pressure and harvest and presently require close scrutiny. For this reason, and because of the dearth of information on black bears in Alaska, in 1974 the Department of Fish and Game initiated a research project designed to gather information on bear harvests and population status in western Prince William Sound (Fig. 1). This research would provide information on bear biology applicable to many other coastal Alaskan black bear populations. This first phase of study necessitated selection of an appropriate study area and development of techniques for use in Alaska. Phase 1 has been completed and reported

upon (Modafferi 1978a); a previous progress report (Modafferi 1978b) summarized work conducted through June 1978 and the purpose of this report is to present results obtained through June 1979.

OBJECTIVES

To delineate populations; to determine home ranges and movement patterns; to determine population densities, sex and age composition, vulnerability to hunting and mortality by sex and age class; to determine habitat use and preference and to gather basic life history information on black bears in Prince William Sound.

PROCEDURES

Detailed descriptions of specific procedures have been outlined in previous reports (Modafferi 1978a, 1978b). In 1978, streams in western Prince William Sound, that in the past have contained substantial numbers of spawning pink (*Onchorhynchus gorbuscha*) and/or dog (*O. keta*) salmon, were visited frequently throughout July to determine when bears were in these areas feeding on salmon and when to commence trapping activities. An outboard motor powered skiff was used for transportation to and between different trapping areas.

In 1976, Aldrich spring activated foot snares were set as trail sets in freshly used bear trails found along preselected streams that contained spawning salmon (Fig. 2).

Capture and handling techniques developed in 1976 proved to be effective and efficient (Modafferi 1978a) and similar procedures were followed in 1977 on a smaller, more "discrete" study area, on the Tebenkof Peninsula (Fig. 3). There an attempt was made to capture and radio-collar as many bears as possible. In addition to trapping at streamside locations in July 1977, some snares were set at other locations where bait was put out to attract the bears. Bears were immobilized with Sernylan, measured for standard body parameters, weighed with a spring scale, tattooed on the upper lip, and ear-tagged with numbered roto tags and colored flagging. A premolar tooth was extracted and a sample of blood was taken from each bear.

Fourteen bears captured on the Tebenkof Peninsula in 1977 were fitted with radio-transmitting collars and monitored from a skiff during the summer and from a light, fixed-wing aircraft (PA-18) through the fall and spring.

Though similar procedures were employed in summer 1978 only one bear was captured and radio-collared.

RESULTS

From 10 August to 28 August 1978, Aldrich foot snares were set at four different streamside locations (Tebenkof west, Tebenkof east, Parks

Fig. 1. Location and extent of glaciers (stippled areas) in western Prince William Sound.

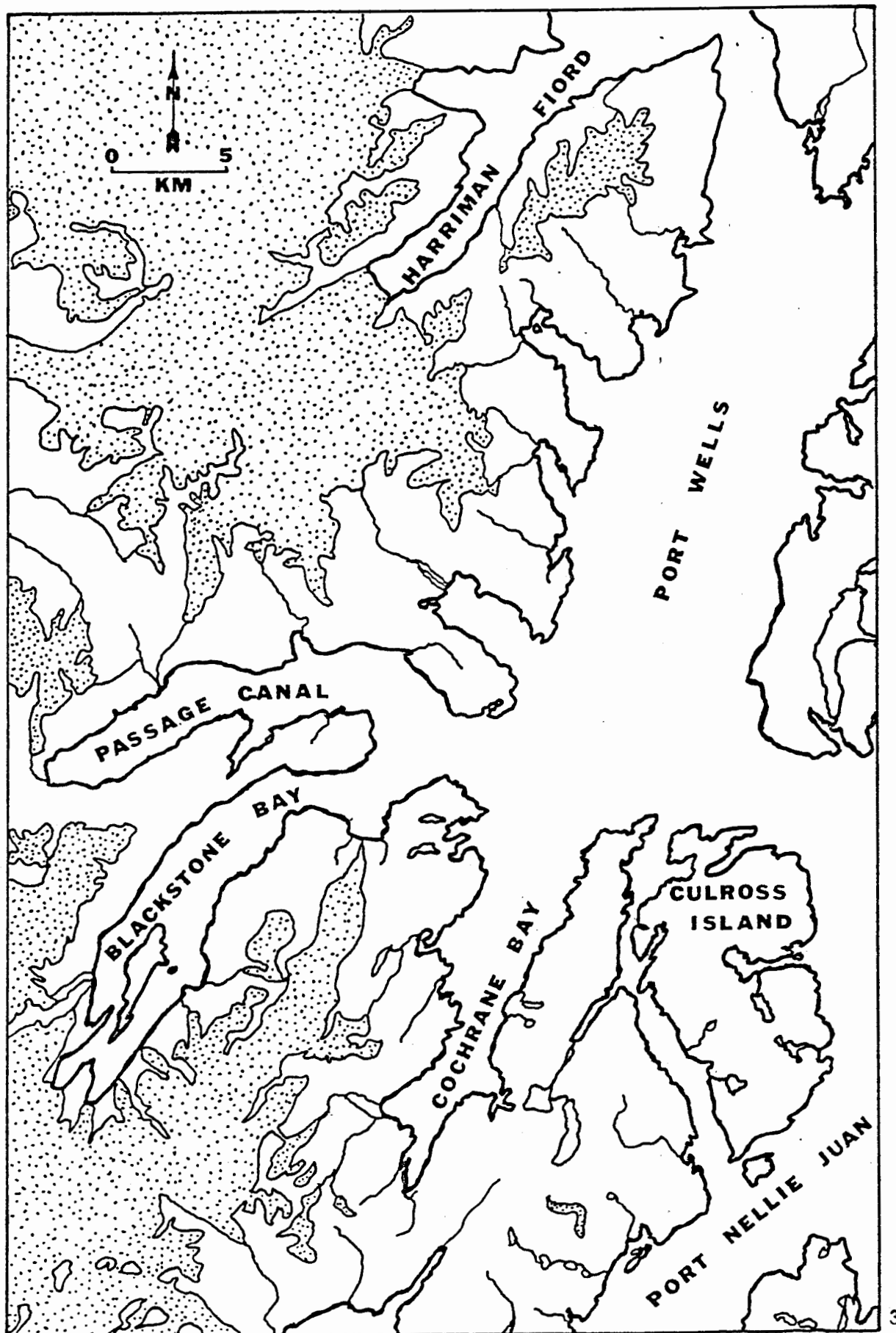


Fig. 2. Locations where black bears were captured, marked and/or radio-collared, released, and killed by hunters in western Prince William Sound, 1976-1978. HL=Harrison Lagoon, PC=Pirate Cove, TW=Tebenkof west, TE=Tebenkof east, PK=Parks Creek and PL=Paulson Creek.

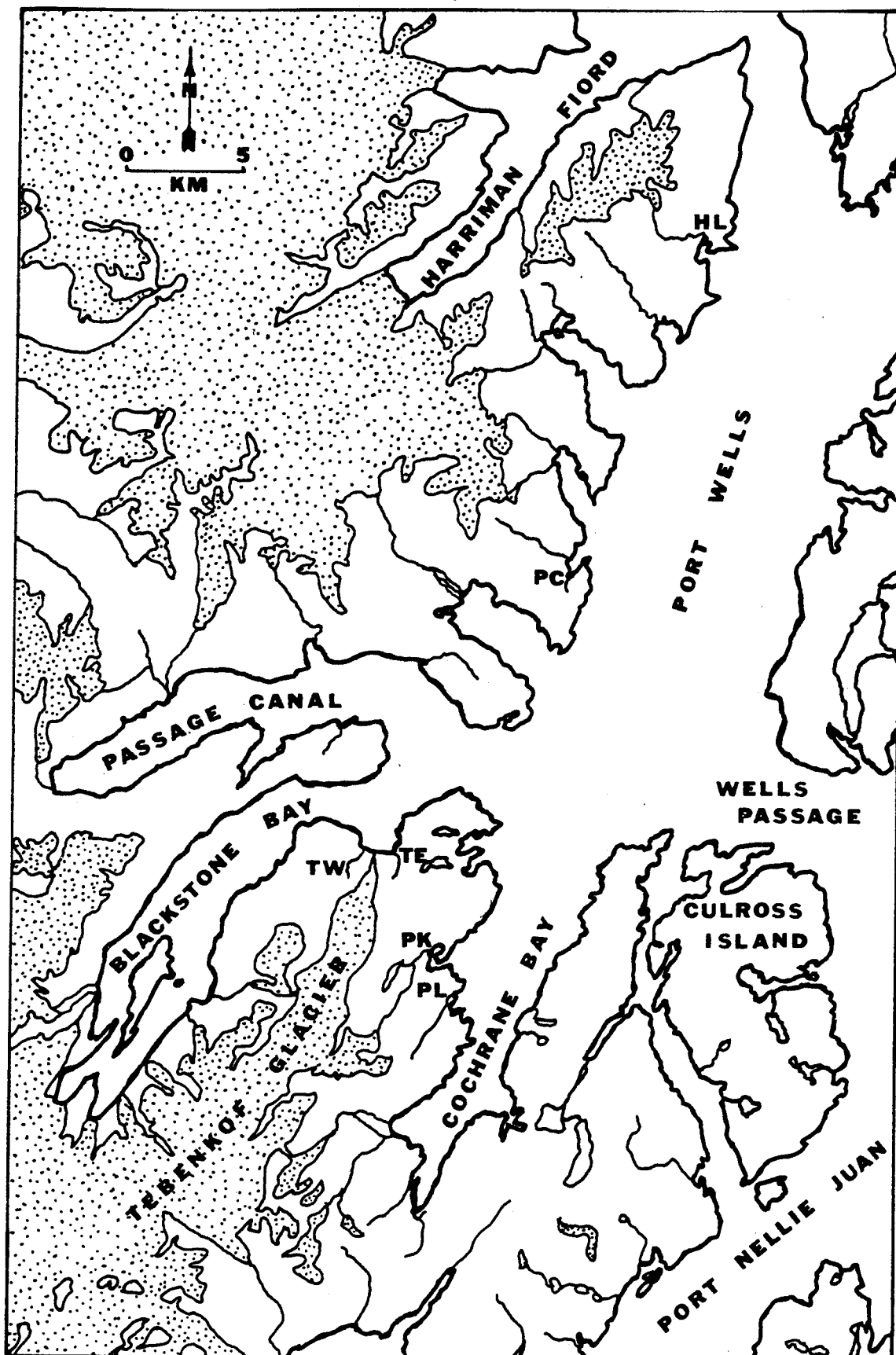


Fig. 3. Location of intensively studied area on Tebenkof Peninsula (north of dashed line) in northwestern Prince William Sound. PK and PL=location of salmon spawning stream sites where trapping took place in 1978. RG=Ripon Glacier and HR=Horse. Darkened areas denote glaciers.

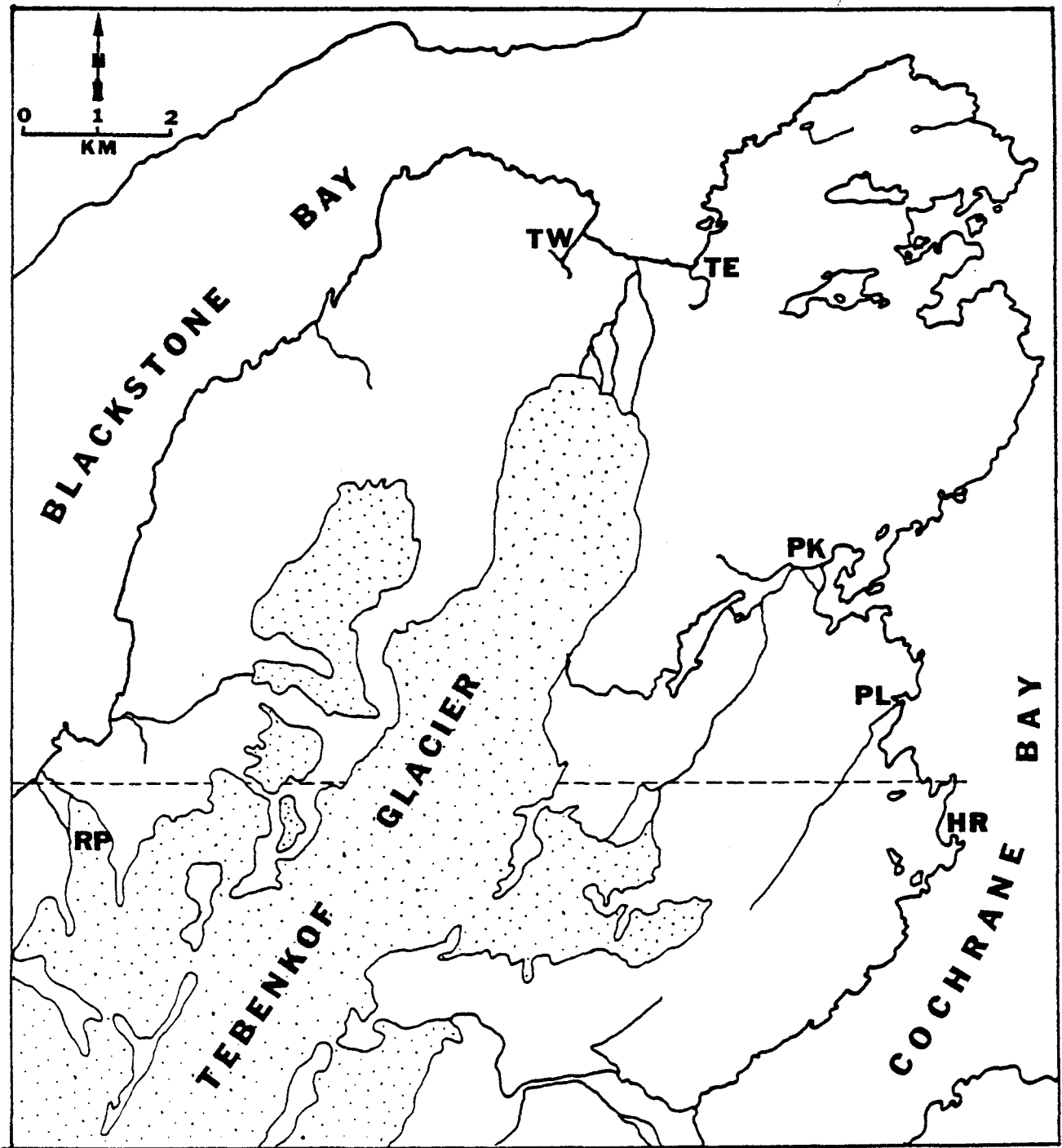


Table 1. Summary of results for trapping black bears in northwestern Prince William Sound, Alaska, from 10-28 August 1978.

Location	No. days trapped	No. trap nights	No. snares sprung	
			w/o capturing a bear	with capturing a bear
Tebenkof Glacier				
Westside stream	18	411	13 (1) ^a	0
Eastside stream	17	187	7 (4)	0
Parks Creek	17	351	5 (3)	1
Paulson Creek	17	<u>74</u>	<u>5 (2)</u>	<u>0</u>
		1,023	30 (10)	1

^a Number of snares found sprung after August 19.

Creek and Paulson Creek; Fig. 1) in northwestern Prince William Sound.

During this time period, a maximum of 32, 12, 24 and 5 foot snares were set at the Tebenkof west, Tebenkof east, Parks Creek and Paulson Creek areas, respectively. In total, 1,023 foot snare nights (411 at Tebenkof west, 187 at Tebenkof east, 351 at Parks Creek and 74 at Paulson Creek) of trapping effort were expended (Table 1). Thirty-one of the 1,023 set snares (1 for every 33) were found sprung.

One black bear was captured, marked, collared with a radio transmitter and released. This particular bear had not been captured previously. Data on this bear and its radio collar are presented in Tables 2 and 3, respectively.

Table 2. Date of capture, location of capture, sex, maternal status, age and weight for the black bear captured in western Prince William Sound, 1978.

Date of capture	Location	No. ear tags	Sex	Maternal Status	Age ^a	Weight (lbs)
8/15/78	Parks Creek	B157/B158	Female	Pregnant	6	146

^a Determine by counting cementum annuli in a premolar tooth.

Table 3. Frequency and type of radio collar put on the black bear captured in western Prince William Sound, 1978.

No. ear tags	Date radio-collared	Collar type ^a	Radio frequency MHz	Receiver channel/frequency
B157/B158	8/15/78	AVM expandable material modified to fixed size	149.148	6.42

^a Radio collars fabricated by AVM Instruments Company, Champaign, Ill., 61820.

Though radio-tracking flights were attempted three times each week, inclement weather in Portage Pass greatly interfered with this schedule (Appendix A). Radio relocations for individual bears collared with transmitters in 1977 and 1978 are presented in Figs. 4-8.

One bear (B107/B108), previously captured in 1976 at Paulson Creek and in 1977 at Parks Creek, was killed (6/14/79) in the vicinity of Parks Creek by a hunter.

DISCUSSION

Capturing and Radio-collaring

At this point, one can only speculate on the reasons for such poor success in snaring bears in 1978 relative to the effort and success in the 2 previous years. In spite of the poor success in capturing bears, one must still account for 32 snares that were sprung and did not capture a bear. In two instances, other people were seen walking in and near trapping areas and could account for six of the sprung snares. Sightings and sign of otters and minks in the trapping areas suggest that some of the sprung snares may be attributable to activities of these animals.

Because of confrontations with cubs and their sows in 1978, guards (wrappings of electrical tape) were placed on snares so they would not tighten down small enough to catch and hold a cub. It is possible that this modification also affected overall effectiveness of snares in capturing even an adult. The one bear captured however, was captured in a "guarded" snare.

Regardless, there was very little sign of bears along stream side areas, in comparison to the amount observed in 1976 or 1977. Data gained from radio-locating bears indicated that, although bears appeared to be in the general vicinity of salmon streams, in reality they were at slightly higher elevations (approximately 500 m) on hillsides and above the actual stream beds.

Preliminary findings indicate that most bears were on hillsides feeding on berries (*Rubus* sp. and *Vaccinium* sp.) and other herbaceous foods during August 1978, when in 1976 and 1977 they were captured along streams while feeding on salmon. This implies that there was a basic difference between the August of 1978 and that of 1976 and 1977.

One outstanding difference between the months of August in those years was the weather. The weather in August 1978 in western Prince William Sound was characterized by mostly warm sunny days and very few rainy and overcast days. In fact, it only rained on 2 days during trapping activities in 1978; in 1976 and 1977 it was only sunny on 4 days. It is possible that the extremely sunny and mild weather in 1978 brought about phenological changes in vegetation at a much earlier date (i.e., plants and parts of plants not normally available until late August were available in early August in 1978), and the bears which would normally be feeding on salmon fed instead on alternate food sources.

Activity of bears in late July and early August 1978 did not appear greatly different from that in 1976 or 1977 (i.e., bears were on and around salmon streams at that time) but by mid August when snaring was most productive in previous years, the bears had left streamside areas and returned to mid elevations. Salmon were certainly as abundant and available as in previous years. Similarly, brown bears (*Ursus arctos*) have been reported to shun a readily available salmon food source for vegetative foods (Troyer and Hensel 1964; p. 771 and Clark 1957; p. 146).

Had the activities of bears been assessed only by aerial radio tracking, I may have falsely believed that bears were (as usual) feeding on salmon because they were so close to the streams. However, observations in the field and on the ground provided more precise information; the bears were, in fact, only scarcely utilizing the salmon resource.

These observations and previous circumstantial evidence (Modafferi 1978b) further indicate that salmon function as an alternate and interim food source utilized only when and as long as their preferred foods (berries?) are not available. The next obvious question to be posed is--what is the difference (in terms of survival and productivity) between bears forced to pre-fatten on salmon and those that pre-fatten and/or fatten on a more desirable diet? In the future, aspects of this study will be directed at partly answering this question.

Even in years like 1978, it may still be profitable to trap bears along salmon streams. It has been mentioned that signs of bears at the streams in early August 1978 were as common as in previous years. But in order to effectively capture bears with snares, you must wait until the bears (maybe individual bears) establish a pattern and specific location for feeding on salmon. Only then are snares affective. But before definite patterns were recognizable in 1978, the bears had left the streams.

It seems reasonable that bears could be captured in barrel-type traps, similar to those used by Rogers (1977) in Minnesota, in early August when they first arrive on the streams. The traps have proven to be very effective, but our bears would have to be attracted to traps in spite of an abundance of available salmon. If bears do prefer berries at this time of the year it is reasonable to believe that jam, honey or any sweet smelling, fragrant attractant would lure bears into the traps. Bears also appear to be very curious and any odor foreign to them and their habitat may also be sufficient to lure bears into the barrel traps. Traps of this sort would probably be very efficient in capturing bears in the early spring when food sources are most scarce and limited to localized areas.

Radio Collars and Collar Material

Since a high proportion of the bears captured in 1976 were immature; in 1977, it was decided to collar bears with expandable type radio transmitter units (manufactured by AVM Instruments) to test their applicability in this study. However, no bears radio-collared in 1977 were recaptured in 1978. Therefore a meaningful appraisal of the utility (material construction of collar and affects on bears) of the expandable type collars can not be made.

It was unfortunate that battery packs selected for these expandable collars had a theoretical life of only 1.5 years, as all expandables remained on the bears (relocations were in different locations) until transmitters stopped working. It is possible that the same collar material and design would be suitable for use in combination with a 3-year life expectancy battery pack.

Apparently fixed-size collars were not fitted tightly enough as three of the four put on bears eventually came off.

Since the collar material on the AVM expandable collars was narrow in width, flexible and non-abrasive, the sole bear captured in 1978 was fitted with a collar made of similar material but fastened to a fixed size with pop rivets.

Movements

Though data on movements of radio-collared bears from July 1977 to mid June 1978 are scanty because many of the transmitters expired during this interval, several salient observations concerning bear behavior can be made.

Male bear (A), B119, extended his range to the south along the west side of Cochrane Bay. Movements into this area occurred after another male (B), B149, was killed by a hunter in the spring of 1978. Prior to his death male B149 ranged over this portion of the Tebenkof Peninsula. It is possible that male B149 dominated male B119 (and/or B119 respected the range of male B149) and excluded this individual from utilizing that parcel of habitat.

In summer 1977, two different sows, each with cubs, were observed in an area immediately west of Parks Lake (lake southwest of Parks Creek). In spring 1979, two different sows with cubs were observed in this same general area. In both of these instances, the family groups were no more than several hundred meters apart. The intriguing fact is the apparent common use of this same area by different sows with cubs and in different years. It is possible that sows use this area because of its food sources for cubs and/or the relative "non-use" of the area by boars. Confrontations of sows and cubs with boars are probably undesirable and could affect the survival of a litter.

Movements of female bears were not as extensive as those of the males. Females appeared to range over the same general areas as in the previous summer. Ranges of all females certainly do not appear to be exclusive but may be so in a temporal sense.

Recommendations

Try to capture bears in baited and/or scented barrel traps set along salmon streams in August and set in sedge and grass flat areas in early spring (May-June).

Determine nutritional content of various foods consumed by bears in spring and summer. In particular, compare the chemical constituents of salmon to those of *Rubus* and *Vaccinium* berries.

ACKNOWLEDGEMENTS

I am grateful to Denny Dawes and David Johnson for assistance in field aspects of this project. Karl Schneider and Julius Reynolds have provided useful suggestions in all aspects of this study.

Fig. 4. Radio relocations for a subadult male black bear (A=B119) captured in 1977.

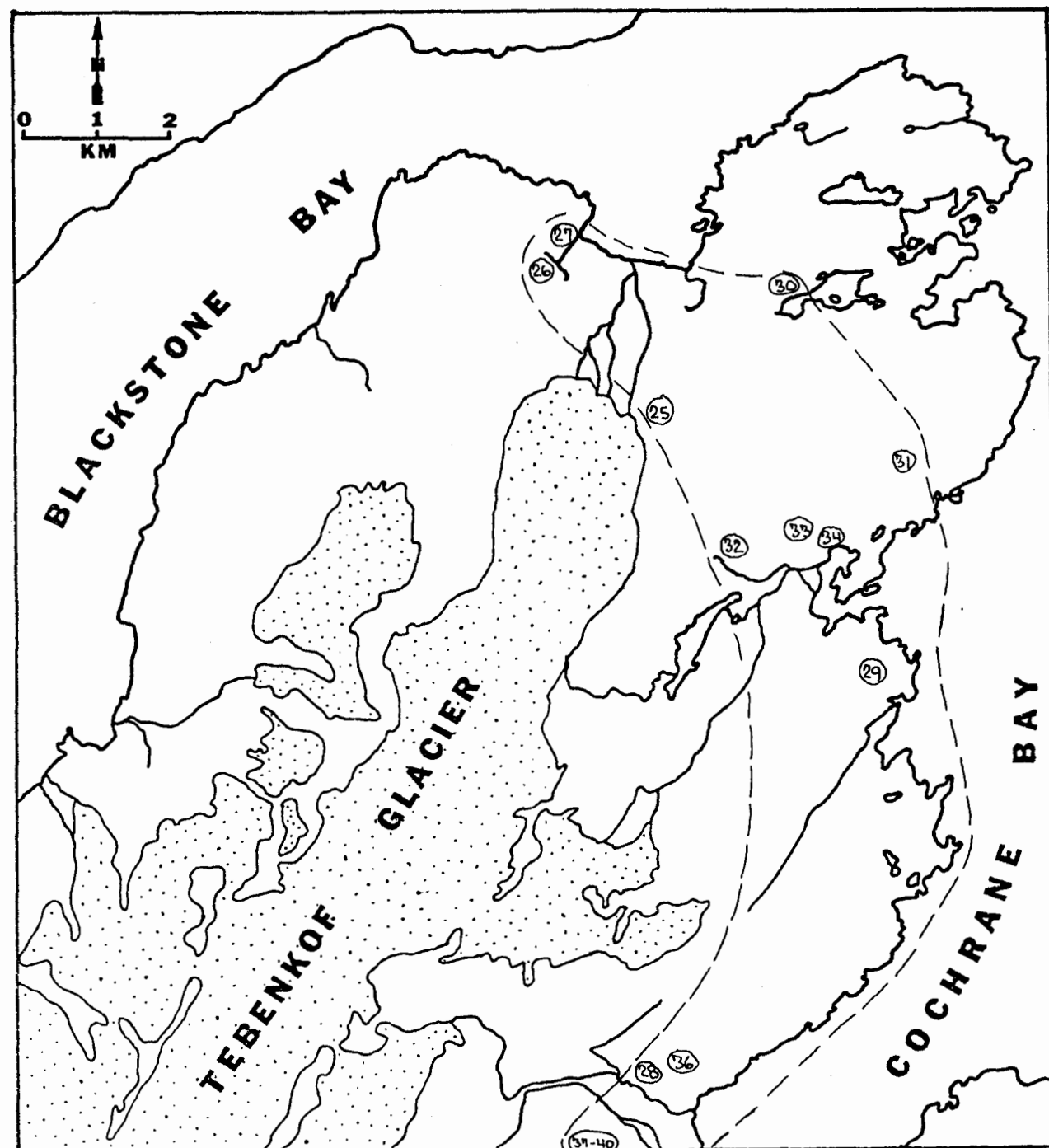


Fig. 5. Radio relocations for a subadult female black bear (J=B147) captured in 1977.

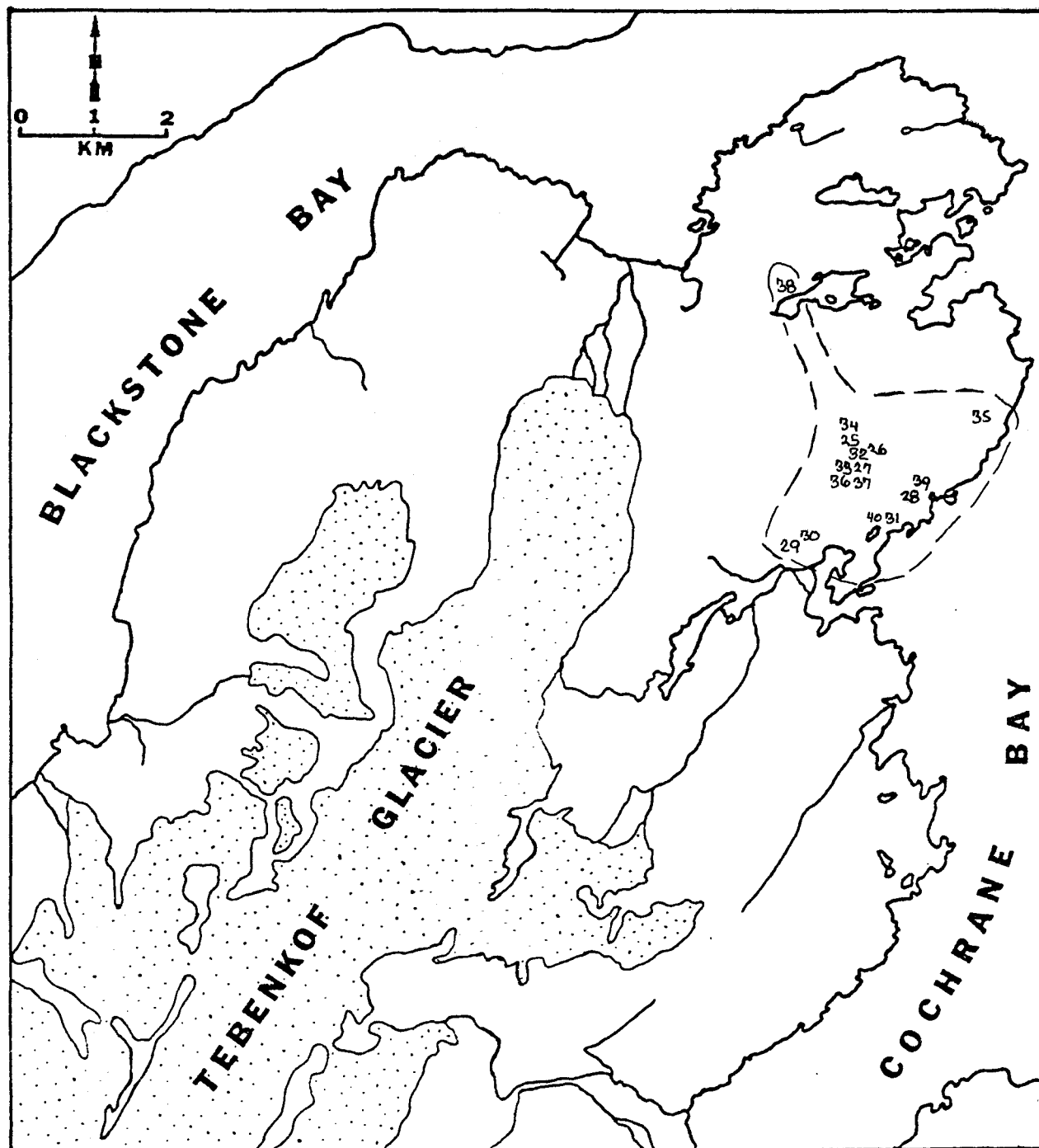


Fig. 6. Radio relocations for a yearling male (K=B155) and an adult female black bear (H=B141) captured in 1977.

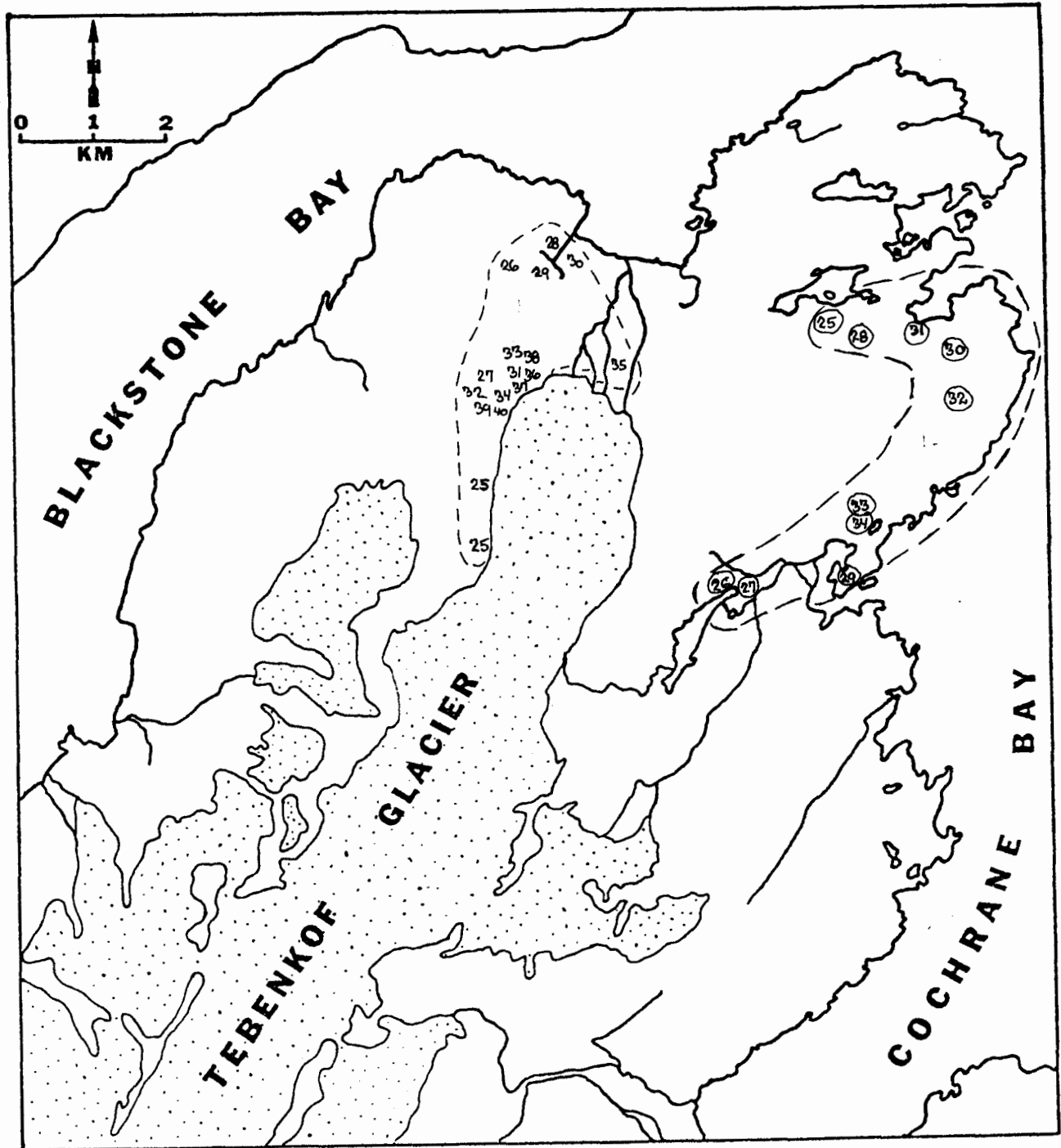


Fig. 7. Radio relocations for two different female black bears (D=B125 and E=B137) radio-collared in 1977.

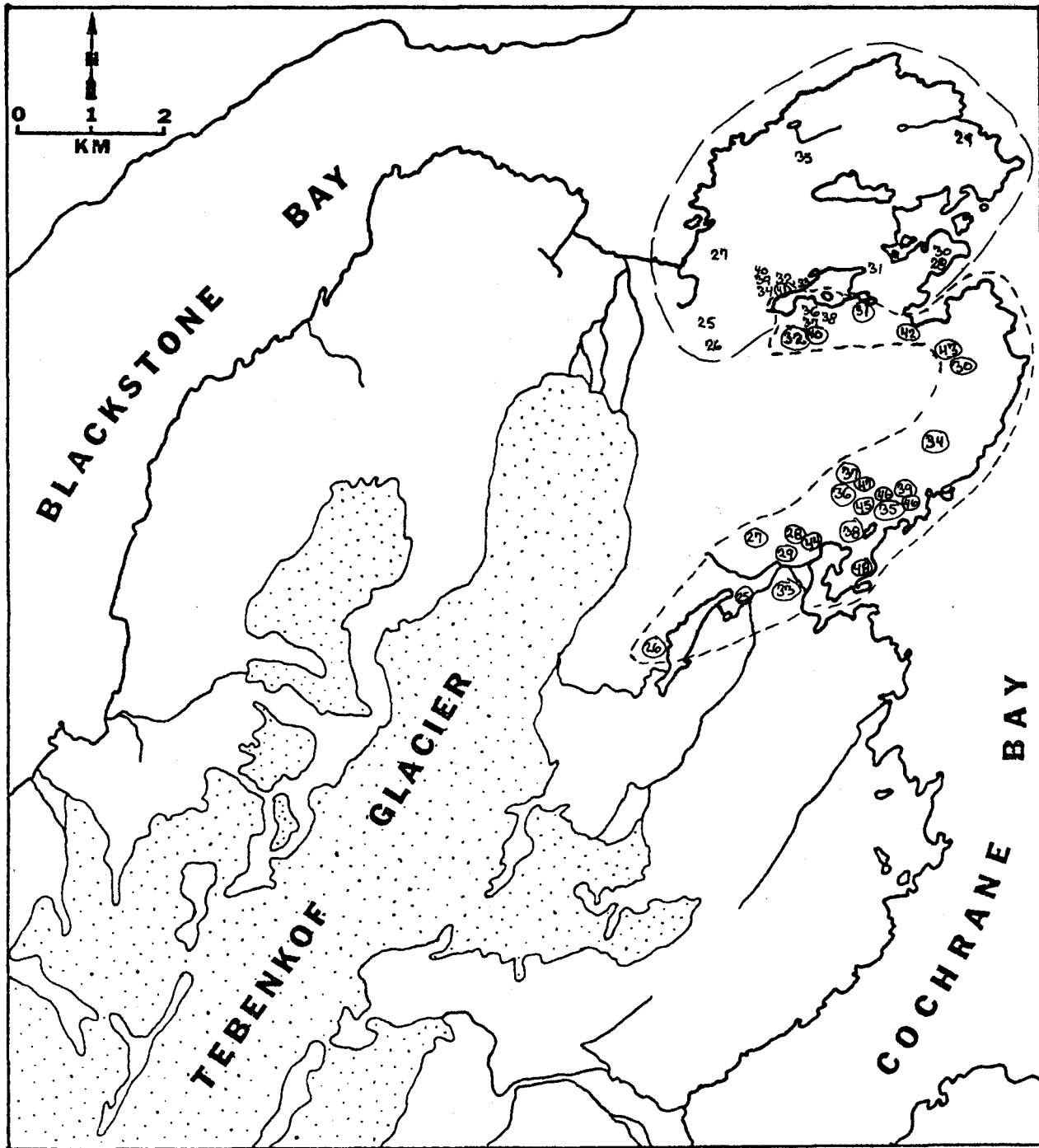
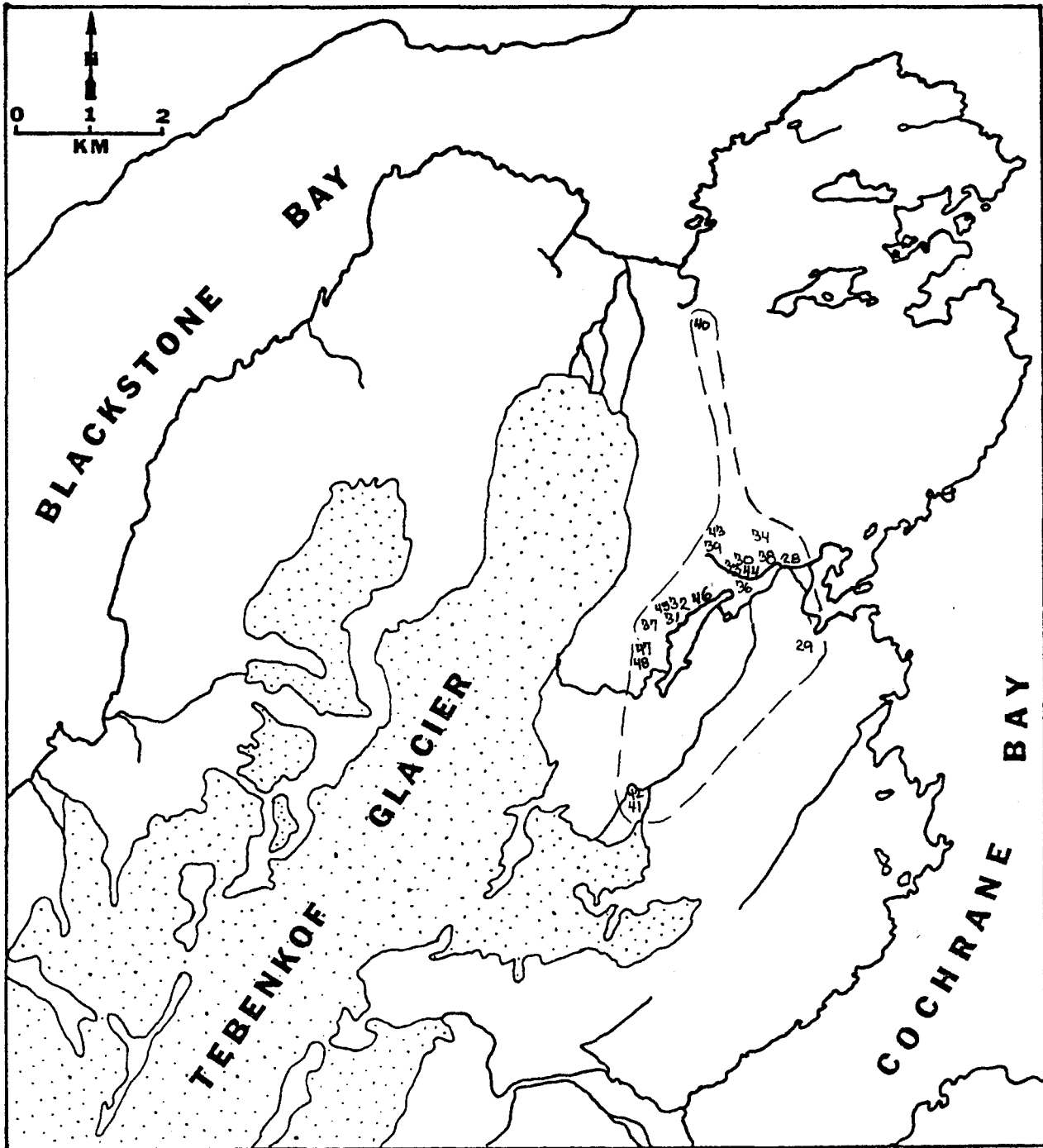


Fig. 8. Radio relocations for an adult female black bear captured in August of 1978 and accompanied with two cubs in 1979 (M=B157).



I would like to extend especial thanks to Charlie Allen of Charlie Allen's Flight Service for his eagerness to do a good job in piloting the sometimes "boring" radio-tracking flights, for making the somewhat hazardous flying conditions as pleasant as possible and for bringing us and the plane safely back from every flight.

Since fall 1978, this study has in part been funded by the U.S. Forest Service (Chugach National Forest). Their support and funding, as well as their desire to learn about the black bear in its habitat, are greatly appreciated. In the presence of State austerity programs, these monies have certainly become vital to the continuation of this study.

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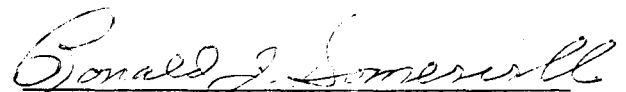
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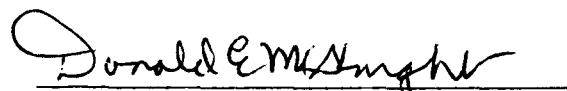
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APPENDIX A

Dates and codes for designated radio relocations of black bears
in western Prince William Sound, Alaska 1978-79.

<u>Code</u>	<u>Date (time)</u>
25	July 17
26	26
27	Aug. 2
28	15
29	18
30	23 (3:00 p.m.)
31	24 (5:00 p.m.)
32	25 (9:00 a.m.)
33	26 (9:00 a.m.)
34	27 (8:00 a.m.)
35	28
36	30
37	9-1
38	9-6
39	9-27
40	9-29
41	4-23
42	5-15
43	5-31
44	6-5
45	6-14
46	6-15
47	6-18
48	6-19