GRIZZLY BEAR POPULATION ESTIMATE AND CHARACTERISTICS IN THE RICHARDSON MOUNTAINS NORTHWEST TERRITORIES, 1992-93

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Abstract: A population estimate of 184 (95% CI, 129-289) grizzly bears (≥2 yrs old) was determined for the study area using a modified Lincoln-Petersen estimate. Reducing the number of marks available in the study area by 5% to compensate for lack of population closure results in a population estimate of 175 (95% CI, 122-275) bears (≥2 yrs old). Bear densities were 23.0 bears/1000 km^2 (95% CI, 16.1-36.1) for the standard Lincoln-Petersen estimate and 21.8 bears/1000 km^2 (95% CI, 15.3-34.4) for the adjusted population estimate. During the 2 year research period 140 bears (83 females, 57 males) (all ages) were captured and marked. The sex ratio of the population for all ages was 59% females and 41% males. A minimum population estimate of 96 bears (62 females, 34 males) (≥2 yrs old) was calculated for the study area by only including captured bears. Bears were found throughout the study area, however, their distribution was clumped. One yearling died during the capture efforts in 1993. No marked bears were taken by hunters or killed in problem bear situations.

The Richardson Mountains and the surrounding foothills have always been a hunting area for the people of Aklavik. The number of grizzly bears harvested on the Yukon North Slope and Richardson Mountains was low prior to the mid-1970's (Nagy et al. 1983a). Grizzly bears were not a favoured food species and their was little demand for their hides. Since the mid-1970's the demand and price for grizzly bear hides has increased. From 1987 to 1991 the Aklavik harvest averaged 9.5 bears/year (Graf et al. 1992, unpubl. Ren. Res. GNWT report). The high annual harvest was of concern to Aklavik residents and wildlife management agencies. During the fall of 1991 and spring of 1992 there were 27 bears harvested from the Aklavik area (Renewable Resources Files, GNWT, Inuvik). Most of the bears (23) were taken in the spring of 1992. The high harvest in 1991-92 became a major management issue and both the Aklavik Hunters' and Trappers' Committee (HTC) and Aklavik Renewable Resources Council (RRC) passed bylaws to prohibit grizzly bear hunting for 2 years. To ensure implementation of sustainable quotas and long-term survival of the grizzly bear population the Aklavik HTC Wildlife Management Advisory Committee (Northwest Territories) (WMAC (NWT)) and Wildlife Management Advisory Committee (North Slope) (WMAC (NS))approved a population estimate for the Richardson Mountains and surrounding area.

Past research on grizzly bears in the Inuvialuit Settlement Region has focused on their ecology, population distribution, densities, habitat, and impacts of development (Slaney 1974, 1975; Harding 1976; Harding and Nagy 1977; Nagy et al. 1983a, 1983b;

Mychasiw and Moore 1984; Johnston et al. 1985; Clarkson et al. 1988, unpubl. Ren. Res. GNWT report; Clarkson and Liepins 1993, unpubl. Ren. Res. GNWT report). Northern grizzly bear populations cannot sustain high mortality rates because of their low densities and low reproductive rate (MacPherson 1965, Stirling et al. 1976, Bunnell and Tait 1980, Nagy et al. 1983b). The population estimate research will provide the Aklavik people and management boards with information to help set a sustainable quota for their area.

Conducting a grizzly bear population estimate has required the assistance and cooperation of many people. We are grateful to everyone who contributed to the project. Members of the Wildlife Management Advisory Committees (WMAC (NWT) (NS)), Inuvialuit Game Council (IGC), Aklavik HTC, and the Aklavik RRC have contributed to the research with their interest, cooperation, and information. During field work the assistance received from local residents was invaluable. R. Joe, J. Arey, D. Edwards, D. Arey and J.J. Arey are thanked for their assistance during the bear capture programs. Thanks to the following aircraft companies and their staff: Aklak Air, Northern Air Link, Williams Aero Service and Sunrise Helicopters. Polar Continental Shelf Project in Ottawa and Tuktoyaktuk Base are thanked for their assistance during in fuel caching in 1993. L. Graf made helpful comments on earlier drafts.

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STUDY AREA

The study area (8,000 km^2) is centred around the Richardson Mountains and falls within the Inuvialuit Settlement Region (The Western Arctic Claim, The Inuvialuit Final Agreement, 1984) and Gwich'in Settlement Area (Gwich'in Comprehensive Land Claim Agreement, 1992) (Fig. 1). The area is bound on the south by the Rat River, the north by the Beaufort coastline, the west by the Bell River and Purkis Creek, and the east by the Mackenzie Delta. Classified as a polar continental climatic region, the area has long periods of extreme cold in winter, short cool summers, and light precipitation (Atmospheric Environment Service, 1982).

METHODS

Population Estimate

To derive a mark-recapture population estimate, the study area was searched during the 2nd and 3rd weeks in June and an attempt made to capture all unmarked bears. Bears were captured in 1992 to provide a sample of marked bears for the 1993 capture program (Stirling et al. 1975, Clarkson and Liepins 1993). A fixed-wing aircraft (Supercub or Bellanca Scout) (approximately 100 hrs/yr) and Bell 206b helicopter (approximately 90 hrs/yr) were used for search and capture work. The study area was searched achieving total coverage in both years. In 1992 the study area was subdivided into 18 quadrats based on identifiable topographical features. The same quadrats were searched in 1993, plus 6

additional quadrats along the southern and western boundary of the study area. The 6 additional quadrats were searched in 1993 to assess if marked bears had left the study area and moved to nearby areas.

Bears were immobilized from a helicopter with disposable darts (Pneu-Dart, Williamsport, Pennsylvania, USA). Telazol (Ayerst Lab, Montreal, Quebec) was used at a concentration of 166 mg/ml to immobilize all bears except cubs-of-the-year (COYs). COYs were captured on the ground with dip nets and hand injected with 0.5 cc of Telazol at a concentration of 88 mg/ml.

Captured bears were weighed, measured and marked using standard procedures (Reynolds 1974, Nagy et al. 1983b). A premolar was removed from bears >1 year old for cementum analysis (Stoneberg and Jonkel 1966, Pearson 1975). Twenty ml's of whole blood were collected and the serum separated for disease analysis (Clarkson and Liepins 1989b). Bears were marked with white numbered ear-tags (1.6 cm) (Western Industrial Research Centre, Edmonton, Alberta), coloured and numbered ear-flags (7.5 cm) (Allflex, Kane Veterinary Supplies, Edmonton, Alberta), and lip tattoos. The coloured and numbered ear-tags allowed identification of individual bears from the helicopter without recapturing them.

A sample of 15 females bears were radio-collared in 1993 to determine their cub production and survival rates. Radio-collared bears will be monitored 2 to 3 times during their active period from May to October. The location, habitat, and activity of the bears is recorded for each telemetry location.

Mark-recapture data obtained during June 1992 and 1993 is used to derive population estimates in June 1993 for bears ≥2 years old. Population estimates were calculated using a modified Lincoln-Petersen equation, with a 95% Confidence Interval (CI) (Begon 1979, Krebs 1989, Pollock et al. 1990).

Because the study area was not closed and marked bears may have left the area or died between capture programs, an adjusted mark-recapture estimate was calculated by reducing the number of marked bears available for recapture by 5%. Reducing the marks by 5% is an approximation to compensate for the potential loss of marks in the study area and is based on: (1) the high harvest (n = 23) of adult and subadult male bears in April and May 1992, (2) the low number of adult males and subadults in the 1992 capture sample, and (3) the potential mortality or movement of marked bears out of the study area before the 1993 capture program. With the low number of males and higher number of adult females in the study area, we thought there would be minimal emigration between the 1992 and 1993 capture programs.

Minimum Population Estimate and Standing Sex and Age Composition

A minimum population estimate and sex and age composition was determined by including all bears that were captured in the study area (Miller and Ballard 1982, Pearson 1975). Bear ages were backdated to 1992. The minimum population estimate assumes that bears captured in 1993 were present in 1992. No adjustments are made for births or deaths in the population. COYs in 1993 were not

included. Age composition by age class (COY's, yearlings, 2 yr olds, subadults (3 and 4 yr olds), and adults (5+ yr olds)) is summarized from the standing sex and age distribution. Bears were considered adults at 5 years old as females were in breeding conditon at this age. For comparision with the mark-recapture population estimate a minimum population estimate is also presented for bears $\geq$2 yrs old.

Population Density and Distribution

Population densities were calculated by dividing the study area by the mark-recapture population estimates for the area. Data is presented in bears/1000 km^2 for comparison with other northern grizzly bear population densities.

The distribution of marked bears throughout the study area was determined by analyzing the initial capture locations of bears ($\geq$2 yrs old) captured in 1992 and 1993. Bear distribution in the study area was analyzed to determine if it was random, clumped, or uniform (Ludwig and Reynolds 1988, pg. 24). A grid system was laid on the study area and bear locations/quadrat were determined and analyzed. Each quadrat was approximately 100 km^2. Only quadrats that were $\geq$50% within the study area were included in the analysis.

Mortality

The location, sex, age, and any marks (ear-tags, ear-flags, or tattoos) of bears harvested in or near the study area during 1992-93 were recorded. When possible, the lower jaw, or skull was

purchased from the hunter and a premolar removed for cementum analysis.

RESULTS

Population Estimate

Two Lincoln-Petersen mark-recapture population estimates were calculated for bears within the study area. An estimate of 184 (95% CI, 129-289) grizzly bears (≥2 yrs old) was determined by including all marked bears (Table 1). A 2nd adjusted estimate of 175 (95% CI, 122-275) bears (≥2 yrs old) was calculated by reducing the marked bear sample by 5% to compensate for mortalities and possible emigration of marked bears because the study area was not closed (Table 2).

Minimum Population Estimate and Standing Sex and Age Composition

A minimum population estimate of 96 bears (62 females, 34 males) (≥2 yrs old) was derived by including bears captured in 1992 and 1993 (Table 4). During the research period there were 140 bears (83 females, 57 males) (all ages) captured and marked. COY's and yearlings were not included in the mark-recapture population estimates or the minimum population estimate because of their high annual mortality rate.

The age class composition of captured bears for both years was 17% COY's, 12% yearlings, 4% 2 year olds, 18% subadults, and 49% adults. The median ages were 11 years for adult females and 13 years for adult males (Table 4).

Population Density and Distribution

Population densities for the Richardson Mountains area were estimated at 23.0 bears/1000 km^2 (95% CI, 16.1-36.1) (all marks) and 21.8 bears/1000 km^2 (95% CI, 15.3-34.4) (marks reduced by 5%) (Table 1 and 2). These densities should be viewed with caution because they are average densities for the entire study area. During capture work bear locations appeared to be concentrated in certain habitats (Fig. 1). Statistical analysis (Negative Binomial Distribution) of grizzly bear capture locations showed that the bears were in a clumped distribution pattern (variance = 2.19, mean = 1.16, k (degree of clumping) = 1.13) (Ludwig and Reynolds 1988, pg. 24).

Mortality

There were no marked bears taken by hunters or killed in problem bear situations during the research period. Two unmarked male bears were killed in problem bear situations (November 1992, June 1993). In April and May 1992, 23 bears (21 males (17 adults, 3 subadults, 1 unknown), 2 females (3 yr olds)) were taken by hunters in April and May 1992. The median age of male bears taken was 8 years (mean age 10 yrs). In 1993 1 yearling bear died during capture. The bear was sent to the Veterinary Pathology Lab at the University of Saskatchewan (Saskatoon, Saskatchewan) for analysis where it was determined that the bear was in poor physical condition.

DISCUSSION

The population estimates and their corresponding densities of 23.0 bears/1000 km^2 (95% CI, 16.1-36.1)(all marks) and 21.8 bears/1000 km^2 (95% CI, 15.3-34.4)(marks reduced by 5%) falls within the range of grizzly bear density estimates for northern areas (Table 3). The wide range of bear densities throughout Alaska, Yukon, and Northwest Territories is a function of different bear habitats, past harvesting pressures, study area size, and population estimate techniques. This makes the comparison or extrapolation of data between areas difficult and further supports the need for area specific research to address management concerns. The population and density estimates were similiar to those determined for the North Yukon (26.7 bears/1000 km^2, Nagy et al. 1983a).

During the research period there were 2 events that affected the population estimate. The 1st was the harvest of 23 bears (21 males, 2 females) in April and May 1992. The harvest was concentrated in the NWT portion of the study area and was mostly adult and subadult males. The harvest reduced the number of males available in the population for the capture in June 1992. In 1992 there were only 8 adult males in the total capture sample of 81 bears. The 2nd event was the number of males that moved into the study area after the 1992 capture program. In 1993 there was no spring bear harvest by hunters from Aklavik. During the 1993 capture program there were 18 unmarked adult males captured and 3 marked adult males were observed (37.5% of marked adult males

available). For comparision in 1992 30 adult females were captured and marked and in 1993 12 unmarked adult females were captured and 14 marked adult females were observed (46.7% of marked adult females available). The above ratios indicate that adult males immigrated into the study area after the 1992 spring hunting and capture program as it is unlikely that such a high percentage of adult males would have been missed during the 1992 capture program. With adult males moving into the study area the proportion of unmarked adult males in the 1993 capture sample increased. The mark-recapture estimate should represent the bear population that was in the study area in 1993 as the marks available for recapture has stayed consistent between capture programs. Many of the male bears captured in 1993 may not have been in the area in 1992, but are included in the population estimate based on their presence during the 1993 capture program.

When determining a population and density estimate for barrenground grizzly bears several problems are encountered. Bear densities are low and logistics of working in remote areas makes research expensive. Study areas are not closed and compensating for lack of closure is difficult. Bear distribution throughout an area is usually clumped because of changes in habitat and available food resources. Adult and subadult males move over large areas which may take them out of the study area after they are marked (Nagy et al. 1983a, Reynolds 1993). The effects of clumped distributions and possible movements in and out of the study area were reduced by searching for bears over a large study area. The

wide range of habitat types made it difficult to select a smaller study area and conduct a more intensive effort as done by Miller et al. (1987) and Ballard et al. (1988, 1990). The level of accuracy gained by a more intensive population estimate may be lost in the extrapolation of the estimate to the overall area. A population estimate for a larger area reduces bear movement related biases, especially when dealing with low density populations (Reynolds 1993).

A Lincoln-Petersen estimate has assumptions that must be satisfied or qualified to ensure that the resulting population estimate is accurate (Stirling et al. 1975, Otis et al. 1978, White et al. 1982, Miller et al. 1987, Pollock et al. 1990):

1. The population is closed.
2. Animals do not lose their marks during the study period and all marks are correctly recorded.
3. Each animal has a constant, equal and independent probability of capture.
4. The ratio of marked to unmarked animals is the same throughout the population during resampling.

Satisfying all of the assumptions is rarely realized in field situations (White et al. 1982, Miller et al. 1987). The 1st assumption that the population is closed was not met. There were no boundaries that would have prevented bear immigration or emigration in our estimate.

The number of marked bears was reduced by 5%/year for an adjusted mark-recapture estimate to compensate for marked bears

that may have left the study area or died between the 1st and 2nd capture programs. The 5% reduction is an approximation based on several factors identified in the Methods. Ensuring that the number of marked bears available for recapture used in the Lincoln-Petersen equation is close to the actual number of marked bears in the study area is difficult when the study area is not closed.

Assumption 2 was adequately met during the mark-recapture research as any bear that did not have an identifiable ear-tag was captured and checked for ear-tags or tattoos before it was marked.

The 3rd assumption is difficult to satisfy (Ballard et al. 1988, Otis et al. 1978). During the mark-recapture work in 1993 most marked bears ran in response to helicopter noise violating the assumption concerning constant and equal probability of capture. In some situations this movement may have made the bears more visible. In other cases bears may have moved beyond the immediate search area.

Independent sightability is violated when considering females with young $\geq$2 years old, subadult siblings that remain together, and paired adults during the breeding season. However, this should be similar for both marked and unmarked animals and therefore reduce the impact of the bias on the population estimate. Sightability throughout the study area was good as most of the area was above treeline and search efforts were conducted before leaves emerged on shrubs. In 1993, 44.4% of the available marked bears ($\geq$2 yrs old) in the study area were resighted.

Assumption 4 was adequately met during the mark-recapture

research as the entire study area was searched each year and all untagged bears were captured and marked. The ratio of marked to unmarked bears should have been the same throughout the study area during the 1993 capture program.

The age composition for the bear population in the study area showed a higher percentage of subadults (12.7) and a lower percentage of adults (53.7) when compared to the Arctic Mountains population in the Northern Yukon (subadults - 6.9%, adults - 65.0%) (Nagy et al. 1983a). The high percentage of subadults and lower percentage of adults is likely caused by immigration of young bears into the area following the high number of adult male bears taken by hunters in recent years.

The minimum population estimate of 96 bears ($\geq$2 yrs old) is within 52.2% (all marks) and 54.9% (adjusted marks) of the 2 population estimates and suggests that a large proportion of the bears in the study area were marked by the end of the 2nd capture program.

Bears were distributed throughout the study area, however their distribution pattern was clumped, indicating that they are concentrating in certain habitats. Habitats with higher bear densities are likely more productive areas for bear food species. In our study area creek and river valleys and associated tributaries had higher bear densities than flat tundra plains. The spacial distribution of bears in an area is an important consideration when calculating bear densities or extrapolating those densities to the entire management area. Had we selected a

smaller study area (1500 to 2500 km^2) within the overall management area we could have easily over or underestimated the bear population in the area. Small study areas may be useful in management areas where bear densities are homogenious. A clumped distribution pattern for bears was also found in the Anderson and Horton rivers area (Clarkson and Liepins 1993).

CONCLUSIONS

1. The mark-recapture estimate of 175 bears (95% CI, 122-275) and associated density of 21.8 bears/1000 km^2 (95% CI, 15.3-34.4) are the most suitable estimates for the study area as they compensate for potential loss of marks between the capture periods.
2. Bear density in the Richardson Mountains area (23.0-21.8 bears/1000 km^2) was close to the density found for grizzly bears in the North Yukon (26.7 bears/1000 km^2) by Nagy et al. (1993).
3. The sex and age structure for bears in the Richardson Mountains area showed a higher percentage of subadults and a lower percentage of adults when compared with other northern grizzly bear populations.
4. Bears are found throughout the study area, however, their distribution in the study area was clumped (variance = 2.19, mean = 1.16, k = 1.13). Considering wthe distribution pattern of bears in an area is important to the overall density estimate and management of bears in the area.

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Table 1. Grizzly bear (>2 yrs. old) population estimate for the Richardson Mountains area, 1992-93.

Date	Unmarked bears	Marked bears obs/cap[c]	Total bears obs/cap	Marks lost[a]	Marks available	L-P[b] Estimate	95% CI lower	95% CI upper	Density bears/1000 km²	Density 95% CI bears/1000 km² lower	Density 95% CI bears/1000 km² upper
June 1992	54	-	54	-	-	-	-	-	-	-	-
June 1993	59	24	83	-	54	184	129	289	23.0	16.1	36.1

[a] radio-collared bears that have died or left the study area.
[b] Lincoln-Petersen estimate.
[c] observed/captured

Table 2. Adjusted grizzly bear (>2 yrs. old) population estimate for the Richardson Mountains area 1992-93.

Date	Unmarked bears	Marked bears obs/cap	Total bears ob/cap	Marks lost 5%	Marks avail.	Adjustedb marked bears	L-P Estimate	95%CI lower	95%CI upper	Density bears/1000 km2	Density 95% CI bears/1000 km2 lower	Density 95% CI bears/1000 km2 upper
June 1992	54	-	54	-	-	-	-	-	-	-	-	-
June 1993	59	24	83	3	51	51	175	122	275	21.8	15.3	34.4

a radio-collared bears that have died or left the study area.

b the number of marked bears that were reduced by 10% to compensate for possible death and emigration because the study area is not closed.

c Lincoln-Petersen estimate.

Table 3. Standing sex and age distribution of grizzly bears captured in the Richardson Mountains area in 1992 and 1993.

Age1	Males	Females	Total	% of Population
0	13	10	23	17.0
1	8	8	16	11.9
2	1	4	5	3.7
3	6	8	14	10.4
4	4	7	11	8.1
5	2	4	6	4.4
6	1	3	4	3.0
7	0	2	2	1.5
8	3	5	8	5.9
9	0	4	4	3.0
10	1	1	2	1.5
11	3	7	10	7.4
12	0	2	2	1.5
13	3	2	5	3.7
14	0	2	2	1.5
15	1	2	3	2.2
16	1	2	3	2.2
17	1	1	2	1.5
18	3	2	5	3.7
19	1	0	1	0.7
20	1	1	2	1.5
21	0	2	2	1.5
22+	1	1	2	1.5
UNKNOWN	1	0	1	0.7
TOTAL	55	80	135	100

1 All ages were backdated to June 1992, COY's in 1993 are not included.

Table 4. Standing sex and age distribution for grizzly bears captured in June 1992 and captured and observed in June 1993 in the Richardson Mountains area.

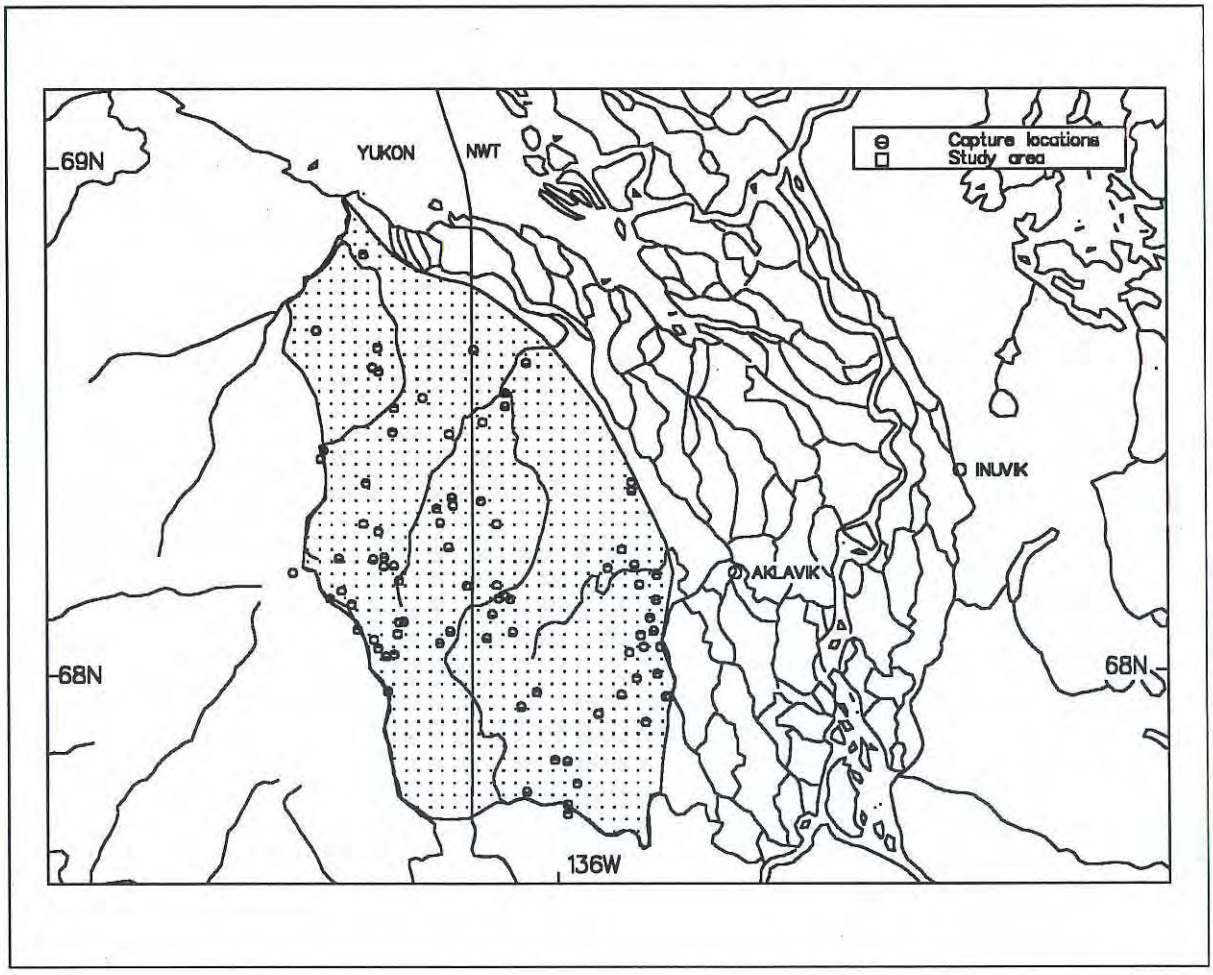
	No. of Males		No. of Females		Male % of Pop.		Female % of Pop.		Ave. % of Pop.
Age	1992[1]	1993	1992	1993	1992	1993	1992	1993	Male and Female
0	9	2	10	3	11.1	3.4	12.3	3.4	16.0
1	6	3	2	1	7.4	5.1	2.5	1.1	7.2
2	1	6	3	7	1.2	11.2	3.7	8.0	9.2
subtotal	**16**	**11**	**15**	**11**	**19.7**	**18.6**	**18.5**	**12.5**	**33.1**
3	2	0	6	2	2.5	0.0	7.4	2.3	6.1
4	1	4	2	3	1.2	6.8	2.5	3.4	5.8
subtotal	**3**	**4**	**8**	**5**	**3.7**	**6.8**	**9.9**	**5.7**	**11.9**
5	2	3	4	6	2.5	3.4	4.9	6.8	8.8
6	1	3	2	0	1.2	3.4	2.5	0.0	3.6
7	0	0	1	2	0.0	0.0	1.2	2.3	1.8
8	0	0	3	2	0.0	0.0	3.7	2.3	3.0
9	0	3	4	3	0.0	3.4	4.9	3.4	5.9
10	1	0	1	4	1.2	0.0	1.2	4.5	3.5
11	1	0	5	0	1.2	0.0	6.2	0.0	3.7
12	0	2	2	5	0.0	2.3	2.5	5.7	5.2
13	0	0	2	0	0.0	0.0	2.5	0.0	1.2
14	0	3	2	3	0.0	3.4	2.5	3.4	4.6
15	0	0	1	1	0.0	0.0	1.2	1.1	1.2
16	1	1	1	2	1.2	1.1	1.2	2.3	2.9
17	1	0	0	1	1.2	0.0	0.0	1.1	1.2
18	0	1	0	1	0.0	1.1	0.0	1.1	1.1
19	0	3	0	2	0.0	3.4	0.0	2.3	2.8
20	1	1	1	0	1.2	1.1	1.2	0.0	1.8
21	0	1	2	1	0.0	1.1	2.5	1.1	2.4
22+	0	1	0	1	0.0	1.1	0.0	1.1	1.1
UNK	0	1	0	0	0.0	1.1	0.0	0.0	0.6
subtotal	**8**	**23**	**31**	**34**	**9.9**	**26.1**	**38.3**	**38.6**	**56.5**
TOTAL	**27**	**38**	**54**	**50**	**33.3**	**43.2**	**66.7**	**56.8**	**101.4**

[1] 1 COY included as a male was not captured

Table 5. Densities of northern grizzly bear populations in Alaska, Northwest Territories and Yukon.

Area (Source)	Population Density km^2/bear	bears/1000 km2
Southwestern Yukon (Pearson 1975)	22.8	43.9
Upper Susitna River, AK (Miller et al. 1987)	35.8	27.9
Northern Yukon (Nagy et al. 1983a)	37.4	26.7
Denali National Park, AK (Dean 1976)	24.4 - 38.5	41.0 - 26.0
Interior Alaska (Miller and Ballard 1982)	41	24.4
Western Brooks Range, AK (Reynolds and Hechtel 1984)	42 - 44	23.8 - 22.7
Richardson Mountains (This Study)	43.5 - 45.9	23.0 - 21.8
Northwest Alaska (Ballard et al. 1990)	51	19.6
Northcentral Alaska (Reynolds et al. 1987)	96	10.4
Anderson and Horton Rivers, NWT (Clarkson and Liepins 1993)	110 - 122	9.1 - 8.2
Mackenzie Mountains, NWT (Miller et al. 1982)	114	8.7
Eastern Brooks Range, AK (Reynolds 1976)	148 - 260	6.8 - 3.8
Tuktoyaktuk Peninsula, NWT (Nagy et al. 1983b)	211 - 262	4.7 - 4.2

Figure 1. Grizzly bear research study area and initial capture locations in the Richardson Mountains area, Northwest Territories, 1992-93.


69N
YUKON
NWT
Capture locations
Study area
INUVIK
AKLAVIK
68N
68N
136W

GRIZZLY BEAR QUOTAS IN THE INUVIALUIT SETTLEMENT AREA AND ADJACENT GWICH'IN LANDS SOUTH AND WEST OF AKLAVIK

Quotas were determined for each community HTC grizzly bear hunting area (GBHA) based on a population estimate for the area and the assumption that 3% of the bears (2 yrs and older) could be harvested each year providing the harvest is comprised of less than 40% females. The 3%/year is based on a polar bear sustainable harvest model as a model for grizzly bears does not exist at this time. Bear numbers for each management area were derived from mark-recapture population and density estimates for the area or were extrapolated from density estimates from adjacent areas. Bear numbers in each GBHA were determined by multiplying the bear density by the size of the GBHA.

Bear Density * Size of GBHA = Bear Population * 3% = Quota

Quotas for the Aklavik ISR (NWT) and Aklavik Gwich'in Lands were initially calculated at 2 bears/year/area based on bear numbers in each area, but were increased to 3 bears/year for each area based on the agreement that there will be a 0 quota for Ivvavik and that few hunters travel to the Yukon North Slope to hunt bears.

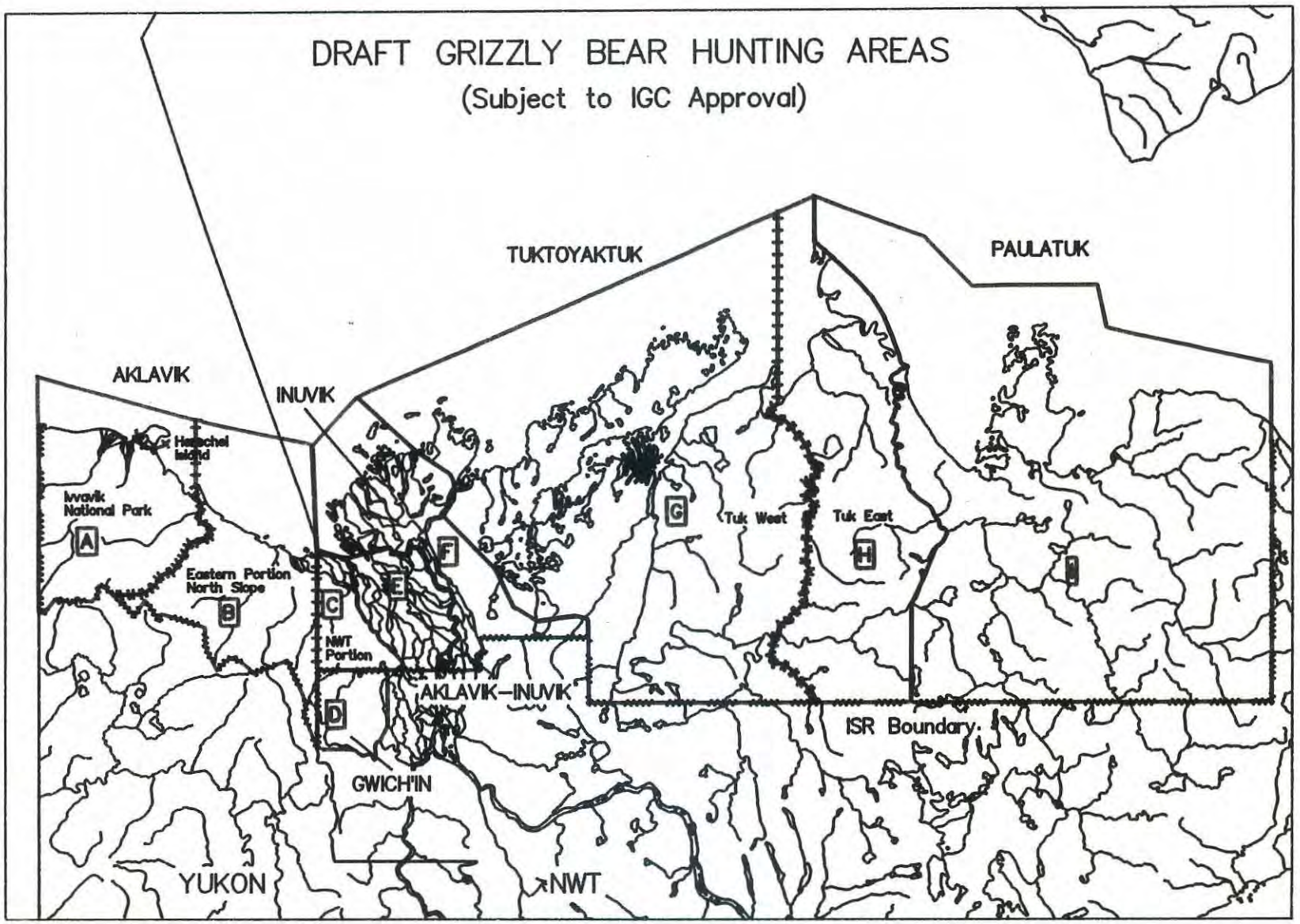
The quota for the Inuvik GBHA was initially calculated at 1 bear/year, but was increased to 2 bears/year based on the agreement that there would be a 0 quota for the Delta.

All GBHA quotas will be monitored to determine the sex and age of the harvest and quota adjustments will be recommended if problems arise.

Table 1. Grizzly bear community hunting areas and recommended quotas for the Inuvialuit Settlement area and adjacent Gwich'in lands.

Grizzly Bear Hunting Area	Physio-Geogr Area	Area (km2)	Estimated Density Bears/1000 km2	Number of Bears	Recommended Quota (3% of Pop.)
A - Ivvavik	NMU-H	2135	26	56	
	NMU-L	5300	15	80	
	ACP	2315	6.5	15	
Subtotal		9750		150	0
B - Yukon N. Slope	NMU-H	5450	26	142	
	NMU-L	360	15	5	
	ACP	2520	6.5	16	
Subtotal		8330		163	5
C - Aklavik (NWT)	All Areas	3040	22	67	3*
D - Gwich'in Lands	Rich. Mtns.	2622	22	58	3*
E - Mac Delta		3920	6.5	25	0
F - Inuvik		7000	6.5	46	2*
G - Tuk West		35506	6.5	231	7
H - Tuk East		18539	8.2	152	5
I - Paulatuk	Brock-Hornaday	10000	8.3	83	
	South-Eastern	33504	3	101	
Subtotal		43504		184	5
Totals		109170		1075	30

* Quotas for these areas are slightly higher than 3% because of no hunting in adjacent areas.


DRAFT GRIZZLY BEAR HUNTING AREAS
(Subject to IGC Approval)
TUKTOYAKTUK
PAULATUK
AKLAVIK
INUVIK
Ivvavik National Park
A
Eastern Portion North Slope
B
C
NWT Portion
D
E
F
G
Tuk West
Tuk East
H
I
AKLAVIK–INUVIK
ISR Boundary
GWICH'IN
YUKON
NWT