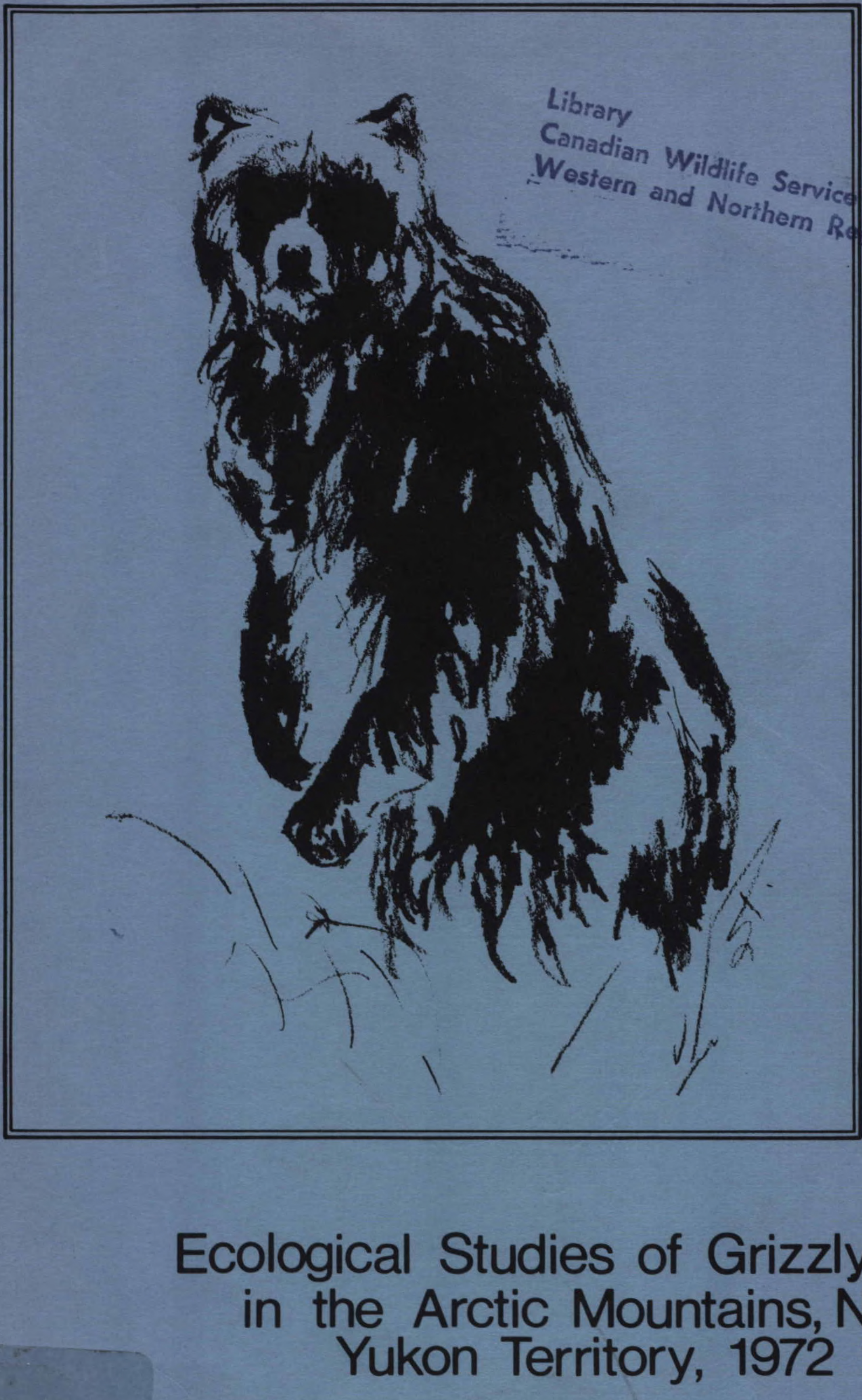



# Ecological Studies of Grizzly Bears in the Arctic Mountains, Northern Yukon Territory, 1972 to 1975

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*Canadian Wildlife Service*

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# ABSTRACT

Seventy-eight different grizzly bears were captured on a 3367 $km^2$ study area in northern Yukon Territory. Densities were one grizzly bear per 33-39 $km^2$.

Eighty percent of the population consisted of subadults ($\geq$2 and $<$6 years) and adults ($\geq$6 years). On average 54 percent of the adult females were not accompanied by young, indicating low productivity. Known natural and harvest mortalities were low. Factors such as productivity, age-sex distribution, known mortalities and comparisons of data from other studies suggested that the population was stable.

The breeding season was between 5 May and 15 July. Females first bred at ages 5.5-7.5 years and produced young as late as 21.5 years. An average of 2.07 young were produced on a 3-4 year interval. Young were weaned at ages 2-3 years.

Northern Yukon bears were larger than those of southwest Yukon and smaller than those of Tuktoyaktuk Peninsula, NWT. Significant increases in body weight during the active period (50-59 percent) and losses during denning (25-36 percent) were recorded. Highly significant correlations between actual weight and girth measurements were found. Weights predicted for girth measurements are given.

Highly significant correlations between age and skull width were obtained. Relationships were compared with populations in other regions. Ages predicted for skull width measurements are given.

Seasonal changes in pelage color caused by solar bleaching and moult were observed. Food habits appeared consistant with those of populations in other northern regions.

Home range data are given. Females showed a high degree of fidelity to specific areas. Subadult males had the largest home ranges. Significant differences were found in the elevational distribution of bears by sex, age and reproductive status.

Information was obtained on den site characteristics. Grizzly bears emerged from winter dens between late April and mid-May.

# ACKNOWLEDGEMENTS

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TABLE OF CONTENTS

| | Page |
|---|---|
| ABSTRACT | ii |
| ACKNOWLEDGEMENTS | iv |
| LIST OF TABLES | vii |
| LIST OF FIGURES | ix |
| LIST OF APPENDICES | xi |
| 1.0 INTRODUCTION | 1 |
| 2.0 DESCRIPTION OF THE STUDY AREA | 3 |
| 3.0 METHODS | 7 |
| 3.1 Capture and Marking of Animals | 7 |
| 3.2 Physical Characteristics | 8 |
| 3.2.1 Weights, measurements and pelage coloration | 8 |
| 3.2.2 Growth parameters | 8 |
| 3.2.3 Weight-heart girth relationships | 8 |
| 3.2.4 Age-zygomatic breadth relationships | 9 |
| 3.3 Population Dynamics | 9 |
| 3.3.1 Age-sex structure | 9 |
| 3.3.2 Breeding biology | 9 |
| 3.3.3 Harvest data | 10 |
| 3.4 Food Habits | 10 |
| 3.5 Telemetry | 10 |
| 4.0 RESULTS AND DISCUSSION | 12 |
| 4.1 Animals Captured | 12 |
| 4.2 Drug Dosages and Reaction Time | 12 |
| 4.3 Weights, Measurements and Pelage Color | 14 |
| 4.3.1 Weights | 14 |
| 4.3.2 Growth parameters | 14 |
| 4.3.3 Seasonal weight gains | 18 |
| 4.3.4 Weight loss during hibernation | 20 |
| 4.3.5 Weight-heart girth relationships | 22 |
| 4.3.6 Pelage color | 23 |

Page

4.4 Relationship between Age and Zygomatic Breadth of Skull.. 26

4.5 Population Dynamics.................................... 29

4.5.1 Age-sex structure.............................. 29
4.5.2 Mortalities.................................... 37
4.5.3 Population densities........................... 38
4.5.4 Breeding biology............................... 40
4.5.4.1 Breeding season........................ 40
4.5.4.2 Breeding ages.......................... 43
4.5.4.3 Litter size............................ 44
4.5.4.4 Frequency of litter sizes.............. 47
4.5.4.5 Reproductive interval.................. 49
4.5.4.6 Weaning dates.......................... 50

4.6 Food Habits............................................ 50

4.7 Seasonal Movements..................................... 54

4.8 Elevational Distribution of Adult Males Compared to other Sex and Age Classes of Grizzly Bears............... 71

4.9 Denning................................................ 74

4.9.1 Geographic location of dens.................... 74
4.9.2 Elevation of dens.............................. 74
4.9.3 Slope aspect of dens........................... 74
4.9.4 Degree of slope of den sites................... 77
4.9.5 Substrate...................................... 79
4.9.6 Internal measurements.......................... 80
4.9.7 Vegetation cover............................... 80
4.9.8 Re-use of densites............................. 81
4.9.9 Emergence from dens in spring.................. 81

5.0 CONCLUSIONS................................................ 84

6.0 RECOMMENDATIONS............................................ 88

7.0 LITERATURE CITED........................................... 90

APPENDICES..................................................... 96

LIST OF TABLES


Table Page

1. Summary of captures of grizzly bears in northern Yukon, 1972-74 .......... 13

2. Average weight by age class of grizzly bears captured in northern Yukon, 1972-74 .......... 15

3. Parameters (with standard errors of estimation) of weight-age relationships for northern Yukon and Tuktoyaktuk Peninsula grizzly bears .......... 16

4. Test vector coefficients and $T^2$ values for difference between northern Yukon and Tuktoyaktuk Peninsula grizzly bear spring weights .......... 17

5. Weight changes measured between May and September among grizzly bears in northern Yukon, 1972-74 .......... 19

6. Weight loss recorded for grizzly bears during the denning period in northern Yukon, 1972-74 .......... 21

7. Parameters of regression lines of weight on heart girth ($\log_{10}$ weight = a + b $\log_{10}$ heart girth) for combined data from northern Yukon and Tuktoyaktuk Peninsula grizzly bears .......... 24

8. Predicted weights, with symmetrical 95 percent confidence intervals on the population mean, for heart girth measurements of grizzly bears in northern Yukon and Tuktoyaktuk Peninsula, NWT .......... 25

9. Parameter of regression lines of age on skull breadth ($\log_{10}$ age = a + b $\log_{10}$ skull breadth) for male and female grizzly bears of the northern Yukon .......... 27

10. Predicted age and symmetrical 95 percent confidence intervals on the population mean from zygomatic breadth measurements for northern Yukon grizzly bears .......... 28

11. Statistics for comparison of age-skull breadth relationships between the Arctic mountain grizzly bear (northern Yukon population) and other northern populations .......... 30

12. Age and sex structure of northern Yukon grizzly bear population in spring 1973 and 1974 .......... 31

13. Age composition of northern Yukon grizzly bear and other grizzly bear populations in North America .......... 32

14. Age composition of four grizzly bear populations .......... 33

Table | Page

15. Percentage of adult female grizzly bears with or without cubs, yearlings or other subadult young in northern Yukon (1973-74) and Tuktoyaktuk Peninsula, NWT (1974-77)........................ 36

16. Densities of grizzly bear popultions in various regions of North America................................................ 41

17. Average litter sizes for northern Yukon and other grizzly bear populations of North America.................................... 46

18. Observed litter sizes for grizzly bears in northern Yukon, 1972-74................................................ 48

19. Importance values and importance value percent of food items in the diet of grizzly bears in northern Yukon in 1973 and 1974................................................ 52

20. Numbers of grizzly bears radio-collared in northern Yukon, 1973-74................................................ 55

21. Observed minimum home range sizes for grizzly bears in northern Yukon, 1973-74................................................ 63

22. Dates of emergence for 16 grizzly bears in northern Yukon, 1973-75................................................ 82

LIST OF FIGURES

Figure Page

1. Location of study area in northern Yukon, 1973-74............... 4

2. Core home ranges of female grizzly bears on or adjacent to study area, 1973-74........................................... 39

3. Cumulative home ranges for 14 male grizzly bears in northern Yukon, 1973-74............................................ 56

4. Cumulative home ranges of 19 female grizzly bears in northern Yukon, 1973-74............................................ 57

5. Annual and cumulative minimum home range polygons for female grizzly bears R-R, G-W and R-G................................ 58

6. Annual and cumulative minimum home range polygons for female grizzly bears W-W, Y-R and W-Y................................ 59

7. Annual and cumulative minimum home range polygons for female grizzly bears L-L, W-R, L-Y, G-O and R-LB..................... 60

8. Annual and cumulative minimum home range polygons for female grizzly bears B-R, B-B, R-O, W-O and G-G...................... 61

9. Annual and cumulative minimum home range polygons for female grizzly bears G-R, G-B and L-P................................ 62

10. Annual and cumulative minimum home range polygons for male grizzly bear W-B............................................. 65

11. Annual and cumulative minimum home range polygons for male grizzly bears L-LB and W-G.................................... 66

12. Annual and cumulative minimum home range polygons for male grizzly bears P-W, R-W, L-O, W-P and B-G...................... 67

13. Annual and cumulative minimum home range polygons for male grizzly bears O-O, Y-G, P-Y and LB-R........................... 68

14. Annual and cumulative minimum home range polygons for male grizzly bears L-L and G-Y..................................... 69

15. Distribution of observations of grizzly bears of different sex, age and reproductive classes by elevation above sea level in northern Yukon, 1973-74.................................... 72

16. Location of den sites in northern Yukon, 1972-75................ 75

| Figure | | Page |
|---|---|---|
| 17. | Aspect of grizzly bear dens in northern Yukon, 1973-74......... | 76 |
| 18. | Angle of slope on which grizzly bear dens were located in northern Yukon 1973-74........................................ | 78 |

LIST OF APPENDICES

Appendix Page

A. Data from female grizzly bears captured in the Arctic mountains of northern Yukon Territory, 1972-74................. 97

B. Data from male grizzly bears captured in the Arctic mountains of northern Yukon Territory, 1972-74.......................... 101

# 1.0 INTRODUCTION

The grizzly bear (*Ursus arctos* L.) was once indigenous to most of western North America and occupied a wide range of habitats. However, man's intolerance for grizzly bears and the species' inability to adapt to changes wrought by civilization has caused significant reduction in both numbers and range occupied by this species (Russell 1967, Cowen 1972, Stebler 1972). Populations relatively unaffected by man now occur only in remote regions of western and northern Canada and in Alaska; one such region is in northern Yukon.

In 1972, the Canadian Wildlife Service (CWS) began ecological studies of the Arctic Mountain ecotype of grizzly bears in northern Yukon in response to a proposal to construct a 1.2 m diameter gas pipeline from Alaska to midwest USA via the Mackenzie River basin. It presented an unique opportunity to study a population largely unhunted by man and hence to provide a yardstick by which data from hunted populations in northern climes could be measured. Field studies were concluded in spring 1975.

There have been several related studies of grizzly bears in the northern limits of their range. In Alaska, Reynolds (1976 and 1980) studied grizzly bears of the Brooks Range. Pearson (1975) conducted studies of grizzly bears in southwest Yukon in the 1960's and research on the biology of this species is going on in the Ogilvie Mountains of Yukon Territory (B. Smith, pers. comm.). In the Northwest Territories two studies of grizzly bears were completed in the late 1970's: in the Mackenzie Mountains (Miller and Barichello 1979) and on the Tuktoyaktuk Peninsula and Richards Island (Nagy *et al.* 1983).

The objectives of the study of grizzly bears in the Arctic Mountains of northern Yukon were as follows:

1) to determine population parameters;

2) to describe the movements and home ranges of various sex and age classes;

3) to describe the food habits of grizzly bears in the study area;

4) to describe the physical characteristics of grizzly bears of northern Yukon;

5) to locate denning areas and to describe den site characteristics; and,

6) to provide a solid data base for the development of a sound management strategy for grizzly bears in northern Yukon in the event of major industrial development of the region.

The study was designed and carried out by CWS in consultation with the Wildlife Branch, Yukon Territorial Government. One progress report was filed in the CWS library in 1974 (Pearson and Goski 1974) and preliminary results of the study were presented at the third International Conference on Bear Research and Management at Binghamton, New York (Pearson 1976). Final results from the study are presented and discussed in this report.

## 2.0 DESCRIPTION OF THE STUDY AREA

The study area covered 3367 $km^2$ straddling the mountains of central northern Yukon (Figure 1). The area was selected as representative of the Arctic mountains which support relatively large numbers of grizzly bears (Watson et al. 1973). A base camp was established at Sam Lake and intensive work was centered between there and Trout Lake (68°49'N; 138°45'W) where additional fuel supplies were cached.

Most of the study area falls within the Northern Mountain-Coastal Plain ecoregion which includes portions of four physiographic units described by Bostock (1948), including the Arctic Coastal Plains, Arctic Plateau, Richardson Mountains and British Mountains. The area features rugged mountains over 1500 meters above sea level (m asl); the Arctic Plateau between the British and Richardson mountains; and, the Arctic Coastal Plains which slope northward to the Arctic Ocean (Oswald and Senyk 1977, Bostock 1948). The north slopes of this ecoregion are drained to the Beaufort Sea by the Blow, Babbage and Trail rivers. The south facing slopes of the British mountains drain into the Porcupine River through the Old Crow Basin. Small to moderate sized lakes, many of thermokarst origin, occur on plateaus and are common on the Coastal Plains (Oswald and Senyk 1977). Only the eastern slopes of the Richardson Mountains and the Arctic Coastal Plains were glaciated during the early Wisconsin period.

The extreme southern portion of the study area falls within the Old Crow Basin ecoregion most of which is below 300 m asl, but also includes plateaus adjacent to the British Mountains which rise to just over 900 m asl. The region is drained by tributaries of the Porcupine River. Lakes are abundant, many of which are of thermokarst origin,

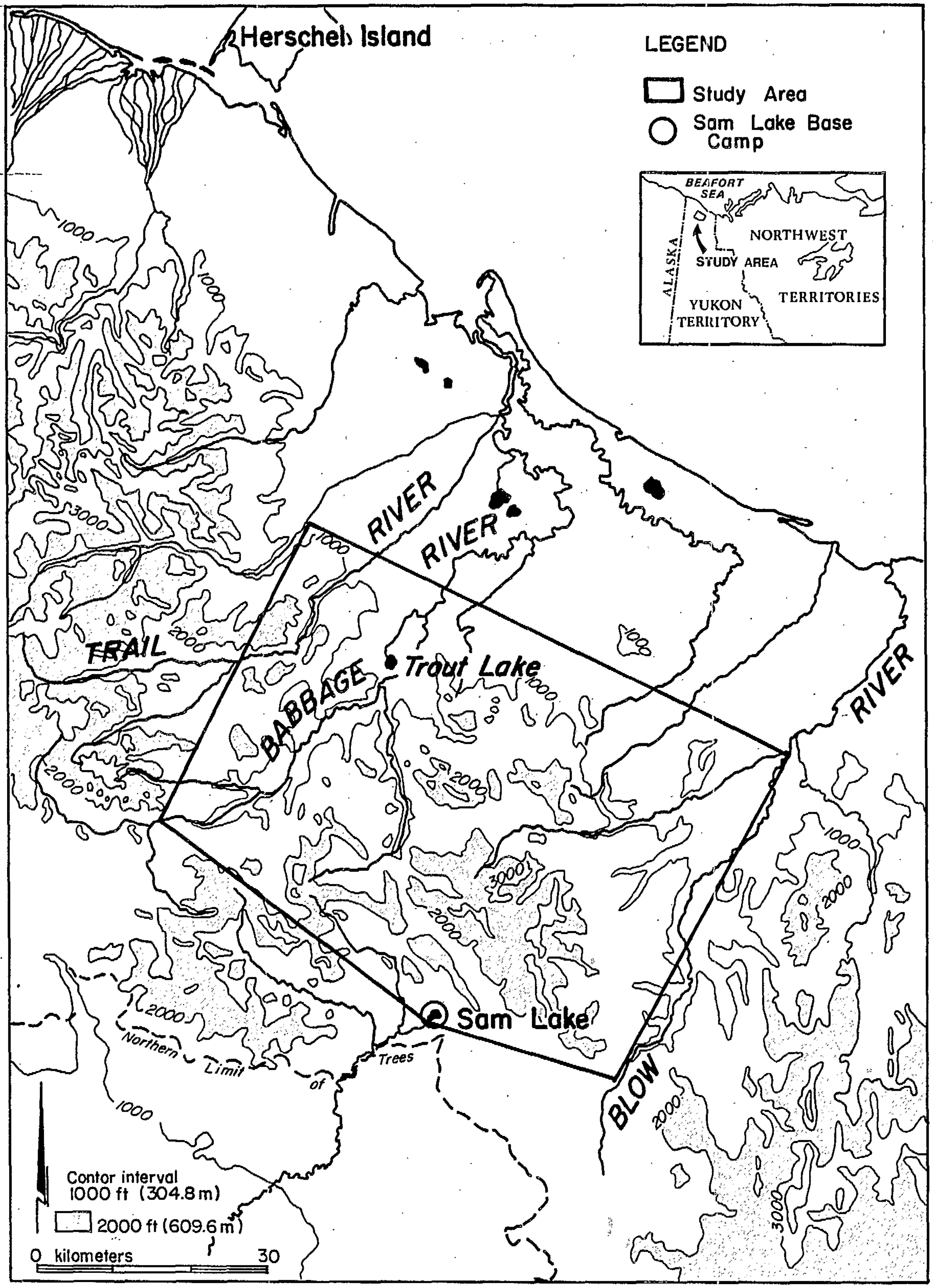


Figure 1. Location of study area in northern Yukon, 1973-74.

shallow and oriented in a northwest-southeast direction (Oswald and Senyk 1977). The area was not glaciated during the last glacial period.

The major part of the study area is underlain by sandstone, shale, conglomerate, limestone and dolomite sedimentary rocks. Extensive deposits of fluvial material bounded by steep sided erosional scarps occur on the coastal plains. Large channel features and deltaic forms occur near and along the coast, respectively (Oswald and Senyk 1977). Lowland areas are characterized by peat plateaus with polygonal surfaces. Almost all land surfaces are hummocky with hummock tops devoid of vegetation. Intricate feather-like drainage patterns typify most sloping landscape (Oswald and Senyk 1977). The area is within the zone of continuous permafrost.

The Northern Mountain-Coastal Plains ecoregion is mostly devoid of trees. Open stands of black spruce (Picea mariana), white spruce (Picea glauca) and balsam poplar (Populus balsamifera) occur in protected valleys and on some south-facing slopes. The Arctic Coastal Plain and similar lowlands extending up river valleys into the mountains are poorly drained and thus are very wet during the summer (Wahrhaftig 1965). Cotton grass (Eriophorum angustifolium) and sedges (Carex spp.) grow in abundance on marshy meadows.

River, stream and lake banks support dense thickets of willow (Salix spp.). Willows also occur in shallow depressions at higher elevations where snow patch communities are developed. Higher, better drained areas support a variety of grasses, herbs and shrubs, most prominent of which are crowberry (Empetrum nigrum), blueberry (Vaccinium spp.), dwarf birch (Betula gladulosa), saxifrages (Saxifraga spp.), poppies (Papaver spp.), louseworts (Pedicularis spp.), vetches (Oxytropis spp.) and grasses (Calamagrostis spp.).

In the Old Crow Basin ecoregion open black and white spruce stands occur at lower elevations, with paper birch (Betula papyrifera), balsam poplar and aspen frequently present. Dwarf birch, willow and alder (Alnus spp.) are common in openings and under trees and extend above tree-line. Sedges and cotton grass are common throughout. Ericaceous shrubs, dwarf willows, forbs, mosses and lichens are prevalent in hummocky regions (Oswald and Senyk 1977).

The climate of the Northern Mountains - Coastal Plains ecoregion is moderated by coastal influences. Temperature ranges are not as extreme as further inland. Mean annual precipitation is approximately 500 mm in the Richardson Mountains; 250-380 mm in the Arctic Plateau and British Mountains; and 125 mm along the Arctic Coast. The mean annual temperature is -10°C to -11°C. The Old Crow Basin ecoregion receives between 170 to 250 mm of precipitation, with mean annual temperatures ranging from -9°C to -12°C (Oswald and Senyk 1977). Because the study area is close to the coast, weather systems moving off the Arctic Ocean result in frequent occurrences of fog during the summer (Pearson and Nagy 1976).

Major fauna of the study area includes caribou (Rangifer tarandus), moose (Alces alces), ptarmigan (Lagopus spp.), and numerous migratory waterfowl and shorebirds.

# 3.0 METHODS

## 3.1 Capture and Marking of Animals

Intensive capture programs were conducted during the post-denning period in May, when a nearly complete snow cover facilitated observation of bears and recently opened dens. Bears were immobilized by darting them from a hovering helicopter, a technique used with polar bears (Lentfer 1968). Capture operations were conducted with the use of Bell 47G3-B2 (piston) and 206B (turbine) helicopters. Approximately 210 hours were flown in the study area to locate bears and den sites. Field work was conducted during summer and fall in order to recapture bears to replace malfunctioning radio transmitters and to locate, measure and describe dens.

Phencyclidine hydrochloride (Sernylan, Park Davies and Co.) alone or in combination with the muscle relaxant promazine hydrochloride (Sparine, Wyeth Ltd.) was used to immobilize bears. The darts were fired from a Cap- Chur gun (Palmer Chemical and Equipment Co. Inc.) powered by medium (crimped green) Ramset powder charges.

The drug dosage(s) and induction time were recorded for each capture. For single-dart captures, a drug tolerance was calculated as:

tolerance = induction time (mins.) x dosage (mg/kg).

Differences between seasons in average drug tolerance were tested using Student's t-test.

Three types of ear markers were used: 1) numbered metal Kurl Lock or plastic Roto tags; 2) hollow-braid polypropylene rope; and, 3) colored polyvinylchloride tape (Pearson 1975). Individual bears were marked with specific color-coded tags which facilitated visual identification from aircraft (Pearson 1975).

## 3.2 Physical Characteristics

### 3.2.1 Weights, measurements and pelage coloration

Each immobilized animal was weighed and measured, and the color of its pelage was recorded. Bears were weighed in a cargo net attached to a dial scale (Chatillon; 450 kg capacity) suspended from the cargo hook of a hovering helicopter.

### 3.2.2 Growth parameters

Age-weight relationships were expressed by Von Bertalanffy growth curves (Kingsley 1979):

$$W(k) = W\ (1 - \exp.\ (-kt - x))^3.$$

Because male grizzlies weigh more than females, and all gain weight in summer and lose again in winter, the data were segregated and separate curves fitted for the two sexes and for spring and fall data. The spring curves were compared with those for the Tuktoyaktuk Peninsula population by multivariate t-tests.

### 3.2.3 Weight-heart girth relationships

The relationship between weight and heart girth was examined as the power curve:

$$wt = 10^a.\ (\text{heart girth})^b$$

which was linearised to

$$\log_{10}\ (wt) = a + b\ \log_{10}\ (\text{girth})$$

Separate values of a and b fitted for males and females were tested by means of F-tests for parallelism and coincidence with each other and other populations. The possible use of these relationships for predicting weight from heart girth was examined.

#### 3.2.4 Age-zygomatic breadth relationships

The zygomatic breadths measured on the live animals were corrected by 0.94 (Pearson 1975) to approximate the skull width, and the relationship

$$\log_{10} (\text{age}) = a + b \log_{10} (\text{zygomatic breadth})$$

was fitted by standard least squares. Relationships for the two sexes were compared by means of F-tests for parallelism and coincidence with each other, and with other populations.

## 3.3 Population Dynamics

#### 3.3.1 Age and sex determination

The ages of bears were obtained by counting annulations on a premolar tooth as described by Pearson (1975) and Stirling et al. (1977). Additionally, an age was estimated for each unweaned young observed but not captured on the study area. The sex of animals was determined at the time of capture.

#### 3.3.2 Breeding biology

The reproductive status of all females, including the degree (if any) of vulvar swelling, lactation, and the number and ages of accompanying young, was recorded. Observations of male-female associations and the time of dispersal or weaning of young were recorded.

### 3.3.3 Harvest data

Although northern Yukon grizzlies are largely unhunted, some animals were harvested by natives near summer fishing camps along the northern Yukon coast and on the western portion of the Mackenzie Delta. Records of those kills were obtained from Fish and Game officers in Aklavik, N.W.T., or from other field workers conducting studies in the area. Skulls were obtained for reference whenever possible.

### 3.4 Food Habits

Fresh faeces were collected and dried for subsequent analysis in the laboratory. The faeces were washed through a series of screens and the percentage volume of each food item was estimated. An importance value for each food item was calculated using the method described by Mealey (1975).

### 3.5 Telemetry

Selected adult bears were fitted with transmitter collars. Most of the transmitters used were in the 40.68 MHz frequency range at 10 Khz intervals. The transmitters emitted pulses at between 1 and 6 per second. In addition, four animals were equipped with VHF radio collars (150 Mhz range), obtained from Ocean Applied Research, California, and Cochran, Wisconsin. The HF transmitters, receivers and accessories were prepared by the Bioelectronics Section, Canadian Wildlife Service, Ottawa.

A series of flight lines, 8 km apart, was set up to monitor the entire study area and adjacent areas. Radio tracking surveys were flown with a Cessna 185 once a week, weather permitting, at 1200-1500 m above ground level. When a signal was received, the exact location of the animal was established by low level search until maximum signal strength or a visual sighting was obtained. All locations were recorded on 1:250,000 scale topographic maps of the area.

Minimum home range polygons were delineated for bears, when four or more locations were obtained, by plotting all observations on maps and joining the extreme peripheral points (Pearson 1975). The areas encompassed by the polygons were measured by using a Hewlett Packard 9864A digitizer.

When a bear was located, its sex and age class was noted, in addition to the elevation (m asl) of the location. The frequencies of occurrence of the various sex and age classes at high and low elevations were compared, and tested with Chi Square tests.

Dens were located by searching the study area for radio signals in November after the bears had denned for the winter. The location of each den was recorded on a map. In addition each was photographed and, whenever possible, marked with a stake. Dens were measured during the following spring or summer.

# 4.0 RESULTS AND DISCUSSION

## 4.1 Animals Captured

During 2 years of intensive study, 78 grizzly bears were captured, marked and returned to the population (Table 1). Fifty-three bears were handled once, 16 twice and 9 three times. The sex ratio was 37 males to 41 females. The ages, weights, capture locations, color and tag descriptions for males and females are presented in Appendices A and B, respectively.

During preliminary work in 1972 a number of bears were captured off the study area subsequently delineated in 1973. In 1974, two adult females were captured in the vicinity of Rat River (also off the study area) to obtain den site data in relation to a proposed pipeline. All data obtained on the physical characteristics of these bears were included in our analysis as they were considered to be representative of the northern Yukon population. However, only animals captured on the study area were included in the population data presented in the following section.

## 4.2 Drug Dosages and Reaction Time

The average dosage of Sernylan used to immobilize grizzly bears in the northern Yukon was 2.77 mg/kg, with a mean induction time of 8.8 minutes (s.d. 4.27). Dosages were similar to those used on the Tuktoyaktuk Peninsula (2.94 mg/kg with a mean induction time of 8.5 minutes; Nagy et al. 1983). Pearson (1975) found a dosage of 2.64 mg/kg of Sernylan was adequate for capture of bears from a helicopter, and reported noticeable seasonal variations in required dosages (Pearson

Table 1. Summary of captures of grizzly bears in northern Yukon, 1972-74.

| Program | No. of individual animals captured | | Sex Ratio (males:females) | New captures | No. of individual animals recaptured by original year of marking | | |
|---|---|---|---|---|---|---|---|
| Year | Total | Individuals | | | 1972 | 1973 | 1974 |
| 1972* | 21 | 21 | 18 : 3 | 21 | - | - | - |
| 1973 | 57 | 50 | 22 : 28 | 46 | 4 | - | - |
| 1974 | 48 | 45 | 22 : 23 | 25 | 4 | 16 | - |
| 1973-74 | 105 | 78 | 37 : 41 | 71 | 7 | 16 | 1 |

*The 1972 capture program was directed at determining the distribution of grizzly bears across the northern Yukon in relation to proposed pipeline construction. As a result the majority of animals handled during that year were captured off of the study area delineated in 1973.

1976). In this study no systematic seasonal variations in drug tolerance were found. Regional variations in average drug dosages used may be caused by difficulties encountered by field personnel in accurately estimating weights of free-roaming grizzly bears.

## 4.3 Weights, Measurements and Pelage Color

### 4.3.1 Weights

Males are generally heavier than females (Table 2); for mature adults the difference is about 62 kg. Such dimorphism is common in bears. Pearson (1975) showed a similar difference for the grizzly bears in southwestern Yukon, although his mean weights for mature males and females are 40 and 21 kg less, respectively, than those for Arctic Mountain bears. Similarly, our mean weights by age class were greater for both males and females, suggesting a more rapid growth rate.

### 4.3.2 Growth parameters

Weights of grizzly bears from northern Yukon were compared with those from Tuktoyaktuk Peninsula (Nagy et al. 1983). The weights of bears can be highly variable depending on the season of capture (Poelker and Hartwell 1973), therefore, spring weights were used to minimize the variability.

The parameters of fitted Von Bertalanffy growth curves for fall and spring weights of males and females for northern Yukon and Tuktoyaktuk Peninsula populations were calculated (Table 3). The statistics of curve comparisons for spring weights between the two populations are presented in Table 4, from which it is seen that northern Yukon bears are generally

Table 2. Average weight by age class of grizzly bears captured in northern Yukon, 1972-74.

| Age (Years) | Males N | Males Mean Weight (kg) | Males S.D.[a] (kg) | Females N | Females Mean Weight (kg) | Females S.D.[a] (kg) |
|---|---|---|---|---|---|---|
| 0.0- 0.9 | - | - | - | 1 | 36.29 | - |
| 1.0- 1.9 | - | - | - | 2 | 37.42 | 27.27 |
| 2.0- 2.9 | 5 | 64.23 | 27.25 | 4 | 55.57 | 13.16 |
| 3.0- 3.9 | 1 | 127.01 | - | 4 | 54.43 | 27.47 |
| 4.0- 4.9 | 2 | 112.27 | 11.22 | 2 | 75.98 | 17.64 |
| 5.0- 5.9 | 3 | 116.89 | 32.90 | 2 | 80.52 | 17.64 |
| 6.0- 6.9 | 5 | 128.19 | 44.93 | 2 | 98.21 | 36.24 |
| 7.0- 7.9 | 5 | 161.48 | 18.87 | 7 | 99.01 | 15.24 |
| 8.0- 8.9 | 1 | 102.06 | - | 3 | 90.72 | 13.61 |
| 9.0- 9.9 | 2 | 232.47 | 56.13 | 4 | 117.14 | 49.18 |
| 10.0-10.9 | 1 | 129.28 | - | 2 | 86.19 | 25.66 |
| 11.0-11.9 | 4 | 186.89 | 40.52 | 2 | 135.63 | 47.47 |
| 12.0-12.9 | 6 | 186.88 | 39.38 | 6 | 119.83 | 20.56 |
| 13.0-13.9 | 5 | 177.63 | 42.93 | 4 | 129.62 | 24.80 |
| 14.0-14.9 | 2 | 153.09 | 33.67 | 2 | 105.46 | 8.02 |
| 15.0-15.9 | 4 | 151.96 | 19.51 | 3 | 113.85 | 31.38 |
| 16.0-16.9 | 2 | 220.00 | 50.03 | 1 | 97.52 | - |
| 17.0-17.9 | 3 | 206.24 | 22.97 | 1 | 169.19 | - |
| 18.0-18.9 | 2 | 159.90 | 1.61 | 1 | 185.98 | - |
| 19.0-19.9 | 3 | 174.64 | 20.42 | - | - | - |
| 20.0-20.9 | - | - | - | 1 | 180.53 | - |
| 21.0-21.9 | - | - | - | 1 | 135.17 | - |
| 22.0-22.9 | - | - | - | - | - | - |
| 23.0-23.9 | 1 | 157.40 | - | - | - | - |
| 24.0-24.9 | 1 | 147.42 | - | - | - | - |
| 8.0-24.9[b] | 37 | 177.69 | 39.70 | - | - | - |
| 6.0-24.9[b] | - | - | - | 40 | 115.80 | 32.10 |

[a]Standard deviation.

[b]Age class of mature adults.

Table 3. Parameters, (with standard errors of estimation) of weight-age relationships for northern Yukon and Tuktoyaktuk Peninsula grizzly bears.

| Population, season and sex | Estimate (standard error) | | | Error correlations | | |
|---|---|---|---|---|---|---|
| | $W_\infty$ (kg) | k (/year) | x | W-k | W-x | k-x |
| Northern Yukon | | | | | | |
| Spring | | | | | | |
| Males | 190.4 (16.89) | 0.2257 (0.05748) | 0.3474 (0.1250) | -0.8443 | 0.5706 | -0.8479 |
| Females | 91.02(5.082) | 0.4118 (0.09610) | 0.3742 (0.1722) | -0.7284 | 0.5375 | -0.9252 |
| Fall | | | | | | |
| Males | 222.4 (17.94) | 0.2958 (0.1008) | 0.4737 (0.2682) | -0.7550 | 0.5534 | -0.9293 |
| Females | 162.5 (12.87) | 0.2047 (0.04966) | 0.7836 (0.08394) | -0.8293 | 0.0522 | -0.3990 |
| Tuktoyaktuk Peninsula | | | | | | |
| Spring | | | | | | |
| Males | 190.6 (11.14) | 0.2828 (0.02548) | 0.4072 (0.02819) | -0.7019 | 0.0540 | -0.5163 |
| Females | 105.0 (5.679) | 0.4094 (0.04907) | 0.5055 (0.03737) | -0.6836 | 0.0427 | -0.4206 |
| Fall | | | | | | |
| Males | 258.3 (44.69) | 0.2299 (0.09034) | 0.6120 (0.1525) | -0.8337 | 0.2966 | -0.7033 |
| Females | 198.9 (25.55) | 0.1456 (0.04913) | 0.9009 (0.09936) | -0.8737 | 0.0442 | -0.4415 |

Table 4. Test vector coefficients and $T^2$ values for difference between northern Yukon and Tuktoyaktuk Peninsula grizzly bear spring weights.

| Sex | W | k | x | $T^2$ |
|---|---|---|---|---|
| Male | 0.00151 | 0.962 | 0.274 | 12.16* |
| Female | 0.03780 | 0.916 | 0.400 | 16.31** |

Statistical significance: *=5%; **=1%.

lighter than their Tuktoyaktuk Peninsula counterparts. It appears that this difference is contributed to for males principally by the growth rate parameter k and for females by the final weight parameter $W\infty$, but comparisons of single parameters are somewhat inaccurate. However, there is a statistically significant difference in weights between the two populations.

4.3.3 Seasonal weight gains

Weight changes in northern Yukon from summer to autumn were summarized by sex and age class (Table 5). Three adult males for which May and September weights were recorded, gained an average of 0.57 kg/day over an average period of 116 days. Their total body weights increased by an average of 50 percent. The greatest rate of gain observed for an adult male was 0.74 kg/day during 112 days (Table 5). However, one 15 year old male actually lost 2 kg between capture dates in July and September. The average daily increase observed for a subadult male (2 years) was 0.24 kg over 111 days.

Average daily weight increases for two adult females with yearlings were 0.14 and 0.58 kg/day over 28 and 62 days, respectively. An adult female without young gained 0.49 kg/day, an increase of 59 percent between capture dates in May and September (Table 5).

A high degree of variability in seasonal weight gains is evident from data reported by other researchers. In southwest Yukon, an adult male grizzly gained 0.413 kg/day over 126 days and a subadult female gained 0.635 kg/day over a 16 day period in August and September while feeding on soap berries (*Sheperdia canadensis*); (Pearson 1975). Nagy and Russell (1978) reported average daily rates of gain of 0.39 and 0.28 kg

Table 5. Weight changes measured between May and September among grizzly bears in northern Yukon, 1972-74.

| Identification | | Age (years) | Time period (months) | No. of days | Weight range (kg) | Weight change (kg) | Rate of change (kg/day) | Percent change in body weight |
|---|---|---|---|---|---|---|---|---|
| Males | Y-W | 2 | 14/5- 2/9 | 111 | 43- 70 | 27 | 0.24 | 63 |
| | L-L | 6 | 30/5-20/9 | 113 | 82-147 | 65 | 0.58 | 79 |
| | W-B | 6 | 1/6-18/9 | 109 | 132-192 | 60 | 0.55 | 45 |
| | R-W | 11 | 25/5-14/9 | 112 | 136-219 | 83 | 0.74 | 61 |
| | W-G | 12 | 19/5-19/9 | 123 | 177-227 | 50 | 0.41 | 28 |
| | L-LB | 15 | 21/7- 1/9 | 42 | 152-150 | -2 | -0.05 | -1 |
| Females | R-LB | 6 | 31/5-13/9 | 105 | 73-124 | 51 | 0.49 | 59 |
| | W-Y[1] | 13 | 19/8-15/9 | 28 | 143-147 | 4 | 0.14 | 3 |
| | Y-R[1] | 15 | 15/7-15/9 | 62 | 111-147 | 36 | 0.58 | 32 |

[1]Females W-Y and Y-R were each accompanied by two yearlings.

for subadult male and female grizzly bears, respectively, in the boreal forest of northern Alberta. Greatest weight increases occurred from mid-July through October.

Individual grizzly bears on the Tuktoyaktuk Peninsula (Nagy et al. 1983) gained as much as 0.49 kg/day over 117 days (adult male); 0.51 kg/day over 81 days (subadult male); 1.78 kg/day over 37 days from mid-August to September (adult female feeding almost exclusively on ground squirrels); and 0.28 kg/day over 115 days (subadult female). Weight increases in summer ranged from 5 to 100 percent of spring weights (Nagy et al. 1983).

Rates of weight gain appear to depend on the season, availability of various food items, feeding habits of individual bears and the reproductive status of females.

### 4.3.4 Weight loss during hibernation

Grizzly bears in the northern Yukon must survive for 6 to 7 months on fat reserves laid down during summer and autumn. Weight losses during hibernation are presented in Table 6. The average rate of daily weight loss between successive captures in September and May for 5 adult males was 0.22 kg/day over an average of 239 days, representing an average reduction in total body weight of 25 percent (5 to 34%). Similarly, 4 adult females lost weight at an average rate of 0.22 kg/day over an average of 238 days. Mean total weight loss during that time was 36 percent (32 to 40%).

In southwest Yukon an average daily weight loss of 0.20 kg over 220 days was recorded for adult males during the denning period; a loss of 28.0 to 43.2 percent of weight over winter (Pearson 1975). On Tuktoyaktuk

Table 6. Weight loss recorded for grizzly bears during the denning period in northern Yukon, 1972-74.

| Identification | | Age (years) | Time period (months) | No. of days | Weight range (kg) | Weight change (kg) | Rate of change (kg/day) | Percent change in body weight |
|---|---|---|---|---|---|---|---|---|
| Males | W-B | 6- 7 | 18/9- 5/5 | 230 | 192-159 | - 33 | - 0.14 | - 17 |
| | R-W | 11-12 | 14/9-12/5 | 241 | 219-159 | - 60 | - 0.25 | - 27 |
| | LB-R | 13-14 | 18/9- 6/5 | 231 | 196-129 | - 67 | - 0.29 | - 34 |
| | Y-G | 14-15 | 20/9-25/5 | 248 | 210-177 | - 33 | - 0.13 | - 16 |
| | L-O | 16-17 | 23/9-27/5 | 247 | 255-181 | - 74 | - 0.30 | - 29 |
| | Mean | | | 239 | | | - 0.22 | - 25 |
| Females | B-R | 7- 8 | 22/9-19/5 | 240 | 124- 77 | - 47 | - 0.20 | - 38 |
| | G-O | 9-10 | 18/9-14/5 | 239 | 174-104 | - 70 | - 0.29 | - 40 |
| | W-Y[1] | 13-14 | 15/9- 3/5 | 231 | 147-100 | - 47 | - 0.20 | - 32 |
| | Y-R[1] | 15-16 | 15/9-14/5 | 242 | 147- 98 | - 49 | - 0.20 | - 33 |
| | Mean | | | 238 | | | - 0.22 | - 36 |

[1]Females W-Y and Y-R each denned with two yearling young.

Peninsula, some average daily weight losses found were: 0.19 kg/day over 255 days for adult males; 0.02 kg/day over 255 days for a subadult male; 0.18 kg/day over 249 days for adult females and 0.10 kg/day for subadult females (Nagy et al. 1983). Average reductions in weight ranged from 18 to 32 percent for adult males; 5 percent for a subadult male; 20 to 38 percent for adult females and 29 to 38 percent for subadult females (Nagy et al. 1983).

The average daily rate of weight loss during denning was similar for both males and females of northern Yukon and Tuktoyaktuk Peninsula. Adult females lost proportionately greater amounts of their total body weight during denning. In both cases the fall weights of males were greater than those of females. This phenomenon could be explained by the thermodynamic balance which exists between the relative body size of animals and their winter dens. Also, females with young expend energy nourishing their young. The significant weight losses observed for both males and females further emphasize the importance of fall conditioning for bears which den in extreme northern regions.

### 4.3.5 Weight-heart girth relationships

Highly significant correlations between actual weights and heart girth measurements have been reported for polar bears (Stirling et al. 1977) and bison (Kelsall et al. 1978). Prediction of weight from heart girth is of value because of its greater convenience under field conditions.

Weight-heart girth relationships were tested for both the northern Yukon and Tuktoyaktuk Peninsula grizzly bear populations. Highly significant correlations between weight and heart girth for males and females of both populations were obtained (coefficients of 0.91 and 0.94 for females and 0.97 and 0.98 for males). Tests for parallelism and coincidence indicated that the regression equations for males and females and for the two populations were not significantly different, so data from both populations were grouped. The parameters of the regression line of weight on heart girth for the combined data are given in Table 7. Predicted weights with symmetrical 95 percent confidence intervals on the population means were constructed from the regression equation (Table 8). The slope of the log-log regression is less than 3 indicating departure from isometry. The value of 2.56 obtained compares with 2.33 obtained by Kelsall et al. (1978) for bison. Based on the correlations obtained, we conclude that weights of grizzly bears can be estimated with a relatively high degree of reliability from girth measurements.

### 4.3.6 Pelage color

Color patterns among grizzly bears of northern Yukon ranged from a basic chocolate or light "grizzled" brown to blonde animals with dark leggings. Similar color patterns were reported for grizzly bears in southwest Yukon (Pearson 1975), Tuktoyaktuk Peninsula (Nagy et al. 1983) and northern Alberta (Nagy and Russell 1978).

The effects of bleaching (from sunlight) were observed in northern Yukon. During the study 24 animals were handled more than once for which general color patterns were noted. Ten bears (42%) were considered to have changed color between handlings. This was most pronounced in males, where 60 percent were judged to have changed color between captures, as compared to 11 percent of females. Premoult bears in spring gradually faded or "bleached out" to a straw blonde color only to be

Table 7. Parameters of regression lines of weight on heart girth ($\log_{10}$ weight = a + b $\log_{10}$ heart girth) for combined data from northern Yukon and Tuktoyaktuk Peninsula grizzly bears.

| Sample size | Mean $\log_{10}$ Heart girth (cm) | Mean $\log_{10}$ Weight (kg) | Slope (b) | Correlation coefficient (r) |
|---|---|---|---|---|
| 211 | 1.99797 | 2.01583 | 2.55757 | 0.95902 |

Table 8. Predicted weights, with symmetrical 95 percent confidence intervals on the population mean, for heart girth measurements of grizzly bears in northern Yukon, and Tuktoyaktuk Peninsula, NWT.

| Heart girth (cm) | Predicted Weight (kg) | 95 Percent confidence limits on mean |
|---|---|---|
| 30 | 4.17 | 3.67- 4.74 |
| 35 | 6.19 | 5.52- 6.93 |
| 40 | 8.70 | 7.87- 9.62 |
| 45 | 11.76 | 10.77- 12.85 |
| 50 | 15.40 | 14.25- 16.65 |
| 55 | 19.65 | 18.35- 21.05 |
| 60 | 24.55 | 23.11- 26.08 |
| 65 | 30.13 | 28.58- 31.77 |
| 70 | 36.42 | 34.78- 38.14 |
| 75 | 43.45 | 41.74- 45.22 |
| 80 | 51.24 | 49.49- 53.06 |
| 85 | 59.84 | 58.05- 61.68 |
| 90 | 69.26 | 67.43- 71.13 |
| 95 | 79.53 | 77.63- 81.47 |
| 100 | 90.67 | 88.64- 92.76 |
| 105 | 102.73 | 100.45-105.06 |
| 110 | 115.70 | 113.05-118.42 |
| 115 | 129.64 | 126.46-132.89 |
| 120 | 144.54 | 140.70-148.49 |
| 125 | 160.45 | 155.79-165.25 |
| 130 | 177.38 | 171.76-183.19 |
| 135 | 195.35 | 188.62-202.33 |
| 140 | 214.40 | 206.39-222.71 |
| 145 | 234.53 | 225.11-244.34 |
| 150 | 255.77 | 244.77-267.26 |
| 155 | 278.14 | 265.41-291.49 |
| 160 | 301.67 | 287.03-317.06 |

transformed by the moult into sleek brown individuals when the new hair appeared.

Variations in coloration and physical appearances of grizzly bears have been suggested as useful characteristics for field identification of individual animals. However, marked seasonal changes in pelage color caused by solar bleaching have also been noted in southwest Yukon (Pearson 1975) and Tuktoyaktuk Peninsula (Nagy et al. 1983). Our data further substantiate the unreliability of using color to identify individual bears over the course of several months.

## 4.4 Relationship between Age and Zygomatic Breadth of Skull

Highly significant curvilinear relationships between age and zygomatic breadth measurements were obtained for male and female grizzly bears of northern Yukon. The parameters of the regression lines of age on zygomatic breadth for males and females are shown (Table 9). Predicted age and symmetrical 95 percent confidence intervals constructed about the population means for zygomatic breadth measurements are given in Table 10.

The regression lines obtained for males and females of the northern Yukon were significantly non-parallel (F for slope=5.89886*). Males had a wider skull at a given age than did females.

The regression equations obtained were tested against those reported by Pearson (1975) and Nagy et al. (1983) for two subpopulations of grizzly bears in southwest Yukon and in the northwestern Mackenzie District, respectively (Table 11). The slopes of the regression lines were not significantly different for males among the populations. However, male grizzly bears on the Tuktoyaktuk Peninsula had significantly wider skulls at any given age than did those of the northern Yukon or the

Table 9. Parameters of regression lines of age on skull breadth ($\log_{10}$ age = a + b $\log_{10}$ skull breadth) for male and female grizzly bears of the northern Yukon.

| Sex | Sample size | Mean $\log_{10}$ age in years | Mean $\log_{10}$ skull breadth (mm) | Slope (b) | Correlation coefficient (r) |
|---|---|---|---|---|---|
| Males | 57 | 0.99409 | 2.30082 | 4.18640 | 0.91272 |
| Females | 55 | 0.88231 | 2.23960 | 5.01475 | 0.94864 |

Table 10. Predicted age and symmetrical 95 percent confidence intervals on the population mean from zygomatic breadth measurements for northern Yukon grizzly bears.

| Skull width (mm) | Males | | Females | |
|---|---|---|---|---|
| | Predicted age (yrs) | 95 percent confidence limit on mean | Predicted age (yrs) | 95 percent confidence limit on mean |
| 100 | 0.54 | 0.38- 0.78 | 0.48 | 0.37- 0.62 |
| 105 | 0.67 | 0.48- 0.93 | 0.61 | 0.48- 0.78 |
| 110 | 0.81 | 0.59- 1.10 | 0.77 | 0.62- 0.96 |
| 115 | 0.97 | 0.73- 1.30 | 0.97 | 0.79- 1.18 |
| 120 | 1.16 | 0.89- 1.52 | 1.20 | 1.00- 1.43 |
| 125 | 1.38 | 1.08- 1.77 | 1.47 | 1.25- 1.73 |
| 130 | 1.63 | 1.30- 2.04 | 1.78 | 1.54- 2.07 |
| 135 | 1.91 | 1.55- 2.35 | 2.16 | 1.89- 2.47 |
| 140 | 2.22 | 1.83- 2.69 | 2.59 | 2.30- 2.92 |
| 145 | 2.57 | 2.16- 3.06 | 3.09 | 2.78- 3.43 |
| 150 | 2.96 | 2.53- 3.48 | 3.66 | 3.34- 4.02 |
| 155 | 3.40 | 2.94- 3.93 | 4.32 | 3.97- 4.69 |
| 160 | 3.88 | 3.41- 4.42 | 5.06 | 4.70- 5.46 |
| 165 | 4.42 | 3.93- 4.97 | 5.91 | 5.52- 6.33 |
| 170 | 5.01 | 4.51- 5.56 | 6.86 | 6.43- 7.32 |
| 175 | 5.65 | 5.14- 6.21 | 7.94 | 7.44- 8.46 |
| 180 | 6.36 | 5.84- 6.92 | 9.14 | 8.55- 9.77 |
| 185 | 7.13 | 6.61- 7.70 | 10.49 | 9.77-11.25 |
| 190 | 7.97 | 7.43- 8.56 | 11.49 | 11.10-12.94 |
| 195 | 8.89 | 8.31- 9.51 | 13.65 | 12.56-14.85 |
| 200 | 9.88 | 9.26-10.56 | 15.50 | 14.14-16.99 |
| 205 | 10.96 | 10.25-11.72 | 17.54 | 15.88-19.39 |
| 210 | 12.12 | 11.30-13.01 | 19.80 | 17.76-22.07 |
| 215 | 13.38 | 12.41-14.43 | 22.28 | 19.81-25.06 |
| 220 | 14.73 | 13.58-15.99 | 25.00 | 22.03-28.37 |
| 225 | 16.19 | 14.81-17.69 | 27.98 | 24.44-32.04 |
| 230 | 17.74 | 16.11-19.55 | 31.24 | 27.04-36.10 |
| 235 | 19.42 | 17.48-21.57 | 34.80 | 29.85-40.57 |
| 240 | 21.21 | 18.93-23.75 | 38.68 | 32.89-45.49 |

Ogilvie, Wernecke and Mackenzie mountains (Table 11). Skull widths of northern Yukon males were not significantly greater than those of southern and central Yukon (Table 11). Regression lines obtained for female grizzly bears of northern Yukon and Tuktoyaktuk Peninsula were not significantly different. However, females of both Arctic coastal populations had significantly wider skulls at any given age than did those of southwest Yukon (Table II).

It is notable that where significant differences were found, the slope of the regression lines were not significantly different. This suggests that the initial starting widths are greater in the younger age classes of some populations. In addition, the high correlations obtained indicate that ages of grizzly bears can be accurately estimated from skull width measurements.

## 4.5 Population Dynamics

### 4.5.1 Age-sex structure

The age-sex structure of the northern Yukon grizzly bear population in 1973 and 1974 is shown in (Table 12). Three untagged females for which ages were not determined were excluded.

The sex ratio of adult and subadult grizzly bears captured during 1973 and 1974 approached an expected 50:50 ratio (37 males: 41 females; $X^2 = 0.115$). Eight of the 11 young bears captured with adult females, were females ($X^2 = 3.27$ N.S.). This proportion reflects the small sample size.

Tables 13 and 14 give the age composition of the northern Yukon population, and that reported for grizzly bear populations of Kodiak

Table 11. Statistics for comparison of age-skull breadth relationships between the Arctic mountain grizzly bear (northern Yukon population) and other northern populations.

| Population | Males | | | Females | | |
|---|---|---|---|---|---|---|
| | Joint sample | F for equal slope | F for one line | Joint sample | F for equal slope | F for one line |
| Tuktoyaktuk Richards Is. | 114 | 0.04075 | 8.37137** | 129 | 1.51967 | 0.20216 |
| Southern and central Yukon | 178 | 0.54292 | 0.01506 | - | - | - |
| Ogilvie, Wernecke and Mackenzie Mnts. | 124 | 0.84980 | 15.10864*** | - | - | - |
| Northern Interior[1] Yukon | - | - | - | 184 | 1.57169 | 5.33697* |

[1]Pearson (1975) found no significant difference between the age-zygomatic breadth relationship of females from the southern and central Yukon and the Ogilvie, Wernecke and Mackenzie mountains. Data were grouped for those subpopulations.

Statistical comparisons of age-skull breadth relationship between males and females in the northern Yukon population showed a significant difference (for equal slope F = 5.89886*; for one line F = 55.07555***.

Statistical significance; * = 5%, ** = 1%, *** = 0.1%.

Table 12. Age and sex structure of northern Yukon grizzly bear population, in spring 1973 and 1974.

| Age* | 1973 | | | | 1974 | | | |
|---|---|---|---|---|---|---|---|---|
| | Males | Females | Unknown | Total | Males | Females | Unknown | Total |
| 0 | 0 | 1 | 3 | 4 | 0 | 0 | 17 | 17 |
| 1 | 3 | 7 | 4 | 14 | 0 | 0 | 3 | 3 |
| 2 | 2 | 1 | 0 | 3 | 3 | 7 | 4 | 14 |
| 3 | 0 | 2 | 0 | 2 | 2 | 1 | 0 | 3 |
| 4 | 3 | 3 | 0 | 6 | 0 | 2 | 0 | 2 |
| 5 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 6 |
| 6 | 4 | 4 | 0 | 8 | 0 | 0 | 0 | 0 |
| 7 | 3 | 3 | 0 | 6 | 3 | 4 | 0 | 7 |
| 8 | 0 | 1 | 0 | 1 | 3 | 3 | 0 | 6 |
| 9 | 2 | 3 | 0 | 5 | 0 | 1 | 0 | 1 |
| 10 | 1 | 1 | 0 | 2 | 2 | 3 | 0 | 5 |
| 11 | 3 | 3 | 0 | 6 | 1 | 1 | 0 | 2 |
| 12 | 2 | 2 | 0 | 4 | 3 | 3 | 0 | 6 |
| 13 | 3 | 3 | 0 | 6 | 2 | 2 | 0 | 4 |
| 14 | 1 | 2 | 0 | 3 | 3 | 3 | 0 | 6 |
| 15 | 2 | 1 | 0 | 3 | 1 | 2 | 0 | 3 |
| 16 | 1 | 0 | 0 | 1 | 2 | 1 | 0 | 3 |
| 17 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 1 |
| 18 | 3 | 1 | 0 | 4 | 1 | 1 | 0 | 2 |
| 19 | 1 | 0 | 0 | 1 | 3 | 1 | 0 | 4 |
| 20 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| 21 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 |
| 22 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 |
| 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |

*Ages for known sex bears were determined from cementum annulations. Ages were assigned to cubs and yearlings based on size and association with maternal females. Data excludes 3 adult females which were not captured.

Table 13. Age composition of the northern Yukon grizzly bear and other grizzly bear populations in North America.

| Region | Percent of population by age class | | | | Totals | |
|---|---|---|---|---|---|---|
| | Cubs | Yearlings | Subadults (2-5 years) | Adults (6 years & over) | Cubs and yearlings | Subadults and adults |
| Northern Yukon (this study) | | | | | | |
| May 1973 | 4 | 16 | 21 | 59 | 20 | 80 |
| Sept. 1973 | 3 | 16 | 20 | 60 | 19 | 80 |
| May 1974 | 17 | 3 | 24 | 56 | 20 | 80 |
| Sept. 1974 | 16 | 0 | 26 | 58 | 16 | 84 |
| Kodiak Island (Troyer and Hensel 1964) | 26 | 22 | 27 | 25 | 48 | 52 |
| Mt. McKinley National Park (Dean 1976) | 20 | 15 | - | - | 35 | 65 |
| Glacier National Park, USA (Martinka 1974) | 17 | 15 | - | - | 32 | 68 |
| Yellowstone (Craighead and Craighead 1976) | 20 | 11 | 26 | 43 | 31 | 69 |
| Western Brooks Range, Alaska (Reynolds 1980) | 17 | 12 | 30 | 41 | 29 | 71 |
| Eastern Brooks Range, Alaska (Reynolds 1976) | 8 | 11 | - | - | 19 | 81 |
| Southwest Yukon (Pearson 1975) | 7 | 17 | 32 | 44 | 24 | 76 |

Table 14. Age composition of four grizzly bear populations[1].

| Location | Cubs | Yearlings | 2 year olds | 3 and 4 year olds | 5 year olds and older | Status of population |
|---|---|---|---|---|---|---|
| | Percent of population | | | | | |
| Northern Yukon | | | | | | |
| 1973 | 4.4 | 15.6 | 3.3 | 8.9 | 67.8 | unknown |
| 1974 | 16.5 | 2.9 | 13.6 | 4.9 | 62.1 | unknown |
| Mean | 10.5 | 9.3 | 8.5 | 6.9 | 65.0 | |
| Yellowstone Park (Craighead *et al*. 1974) | 18.6 | 13.0 | 10.2 | 14.7 | 43.7 | increasing |
| Eastern Brooks Range (Reynolds 1976) | 7.9 | 10.9 | 10.9 | 5.0 | 65.3 | declining |
| Western Brooks Range (Reynolds 1980) | 13.0 | 10.7 | 13.7 | 10.7 | 51.9 | unknown |

[1]Adapted from Table 2 in Reynolds (1980).

Island (Troyer and Hensel 1964), Mt. McKinley National Park (Dean 1976), Yellowstone (Craighead and Craighead 1976 and Craighead et al. 1974), Glacier National Park (Martinka 1974), southwest Yukon (Pearson 1975), and for east and west Brooks Range, Alaska (Reynolds 1976 and 1980).

The percent composition by age cohorts of the northern Yukon population was calculated so that comparisons could be made with data from other studies (Tables 13 and 14). The northern Yukon population consisted primarily of subadults (over two years old) and adults (6 or more years old) (Table 13). With the exception of eastern Brooks Range (Reynolds 1980) there were approximately 10-20 percent more subadults and adults in northern Yukon than figures reported for other regions (Tables 13 and 14). A corresponding underrepresentation of cubs and yearlings (10-20%) was also apparent in northern Yukon and eastern Brooks Range (Tables 13 and 14).

The mean percent composition by age cohorts for northern Yukon grizzly bears was most comparable with data presented by Reynolds (1980) for eastern Brooks Range, Alaska. Reproduction and age distribution led Reynolds (1980) to conclude that the population was declining. Analyses of 1973 and 1974 data for northern Yukon show considerable variation in proportions of early cohorts (Table 13), although proportions of adults were similar. A direct comparison of data for the two regions suggests that, if Reynold's conclusion is correct, then the northern Yukon population was also declining. However, grizzly bears in northern Yukon are unhunted and inhabit a relatively undisturbed environment and, therefore, were more likely to be in long-term equilibrium, instead of declining.

We were able to determine the reproductive status of 24 female grizzly bears which were capable of producing young in 1973, and 22 in 1974. Nineteen females were observed during both years of the study. The percentages of female grizzly bears with or without young are given for northern Yukon and Tuktoyaktuk Peninsula, NWT populations (Table 15). Approximately 4 times as many females without young were observed in spring in northern Yukon, compared with the Tuktoyaktuk Peninsula. Similarly, one half as many females in northern Yukon were observed with cubs, yearlings and two-year olds. The reason for the large number of females without young in northern Yukon was not determined. However, we suggest that either nutrition or some internal regulatory mechanisms may have been operatiing to reduce reproductive success in females to maintain relative population stability.

Bears rely on high-energy foods such as berries to get fat enough to survive hibernation. In the case of females, nutritional status influences either implantation or survival of cubs. Jonkel and Cowan (1971) suggested that reproduction in black bears approached zero in Montana when huckleberries (*Vaccinium* spp.) were scarce. Female black bears which do not gain sufficient weight before denning usually fail to produce cubs (Rogers 1976). Rogers (1976) also suggested that mortality among cubs and yearlings appeared to be nutrition-related because the lighter bears suffered higher mortality.

A failure in the annual supply of high-energy foods would be expected to cause death by starvation of that year's cubs in the following winter and lowered reproduction (by failure to implant or by death of cubs) of females pregnant that fall. This would mean more females than usual in estrus the following summer and a temporary partial reproductive synchrony

Table 15. Percentage of adult female grizzly bears with or without cubs, yearlings or other subadult young in northern Yukon (1973-74) a and Tuktoyaktuk Peninsula, NWT (1974-77).

| Post emergence Reproductive Status of Adult Females | Percent of females: Northern[a] Yukon | Percent of females: Tuktoyaktuk[b] Peninsula |
|---|---|---|
| No young | 54 | 15 |
| With cubs | 16 | 33 |
| With yearlings | 15 | 26 |
| With 2-year-olds | 12 | 22 |
| With 3-year-olds | 2 | 5 |
| With 4-year-olds | 2 | - |
| Totals | 101[c] | 101[c] |

[a]Average percent value based on observations of 24 females which were capable of producing cubs in 1973, and 22 in 1974.
[b]From Nagy *et al*. (1983).
[c]Deviation from 100% caused by rounding off values to nearest percent.

in the population. In regions of severe climate, failures in important food crops may occur in consecutive years thus resulting in a relatively high proportion of female bears without young.

The northern Yukon population is considered to be stable. Because it was not hunted, stability may have been maintained through intraspecific interactions reducing success of implantation or inducing increased levels of intraspecific predation. Circumstantial evidence for the latter was observed.

Two adult females were lactating and showed rubbed areas around the teats, both indicating the recent presence of young prior to capture. One of these females was already in estrus. She exhibited vulvar swelling and was accompanied by an adult male. It is likely that both females had recently lost their cubs. Similar occurrences were noted at Tuktoyaktuk Peninsula, NWT (Nagy et al. 1983) and Brooks Range, Alaska (Reynolds 1980).

In species such as grizzly bears which do not reproduce every year, and where reproduction may be even partially synchronized due to nutrition or other influences, a run of several years' data is needed before one can deduce the status of the population from population structure alone.

### 4.5.2 Mortalities

Seven deaths of grizzly bears were recorded during the study: 2 in 1973 and 5 in 1974. Four bears were shot by hunters and 3 died of natural causes. Compared to bears in other regions (e.g. southwest Yukon and Tuktoyaktuk Peninsula, NWT) the hunting pressure on northern Yukon bears was light. Old Crow, the nearest permanent settlement to the study area is 130 km distant.

Two bears died of natural causes in 1973. The fate of one cub-of-the-year could not be ascertained. The second was a 6 year old 152 kg male who had been killed by a 9 year old 273 kg male. The recently killed carcass of male (L-L) was located through radio tracking. The large male responsible for the kill was observed at the carcass which had been partially concealed with debris.

In 1974 four bears were harvested and one cub of the year died of undetermined natural causes. Female P-P and her 3 yearlings were harvested after they had destroyed a native fishing camp near Shingle Point.

4.5.3 Population densities

The core home ranges of all marked and unmarked female grizzly bears identified on or adjacent to the study area were plotted to show the areas of greatest activity for each female in relation to other females (Fig. 2). Population densities varied from season to season and from year to year. The May 1973 population total was 88 animals, while that for September was 86 (Table 12). Densities for 1973 varied only slightly from one bear per 38 $km^2$ in May to one per 39 $km^2$ in September. Populations densities were higher in 1974. The May 1974 total was 103 bears, while that for September was 98. Densities for that year varied from one bear per 33 $km^2$ for May to one per 34 $km^2$ during September. Fluctuations in the yearly densities were a result of varying degrees of reproductive success and observed mortality within the population. These estimates of density are minimums because the fate of several weaned 2 and

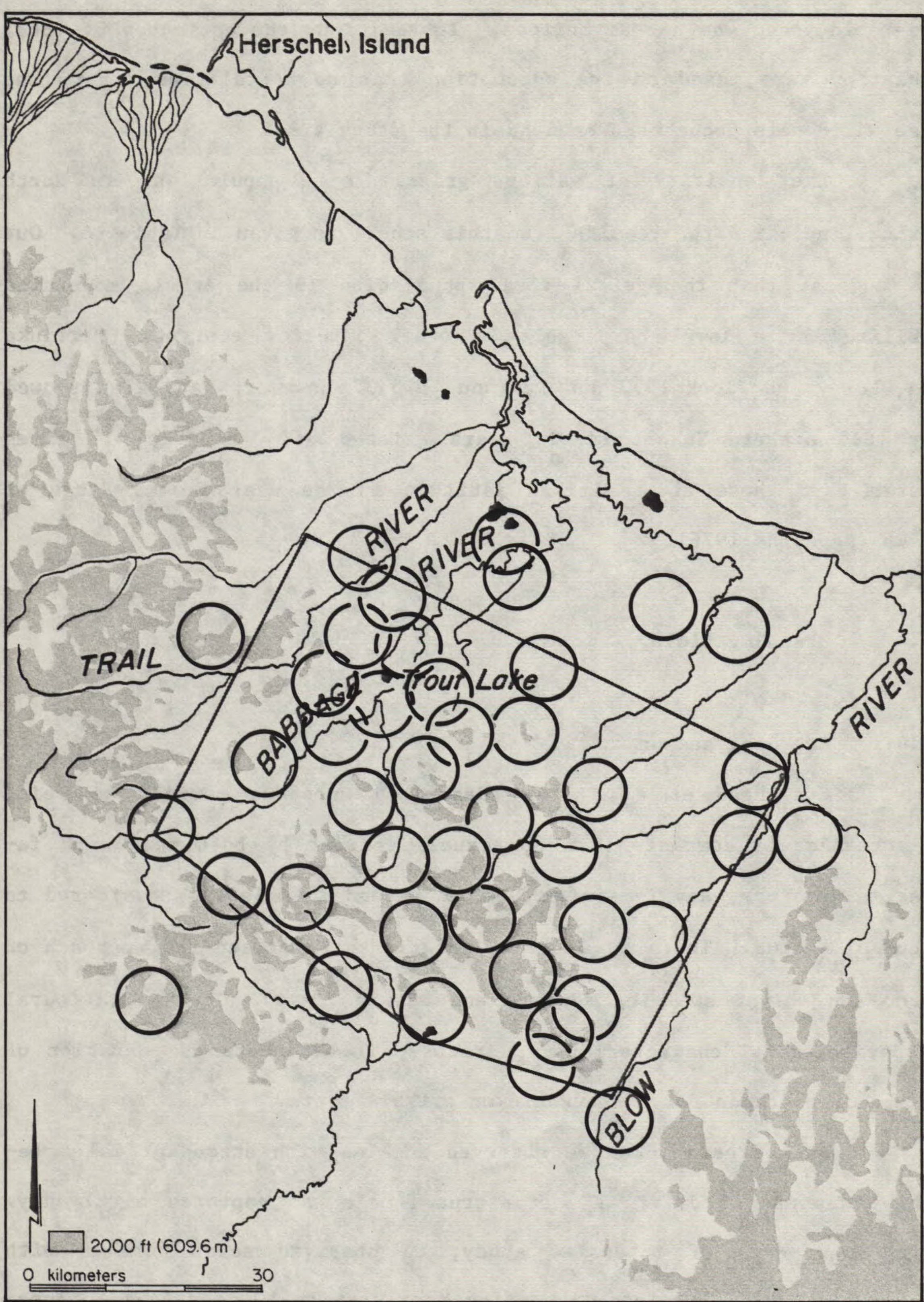


Figure 2. Core home ranges of female grizzly bears on or adjacent to study area, 1973-74.

3 year old young was not determined. In addition, the estimates of total population were based on the assumption that no mortalities other than those which were documented occured in the study area.

The densities of various grizzly bear populations in North America, including the results from this study are given in Table 16. Our data suggest that the grizzly bear population in the Arctic mountains stabilized at a level comparable to other interior ecotypes (Martinka 1974, Mundy and Flook 1973 and Pearson 1975). However, data also showed that the northern Yukon grizzly bears existed at a density 4.5 times greater than those at a similar latitude in the east Brooks Range of Alaska (Reynolds 1976).

### 4.5.4 Breeding biology

#### 4.5.4.1 Breeding season

Craighead _et al_. (1969) described anestrus periods as being characterized by complete lack of sexual interest by both males and females. Therefore, any female without an attendant male was considered to be out of estrus. There is a direct relationship between the approach of estrus and vulvar swelling (Enders and Leekly 1941). These behavioural and physiological characteristics were used to delineate the duration of the breeding season for northern Yukon grizzly bears.

In northern Yukon we observed females with attendant males between 5 May and 15 July. A post-estrus female was captured on 27 July. During two years of intensive study, we observed seven females with attendant males on 11 occasions during May; nine on 10 occasions in June;

Table 16. Densities of grizzly bear populations in various regions of North America.

| Region | Population density ($km^2$/bear) |
|---|---|
| Northern Yukon (this study) | 33 - 39 |
| Mt. Mckinley National Park (Dean 1976) | 24.4 - 38.5 |
| Glacier National Park, B.C. (Mundy and Flook 1973) | 18.1 - 28.5 |
| Glacier National Park, Mon. (Martinka 1974) | 21.2 |
| Kodiak Island (Troyer and Hensel 1964) | 1.6 - 0.26 |
| Southwestern Yukon (Pearson 1975) | 22.8 |
| Eastern Brooks Range, Alaska (Reynolds 1976) | 148 - 260 |
| Western Brooks Range, Alaska (Reynolds 1980) | 44 - 42 |
| Mackenzie Mountains, N.W.T. (Miller and Barichello 1979) | 90 |
| Tuktoyaktuk Peninsula, N.W.T. (Nagy et al. 1983) | 211 - 262 |

and three on three occasions in July. The peak of the breeding season appeared to occur from late May to the end of June.

Three females which were observed with attendant males or were in estrus when captured during May were subsequently observed with males in late June or early July. A 10-year-old female in estrus when captured on 14 May was observed with a male on 19 May and again on 11 and 19 June. Similarly, a 13-year-old female was in pre-estrus condition when captured on 28 May and was with an attendant male and in full estrus when recaptured on July 15. An 8-year-old female, observed with a male on 26 June, was in post-estrus state when captured on 27 July (vulva swollen). We could not ascertain whether these females had cycled more than once during the breeding season after unsuccessful breeding during the initial heat (Craighead _et al_. 1969); or if they remained in constant estrus until they bred successfully or ovarian degeneration occurred (Erickson and Nellor 1964, cited in Poelker and Hartwell 1973).

The breeding season in Yellowstone National Park occurs between 26 May and 9 July for female grizzly bears (Craighead _et al_. 1969). Pre- and post-copulatory behaviour was observed as early as 14 May and as late as 15 July, respectively. Dean (1976) and Murie (1944) observed associations of males and females between 20 May and 17 July in Mount McKinley Park, Alaska. Mundy and Flook (1973) reported breeding activity between 30 April and 25 June in Glacier National Park, Canada. Actual copulation was observed in mid- May in Banff by Herrero and Hamer (1977). Pearson (1975) observed male-female associations between 21 May and 16 July in southwest Yukon, with the peak of breeding activity occurring in June and July.

4.5.4.2. Breeding ages

Breeding ages were determined for 15 females. The minimum ages at which females successfully conceived, were between ages 5.5 and 7.5 years. Female W-W, first observed as a 10.5-year-old with a 4.5-year-old young, would have bred at 5.5 years. Female L-L was accompanied by 2-year-olds when she was 9.5 years old, signifying that she had bred at age 6.5. Female O-LB, was observed with a yearling at age 9.5 years.

Successful breeding ages for nine other females ranged between ages 9.5 and 13.5 years. These bears may have previously weaned or lost young. In addition, three 7 and two 8 year old females were observed in estrus or with attendant males during the study but we were unable to determine whether these females produced young the following year.

We documented three females which successfully bred at 18.5 and 20.5 years. Female R-L produced two cubs at 19 and females P-O and R-R both bred successfully at 20.5 years, producing litters of one and two cubs respectively, in the following year.

Minimum breeding ages in the literature vary from region to region . Craighead et al. (1969) found that sexual maturity in females occurred first between the ages of 4.5 and 8.5 years for grizzlies in Yellowstone National Park. Some females did not produce their first litter until age nine years and the maximum age of a female producing cubs was 21.5 years. Craighead et al. (1976) suggest that reproductive longevity approximates physical longevity, and that adult females can produce offspring as long as they live.

Hensel et al. (1969) reported successful conception in three year old Kodiak bears, while Glen et al. (1976) observed a number of 3.5 year old females in estrus although none conceived successfully.

Reynolds (1976) found that the minimum age of sexual maturity for female grizzlies in the Brooks Range of Alaska was 6.5 years although some did not conceive successfully until ages 8.5 or 9.5 years.

In southwest Yukon no females were pregnant or in estrus at ages less than 6.5 years (Pearson 1975). Three females produced cubs at age seven years. Pearson (1975) also observed a sexually active 24.5-year-old female.

Minimum breeding ages for grizzlies in northern Yukon were most comparable with those in southwest Yukon (Pearson 1975), the Brooks Range in Alaska (Reynolds 1976), and Tuktoyaktuk Peninsula (Nagy et al. 1983). It appears that grizzly bears in northern climes breed at ages 2-3 years older than grizzlies further south or on the west coast of Alaska (Craighead et al. 1969, Hensel et al. 1969 and Glenn et al. 1976).

Nagy et al. (1983) found that female grizzly bears at Tuktoyaktuk bred successfully at an average age of 5.9 years (range 4.5 to 7.5 years), when females have attained weights within 17 percent of their eventual maximums. Similarly, in northern Yukon, females have reached approximately 86 percent of their final mean maximum spring weight by age 6.5 years. Females of both populations attained adequate physical maturity to breed successfully at around age 6 years (Nagy et al. 1983). Earlier or later sexual mauturity may be caused by variations in nutritive status among individual bears (Jonkel and Cowan 1971) or by reduction in reproductive success induced by internal regulatory mechanisms.

4.5.4.3 Litter size

Average litter sizes vary between populations, and between age classes within populations; a summary of some of the regional differences is given in Table 17.

In northern Yukon we observed 14 different litters during 1973 and 1974. One three-year-old, and one four-year-old accompanying females were excluded from the analysis because litter mates might have already been weaned. Non-simultaneous weaning was observed on the Tuktoyaktuk Peninsula, NWT (Nagy et al., 1983).

Six females were observed with a total of 12 cubs of the year, and four others each had twin yearlings, an average of 2.0 young per female. Similarly, six two-year-old litters totalled 13 young or 2.17 young per female. In two cases the same litters were recorded in consecutive years, first as yearlings and then as two-year-olds. The combined mean litter size for all females was 2.07 young.

Comparisons with other regions in North America (Table 17) show the average litter size for northern Yukon is similar to those reported for cubs-of-the-year and yearlings for Glacier National Park, Canada (Mundy and Flook 1973), and for yearlings and for all ages combined on Kodiak Island, Alaska (Hensel et al. 1969). Litters were larger in almost all age classes than for bears in southwest Yukon (Pearson 1975) and Brooks Range, Alaska (Reynolds 1976).

Glenn et al. (1976) reported a 38 percent reduction in litter size between ages 0.5 and 1.5 years for litters observed during two consecutive years at McNeil River, Alaska, reflecting high mortality among litter mates during the first year of life. Although our observations were not continuous from year to year and our sample size was small, the data suggest that mortality was low during the first few years of life, especially if the young survived their first year.

Table 17. Average litter sizes for northern Yukon and other grizzly bear populations of North America.

| Region | Age Class | | | | |
|---|---|---|---|---|---|
| | Corpora lutea | Cub-of-Year | Yearlings | Two Years | Combined mean |
| Northern Yukon (this study) | - | 2.00 | 2.00 | 2.17 | 2.07 |
| Kodiak Island (Hensel *et al.* 1969) | 2.10 | 2.33 | 2.00 | - | 2.10 |
| Kodiak National Wildlife Refuge (Troyer and Hensel 1964) | - | 2.36 | 2.17 | - | - |
| Glacier National Park, USA (Martinka 1974) | - | 1.70 | 1.80 | - | - |
| Glacier National Park, Canada (Mundy and Flook 1973) | - | 2.00 | 2.00 | - | - |
| Eastern Brooks Range, Alaska (Reynolds 1976) | - | 1.77 | 2.00 | 2.00 | 1.83 |
| Western Brooks Range, Alaska[1] (Reynolds 1980) | - | 1.96 | 2.25 | 2.00 | 2.03 |
| Southwest Yukon (Pearson 1975) | 1.90 | 1.70 | 1.50 | - | 1.60 |
| Tuktoyaktuk Peninsula (Nagy *et al.* 1983) | - | 2.30 | 2.30 | 2.10 | 2.20 |

[1] Calculated from data presented by Reynolds (1980).

4.5.4.4 Frequency of litter sizes

In northern Yukon we observed 16 litters with young of known age ranging from cubs-of-the-year to two years. This included two litters observed during two consecutive years. The frequency distribution of litter size is shown in Table 18. The greatest number of litters in all age classes contained two young (mean of 69 percent), with the remainder made up of litters of one and three young (mean of 13 and 19 percent, respectively). The proportion of litters with two young increased from cub-of-year to two-year-old age class (Table 18). However, deviations from the overall mean were considered to be a result of the small sample size, rather than to age specific mortalities in smaller or larger litters.

Troyer and Hensel (1964) found that 26 and 51 percent of cub-of-year litters contained two and three young, respectively, in the Kodiak National Wildlife Refuge, Alaska. By comparison, 52 and 33 percent of yearling litters contained two and three young, suggesting high mortality during the first year. A total of 38 and 50 percent of litters contained one and two young, respectively, in combined cub-of-year and yearling age classes for Glacier National Park, U.S.A. (Martinka 1974). In Glacier National Park, Canada, the greatest proportion of litters in all age classes contained two young (mean of 52 percent, calculated from Table 2, Mundy and Flook 1973). Litters of one and three young occurred with similar frequencies (means of 26 and 22 percent, respectively). In Yellowstone Park 56 percent of litters contained two cubs and 26 percent of litters were made up of three cubs.

Table 18. Observed litter sizes for grizzly bears in northern Yukon, 1972-74.

| Age Class* | No. of litters observed | No. of litters and Frequency of Occurrence (FO) by litter size — Number of young per litter: one | | two | | three | |
|---|---|---|---|---|---|---|---|
| | | No. Obs. | FO | No. Obs. | FO | No. Obs. | FO |
| Cubs-of-year | 6 | 1 | 17 | 4 | 67 | 1 | 17 |
| Yearlings | 4 | 1 | 25 | 2 | 50 | 1 | 25 |
| Two years | 6 | - | - | 5 | 83 | 1 | 17 |
| Overall | 16 | 2 | 13 | 11 | 69 | 3 | 17 |

*Two litters were observed in consecutive years, and were included in the yearling and two-year-old classes.

4.5.4.5 Reproductive interval

The reproductive interval for four females in northern Yukon, judging from the known ages of young at weaning, ranged from 3 to 5 years. It is assumed that females produce cubs a year after they wean young. One female gave birth to cubs after weaning a 4-year-old. Two others weaned two and three-year-old young, but it was not known whether they produced litters the following spring. Two more females were observed with two-year-old young during the fall capture program; those young presumably denned with the female for a third winter. Although the sample size was small, we believe that the majority of females produced litters at three to four year intervals.

Hensel et al. (1969) suggested that the reproductive interval for most Alaska brown bears was three years. Similarly, intervals of 2 and 3 years between litters born to young female grizzlies of known reproductive history were found in Yellowstone National Park (Craighead et al. 1969). At McNeil River, Alaska, the number of years separating litters ranged from 2 to 6 years (Glenn et al. 1976). However, seven of the 12 females there of known history produced litters on a three year interval. In Glacier National Park, Canada, most females passed at least two breeding seasons unmated, after successfully giving birth; while a significant number passed three breeding seasons unmated while rearing their litters (Mundy and Flook 1973). This suggests a 3 to 4 year reproductive interval. Pearson (1975) found the usual interval between litters in southwest Yukon to be at least 3 years. The reproductive intervals for female grizzly bears of northern Yukon appear to be similiar to that reported for other regions in North America.

4.5.4.6 Weaning dates

Weaning dates were documented for four litters of young reaching ages of self-sufficiency. Females Y-R, W-Y and L-Y weaned two-year-olds between 14 May to 11 June; 28 May to 19 June and 17 to 27 May, respectively. These dates corresponded with the onset and peak of the breeding season. Weaning of young may be induced by the onset of estrus in females or by intolerance of male bears attending the female.

## 4.6 Food Habits

Seventy-five faecal samples were collected in northern Yukon (Table 19). Eleven were collected in May, 12 in June and July, 32 in August and September as well as 20 others for which exact dates of deposition were not certain. Importance values for various food categories were calculated for each of the three collecting periods and for the entire collection period (Table 19) using the method described by Mealey (1975).

During late May grizzly bears primarily fed on crowberries (*Empetrum nigrum*) and the roots from Eskimo potato (*Hedysarum alpinum*). In June and July grasses were consumed almost exclusively. Berries and grasses again constituted the greatest proportion of foods eaten in August and September, although legume roots (*Hedysarum* sp.) and ground squirrels (*Spermophilus undulatus*) were also important (Table 19). Crowberry was the most commonly eaten berry, while soapberry (*Shepherdia canadensis*) was occasionally consumed. Most of the animal matter was identified as remain of ground squirrels, while remains of barren gound caribou (*Rangifer tarandus groenlandicus*) were infrequent. One scat contained traces of an unidentified bird species.

Two food items were conspicuous by their scarcity; caribou and Vaccinum spp. berries. The nearly complete lack of caribou remains was unexpected because the Porcupine caribou herd migrates through the study area. A bear killing a caribou or finding a carcass would probably remain nearby until all of the meat was consumed. Therefore, faeces containing caribou remains would be concentrated around carcasses. Since few grizzlies were captured near carcasses, the scats collected probably did not show the importance of caribou in the overall diet. In addition to capturing a small number of grizzlies near carcasses, we also observed a number of bears on caribou carcasses during telemetry tracking flights. Whether these bears actually killed caribou or claimed carcasses from wolves was not known. J. Russell (pers. comm.) observed several instances of grizzly bears feeding on caribou in northern Yukon in the late 1970's.

The low volume of Vaccinium spp. berries in the faeces is more difficult to explain. Tissue slides were prepared from scats containing berries to determine whether some Vaccinium spp. remains had been incorrectly identified, but none was found. Although quantitative measurements were not made, there did not appear to be a heavy production of Vaccinium spp. berries in 1973 or 1974. We do not know whether this was typical, nor whether Vaccinium berries are an important component in the diet of grizzly bears in years of abundance in the Arctic mountains.

Although evidence was found of grizzly bears fishing for Arctic char (Salvelinus alpinus) in any of the coastal rivers of Yukon Territory, on two occasions bears were seen feeding on beluga (Delphinapterus leucus) which had died and washed up on the beach.

Ground squirrels were utilized to some degree during August and September (Table 19). Importance values for ground squirrels reached a

Table 19. Importance values and importance value percent of food items in the diet of grizzly bears in northern Yukon in 1973 and 1974. (tr = trace).

| Food Item | Time period | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | April-May (n=11) | | June-July (n=12) | | August-September (n=12) | | Overall (n=75) | |
| | Imp. Value | Imp. Value % | Imp. Value | Imp. Value % | Imp. Value | Imp. Value % | Imp. Value | Imp. Value % |
| Berries | 17.2 | 36.4 | 0.7 | 0.8 | 20.5 | 36.4 | 8.4 | 17.3 |
| Monocots | 4.1 | 8.7 | 81.0 | 97.7 | 21.8 | 38.7 | 32.0 | 66.2 |
| Roots | 25.8 | 54.8 | 0.7 | 0.8 | 6.0 | 10.7 | 5.5 | 11.4 |
| Forbs | - | - | - | - | tr. | 0.6 | 0.1 | 0.1 |
| Equisetum | - | - | - | - | tr. | 0.1 | tr. | 0.9 |
| Shrubs | tr. | tr. | tr. | tr. | 0.1 | 0.1 | tr. | tr. |
| Rangifer | - | - | 0.6 | 0.7 | tr. | 0.1 | tr. | tr. |
| Spermophilus | - | - | - | - | 7.5 | 13.4 | 1.7 | 3.5 |
| Ursus hair | tr. | 0.1 | - | - | tr. | tr. | tr. | 0.1 |
| Microtines | - | - | - | - | tr. | 0.1 | tr. | tr. |
| Feathers | - | - | tr. | tr. | tr. | tr. | tr. | tr. |
| Soil and rocks | - | - | - | - | - | - | tr. | tr. |
| Bryophytes | - | - | - | - | tr. | tr. | tr. | tr. |
| | 47.1 | 100.0 | 83.0 | 100.0 | 55.9 | 100.0 | 47.7 | 100.0 |

value of 7.5 during those months, but the overall importance of that food item was low (1.7). By comparison, on the Tuktoyaktuk Peninsula ground squirrels made up a large proportion of the late summer diets of grizzly bears (Nagy et al., 1983). The low incidence of ground squirrels in the diet of bears in northern Yukon may be the result of more difficult digging conditions. In the Barn and Richardson mountains, ground squirrels dig their burrows in morainal deposits, old fragmented rock, angular talus and fractured rubble. This substrate is undoubtedly difficult to dig in compared to Tuktoyaktuk Peninsula where ground squirrel burrows are found in sand, glacial fluvium, gravel eskers, river deposits, and sandy or clay-loam marine deposits. The generally sandy nature of these soils make it easier for bears to excavate ground squirrels.

Although the species of plant and animals consumed vary from region to region, the general seasonal feeding regimes of northern Yukon bears were similar to those of other northern populations (Pearson 1975, Reynolds 1976 and Nagy et al., 1983). After emergence from the den, legume roots (*Hedysarum* spp.) and carrion appeared to be the primary constituents of the bears' diet in southwest Yukon and Brooks Range, Alaska (Pearson 1975 and Reynolds 1976). Although legume roots constituted an important part of grizzly bear diets after emergence on the Tuktoyaktuk Peninsula, N.W.T. (Nagy et al. 1983), bears also preyed on reindeer (*Rangifer tarandus tarandus*) on the calving grounds (Abraham Carpenter, pers. comm.). As bulk foods (grasses, sedges, horsetails, and a variety of forbs) became available during the spring and summer months, they were consumed almost exclusively. In late summer and fall the diet among Tuktoyaktuk grizzly bears shifted to a heavy utilization of berries (*Shepherdia* sp., *Empetrum* sp., *Vaccinium* spp. and *Arctostaphylos* spp.) in association with some herbs and forbs. As the berry season passed, legume roots, herbs, forbs, small mammals (Spermophilus sp.) and carrion were used in varying amounts until den-up (Pearson 1975 and Reynolds 1976, Nagy et al. 1983). In years of low, or no, berry production, there was a shift to more stable foods such as Hedysarum roots and small mammals (Pearson 1975).

Although our sample size was small, the food habits of grizzlies in northern Yukon appeared consistent with those reported for southwest Yukon and the Brooks Range, Alaska (Pearson 1975 and Reynolds 1976).

## 4.7 Seasonal Movements

A total of 14 female and 20 male grizzly bears was equipped with radio collars during 1973 and 1974. Data were obtained from 28 of these bears (Table 20). The composite home ranges for males and females are shown in Figures 3 and 4, respectively. There was a considerable overlap in the home ranges of males and females.

The average observed home range size varied from 83 $km^2$ (8-177 $km^2$) for 11 adult females (6 years or older) in 1973 to 154 $km^2$ (2-701 $km^2$) for 13 females in 1974 (Table 21). The overall average home range observed over the two years of the study for 24 adult females was 121 $km^2$ (2-701 $km^2$). Most adult females showed a remarkable degree of fidelity for their respective home ranges from year to year (Figures 5, 6, 7, 8, and 9) although extended movements were recorded for four females whose home ranges were situated along the north side of the coastal mountains. These animals moved toward the coast during summer and then back into the mountains in autumn. The reasons for these movements are not clear although it appeared to be a migration from a region of greater

Table 20. Numbers of grizzly bears radio-collared in northern Yukon, 1973-74.

| Year | Females | | Males | |
|---|---|---|---|---|
| | Number collared | Number monitored | Number collared | Number monitored |
| 1973 | 11 | 11 | 14 | 10* |
| 1974 | 7 | 7 | 10 | 9 |
| 1973-74 | 14 | 14 | 20 | 14 |

*A number of collars failed shortly after installation or data were not obtained because the bears left the study area.

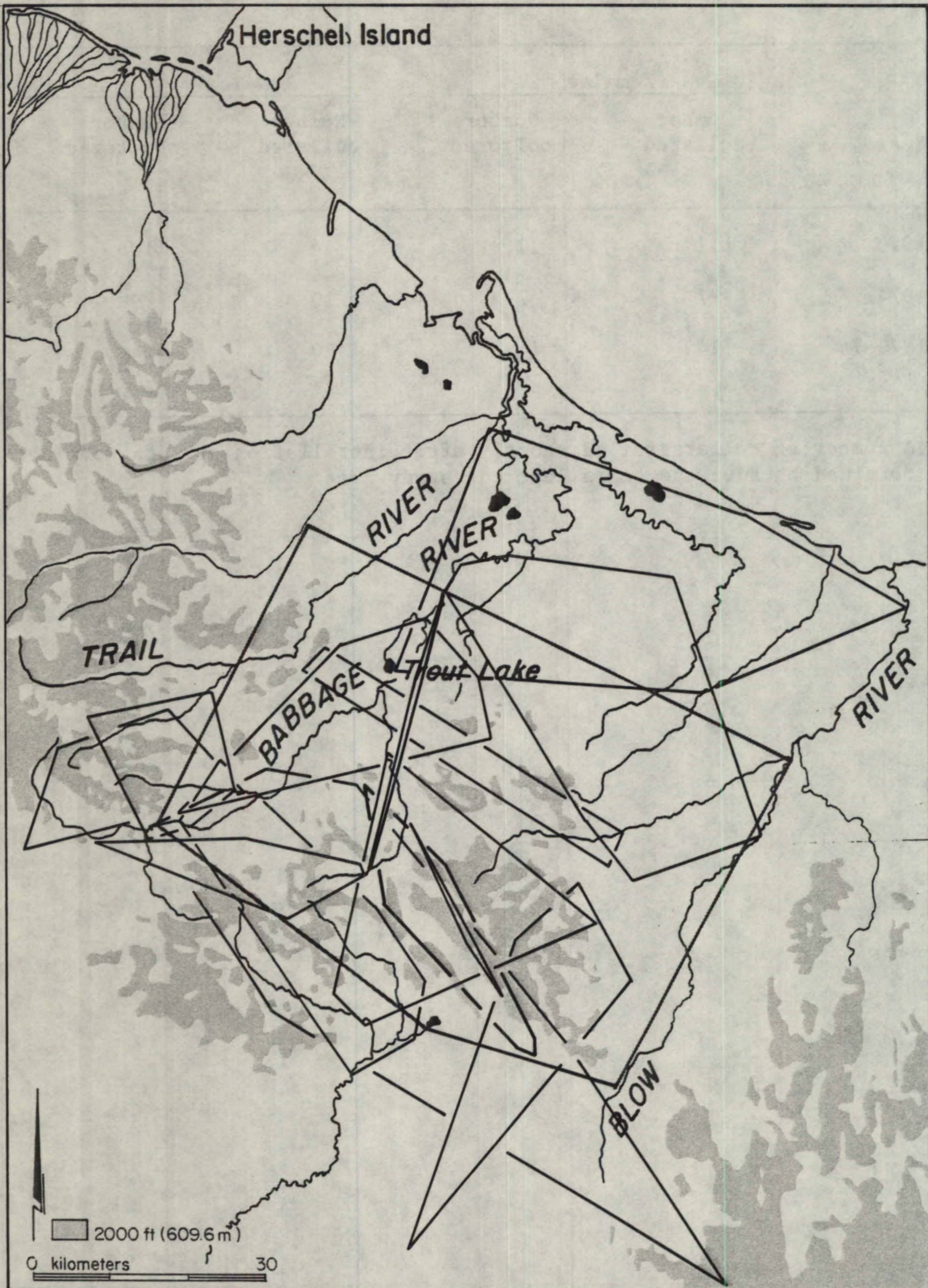


Figure 3. Cumulative home ranges for 14 male grizzly bears in northern Yukon, 1973-74.

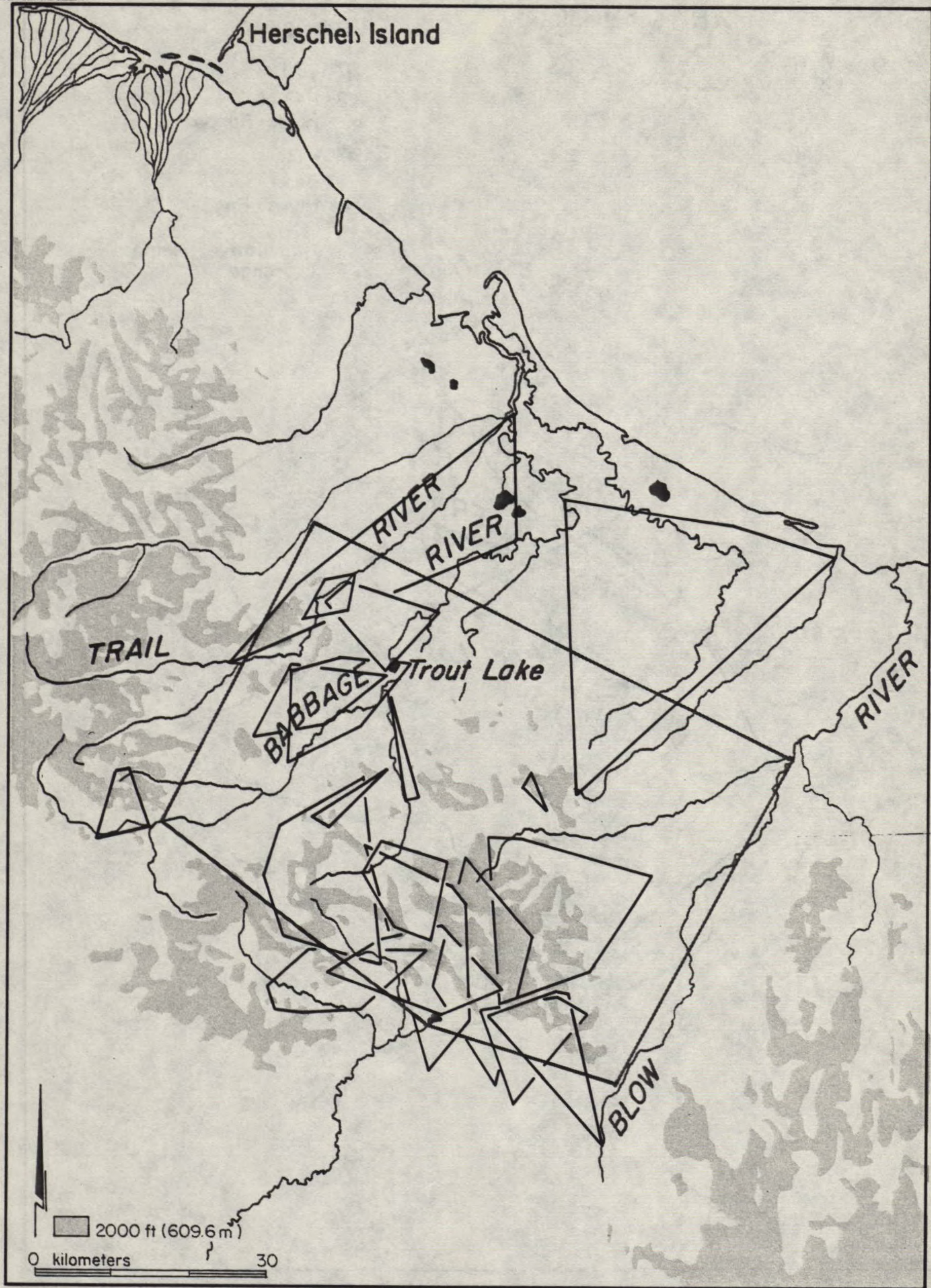


Figure 4. Cumulative home ranges of 19 female grizzly bears in northern Yukon, 1973-74.

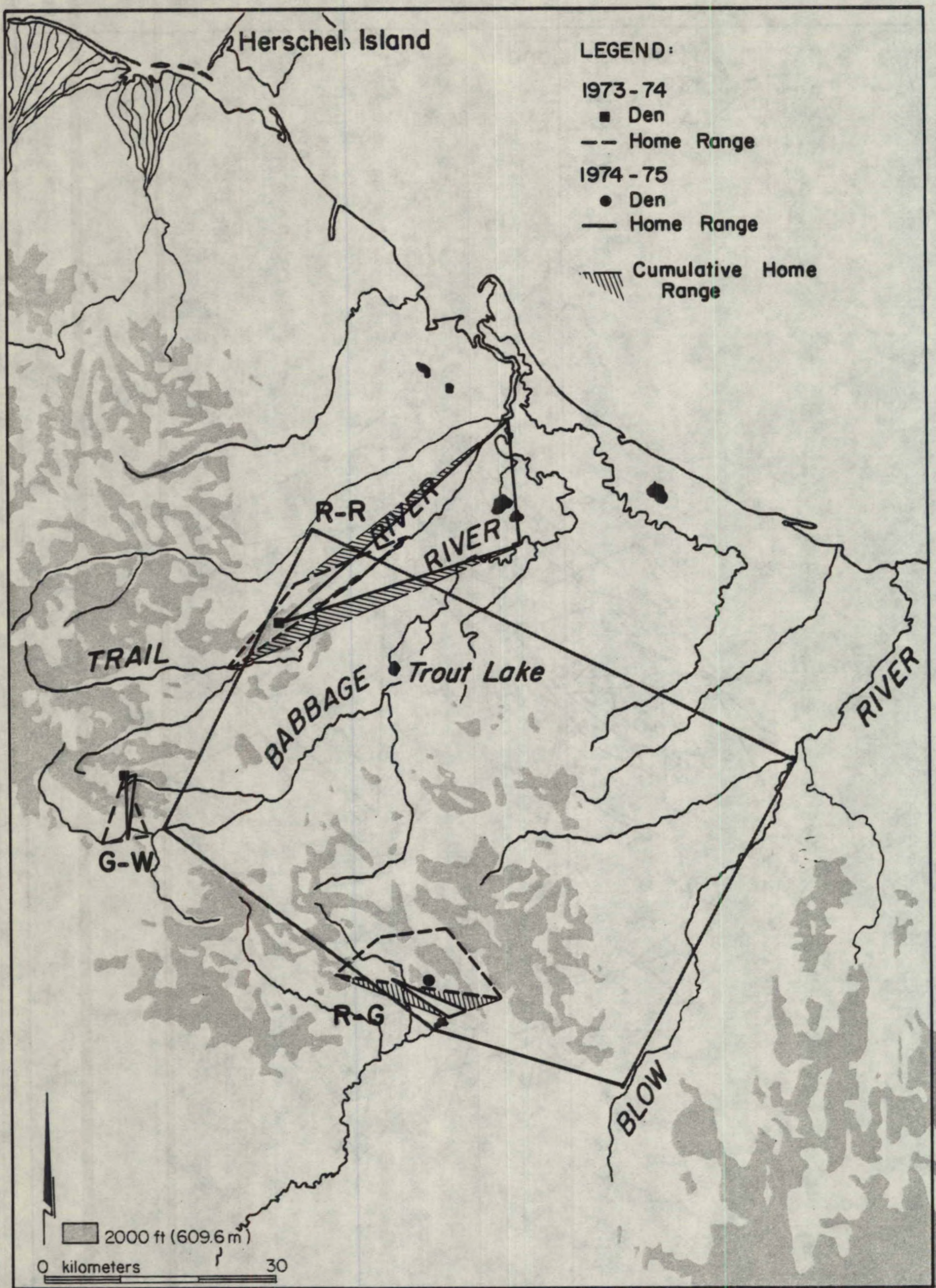


Figure 5. Annual and cummulative minimum home range polygons for female grizzly bears R-R, G-W and R-G.

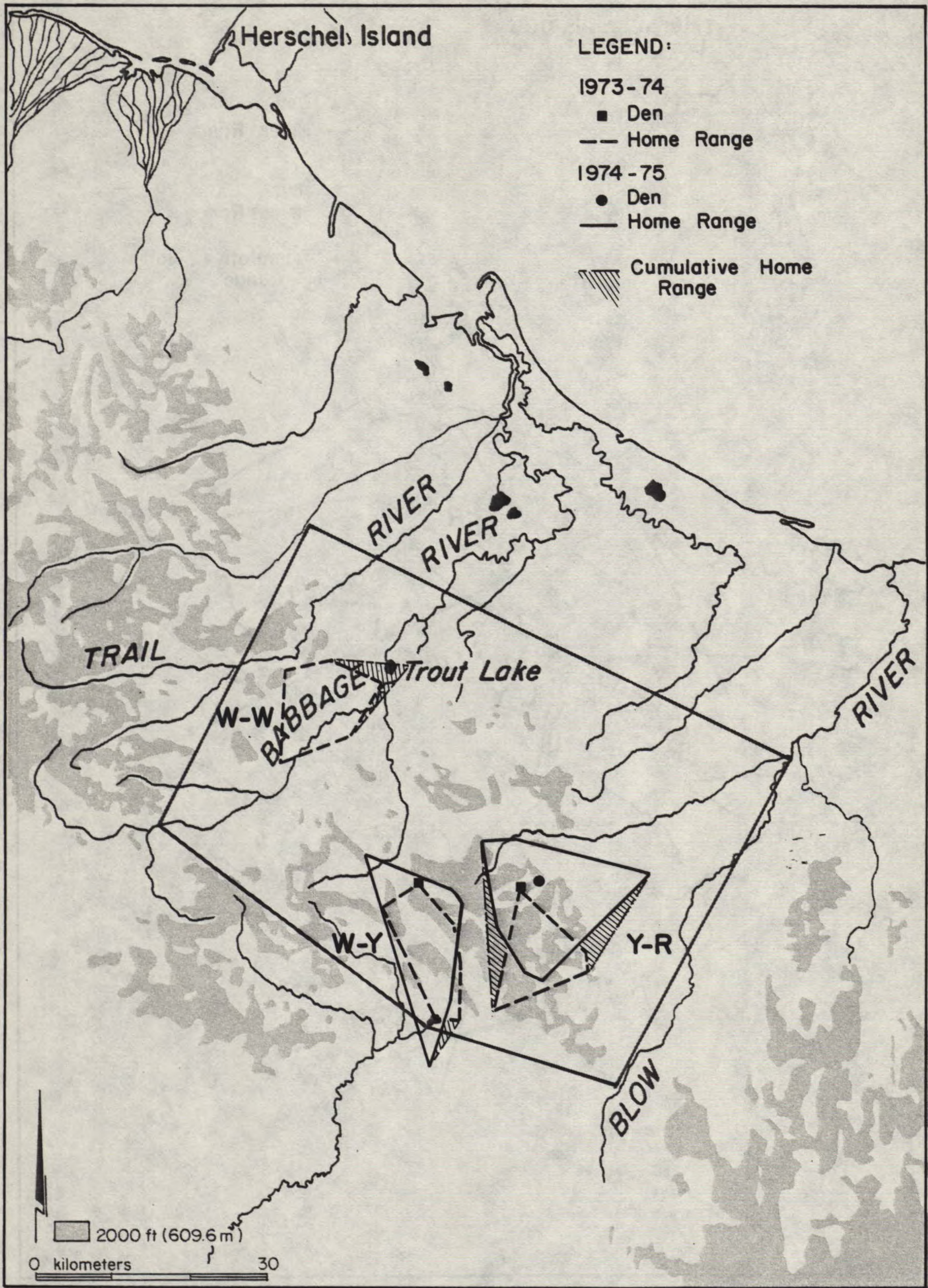


Figure 6. Annual and cumulative minimum home range polygons for female grizzly bears W-W, Y-R and W-Y.

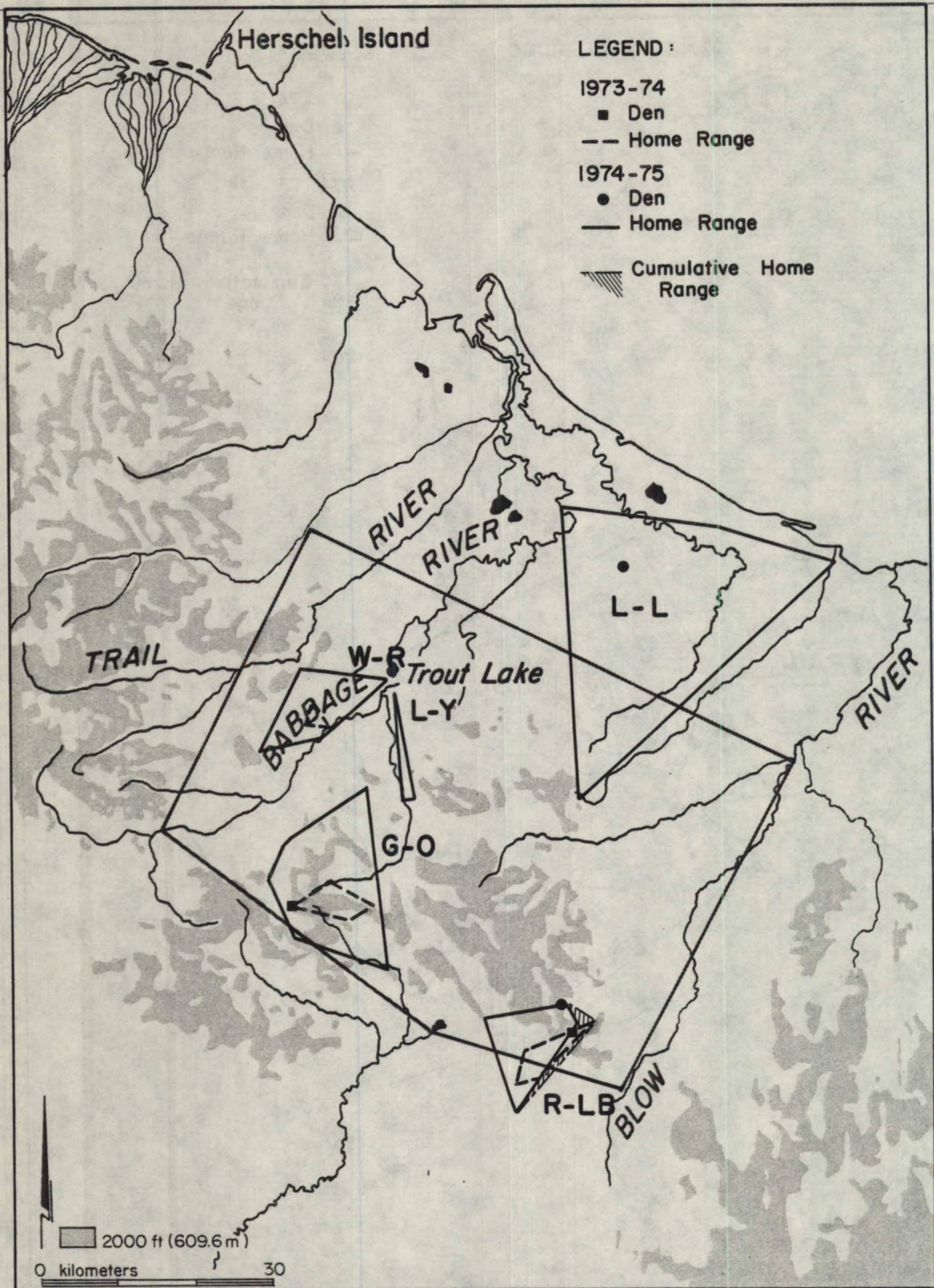


Figure 7. Annual and cumulative minimum home range polygons for female grizzly bears L-L, W-R, L-Y, G-O and R-LB.

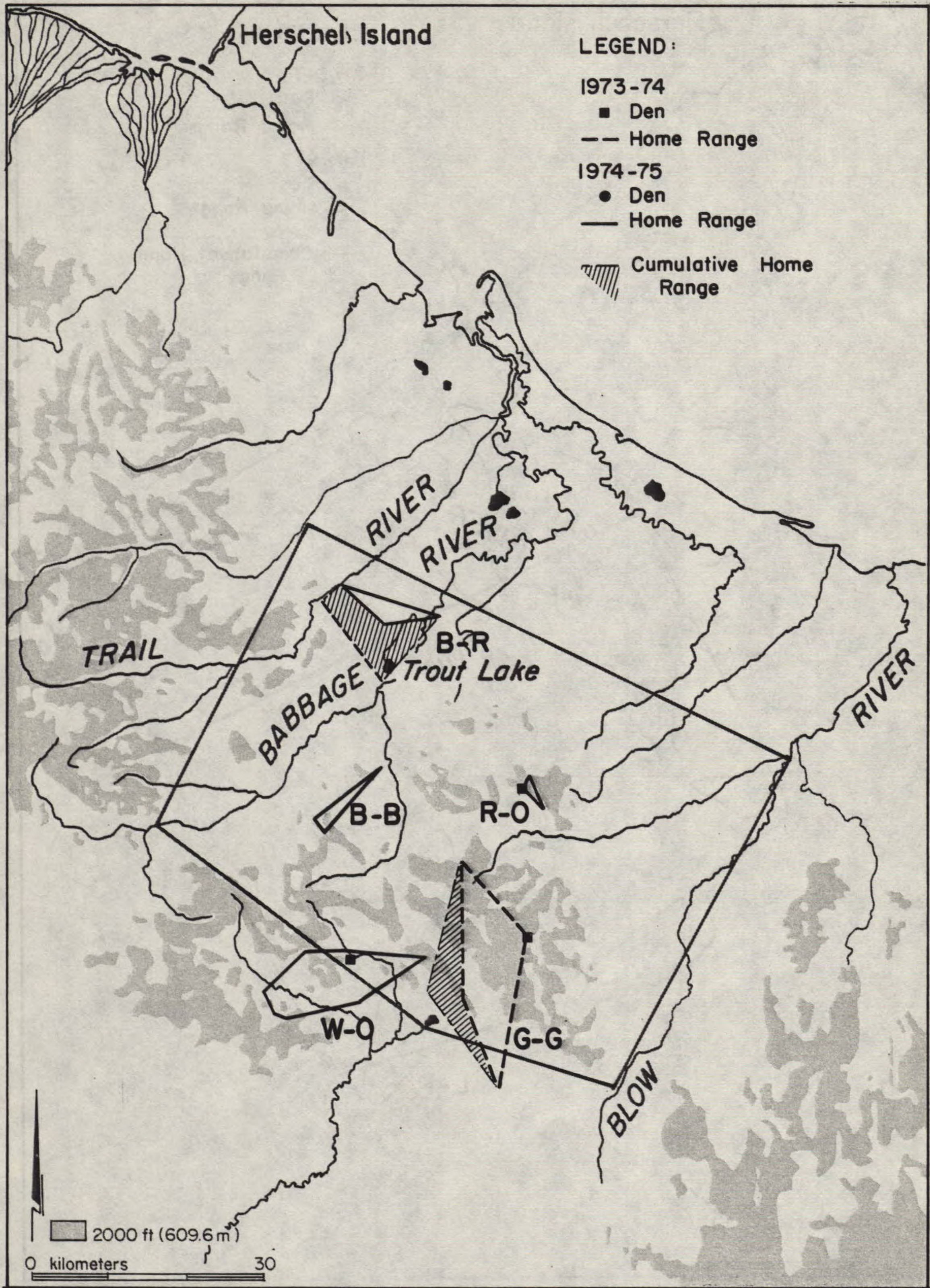


Figure 8. Annual cumulative minimum home range polygons for female grizzly bears B-R, B-B, R-O, W-O and G-G.

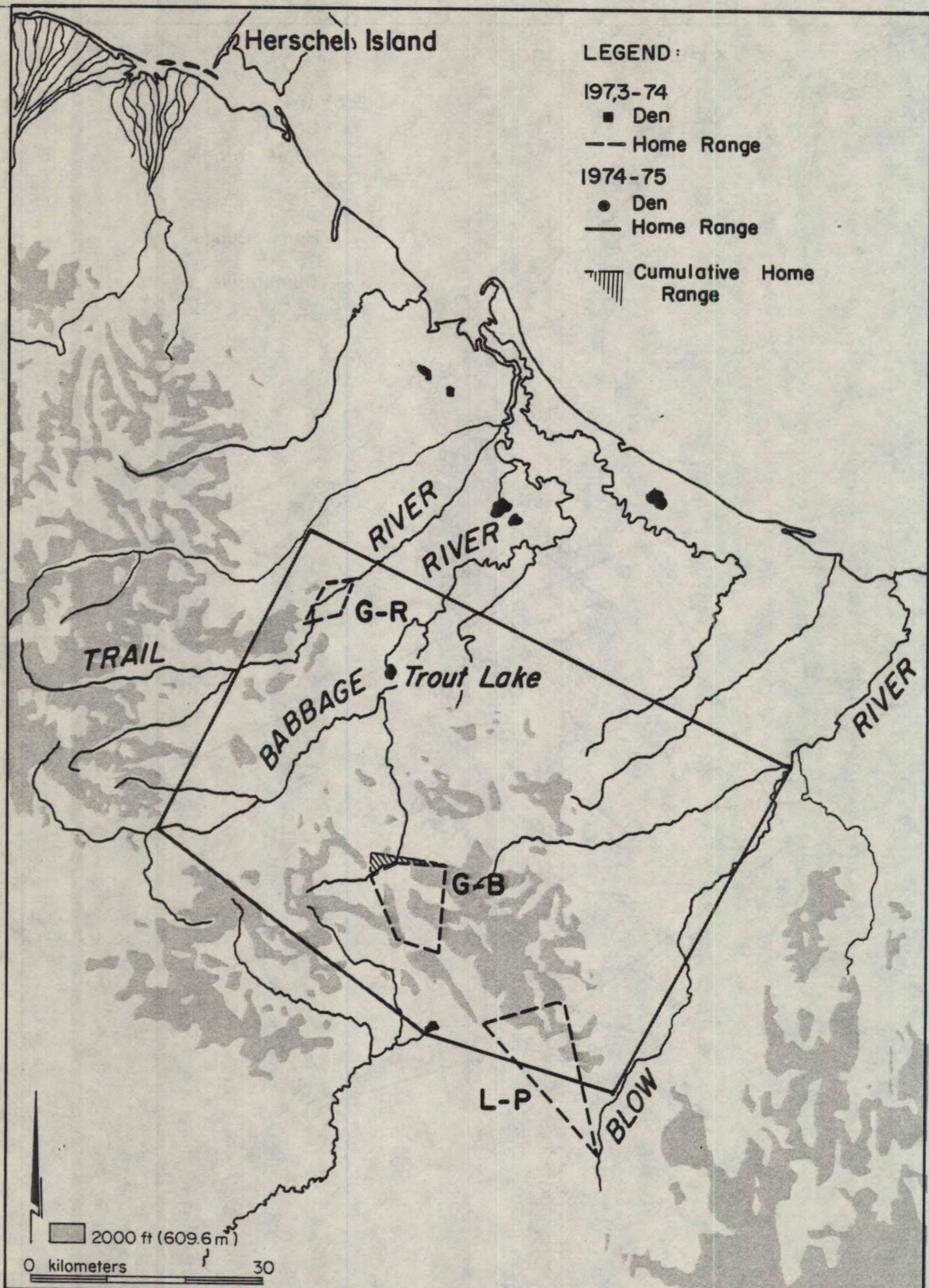


Figure 9. Annual cumulative minimum home range polygons for female grizzly bears G-R, G-B and L-P.

Table 21. Observed minimum home range sizes for grizzly bears in northern Yukon, 1973-74.

| Type of Observation | Age Class | Sex | Annual Home Range Size ($km^2$) 1973 N | | | 1974 N | | | 1975 N | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | N | Mean Min. | Min. - Max. | N | Mean Min. | Min. - Max. | N | Mean Min. | Min. - Max. |
| Radio Tel. | Subad.[1] | F | 1 | 67 | 67 | - | - | - - | 1 | 67 | 67 |
| | | M | 2 | 1023 | 148 - 1898 | 1 | 1307 | 1307 | 3 | 1118 | 148 - 1898 |
| | Adults[2] | F | 10 | 90 | 21 - 177 | 8 | 208 | 3 - 701 | 18 | 143 | 3 - 701 |
| | | M | 7 | 185 | 69 - 688 | 8 | 415 | 8 - 1352 | 15 | 307 | 8 - 1352 |
| All Obs.* | Subad. | F | 2 | 36 | 5 - 67 | 3 | 37 | 2 - 78 | 5 | 36 | 2 - 78 |
| | | M | 2 | 1023 | 148 - 1898 | 2 | 659 | 10 - 1307 | 4 | 841 | 10 - 1898 |
| | Adult | F | 11 | 83 | 8 - 177 | 13 | 154 | 2 - 701 | 24 | 121 | 2 - 701 |
| | | M | 8 | 169 | 58 - 688 | 9 | 390 | 8 - 1352 | 17 | 286 | 8 - 1352 |

*Includes home ranges delineated using capture points and incidental observations of tagged bears

[1]Subadults ♀ ≤ 5 years old
♂ ≤ 7 years old
[2]Adults ♀ ≥ 6 years old
♂ ≥ 8 years old

grizzly bear densities (mountains) to one with few or no permanent inhabitants (coastal plain). Some bears may move to the coast to scavenge on dead seals or whales washed up on the beach.

Adult males (>7 years) ranged over much larger areas; minimum home range polygons averaged 169 $km^2$ (58-688 $km^2$) for 8 males in 1973 to 390 $km^2$ (8-1352 $km^2$) for 9 males in 1974. The overall average for adult males based on cumulative data for the two years of observation was 286 $km^2$ (8-1352 $km^2$) for 17 adult males. The home ranges of 11 adult males are shown in Figures 10, 11, 12, 13 and 14. The largest home ranges (1352 km and 1006 $km^2$) were recorded for two prime adult males (P-W and O-O), each of which was observed with a number of different females during the breeding season.

The minimum home range polygons for 2 subadult females (>2 and 5 ≤ years) averaged 36 $km^2$ (5-67 $km^2$) during 1973, while those for 3 subadults in 1974 averaged 37 $km^2$ (2-78 $km^2$). The overall average minimum home ranges observed for subadult females was 36 $km^2$ (2-78 $km^2$). Subadult females were more sedentary than subadult males, remaining on or in close proximity to the general home range of their mothers. Pearson (1975) reported a similar pattern of movement for subadult females in southwest Yukon.

Subadult males (>2 and ≤ 7 years) ranged over the greatest areas. The average home ranges of two subadult males was 1023 $km^2$ (148-1898 $km^2$) during 1973 and 659 $km^2$ (10-1307 $km^2$) for 2 subadults in 1974. The overall average for cumulative home ranges of all subadult males was 841 $km^2$ (10-1898 $km^2$). The largest home range of 1898 $km^2$ was recorded for a six year old male, while a seven year old male had a known annual home range of 1307 $km^2$.

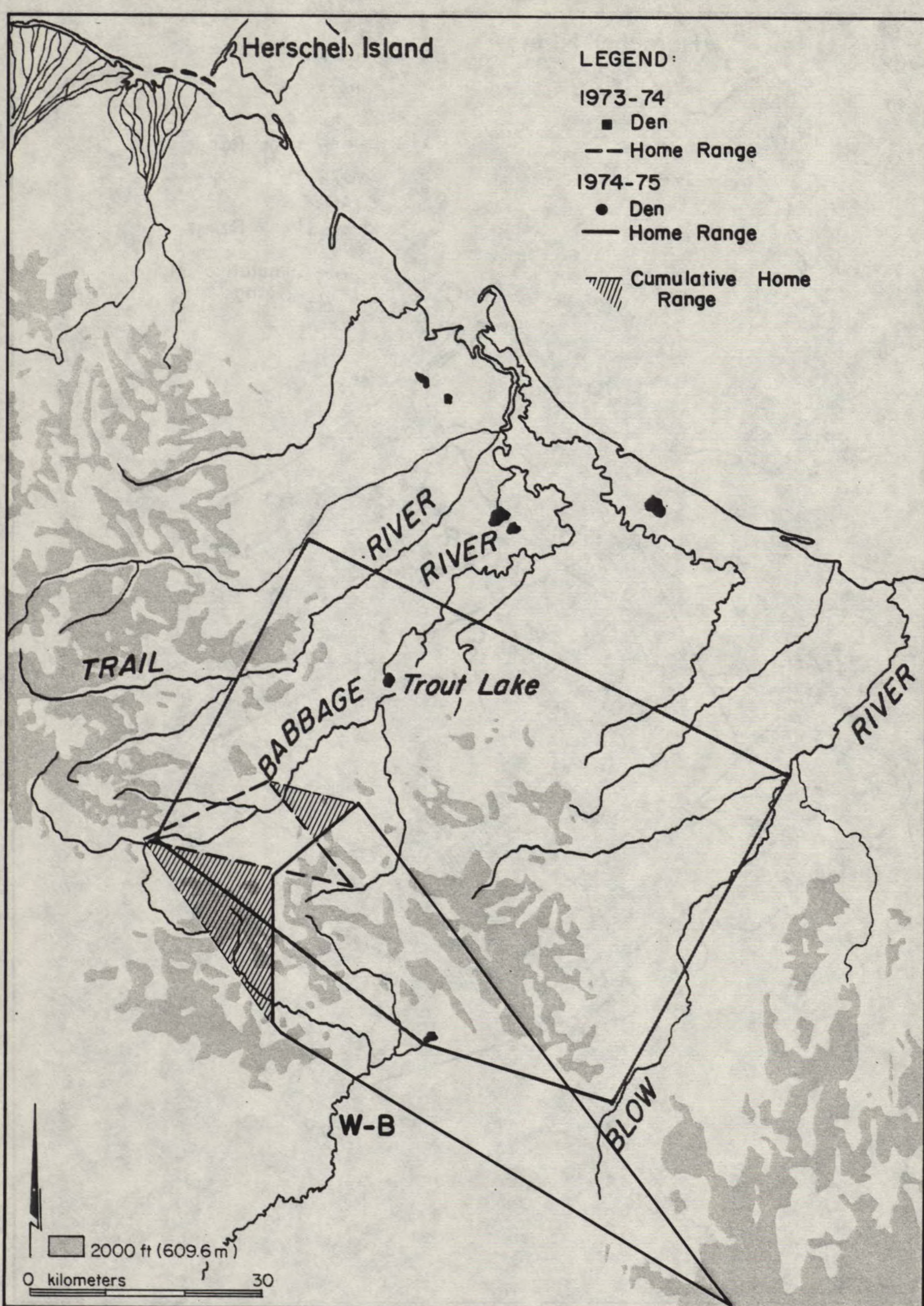


Figure 10. Annual and cumulative minimum home range polygons for male grizzly bear W-B.

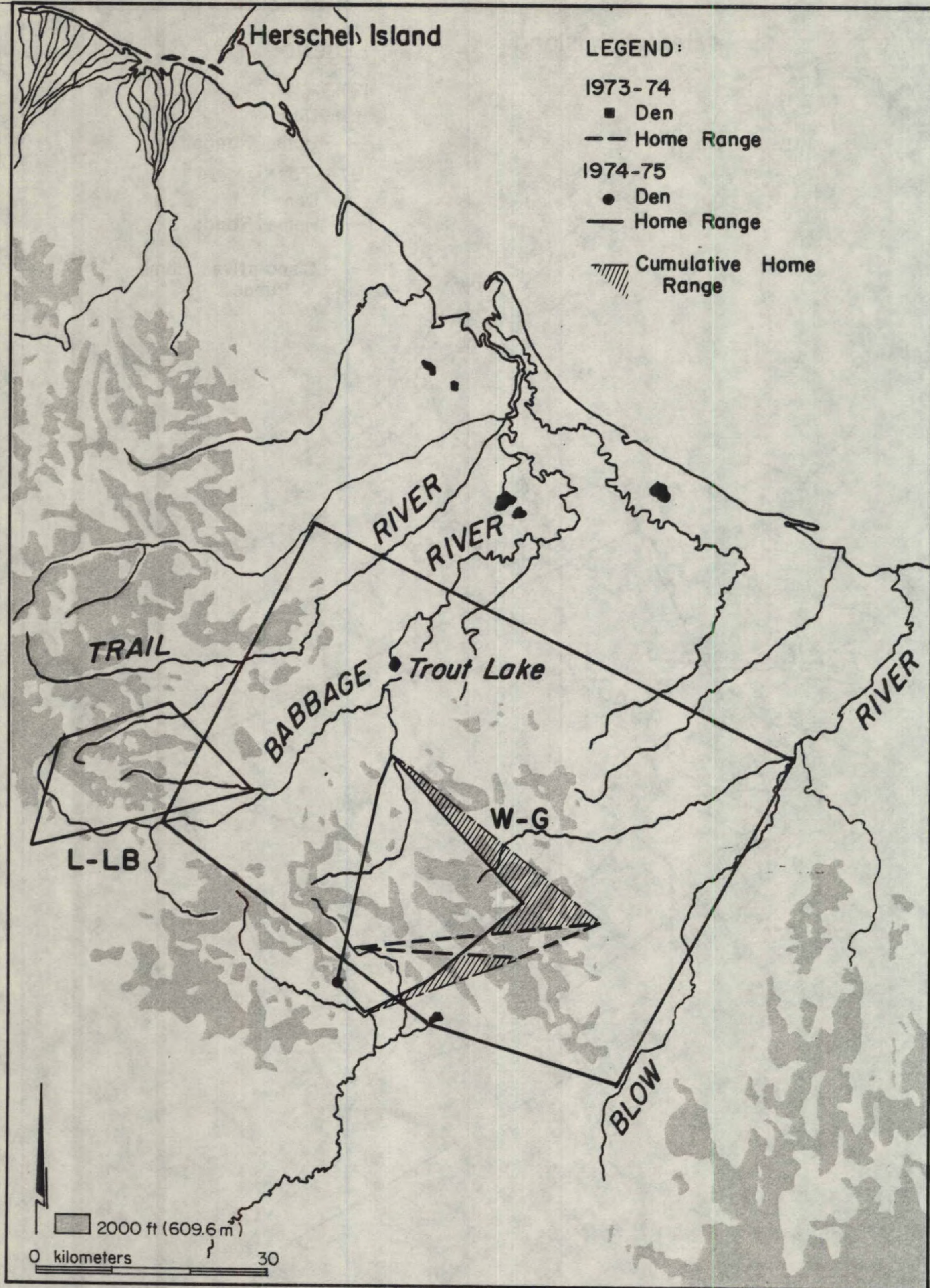


Figure 11. Annual and cumulative minimum home range polygons for male grizzly bears L-LB and W-G.

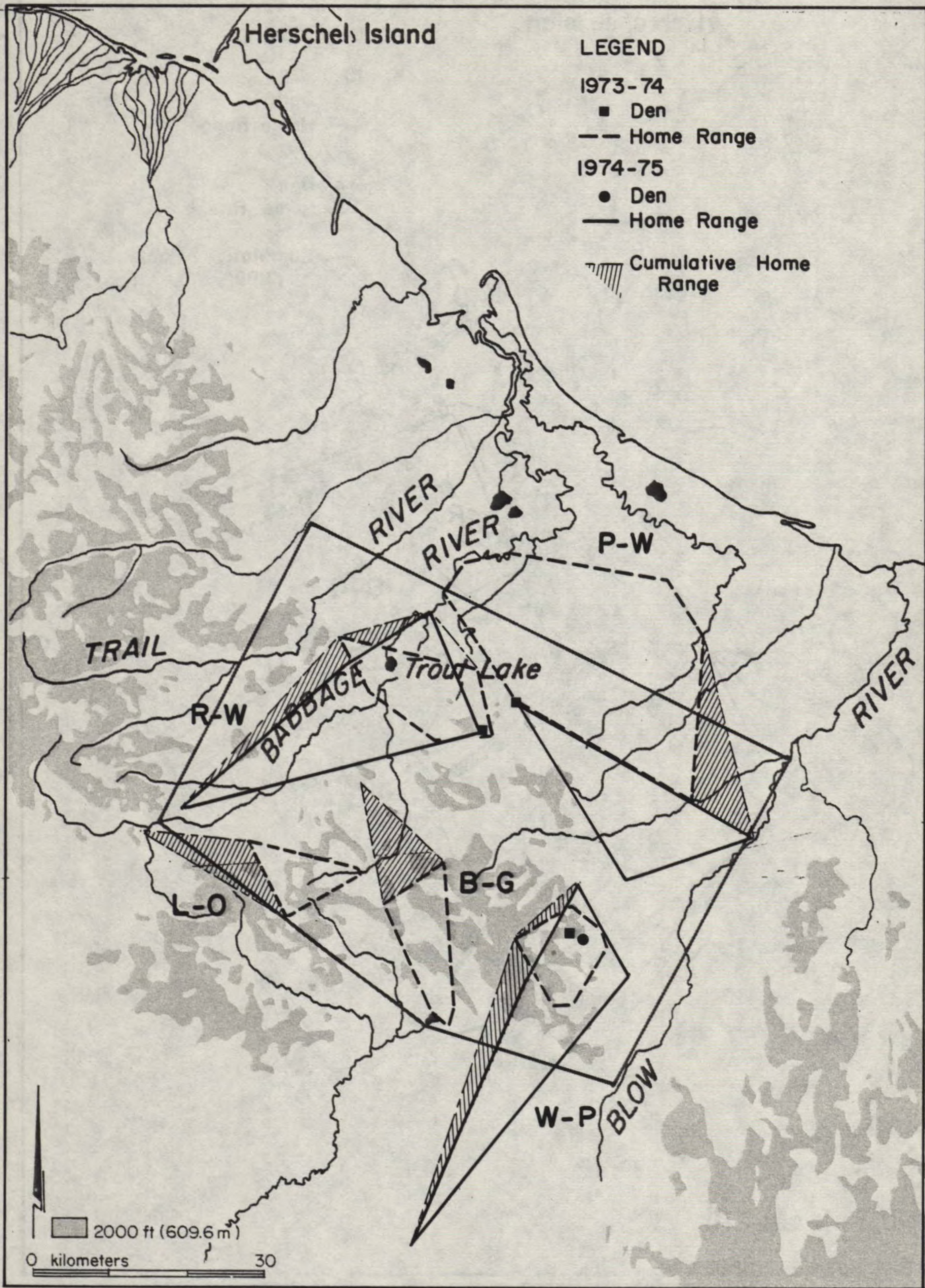


Figure 12. Annual and cumulative minimum home range polygons for male grizzly bears P-W, R-W, L-O, W-P and B-G.

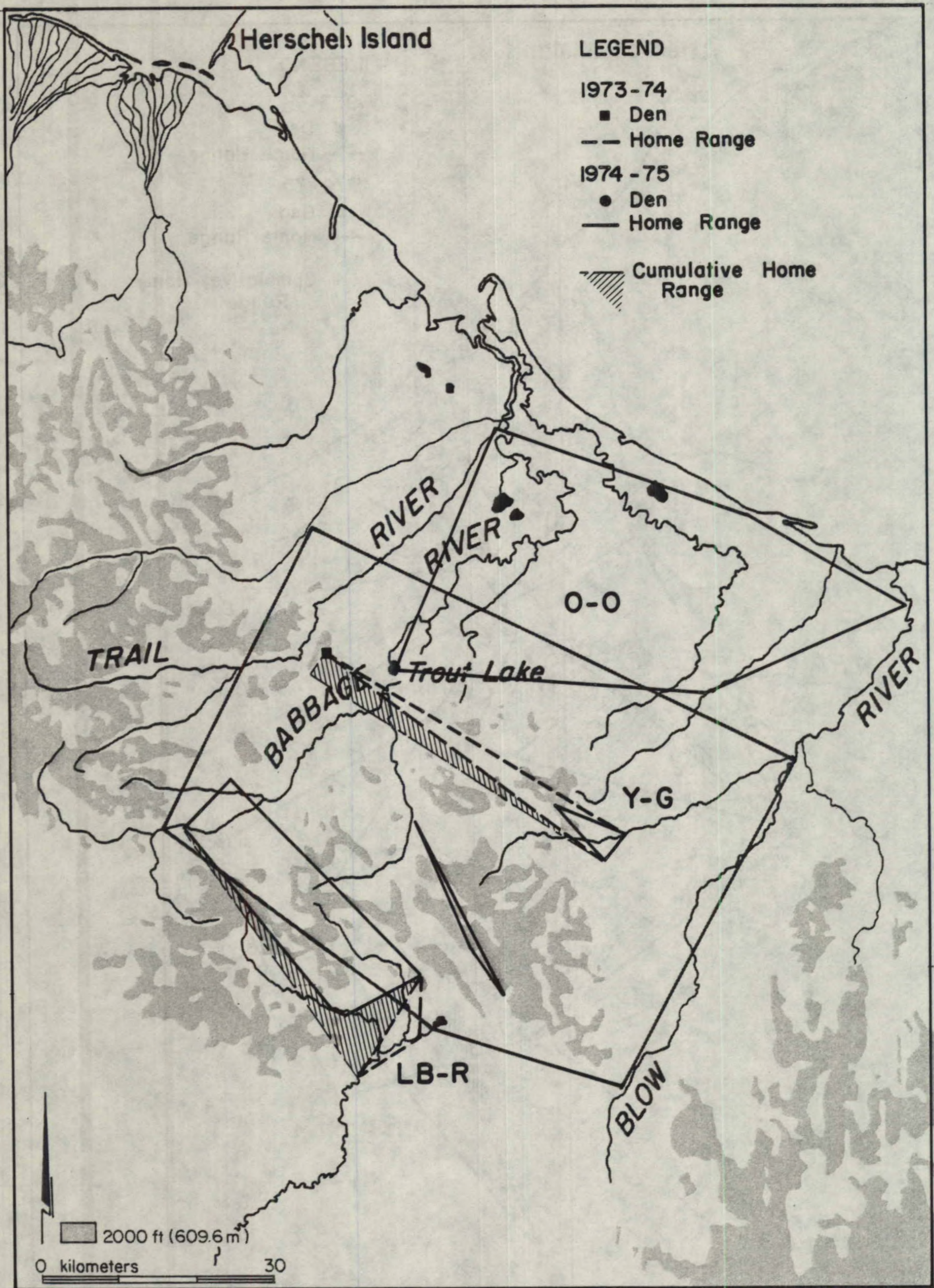


Figure 13. Annual and cumulative minimum home range polygons for male grizzly bears O-O, Y-G, P-Y and LB-R.

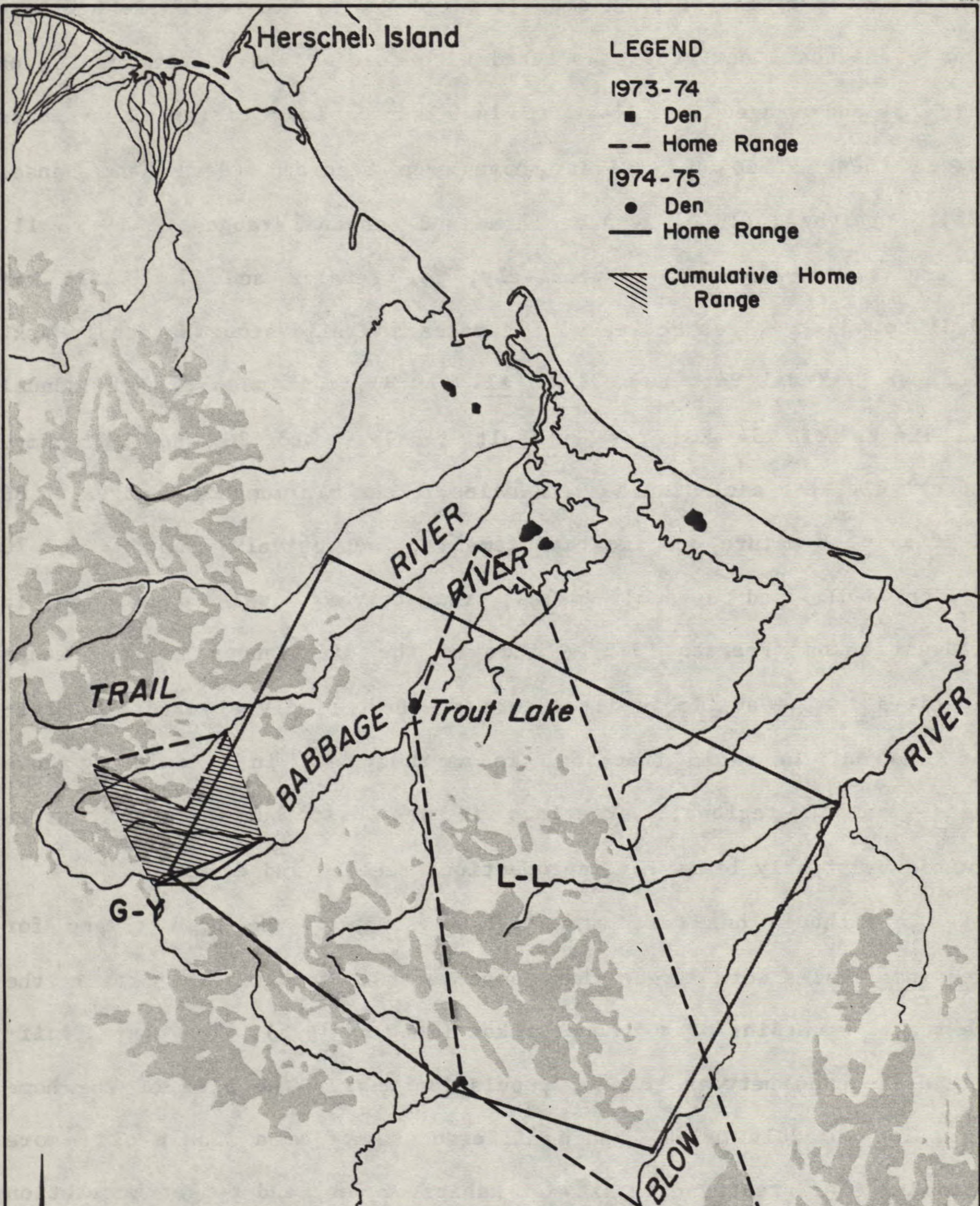


Figure 14. Annual and cumulative minimum home range polygons for male grizzly bears L-L and G-Y.

Home ranges vary in size from one geographic region to another. Areas of seasonal activity associated with feeding and winter denning on Kodiak Island ranged from 14.4 to 14.9 $km^2$. Long distance movements between these areas of activity have been recorded (Berns and Hensel 1972). Craighead (1976) reported home and seasonal ranges of 18 to 111 $km^2$ and 20 to 275 $km^2$, respectively, for females and 57 to 324 $km^2$ and 31 to 435 $km^2$, respectively, for males in Yellowstone National Park. In Jasper National Park Russell et al. (1979) found mean minimum annual home ranges of 234 $km^2$ for subadult females, and 248 and 875 $km^2$, respectively, for adult females and males. Mean minimum home ranges of 86 and 88 $km^2$ for mature and immature females, respectively, and 287 and 70 $km^2$ for adult and subadult males, respectively, were documented in southwest Yukon (Pearson 1975). Some of the differences in home range size cited in the available literature are undoubtedly a result of problems inherent in radio tracking, in methods used in calculating home ranges, and in regional variations in the distribution of resources required by grizzly bears for reproduction, feeding and denning.

Although our data were highly variable, the home ranges for males and females were larger than those recorded for grizzly bears in the more rugged mountains of southwest Yukon (Pearson 1975). The most significant difference between the two population was in the size of the home ranges for subadult males. Such differences may be a result of a more varied terrain, greater diversity of habitat types, and denser vegetation in southwest Yukon.

Watson et al. (1973) suggested that grizzly bears of the Arctic mountains made significant movements in relation to migration of barren ground caribou. Our data do not substantiate that contention. In fact, during June when caribou were moving generally to the north and west, some adult grizzlies were moving east and south. These movements may have been more closely related to breeding behaviour of the bears than to predation or scavenging on the caribou herds. We suggest that while individual grizzly bears - especially adult males - may prey or scavenge on carcasses of caribou that migrate through the bears' home ranges, they do not actually "migrate" with the herds. The large home ranges of some adult males could, however, allow them to remain with the caribou herds for many days without actually deserting their areas of familiarity.

## 4.8 Elevational Distribution of Adult Males Compared to other Sex and Age Classes of Grizzly Bears

In northern Yukon the elevational distribution of grizzly bears by sex, age and reproductive class was disproportionate (Figure 15). Adult males tended to frequent the 150-460 m asl elevational range (54% of observations). By comparison, only 33 and 24 percent of observations of adult females with and without young, respectively, were recorded in the same elevational range. Adult females without young were found most often in the 460-760 m asl elevational range (56 percent of observations), while the greatest proportion of observations of adult females with young were in the 0-150 m asl (42 %) and 460-760 m asl (33%) elevational ranges. On the other hand only 18 and 38 percent of all observations of adult males were located in the 0-150 and 460-760 m asl elevational ranges, respectively. The differences were significantly different ($P < 0.001$). Data for subadults were considered inadequate for accurate interpretation.

The greatest proportion of the study area is above 150 m asl, with the coastal plains falling below that elevation to sea level. The

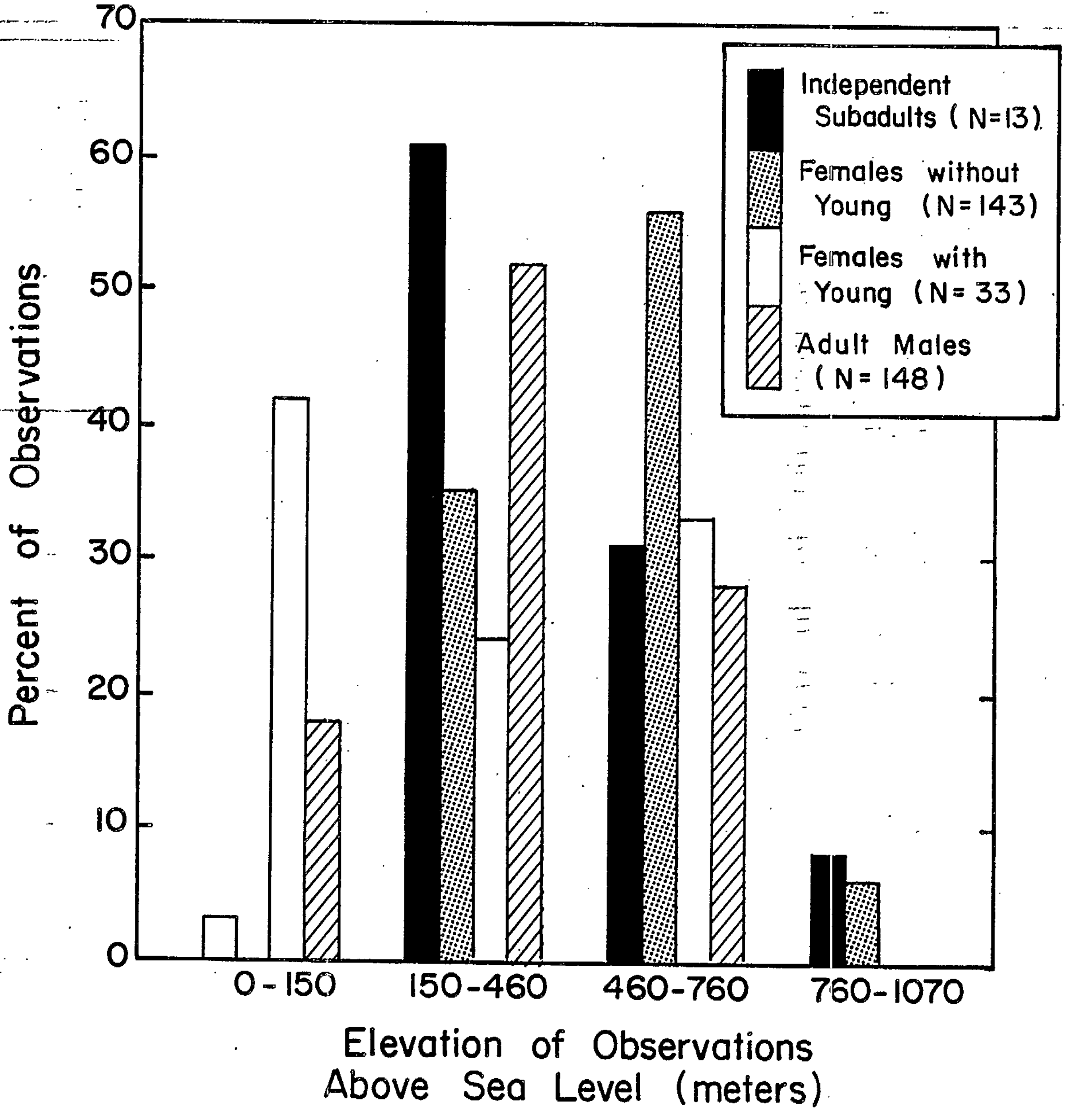


Figure 15. Distribution of observations of grizzly bears of different sex, and reproduction classes by elevation above sea level in northern Yukon, 1973-74.

mountainous portions rise from valley floors of 150-460 m asl to elevations as high as 1500 m asl. Adult males tended to occupy the lower portions of the valleys, while adult females spent most of their time on the upper valley slopes and on the coastal lowlands, areas less frequented by adult males.

Pearson (1975) and Russell et al. (1979) reported seasonal and annual variations in the elevational distribution of grizzly bears by sex and age classes. Adult males in southwest Yukon moved to lower ground following emergence from their winter dens, while adult females and immature animals remained higher on mountain sides near their den sites, until late May (Pearson 1975). In Jasper National Park, Alberta, Russell et al. (1979) deserved that lone females, females with subadults and independent subadults spent disproportionately greater amounts of time in areas above valley floors than did adult males. Although overlap in the elevational ranges used occurred, significant differences were obtained when the elevational distribution of adult males was compared with other sex and age classes. Our data appear to be consistent with those reported by Pearson (1975) and Russell et al. (1979). As a tactic to improve their survival lone females, females with subadults and indepent subadults may actively avoid lower elevation ranges frequented by males (Russell et al. 1979). Adult male bears often present a significant threat to subadults. Survival of subadult black bears in the Cold Lake area of Northeast Alberta improved after the removal of adult males from the population suggesting that predation of subadults by adult males contributes to the regulation of population size (Kemp 1976).

## 4.9 Denning

### 4.9.1 Geographic location of dens

During the study 36 dens were located (Fig. 16), of which 16 were measured. Twenty-one were discovered by monitoring radio-collared bears and the others were found during random capture flights. Only three (8%) of the dens were situated on the Arctic Coastal Plain, while 33 (92%) were located in the montane region of the Arctic Plateau or British Mountains. The scarcity of dens on the lowlands is further corroborated by the fact that only 5 percent of all observations of grizzly bears in May were in such terrain. It is likely that desirable denning habitat is much more easily found on mountain slopes than on lowlands where drainage is relatively poor.

### 4.9.2 Elevation of dens

The three dens on the edge of the coastal lowlands were at a mean elevation of 120 m asl (range 117-121). Elevations were also recorded for 20 of the dens in the mountains. Seventeen were found behind the front ranges and were at a mean elevation of 618 m asl (range 419-914). Another three were located along river banks at an average elevation of 147 m asl (range 137-152).

### 4.9.3 Direction in which dens face (aspect)

The aspects of 24 dens are shown in Figure 17. A southerly or southeasterly-facing slope was preferred. Fifteen (62.5%) were oriented

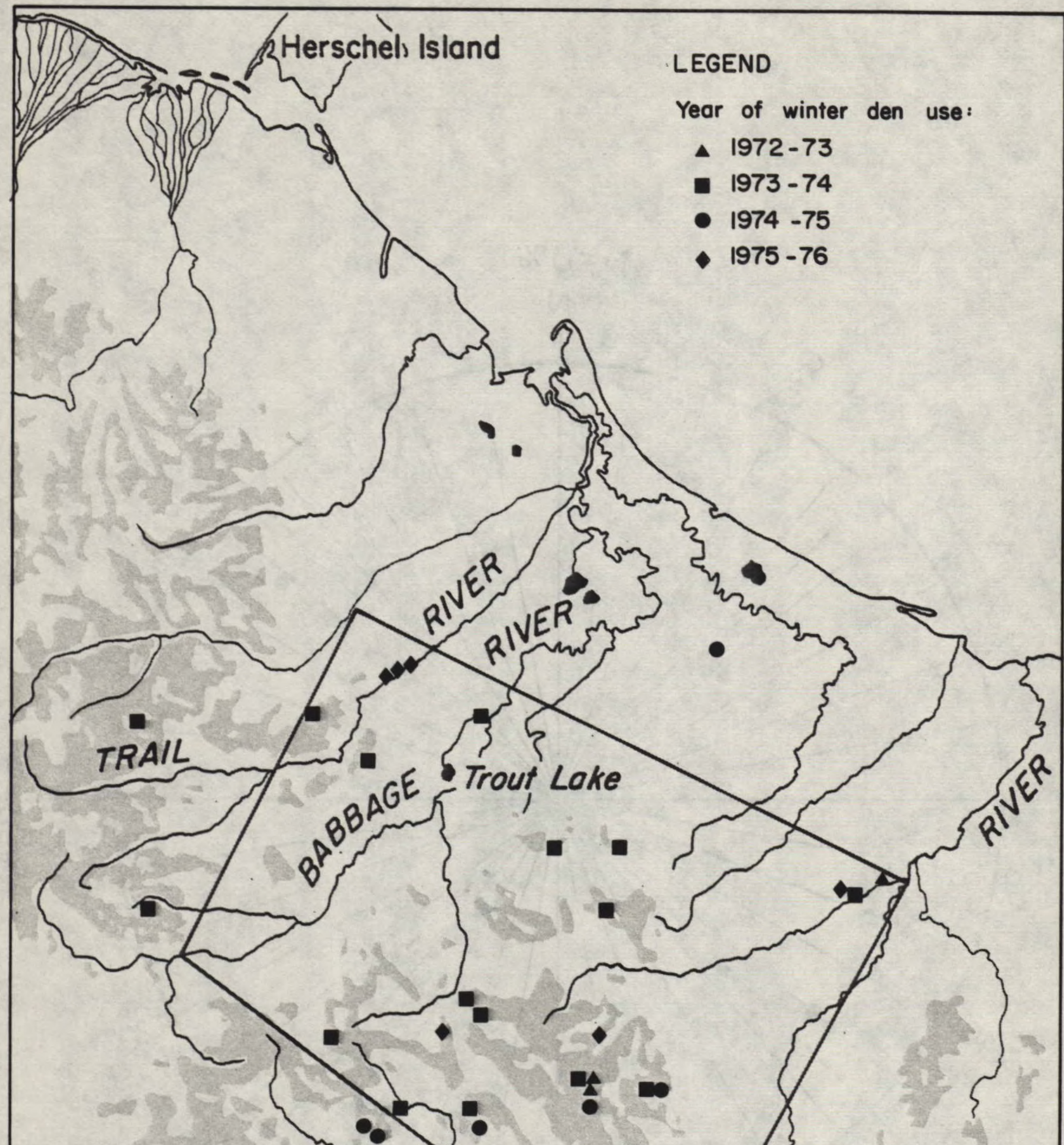


Figure 16. Location of den sites in northern Yukon, 1972-75.

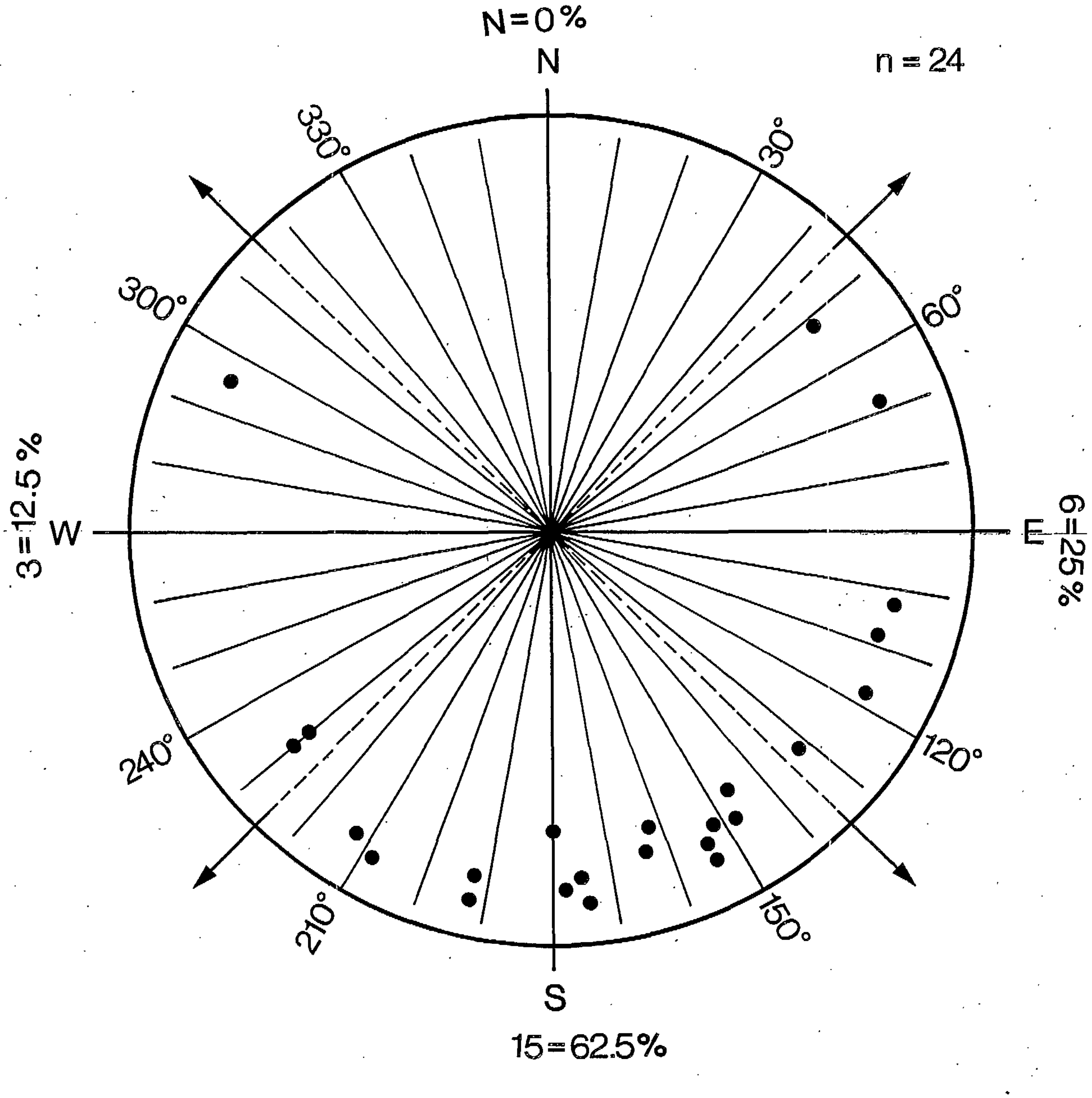


Figure 17. Aspect of grizzly bear dens in northern Yukon, 1973-74.

to the south, six (25%) to the east, and three (12.5%) to the west. None opened towards the north. Of the total, 21 (87%) had openings oriented to the south of an east-west line.

The aspect of slopes on which dens were excavated by grizzly bears appear to vary from region to region. Lentfer et al. (1972) reported that dens on Kodiak Island and Alaskan Peninsula usually occurred on north and east-facing slopes, respectively. In Banff National Park most dens were found within an aspect range of 45 to 112.5° (Vroom et al. 1980). In Jasper National Park some dens faced from east to northeast, although most were oriented towards the south and southeast (Russell et al. 1979). Pearson (1975) found that dens in southwest Yukon had an east, south or westward orientation. On Tuktoyaktuk Peninsual and Richards Island, N.W.T. most dens faced south or west (Nagy et al. 1983 and Harding 1976).

Harding (1976) and Nagy et al. (1983) found a significant orientation towards the southern quarter in dens inspected on the Tuktoyaktuk Peninsula and Richards Island, NWT; a situation evident for dens of northern Yukon. The reason for the similarity is likely the same. Prevailing north and northwest winds tend to drift snow on south-facing slopes, supplying an early, deep insulative cover over the den entrance. Vroom et al. (1980) reported that den sites in Banff National Park were also located on leeward slopes, within zones of snow deposition.

4.9.4 Angle of slope of den sites

The slopes on which 23 dens were dug ranged from 22-43° with a mean of 30.4° (Figure 18). In other regions the degree of slopes on which

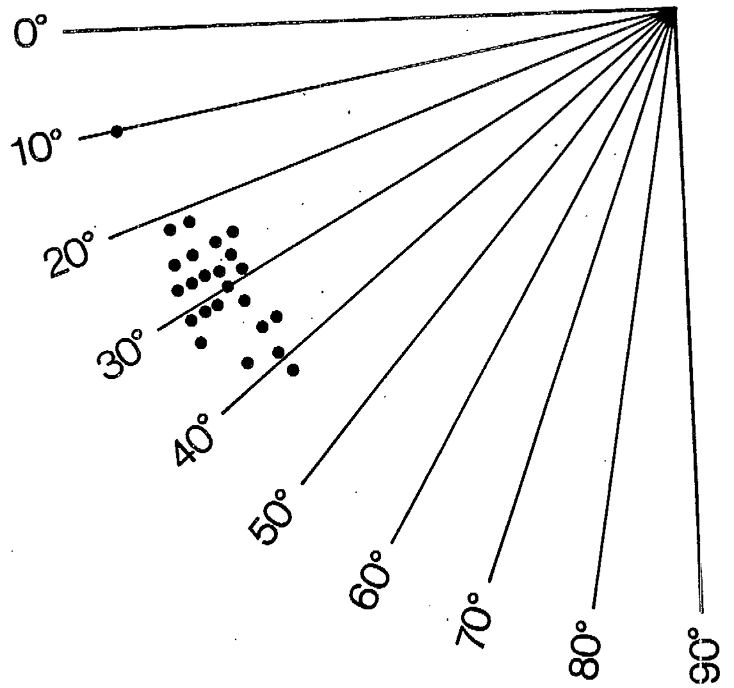


Figure 18. Angle of slope on which grizzly bear dens were located in northern Yukon 1973-74.

dens were found ranged from 30° to 45° on Alaskan Peninsula (Lentfer et al. 1972), 30° to 38° in Banff National Park (Vroom et al. 1980), 15° to 40° in Jasper National Park (Russell et al. 1979), 30° to 40° in northern interior Yukon (Pearson 1975), 0° to 85° on Tuktoyaktuk Peninsula and Richards Island, NWT (Nagy et al. 1983) and an estimated 30 to 50 percent on Richards Island, NWT (Harding 1976).

Our data for northern Yukon generally conforms with the findings of most other studies. It is undoubtedly easier to dig a den on a steep slope than on flat ground because the soil can be moved horizontally rather than upwards.

4.9.5 Substrate

All the dens inspected were excavated except one which was in the form of a natural cave located at the base of a large rocky outcrop. Soil development was minimal on the study area, therefore most dens were dug into stabilized or partially stabilized talus slopes. A small number (10%) were found along stream banks where mineral soil and small talus rocks were mixed. One den was excavated in organic peat on the bank of a small creek at the edge of the coastal plain. The creek bank was 7 m high and the den was at its base. No freshly excavated peat was visible, suggesting it was an old den. Nevertheless, it was used by an adult female and two yearling young in the winter of 1974-75. A similar peat den was found on the Tuktoyaktuk Peninsula (Nagy et al. 1983).

The characteristics of the substrate into which dens were dug in northern Yukon appear similar to those in southwest Yukon (Person 1975) and Alaska (Lentfer et al. 1972). Dens were generally located in areas where digging was not difficult and the subsoil was sufficiently porous to allow for enough drainage to prevent flooding. Dens were usually dug where the roof was stabilized by frost or roots of vegetation to prevent slumping or collapse of the dens (Pearson 1975 and Lentfer et al. 1972). The use of a natural cave as a winter den was reported by Russell et al. (1979) in Jasper National Park.

4.9.6 Internal measurements

In total, 16 dens, excavated in soil or talus were measured. Because of the nature of the substrate some of those dens were either partially or completely collapsed by the summer, so that some measurements could not be taken. For those which could be measured, the entrance had a mean width and height of 75 cm (49-110 cm) and 67 cm (47-80 cm), respectively. Generally a tunnel led from the entrance into the den chamber. The tunnel averaged 75 cm (22-120 cm) in length, 79 cm (53-120 cm) in height and 64 cm (33-104 cm) in width. The tunnel then opened up into a pear-shaped chamber with a mean length of 144 cm (50-202 cm), a width of 125 cm (80-168 cm) and a height of 100 cm (60-150 cm), respectively. A natural cave used as a den was slightly larger (length-230 cm, width-170 cm, height-76 cm), than the average excavated den.

The internal measurements of dens reported here are similar to those reported for other regions (Craighead and Craighead 1972, Lentfer et al. 1972, Pearson 1975, Harding 1976, Russell et al. 1979, Vroom et al. 1980, Reynolds 1980 and Nagy et al. 1983).

4.9.7 Vegetation cover

All dens had at least sparse vegetation around the entrance and above the chamber. The vegetation cover was not as great as in southwestern Yukon (Pearson 1975), and in a few cases (20%) cover was provided only by grasses, mosses and herbs. However, willows and alders were present in dwarf form around most den sites. Roots hanging from the roof of the chamber were noted in 60% of dens inspected. Because of the unstable substrate 73% (11 of 15) of the 1973-74 winter dens inspected in May and June of 1974 had collapsed. The talus slopes on which the majority of dens were located soon slumped, thereby obliterating most dens and making them difficult to locate.

Often shrubs or trees were found at den sites. Such places may be selected because of the stabilizing effects of root systems on subsoil, for concealment (Lentfer et al. 1972), or because they would aid in the catchment of an insulating cover of snow.

4.9.8 Re-use of den sites

Grizzlies did not use the same den in consecutive years. One subadult female returned to the headwaters of the same creek but chose a different branch to den in. In 1974 an adult male excavated a new den only a few meters from the site of his 1973 den which had collapsed. One den excavated in a peat bank may have been used during a previous winter. All other bears for which dens were found in both 1973 and 1974 denned in a different drainage.

4.9.9 Emergence from dens in spring

Approximate emergence dates were recorded for 16 radio-collared grizzly bears in northern Yukon during 1974 (Table 22). The timing appeared to follow those reported by Pearson (1975) for grizzly bears in southwest Yukon. Active males were observed on the study area during the start of telemetry and capture surveys flown during late April and early

Table 22. Dates of emergence for 16 grizzly bears in northern Yukon, 1973-75.

| Bear identification | Sex[a] | Reproductive status[b] | Known approximate emergence time 1974 | Remarks |
|---|---|---|---|---|
| R-LB | F | WOY | 1-3 May | no radio signal at den 3 May |
| G-G | F | WOY | 1-3 May | den vacant 3 May |
| G-O | F | WOY | 3-6 May | captured 6 May near den |
| R-R | F | WOY | after 5 May | no subsequent observation until 19 July |
| W-O | F | WOY | before 3 May | captured 3 May near den |
| G-W | F | WC | 4-12 May | observed outside of den 12 May |
| R-O | F | WC | before 5 May | observed outside of den 5 May |
| Y-R | F | W2Y | before 3 May | observed outside of den 3 May |
| W-Y | F | W2Y | before 3 May | observed outside of den 3 May |
| L-L | F | W2Y | before 4 May | captured 4 May |
| Y-LB | M | | before 1 May | den vacant 1 May |
| W-P | M | | before 1 May | den vacant 1 May |
| P-W | M | | before 1 May | den vacant 1 May |
| R-W | M | | before 1 May | den vacant 1 May |
| W-B | M | | before 5 May | captured 5 May |
| LB-R | M | | before 6 May | captured 6 May |

[a] F = female; M = Male.

[b] WOY = without young; WC with cubs-of-year; W2Y = with two year olds.

May. Four adult males were known to have emerged prior to 1 May and two others before 5 May. Although our data were limited there did not appear to be differences in the emergence times of adult females with and without young. Known emergence times ranged from 2-12 May. Dates of departure from winter dens in northern Yukon appear to be two weeks to a month later than those reported for more southerly latitudes (Craighead and Craighead 1972, Hamer _et al_. 1979).

In some instances emergence times may be dictated by the den aspect. The majority of dens faced in a southerly direction where they would be more prone to the effects of melting. In many of the vacated dens examined in early May, water had percolated through the roof to form pools on the den floor. Some dens had either partially or totally collapsed by mid-May. Therefore, flooding or collapse of dens may have caused early den abandonment. Female R-O was observed with three cubs-of-the-year at her winter den on 5 May. The den was situated on a partially stabilized talus slope facing almost due south (174°). On 7 May the same female and cubs were observed on a ridge above the den site. The den had collapsed and was partly filled with water.

## 5.0 CONCLUSIONS

During 2 years of intensive capture work 78 grizzly bears (37 males and 41 females) were marked and released in northern Yukon Territory.

Male grizzly bears were larger than females. Mean weights by age class for both sexes were greater than those of the southwest Yukon, suggesting a more rapid growth rate. However, parameters of fitted Von Bertalanffy growth curves indicated that spring weights of bears of Tuktoyaktuk were significantly greater than those of northern Yukon.

Significant seasonal weight changes were observed for males and females. Weight data emphasize the importance of high quality foods for summer and fall conditioning of grizzly bears in northern regions.

A highly significant correlation was found between weight and heart girth. That correlation was not much different for males and females of the northern Yukon population, nor did correlations between weight and heart girth differ significantly between the Yukon and Tuktoyaktuk Peninsula populations. Data were combined and predicted weights with symmetrical 95 percent confidence intervals on the population means were constructed.

Marked seasonal changes in pelage coloration caused by solar bleaching were observed, a phenomenon which was more pronounced in males. This demonstrates the unreliability of identifying bears by color over a period of months.

Highly significant curvilinear relationships between age and zygomatic breadth measurements were obtained for male and female grizzly bears in northern Yukon. Males had significantly wider skulls at a given age than did those of the Ogilvie, Wernecke and Mackenzie mountains in

Yukon Territory and were signicantly narrower than males of the Tuktoyaktuk Peninsula, NWT. No significant differences in skull widths were found between males of the northern Yukon and those from south and central Yukon. Females had significantly wider skulls at a given age than did those of southwest Yukon, but were not significantly different from female grizzly bears of Tuktoyaktuk.

The northern Yukon grizzly bear population consisted primarily of subadult (over 2 years) and adult (over 6 years) bears, with an under-representation of cubs and yearlings. The age structure, apparent annual variations in production of young and comparisons with data presented by other researchers might suggest that the northern Yukon population was in a state of decline. However, because the populations was unhunted and occupied a relatively undisturbed environment we concluded that it was in a state of long-term equilibrium.

Densities which ranged from one bear per 32-37 $km^2$, were lower than those reported for other interior populations of grizzly bears but was 4.5 times greater than those reported for a similar latitude in the east Broods Range, Alaska.

The peak of the breeding season lasted from late May to the end of June, although male-female associations were observed as early a 5 May and as late as 15 July.

Female grizzly bears in northern Yukon successfully bred as early as age 5.5 years with the average being 6.5 years. At age 6.5 females have attained 86 percent of their final spring weights.

Combined mean litter sizes for all females was 2.07 young. The data suggest that cub mortality was low during the first few years of life. Litters of two young occurred with the greatest frequency in all age classes, followed by litters with three and one young.

Most females produced young at 3-4 year intervals. Weaning of young coincided with the onset and peak of the breeding season.

The diet of northern Yukon grizzly bears was generally similar to that of other interior and coastal grizzly bear populations in northern Canada and Alaska. Some of the most widely consumed foods were crowberry, roots of Eskimo potato, ground squirrels, grasses, blueberry, caribou and soapberry.

Totals of 14 female and 20 male grizzly bears were equipped with radio collars during 1973 and 1974. Home ranges of males were larger than those of females, while home ranges of both sexes were greater than those reported for grizzly bears of southwest Yukon. Considerable overlap was observed in the home ranges of both sexes. Females showed a high degree of fidelity to home ranges from year to year. We did not observe significant long range movements of bears in relation to the migration of barren ground caribou. Adult male grizzly bears tended to occupy lower elevations in valleys, while adult females spent most of their time on upper valley slopes and on coastal lowlands. These differences in elevational distribution of bears were significant.

Dens were usually located between 419 and 914 m asl in the montane regions of the Arctic Plateau or British Mountains. Most dens faced south and were located on a slope of 22-43°. Dens were usually excavated in stabilized or partially stabilized talus slopes. One den was excavated in a peat bank, while another was in a natural cave. Internal measurement recorded were comparable to those reported by other researchers. Vegetation around den sites varied from sparse cover of grasses, mosses and herbs to dense stands of dwarf willow, dwarf birch and alder. Most dens collapsed during or following spring melt. Bears emerged from dens between late April and mid-May; approximately 2 weeks to a month later than those reported for more southern latitudes.

## 6.0 RECOMMENDATIONS

History shows us that grizzly bears do not fare well in the face of significant human settlement or industrial development. Their disappearance from more than half their former North American range attests to this fact. The impact of major hydrocarbon or mining development on grizzly bears in northern Yukon could be greatly reduced, however, by establishing firm guidelines and, where necessary, legislating and enforcing practicable rules of conduct by industry and residents. Some recommendations along these lines are as follows:

1) There is overwhelming evidence from data compiled throughout North America that more than two-thirds of grizzly-human incidents are attributable to inadequate treatment of garbage in bear habitats (Herrero, in prep.). Although incidents resulting in human injury receive extraordinary publicity, it is the grizzly bear which suffers most in terms of mortality and disturbance. The necessity for relocating or destroying grizzly bears would be greatly reduced if all exploration or permanent camps were required by law to incinerate or otherwise prevent access to garbage by bears. A garbage bear is a problem bear and inevitably such bears must be killed to protect people.

2) Where the industrial work force in grizzly habitat is itinerent, continuing education programs are necessary in order to inform new workers of the dangers inherent in feeding or harassing bears and of the unhappy fate of grizzly bears which become "camp bums". Such a program could be designed and operated by the responsible government agency or by industry itself, following guidelines drafted by the Yukon Wildlife Branch.

3) As yet, hunting pressure on the northern Yukon grizzly bear population is not great enough to warrant serious management concerns. However, any future major industrial activity in the region would mean increased access to wildlife populations by hunters. In that event, it may be desirable to establish quotas for the harvest of grizzly bears. The annual harvest probably should not exceed 5 percent of the total population or approximately one bear per 700 $km^2$ of bear range in northern Yukon.

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# APPENDICES

Appendix A. Data from <u>female</u> grizzly bears captured in the Arctic mountains of northern Yukon Territory, 1972-74.

| DATE OF CAPTURE | CAPTURE LOCATION Long. (west) | | CAPTURE LOCATION Lat. (north) | | PLASTIC TAGS Left ear | PLASTIC TAGS Right ear | ROPES (color) Left | ROPES (color) Right | FLAGS (color) Left | FLAGS (color) Right | YEAR OF BIRTH | BODY WEIGHT (kg) | HEART GIRTH (cm) | ZYGO BREADTH (cm) | CANINE LENGTH (cm) | CANINE WIDTH (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26/05/72 | 136° | 15' | 68° | 06' | R77A | P103A | G | W | LB | O | - | 70 | - | 17.1 | - | - |
| 26/05/72 | 136° | 55' | 68° | 32' | G48A | P105A | Y | Y | O | L | - | 93 | - | 19.2 | - | - |
| 01/06/72 | 139° | 22' | 69° | 16' | B25A | G49A | W | G | B | Y | - | 78 | - | 17.6 | - | - |
| 01/06/72 | 139° | 24' | 68° | 41' | Y71A | Y72A | G | G | LB | Y | - | 95 | - | 19.9 | - | - |
| 25/05/73 | 138° | 47' | 68° | 44' | G42A | Y52A | Y | Y | W | R | 1969 | 64 | 84.0 | 17.1 | 2.78 | 1.55 |
| 12/05/74 | 138° | 46' | 68° | 49' | G42A | Y52A | Y | Y | W | R | 1969 | 68 | 90.0 | 17.6 | 2.79 | 1.58 |
| 25/05/73 | 138° | 47' | 68° | 44' | W134A | B19A | G | W | W | W | 1963 | 68 | 93.0 | 19.0 | 2.91 | 1.67 |
| 26/05/73 | 138° | 53' | 68° | 54' | Y67A | R99A | Y | W | G | R | 1966 | 79 | 95.0 | 17.6 | 2.73 | 1.49 |
| 27/05/74 | 138° | 53' | 68° | 57' | Y67A | R99A | Y | W | G | R | 1966 | 90 | 99.0 | 17.8 | 2.70 | 1.55 |
| 28/05/73 | 137° | 30' | 68° | 40' | Y51A | P109A | G | W | O | LB | 1964 | 75 | 95.0 | 19.2 | 2.73 | 1.56 |
| 28/05/73 | 137° | 30' | 68° | 40' | W133A | - | - | - | - | - | 1972 | 18 | 56.0 | 12.4 | 0.95 | 0.77 |
| 28/05/73 | 137° | 23' | 68° | 37' | B3A | P111A | G | Y | G | P | 1960 | 93 | 100.0 | 19.2 | 3.11 | 1.72 |
| 28/05/73 | 137° | 23' | 68° | 37' | R82A | Y53A | W | Y | L | W | 1970 | 41 | 73.0 | 14.6 | 2.12 | 1.20 |
| 30/05/73 | 138° | 30' | 68° | 26' | G47A | B136A | G | Y | R | G | 1966 | 84 | 97.0 | 18.9 | 2.88 | 1.61 |
| 17/07/73 | 138° | 44' | 68° | 29' | G47A | - | G | Y | R | G | 1966 | 104 | 105.0 | 19.3 | 2.85 | 1.60 |

Appendix A. Continued.

| DATE OF CAPTURE | CAPTURE LOCATION Long. (west) | | Lat. (north) | | PLASTIC TAGS Left ear | Right ear | ROPES Left | Right | FLAGS Left | Right | YEAR OF BIRTH | BODY WEIGHT (kg) | HEART GIRTH (cm) | ZYGO BREADTH (cm) | CANINE LENGTH (cm) | CANINE WIDTH (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31/05/73 | 138° | 12' | 68° | 24' | W140W | R84A | W | G | R | LB | 1967 | 73 | 97.0 | 17.5 | 2.91 | 1.69 |
| 13/09/73 | - | | - | | - | R84A | W | G | R | LB | 1967 | 124 | 111.0 | 17.7 | 2.82 | 1.57 |
| 22/07/74 | 138° | 16' | 68° | 22' | - | R84A | W | G | R | LB | 1967 | 104 | 106.0 | 18.9 | 2.85 | 1.61 |
| 31/05/73 | 138° | 00' | 68° | 29' | P115A | G28A | Y | W | R | P | 1961 | 88 | 96.0 | 20.0 | 2.83 | 1.65 |
| 01/06/73 | 138° | 12' | 68° | 26' | P112A | W138A | W | G | L | P | 1959 | 111 | 119.0 | 19.4 | 3.03 | 1.70 |
| 15/07/73 | 138° | 45' | 68° | 33' | R93A | W149A | Y | G | G | B | 1970 | 81 | 100.0 | 17.3 | 3.05 | 1.59 |
| 15/07/73 | 139° | 23' | 69° | 48' | R94A | P122A | G | W | LB | G | 1960 | 136 | 114.0 | 21.3 | 3.28 | 1.76 |
| 15/07/73 | 138° | 27' | 68° | 26' | B6A | B7A | G | W | Y | R | 1958 | 111 | 111.0 | 21.8 | 3.19 | 1.83 |
| 15/09/73 | - | | - | | B6A | B7A | G | W | Y | R | 1958 | 146 | 131.0 | 22.0 | 3.16 | 1.76 |
| 14/05/74 | 138° | 18' | 68° | 33' | B6A | B7A | G | W | Y | R | 1958 | 98 | 102.0 | 21.7 | 3.13 | 1.82 |
| 19/08/73 | 138° | 33' | 68° | 29' | R95A | Y65A | G | Y | W | Y | 1960 | 143 | 127.0 | 20.9 | 2.63 | 1.63 |
| 15/09/73 | 138° | 35' | 68° | 31' | R95A | Y65A | G | Y | W | Y | 1960 | 147 | 124.0 | 21.0 | 2.64 | 1.66 |
| 03/05/74 | 138° | 38' | 68° | 35' | R95A | Y65A | G | Y | W | Y | 1960 | 100 | 93.0 | 21.0 | 2.65 | 1.67 |
| 19/08/73 | 138° | 33' | 68° | 29' | - | W141A | - | - | - | - | 1972 | 57 | 89.0 | 14.5 | 2.04 | 1.14 |
| 20/08/73 | 139° | 04' | 68° | 49' | Y62A | Y63A | W | G | L | G | 1969 | 88 | 97.0 | 17.3 | 2.66 | 1.51 |
| 20/08/73 | 139° | 25' | 68° | 26' | W148A | Y61A | Y | W | Y | P | 1964 | 143 | 112.0 | 21.0 | 3.00 | 1.53 |

Appendix A. (Continued).

| DATE OF CAPTURE | CAPTURE LOCATION Long. (west) | | CAPTURE LOCATION Lat. (north) | | PLASTIC TAGS Left ear | PLASTIC TAGS Right ear | ROPES Left | ROPES Right | FLAGS Left | FLAGS Right | YEAR OF BIRTH | BODY WEIGHT (kg) | HEART GIRTH (cm) | ZYGO BREADTH (cm) | CANINE LENGTH (cm) | CANINE WIDTH (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21/08/73 | 138° | 21' | 68° | 39' | B15A | R92A | Y | G | R | O | 1961 | 143 | 123.0 | 20.1 | 3.09 | 1.67 |
| 12/09/73 | 138° | 19' | 68° | 22' | G26A | P124A | Y | W | P | O | 1952 | 135 | 111.0 | 20.0 | 2.71 | 1.71 |
| 12/09/73 | 138° | 19' | 68° | 22' | Y64A | – | – | – | – | – | 1973 | 36 | 76.0 | 12.4 | – | – |
| 13/09/73 | 138° | 32' | 68° | 26' | R114A | P123A | W | Y | G | G | 1956 | 169 | 135.0 | 20.0 | 2.61 | 1.78 |
| 14/09/73 | 139° | 43' | 68° | 38' | G34A | Y49 | Y | G | P | B | 1962 | 169 | 126.5 | 21.6 | 2.96 | 1.64 |
| 11/09/74 | 139° | 37' | 68° | 38' | – | Y49 | BW | BW | G | W | 1962 | 136 | 112.0 | 20.2 | 3.09 | 1.77 |
| 18/09/73 | 138° | 53' | 68° | 34' | G30A | G31A | Y | Y | G | O | 1964 | 174 | 121.0 | 19.8 | 2.88 | 1.67 |
| 14/05/74 | 139° | 05' | 68° | 37' | G30A | G31A | Y | Y | G | O | 1964 | 104 | 100.0 | 20.1 | 2.91 | 1.64 |
| 18/09/73 | 138° | 32' | 68° | 36' | P119A | B14A | W | W | R | L | 1955 | 186 | 124.0 | 21.2 | 3.19 | 1.70 |
| 18/09/73 | 138° | 34' | 69° | 02' | Y59A | G33A | G | G | R | R | 1953 | 181 | 140.0 | 21.7 | 2.94 | 1.79 |
| 22/09/73 | 138° | 46' | 68° | 49' | R87A | G27A | W | W | B | R | 1966 | 124 | 122.0 | 18.7 | 2.70 | 1.41 |
| 19/05/74 | 138° | 45' | 68° | 53' | R87A | G27A | W | W | B | R | 1966 | 77 | 92.0 | 18.6 | 2.71 | 1.43 |
| 03/05/74 | 138° | 53' | 68° | 27' | Y320 | Y310–319 | BW | BW | W | O | 1967 | 100 | 102.0 | 19.3 | 3.16 | 1.76 |
| 04/05/74 | 138° | 07' | 68° | 42' | P372 | P371 | BW | BW | L | L | 1965 | 77 | 94.0 | 19.1 | 2.78 | 1.55 |
| 04/05/74 | 138° | 07' | 68° | 42' | Y301 | – | – | – | – | – | 1972 | 43 | 87.0 | 14.7 | 2.74 | 1.49 |

Appendix A. (Continued).

| DATE OF CAPTURE | CAPTURE LOCATION Long. (west) | | CAPTURE LOCATION Lat. (north) | | PLASTIC TAGS Left ear | PLASTIC TAGS Right ear | ROPES Left | ROPES Right | FLAGS Left | FLAGS Right | YEAR OF BIRTH | BODY WEIGHT (kg) | HEART GIRTH (cm) | ZYGO BREADTH (cm) | CANINE LENGTH (cm) | CANINE WIDTH (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 04/05/74 | 138° | 07' | 68° | 42' | Y320 | – | – | – | – | – | 1972 | 23 | 62.0 | 13.0 | 2.16 | 1.18 |
| 17/05/74 | 138° | 45' | 68° | 48' | P433 | P429 | BW | BW | L | Y | 1962 | 104 | 104.0 | 19.5 | 2.94 | 1.62 |
| 17/05/74 | 138° | 45' | 68° | 48' | Y314 | – | – | – | – | – | 1972 | 45 | 84.0 | 15.2 | 2.63 | 1.88 |
| 27/05/74 | 138° | 46' | 68° | 43' | Y479 | Y480 | BW | BW | B | B | 1967 | 91 | 93.0 | 18.6 | 3.22 | 1.66 |
| 30/05/74 | 138° | 16' | 68° | 51' | P373 | Y326 | BW | BW | P | P | 1959 | 84 | 91.0 | 20.0 | 3.19 | 1.72 |
| 23/08/74 | 138° | 25' | 68° | 23' | Y389 | Y388 | BW | BW | P | L | 1971 | 73 | 92.0 | 15.5 | 2.82 | 1.57 |
| 23/08/74 | 138° | 50' | 68° | 59' | P324 | P428 | BW | BW | Y | L | 1972 | 66 | 86.0 | 15.4 | 2.91 | 1.63 |
| 01/09/74 | 139° | 18' | 68° | 42' | P333 | Y327 | BW | BW | LB | W | 1962 | 129 | 103.0 | 20.1 | 3.42 | 1.89 |
| 05/09/74 | 138° | 43' | 68° | 54' | P348 | P349 | BW | BW | G | LB | 1969 | 93 | 99.0 | 17.6 | 2.96 | 1.33 |
| 08/09/74 | 136° | 16' | 67° | 23' | P134 | P135 | Y | Y | O | G | 1962 | 118 | 102.0 | 19.9 | 3.24 | 1.69 |
| 08/09/74 | 136° | 29' | 67° | 26' | P312 | P313 | Y | Y | O | R | 1963 | 102 | 99.0 | 18.8 | 3.12 | 1.72 |
| 19/09/74 | 138° | 05' | 68° | 39' | P359 | P360 | BW | BW | O | W | 1972 | 68 | 105.0 | 15.5 | 2.77 | 1.33 |
| 20/09/74 | 138° | 13' | 68° | 47' | Y335 | Y331 | – | – | – | – | 1967 | 111 | 108.0 | 18.5 | 3.04 | 1.62 |

Appendix B. Data from male grizzly bears captured in the Arctic mountains of northern Yukon Territory, 1972-74.

| DATE OF CAPTURE | CAPTURE LOCATION Long. (west) | CAPTURE LOCATION Lat. (north) | PLASTIC TAGS Left ear | PLASTIC TAGS Right ear | ROPES (color) Left | ROPES (color) Right | FLAGS (color) Left | FLAGS (color) Right | YEAR OF BIRTH | BODY WEIGHT (kg) | HEART GIRTH (cm) | ZYGO BREADTH (cm) | CANINE LENGTH (cm) | CANINE WIDTH (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26/05/72 | 137° 37' | 68° 05' | G50A | Y75A | G | Y | B | O | 1955 | 210 | - | 25.3 | - | - |
| 15/09/73 | 138° 09' | 68° 22' | - | Y75A | - | - | - | - | 1955 | 252 | - | 25.4 | - | 2.79 |
| 27/05/72 | 138° 34' | 68° 50' | P101A | W126A | Y | W | LB | Y | 1956 | 185 | - | 23.1 | - | - |
| 30/05/72 | 138° 46' | 68° 49' | R78A | Y78A | Y | W | L | L | 1967 | 80 | - | 18.5 | - | - |
| 30/05/73 | 138° 30' | 68° 26' | R78A | Y73A | Y | W | L | L | 1967 | 82 | 99.0 | 19.2 | 3.21 | 1.87 |
| 20/09/73 | 138° 21' | 68° 27' | R78A | - | Y | W | L | L | 1967 | 147 | 121.0 | 20.0 | 3.32 | 1.90 |
| 30/05/72 | 139° 02' | 68° 59' | P102A | R76A | G | W | Y | LB | 1960 | 183 | - | - | - | - |
| 20/09/73 | 138° 04' | 68° 35' | - | R76A | G | W | Y | LB | 1960 | 210 | 135.0 | 23.0 | 3.99 | 2.18 |
| 27/05/74 | 139° 03' | 68° 49' | - | R76A | G | W | Y | G | 1960 | 177 | 120.0 | 22.6 | 4.09 | 2.11 |
| 30/05/72 | 139° 30' | 68° 58' | Y74A | W127A | W | Y | O | B | - | 121 | - | 21.6 | - | - |
| 31/05/72 | 140° 57' | 68° 40' | P104A | B24A | W | W | L | B | - | 151 | - | 23.0 | - | - |
| 01/06/72 | 139° 24' | 68° 41' | W129A | G46A | G | W | L | LB | 1959 | 105 | - | 21.4 | - | - |
| 21/07/74 | 139° 12' | 68° 41' | W129A | Y345 | G | W | L | LB | 1959 | 152 | 122.0 | 22.1 | 3.72 | 2.23 |
| 01/09/74 | 139° 22' | 68° 43' | - | Y345 | G | W | L | LB | 1959 | 150 | 120.0 | 22.0 | 3.82 | 2.25 |
| 03/06/72 | 140° 41' | 68° 47' | B21A | W130A | Y | Y | O | LB | - | 250 | - | 24.0 | - | - |
| 25/07/72 | 137° 13' | 68° 11' | Y70A | P108A | Y | Y | Y | Y | - | 219 | - | 24.2 | - | - |
| 25/07/72 | 137° 35' | 68° 24' | R96A | R98A | Y | Y | B | L | - | 60 | - | 15.2 | - | - |

Appendix B. (Continued).

| DATE OF CAPTURE | CAPTURE LOCATION Long. (west) | CAPTURE LOCATION Lat. (north) | PLASTIC TAGS Left ear | PLASTIC TAGS Right ear | ROPES Left | ROPES Right | FLAGS Left | FLAGS Right | YEAR OF BIRTH | BODY WEIGHT (kg) | HEART GIRTH (cm) | ZYGO BREADTH (cm) | CANINE LENGTH (cm) | CANINE WIDTH (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27/05/72 | 138° 34' | 68° 50' | P101A | W126A | Y | W | LB | Y | 1956 | 185 | - | 23.1 | - | - |
| 25/07/72 | 137° 34' | 68° 24' | W128A | P106A | Y | G | Y | B | - | 119 | - | 18.9 | - | - |
| 25/07/72 | 137° 33' | 68° 24' | G45A | R97A | W | W | Y | O | - | 205 | - | 21.8 | - | - |
| 25/07/72 | 137° 33' | 68° 22' | W131A | R100A | W | Y | LB | Y | - | 210 | - | 24.2 | - | - |
| 26/07/72 | 138° 48' | 68° 31' | Y69A | B23A | Y | G | B | O | 1955 | 210 | - | 25.3 | - | - |
| 26/07/72 | 139° 37' | 68° 47' | B2A | R80A | G | G | O | L | - | 135 | - | 19.3 | - | - |
| 26/07/72 | 138° 52' | 68° 55' | R81A | G44A | W | Y | Y | LB | 1966 | 89 | - | 17.8 | - | - |
| 27/07/72 | 139° 42' | 69° 15' | G43A | W132A | W | G | LB | LB | 1949 | 157 | - | 22.8 | - | - |
| 25/05/73 | 138° 47' | 68° 44' | Y56A | W139A | G | W | R | W | 1962 | 136 | - | 22.5 | 3.48 | 2.07 |
| 14/09/73 | 138° 33' | 68° 44' | Y56A | W139A | G | W | R | W | 1962 | 219 | 132.0 | 23.0 | 3.41 | 2.02 |
| 12/05/74 | 138° 53' | 68° 45' | Y56A | W139A | G | W | R | W | 1962 | 159 | 116.0 | 22.7 | 3.53 | 2.13 |
| 26/05/73 | 138° 57' | 68° 51' | W137A | Y55A | W | Y | G | L | 1961 | 127 | 121.0 | 21.5 | 3.38 | 2.00 |
| 28/05/73 | 138° 36' | 68° 56' | B4A | P110A | Y | G | P | W | 1958 | 129 | 116.0 | 21.7 | 3.39 | 1.95 |
| 28/05/73 | 138° 51' | 68° 36' | W135A | - | Y | W | LB | Y | 1956 | 227 | - | 24.1 | 3.84 | 2.61 |
| 30/05/73 | 137° 50' | 68° 29' | P107A | B22A | G | G | P | R | 1954 | 195 | 126.0 | 24.9 | 3.52 | 1.99 |
| 30/05/73 | 139° 26' | 68° 35' | Y54A | G41A | W | W | P | G | 1955 | 161 | 117.0 | 23.2 | 3.56 | 2.23 |
| 31/05/73 | 138° 4' | 68° 31' | B5A | R85A | Y | W | W | G | 1962 | 172 | 125.0 | 22.0 | 3.99 | 2.32 |
| 19/05/74 | 138° 45' | 68° 41' | B5A | - | Y | W | W | G | 1962 | 177 | 131.0 | 22.0 | 3.99 | 2.38 |
| 19/09/74 | 138° 45' | 68° 29' | B5A | - | Y | W | W | G | 1962 | 227 | 140.0 | 21.9 | 4.15 | 2.44 |

Appendix B. (Continued).

| DATE OF CAPTURE | CAPTURE LOCATION Long. (west) | | CAPTURE LOCATION Lat. (north) | | PLASTIC TAGS Left ear | PLASTIC TAGS Right ear | ROPES Left | ROPES Right | FLAGS Left | FLAGS Right | YEAR OF BIRTH | BODY WEIGHT (kg) | HEART GIRTH (cm) | ZYGO BREADTH (cm) | CANINE LENGTH (cm) | CANINE WIDTH (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01/06/73 | 138° | 12' | 68° | 26' | R86A | P113A | Y | G | P | W | 1960 | 172 | 127.0 | 22.4 | 4.18 | 2.27 |
| 01/06/73 | 138° | 51' | 68° | 36' | R88A | Y58A | W | Y | W | B | 1967 | 132 | 113.0 | 20.0 | 3.10 | 2.05 |
| 18/09/73 | 139° | 09' | 68° | 42' | R88A | Y58A | W | Y | W | B | 1967 | 192 | 135.0 | 20.8 | 3.13 | 2.02 |
| 05/05/74 | 138° | 18' | 68° | 22' | R88A | Y52A | W | Y | W | B | 1967 | 159 | – | 20.6 | 3.13 | 1.93 |
| 14/07/73 | 138° | 34' | 68° | 24' | W147A | W146A | Y | G | B | G | 1966 | 163 | 120.0 | 22.8 | 3.54 | 2.19 |
| 15/07/73 | 139° | 18' | 69° | 48' | R89A | B9A | W | W | G | Y | 1955 | 159 | 122.0 | 23.0 | 3.80 | 2.24 |
| 22/07/74 | 139° | 33' | 68° | 38' | R89A | B9A | W | W | G | Y | 1955 | 154 | 128.0 | 22.8 | 3.83 | 2.34 |
| 15/07/73 | 139° | 17' | 69° | 50' | G29A | B8A | W | Y | B | LB | 1969 | 104 | 112.0 | 18.3 | 3.29 | 1.84 |
| 20/08/73 | – | | – | | G29A | B8A | W | Y | B | LB | 1969 | 120 | – | – | – | – |
| 20/08/73 | 138° | 12' | 68° | 25' | P120A | P121A | W | Y | W | P | 1964 | 193 | 140.0 | 20.7 | 3.53 | 1.92 |
| 25/06/74 | 138° | 11' | 68° | 26' | P120A | P121A | W | Y | W | P | 1964 | 129 | 104.0 | 20.6 | 3.60 | 2.06 |
| 21/08/73 | 139° | 28' | 68° | 50' | G43A | W132A | W | G | LB | LB | 1949 | 147 | 117.0 | 22.9 | 3.29 | 2.03 |
| 18/09/73 | 138° | 42' | 68° | 24' | R91A | Y60A | G | Y | LB | R | 1960 | 196 | 132.0 | 22.1 | 4.16 | 2.17 |
| 06/05/74 | 138° | 40' | 68° | 28' | R91A | Y60A | G | Y | LB | R | 1960 | 129 | 109.0 | 21.8 | 4.28 | 2.18 |
| 19/09/73 | 138° | 32' | 68° | 55' | P116A | R90A | G | W | B | W | 1971 | 101 | 103.5 | 16.6 | 3.42 | 1.67 |
| 20/09/73 | 139° | 06' | 68° | 42' | B10A | G32A | W | W | W | L | 1966 | 181 | 127.0 | 20.5 | 3.55 | 1.94 |
| 23/09/73 | 138° | 50' | 68° | 36' | G35A | P125A | G | W | L | O | 1957 | 255 | 142.0 | 24.1 | 4.44 | 2.42 |
| 27/05/74 | 139° | 43' | 68° | 38' | G35A | P125A | G | W | L | O | 1957 | 181 | 130.0 | 23.9 | 4.41 | 2.38 |

Appendix B. (Continued).

| DATE OF CAPTURE | CAPTURE LOCATION Long. (west) | | CAPTURE LOCATION Lat. (north) | | PLASTIC TAGS Left ear | PLASTIC TAGS Right ear | ROPES Left | ROPES Right | FLAGS Left | FLAGS Right | YEAR OF BIRTH | BODY WEIGHT (kg) | HEART GIRTH (cm) | ZYGO BREADTH (cm) | CANINE LENGTH (cm) | CANINE WIDTH (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01/06/73 | 138° | 12' | 68° | 26' | R86A | P113A | Y | G | P | W | 1960 | 172 | 127.0 | 22.4 | 4.18 | 2.27 |
| 26/09/73 | 139° | 21' | 68° | 50' | G142A | B17A | G | G | O | Y | 1958 | 177 | 122.0 | 23.1 | 3.82 | 2.45 |
| 27/09/73 | 138° | 32' | 68° | 56' | – | – | – | – | – | – | 1964 | 272 | 156.0 | 24.3 | 3.69 | 2.11 |
| 07/05/74 | 138° | 17' | 68° | 51' | P351 | P352 | BW | BW | O | O | 1963 | 220 | 146.5 | 24.2 | 3.62 | 2.18 |
| 11/05/74 | 138° | 24' | 68° | 26' | Y304 | Y308 | Y | – | P | – | 1961 | 204 | 142.5 | 23.9 | 3.95 | 2.59 |
| 14/05/74 | 138° | 18' | 68° | 33' | Y311 | – | – | – | – | – | 1972 | 34 | 67.1 | 14.3 | 2.47 | 1.32 |
| 14/04/74 | 138° | 18' | 68° | 33' | Y312 | – | – | – | – | – | 1972 | 43 | 77.2 | 15.5 | 2.40 | 1.28 |
| 02/09.74 | 138° | 17' | 68° | 27' | Y312 | P483 | BW | BW | Y | W | 1972 | 70 | 92.0 | 15.2 | 2.98 | 1.51 |
| 26/05/74 | 138° | 55' | 68° | 45' | Y324 | Y318 | W | Y | Y | LB | 1966 | 102 | 100.0 | 19.6 | 3.36 | 1.90 |
| 27/05/74 | 138° | 44' | 68° | 44' | Y316 | Y317 | Y | G | B | O | 1955 | 175 | 140.0 | 25.1 | 3.24 | 2.27 |
| 27/05/74 | 138° | 44' | 68° | 41' | Y330 | Y331 | BW | BW | L | R | 1967 | 132 | 110.0 | 20.6 | 3.49 | 1.83 |
| 22/07/74 | 139° | 16' | 68° | 39' | P344 | Y340 | BW | BW | R | Y | 1967 | 172 | 121.0 | 20.8 | 3.69 | 2.37 |
| 01/09/74 | 138° | 40' | 68° | 25' | P388 | P389 | BW | BW | R | B | 1971 | 127 | 117.0 | 18.6 | 3.58 | 2.07 |
| 01/09/74 | 139° | 18' | 68° | 42' | Y328 | Y330 | – | – | – | – | 1972 | 70 | 85.0 | 15.5 | 3.01 | 1.50 |
| 02/09/74 | 138° | 07' | 68° | 26' | Y295 | Y296 | W | BW | B | P | 1962 | 215 | 140.0 | 24.2 | 3.95 | 1.91 |
| 05/09/74 | 138° | 40' | 68° | 50' | P477 | P478 | BW | BW | LB | L | 1969 | 125 | 115.0 | 18.4 | 3.57 | 1.71 |
| 20/09/74 | 137° | 47' | 68° | 49' | P426 | P427 | BW | BW | LB | B | 1969 | 145 | 124.0 | 19.1 | 3.34 | 1.84 |

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Nagy, J. A.

Ecological studies of grizzly bears in the arctic mountains, northern Yukon Territory, 1972 to 1975.