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BLACK BEAR

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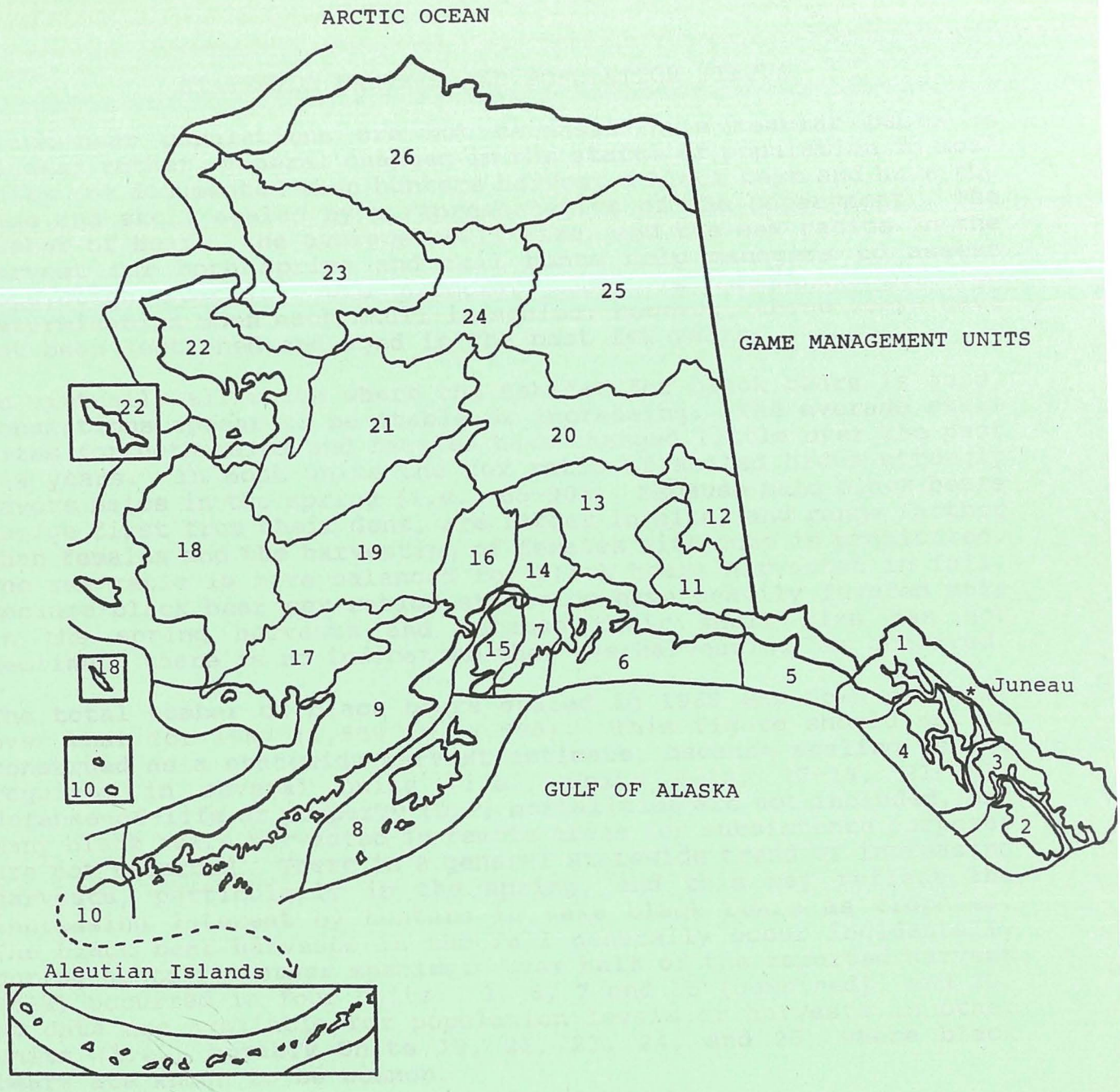
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GAME MANAGEMENT UNITS

STATEWIDE HARVEST AND POPULATION STATUS

Black bear populations are not censused on a regular basis in Alaska; rather, general changes in the status of population in most units are documented when hunters harvest a black bear and have the hide and skull sealed by a representative of the Department. The number of bears, the average skull size, and the sex ratios in the harvest for both spring and fall hunts help managers to assess population status. One premolar tooth is extracted for age determination when each skull is sealed; however, these teeth have not been sectioned and aged in the past few years.

In virtually all units where the habitat for black bears is good, populations appear to be stable or increasing. The average skull sizes for both males and females have changed little over the past few years. In most units the sex ratio of sealed hides strongly favors males in the spring (i.e., 65-90%), because male black bears emerge first from their dens, are larger in size, and range farther than females and the harvesting of females with cubs is prohibited. The sex ratio is more balanced for black bears harvested in fall. Because black bear sex ratios statewide have heavily favored male in the spring harvests and because their skull size has not declined, there is no indication that overharvesting has occurred.

The total number of black bears sealed in 1988 was down slightly over that for 1987 (1,559 vs. 1,595). This figure should not be construed as a statewide harvest estimate, because sealing is not required in several units (i.e., Units 8-10, 17-19, 21-26), defense-of-life or property (DLP) mortalities are not included, and many black bears harvested in remote areas for subsistence purposes are not recorded. There is a general statewide trend of increasing harvests, particularly in the spring, and this may reflect the increasing interest by hunters to take black bears as trophies. The black bear harvests in the fall generally occur incidentally during hunts for other species. Over half of the reported harvest (51%) occurred in four Units: 1, 6, 7 and 15 (combined), and 20. No data are available for population levels or harvests in other units (i.e., notably Units 19, 21, 23, 24, and 25) where black bears are known to be common.

After a record DLP mortality in Unit 1C during 1987, a major public education program was initiated to increase the awareness of wildlife-related garbage problems. The subsequent reduction of bear complaints and DLP and control action mortalities may have been a result of these efforts. The DLP-killed black bears are not often recorded in the Interior, because a year-round season and multiple bag limits allow such bears to be sealed and possessed as normally hunted animals. Also in the Interior, the tendency is to take more bears over bait; in these circumstances, the sex ratio in the harvest is more even. The reported 1988 black bear harvest is summarized in the following table.

Unit	Reported black bear harvest[a]
1A	56
1B	7
1C	86
1D	10
2	204
3	177
5	21
6	294[b]
7 & 15	159
11	10
12	37
13	82
14	103
16	131
20	182
Total	1,559

[a]Sealing not required in Units 8-10, 17-19, and 21-26

[b]Highest on record

STUDY AREA

GAME MANAGEMENT UNIT: 1A (5,000 m^2)

GEOGRAPHICAL DESCRIPTION: Ketchikan area, including mainland draining into Behm and Portland Canals.

BACKGROUND

Biological and hunter information has been collected from all black bears reported taken since 1973. Data are not collected from unsuccessful hunts, and no population surveys are conducted. The current objectives for black bear management in Revillagigedo Island and Misty Fjords are to provide the greatest possible opportunity to hunt black bears under aesthetically pleasing conditions; i.e., low hunter density.

POPULATION OBJECTIVES

To maintain an average skull size of at least 17.2 inches for males harvested in the spring.

METHODS

Black bear harvest data were collected through mandatory sealing of all bears reported. A standard data form was used statewide to collect hunt and hunter information and biological data, including skull measurements. No population surveys were conducted.

RESULTS AND DISCUSSION

Population Status and Trend

Without survey data, it is difficult to definitively identify population trends; however, skull measurements have not changed significantly in 14 years. Discussions with hunters and ADF&G personnel suggest that major changes in bear densities have not occurred. The population is therefore believed to be either stable or increasing slightly.

Although logging-related habitat changes increase bear numbers in certain habitat types for about 20 years, populations drop after canopy closure. Over a 100-year period, bear populations should be significantly lower in logged areas than they had been previously, because suitable habitat will only be present in about 20% of the area (i.e., those areas cut within the previous 20 years).

Population Size:

Population size estimates have been extrapolated from studies conducted in other areas. The Revillagigedo Island portion of Subunit 1A has high densities, and because mainland areas have less suitable habitat, overall densities are less. Based on coastal populations elsewhere in western North America, there are probably 1.5 bears/mi^2 on Revillagigedo Island and 1.0 bears/mi^2 on the mainland; i.e., 1,800 and 3,800 bears, respectively.

Mortality

Season and Bag Limit:

The open season in Subunit 1A for subsistence, resident, and nonresident hunters is from 1 September to 30 June. The bag limit is 2 bears, of which not more than one may be a blue or glacier bear.

Human-induced Mortality:

The harvest of black bears in Subunit 1A has been relatively stable since data collection began in 1974. Although the 1988 harvest was down from that in 1987, it was equal to the average harvest for the past 5 years. Table 1 shows harvest statistics for Subunit 1A from 1984 through 1988. The nonhunting mortality was mostly associated with garbage in the Ketchikan area; i.e., 4 bears in 1988.

The sex ratio is typically very high for males in the spring season. Although sex ratios for the fall seasons are more balanced, they are still weighted to males. In 1988, 93% of the spring harvest were males, while 62% of the fall bears were males.

Skull sizes have remained consistently above the management objectives since measurements were first taken. The average skull size for 40 males taken in 1988 was 18.0 inches, compared with the 5-year average of 17.7 inches.

Hunter Residency and Success. The harvest by nonresidents has been relatively steady over the last 5 years, averaging 21%. Forty seven hunters took the 56 bears reported from Subunit 1A in 1988. Nine hunters, all local residents, harvested 2 bears each.

Harvest Chronology. Table 2 presents harvest chronology for the last 5 years. The peak of the harvest normally occurs between 11 and 31 May in the spring and 1 to 20 September in the fall.

Transport Methods. Very few roads are connected to population centers within Subunit 1A, and aircraft and boats are the most common transportation means. Nonresidents tend to use planes, while residents have relied mainly on boats. Roads will

gradually come into greater use as logging roads become interconnected, and once they become tied to Ketchikan, a major shift to road hunting will probably occur. Currently, the only roaded area in use is in the Carroll Inlet/Shoal Cove portion of Revillagigedo Island.

Natural Mortality:

There has been no known substantial natural mortality during the past 5 years. Winters have been mild, and no major losses of berry crops or fish runs have occurred.

Habitat

Major habitat changes occur from logging, which converts uneven-aged old growth to even-aged stands. Early successional stages (3 to 25 years) provide excellent black bear habitat; however, when canopy closure occurs the understory disappears and the area provides little in the way of black bear habitat. In addition, large hollow trees and root masses used for denning are lost and will not be replaced under the current 100- to 125-year logging rotation. Under this rotational scheme, logged areas will be suitable black bear habitat only about 20% of the time. The loss of denning habitat is harder to assess, but it may have a major impact on bear survival.

In the short term, logging will probably increase bear numbers in Subunit 1A, but as the first logging rotation progresses and the early cuts mature, bear populations can be expected to drop. These habitat changes do not apply to the Misty Fjord National Monument where logging is not permitted.

Game Board Actions and Emergency Orders

The current regulations have been in effect for the past 16 years. No proposals have been made to change either season lengths or bag limits. The current regulations have provided sufficient hunter opportunity, and harvests have been well below sustainable levels. No changes are recommended.

CONCLUSION AND RECOMMENDATIONS

Although the 1988 harvest represents a decline from those of the last 2 years, annual harvests have been slowly increasing since 1981. This trend will probably continue because of the expanding road system and increasing human population. Once the currently isolated logging-road systems on Revillagigedo Island are linked to Ketchikan, a major increase in harvest will probably occur.

The harvest is currently about 1% of the estimated 5,600 bears in Subunit 1A. The bear population is stable or increasing slightly. The relatively low harvest has not had a discernable

effect on the bear population, and the management objective of maintaining an average male skull size of 17.2 inches for the spring season was easily reached.

Hunters from mainland areas should be asked about the quality of their hunting experience to ascertain the level of hunter density beyond which aesthetically pleasing hunts are not possible. At some point, hunter registration may be necessary to maintain quality of the hunt. In addition, an area of intensive harvesting on Revillagigedo Island around Shoal Cove should be monitored to see if skull sizes from this area are declining.

Size of logged areas should also be tracked through vegetative successional stages to help anticipate expected declines in bear populations, as the younger clear-cuts become nonproductive second growth. Efforts to educate the public about the trade offs between timber harvesting and the bear resource in Subunit 1A should be identified and publicized.

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Table 1. Black bear harvest statistics for Subunit 1A, 1984-1988.

Year	Season	Total harvest	No. males	No. females	Unk. sex	Nonres. harvest	(%)	Mean skull size: Males	(n)	Females	(n)	% Transport: Air	Boat	Roads
Total	Spring	23	17	6	0	0		17.8	(13)	16.5	(4)	9	70	22
	Fall	22	9	13	0	6	(27)	15.8	(9)	15.8	(13)	27	50	23
1984	Year	45	26	19	0	6	(13)	17.0	(22)	16.0	(17)	18	60	22
Total	Spring	26	26	0	0	3	(12)	18.5	(20)	0.0	(0)	19	65	15
	Fall	23	12	10	1	11	(48)	17.7	(9)	15.8	(9)	26	70	4
1985	Year	49	38	10	1	14	(29)	18.2	(29)	15.8	(9)	22	67	10
Total	Spring	38	33	5	0	5	(13)	18.3	(31)	15.4	(5)	8	79	13
	Fall	25	16	9	0	10	(40)	17.2	(13)	15.3	(8)	40	48	12
1986	Year	63	49	14	0	15	(24)	18.0	(44)	15.3	(13)	21	67	13
Total	Spring	43	39	4	0	13	(30)	17.7	(36)	16.4	(4)	16	70	14
	Fall	23	13	9	1	4	(17)	18.4	(10)	16.1	(7)	22	39	39
1987	Total	66	52	13	1	17	(2)	17.9	(46)	16.2	(11)	18	59	23
1988	Spring	14	14	0	0	4	(29)	18.8	(12)	0	(0)	29	71	0
Mainland	Fall	4	3	1	0	2	(50)	17.4	(3)	15.0	(1)	50	25	25
	Year	18	17	1	0	6	(33)	18.5	(15)	15.0	(1)	53	61	6
1988	Spring	29	25	4	0	2	(7)	17.7	(24)	15.5	(4)	7	55	38
Revilla-	Fall	9	5	3	1	0	(0)	16.0	(1)	16.4	(2)	0	44	56
gigedo	Year	38	30	7	1	2	(5)	17.6	(25)	15.8	(6)	5	53	42
Total	Spring	43	39	4	0	6	(14)	18.1	(36)	15.5	(4)	14	60	26
Sub-unit 1A	Fall	13	8	4	1	2	(15)	17.1	(4)	15.9	(3)	15	38	46
1988	Year	56	47	8	1	8	(14)	18.0	(40)	15.7	(7)	14	55	30

Table 2. Chronology of the black bear harvest in Subunit 1A, 1984-1988.

	Number of black bears				
Date	1984	1985	1986	1987	1988
April 1-20	1	1	0	1	0
April 21-30	7	1	3	0	6
May 1-10	2	6	5	12	5
May 11-20	5	6	12	8	6
May 21-31	6	12	8	16	14
June 1-10	0	0	6	0	8
June 11-20	2	0	2	2	2
June 21-30	0	0	2	4	2
Sept 1-10	12	10	7	11	4
Sept 11-20	6	5	9	1	1
Sept 21-30	0	6	2	2	2
Oct 1-10	0	2	2	3	1
Oct 11-20	1	0	1	0	2
Oct 21-31	0	0	0	1	1
Nov 1-10	0	0	4	3	0
Nov 11-30	0	0	0	1	2

STUDY AREA

GAME MANAGEMENT UNIT: 1B (3,300 mi^2)

GEOGRAPHICAL DESCRIPTION: Southeast mainland from Cape Fanshaw to Lemesurier Point.

GAME MANAGEMENT UNIT: 3 (3,600 mi^2)

GEOGRAPHICAL DESCRIPTION: Islands of the Petersburg, Kake, and Wrangell areas.

BACKGROUND

Black bears are indigenous to the area covered in this report and have been traditionally killed for food as well as for trophies or rugs. Road building associated with the timber industry has opened more territory to hunters, where previously travel had been by boat or aircraft only. The bag limit was increased from 1 to 2 bears in 1984, after it had been reduced to 1 bear in 1980. In 1977, 3 and 26 black bears were killed in Subunit 1B and Unit 3, respectively. In 1988 the harvest was only seven for Subunit 1B, but 177 for Unit 3.

POPULATION OBJECTIVES

To maintain a mean skull size of at least 17.0 inches for males and a male to females harvest ratio of 3:1.

METHODS

Hunters harvesting black bears are required to seal them within 30 days. Sex, skull size, location of harvest, and other data are collected at the time of sealing. No data were collected for unsuccessful bear hunts. Comparison of current data to the historical records provided indirect evidence of population composition. Most hunters in these areas selected for larger bears. A decrease in average skull size would indicate that the bears killed were younger, suggesting that older (larger) bears were not available.

Skull sizes were determined by adding length and width of skulls. The mean skull size of black bears in Unit 3 was 18.6 inches for males and 16.3 inches for females (Table 4). As there is no affordable census technique, average skull size and the sex ratio were used as indices to population status.

RESULTS AND DISCUSSION

Population Status and Trend

Field observations and harvest data continued to suggest a stable black bear population in Subunit 1B and Unit 3. No decrease in male:female ratios or in mean skull size in the harvest indicated a stable population.

Population Size:

Black bear population density and home range size studies have been made by several researchers in Alaska and Washington: Schwartz et al. (1983), Kenai Peninsula; Modafferi (1982), northwestern Prince William Sound; Lindzey and Meslow (1977), Long Island, Washington. Erickson (1982) also calculated black bear home ranges on Mitkof Island as part of his denning study. Assuming that Subunit 1B and Unit 3 have bear densities somewhere between those found on Long Island and the Kenai Peninsula, there are an estimated 40 to 80 bears per 100 km^2, or 1.0 to 2.0 bears/mi^2.

Population Composition:

In Unit 3, 14% (n = 25) of the harvest were females, with males composing 83% (n = 147). We were not able to determine the sex of the remaining 3% (n = 5). The low proportion of females in the harvest indicates that hunters selecting for a large body size, males are more susceptible to hunters, or both. Based on average skull size (Table 1), it appears that unitwide black bear harvests have not been excessive.

Distribution and Movements:

Black bears are found on the mainland and most of the larger islands, ranging from the tidelands to the alpine. No bears have been reported killed on Zarembo Island in the past 5 years, and reports from trappers and loggers imply a limited or nonexistent population there. Erickson (1982) studied black bears on Mitkof Island and found that home ranges for young bears, adult females, and adult mals averaged 1.7 mi^2, 4.6 mi^2, and 16.2 mi^2, respectively. None of the bears showed marked seasonal differences in home ranges, and individual movements were greatly variable; e.g., 2 bears were highly sedentary and two others made brief trips of 15-20 miles beyond the limits of their normal home range.

Mortality

Season and Bag Limit:

The open season in Subunit 1B and Unit 3 is from 1 September to 30 June for subsistence, resident, and nonresident hunters. The

bag limit is 2 bears, of which not more than one may be a blue or glacier bear.

Human-induced Mortality:

The 1988 harvest in Subunit 1B was 7 bears, compared with 22 in 1987. Two of the 5 successful hunters killed a second bear. The reported harvest in Unit 3 was 177 black bears, which is 24 more than last year's harvest of 153 (Table 2). The high percentage of males (83%, n = 147) in the harvest may be an indication of a healthy population. The total spring harvest was 142 bears (81%); the fall harvest was 33 (19%) (Table 2). Guided hunters took 37 bears in Unit 3; all were taken in the spring by nonresident hunters. Self-guided nonresident hunters killed an additional 47 bears in Unit 3. Nonresidents took 47% (n = 84) of the reported harvest in Unit 3. Two bears were reported killed in Unit 3 in defense of life or property during 1988.

The highest harvest per unit area for the larger islands occurred on Mitkof and Kuiu Islands (Table 3); i.e., 1 bear/10 mi^2 and 1 bear/8 mi^2, respectively. An extensive road system has been constructed by the U. S. Forest Service on Mitkof Island for logging activities, and almost every part of the island is accessible to hunters using road vehicles. Kuiu Island is heavily hunted by water-borne professional hunters and their clients, and it is also favored by many of the nonresident hunters without guides. Of the 37 bears killed by guided hunters, 78% (n = 29) were taken on Kuiu Island. On Kupreanof Island, 7 bears were reported killed by guided nonresident hunters, and 14 more were killed by nonresidents without guides.

The black bear harvest in Unit 3 has steadily increased during the past decade. In Unit 3 the total harvest from 1974 to 1988 was 1,214 bears, an average of 81 bears annually (Table 2). The current harvest has not noticeably affected the age structure or sex ratio of bears, and mean skull sizes have remained relatively constant (Table 1).

Although the bag limit in Unit 3 was 2 bears, only 20% (n = 29) of the successful bear hunters killed a second bear in 1988. This is a small increase from the 22 hunters killing a second bear in 1987.

Hunter Residency and Success. Of the 7 bears killed in Subunit 1B none were taken by residents, and no guided hunts occurred there. Sixty-eight nonresident hunters killed 44% (n = 77) of the total in Unit 3. Guided, nonresident hunters killed 29 and 7 bears on Kuiu and Kupreanof Islands, respectively. Three guided nonresident hunters killed a second bear, and 6 nonresidents without guides killed a second bear. Eighty resident hunters in Unit 3 killed 100 bears; no resident hunter employed a guide.

Hunters in Unit 3 averaged 3 days for each bear killed. There was no significant difference in length of hunt between resident,

guided, or self-guided nonresident hunters. The 5 hunters in Subunit 1B averaged 6 days for each bear killed.

Harvest Chronology. In Subunit 1B, 5 nonresident hunters killed 7 male bears in the spring. For Unit 3 the spring harvest was 142 bears (80% of the year's total); the fall take was 33 (20%) (Table 4). Twenty-nine (20%) bears were killed before 1 May, 83 (58%) during May, and 30 (22%) in June. During the fall, 20 were killed in September and 10 in October. All bears harvested by guided hunters in Unit 3 were taken in the spring. Table 1 shows the numbers of bears killed on each island.

Transport Methods. All hunters in Subunit 1B traveled by boat. Hunters in Unit 3 used 4 types of transportation. Thirty six hunters traveled by airplane; 25 were nonresidents. Boat travel was the most frequent means of transportation (83 hunters); 41 were nonresidents. Two hunters reported using off-road vehicles, while the remainder reported using "OTHER" means, probably road vehicles.

Habitat

Continued logging in Unit 3 may contribute to a temporary increase in the bear population by expanding the surface area in early seral stages, providing high production of plant products. This is accompanied by loss of denning trees (Erickson 1982) and greater accessibility for the hunters using the road system. Black bear habitat may diminish as the canopy closes in logged areas.

CONCLUSION AND RECOMMENDATIONS

Black bear populations in both Subunit 1B and Unit 3 are stable, because older age classes (i.e., based on skull sizes) and males are still predominant in the harvest. In Subunit 1B the average male skull size was 18.5 inches, compared with a goal of 17.0 inches; the male to female sex ratio was 7:1, compared with the goal of 3:1. In unit 3 the mean male skull size was 18.6 inches, which is 1.6 inches greater than the goal of 17.0 inches; the male to female ratio was 4:1, compared with the goal of 3:1. I recommend that the ADF&G implement metric measurement of bear skulls to be consistent with modern scientific practice.

The harvest of black bears can be expected to increase as state land subdivisions are developed on Kuiu, Wrangell, Etolin, Mitkof, and Kupreanof Islands. Conflicts between bears and rural residents can be expected to escalate. There is increasing nonresident hunter interest in black bear hunting in Unit 3.

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Table 1. Skull size of black bears killed in Unit 3, 1974-1988.

	Skull size[a]			
	Males		Females	
Year	$\bar{x}$	n	$\bar{x}$	n
1974	18.4	24	16.2	2
1975	18.6	34	16.8	6
1976	18.4	47	17.1	7
1977	18.5	17	16.2	7
1978	18.6	23	16.0	12
1979	18.5	36	16.8	4
1980	18.4	30		0
1981	18.5	43	16.6	10
1982	18.3	68	15.9	11
1983	18.7	61	16.4	12
1984	18.4	66	16.4	17
1985	18.3	79	16.4	17
1986	18.2	88	16.3	18
1987	18.4	105	16.1	23
1988	18.6	123	16.1	15
All years	18.5	844	16.4	161

[a] skull size = total length + zygomatic width in inches.

Table 2. Historical black bear harvest by island in Unit 3, 1974-1988.

Year	Number of bears	Percentage of Harvest				
		Kupreanof	Kuiu	Mitkof	Wrangell	Other islands
1974	27	18	61	4	10	7
1975	49	25	63	4	4	4
1976	60	33	57	3	2	5
1977	27	15	77	4	0	4
1978	41	29	62	7	0	2
1979	50	31	52	4	4	9
1980	37	40	22	32	3	3
1981	66	38	24	32	5	1
1982	84	41	41	15	2	1
1983	83	34	52	13	0	1
1984	98	40	47	11	1	1
1985	131	33	43	23	0	1
1986	131	16	56	19	6	1
1987	153	41	75	21	12	4
1988	177	50	94	21	1	11
Means	81[a]	32	55	14	3	4

[a] Sum = 1,214

Table 3. Black bear harvest by island in Unit 3, 1988.

Island	Area (mi^2)	Annual harvests 1988	Annual harvests 1987	Mi^2/ bear	Males	Females	Unk	Percentage of harvest
Kupreanof	1,090	50	41	22	44	6	0	28
Kuiu	746	94	75	8	76	13	5	53
Mitkof	211	21	21	10	15	6	0	12
Wrangell	220	1	12	220	1	0	0	0.5
Etolin	343	8	3	43	8	0	0	5.0
Woewodski	15	1	1	15	1	0	0	0.5
Deer	12	2	0	6	2	0	0	1.0
Totals	2,637	177	153	15[a]	147	25	5	100

[a] The mean for the 7 islands combined.

Table 4. Skull size and percentage of males in black bear harvest by island and season in Unit 3, 1988.

Island	Season	Total harvest	Males (%)	Skull size[a] Males $\bar{x}$	Males n	Females $\bar{x}$	Females n
Kupreanof	Spring	44	80	19.0	35	14.7	5
	Fall	6	83	18.6	4	18.1	1
	Total	50	88	18.9	39	15.3	6
Kuiu	Spring	75	84	18.8	59	16.7	7
	Fall	19	68	17.8	13	17.5	5
	Total	94	81	18.6	72	17.0	12
Mitkof	Spring	14	71	18.2	9	16.3	3
	Fall	7	71	17.1	4	15.5	2
	Total	21	71	17.9	13	16.0	5

[a] Skull size = total length + zygomatic width.

Table 5. Black bear population density and home range size.

Location	Density[a] bears/100km^2	Home Range Size	
		Male	Female
Kenai	13-26 (1/3.9-1/7.5 km^2)[b]	141 km^2	17.6-26.2 km^2
Pr. William Sound	42 (1/2.4 km^2)	70-100 km^2	10-30 km^2
Long Isl.	112-149 (1/89 ha-1/67 ha)	5 km^2 (505 ha)	2 km^2 (235 ha)
Mitkof		42 km^2 (16.2 mi^2)	12 km^2 (4.6 mi^2)

[a] Calculated
[b] As reported

STUDY AREA

GAME MANAGEMENT UNIT: 1C (6,500 mi^2)

GEOGRAPHICAL DESCRIPTION: The Southeast Alaska mainland and the islands of Lynn Canal and Stephens Passage lying between Cape Fanshaw and the latitude of Eldred Rock, including Sullivan Island and the drainages of Berners Bay.

BACKGROUND

Harvest data and hunter interviews have historically provided the only data on which management decisions were made. As only successful hunters are required to report hunting activity, data on hunting effort are unavailable. Black bear teeth are routinely collected at the time of sealing and archived. The teeth have not been used for age determination for several years.

The propensity of black bears to use human food resources is well documented from throughout their range. Bears that have become habituated to human garbage are difficult to discourage, and it is often necessary to destroy these nuisance animals. As the human population of Juneau has increased, the number of bear complaints received each year by the ADF&G and Department of Public Safety officers has increased, resulting in the death of several animals each year. Joint efforts by the Department and City and Borough of Juneau to decrease the numbers of bears killed because of garbage-related incidents are under way.

POPULATION OBJECTIVES

To maintain a mean skull size of at least 17.3 inches for males and a male:female harvest ratio of 3:1.

To reduce by 50% the number of nuisance bear problems resulting from improper refuse handling and disposal by FY90.

METHODS

Successful bear hunters are required to present the hide and skull for sealing within 30 days of the harvest. The skull is measured, and a rudimentary premolar is extracted for age determination. Other harvest-related data and anecdotal information are collected from hunters at the same time. A total of 12 problem bears have been captured and equipped with radio-collars over the past 2 years. Movements and den locations have been monitored.

RESULTS AND DISCUSSION

Population Status and Trend

Population data are not available; however, harvest data (Table 1) and reported bear activity in and around Juneau suggest a large population. Males continued to make up a large proportion of both the sport harvest and captures during problem black bear investigations. It was previously reported that most captured or killed problem bears were young males, indicating either a growing population or a great density. However, ages determined for a number of these bears captured or destroyed during this reporting period ranged from 3 to 11 years, indicating that problem activities are not confined to young bears. Skull sizes for males suggested a stable population; the mean skull sizes for the period 1984 to 1988 was 17.5 inches, and the average skull size for 1988 was 17.6 inches.

Mortality

Season and Bag Limit:

The open season in Subunit 1C is from September to 30 June for subsistence, resident, and nonresident hunters. The bag limit is 2 bears, of which not more than one may be a blue or glacier bear.

Human-induced Mortality:

Hunters reported killing 86 black bears in Subunit 1C in 1988. Although this represented a substantial drop from the record-high harvest of 111 bears in 1987, it was close to the 5-year average of 84 bears. In 1988 males made up 84% of the known-sex harvest, similar to last year's 85% and well above the current management objective of 75%. Successful sport hunters spent an average of 2.8 days in the field per harvest, only slightly higher than the 2.4-day average for the last 5 years.

During 1988, 5 black bears were destroyed in garbage-related control actions, and two were taken defense of life or property (DLP). At least one incident involved a bear that has been in the act of removing garbage from a residence. There were unsubstantiated reports of at least two additional garbage-habituated bears killed in DLP situations.

Hunter Residency. Nonresident hunters took 19 (22%) of the bears harvested in 1988. This compares with 23% taken by nonresidents in 1987.

Harvest Chronology. During this reporting period, 83% of the harvest occurred in the spring; this is slightly higher than the previous 5-year average of 80% and several points higher than the 77% for 1987.

Transportation Methods. Hunters most frequently reached their hunting areas by boat (66%), followed by highway vehicle or on foot (24%), and aircraft (10%).

Habitat

Mining operations and the associated increase in human activities continued to pose the biggest potential threat to black bear habitat in Subunit 1C. In addition to ongoing projects in the vicinity of Berners Bay, mining operations have been proposed for the Herbert Glacier area, and a study of the feasibility of reopening the AJ Mine adjacent to Juneau is also in progress. The most likely alternative for tailings disposal from the AJ mine is the Sheep Creek Valley, which would be utilized as a catchment basin for the slurry. While little is known about the intensity of bear use of Sheep Creek Valley, the Herbert River area provides exceptional bear habitat that could be negatively impacted. The impacts of mineral development on brown bear habitat use is being examined on nearby Admiralty Island (Schoen and Beier 1987). Preliminary work suggests that brown bears avoid developed areas and associated roads.

Problem Bear Management Activities

In the spring of 1988 the Department of Fish & Game and the City and Borough of Juneau launched a cooperative effort to reduce garbage-related problems in Juneau. The program concentrated efforts in two areas: (1) public education and (2) aversive conditioning of black bears.

To address the source of the problem (i.e., inadequate refuse containment) the Assembly enacted a stronger containment ordinance, increasing the bail for infractions from $15.00 to $100.00 per offense. In conjunction with the new enforcement program, a jointly funded and managed public education campaign was initiated. Television and radio advertisements and public service announcements were employed to deliver the message to residents that garbage was the source of Juneau's increasing bear problems. The campaign slogan "Garbage Kills Bears" appeared on garbage trucks, public buses, City Hall, and on the face of nearly 3,000 brochures delivered door-to-door by area cub scouts.

The use of aversive conditioning agents, including rubber bullets and chemicals, was examined as an interim measure. This was aimed at altering garbage-use patterns of habituated bears until the containment situation had improved. Bears caught in the act of removing refuse from residential cans and dumpsters were shot with rubber bullets or buckshot (Cart-A-Ball and Cart-A-Buck, Bumble Bee Wholesale, Inc) from a 12-gauge shotgun. Continued uses of garbage by bears in known locations suggested that the rubber bullets were having little effect. To better monitor the responses of treated bears, 2 females and 5 males were captured and fitted with radio-collars and ear-tags.

All bears were released within 5 miles of their capture sites in areas away from human housing. Although the moves were short, none of the bears are known to have returned to garbage-raiding habits that season. One subadult female bear actually moved away from town and denned approximately 10 miles north of the Montana Creek release site. The remaining 6 bears, all of which had been captured between 20 July and 26 October, stayed away from areas of human habitation until they denned. In 1989 these collared and tagged animals will be monitored to determine the effectiveness of our aversive-conditioning efforts.

Chemical agents, particularly emetics, may prove valuable in attaining conditioned responses to use of human garbage. During the summer of 1988 one chemical, Ro-Pel (Benzyldiethyl ammonium saccharide, Burlington Scientific Corp., Farmington, NY), was applied to garbage in containers that were being repeatedly used by an individual bear. The bear was easily identified, given her small size and cinnamon coloration. The refuse in the container was coated with liquid, using an aerosol spray bottle. In the first trial, only the top layer of garbage received an application. On subsequent trials approximately, 1/2 of the contents of the can were removed and the deterrent applied to the bulk prior to replacement. There were no discernable changes in use of treated cans by this bear. No further trials of chemical deterrents were conducted during this reporting period.

CONCLUSIONS AND RECOMMENDATIONS

Management objectives for Subunit 1C are being met. Skull sizes for 1987 were at the limit of 17.3, increasing in 1988 to 17.6 inches. The 1988 total harvest was more typical of historic harvests than the record 111 bears harvested in 1987. The 2-bear bag limit instituted the previous year has not had an appreciable impact on the total harvest, because only a small percentage of hunters took 2 bears during either 1987 or 1988.

The public education activities of the Department and the City and Borough of Juneau have increased the awareness of residents concerning wildlife-related garbage problems. There has been a substantial reduction in litter control problems and violations of refuse containment ordinances. Preliminary data suggest that the program has had an effect on garbage availability and bear complaints. In the 1st year of the program there was a substantial drop in garbage-related mortalities. This may be attributable, in part, to better garbage containment efforts by residents. The subsequent reduction of bear complaints and DLP and control action mortalities may be a result of these improvements. Monitoring and public education should be continued.

In cooperation with the University of Alaska--Fairbanks, use of chemical and physical deterrents to control garbage-habituated bears will be examined during the next 2 years. Data from this

study should be applicable throughout Alaska, where small communities and camps face garbage-and waste-handling problems or anticipate displacement of habituated bears because of a change to garbage incineration.

LITERATURE CITED

Schoen, J. W., and L. Beier. 1987 Brown bear habitat preferences and brown bear logging relationships in Southeast Alaska. Fed. aid in Wildl. Rest. Proj. W-22-4. 45pp.

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Table 1. Black bear harvest parameters for Subunit 1C, 1983-1988.

Year	Harvest	Nonhunting mortalities	Males (%)	Spring harvest(%)	Mean skull size[a] Male $\bar{X}$	Male n	Female $\bar{X}$	Female n
1983	50	1	72	80	17.3	35	15.4	8
1984	78	6	90	76	17.2	68	15.8	7
1985	98	5	76	75	17.8	72	16.2	13
1986	83	12	67	90	17.7	62	16.4	10
1987	111	16	85	77	17.3	92	15.5	14
1988	86	7	84	83	17.6	66	16.2	10

[a]Skull size equals total length plus zygomatic width.

STUDY AREA

GAME MANAGEMENT UNIT: 1D (2,600 mi^2)

GEOGRAPHICAL DESCRIPTION: The Southeast Alaska mainland lying north of the latitude of Eldred Rock, excluding Sullivan Island and the drainages of Berners Bay.

BACKGROUND

Black bear numbers are probably lower than in any other Southeast Alaska mainland area. Brown bear numbers, on the other hand, appear to be high and increasing. Hunters and outdoor recreationists have reported that sightings of black bears have decreased over the last 3 to 5 years. While earlier harvest data have not suggested a decline in black bear numbers, the lack of population data and hunter effort information makes these determinations difficult.

POPULATION OBJECTIVES

To maintain a population capable of sustaining an annual harvest of at least 25 black bears.

METHODS

Successful bear hunters are required to present the hide and skull for sealing within 30 days of harvest. The skull is measured, and a rudimentary premolar is extracted for age determination. Other harvest-related data and anecdotal information are collected at the same time.

RESULTS AND DISCUSSION

Population Status and Trend

The black bear harvest has fluctuated widely during recent years in both numbers and seasonality. Between 1983 and 1987, skull sizes for both sexes and the percentage of males in the harvest were relatively constant, suggesting a stable population. In 1988 a dramatic decrease in the total harvest was observed. During the same period, the mean skull size for harvested males decreased, and the proportion of bears harvested in the fall increased. These factors, as well as increasing brown bear numbers and anecdotal information, may indicate a decline in the black bear population.

Mortality

Season and Bag Limit:

The open season in Subunit 1D is from 1 September to 30 June for subsistence, resident, and nonresident hunters. The bag limit is 2 bears, of which not more than 1 may be a blue or glacier bear.

Human-induced Mortality:

The black bear harvest in Subunit 1D was 10 animals during 1988 (Table 1). No nonhunting mortalities were reported. Twenty-three black bears were harvested in 1987, and the five-year (1984-88) mean is 35.

Males made up 70% and females 30% of the harvest. The average skull size for males was 16.3 inches, which was down from that for the previous year (17.6 inches) and the 5-year mean (17.3 inches). The mean female skull size (15.8 in), however, was up slightly from the 1987 mean (15.4 in) and the previous 5-year mean (15.5 in).

Only one of the 10 bears taken had the cinnamon-color phase; the remainder were black. No hunter took more than 1 bear. Successful hunters in Subunit 1D spent an average of 1.1 days/harvest, well below the 4.8 days/harvest in 1987.

Hunter Residency and Success. No black bears were killed by non-residents. Nine hunters were from Haines, and one was from Skagway.

Harvest Chronology. Only 50% of the bears were taken during the spring portion of the hunt. During the 1983-87 period the spring harvest accounted for an average of 68% of the total harvest.

Transportation Methods. In 1987, 44% of the hunters used boats, while in 1988 only one hunter (10%) reported using a boat. The remainder used off-road vehicles (20%), highway vehicles (50%), aircraft (10%), or did not report (10%).

Habitat

A substantial portion (247,000 acres) of the black bear habitat in this subunit is managed under the multiple-use guidelines of the 1986 Haines State Forest Management Plan. The plan's goals include an annual harvest of 8.8 million board feet of timber (approximately 300 to 600 acres). The plan stipulate that the impacts on wildlife that support commercial, recreational, and subsistence pursuits of the area will be minimized through mitigation and enhancement, even in areas where forest management is the primary activity.

The limited timber harvest that occurred in 1988 was confined to the upper Chilkat and Kelsall River drainages. While intensity

of black bear use of these areas is unknown, 40% of the 1988 sport harvest came from adjacent habitats.

CONCLUSIONS AND RECOMMENDATIONS

The late spring and deep snows on the hillsides in 1988 probably contributed to a reduced harvest. Discussions with both hunters and guides confirmed that weather conditions kept many hunters from pursuing bears in the spring. A further indication that few hunters spent time and effort hunting spring bears is found in the transportation data. In 1987, 44% of the hunters used boats to reach hunt areas, while in 1988 only 1 of 10 successful hunters did so. Most hunters harvested bears using highway vehicles, and all but 1 hunter reported taking their bears on the 1st day of their hunt.

The small total harvest in 1988 and decreased mean skull size for males may be indicators of a population decline; however, the sample size is very small, and other harvest parameters (i.e., such as female skull size and male component of the harvest) do not corroborate such a decline. Nevertheless, this population should be closely monitored, because local hunters and residents perceive that the Chilkat Valley black bear population may be decreasing as brown bear numbers increase.

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Table 1. Black bear harvest parameters for Subunit 1D, 1983-88.

Year	Harvest	Males (%)	Nonresident harvest(%)	Spring harvest (%)	Days hunted per bear	Mean Skull Size[a] Male $\bar{X}$	Male n	Female $\bar{X}$	Female n
1983	43	74	5	43	1.8	16.8	26	14.9	12
1984	23	71	9	74	2.3	16.9	13	15.3	5
1985	32	75	9	73	1.9	18.1	15	15.9	6
1986	54	75	7	66	2.1	17.0	31	16.0	12
1987	23	65	18	82	4.8	17.6	11	15.4	7
1988	10	70	0	50	1.1	16.3	6	15.8	3

[a] Skull size equals length plus zygomatic arch width.

STUDY AREA

GAME MANAGEMENT UNIT: 2 (3,400 mi^2)

GEOGRAPHICAL DESCRIPTION: Prince of Wales Island and adjacent islands south of Sumner Strait and west of Kashevarof Passage.

BACKGROUND

The collecting of biological data and hunting information on black bears was begun in 1973, because of a regulation requiring sealing of hides and skulls. Unit 2 is an intensively logged and rapidly developing area with increasing road access and a growing human population; this trend will likely continue. Black bear populations are high and increasing because of creation of more favorable habitat in some areas by young-aged clearcuts. In the long term, these black bear populations can be expected to decline for a century or more as the logged areas mature.

POPULATION OBJECTIVES

To maintain an average spring skull size of at least 19.1 inches for males, or 18.8 inches for all males taken in one year.

METHODS

Black bear harvest data are collected through a mandatory check of all bears taken by hunters. A standard form is used to collect hunting, hunter, and basic biological data, including skull measurements. Anecdotal information is obtained from hunters during the sealing process. No population surveys were conducted.

RESULTS AND DISCUSSION

Population Status and Trend

Without survey data it is difficult to make definite statements about population trends; however, skull measurements have not changed significantly in 14 years. Furthermore, discussions with hunters and ADF&G personnel suggest that major changes in bear densities have probably not occurred. Based on this information, the population is either stable or increasing slightly.

Habitat changes through logging tend to increase bear numbers in certain habitat types for about 20 years, but after canopy closure, populations will likely drop. Over a 100-year rotation, bear populations should be significantly lower in logged areas than they had been prior to logging, because suitable habitat

will only be present in about 20% of the area (i.e., those areas cut within the previous 20 years).

Population Size:

Only rough estimates of population size are available. These are extrapolated from studies conducted in other areas. Unit 2 has some of the best black bear habitat in Southeast Alaska, and based on populations in similar areas of coastal North America, there are probably 1.5 bears/mi^2. The estimated population for Unit 2 is 5,100 bears.

Mortality

Season and Bag Limit:

The open season in Unit 2 is from 1 September to 30 June for subsistence, resident, and nonresident hunters. The bag limit is 2 bears, of which not more than one may be a blue or glacier bear.

Human-induced Mortality:

Several things about the harvest in 1988 have changed significantly from those of past years; specifically, the fall harvest was almost twice the previous high of 50 in 1985, and the harvest by nonresidents has greatly increased in both seasons. Finally, the 1988 harvest was 28% above the previous high of 160 in 1986.

Table 1 shows the annual harvest and sex ratios by season for the last 5 years and presents data on skull sizes, residency of hunters, and method of transportation. Skull sizes have remained fairly constant since measurements were first taken; they have been consistently above the management objective. In addition to a harvest of 204, 4 bears were killed illegally or accidentally. This type of mortality varies greatly from year to year, probably because of changes in reporting efforts.

Spring seasons have always provided the bulk of the harvest in Unit 2 and sex ratios run very high to males--generally in excess of 90%. Fall harvest, while still skewed toward the more mobile males, may be more representative of actual populations, because it contains more balanced sex ratios and younger bears.

Distribution of the harvest in Unit 2 is concentrated mainly around the roaded and more populated sections of Prince of Wales Island. Very few bears were taken from the smaller islands along the west side of the unit. The area from Polk Inlet through the Harris River to Craig and Klawock sustained the heaviest harvest, followed by the Naukati and El Capitan areas. One or two parties of serious bear hunters have the potential of significantly affecting the harvest in an area. For instance, one party killed 10 of the 13 bears taken from Moira Sound in 1988.

Hunters in Unit 2 salvaged meat from 42% of the bears killed. The incidental harvest (i.e., bears taken while engaged in other activities) during 1988 was 5% of the total.

Hunter Residency and Success. Nonresidents took about 35% of the harvest for the years 1983 through 1987. This proportion rose to 56% for 1988, with nonresidents taking 46% of the spring and 67% of the fall harvests. The most likely explanation is publicity through video tapes and magazine articles about black bear hunting on Prince of Wales Island. The large bears and high hunter success are attracting many out-of-state hunters. Nonresidents from 11 different states hunted in Unit 2 in 1988.

One hundred seventy eight hunters harvested 204 bears in 1988. Twenty six hunters took 2 bears each; 24 of these were nonresidents.

Harvest Chronology. Table 2 presents the harvest chronology for the last 5 years. The peak harvest normally occurs from 1 to 20 May and does not vary much from year to year. The first bears taken are almost invariably larger males; sows with cubs are seldom seen before mid-May.

In 1988 there were 48 bears harvested during the first 10 days in September, more than have ever been taken in any 10-day period since 1974. This was apparently a result of intensive interest by nonresidents in the early fall season. At least eight of these bears were taken by archers hunting along salmon streams.

Transport Methods. Hunters in Unit 2 mainly use highway vehicles, because of the extensive logging-road system and numerous scattered communities. Hunting near roads is also greater during the fall, when bears are more often found along streams and in logged areas. Spring hunting occurs more frequently along beach areas, and boats are often used during this season. Most of the airplane use is by nonresidents.

Natural Mortality:

There has been no substantial known natural mortality during the last 5 years. Winters have been mild, and no major losses of berry crops or fish runs have occurred.

Habitat

Major habitat changes occur after logging, which converts uneven-aged old growth to an even-aged stand. Early successional stages (3 to 25 years) provide excellent black bear habitat, but when the canopy closes, the understory disappears and the area provides little black bear habitat. In addition, large hollow trees and root masses used for denning are lost and will not be replaced under the current 100- to 125-year logging rotation. Under this rotational scheme, logged areas will be suitable black

bear habitat only about 20% of the time. The loss of denning habitat is harder to assess, but it may have a major impact on bear survival. In the short term, logging will probably increase bear numbers in Unit 2, but as the first rotation progresses and the early cuts mature, bear populations can be expected to drop.

Game Board Actions and Emergency Orders

The current regulations have been in effect for the past 15 years. No proposals have been made to change either season lengths or bag limits, and the current regulations have provided sufficient hunter opportunity and a harvest below sustainable-yield levels. The current regulations appear to satisfy demand and meet the goals and management objectives established for the unit. No changes are recommended.

CONCLUSION AND RECOMMENDATIONS

The black bear harvest in Unit 2 has fluctuated from year to year, but it has generally increased. This trend is expected to continue because of the expanding road system, the increase in people and new communities, and the attention being focused on Prince of Wales because of its number of large bears. The harvest is currently about 4% of the estimated 5,100 bears in Unit 2, and from personal observations and hunter contacts, it appears the bear population is stable or increasing slightly. The relatively low harvest has not had a discernable effect on the bear population, and the existing management objective of maintaining an average spring season skull size of 19.1 inches for males has been easily reached.

If the harvest continues to increase at the current rate, efforts should be directed at verifying estimated bear densities and assessing the illegal harvest of bears. It is probable the killing of nuisance bears around camps and communities is substantially higher than currently estimated.

Size of logged areas by successional stages should also be tracked through vegetative successional stages to help anticipate expected declines in bear populations as the younger clear cuts become nonproductive second growth. Efforts to educate the public about the trade offs between the timber harvest and the bear resource should be identified and publicized.

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Table 1. Black bear sport harvest statistics for Game Management Unit 2, 1984-1988.

Year	Season	Total harvest	No. males	No. females	Unk. sex	Nonres harves	(%)	Mean skull size in inches Males (n)	Females (n)	Transport used % air	boat	roads
1984												
	Spring	95	79	15	1	36	(38)	19.4(72)	17.0 (14)	28	34	38
	Fall	32	20	12	0	14	(44)	18.5(15)	16.4 (9)	27	19	54
	Year	127	99	27	1	50	(39)	19.2(87)	16.8 (23)	28	31	42
1985												
	Spring	58	46	11	1	8	(14)	19.7(42)	16.6 (9)	11	53	36
	Fall	50	27	20	3	9	(18)	18.2(19)	16.5 (17)	8	12	8
	Year	108	73	31	4	17	(16)	19.2(61)	16.6 (26)	9	32	59
1986												
	Spring	121	95	24	2	40	(33)	19.1(74)	16.8 (18)	18	29	52
	Fall	39	23	16	0	15	(38)	17.7(18)	16.5 (7)	12	9	77
	Year	160	118	40	2	55	(34)	18.8(92)	16.7 (25)	17	25	57
1987												
	Spring	114	107	7	0	41	(36)	19.6(98)	16.3 (6)	11	44	46
	Fall	40	27	12	1	10	(25)	17.1(23)	16.6 (9)	8	39	0
	Year	154	134	19	1	51	(33)	19.2(121)	16.5 (15)	10	33	57
1988												
	Spring	112	101	11	0	52	(46)	19.5(95)	17.5 (10)	10	34	56
	Fall	92	64	28	0	62	(67)	18.0(56)	16.9 (26)	27	10	63
	Year	204	165	39	0	114	(56)	18.9(151)	17.1 (36)	18	23	59

Table 2. Chronology of the black bear harvest in Unit 2, 1984-1988.

Date	1984	1985	1986	1987	1988
April 1-20	1	1	8	12	9
April 21-30	6	2	14	12	12
May 1-10	33	15	27	23	28
May 11-20	24	13	37	23	25
May 21-31	17	9	26	23	18
June 1-10	8	3	6	12	5
June 11-20	4	2	2	5	7
June 21-30	1	2	0	4	2
Sept 1-10	12	14	9	16	48
Sept 11-20	2	3	9	4	15
Sept 21-30	1	9	3	5	8
Oct 1-10	2	7	6	3	13
Oct 11-20	1	6	2	4	4
Oct 21-31	1	2	5	7	3
Nov 1-10	1	5	4	1	1
Nov 11-30	0	4	1	0	0

STUDY AREA

GAME MANAGEMENT UNIT: 5 (6,235 mi^2)

GEOGRAPHICAL DESCRIPTION: Cape Fairweather to Icy Bay, eastern Gulf Coast

BACKGROUND

Black bears are rarely found in Subunit 5B, which is dominated by the Malaspina Glacier; only 8 of 350 bears sealed since 1971 were reported from Subunit 5B. The uncommon blue or glacier bear color phase occurs in relative high abundance in Unit 5.

POPULATION OBJECTIVES

To maintain a 3:1 male:female ratio in the harvest and a population capable of supporting an annual harvest of at least 20 bears.

METHODS

Black bear hides and skulls were sealed by staff of the Departments of Fish and Game and Public Safety. Biological data collected from bear sealing included color phase, sex, skull size, and location of harvest. Incidental observations of bear dens were noted during aerial surveys for mountain goats. Anecdotal information was collected from hunters at the same time.

RESULTS AND DISCUSSION

Population Status and Trend

Precise population information is not available for black bears in Unit 5. Data gathered from sealing certificates suggests that the population is stable. While the harvest (Table 1) has increased since 1971, dimensions of male skulls have remained nearly constant (n = 246, mean = 17.3 in). However, without knowing hunter effort over the years, the population trend cannot be ascertained with certainty.

Mortality

Season and Bag Limit:

The open season in Unit 5 is from 1 September to 30 June for subsistence, resident, and nonresident hunters. The bag limit is 2 bears, of which not more than one may be a blue or glacier bear.

Human-induced Mortality:

Black bear harvests have ranged from 18 to 39 since 1984 (Table 1). With the exception of 1985, the harvest has remained similar, averaging about 25 bears per year. The reason for the higher-than-average harvest in 1985 is not known. The 1988 harvest of 21 was composed entirely of male bears. Two blue-color-phase bears were harvested in 1988, and the remainder were black. (Table 2).

The mean length-plus-width dimensions for 101 male bears skulls measured since 1984 has ranged from 17.1 to 18.0 inches and averaged 17.6 inches (Table 1). This compares closely to the 18-year average of 17.3 inches. The 1988 mean of 18.0 inches is the largest on record since 1972.

Hunter Residency and Success. Nonresident hunters harvested 20 black bears in 1988, which was 100% of the harvest. An additional bear was found dead in a wolf snare. Historically, nonresidents have taken an average of 63% of the harvest. There is no apparent reason for this year's difference. While total effort is unknown, field observations indicate no significant change from recent years. Successful hunters averaged 5.9 days per bear in 1988, compared with the 1983-1987 mean of 6.3.

Harvest Chronology. Most black bears are taken in Unit 5 during the spring season (1983-1987 mean = 90%). All of the bears harvested in 1988 were taken in the spring.

Transport Methods. Eleven (55%) successful hunters used aircraft and nine (45%) used boats in 1988, compared with 1983-1987 averages of 38% aircraft, 52% boats, and 10% highway vehicles. The relatively small percentage of highway vehicles used by successful hunters reflects that the entire harvest was taken by nonresidents.

CONCLUSIONS AND RECOMMENDATIONS

One part of the population objectives for black bear in Unit 5 is being met; i.e., the male to female harvest ratio has been 3:1 or greater since 1983. The second part of the objective (i.e., to maintain a population capable of supporting an annual harvest of 20 black bears) cannot be directly measured with existing procedures; however, skull size measurements may provide an indirect index of population trend. Based on recent skull sizes and the level of harvest, reductions in the population are not occurring. The rate of hunter effort would be useful information so that hunter success can be measured and tracked for indications of changes in bear numbers.

Both black and brown bears are generally regarded as pests by residents of Yakutat, rather than as a valuable wildlife

resource. Years of conflict over garbage management at the city dump, at a fish offal waste site, and at residences have exacerbated this situation. An "all bears are nuisances" philosophy prevails. The Division of Wildlife Conservation should continue to work with citizens to reduce human food attractants and raise the status of bears in the public eye.

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Table 1. Historical black bear harvest and skull sizes in Unit 5, 1984-1988.

Year	Males	Females	Unknown	Total harvest	Mean skull size	
					Males	Females
1984	19	5	1	25	17.1	15.3
1985	30	9	0	39	17.9	15.7
1986	18	6	0	24	17.2	15.9
1987	17	1	0	18	17.6	16.2
1988	21	0	0	21	18.0	NA
Totals	105	21	1	127		
Means	21	4	0	25	17.6	15.7

Table 2. Historical black bear harvest by residency and color phase in Unit 5, 1984-1988.

Year	Resident	Nonresident	Total	Color phase	
				Black	Blue
1984	11	14	25	22	3
1985	17	22	39	33	6
1986	2	22	24	24	0
1987	5	13	18	13	5
1988	1	20	21	19	2
Totals	36	91	127	111	16
Means	7	18	25	22	3

STUDY AREA

GAME MANAGEMENT UNIT: 6 (10,140 mi^2)

GEOGRAPHICAL DESCRIPTION: Prince William Sound and north Gulf Coast

BACKGROUND

Black bears are native to most of Unit 6, with the exception of Hinchinbrook, Montague, Kayak, Middleton, and several smaller islands in Prince William Sound. Within Unit 6 black bears utilize a number of habitat types, but coniferous forests appear to be used most frequently.

Black bear abundance has fluctuated in the past. Hunting pressure during the spring affected local populations adjacent to Valdez (McIlroy 1970) and Whittier (Modafferi 1982). Food abundance and adverse weather may have affected abundance more widely. Where black bears were sympatric with brown bears, abundance may have been a product of competition and predation.

Prior to sealing requirements that began in 1974, information on the historical harvests was vague, with annual harvests ranging from "practically nil" (Robards 1953) to well over 100 during 1965 and 1966 (McIlroy 1970). The number of sealed black bears peaked in 1976 at 158, dropped to a low of 66 in 1980, and rose to a high of 273 in 1985 (Griese 1989).

Harvest levels and total hunter effort were correlated to bear population levels between 1966 and 1977. McIlroy (1970) suggested the black bear population was declining in the Valdez Arm between 1966 and 1969, based on declining harvests and hunter success and increasing hunter-days per harvested bear. Unguided hunter-days per bear increased from 3.3 in 1966 to 4.4 in 1969. Modaferri (1978) sampled Whittier-based hunters in the spring of 1977 and found that they spent an average of 11 days hunting per bear harvested in a moderate to heavily hunted area. Similar correlations were lacking after 1978 (Griese 1989).

Density of black bears in Prince William Sound has been estimated on 3 occasions: Grauvogel (1967), 9.8 bears/mi^2 in good habitat; McIlroy (1970), 1.0 to 14.0 bears mi^2 in moderately to heavily hunted good habitat; Modafferi (1982) 1.3 bears/mi^2 in a moderately to heavily hunted area. McIlroy (1970) further estimated that densities might reach 25 bears/mi^2 in unhunted good habitat in Prince William Sound.

Increasing hunting pressure is a primary factor affecting bear abundance in Unit 6, while proposed clear-cutting of timber on private, state, and federal lands is the single greatest potential long-term problem (Griese 1989). Research efforts to

assess impacts of clear-cutting timber on black bear populations of Unit 6 are recommended (Griese 1989).

POPULATION OBJECTIVES

To maintain a black bear population that will sustain a 3-year-average annual harvest of 200 bears composed of at least 75% males, including a minimum average male skull size of 17.0 inches.

METHODS

The hide and skull of all harvested black bears (i.e., sport, subsistence, or DLP) are required to be sealed. Each hide is checked for sex identifiers, skull measurements are taken for total length and zygomatic width, and a rudimentary premolar is pulled for future age assessment. Hunters are asked to report on harvest date, days hunted, location of harvest, and type of transportation used to access their hunting areas.

RESULTS AND DISCUSSION

Population Status and Trend

While no population data are available, I believe that recent trends in sport harvest and hunter effort reflect peaks in bear availability in Subunit 6D. Although the sport harvest in Subunit 6D peaked in 1985 and again in 1988 (Figure 1A), an evaluation of average annual efforts for successful hunters (i.e., days hunted per harvested bear) indicated 1984 and 1985 as the period when the least effort was expended to harvest bears (Fig. 1B). Since then, hunting efforts and harvests have increased concurrently, resulting in a decline in the black bear population after 1986. The harvests reported from more distant hunting areas, as well as the varyingly increased harvest levels throughout the unit (Table 1), suggest a general population decline. The wide variance in hunter efforts depicted in Figure 1B for the remainder of Unit 6 and prior to 1983 for Subunit 6D appears to be the product of an insufficient sample size.

Mortality

Season and Bag Limit:

The open seasons for all hunters in Unit 6 is 1 January to 30 June and 1 September to 31 December. The bag limit is one bear; harvest of cubs or sows accompanied by cubs is prohibited.

Human-induced Mortality:

Sealing records indicate that a record harvest of 294 black bears were killed during 1988 (Table 1); record harvests occurred in Subunit 6A, Subunit 6B, and Subunit 6D. Individual recording areas (Table 1) experiencing record-high harvest levels were western Subunit 6A and the Port Gravina to Port Fidalgo, Port Wells, Port Nellie Jaun to Johnstone Bay, Bainbridge to Latouche Island, and Knight Island areas in Subunit 6D. Seventy-nine percent of the bear harvest came from Subunit 6D; the remainder, from Subunits 6A (11%), 6B (5%), and 6C (3%).

The 1988 harvest was 293 sport-killed black bears; 1 female was killed by a highway vehicle (Table 2). The sport harvest was 213 (73%) males, 64 (22%) females, and 16 (6%) unknowns.

The mean skull size of male bears killed during 1988 was 17.3 inches ($\underline{n}$ = 205) (Table 3). There has been no apparent trend in skull size for either males or females since 1984.

Hunter Residency and Success. In 1988 nonresident hunters harvested 94 bears, representing 32% of the total sport harvest (Table 4) as well as a record high. Nonresident hunters accounted for 30% of the spring harvest and 42% of the fall harvest (Table 4). The proportion of successful nonresident hunters has doubled from those observed over the prior 4 years.

Harvest Chronology. During 1988 hunters killed 250 (85%) black bears during the spring and 43 (14%) during the fall (Table 4). The peak in the spring harvest occurred during the 21st and 22nd week of 1988, following the previous 4-year trend (Fig. 2).

Transport Methods. During 1988, 65% of hunters used boats; airplanes provided transportation for 26% (Table 5). No change in the 5-year trend occurred.

Game Board Actions and Emergency Orders

The bag limits and seasons have remained unchanged since 1969. In 1986 the Board determined that black bears were customarily and traditionally hunted by qualifying rural residents of Unit 6 and residents of Yakutat. The season and bag limit for subsistence hunters remained the same as those for resident and nonresident hunters.

CONCLUSIONS AND RECOMMENDATIONS

Population objectives were partially attained. From 1986 to 1988, 73% of the harvest were males, falling short of the 75% objective; however, recommendations had been made previously to reduce it to 70% males (Griese 1989).

The objectives for harvest level and male skull size were attained; i.e., the 3-year annual mean harvest was 269 bears, and the most recent 3-year-mean (1986-1988) annual male skull size was 17.2 inches (n = 553). Continued high harvests may interfere with sustaining management objectives in the future.

The most notable deviations from historical means occurred in 1988. The success of nonresident hunters during the spring season dramaticaly increased, resulting in a record-high total harvest for the unit. Continued hunting efforts at the 1988 level or higher could be detrimental to the short-term stability of the population.

I recommend that we assess unsuccessful hunter effort in Unit 6. Requiring hunters to obtain a harvest ticket before entering the field would provide the opportunity to sample the unsuccessful black bear hunter. Total hunter effort would provide clearer evidence of population trends. Anticipating population declines and recommending appropriate regulations to moderate future fluctuations in hunter success and harvest may be demanded by the public. Furthermore, total hunting days spent afield could be assessed more easily to attribute a more accurate dollar value to the black bear resources.

I continue to recommend that research efforts be directed at assessing the impacts of clear-cutting large tracts of limited timber stands in Unit 6. As much as 50,000 acres of timber may be clear-cut over the next 10 to 20 years. Anticipating impacts to black bear populations is purely speculative at this time. Recommendations to land managers and the public to prevent long-term damage to a truly renewable resource should be our highest priority.

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SUBMITTED BY:

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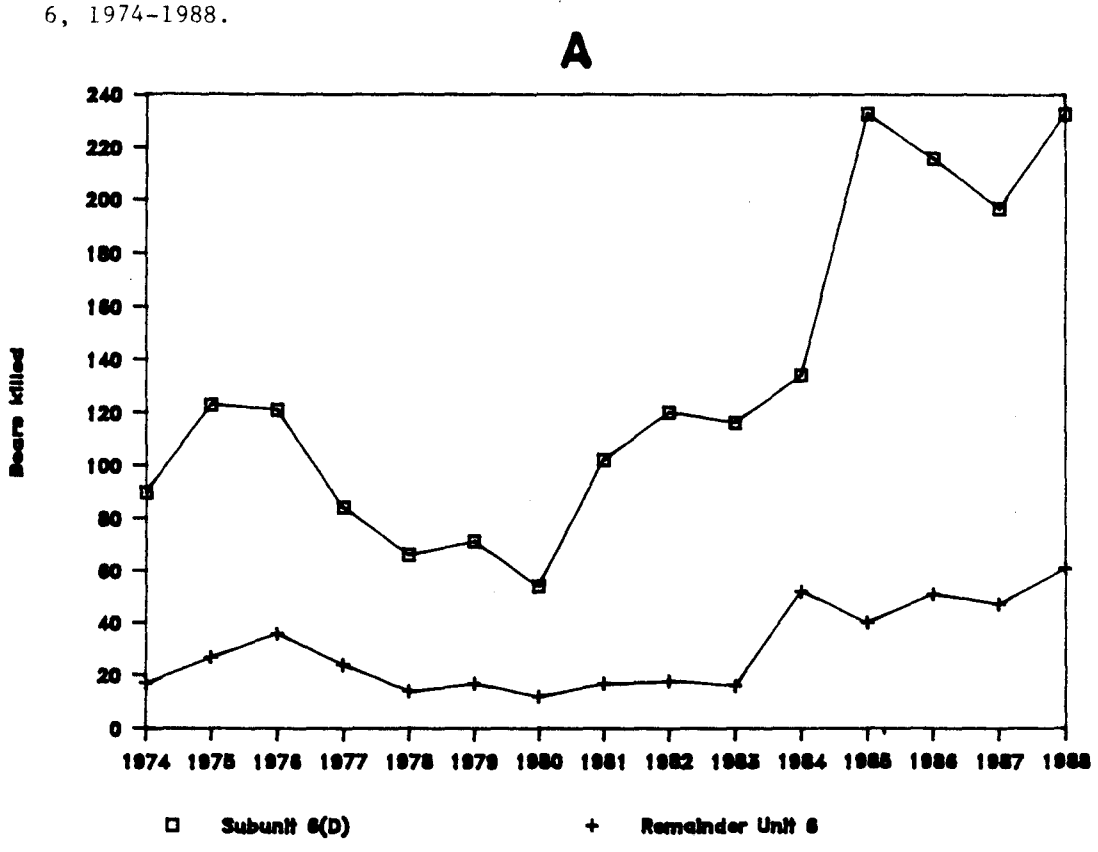
Management Coordinator

Figure 1. Annual black bear harvest (A) and average annual hunter-days expended by successful black bear hunters (B) in Subunit 6D vs. the remainder of Unit 6, 1974-1988.



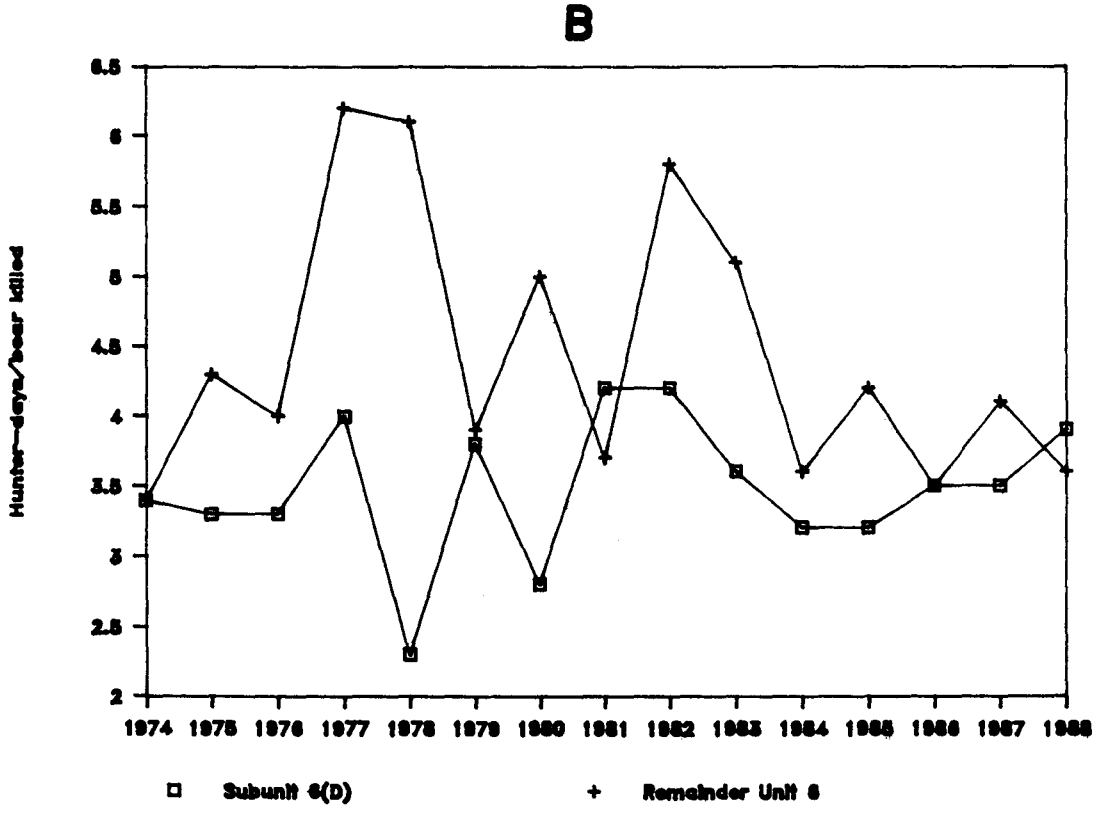


Figure 2. Chronology by week of year of black bear harvest by sport hunters in Unit 6, 1984-1988.

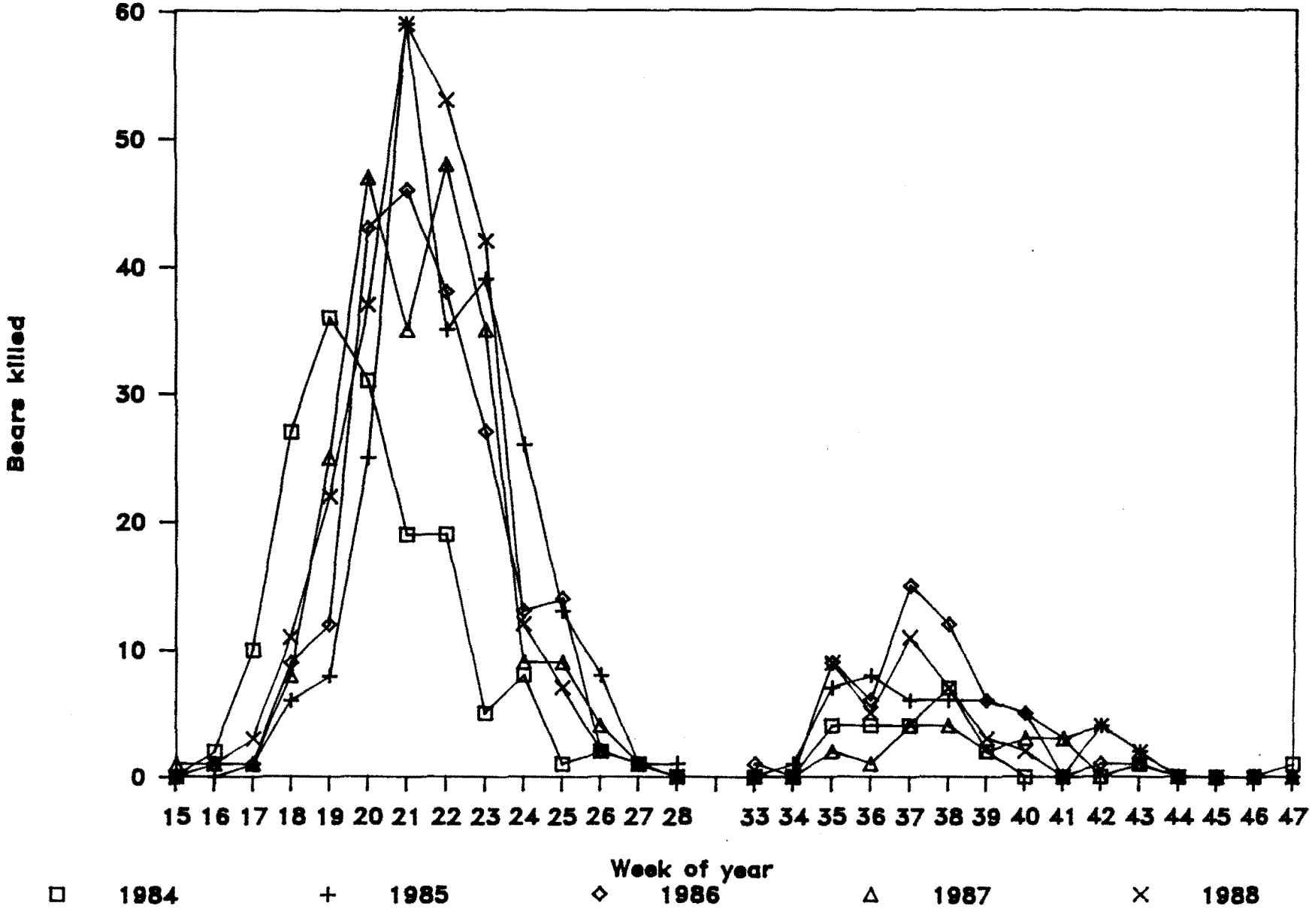


Table 1. Black bear harvest by subunit in Unit 6, 1984-1988.

Unit	Area	Number of Bears Sealed[a] 1984	1985	1986	1987	1988	Total	Mean
6(A)	Icy Bay-Ragged Mtns.							
	Icy Bay-Suckling Hills	8	13[b]	8	8	8	45	7.5
	Controller Bay-Ragged Mtns.	15	6	18	18	25[b]	82	16.4
	Nonspecific 6(A)	1	1	0	0	0	2	0.4
	Subtotal 6(A)	24	23	26	26	33[b]	132	26.4
6(B)	Ragged Mtns-Copper River	13	9	9	13	15[b]	59	11.8
6(C)	Copper River-Cordova	15	8	16	8	13	60	12.0
6(D)	Prince William Sound							
	Nelson Bay-Sheep Bay	11	1	11	9	12	44	8.8
	Port Gravina-Port Fidalgo	16	21	15	13	27[b]	92	18.4
	Valdez Arm	33	54[b]	39	31	25	182	30.3
	Columbia Bay-Eaglek Bay	4	24	38[b]	30	27	123	20.5
	Port Wells	20	51	29	39	53[b]	192	38.4
	Whittier-Culross Island	16	37[b]	34	20	26	133	22.2
	Port Nellie Juan-Johnstone Bay	21	35	37	43	44[b]	180	36.0
	Bainbridge/Evans/Latouche Islands	4	9	9	10	13[b]	45	9.0
	Knight Island	2	0	2	1	3[b]	8	1.6
	Naked/Peak/Storey/Perry Islands	0	0	0	0	0	0	0.0
	Nonspecific 6(D)	7	1	2	1	3	14	2.8
	Subtotal 6 (D)	134	233[c]	216	197	233[c]	1013	168.8
Unit 6 - Non specific		0	0	0	1	0	1	0.2

Table 1. Continued.

Unit	Area	Number of Bears Sealed[a] 1984	1985	1986	1987	1988	Total	Mean
Total		186	273	267	245	294[b]	1265	253.0

[a] Includes all bears reported to be killed
[b] Record high value for area (1974-1988).
[c] Equaled record high value for area (1974-1988).

Table 2. Black bear reported harvest summary by sex in Unit 6, 1984-1988.

Year	Hunting mortality							Other mortality		Total reported kill
	Males	%	Females	%	Unknown	%	Total	DLP[a]	Other	
1984	139	76	31	17	14	8	184	2	0	186
1985	201	74	56	21	13	5	270	3	0	273
1986	183	70	72	27	8	3	263	4	0	267
1987	189	78	54	22	1	<1	244	1	0	245
1988	213	73	64	22	16	6	293	0	1	294
Total	925	73	277	22	52	4	1254	10	1	1265
Mean	185		55.4		10.4		250.8	2	0.2	253

[a] Defense of life or property.

Table 3. Black bear mean skull size by sex in Unit 6, 1984-1988.

Year	Male		Female	
	Mean skull size[a] (in.)	Sample size	Mean skull size[a] (in.)	Sample size
1984	17.3	130	15.3	27
1985	17.2	191	15.6	52
1986	17.2	169	15.7	63
1987	17.1	179	15.8	50
1988	17.3	205	15.5	64
Total		874		256
Mean	17.2	174.8	15.6	51.2

[a] Skull size equals total length plus zygomatic width.

Table 4. Black bear sport harvest chronology, sex and hunter residency in Unit 6, 1984-1988.

Year	Spring[a]			Fall[b]			Total		
	Harvest	Percentage males	Percentage nonresident hunters	Harvest	Percentage males	Percentage nonresident hunters	Harvest	Percentage males	Percentage nonresident hunters
1984	161	76	16	23	70	22	184	76	16
1985	221	75	10	49	74	43	270	74	16
1986	207	74	11	56	54	38	263	70	17
1987	223	79	17	21	67	48	244	78	20
1988	250	75	30	43	58	42	293	73	32
Total	1062			192			1254		
Mean	212.4	75.7	17.2	38.4	63.0	39.1	250.8	73.8	20.6

[a] 1 January-30 June.
[b] 1 September-31 December.

Table 5. Successful black bear hunter transportation methods in Unit 6, 1984-1988.

Year	Method of transportation[a]										
	Airplane	%	Boat	%	3-4 wheeler	%	Walk	%	Other/ unknown	%	Total
1984	46	25	113	61	1	<1	11	6	13	7	184
1985	55	20	179	66	0	0	12	4	24	8	270
1986	71	27	160	61	0	0	9	3	23	8	263
1987	58	24	165	68	1	<1	7	3	13	5	244
1988	77	26	190	65	0	0	4	1	22	7	293
Total	307		807		2		43		95		1254
Mean	61.4	24	161.4	64	0.4	<1	8.6	3	19.0	8	250.8

[a] Primary means of transport to hunt area by successful hunters only.

STUDY AREA

GAME MANAGEMENT UNITS: 7 and 15 (10,038 mi^2)

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

BACKGROUND

Black bears are relatively abundant and widely distributed on the Kenai Peninsula. They are most consistently associated with lowland forest habitats; however, seasonal use of subalpine and alpine habitats also occurs.

Schwartz and Franzmann (1988) conducted a 5-year study of the ecology of black bears in the northern Kenai Lowlands (Subunit 15A). Their research identified the black bear as an important predator of young moose calves.

Holderman (1987) analyzed recent historical black bear harvest data from the Kenai Peninsula in a previous report. Between 1980 and 1987, fall black bear harvests composed 51% of the total harvest, varied widely, and were derived primarily from alpine locations scattered throughout the Kenai Mountains. Spring black bear harvests showed less annual variation in magnitude, increased at the linear rate of 10.4 bears per year, and were derived primarily from a relatively few traditional hunting areas located in the coastal portions of Subunit 15C and along the Sterling and Seward Highway corridors in Unit 7.

POPULATION OBJECTIVE

To maintain a black bear population that will sustain a 3-year average annual harvest of 200 bears composed of at least 60% males.

METHODS

No effort has been made to extensively survey black bear populations because of the difficulties associated with sighting bears in forest habitats; consequently, assessments of abundance and distribution rely heavily on the cumulative knowledge and experience of Department biologists. A mandatory sealing program has provided information concerning the distribution, magnitude, and sex-age composition of black bear harvests on the Kenai Peninsula since 1973. Sex ratios of bear harvests supplement the Department's assessment of black bear population status.

RESULTS AND DISCUSSION

Population Status and Trend

Schwartz and Franzmann (1988) determined that there were 1 black bear/1.5 mi^2 of suitable habitat in the northern Kenai Lowlands. Although current information is insufficient to make accurate estimates of population size and trend, field observations made by Department personnel and others indicate that black bears remain abundant throughout the Kenai Peninsula.

Mortality

Season and Bag Limit:

There is no closed season in Units 7 and 15. The bag limit for subsistence, resident, and nonresident hunters is 3 bears. The taking of cubs or females accompanied by cubs is prohibited.

Human-induced Mortality:

The reported sport harvest was 159 black bears, including 58 bears in Unit 7 and 101 bears in Unit 15 (Table 1). The 1988 annual harvest was 35% lower than the previous 5-year mean, 22% lower than the 1987 harvest, and the 3rd-lowest black bear harvest since 1980. The peninsula-wide sex composition was 64% males, 33% females, and 3% unspecified (Table 2). The sex composition of the harvest by unit was 60% males, 33% females, and 7% unspecified in Unit 7 and 66% males, 33% females, and 1% unspecified in Unit 15. The 3-year-average annual harvest was 200 black bears/year, and harvest sex composition was 62% males, 36% females, and 2% unspecified. The sex composition of harvests in 5-year increments showed the percentage of males increasing in Unit 15 and no clear trend in Unit 7 (Table 2).

Hunter Residency and Success. Nonresidents have taken from 7% to 20% of the annual black bear harvest since 1980. In 1988, 9% of the harvest was taken by nonresidents.

Harvest Chronology. The spring harvest of 30 bears for Unit 7 declined by half from that for 1987 and was substantially lower than the 4-year mean of 49 (Table 2). The spring harvest for all of Unit 15 was also lower than those for previous years, as was the reported spring harvest along the coastal zone of Subunit 15C (Table 3).

CONCLUSIONS AND RECOMMENDATIONS

The 1988 peninsula-wide black bear harvest dropped substantially from those of previous years. The relatively small spring harvest probably resulted from cooler-than-average temperatures and an abnormally deep snowpack that lingered into late May and early June on low-elevation foraging areas. Since little spring

forage was available in April and May, these conditions may have prolonged the denning period or in some way disrupted normal spring foraging behavior. Additionally, the unusually cool spring and late snow may have depressed bear hunting pressure and success. Black bear harvests have been declining since 1985.

The current 3-year-average (1986-1988) harvest and the sex composition of the harvest met the Department's population objectives; however, since these guidelines could lend to overharvesting, decisions to change seasons and bag limits should at least be augmented by information about long-term trends in harvest magnitude and the geographic distribution of harvests. If care is taken to consider these factors, current population objectives are probably adequate to maintain a healthy bear population.

I believe that there exists enough evidence about the intensity and spatial patterns of spring black bear mortalities to warrant closer inspection. I recommend that spring harvest areas be more clearly delineated, so that their relative position to each other, to fall harvest sites, and to the overall black bear range can be more completely appreciated. Since reproductive parameters and rates of natural mortality have been estimated for black bear populations inhabiting the northern Kenai lowlands (Schwartz and Franzmann 1988), it might be possible to use computer simulations to explore how localized spring harvests affect black bear population dynamics. During 1989, I will discuss the possibility and potential ramifications of local overharvesting in black bear populations with staff experts. Finally, I recommend the inclusion of this subject into the itinerary of any forthcoming regional or statewide discussions concerning black bear harvest management.

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SUBMITTED BY:

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Table 1. Summary of black bear sport harvests on the Kenai Peninsula, 1984-1988.

Year	Unit 7		Unit 15		Totals	Percentage change
	Spring	Fall	Spring	Fall		
1984	41	22	77	78	218	--
1985	47	82	113	132	374	+ 72
1986	43	51	64	79	237	- 36
1987	63	29	75	38	205	- 14
1988	30	28	44	57	159	- 22

Table 2. Number and percentage of males in the reported black bear harvests in 5-year increments on the Kenai Peninsula, 1975-1988.

5-year increment	Unit 7		Unit 15		Total	
	No.	%	No.	%	No.	%
1975-1979	183	59	265	62	448	60
1980-1984	205	66	370	61	575	63
1985-1988	222	59	404	67	626	64

Table 3. Reported spring black bear harvests along the coastal zone of Subunit 15C from the head of Kachemak Bay southeryly to Gore Point, 1984-1988.

Coastal interval	1984	1985	1986	1987	1988	Totals
Bradley River-Glacier Spit	2	--	--	2	1	5
Halibut Cove-Jakalof Bay	6	15	8	6	4	39
Kasitsna Bay-Point Adam	5	7	4	3	3	22
Koyuktolik Bay-Chugach Bay	2	10	4	8	3	27
Windy Bay-Gore Point	8	7	3	10	4	32
Totals	23	39	19	29	15	125

STUDY AREA

GAME MANAGEMENT UNIT: 11 (14,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Wrangell Mountains

BACKGROUND

Black bears are considered numerous in those portions of Unit 11 where favorable forest habitat exists. Harvests have averaged 11 (range = 0-32) black bears per year since 1973, with wide yearly fluctuations in the number of bears taken and no trends evident. Black bears are gaining in stature as a desirable big game animal, and black bear hunting appears to be increasing in popularity.

POPULATION OBJECTIVES

To maintain the existing population of black bears with a sex and age structure that will sustain a harvest composed of at least 60% males.

METHODS

The black bear harvest was monitored by interviewing successful hunters and sealing all black bears presented for examination. Skulls of sealed bears were measured, sex of bears was determined, and a premolar tooth was extracted for future aging.

RESULTS AND DISCUSSION

Population Status and Trend

Black bear surveys to determine population status have not been conducted in Unit 11; however, field observations and harvest data suggest black bears are abundant wherever suitable habitat occurs. The lower Chitina River Valley appears to be especially favorable bear habitat; salmon are available. The black bear population in this area is the highest in the unit, and may be increasing.

Mortality

Season and Bag Limit:

The hunting season in Unit 11 remains open throughout the year. The bag limit for subsistence, resident, and nonresident hunters is 3 bears.

Human-induced Mortality:

Hunters reported harvesting 10 black bears in 1988, which is about the same as that for 1987 but slightly higher than the 10-year (1978-87) mean of eight (Table 1). The mean skull size for all males (n = 9) was 16.7 inches in 1988, similar to the 15-year (1973-87) mean of 16.9 inches. Only 1 female was taken in 1988; its skull size was 15.7 inches, similar to the 15-year mean of 15.6 inches.

Hunter Residency and Success. Only 1 (10%) nonresident took a black bear during 1988. Nonresidents have averaged 3 bears per year, or 28% of the harvest in Unit 11 since 1973. During 1988 the only successful nonresident did not report the use of a guide. Five Glennallen residents took a bear in Unit 11, while the remainder of the resident harvest was taken by nonlocal residents. Successful bear hunters spent an average of 2.2 days afield during 1988.

Data obtained from sealing certificates indicate 60% of the successful hunters were specifically hunting black bears. The remainder reported taking them incidentally to other hunting activities. In 1989, 70% of the successful hunters salvaged some or all of the meat, compared with only 30% during 1987. There were no black bears reported harvested over bait during 1988 in Unit 11.

Harvest Chronology. Four bears (40%) were taken in the spring, and six (60%) were taken during the fall. Since 1973, 73% of the black bear harvest occurred during the fall season.

Transportation Method. Aircraft, boats, and highway vehicles each accounted for 30% of the transportation methods reported by the successful black bear hunters. One successful hunter reported the use of an ORV (10%).

Game Board Actions And Emergency Orders

No regulatory actions were taken in 1988 regarding black bear hunting in Unit 11.

CONCLUSIONS AND RECOMMENDATIONS

The black bear population in Unit 11 receives relatively light hunting pressure, because most of the unit is included in Wrangell Saint Elias Park/Preserve. National Park Service regulations prohibit sport hunting in portions of the unit designated as park. Subsistence hunting by local rural residents has continued in these areas; however, aircraft cannot be used to access park areas. This effectively closes much of the park to all hunting. Sport hunting and aircraft access is allowed in areas designated as preserve.

Black bear harvests are low and are believed to exert little influence on the unitwide bear population. The proportion of males in the harvest exceeded the 60% management guideline for black bear harvests in this unit. However, in adjoining Unit 13 I am recommending that the bag limit for sport hunters be reduced from 3 to 1 black bear per year. I recommend that the bag limit for Unit 11 also be reduced to 1 black bear per year for sport hunters, if the Unit 13 reduction is adopted. Because the units are adjacent, hunters frequently hunt in both units. Consistent bag limits in adjacent units reduces confusion, unintentional violations, and bootlegging of bears.

PREPARED BY:

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SUBMITTED BY:

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Table 1. Black bear harvests in Unit 11, 1971-1988.

Year	Total harvest	Males	(%)	Females	(%)	Unknown	Nonresident hunters	(%)	Season length
1971	0	0	0%	0	0%	0	0	0%	365 Days
1972	0	0	0%	0	0%	0	0	0%	365 Days
1973	32	21	66%	11	34%	0	18	56%	365 Days
1974	18	10	59%	7	41%	1	7	39%	365 Days
1975	6	3	50%	3	50%	0	1	17%	365 Days
1976	11	8	80%	2	20%	1	3	27%	365 Days
1977	16	10	71%	4	29%	2	3	19%	365 Days
1978	6	4	67%	2	33%	0	0	0%	365 Days
1979	10	8	80%	2	20%	0	4	40%	365 Days
1980	6	4	67%	2	33%	0	1	17%	365 Days
1981	8	6	75%	2	25%	0	1	13%	365 Days
1982	0	0	0%	0	0%	0	0	0%	365 Days
1983	12	8	67%	4	33%	0	1	8%	365 Days
1984	16	10	63%	6	37%	0	0	0%	365 Days
1985	2	1	50%	1	50%	0	1	50%	365 Days
1986	6	4	67%	2	33%	0	2	33%	365 Days
1987	10	8	80%	2	20%	0	5	50%	365 Days
1988	10	9	90%	1	10%	0	1	10%	365 Days
Totals	169	114	69%	51	31%	4	48	28%	

STUDY AREA

GAME MANAGEMENT UNIT: 12 (10,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Upper Tanana and White River drainages, including the northern Alaska Range east of the Robertson River and the Mentasta, Nutzotin, and north Wrangell Mountains

BACKGROUND

Human use of black bears in Unit 12 has been relatively low, despite liberal hunting regulations. Based on incidental observations, black bear abundance appears to be moderate in the forested areas that compose the best habitat. From the 1960's to the present, most black bear hunting has been confined to areas along the highway system and the Tanana River.

Interest in hunting black bears, particularly in the spring, has increased in recent years. Baiting has also increased in popularity because of its effectiveness and convenience, but some hunters still hunt bears on exposed south slopes during spring. Most fall black bear are harvested incidentally during hunts for other species. The meat is salvaged from most black bears taken in Unit 12.

MANAGEMENT OBJECTIVES

To maintain a black bear population capable of sustaining an annual average harvest of 30 bears.

METHODS

By regulation, all black bears harvested in Unit 12 must be sealed. The number and sex of bears taken are recorded during sealing; although premolar teeth are extracted from bears for age determination, they have not been sectioned or aged for several years.

RESULTS AND DISCUSSION

Population Status and Trend

While no census techniques have been applied to black bears in Unit 12, the population appeared stable, based on observations and hunter reports.

Population Size:

No firm estimate of black bear population size has been made in Unit 12. However, using a density range of 1 bear/3-6 mi^2 and a rough estimate of approximately 4,500 mi^2 of suitable forested black bear habitat, Unit 12 probably supports 750 to 1,500 black bears (see Distribution and Movements section).

Population Composition:

Data obtained from sealing certificates are not useful for determining population composition, because of the differential vulnerability of males and females to harvesting and the complete protection afforded cubs and females accompanied by cubs. In the Tok area, the bear population appears to be productive, based on numerous sightings of sow-cub and sow-yearling family groups.

Productivity:

In 1981 a low-key investigation of black bears was initiated, continuing through 1983. The study area was near Tanacross in the Tanana River drainage in northwestern Unit 12. Four bears, (i.e., 2 females, 2 males) were captured, collared, and periodically radio-tracked. Interior black bears are small; in the spring the adult male, younger adult male, mature sow, and subadult sow weighed 158, 95, 112, and 90 pounds, respectively. One 2-year-old female weighed an estimated 50 pounds.

Based upon casual observations, some black bear sows in Unit 12 attend offspring until the spring of their 3rd year (i.e., 28 months old). This is 1 year longer than black bears attend their offspring in more southern areas, and it could have an important impact upon useful productivity of Interior black bear populations; 16-month-old yearlings weigh only about 30 pounds, and they may be too small to fend for themselves. This is probably attributable to the relatively short period that bears experience net caloric gain for growth and fat accumulation.

Distribution and Movements:

Black bears are well distributed throughout the forested areas composing approximately 4,500 mi^2 of the total Unit 12 area (i.e., 10,000 mi^2). Denning occurs from the floor of the Tanana Valley up to elevations of 4,000 feet in the subalpine zone of the north face of the Alaska Range. During spring the bears move to areas where berries from the previous fall are still available. In some years, use of south-facing slopes with a bearberry understory and sparse aspen overstory is high in May and June. Use of overwintering lowbush cranberries is also high when they are available. When berries are unavailable, black bears have been observed eating quantities of young horsetails in lowland habitats. Some predation on young calf moose occurs at this time in late May to mid-June.

In summer bears move to lowland bogs where they seek blueberries. As plant phenology progresses, bears move up to subalpine habitats seeking later-ripening blueberries.

Home ranges were calculated for the 4 bears radio-collared during the period 1981 to 1983. One mature sow occupied a home range of 16 mi^2, based on 29 relocations during 3 summers. The 3-year-old sow inhabited a spring home range of 4 mi^2, based upon 8 relocations before she was killed as a nuisance bear in June 1983. The mature male had a home range of 63 mi^2 during 1983, based upon 15 relocations. The young adult male (i.e., 4 years old) occupied a 3-mi^2 area, based on 7 relocations. Based upon a known minimum population of 8 bears in the 36-mi^2 core study area, a density estimate of 1 black bear/3-6 mi^2 was calculated, but this is minimal.

Mortality

Season and Bag Limit:

There is no closed season for black bear in Unit 12; the bag limit is 3 bears. The harvesting of cubs and females accompanied by cubs is prohibited.

Human-induced Mortality:

In 1988 hunters reported taking 37 black bears in Unit 12, or 2.4-4.8% of the estimated population. This was the 2nd-highest harvest since 1984, when 45 bears were taken (Table 1). The 1988 harvest was higher than the 26 reported for 1987 and the 5-year average of 30 bears.

Interest in black bear hunting has increased during the past 5 years, and harvests have reflected that increased effort. Spring bear hunting, primarily over baits, is responsible for most of the increased harvest.

The harvest was well distributed along the highway system and major rivers. Of 37 bears for which harvest locations were reported, nine (24%) were taken in the main Tok River drainage, 11 (30%) in the main Tanana Valley, nine (24%) in the Chisana, three (8%) in the Little Tok, three (8%) in the Nabesna, and one each (3%) in the Tetlin and Robertson River drainages.

Twenty-one (57%) of the harveted bears were males, and 16 (43%) were females, compared with the 5-year harvest composition means of 63% males and 37% females. No trend in sex composition of the harvests is evident.

Although premolar teeth were collected from each black bear sealed in 1988, they were not prepared and aged. Mean skull size of 14 males in 1988 was 16.4 inches, compared with an average of 16.5 in 1987 and a long-term mean of 16.3 inches. Average skull size of 14 females taken in 1988 was 15.5 inches, larger than the

15.2 inches mean in 1987, but comparable to the long-term mean of 15.6 inches.

Hunter Residency and Success. Thirty (81%) of the successful black bear hunters in 1988 were Alaska residents, and seven (19%) were nonresidents (Table 1). For the past 5 years, 85% of the black bears harvested in Unit 12 have been taken by residents. Of 31 hunters reporting, 22 (71%) stated that they salvaged meat from the harvested bears, and all were residents. Many local Unit 12 hunters specifically hunt bears for the meat during the spring, when other big game seasons are closed; however, few local Natives consider bears to be a meat species. No measure of hunter success is available, but hunters using bait report consistently high success.

Harvest Chronology. Eighteen (49%) of the 37 bears taken were harvested during the spring (May-Jun) and 19 (51%) during the fall (Jul-Sep). Generally, bears are purposefully hunted during the spring, but they are taken incidentally during hunts for other species during the fall. Of 37 black bears for which the date of harvest is known, six (16%) were taken in May, 12 (32%) in June, two (5%) in July, 10 (27%) in August, and seven (19%) in September.

Transport Means. Most black bear hunters in Unit 12 use highway vehicles or boats for transportation.

Natural Mortality:

Most black bear mortality in Unit 12 is natural, because of the low rates of human-caused mortality. Grizzly bears kill black bears in Unit 12, and adult male black bears are the primary cause of cub bear mortality in other areas. Reports concerning the elusive behavior of females with cubs at baiting sites when adult males approach the area indicate adult males are important predators of cubs in this area as well.

Habitat Assessment and Enhancement

Approximately one-half of Unit 12 is considered to be black bear habitat because of its forested nature. Because grizzly bears are also moderately abundant, they limit black bear distribution to areas offering escape cover (climbable trees). All of the berry-producing plants mentioned previously are abundant throughout the unit; however, varying climatic conditions directly affect that production. It appears blueberries are highly preferred during summer and fall; cranberries are less preferred. Bearberries, or kinnikinnik, are eaten primarily during the spring. Bears in Unit 12 lack good available runs of salmon; also they experience a much shorter period of berry abundance than bears inhabiting coastal areas. For these reasons, I think black bears in Unit 12 are smaller, exist at lower densities, and the females attend their young longer than black bears inhabiting richer, coastal habitat.

The implementation of the Alaska Interagency Fire Management Plan is expected to enhance bear habitat over the long-term in Unit 12, because more area will be burned annually. Extensive areas of black spruce forest have understories nearly devoid of high-quality, preferred black bear food. If a greater percentage of the area is disturbed by fire, the average age of successional habitats will be lower. A younger, more diverse habitat mosaic would be expected to be more productive of bear food plants.

Game Board Actions and Emergency Orders

At the spring 1988 Game Board meeting, regulations were adopted that placed additional restrictions on hunting black bears over bait. This is expected to reduce annual harvests of black bears during late June and early July beginning in 1989. A few hunters who have hunted bears over bait during the fall will no longer be allowed to do so.

CONCLUSIONS AND RECOMMENDATIONS

During 1988 the management objective was met. After more restrictive regulations affecting the use of bait for black bear hunting are implemented in 1988, the management goal of providing for the greatest sustained opportunity to participate in hunting black bears is not expected to be met as well as it has been in recent years. Similarly, the management objective of maintaining an average harvest of at least 30 bears/year is not expected to be met.

Although undocumented, hunter success has apparently increased during the past few years as baiting has become more popular. This has had a two-fold effect: (1) local people have taken more bears for food to offset what they have lost because of depressed moose and caribou populations and (2) the bear harvests concentrated along the highways have very likely reduced the extent of black bear predation on calf moose, aiding the management of moose in those areas. It is recommended that black bear hunting regulations remain liberal for these reasons.

There is no indication that current harvests of black bears are excessive. Harvests are largely restricted to only a relatively small percentage of the unit and therefore probably have little effect on the overall bear population. Black bears are not hunted in most of the areas of Unit 12. Given the dispersal of subadult bears into unoccupied home ranges, there appears to be no problem with the present level or distribution of black bear harvests.

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Table 1. Reported black bear harvests in Unit 12, 1984-88.

Year	No. taken	No. males (%)	No. females (%)	No. res. (%)	No. nonres. (%)	No. spring (%)	No. fall (%)
1984	45	22(59)	15(41)	41(91)	4 (9)	21(47)	24(53)
1985	25	12(50)	12(50)	23(92)	2 (8)	13(52)	12(48)
1986	19	14(74)	5(26)	13(68)	6(32)	9(47)	10(53)
1987	27	21(78)	6(22)	25(93)	2 (7)	18(67)	9(33)
1988	37	21(57)	16(43)	29(81)	7(19)	18(49)	19(51)
Mean	31	18(63)	11(37)	26(85)	4(15)	16(52)	15(48)

STUDY AREA

GAME MANAGEMENT UNIT: 13 (23,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Nelchina Basin

BACKGROUND

Black bears are considered numerous in portions of Unit 13 having suitable forest habitats. Bear habitat and the unit's ability to support black bears have increased. Since 1950 fire suppression activities have all but eliminated the incidence of wildfire, and areas that were extensively burned years ago are again reforested. Overall, the unit now supports more closed-canopy forest, which is better black bear habitat, and less shrubland than it did before fire suppression started.

Harvest data are not available prior to 1973, when the sealing of black bears became mandatory. Average annual harvests have increased 34% from a mean of 62 bears between 1970-79 to an average of 83 bears per year since 1980. Black bears are gaining in status as a desirable big game animal, and black bear hunting appears to be much more popular than in the past.

POPULATION OBJECTIVES

To maintain the existing population of black bears with a sex and age structure that will sustain a harvest composed of at least 60% males.

METHODS

The black bear harvest was monitored by interviewing successful hunters and sealing all black bears presented for examination. Skulls of sealed bears were measured, sex was determined, and a premolar tooth was extracted for future aging.

RESULTS AND DISCUSSION

Population Status and Trend

Black bear surveys or censuses to determine the population status have not been conducted in most of Unit 13; however, field observations and harvest data suggest black bears are abundant wherever appropriate habitat exists. No discernable trend in bear abundance has been documented, but bears may be increasing as more of the unit becomes forested.

Population Size:

A black bear census was conducted in 1985 along a portion of the Upper Susitna River, in conjunction with the Susitna Hydroelectric Project (Miller 1987). Results indicated a density of 1 black bear/4.3 mi^2; however, the study area was only marginal black bear habitat, and the results may not be indicative of bear densities found in more favorable forested habitats within the unit. Because density estimates for bears in more favorable or typical forested habitat are not available, an extrapolated population estimate for Unit 13 has not been attempted. Overall, I consider black bear densities, even in good habitats, to be lower in Unit 13 than those in areas like the Kenai Peninsula.

Population Composition:

Radio-collared female black bears along the Upper Susitna River had an observed mean litter size of 2.1 (range = 1-4) cubs-of-the-year and 1.9 (range = 1-3) yearlings (Miller 1987).

Distribution and Movements:

Black bears usually are found in forested habitats, except during the fall and occasionally in the spring when they move into shrub zones to feed on berries and succulent vegetation (Miller 1987).

Mortality

Season and Bag Limit:

The hunting season in Unit 13 was open for 365 days. The bag limit for subsistence, resident, and nonresident hunters was 3 bears.

Human-induced Mortality.

The reported harvest of black bears in 1988 was 82, slightly below both the 1987 harvest of 85 bears and the 5-year (1983-87) average annual harvest of 83 (Table 1). Males composed 61% (n = 47) of the take and females 39% (n = 30). The mean skull size for males was 17.0 inches in 1988, greater than the 15-year mean of 16.6 inches. In 1988 the mean skull size for females was 15.2 inches, below the 15-year mean average of 15.5 inches. Subunit 13D had the highest reported harvest with 42 (52%) bears, followed by Subunit 13E with 25 (31%), Subunit 13A with two (2%), Subunit 13C with seven (9%), and Subunit 13B with five (6%).

Hunter Residency and Success. Nonresidents took 18 (22%) black bears during 1988. Overall, nonresidents have averaged 15 bears per year, or 20% of the harvest in Unit 13 since 1973. In 1988, 22% (18) of the successful hunters reported using a guide. Most guided hunters were nonresidents. Residents of Unit 13 killed 19

(23%) black bears in 1988, compared with 20 (24%) the previous year. The remaining 45 (55%) black bears were sealed by residents of other units.

Successful black bear hunters spent an average of 4.3 days in the field. Historically, hunter success has been much greater in Subunits 13D and 13E, which have accounted for 83% of the unitwide take for the past 7 years. Data obtained from bear sealing certificates indicate 65% (n = 53) of the successful hunters were specifically hunting black bears. Thirty-five percent (n = 29) reported taking a bear incidentally. In 1988, 69% (n = 56) of the successful hunters salvaged some or all of the bear meat, compared with 75% (n = 62) during 1987. Only 5 bears were reported killed at a bait station in 1988.

Harvest Chronology. The spring harvest was 32 (39%) black bears, compared with 50 (61%) in the fall of 1988. Since 1973, 66% of the black bear harvests in Unit 13 have occurred during the fall season.

Transport Methods. Among successful 1988 bear hunters, 39 (48%) reported use of highway vehicle or walking, 31 (38%) used aircraft, eight (10%) used ORV's, two (3%) used boats, and one (1%) used a horse. These proportions were similar to those observed in previous years. It appears that roadside bear populations received the greatest hunting pressure.

Natural Mortality:

Miller (1987) observed 35% mortality among cubs-of-the-year accompanying radio-collared females in the Upper Susitna River study area. In this study, natural mortality also occurred among radio-collared adult black bears. Miller (1987) felt predation by brown bears was an important source of natural mortality for black bears of all age classes.

Game Board Actions and Emergency Orders

No regulatory actions were taken during 1988 regarding black bears in Unit 13.

Habitat Assessment

Preferred habitat for black bears appears to be extensive tracts of spruce forests; more marginal habitat types include fingers of forested land bordering rivers and surrounded by upland shrub zones. Currently, Subunits 13D and 13E have the most extensive areas of heavily timbered spruce forests. Black bear habitat has improved in these subunits, because fire suppression has limited wildfire, resulting in more land with a closed-forest canopy. Land management objectives, however, call for a reduction in fire suppression activities in remote portions of Unit 13 to return to a natural fire regime, resulting in interspersion of forested tracts of different successional stages. This could result in a

reduction of the amount of black bear habitat available in the future.

CONCLUSIONS AND RECOMMENDATIONS

Harvest data is not currently collected from unsuccessful black bear hunters, thus we have no way of determining hunting effort. There has been an increase in the number of hunters seeking information on black bear hunting, and it appears that black bear hunting has become more popular. This trend is expected to continue as hunters seek alternative big game hunting opportunities because of increasing competition, shorter hunting seasons, and increased use of permit hunts for the more popular big game species. Because it is important to evaluate changes in hunting pressure and success rates as means of indicating bear abundance, this data should be collected. I recommend that a system of collecting hunting data from unsuccessful hunters be developed and implemented.

Black bear harvests have increased in Unit 13 during the 1980's. Overall, males predominated in the harvest, composing 65% over the past 15 years; however, since 1983 the percentage of males in the harvest has approached the management objective of maintaining 60% males. If current harvest levels are exceeded, the percentage of males may drop below the desired guideline. I recommend that the bag limit on black bears be reduced to 1 bear per year for sport hunters. This should reduce the overall take of females, because hunters would be more selective before shooting a bear, knowing they could not take another later in the year.

LITERATURE CITED

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Table 1. Black bear harvests in Unit 13, 1973-1988.

Year	Total harvest	Males	(%)	Females	(%)	Unknown	Nonresident hunters	(%)	Season length
1973	70	42	62%	26	38%	2	34	49%	356 days
1974	47	31	69%	14	31%	2	10	21%	365 days
1975	66	45	76%	14	24%	7	13	20%	365 days
1976	62	40	67%	20	33%	2	13	21%	365 days
1977	56	37	69%	17	31%	2	12	21%	365 days
1978	69	47	72%	18	28%	4	13	19%	365 days
1979	67	34	55%	28	45%	5	8	12%	365 days
1980	86	60	73%	22	27%	4	21	24%	365 days
1981	91	63	71%	26	29%	2	13	14%	365 days
1982	72	46	67%	23	33%	3	16	22%	365 days
1983	53	30	60%	20	40%	3	12	23%	365 days
1984	102	61	64%	34	36%	7	18	18%	365 days
1985	105	60	61%	39	39%	6	16	15%	365 days
1986	69	37	59%	26	41%	6	13	19%	365 days
1987	85	50	60%	34	40%	1	11	13%	365 days
1988	82	47	61%	30	39%	5	18	22%	365 days
Totals	1,182	730	65%	391	35%	61	241	20%	

STUDY AREA

GAME MANAGEMENT UNIT: 14A and 14B (4,780 mi^2)

GEOGRAPHICAL DESCRIPTION: Upper Cook Inlet

BACKGROUND

Limited information is available on the status of the black bear population in Subunits 14A and 14B. Population surveys have never been conducted. The population has been managed using hunter harvests and observations of general distribution and abundance of bears as reported by the staff and public. Annual harvests have more than doubled since 1982. Because population data are limited, it is not possible to determine whether the harvest has adversely affected the bear population. However, during the past 5 years, bear numbers may have been reduced in some drainages in Subunit 14A. Bear populations in Subunit 14B have probably remained stable, or at worst, decreased slightly in a few small areas.

POPULATION OBJECTIVES

To maintain a 3-year-mean harvest of 100 bears, of which 60% are males.

METHODS

Information about population status was derived primarily by indirect means, drawing primarily on black bear studies conducted in other places in Southcentral Alaska. Spring and fall harvest data were compiled from sealing information supplied by successful hunters.

RESULTS AND DISCUSSION

Population Status and Trend

Although no population surveys have been conducted, observations by hunters, guides, air-taxi operators, interested members of the public, and Department staff indicate that black bears in Subunits 14A and 14B are common. These observations have been too general in nature to detect any major changes in population status, but black bear numbers have probably remained relatively stable during the past decade. A slight decrease in bear numbers has probably occurred in some drainages, as a result of recent increases in the harvests. Both subunits have extensive forested habitat, but bears appear to be more abundant in Subunit 14A than in Subunit 14B.

Population Size

Schwartz et al. (1984) indicated that black bear density on the Kenai Peninsula (Unit 15) was approximately 1 bear/2 mi^2 in good habitat. Miller et al. (1987) found that black bear density along the Susitna River in Unit 13 was 1 bear/4.3 mi^2; he reported that black bear habitat there was almost always below an elevation of 2,500 feet, and he used this elevation to estimate the amount of habitat available. Miller (pers. commun.) indicated that most black bear habitat in Subunits 14A and 14B is below an elevation of 2,500 feet. Approximately 2,404 mi^2 (including lakes and rivers) in Subunits 14A and 14B are below 2,500 feet (1,492 mi^2 and 912 mi^2 in Subunits 14A 14B, respectively). Because the black bear density for Subunits 14A and 14B was lower than that for the Kenai Peninsula (1 bear/2 mi^2) and higher than Unit 13 (1 bear/4.3 mi^2), Miller (pers. commun.) estimated black bear density in the lower Matanuska/Susitna Valley at 1 bear/3-4 mi^2. Assuming that Subunits 14A and 14B have 2,404 mi^2 of black bear habitat and that the density is 1 bear/3-4 mi^2, the population estimate would be 600 to 800 black bears. If bear density were as high as 1 bear/2 mi^2, which is possible but not very likely, the population would be about 1,200 bears. Although no statistical confidence can be placed on these estimates, a range of 600 to 1,200 bears probably includes the actual number of black bears in the population. This estimate provides a useful range for basing management decisions.

Mortality

Season and Bag Limit:

The hunting season in Subunits 14A and 14B is open throughout the reporting period. The bag limit for subsistence, resident, and nonresident hunters is 3 bears.

Human-induced Mortality;

During 1988 black bear hunters harvested 74 bears in Subunit 14A and 8 bears in Subunit 14B. The combined harvest in Subunits 14A and 14B was the 3rd highest on record. The harvest in Subunit 14A was the highest ever recorded. Annual harvests in Subunit 14A increased significantly in the 1980's from levels observed in the late 1970's, particularly since 1985 (Table 1), while the mean harvest for Subunit 14B during these periods was essentially unchanged.

In 1988 male bears accounted for 59% of the harvest in Subunit 14A and 20% of the harvest in Subunit 14B. Since 1982 the harvest of females has gradually become more prevalent, increasing from 26% of the harvest in 1982 to 44% of the harvest in 1988 (Table 2). If considered separately, the data from each subunit are less clear with respect to trend in sex ratio in the harvest.

Data on the geographical distribution of the harvest by drainage from 1985 to 1988 (Table 3) indicate harvests have not shifted dramatically into new drainages; rather, harvests have occurred in the same relative proportions in the major drainages. Harvests also have increased proportionally in all the major drainages in these subunits.

Mean skull sizes of black bears from Unit 14, including Subunit 14C, have shown little change since 1982, fluctuating between 16.2 inches (1985) and 17.0 inches (1988) for males (Table 4) and 15.3 inches (1982) and 15.8 inches (1983) for females.

Despite urban development, few black bears have been taken in defense of life and property (DLP) in Subunits 14A and 14B. In 1988 no DLP mortalities were reported, and only three have been reported for the previous 6 years (Table 1). Reported DLP mortalities, however, do not represent the actual number killed; many people living in Unit 14 consider black bears nuisances, especially when the animals repeatedly visit homes or camp sites. A number of these "nuisance" bears were killed but not reported, or they were killed by people with hunting licenses and reported as hunter harvests. The actual DLP bear mortality was probably several times the reported figures.

Hunter Residency and Success. Most black bears harvested in Subunits 14A and 14B were taken by Alaska residents. From 1982 to 1988 resident hunters took at least 93% of the annual harvest, and in six of those 7 years residents took 100% of the harvest in either Subunit 14A or Subunit 14B (Table 5). Participation by nonresidents has generally increased, but at a lower rate in Subunit 14A than in Subunit 14B.

Harvest Chronology. Most black bears were taken during the spring. From 1983 to 1988, 40-78% of the harvest was taken in May and June, compared with 18-41% in September and October. Weekly harvests in the spring have varied slightly from year to year, depending on winter snow depth and the emergence of spring vegetation. In 1988, 52% of the harvest (54 bears) was taken during the 3-week period from 16 May to 8 June (Table 6).

The next most successful hunting period during the year was September; from 1982 to 1988 hunters took 16-36% of the annual harvest during September. The 6-year trend indicates an increasing harvest during the spring season and a stable or slightly decreasing harvest during the fall season.

Game Board Actions and Emergency Orders

The regulations that provide a year-round hunting season and a bag limit of 3 black bears have been in effect since statehood (1959). In the spring of 1988, the Board of Game amended the black bear baiting regulations throughout much of Southcentral Alaska, including Subunits 14A and 14B. Legal baiting was authorized only from 15 April to 15 June. Hunters were limited

to 2 registered bait stations. Two preprinted "bait station signs" bearing an exclusive registration number are issued to each applicant, and these cards must be displayed at each bait-station site. No changes were made to the other bear-baiting regulations already in effect. Hunters are still restricted from baiting within 1/4 mile of a maintained public road and within 1 mile of a house or permanent dwelling.

CONCLUSIONS AND RECOMMENDATIONS

Since 1982 the annual harvests of black bears in Subunits 14A and 14B have been steadily increasing. A record harvest of 100 bears for Subunit 14A and 14B occurred in 1987, (up from 45 in 1982). Although the harvest in 1988 was down slightly, the harvest of 76 bears established a new record for Subunit 14A. No data were available to determine whether the higher harvests occurred because of an increased success rate among hunters or increased hunting pressure from more hunters in the field. One factor that significantly contributed to the increased harvest was the increased use of bait stations by hunters, guides, and outfitters. During the 1987 hunting season, 12 of 43 successful hunters (28%) reported killing bears over bait; in 1988, 45 of 76 successful hunters (60%) used bait stations. Bait stations have proven to be an efficient means of harvesting bears, especially in forested habitat. Use of bait stations has increased as more hunters have become aware of their effectiveness. Beginning in 1983 outfitters started using and maintaining bait stations as a new service for clients (R. Graham, pers. commun.). The increase in the bear harvest after 1983 can be attributed in large part to the use of bait stations by outfitters, guides, and the general public.

Because the black bear harvest has significantly increased over the past 10 years, it would be desirable to determine the impact of recent harvest levels on the black bear population. Using reproductive rates estimated for a black bear population in Unit 13 and assuming low rates of natural mortality for all age classes, Miller and Miller (1988) estimated the sustainable exploitation rate of 11.3% annually for bears older than 1 year; when they used reproductive data from a more productive black bear population on the Kenai Peninsula, the estimated rate was 15.0%. Because the productivity of black bears in Unit 14 is probably within the range of the Kenai Peninsula and Unit 13 populations, maximum sustainable harvest rates of Unit 14 black bears (i.e., older than 1 year, assuming low natural mortality in all age classes) probably do not exceed 11-15% of the population annually. Depending on rates of natural mortality, maximum sustainable exploitation rates could be lower than 11-15%.

I estimate that the black bear population in Subunits 14A and 14B ranges from a low of 600 to 800 bears at a density of 1 bear/3-4 mi^2 to a high of 1,200 bears at a density of 1 bear/2 mi^2. If Subunits 14A and 14B have 800 black bears, the population could

sustain an annual harvest of 88-120 bears at exploitation rates of 11-15%; if there were 1,200 bears in the population a harvest of 132-180 bears would be possible. I believe that the population in Subunits 14A and 14B is closer to 800 bears than 1,200. Therefore, the 1988 harvest of 84 bears was close to sustained yield at an exploitation rate of 11% (88 bears); it would be below sustained yield if the exploitation rate were as high as 15% (120 bears).

In 1988, 90% of the black bear harvest from Subunits 14A and 14B came from Subunit 14A (1,492 mi^2 of black bear habitat). At a density of 1 bear/3-4 mi^2 the population would contain 373-487 bears. At an annual sustainable exploitation rate of 11%, the population could provide a harvest of 41-53 bears; if the sustainable exploitation rate were as high as 15%, 56-73 bears could be taken annually. The 1988 harvest in Subunit 14A was 76 bears, a figure higher than the most liberal sustainable exploitation rate postulated above. For the 1988 harvest to have been below sustained yield, bear density would have had to be higher than 1 bear/3 mi^2.

Although population estimates and exploitation rates were based on a number of assumptions, I also believe recent harvests have exceeded sustained yield for Subunit 14A for the following reasons: (1) the harvest of females has steadily increased in Subunit 14A, where the majority of the harvest has occurred, (2) in some years, the female harvest has exceeded the male harvest, and (3) the harvest figure of 76 bears does not include DLP mortalities.

The population objective for Unit 14 (including Subunit 14C) of maintaining a 3-year-mean harvest of 100 bears has been met. The mean harvest in Unit 14 during the past 3 years (1986-1988) was 112 bears (excluding DLP bears); however, most of the harvest occurred in Subunit 14A and exceeded sustained-yield levels in that subunit. Accordingly, the Subunit 14A bear population should be managed more conservatively. Until we can more accurately determine the bear density in Subunits 14A and 14B, I believe a prudent harvest management objective would be to keep harvests in Subunit 14A below 50 bears annually.

The current bag limit is 3 bears per regulatory year. In light of the recent increase in annual harvest and the increasing take of females, I recommend reducing the bag limit to 1 bear. Because only a small percentage of hunters take a 2nd or 3rd bear during the hunting season, it can be argued that reducing the bag limit to 1 bear per year will have little effect on reducing annual harvest; however, a liberal bag limit of 3 bears encourages hunters to shoot the 1st legal bear they see, regardless of its size or hide quality, because hunters know they will still have an opportunity to try for a "better" one. Also, a liberal bag limit promotes the perception bears are very abundant and the potential for overharvest is relatively low. Consequently, hunters tend to be less selective, and this

attitude can result in higher harvests. By advocating more conservative black bear hunting regulations, the Department can promote a more conservative hunting philosophy among the public.

The increased use of bear baiting as a hunting technique has contributed significantly to the increased harvests in the past 6 years. In 1987, 28% of the successful hunters in Subunit 14A and 14B took bears over baits; that number increased to 45% in 1988; and in Subunit 14A where most of the harvest occurred that figure was 59%. Bait stations are an effective means to take black bears, especially for someone who has limited time to hunt. Many hunters who use bait stations are "week-end" or "evening" hunters. Subunit 14A has a good road and trail system that allow hunters to check baits regularly without expending much time and effort. In contrast, Subunit 14B is less accessible, and running a bait station takes more work. This is reflected in the harvest data; no bears killed in Subunit 14B in 1988 were taken over bait.

Although recent annual harvests have probably exceeded sustained-yield levels in Subunit 14A, harvests may remain high or continue to increase temporarily because (1) spring bear hunting has become very popular in recent years and more hunters are afield than ever before and (2) the increasing use of baits in forested habitat has made bears more vulnerable to hunting than in the recent past. Bears that stayed in forested habitat or thick cover were seldom taken by "normal" hunting methods, but the use of bait stations has changed this situation, making these bears more vulnerable to harvest. Therefore, even though less bears may be available to hunters in Subunit 14A, more hunters are afield looking for those bears, and their hunting methods are more efficient.

Current hunting regulations allow the use of bait in the spring. If the bag limit is reduced and the black bear harvest remains high, I recommend reducing or eliminating the use of bear baiting.

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Table 1. Black bear harvest in Subunits 14A and 14B, 1976-1981 and 1982-1988.

	Hunter Harvest					
	Subunit 14A		Subunit 14B			
Year	No.	%	No.	%	Total	DLP[a]
1976	26	(68)	12	(32)	38	3
1977	34	(81)	8	(19)	42	1
1978	33	(60)	22	(40)	55	2
1979	27	(75)	9	(25)	36	1
1980	55	(60)	37	(40)	92	0
1981	49	(64)	27	(36)	76	2
Total	224	(66)	115	(34)	339	9
Mean	37.3		19.2		56.5	
1982	33	(73)	12	(27)	45	0
1983	52	(76)	16	(24)	68	2
1984	50	(68)	23	(32)	73	0
1985	51	(73)	19	(27)	70	0
1986	68	(78)	19	(22)	87	0
1987	72	(72)	28	(28)	100	1
1988	76	(90)	8	(10)	84	0
Total	402	(76)	125	(24)	527	3
Mean	57.4		17.9		75.3	

[a] Defense of Life or Property (DLP) kill is not included in harvest total.

Table 2. Sex of black bears harvested in Subunits 14A and 14B, 1982-1988.

Year	Subunit 14A				Subunit 14B				Total				Unknown	Total
	M	(%)	F	(%)	M	(%)	F	(%)	M	(%)	F	(%)		
1982	21	(72)	28	(38)	8	(80)	2	(20)	29	(74)	10	(26)	6	45
1983	27	(63)	16	(37)	12	(68)	2	(14)	39	(68)	18	(32)	11	68
1984	23	(53)	20	(47)	16	(76)	5	(24)	39	(61)	25	(39)	9	73
1985	23	(50)	23	(50)	11	(61)	7	(39)	34	(53)	30	(47)	6	70
1986	40	(62)	25	(38)	8	(47)	9	(53)	48	(59)	34	(41)	5	87
1987	33	(49)	34	(51)	21	(78)	6	(22)	54	(57)	40	(43)	6	100
1988	42	(59)	29	(41)	1	(20)	5	(80)	43	(56)	34	(44)	7	84
Total	209	(54)	175	(46)	77	(68)	36	(32)	286	(60)	191	(40)	50	527
Mean	29.9		25.0		11.0		5.1		40.9		27.3		7.0	

Table 3. Distribution of black bear harvest by major drainage in Subunits 14A and 14B, 1985-1988.

Subunit/Drainage	1985	Percent of subunit	1986	Percent of subunit	1987	Percent of subunit	1988	Percent of subunit	Total	Percent of subunit
14A										
Willow Creek	2	(4)	5	(7)	3	(4)	4	(5)	14	(5)
Susitna R.	3	(6)	3	(4)	2	(3)	7	(9)	15	(6)
(east bank)	15	(29)	31	(46)	22	(31)	24	(32)	92	(34)
Susitna R. Palmer,	9	(18)	6	(9)	5	(7)	4	(5)	24	(9)
Big Lake, Knik Arm	6	(12)	3	(4)	7	(10)	13	(17)	29	(11)
Matanuska R.	4	(8)	6	(9)	13	(18)	10	(13)	33	(12)
(west bank) Knik R.	11	(22)	12	(18)	13	(18)	9	(12)	45	(17)
(lower) Knik R.	1	(2)	2	(3)	7	(10)	5	(7)	15	(6)
(upper)										
Subtotal	51	(100)	68	(100)	72	(100)	76	(100)	267	(100)
14B										
Sheep R./Iron Cr.	6	(32)	2	(11)	5	(18)	2	(25)	15	(18)
Talkeetna R.	1	(5)	1	(5)	0	(0)	0	(0)	2	(2)
(S.E. bank)	2	(11)	2	(11)	6	(21)	1	(13)	11	(13)
Sunshine Cr.	6	(32)	10	(53)	11	(39)	4	(50)	31	(38)
Montana/Sheep Cr.	0		1	(5)	1	(4)	1	(13)	3	(4)
Kashwitna R.	4	(21)	3	(16)	5	(18)	0		12	(15)
Willow/Little Willow Creek										
Subtotal	19	(100)	19	(100)	28	(100)	8	(100)	82	(100)
Grand total	70		87		100		84		349	

Table 4. Mean skull size of black bears killed in Unit 14 (including Subunit 14C), 1982-1988.

Year	Skull size			
	Males		Females	
	n	$\bar{x}$	n	$\bar{x}$
1982	42	16.9	12	15.3
1983	48	16.6	22	15.8
1984	50	16.5	29	15.4
1985	46	16.2	35	15.3
1986	52	16.3	40	15.4
1987	57	16.7	52	15.5
1988	42	17.0	30	15.4
Total	337	116.2	220	108.1
Mean	48	16.6	31	15.4

Table 5. Residency of successful black bear hunters in Subunits 14A and 14B, 1982-1988.

Subunit	Year	Resident No.	Resident (%)	Nonresident No.	Nonresident (%)	Total
14A	1982	33	(100)	0	(0)	33
	1983	52	(100)	0	(0)	52
	1984	45	(90)	5	(10)	50
	1985	50	(98)	1	(2)	51
	1986	66	(97)	2	(3)	68
	1987	72	(100)	0	(0)	72
	1988	74	(97)	2	(3)	76
	Total	392	(98)	10	(2)	402
	Mean	56.0		1.4		57.4
14B	1982	9	(75)	3	(25)	12
	1983	16	(100)	0	(0)	16
	1984	23	(100)	0	(0)	23
	1985	18	(100)	1	(5)	19
	1986	17	(89)	2	(11)	19
	1987	26	(93)	2	(7)	28
	1988	8	(100)	0	(0)	8
	Total	117	(93)	8	(7)	125
	Mean	16.7		1.1		17.9
14A & 14B	1982	42	(95)	3	(7)	45
	1983	68	(100)	0	(0)	68
	1984	68	(93)	5	(7)	73
	1985	68	(97)	2	(3)	70
	1986	83	(95)	4	(5)	87
	1987	98	(98)	2	(2)	100
	1988	82	(98)	2	(2)	84
	Total	509	(96)	18	(4)	527
	Mean	72.3		2.6		75.3

Table 6. Chronology of annual black bear harvest in Unit 14 (including Subunit 14C), 1983-1988.

Date		1983		1984		1985		1986		1987		1988	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
May	1-8	3	(4)	2	(2)	1	(1)	5	(5)	2	(2)	5	(5)
	9-15	7	(8)	4	(4)	3	(3)	4	(4)	2	(2)	2	(2)
	16-22	7	(8)	12	(13)	5	(5)	6	(6)	12	(9)	10	(10)
	23-31	8	(10)	12	(13)	6	(6)	14	(13)	17	(13)	21	(20)
	Total	25	(30)	30	(32)	15	(15)	29	(28)	34	(26)	38	(37)
June	1-8	8	(10)	7	(7)	7	(7)	7	(7)	10	(8)	23	(22)
	9-15	3	(4)	6	(6)	6	(6)	4	(4)	9	(7)	6	(6)
	16-22	3	(4)	0	(0)	6	(6)	3	(3)	8	(6)	6	(6)
	23-30	5	(6)	4	(4)	4	(4)	8	(8)	8	(6)	8	(8)
	Total	19	(24)	17	(17)	23	(23)	22	(22)	35	(27)	43	(42)
July	1-8	5	(6)	0	(0)	2	(2)	7	(7)	5	(4)	0	(0)
	9-15	1	(1)	4	(4)	3	(3)	3	(3)	6	(5)	2	(2)
	16-22	1	(1)	2	(2)	5	(5)	0	(0)	4	(3)	0	(0)
	23-31	2	(2)	3	(3)	1	(1)	2	(2)	2	(2)	0	(0)
	Total	9	(10)	9	(9)	11	(11)	12	(12)	17	(14)	2	(2)
Aug.	1-8	1	(1)	1	(0)	0	(2)	2	(1)	1	(1)	1	(1)
	9-15	1	(1)	1	(1)	1	(1)	0	(0)	2	(2)	0	(0)
	16-22	2	(2)	2	(2)	2	(2)	4	(4)	2	(2)	0	(0)
	23-31	0	(0)	2	(2)	3	(3)	1	(1)	0	(0)	1	(1)
	Total	4	(4)	6	(6)	6	(6)	7	(6)	5	(5)	2	(2)

Table 6. Continued

Date		1983 No.	1983 (%)	1984 No.	1984 (%)	1985 No.	1985 (%)	1986 No.	1986 (%)	1987 No.	1987 (%)	1988 No.	1988 (%)
Sept.	1-8	9	(11)	16	(17)	17	(18)	10	(10)	8	(6)	10	(10)
	9-15	5	(6)	5	(5)	5	(5)	10	(10)	5	(4)	3	(3)
	16-22	6	(7)	6	(6)	7	(7)	4	(4)	5	(4)	2	(2)
	23-30	0	(0)	3	(3)	5	(5)	3	(3)	5	(4)	2	(2)
	Total	20	(24)	30	(24)	34	(36)	27	(27)	23	(18)	17	(17)
Oct.	1-8	4	(5)	2	(2)	3	(3)	2	(2)	2	(2)	1	(1)
	9-15	2	(2)	1	(1)	1	(1)	3	(3)	2	(2)	1	(1)
	16-22	0	(0)	0	(0)	0	(0)	4	(4)	1	(1)	0	(0)
	23-31	0	(0)	0	(0)	1	(1)	1	(1)	2	(2)	0	(0)
	Total	6	(7)	3	(3)	5	(5)	10	(10)	7	(7)	2	(2)
Grand Total		83		95		94		105		129		104	

[a] Column percentages within and among months may not add to 100% due to rounding error.

STUDY AREA

GAME MANAGEMENT UNIT: 14C (2,091 mi^2)

GEOGRAPHICAL DESCRIPTION: Anchorage area

BACKGROUND

Black bear harvest records were first obtained during the 1973-74 regulatory year. The mean annual harvest from 1973 through 1981 was 10 bears. From 1982 through 1988, the mean annual harvest more than doubled to 21 bears and there was a significant decline in the percentage of males in the harvest. These changes coincided with the legalization of bear baiting in 1982.

POPULATION OBJECTIVES

To maintain a black bear population that will sustain a 3-year-average annual harvest of 100 black bears composed of at least 60% males.

METHODS

The black bear harvest was monitored by sealing skulls and hides of black bears. Skulls of sealed bears were measured, sex was determined, a premolar tooth was extracted for future aging, and information on the date and location of harvest and on hunter effort was obtained from the hunters.

RESULTS AND DISCUSSION

Population Status and Trend

Information derived from black bear harvest statistics indicate that the population in Subunit 14C is stable or decreasing slightly.

Population Size:

Studies in adjacent units indicate that black bears exist in suitable habitat at densities of 1 per 7-13 mi^2 (Miller 1987, Schwartz et al. 1983). Much of black bear habitat in Subunit 14C is similar to that which exists in these study areas. If the subunit's bear density is similar, it likely supports from 150 to 250 black bears.

Distribution and Movements:

Black bears are found throughout Subunit 14C in nonglaciated terrain below elevations of 3,000 feet. There have been no

investigations of black bear movements or distribution in Subunit 14C. Incidental observations and harvest records indicate that black bears frequent lowland timbered areas during the spring and early summer and move to upland timbered and subalpine habitat during late summer and early fall.

Mortality

Season and Bag Limit:

In Unit 14, excluding Subunit 14C, the hunting season is open throughout the reporting period (i.e., no closed season). The bag limit for subsistence, resident, and nonresident hunters is 3 bears. There is no subsistence season in Subunit 14C. In Subunit 14C in Chugach State Park, the hunting season is from 8 September to 20 May and the bag limit is 1 bear.

Human-induced Mortality.

Twenty-one black bears were harvested in Subunit 14C in 1988, of which 12 (57%) were males (Table 1). Harvests of black bears ranged from 4 to 16 bears annually ($\bar{X}$ = 10) between 1973 and 1981. Following the legalization of baiting in 1982, the mean annual harvest more than doubled to 21 over the next 7 years. Ten additional bears were taken in defense of life and property between 1983 and 1988. The proportion of males in the harvest has shown a declining trend since the early 1980's.

Hunter Residency and Success. Residents of Subunit 14C were responsible for 52% of the harvest of black bears during 1988. Residents of the remainder of Unit 14 accounted for 33% of the harvest, and nonresidents took 10%. Only one bear was taken by a state resident residing outside of Unit 14.

Harvest Chronology. All of the reported black bear harvest in 1988 occurred between May and September. The harvest percentage by month was as follows: May, 43%; June, 38%; July, 0%; August, 0%; and September, 19%. Most of the bears (71%) were taken from 15 May to 15 June (Table 2).

Transport Methods. Transport methods have not changed significantly for several years (Table 3). In 1988 most bears were taken with the use of a highway vehicle (33%) or aircraft (43%). Off-road vehicles (5%) and boats (19%) were also used.

Habitat Assessment

The abundance of black bears throughout much of the subunit suggests that the habitat supports a substantial bear population.

Game Board Actions and Emergency Orders

In March 1988 the Game Board eliminated black bear baiting in Subunit 14C. This action came about as a result of the greatly increased harvest over the past 4 years and a precipitous decline in the percentage of males in the harvest. The 1988 closure was a follow-up action to the partial closure implemented in 1987 within the southern portion of the subunit. The 1987 closure resulted from conflicts between persons baiting bears and other recreationists near bait stations.

CONCLUSIONS AND RECOMMENDATIONS

Black bear baiting was prohibited throughout Subunit 14C beginning 1 July 1 1988. During all of 1988, 21 black bears were harvested, four over bait during May and June before the closure began. The 1988 harvest equalled the 1982-1987 mean of 21 bears achieved during legalized baiting, but it was less than the record harvest of 29 bears in 1987. During 1988 the percentage of males in the harvest was 57%, 10% higher than the 10-year low of 47% in 1986. With the elimination of baiting, the total harvest and percentage of males in the harvest should, within a few years, allow the population to meet the management objective of at least 60% males.

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Table 1. Annual harvest of black bears in Subunit 14C, 1979-1988.

Year	Male	Female	Unknown	Total	Percent male
1979	7	0	4	11	--
1980	8	4	1	13	67
1981	9	2	2	13	82
1982	15	2	1	18	88
1983	11	4	0	15	73
1984	16	7	2	25	70
1985	15	8	0	23	65
1986	8	9	1	18	47
1987	14	13	2	29	52
1988	12	9	0	21	57

Table 2. Black bear harvest chronology in Subunit 14C, 1984-1988.

Year	5/1-5/15	5/16-5/31	6/1-6/15	6/16-6/30	7/1-7/15	7/16-7/31	8/1-8/15	8/16-8/31	9/1-9/15	9/16-9/30	10/1-10/15	10/16-10/31
1984	3	10	4	3	0	0	0	0	2	1	1	1
1985	2	3	4	1	1	0	0	0	4	5	3	0
1986	3	3	0	0	1	0	0	0	3	1	2	4
1987	3	13	3	3	1	0	0	0	2	2	1	0
1988	1	8	7	1	0	0	0	0	3	1	0	0

Table 3. Successful black bear hunter transport means in Subunit 14C, 1984-1988.

Year	Aircraft	ORV	Boat	Horse	Highway vehicle
1984	8	2	2	0	13
1985	3	1	2	0	17
1986	5	3	2	0	8
1987	13	3	1	0	12
1988	9	1	4	0	7

STUDY AREA

GAME MANAGEMENT UNIT: 16 (12,445 mi^2)

GEOGRAPHICAL DESCRIPTION: West side of Cook Inlet

BACKGROUND

Hunting pressure for black bears in Unit 16 is intensive in areas easily accessed by boat, aircraft, or automobile; however, large areas of mature spruce forests are lightly hunted, because hunters have limited ability to get to and around such areas. Annual harvest levels are determined as much by environmental conditions as actual bear abundance. The largest fall harvests occur when alpine berry crops attract bears to open areas. Harvests are smaller if bears remain in mature forests. Annual harvests have averaged 136 bears in the last 10 years (range = 75-246).

POPULATION OBJECTIVES

To maintain existing populations of black bears with a sex and age structure that will sustain a harvest composed of at least 60% males.

METHODS

The black bear harvest was monitored by sealing skulls and hides of black bears. Skulls of sealed bears were measured, sex determined, a premolar tooth extracted for future aging, and information on the date and location of harvest and hunter effort was obtained from hunters.

RESULTS AND DISCUSSION

Population Status and Trend

Black bears are frequently observed during surveys for other species. Additionally, local residents and recreational visitors to the unit report that black bears are commonly encountered. The trend in the population is unknown.

Mortality

Season and Bag Limit:

There is no closed season in Unit 16. A bag limit of 3 bears has been in effect for subsistence, resident, and nonresident hunters.

Human-induced Mortality:

Since 1983 the reported harvest of black bears had been relatively stable, without the wide fluctuations of the previous 5 years (Table 1). In 1988, 131 bears were killed, 35 in Subunit 16A and 96 in Subunit 16B. Males composed 61% of the harvest. Of 69 bears harvested prior to 1 July, 51% were males, while 75% of 62 bears taken in the fall were males. The mean skull sizes for both males and females increased slightly to 16.3 (n = 71) and 15.9 inches (n = 44), respectively. These values are similar to the 15-year average of 16.6 inches for males and 15.6 inches for females; however, mean skull sizes for males has shown a decreasing trend since 1984 (Table 1).

Hunter Residency and Success. Nonresident hunters harvested 42 bears, and resident hunters harvested 89.

Harvest Chronology. Sixty-nine bears were harvested prior to 1 July; 62 bears were harvested after that. The earliest reported bear was harvested on 16 April, the latest on 15 October. Harvest chronology by month was 1% in April, 16% in May, 36% in June, 8% in July, 9% in August, 27% in September, and 3% in October.

Transport Methods. Aircraft were the most frequently used (40%) method of transportation by successful hunters. Boats (23%), horses (10%), ORV's (4%), and "other" (10%) means of transportation were used by successful hunters. Access differences in Subunits 16A and 16B are clearly reflected in the transportation data. In Subunit 16A, boats (51%) and "other" methods (26), including automobiles, were most often used by successful hunters, compared with Subunit 16B where aircraft (51%) and boats (22%) were most commonly used.

CONCLUSIONS AND RECOMMENDATIONS

Hunting may be affecting the black bear population in some areas in Unit 16. The average skull size of females increased slightly in 1988 to a value comparable to the long-term average; however, the average male skull size has continued to decline. The objective of maintaining at least 60% males in the harvest is being met; however, because the sexes are now nearly equally represented in the spring/early summer harvest, it is cause for concern. The spring harvest has increased because more hunters are now specifically seeking bears, and the black bear harvest occurs in May and June, when both sexes are vulnerable. Nearly half (49%) of the spring harvest occurs over bait; slightly more females were taken by baiting (18) than without it (15) in 1988. Females are less vulnerable to hunters in summer and fall because of regulatory protection of females accompanied by cubs, the prohibition on bear baiting in the fall, and behavior patterns of the species. If the harvest of females continues to rise in the spring, restrictions on season dates or the use of bait may be

necessary. However, harvest for the unit as a whole has been low, because extensive mature forest makes bears difficult to locate or few hunters use the areas. No changes in seasons or bag limits are proposed at this time.

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Table 1. Annual black bear harvest in Unit 16, 1984-88.

Year	No. males	No. females	No. unid	Total	Mean male skull size
1984	85	45	11	141	17.4
1985	92	49	5	146	17.0
1986	86	45	6	131	16.9
1987	77	37	12	126	16.5
1988	77	49	5	131	16.3

STUDY AREA

GAME MANAGEMENT UNIT: 17 (20,350 mi^2)

GEOGRAPHICAL AREA: Northern Bristol Bay

BACKGROUND

Black bears occur at low densities along the forested drainages of the lower Nushagak and Wood Rivers. Densities are slightly higher along the upper Nushagak and King Salmon Rivers than in other parts of Unit 17. Observations of black bears are infrequent, and no trend in the population is apparent.

POPULATION OBJECTIVES

To maintain the existing population of black bears with a sex and age structure that will sustain a harvest of at least 60% males.

METHODS

Sealing harvested black bears is not required in this unit, and only a few (less than three) are voluntarily sealed annualy. No other work is accomplished on black bears.

RESULTS AND DISCUSSION

Mortality

Season and Bag Limit:

There is no closed season in Units 7 and 15. The bag limit for subsistence, resident, and nonresident humters is 3 bears. The taking of cubs or females accompanied by cubs is prohibited.

Human-induced Mortality:

Since sealing of black bears is not required in Unit 17, harvest data do not reflect the true harvest rate. Black bears are most often taken on an opportunistic basis by moose, caribou, or brown bear hunters. Very few hunters come to Unit 17 specifically to hunt black bears, and they are not an important subsistence species in this area. In a random survey of households by the Subsistence Division in 1988, the Nushagak River villages of Ekwok, New Stuyahok, and Koliganek reported taking 1, 2, and 4 black bears, respectively.

CONCLUSIONS AND RECOMMENDATIONS

The number of big game hunters in Unit 17 has been increasing significantly each year, and the black bear harvest may be limiting the population. Harvest reporting should be required in this unit, as it is in most others having significant sport-hunting pressures. I recommend that such a proposal (i.e., mandatory sealing of all black bears taken in Unit 17) be submitted to the Board of Game in 1991.

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STUDY AREA

GAME MANAGEMENT UNIT: 20A, B, C, and F (34,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Central-Lower Tanana and Middle Yukon River Valleys

BACKGROUND

Human use of black bears in Subunits 20A, 20C, and 20F has been relatively low, despite liberal hunting regulations; however, because of better access, black bears in Subunit 20B have been hunted more intensively. Interest in black bear hunting has increased with use of bait stations. Harvests in Unit 20 have been monitored through a sealing requirement since 1974.

Monitoring the effects of human use on Interior black bears is difficult because few data are available regarding population size. We are using the sex ratio and the number of bears in the harvest to indicate when to more closely examine the human use of black bears in an area. A preponderance of males in the harvest is expected in lightly or moderately harvested populations, because the taking of sows with cubs has been prohibited since 1972. The proportion of males in the harvest, however, is influenced by many factors and will only be used as a guideline to additional monitoring.

Military personnel have demonstrated considerable interest in hunting black bears (McNay 1987). With the deployment of the 6th Light Infantry Division to Fort Wainwright, hunting pressure on black bears is expected to increase. In response to this anticipated demand, a 3-year study of black bears was designed and funded by the U.S. Army and initiated by ADF&G in 1988. Twelve black bears were trapped, measured, and radio-collared in the Tanana Flats during the 1st year of the project. Their movements, distribution, and denning locations were recorded.

MANAGEMENT OBJECTIVES

To maintain a harvest of black bears with 55% or more males for the most recent 3 years in Subunit 20B.

To sustain annual harvests of $\leq$150 black bears, of which at least 55% are males in Subunit 20B.

To maintain 50% or more males in the combined harvests from both Subunits 20C and 20F for the most recent 3 years.

METHODS

Black bear sealing documents provided data on harvest location and date, sex, skull size, salvage of meat, defense of life or property, hunter residency, incidental take, and baiting. Area biologists coded sealing certificates from bears killed in their area according to Uniform Coding Units (UCU). The most recent 5 years of data on black bears were compiled for this report, to evaluate changes in harvests and to infer changes in populations. Muscle samples taken from bear skulls were examined for incidence of Trichinella. Premolars collected during sealing since 1986 were sent to Matson's Laboratory (Milltown, MT) for sectioning and age determination.

Although new sealing documents provide information on whether bears were taken over bait, some documents used in 1988 did not. Sealers in the Fairbanks ADF&G office used the new forms and were requested to ask additional questions of black bear hunters using bait stations. Most black bears killed in Subunits 20A and 20B are sealed in the Fairbanks office, so data on baiting practices were most complete from these 2 subunits.

As part of the Army-funded research project, Aldridge foot snares and barrel traps were set in the Tanana Flats to trap black bears. Captured bears were immobilized, measured, and radio-collared; their subsequent movements were monitored until denning.

RESULTS AND DISCUSSION

Population Status and Trend

Based on reported observations, hunter contacts, and harvest data, the black bear population appears to be stable at a moderate density in Unit 20.

Population Size:

Studies designed to arrive at estimates of Interior Alaska black bear densities have not been completed; however, based on a study of 5 black bears near Tok from 1981 through 1983, Kelleyhouse (memo to Burris, 15 May 1984) estimated black bear densities at 1 bear/3-6 mi^2. Miller et al. (1987) estimated densities of 1 black bear/4.3 mi^2 for the upper Susitna River drainage south of the Alaska Range. Current research in the Tanana Flats (Subunit 20A) should yield more information regarding black bear densities for a lightly exploited population in Interior Alaska. However, at present a density-based population size estimate is considered premature.

Population Composition:

Few data were available on population composition. Sex ratios in the harvest were not representative of the population, because sows with cubs were protected by regulation. In addition, behavioral differences of male and female bears cause males to be more vulnerable to hunters. The sample of radio-collared black bears in 1988 included 6 males and 6 females.

Distribution and Movements:

Habitat use by black bears varies between seasons. During the spring, bears use moist lowlands where early-growing vegetation, especially Equisetum, composes the bulk of their diet (Hatler 1967). Some salmon spawning streams are used during summer, but opportunities for this type of habitat use are more limited in the Interior. During fall, black bears feed primarily on blueberries in open meadows or alpine areas.

In Unit 20 the highest densities of black bears probably occur in mixed forest-swamp habitats of the Tanana and Minto Flats that are relatively inaccessible to hunters. Densities are probably lower in more continuous spruce forest habitats and along the road system of Subunit 20B.

According to preliminary results from the black bear research project, home ranges of radio-collared black bears in Subunit 20A in 1988 ranged from 5 to 10 mi^2 for females (n = 6, subadults and adults) and 5 to 36 mi^2 for males (n = 6, all were subadults 1-3 years old) (J. Hechtel, pers. commun.). Dens of 13 marked bears were located during the winter of 1988-89. Ten dens were on the Tanana Flats in a variety of habitat types, two were on islands in the Tanana River, and one was on a hillside west of Fairbanks. A fire adjacent to the research study area burned approximately 14,000 acres during the summer of 1988, and it may have influenced bear activities.

Mortality

Season and Bag Limit:

There is no closed season in Unit 20; the bag limit is 3 bears. Since July 1972, the taking of cubs (1st year of life) and females accompanied by cubs is prohibited.

Human-induced Mortality:

In 1988, 150 black bears were reported killed in the study area (Table 1), slightly above the 1983-87 mean annual reported harvest of 135 bears. Sixty-two percent of the 1988 harvest was from Subunit 20B, where road access and hunters are concentrated.

Although recent hunting pressure has resulted in localized overharvesting, most areas were lightly harvested. Within

Subunit 20B, most bears were harvested in the Tolovana and Chatanika River drainages along the Elliott and Steese Highways and in drainages along the Parks Highway (Table 2).

Sex Ratios. Our management objectives for sex ratios in the harvest were met. Since 1986, 60% of the harvests in Subunit 20A (n = 90) and Subunits 20C and 20F combined (n = 70) have been males; 62% of the harvest in Subunit 20B (n = 93) were males.

Ages. From 1983 to 1985 the mean age of harvested black bears in Subunit 20B decreased from 5.8 to 4.2 years old for males and increased from 4.6 to 6.8 years old for females (Fig. 1). Black bear teeth sent to a laboratory for sectioning and aging were not returned in 1988; data will be analyzed and presented during the next reporting period. Mean annual skull sizes for male black bears harvested since 1978 have ranged from 16.3 to 17.3 inches (Table 3).

Baiting. During 1988, 29% (n = 21) and 54% (n = 87) of the black bears harvested in Subunits 20A and 20B, respectively, were killed at bait stations (Table 4). Bait stations were not used as frequently in the rest of the study area. All harvest of black bears over bait stations occurred during the spring, because effective 1 July 1988 baiting is only permitted from 15 April to 15 June. Two leaflets were written to explain the new regulations and to offer tips on baiting. Most baiting occurred near roads and along rivers, because of the logistics of handling large quantities of bait. Popular areas for baiting include the Elliott Highway up to Mile 95, the Parks Highway, and military reservation land at Eielson Air Force Base and Fort Wainwright.

Prior to 1982 black bear baiting was legal, and regulations were minimal. Permits for baiting were required from mid-1982 through 1983. From 1984 to 30 June 1988, no permits were required; hovever, they were subsequently incorporated into the regulations.

Incidental Take. Since 1984, 15% of 386 bears harvested during the spring and 48% of 335 bears harvested during the fall have been taken while hunters were pursuing other activities; that is, while not specifically hunting for black bears (Table 5). However, the 1988 fall incidental take (66%) was higher than any of those for the previous 4 years.

Meat Salvage. During the last 5 years, most hunters (89%) reported salvaging some meat (Table 5). Black bear meat may be especially desirable during spring, when few other fresh sources of meat are available.

Although prevalence of trichinosis in Interior black bears has previously been reported to be approximately 50% (R. Zarnke memo, 14 Mar 1989), only 2% (1/54) of black bear muscle samples collected during sealing in Fairbanks contained Trichinella larvae. The "positive" bear was taken from Hess Creek in Subunit

20F. The 1988 prevalence was lower than the 7% (3/43) found in 1987.

Defense of Life or Property Mortality. The number of bears reported taken in defense of life or property (DLP) is lower than the actual number, because a year-round season and liberal bag limit (i.e., 3) allow such bears to be sealed and possessed as legally hunted animals by a person with a valid hunting license. Only 14 black bears harvested between 1983 and 1987 were reported as DLP bears (9 males, 1 female, and 4 not specified). Although there were no DLP mortalities for 1988, they may increase with the continued development of rural areas. In addition, conflicts between humans and black bears may increase in years with poor blueberry production (Hatler 1967). Human-bear conflicts should be minimized by discouraging improper disposal of garbage and feeding of bears.

Hunter Residency and Success. Alaska residents harvested 96% of the black bears killed in the study area from 1984 to 1988 (Table 6). The number of black bears killed annually by nonresidents during this period ranged from five to 11. No measure of hunter success was available, because unsuccessful hunters are not required to report.

Harvest Chronology. In 1988 black bears were killed from 27 April to 19 September, but most of the harvest occurred during May-June and August-September. During the spring, bears are hunted soon after emerging from dens, when hide quality is best. Hide quality declines, because winter hair is rubbed by late June, and harvests decline as well. During the fall, black bear hunting resumes when hide quality improves and hunting seasons open for other species.

Transport Methods. Highway vehicles were the most commonly listed (29%) mode of transportation for successful black bear hunters in 1988 (Table 7). Between 1983 and 1987, 62% of the black bear hunters were listed as using "other" modes of transportation. In 1987, 56% of the sealing certificates that listed "other" noted use of a highway vehicle. The extensive use of highway vehicles suggests concentrated hunting pressure for black bears along the road system. Access to remote areas is increasing as roads and trails are built for mineral, housing, and other developments. Off-road vehicles and boats were the next most commonly used types of transportation.

Natural Mortality:

Predation by other bears, parasites, and diseases contribute to black bear natural mortality. There are no data for the Interior; however, in the upper Susitna River of Unit 13, cubs-of-the-year that accompanied radio-collared females had a natural mortality rate of 35% (Miller et al. 1987).

Game Board Actions and Emergency Orders

Effective on 1 July 1988, the use of black bear bait stations in the study area was limited to the period from 15 April to 15 June and by registration permit; the limit was 2 bait stations per hunter.

CONCLUSIONS AND RECOMMENDATIONS

Management objectives for black bears in Subunits 20A, 20B, 20C, and 20F were met. In Subunit 20A, males composed 60% (n = 90) of the bears harvested from 1986 through 1988. In Subunit 20B, 63% (n =93) of the bears harvested in 1988 were males. In Subunits 20C and 20F combined, 60% (n = 70) of the bears harvested from 1986 through 1988 were males.

Our current management goals are being met with liberal black bear hunting regulations that provide for subsistence use and the greatest sustained opportunity to hunt black bears. Harvests have not reduced the black bear population to undesirably low levels. Research underway in the Tanana Flats will increase our knowledge of black bear densities and population dynamics.

To more effectively manage black bears in Subunits 20A, 20B, 20C, and 20F, we recommend (1) analyzing age data from black bears harvested in Subunits 20A and 20B since 1986; (2) changing sealing requirements to require only black bears from Subunits 20A and 20B to be sealed; (3) monitoring harvest of black bears from Subunits 20C and 20F through development of an alternate system to sealing; (4) continuing to provide logistic support to the black bear research project on the Tanana Flats; (5) increasing public education efforts to reduce human-bear conflicts; and (6) modifying sealing documents to include use of metric measurements, addition of highway vehicle to list of transport methods, and specification of the percentage of meat salvaged.

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Figure 1. Age structure of black bears harvested in Subunit 20B, 1983-85.

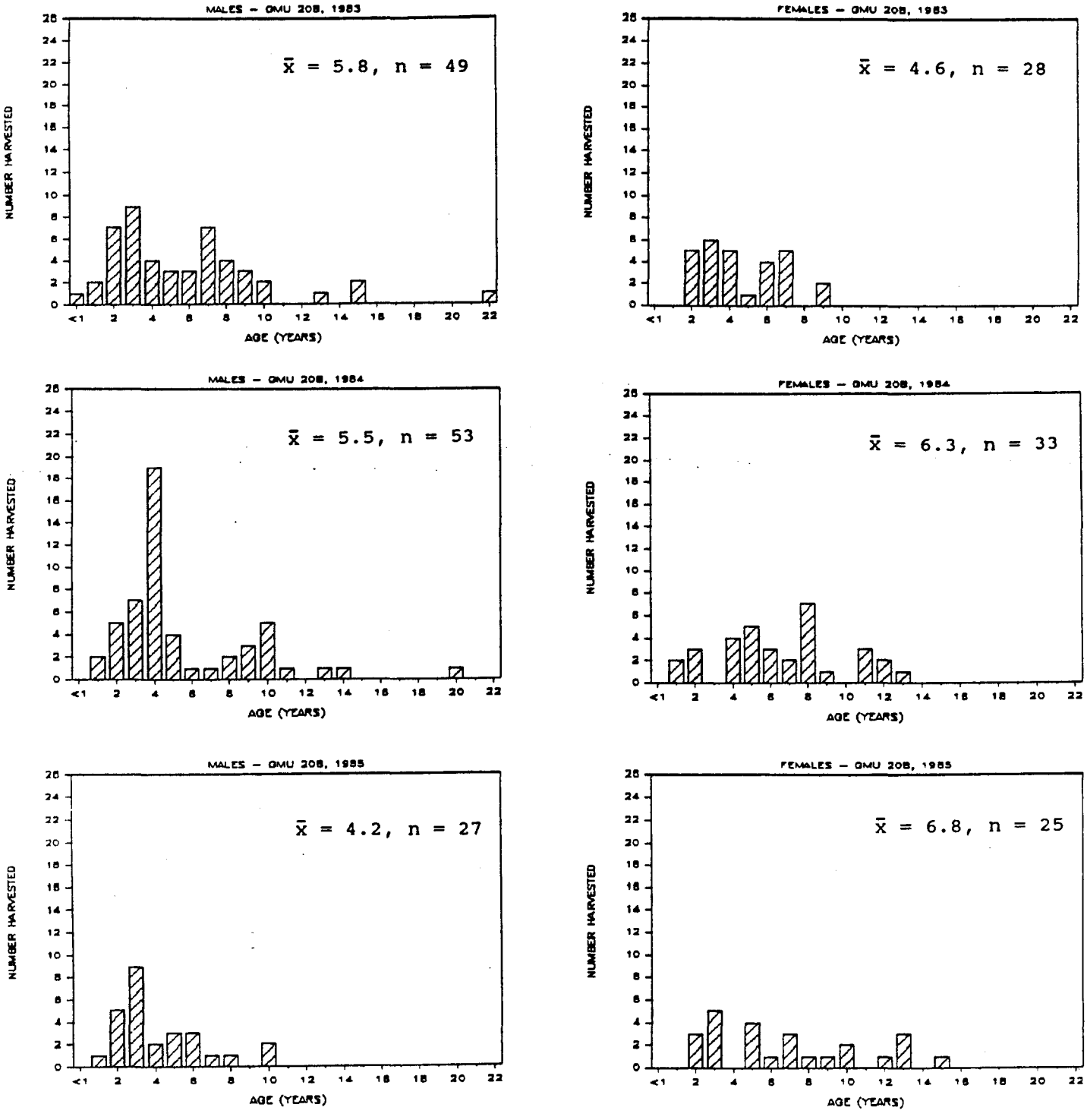

Table 1. Black bear harvest[a] in Subunits 20A, 20B, 20C, and 20F, 1984-88.

Year	Area	Spring				Fall				Annual total			
		Male	Female	Unk.	Tot.	Male	Female	Unk.	Tot.	Male	Female	Unk.	Tot.
1984	20A	4	1	3	8	13	18	0	31	17	19	3	39
	20B	33	13	2	48	24	20	1	45	57	33	3	93
	20C	7	5	0	12	7	1	0	8	14	6	0	20
	20F	1	2	0	3	4	4	1	9	5	6	1	12
	Total	45	21	5	71	48	43	2	93	93	64	7	164
		(68%)				(53%)				(59%)			
1985	20A	8	2	0	10	6	2	0	8	14	4	0	18
	20B	22	15	1	38	14	13	0	27	36	28	1	65
	20C	1	0	0	1	2	1	0	3	3	1	0	4
	20F	2	2	0	4	0	2	0	2	2	4	0	6
	Total	33	19	1	53	22	18	1	18	55	37	1	93
		(63%)				(55%)				(60%)			
1986	20A	4	2	0	6	10	9	0	19	14	11	0	25
	20B	46	21	0	67	31	12	3	46	77	33	3	113
	20C	3	2	1	6	1	1	0	2	4	3	1	8
	20F	3	2	0	5	1	1	0	2	4	3	0	7
	Total	56	27	1	84	43	23	1	69	99	50	4	153
		(67%)				(65%)				(66%)			
1987	20A	11	2	1	14	16	11	1	28	27	13	2	42
	20B	40	32	2	74	36	15	5	56	76	47	7	130
	20C	3	2	0	5	6	5	0	11	9	7	0	16
	20F	2	1	0	3	1	2	1	4	3	3	1	7
	Total	56	37	3	96	59	33	7	99	115	70	10	195
		(60%)				(64%)				(62%)			
1988	20A	5	7	0	12	8	5	0	13	13	12	0	25
	20B	36	30	1	67	22	4	0	26	58	34	1	93
	20C	9	2	1	12	3	4	0	7	12	6	1	19
	20F	5	2	0	7	5	1	0	6	10	3	0	13
	Total	55	41	2	98	38	14	0	52	93	55	2	150
		(57%)				(73%)				(63%)			
1984-88 Total		245	145	12	402	210	131	12	353	455	276	24	755
		(63%)	(37%)			(62%)	(38%)			(62%)	(38%)		

[a] Parentheses indicate percentage of male bears of known sex. This take includes bears killed in defense of life or property.

Table 2. Distribution of black bear harvest in Subunit 20B, 1988. Uniform Coding Units for location of harvest in parentheses.

Area	Spring	Fall	Total	% of total
Tolovana R./Elliott Highway, mi 78-94 (200-204)	9	5	14	15
Chatanika R./Steese Highway, mi 6-86 (208, 287)				
Goldstream Cr./Standard Cr./Fox (211, 212)	8	4	12	13
Tatalina R./Minto Flats/Washington Cr./ Elliott Highway, mi 20-50 (206, 207, 210)	10	2	12	13
Chena R./Chena Hot Springs Rd. (402, 403, 404, 486)	6	5	11	12
Bonanza Cr./Rosie Cr. (285, 301, 385)	9	2	11	12
Manley/Eureka (101)	4	5	9	10
Salcha R./Johnson Rd./Birch Lk./Harding Lk. (601, 602, 604, 684)	4	1	5	5
Moose Cr./French Cr./Eielson Air Force Base (501)	4	1	5	5
Total	67	27	94	

Table 3. Mean annual skull sizes of male black bears sealed in Unit 20, 1978-88.

Year	Spring		Fall		Annual	
	Mean skull size in inches	n	Mean skull size in inches	n	Mean skull size in inches	n
1978	16.8	40	16.7	33	16.7	73
1979	17.1	29	16.7	14	17.0	43
1980	17.3	48	17.2	31	17.3	79
1981	17.2	49	17.0	63	17.1	112
1982	17.1	43	16.9	49	17.0	92
1983	17.0	50	16.9	61	16.9	111
1984	17.1	42	16.9	60	17.0	102
1985	16.6	42	16.2	26	16.4	68
1986	16.4	60	16.3	44	16.3	104
1987	16.5	59	16.5	63	16.5	122
1988	16.8	65				

Table 4. Use of bait stations to harvest black bears in Subunits 20A, 20B, 20C, and 20F, 1988[a].

Subunit	No. bears harvested over bait station	Total harvest with data on bait station	% Harvest over bait
20A	6	21	29
20B	47	87	54
20C	2	18	11
20F	2	9	22
Total	57	135	42

[a] Baiting only allowed through 30 June 1988.

Table 5. Occurrence of incidental take and salvage of meat for black bears in Subunits 20A, 20B, 20C, and 20F, 1984-88.

Calendar year	Area	Incidental take				Meat salvaged			
		Spring		Fall		Spring		Fall	
		Y	N	Y	N	Y	N	Y	N
1984	20A	3	4	21	10	5	1	25	5
	20B	6	39	11	32	42	3	37	4
	20C	5	7	7	1	12	0	7	1
	20F	0	3	4	5	0	3	7	2
	Total	14	53	43	48	59	7	76	12
		(21%)		(47%)					
1985	20A	3	7	4	4	9	1	8	0
	20B	3	33	6	16	34	3	23	1
	20C	0	1	3	0	1	0	2	0
	20F	1	3	1	1	4	0	2	0
	Total	7	44	14	21	48	4	35	1
		(14%)		(40%)					
1986	20A	2	4	15	3	6	0	17	2
	20B	7	59	21	24	57	9	38	7
	20C	3	3	1	0	6	0	0	1
	20F	2	3	1	1	5	0	2	0
	Total	14	69	38	28	74	9	57	10
		(17%)		(42%)					
1987	20A	5	8	17	11	13	0	23	5
	20B	2	70	10	42	63	7	49	3
	20C	1	3	4	7	3	2	10	0
	20F	1	2	1	1	3	0	3	1
	Total	9	83	32	61	82	9	85	9
		(10%)		(34%)					
1988	20A	2	10	10	3	9	3	11	2
	20B	8	55	18	7	58	9	23	2
	20C	2	9	3	3	11	1	7	0
	20F	1	6	2	4	7	0	6	0
	Total	13	80	33	17	85	13	47	4
		(14%)		(66%)		(87%)		(92%)	
1984-88		57	329	160	175	348	42	300	36
		(15%)		(48%)		(89%)		(89%)	

Table 6. Residency of successful black bear hunters in Subunits 20A, 20B, 20C, and 20F, 1984-88.

Calendar year	Area	Spring			Fall		
		Res.	Nonres.	Unk.	Res.	Nonres.	Unk.
1984	20A	7	1	0	28	3	0
	20B	45	3	0	41	4	0
	20C	12	0	0	8	0	0
	20F	3	0	0	9	0	0
1985	20A	9	0	1	8	0	0
	20B	36	2	0	26	1	0
	20C	1	0	0	2	0	1
	20F	4	0	0	2	0	0
1986	20A	6	0	0	17	2	0
	20B	63	4	0	45	1	0
	20C	6	0	0	1	0	1
	20F	5	0	0	2	0	0
1987	20A	13	0	1	25	3	0
	20B	74	0	0	52	2	2
	20C	4	0	1	9	2	0
	20F	3	0	0	4	0	0
1988	20A	11	1	0	12	1	0
	20B	64	2	1	24	2	0
	20C	12	0	0	6	1	0
	20F	7	0	0	6	0	0
5-year total		385	13	4	327	18	4

Table 7. Transport methods[a] for successful black bear hunters in Subunits 20A, 20B, 20C, and 20F, 1984-88; S = spring, F = fall.

Calendar year	Area	Airplane		ORV		Boat		Horse		Highway vehicle[b]		Foot[b]		Other		Unknown	
		S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F
1984	20A	2	7	0	6	1	6	0	0					4	11	1	1
	20B	1	0	10	4	2	0	0	0					32	39	3	2
	20C	1	3	3	0	6	3	0	0					2	2	0	0
	20F	0	0	0	0	1	6	0	0					2	2	0	1
1985	20A	2	3	0	2	5	2	0	0					3	0	0	1
	20B	2	0	6	5	3	0	1	0					26	22	0	0
	20C	0	2	0	0	1	0	0	0					0	0	0	1
	20F	0	0	0	0	0	0	0	0					4	2	0	0
1986	20A	1	7	0	6	1	4	0	0					4	2	0	0
	20B	1	0	7	9	1	4	0	0					56	32	2	1
	20C	0	0	0	0	3	0	0	0					2	1	1	1
	20F	0	0	0	1	2	0	1	0					2	1	0	0
1987	20A	1	8	3	4	4	9	0	0					4	5	2	2
	20B	1	2	14	5	5	1	0	0					52	46	2	2
	20C	1	4	0	2	1	3	0	0					0	1	0	1
	20F	0	0	1	2	1	1	0	0					3	1	0	0
1988	20A	2	5	2	4	4	0	0	0	1	2	0	0	2	2	0	0
	20B	2	0	10	5	6	5	0	0	25	9	11	3	10	4	2	0
	20C	1	3	0	1	8	1	0	0	0	1	0	0	1	1	2	0
	20F	0	0	3	0	1	2	0	0	0	3	0	0	2	1	0	0
1984-88 Total		18	44	59	56	56	47	2	0	26	15	11	3	211	175	15	14

[a] Method of transportation will be counted more than once when listed in combinations. Many hunters reported more than one means of transportation used; therefore, these figures do not indicate the actual number of either successful or unsuccessful hunters afield.

[b] Prior to 1988 this method recorded under the "other" category.

STUDY AREA

GAME MANAGEMENT UNIT: 20D (5,270 mi^2)

GEOGRAPHICAL DESCRIPTION: Central Tanana Valley near Delta Junction

BACKGROUND

There has been little variation from the mean annual harvest of 16 black bears during the last 15 years. Most of the harvest has occurred along the road system south of the Tanana River and along the Richardson Highway. Harvests have been minimal in other portions of Subunit 20D.

MANAGEMENT OBJECTIVES

To prepare management objectives for the next annual progress report.

METHODS

Harvest data are collected from mandatory hunter reports, including sex, skull length and width, transportation used by the hunter, date and location of harvest, number of days hunted, and name, address, and residency of hunter. A premolar was extracted from each black bear skull for use in age determination. Black bear baiting permits were issued to hunters who wanted to establish bait stations.

RESULTS AND DISCUSSION

Population Status and Trend

Black bear population size, composition, distribution, and trends are unknown in Subunit 20D.

Mortality

Season and Bag Limit:

There is no closed season on black bears in Subunit 20D during 1988; the bag limit is 3 bears. Harvesting of cubs or sows accompanied by cubs is prohibited. Black bear baiting is allowed; however, hunters are required to obtain a permit issued by ADF&G and limited to 2 bait stations.

Human-induced Mortality:

Black bear harvest by hunters in Subunit 20D was 15 bears in 1988. The 1988 harvest is below the mean harvest of 20 bears per year for the previous 5 years (Table 1). The harvest consisted of 11 males and 4 females. Black bear baiting permits were issued to 14 hunters during 1988.

Harvest Locations. The majority of black bears killed in Subunit 20D during 1988 were taken south of the Tanana River (Table 2). This is similar to harvest locations of those killed during the previous 4 years.

Hunter Residency. Although most black bears in 1988 were killed by resident hunters (Table 3), the 4 black bears killed by nonresident hunters represent their largest harvest in Subunit 20D since at least 1974.

Harvest Chronology. Most black bears were taken during May and September; 27% of the harvest occurred during each month (Table 4). This is typical of harvest chronologies for past years.

Transportation Methods. During 1988 most successful black bear hunters used transportation means classified as "other" on bear sealing documents (Table 5). This classification includes highway vehicles and three- or four-wheelers, which are both popular methods of transportation for hunting in Subunit 20D.

Game Board Actions and Emergency Orders

In 1987 the Board of Game passed regulations requiring black bear hunters to obtain permits before establishing bait stations and limiting the number of bait stations to two per hunter.

CONCLUSIONS AND RECOMMENDATIONS

The objective of providing maximum opportunity to hunt black bears has been accomplished in Subunit 20D, because there is no closed season and a liberal bag limit of three per year. However, the impact of these liberal seasons on black bear populations is unknown, because the size of the population is unknown. When funding for black bear population estimation becomes available, a census estimate should be conducted so that a new harvest rate can be determined. Until that time, if no change in harvest patterns occurs, current seasons and bag limits should be maintained.

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Table 1. Annual reported harvest of male and female black bears from 1974 through 1988 in Subunit 20D.

Year	Males	Females	Total
1974	5	1	6
1975	8	1	9
1976	10	2	12
1977	9	2	14[a]
1978	9	3	12
1979	11	5	16
1980	12	3	15
1981	19	2	21
1982	14	4	18
1983	16	4	20
1984	22	9	31
1985	9	4	13
1986	15	3	18
1987	9	8	17
1988	11	4	15

[a] Sex unknown for 3 black bears.

Table 2. Location of harvest north or south of the Tanana River for black bears in Subunit 20D from 1984 through 1988.[a]

Year	No. harvested south of Tanana River	No. harvested north of Tanana River
1984	21 (68)	10 (32)
1985	11 (85)	2 (15)
1986	11 (61)	7 (39)
1987	14 (82)	3 (18)
1988	10 (67)	5 (33)

[a] Values in parenthese are percentages.

Table 3. Residency of successful black bear hunters in Subunit 20D from 1984 through 1988.

Year	No. resident hunters	No. nonresident hunters	Unknown
1984	31	0	0
1985	13	0	0
1986	18	0	0
1987	17	0	0
1988	11	4	0

Table 4. Number of black bears killed by month in Subunit 20D from 1984 through 1988.[a]

Year	Harvest by month						
	Apr	May	Jun	Jul	Aug	Sep	Oct
1984	0	4 (13)	7 (23)	6 (19)	5 (16)	9 (29)	0
1985	0	3 (23)	3 (23)	3 (23)	0	4 (31)	0
1986	0	5 (28)	4 (22)	3 (17)	3 (17)	3 (17)	0
1987	0	2 (12)	5 (29)	2 (12)	3 (18)	5 (29)	0
1988	2 (13)	4 (27)	2 (13)	1 (7)	2 (13)	4 (27)	0

[a] Values in parenthese are percentages for each year.

Table 5. Transportation methods of successful black bear hunters in Subunit 20D from 1984 through 1988.

Year	Number of Hunters				
	Air-plane	Offroad vehicle	Boat	Horse	Other
1984	4	0	6	1	20
1985	0	5	1	0	6
1986	1	5	4	0	8
1987	0	1	0	0	15
1988	4	4	1	0	6

STUDY AREA

GAME MANAGEMENT UNIT: 20E (11,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Fortymile, Charley, and Ladue River drainages, including the Tanana Uplands and all drainages into the south bank of the Yukon River upstream from and including the Charley River drainage

BACKGROUND

Black bears can be found throughout forested habitat in Subunit 20E. Observations by long-term residents of the area indicate that black bears were more common during the 1960's and early 1970's than they are at present. In contrast, grizzly bear abundance was depressed during the 1960's and early 1970's, apparently related to federal predator control poisoning efforts of the 1950's, but it has since recovered. Competition with or predation by grizzly bears may have resulted in reduced black bear abundance.

Currently, the black bear population in Subunit 20E appears to be stable. The highest densities may be found in hardwood habitats in the Kechumstuk Creek drainage and near the village of Chicken. Historically, interest in black bear hunting in the subunit has been relatively low.

POPULATION OBJECTIVES

To maintain for a black bear population in Subunit 20E capable of sustaining annual harvests of 14 bears/year.

METHODS

All black bears taken in Subunit 20E are required to be sealed. While premolar teeth were extracted during the sealing process, they have not been sectioned or aged for several years.

RESULTS AND DISCUSSION

Mortality

Season and Bag Limit:

There is no closed season for black bears in Subunit 20E. The bag limit is 3 bears, and harvesting of cubs and females accompanied by cubs is prohibited.

Human-induced Mortality:

Sealing records indicate that 17 black bears were harvested in Subunit 20E in 1988. This harvest represents a decrease of 29% from the 1987 harvest of 24 bears, but approximately equals the 5-year mean harvest of 16 (Table 1). Of these 17 bears, 13 (76%) were males and four (24%) were females. No trends in overall harvest or the sex ratio in the harvest are evident. Ages of harvested bears were not determined. Human-induced mortality of black bears in Subunit 20E is believed to be insignificant.

Hunter Residency and Success. During 1988 all of the black bears taken by hunters in Subunit 20E were killed by Alaska residents. No measure of black bear hunter success has been made.

Harvest Chronology. Eight (47%) black bears were taken during spring and nine (53%) during the fall, comparable to the harvest chronology for the past 5 years (Table 1). All of the bears taken during the spring were taken in the last half of May; of the nine bears taken during the fall, two were taken in July, three in August, and four in September.

Transport Methods. Judging from harvest locations, most bears were taken along the Taylor Highway by hunters using highway vehicles or along mining trails by hunters using three- or four-wheelers. Occasionally, hunters take black bears while floating the Fortymile River or hunting for other species after being flown into remote airstrips.

Habitat Assessment

Black bear habitat is extensive in Subunit 20E. Only treeless habitat, generally above elevations of 4,000 feet, is not considered to be black bear habitat. Blueberries and cranberries are widely available in Subunit 20E, but there are relatively fewer areas where bearberries are available.

The implementation of the Alaska Interagency Fire Management Plan has allowed wildfires to burn in more areas than was possible prior to 1984. Burned-over areas are generally expected to become more productive than mature forests of black or white spruce, because of revegetation of species of plants preferred by bears.

CONCLUSIONS AND RECOMMENDATIONS

All management goals and objectives are currently being met. Black bears in Subunit 20E are believed to be only lightly harvested and could withstand far larger annual harvests. No changes in seasons or bag limits are recommended.

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Table 1. Reported black bear harvests in Subunit 20E, 1984-88.

Year	No. taken	No. males (%)	No. females (%)	No. res. (%)	No. nonres. (%)	No. spring (%)	No. fall (%)
1984	18	8(47)	9(53)	18(100)	0(0)	6(33)	2(67)
1985	16	8(57)	6(43)	15 (94)	1(6)	9(56)	7(44)
1986	5	3(60)	2(40)	5(100)	0(0)	2(40)	3(60)
1987	24	13(62)	8(38)	23 (96)	1(4)	10(42)	14(58)
1988	17	13(76)	4(24)	17(100)	0(0)	8(47)	9(53)
Mean	16	9(60)	6(40)	16 (98)	0.4(2)	7(44)	9(56)

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