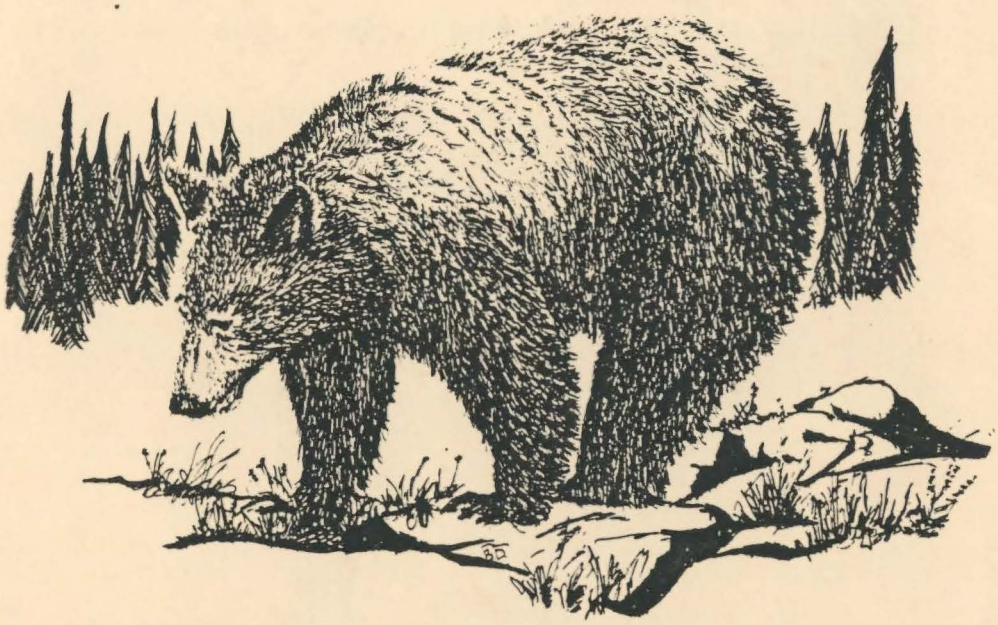
Alaska Department of Fish and Game
Division of Wildlife Conservation
Federal Aid in Wildlife Restoration
Annual Report of Survey—Inventory Activities
1 January 1987—31 December 1987

BLACK BEAR



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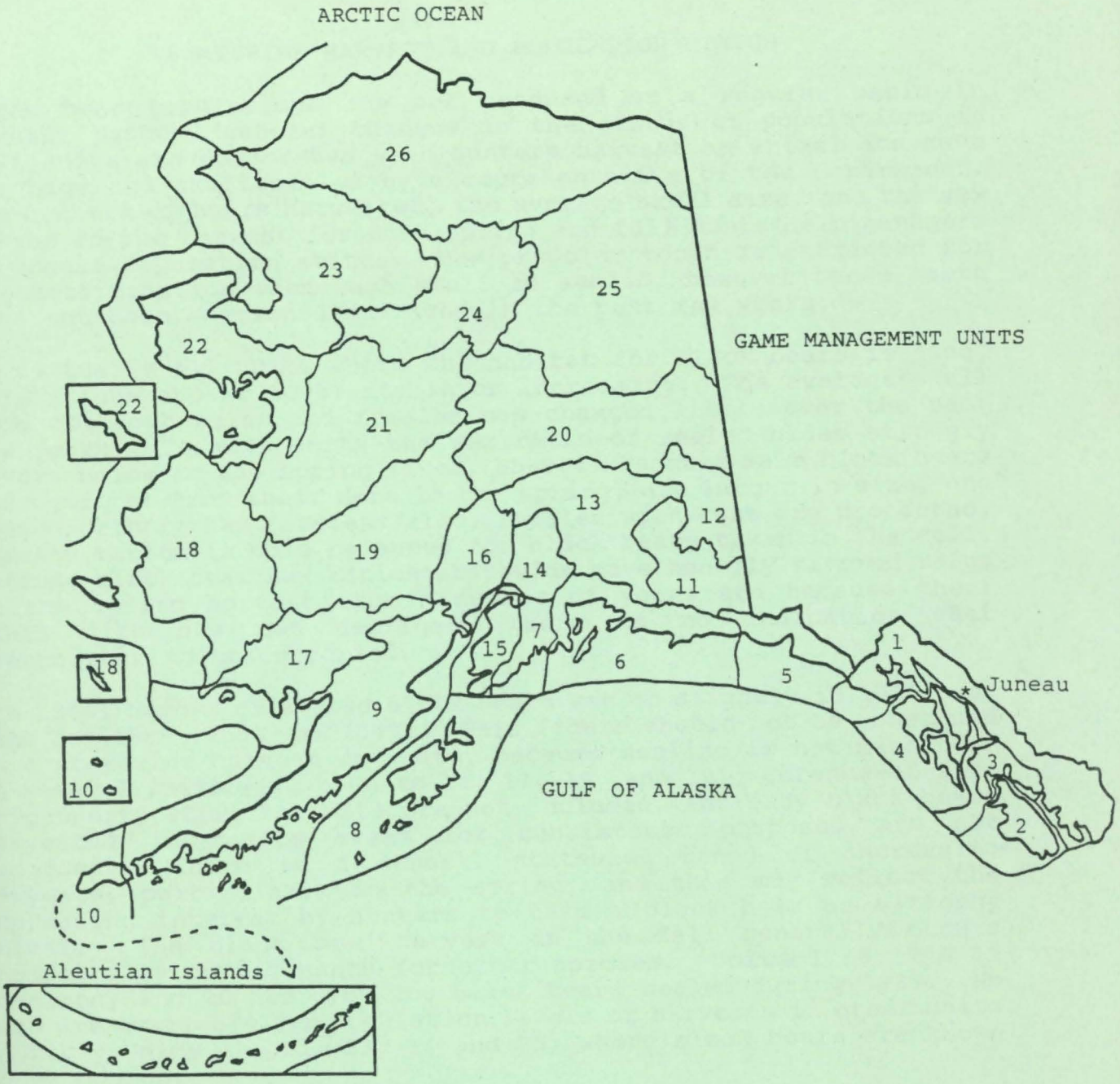
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STATEWIDE HARVEST AND POPULATION STATUS

Black bear populations are not censused on a regular basis in Alaska; rather, general changes in the status of populations in most units are documented when hunters harvest an animal and have the hide and skull sealed by a representative of the Department. The numbers of bears harvested, 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 size for both males and females has 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 in the spring, are larger in size, and range farther than females; also, females with cubs are protected. The sex ration is more balanced for black bears taken in the fall. Because black bear sex ratios statewide have heavily favored males in the spring harvests for a number of years and because their skull size has not declined, there is no indication that overharvesting has occurred.

The total number of sealed black bears was up slightly in 1987 over that for 1986 (1593 vs. 1541). This figure should not be construed as a statewide harvest estimate, because sealing is not mandatory in several units (i.e., Units 11, 17, 18, and 19), defense-of-life or property (DLP) harvests 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 a black bear as a trophy animal. The black bear harvest in the fall generally occurs incidentally during hunts for other species. Units 1, 6, 7 & 15 combined, and 20 had over 200 black bears sealed during 1987. No data are available for population levels or harvests in other units (notably Units 19, 21, 23, 24 and 25) where black bears are known to be common.

The number of DLP-killed black bears continue to be a concern, particularly in Southeast Alaska where 16 were taken in Subunit 1C; this is the highest DLP mortality on record. 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 1987 black bear harvest is summarized in the following table.

Unit	Reported black bear harvest
1A	66
1B	22
1C	111
1D	23
2	154
3	153
5	18
6	245
7 & 15	205
9	2[a]
11	10
12	27
13	85
14	129[b]
16	126
20	219
Total	1595

[a] Sealing not required in this unit, along with Units 17-19.

[b] Highest on record for 14C

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STUDY AREA

GAME MANAGEMENT UNIT: 1A (5,000 mi²)

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

BACKGROUND

Biological and hunter information has been collected from all black bears taken since 1973. Data were not collected from unsuccessful hunts, and no population surveys were conducted. The strategic goal for black bear in the Revilla Island portion of this unit is to provide maximum opportunity to hunt black bears. In the Misty Fjords area of Subunit 1A, the goal is to provide an opportunity to hunt 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 a mandatory sealing program. A statewide standard data form was used to collect hunter information and biological data, including skull measurements. No population surveys were conducted.

RESULTS AND DISCUSSION

Population Status and Trend

Without survey data of any kind, it is difficult to make definite statements about population trends; however, skull measurements have not changed significantly in 13 years. Furthermore, discussions with hunters and ADFG personnel suggested that major changes in bear densities have probably not occurred. Based on these facts, the population is believed to be 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 quite a bit 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 last 20 years).

Population Size:

Only rough estimates of population size are available, because they are extrapolated from studies conducted in other areas. The Revilla Island portion of Subunit 1A had high black bear densities; because mainland areas have more unusable high elevation areas,

overall densities were lower. Based on coastal populations elsewhere in western North America, there were approximately 1.5 bears/mi² on Revilla Island and 1.0 bears/mi² on mainland areas; i.e., 3800 bears on the mainland and 1800 bears on Revilla Island and the smaller adjacent islands--a total of 5600 for Subunit 1A.

Mortality

Season and Bag Limit:

The hunting 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 the initiation of data collection in 1974, although there has been a slight increase during the last 5 years. Table 1 shows harvest statistics for Subunit 1A from 1983 through 1987. Unlike Unit 2, Subunit 1A did not appear to have the "defense of life or property" and illegal harvest problems. There are very few people living away from Ketchikan's limited road system. Most of the nonsport harvest was associated with the Ketchikan area and is garbage related. There were 3 bears reported as nonsport mortalities in Subunit 1A in 1987.

The annual harvest was more evenly divided between the spring and fall season than it was in Unit 2, but the sex ratios are similar (i.e., very high for males in the spring and more balanced in the fall). Skull sizes have remained fairly constant (i.e., consistently above the management objective) since measurements were first taken.

Hunter Residency and Success. The nonresident portion of the harvest has been relatively steady over the last 5 years, averaging 23%. Fifty-nine hunters harvested 66 bears from Subunit 1A in 1987; 7 hunters took 2 bears each.

Harvest Chronology. Table 2 presents the harvest chronology for the last 5 years. The peak of the harvest occurred between 11 and 31 May in the spring and 1 and 20 September in the fall. The spring harvest peak generally comes about 10 days later than that in Unit 2.

Transport Methods. Very few roads are connected to population centers within Subunit 1A, and planes and boats were the most common transportation means in use. Nonresidents tended to use air transport, while residents relied mainly on boats. When logging

roads become interconnected and tied to Ketchikan, a major shift to road hunting will occur. Currently, the only roaded area in use is in the Carrol 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 an even-aged stand. Early successional stages (3 to 25 years) provide excellent black bear habitat, but upon canopy closure, 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 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 prohibited.

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 well below sustainable levels. No changes are recommended.

CONCLUSION AND RECOMMENDATIONS

The black bear harvest in Subunit 1A has been slowly increasing since 1983, and this trend will probably continue because of the expanding road system and increasing human population. Once the currently isolated logging-road systems on Revilla Island become linked to Ketchikan, a major increase in harvest will probably occur; however, this should not happen for many years.

The harvest is currently about 1% of the estimated 5600 bears in Subunit 1A, 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 management objective of maintaining an average spring season skull size of 17.2 inches for males has been easily reached.
Hunters from mainland areas should be asked about the quality of their hunting experience to help ascertain the level of hunter

density beyond which aesthetically pleasing hunts are not possible. At some point, hunter registration may be necessary to maintain hunt quality. In addition, an intensive harvest area on Revilla Island around Shoal Cove should be monitored to see if skull sizes in this particular area are declining.

Acreage of logged areas should also be tracked by 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 effects of clear cutting on bear populations should be intensified. Trade offs between the 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, 1983-1987.

Year	Season	Total harvest	No. males	No. females	Unk. Sex	Harvest by nonres. (%)	Mean skull size in inches: males (n)		females (n)		Transport used(%): Air	Boat	Roads
Total	Spring	26	22	4	0	5 (19)	17.1	(21)	16.2	(3)	27	54	19
GMU 1A	Fall	22	12	10	0	5 (23)	16.9	(9)	15.6	(9)	23	55	22
1983	Year	48	34	14	0	10 (21)	17.1	(30)	15.8	(12)	25	54	21
Total	Spring	23	17	6	0	0	17.8	(13)	16.5	(4)	9	70	22
GMU 1A	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	19	65	15
GMU 1A	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
GMU 1A	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
1987	Spring	12	12	0	0	4 (33)	17.9	(11)	0	0	33	67	0
Mainland	Fall	4	2	2	0	1 (25)	17.3	(2)	15.8	(2)	50	50	0
	Year	16	14	2	0	5 (31)	17.8	(13)	15.8	(2)	38	63	0
1987	Spring	31	27	4	0	9 (29)	17.6	(25)	16.4	(4)	10	71	19
Revilla	Fall	19	11	7	1	3 (16)	18.6	(8)	16.3	(5)	16	37	47
	Total	50	38	11	1	12 (24)	17.9	(33)	16.3	(9)	12	58	30
Total	Spring	43	39	4	0	13 (30)	17.7	(36)	16.4	(4)	16	70	14
GMU 1A	Fall	23	13	9	1	4 (17)	18.4	(10)	16.1	(7)	22	39	39
1987	Total	66	52	13	1	17 (26)	17.9	(46)	16.2	(11)	18	59	23

Table 2. Chronology of the black bear harvest in Subunit 1A, 1983-87.

Date	Number of Animals 1983	1984	1985	1986	1987
April 1-20	1	1	1	0	1
April 21-30	3	7	1	3	0
May 1-10	5	2	6	5	12
May 11-20	7	5	6	12	8
May 21-31	4	6	12	8	16
June 1-10	5	0	0	6	0
June 11-20	1	2	0	2	2
June 21-30	0	0	0	2	4
Sept 1-10	3	12	10	7	11
Sept 11-20	8	6	5	9	1
Sept 21-30	5	0	6	2	2
Oct 1-10	4	0	2	2	3
Oct 11-20	1	1	0	1	0
Oct 21-31	0	0	0	0	1
Nov 1-10	0	0	0	4	3
Nov 11-30	1	0	0	0	1

STUDY AREA

GAME MANAGEMENT UNITS: 1B (3,300[2)] and 3 (3,600 mi²)

GEOGRAPHICAL DESCRIPTION: Southeast mainland from Cape Fanshaw to Lemesurier Point and Islands of the Petersburg, Kake and Wrangell area, respectively.

BACKGROUND

Black bears are indigenous to the area and have been traditionally used for food as well as trophies or rugs. Road building associated with the timber industry has opened more territory to hunters; previously, travel was by water or airplane only. The bag limit was again increased from 1 bear to 2 bears on 1 July 1984, after having been reduced to 1 bear in 1980. Harvests have increased; in 1977, 3 bears were killed in Subunit 1B and 26 in Unit 3. The harvests in 1987 were 22 and 153 black bears for Subunit 1B and Unit 3, respectively. The average skull size has not declined, suggesting that the age structure of the population is stable.

POPULATION OBJECTIVES

To maintain a mean skull size of at least 17.0 inches for males and a ratio of 3 males:1 female in the harvest.

METHODS

State game regulations require that all bears killed in these 2 reporting areas be sealed. Sex, skull size, location of harvest, and other data were collected at the time of sealing. Comparison of current data to historical records provided indirect evidence of population composition. Hunter interviews taken while sealing bears indicated that most of the hunters in these 2 management areas selected for large body size during the spring hunt. A decrease in average skull size would indicate that the bears killed were younger, leading to the conclusion that older (larger) bears were less available in the population. As there is no cost-effective census technique, we have used average skull size and the sex ratio of the harvest as indices to the population.

RESULTS AND DISCUSSION

Population Status and Trend

Field observations and bear harvest data continued to suggest a stable black bear population in Subunit 1B and Unit 3. The absence of a decrease in male:female ratios or in mean skull size in the harvest suggested a stable population, relative to hunter activity.

Distribution and Movements:

In Subunit 1B and Unit 3, black bears are found on the mainland and all the larger islands, ranging from the tideland to the alpine areas. Erickson et al. (1982) studied black bears on Mitkof Island and found that subadult bears occupied home ranges averaging 1.7 mi^2 in size, adult females averaged 4.6 mi^2, and adult males 16.2 mi^2. None of the bears showed marked seasonal differences in home ranges. Individual movements were highly variable (e.g., 2 bears were sedentary and two others made brief trips of 15 to 20 miles beyond the limits of their normal home range).

Mortality

Season and Bag Limit:

The hunting 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 1987 harvest in Subunit 1B was 22 bears, up from 19 in 1986. Twenty bears (91%) were taken during the spring, and two (9%) were taken in the fall. Eighteen percent were killed in April, 59% in May, 13% in June, 5% in September, and 5% in October. Only 1 hunter in Subunit 1B reported taking a 2nd bear.

In Unit 3 the total harvest for 1987 was 153 black bears. This total is 22 bears more than the previous year's harvest (i.e., 131 bears) (Table 1). The high percentage of males (76%, n = 117) in the harvest suggests a healthy population. The total spring harvest was 131 bears (86%); the fall harvest was 22 bears (14%). Guided hunters took 41 bears in Unit 3, and 39 of these were taken in the spring.

In Subunit 1B, 5% (n = 1) of the black bears harvested were females and 86% (n = 19) were males. We were unable to determine the sex of the remaining 9% (n = 2).

In Unit 3, 16% (n = 25) of the harvest were females; males composed over 76% (n = 117) of the total harvest. We were not able to determine the sex of the remaining 8% (n = 11) bears.

The low proportion of females in the harvest indicates either hunters were consciously selecting for large body size in Subunit 1B and Unit 3 or males were more susceptible to hunters. Based on the average skull size (Table 2), it appears that the total black bear harvest was not excessive.

The peak of the spring harvest in Unit 3 occurred in May, when 75% (n = 97) of the spring bears were killed. September was the most popular hunting month in the fall, representing 58% (n = 14) of the

fall harvest. October hunters accounted for 25% (n = 6), while the remaining 17% (n = 4) of the fall harvest occurred in November.

The highest harvest per unit area (i.e., 1 black bear/10m^2) occurred on Mitkof and Kuiu Islands (Table 3). An extensive logging-road system has been constructed by the U.S. Forest Service on Mitkof Island, and almost every part of the island is accessible to hunters using vehicles. Kuiu Island, which is heavily hunted by professional hunters, is also favored by many unguided nonresident hunters. Of the 41 black bears killed by guided hunters, 88% (n = 36) were taken on Kuiu Island. Nine of these nonresident guided hunters killed a 2nd bear. An additional 16 nonresident hunters killed black bears on Kuiu Island. On Kupreanof Island 5 black bears were killed by guided nonresident hunters, and six more were killed by unguided nonresidents hunters.

The black bear harvest in Unit 3 has steadily increased during the past decade. The total harvest from 1974 through 1987 was 1027 black bears, averaging 73 annually (Table 2). Generally, the current harvest has not noticeably affected the age structure or sex ratio of black bears, and mean skull size has remained relatively constant (Table 2). In Unit 3 only 1 nonsport black bear was reported killed during 1987. Although the bag limit in Unit 3 is two bears, only 17% (n = 22) of the successful bear hunters killed a 2nd bear in 1987, representing an increase from the 7 hunters harvesting them in 1986.

Hunter Residency and Success. Residents did not account for any of the 22 black bears killed in Subunit 1B, and no guided hunts occurred there. Fifty-eight nonresident hunters killed 44% (n = 67) of the total (n = 153), and 41 of these black bears were harvested by guided hunters. Guided, nonresident hunters killed 36 on Kuiu island and five on Kupreanof island. All nonresident hunters that harvested the 2nd bears were guided. Seventy-three resident hunters in Unit 3 killed 86 black bears; none of the resident hunters employed a guide. No data were collected from unsuccessful black bear hunters.

Harvest Chronology. In Unit 1B, 20 black bears (91%) were harvested during the spring, and two (9%) were harvested in the fall. Eighteen percent were killed in April, 59% in May, 13% in June, 5% in September, and 5% in October. Only 1 hunter reported taking a 2nd bear in Subunit 1B. The spring harvest in Unit 3 was 131 black bears (i.e., 86% of the year's total), and the fall take was 22 (14%) (Table 4). Six black bears were killed before the first of May, 97 during May, and 28 in June. During the fall 14 black bears were killed in September and six in October. Guided hunters took 42 black bears in Unit 3; 39 of these were taken in the spring. Table 1 shows number killed on each of the larger islands in Unit 3.

Transport Methods:

All hunters in Subunit 1B traveled by boat; however hunters in Unit 3 used 4 types of transportation: airplane, 22; boat, 100; off-road vehicles, 2; highway vehicles, 27.

Habitat

Continued logging in Unit 3 may contribute to an increase in the black bear population by expanding the surface area in early seral stages, which provides high production of plant products. This will be accompanied by loss of denning trees (Erickson 1982) and greater accessibility for the hunters using the road system.

CONCLUSION AND RECOMMENDATIONS

The mean annual black bear harvest in Unit 3 from 1974 to 1987 was 74 (Table 1). Black bear populations in both Subunit 1B and Unit 3 are stable, because older age classes (based on skull sizes) and males were still predominant in the harvest. I recommend that the Department implement metric measurement of bear skulls to allow more accurate recording and reporting of the data.

The black bear harvest can be expected to increase as state land subdivisions are developed on Kuiu, Wrangell, Etolin, Mitkof, and Kupreanof Islands. Because of the attendant garbage disposal problems, conflicts between bears and rural residents can be expected to escalate as more land owners develop their parcels. The continued requirement for sealing will allow the the close monitoring needed to detect quickly any change in the composition of the harvest.

LITERATURE CITED

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Table 1. Historical black bear harvest by island in Unit 3, 1982-1987.

Year	Number of bears	Percentage of Harvest				
		Kupreanof	Kuiu	Mitkof	Wrangell	Other islands
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
Means	113[a]	34	52	17	5	2

[a] The mean for the six years.

Table 2. Skull size of black bears killed in Unit 3, 1982-1987.

Year	Skull size[a]			
	Males		Females	
	$\bar{x}$	n	$\bar{x}$	n
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
Means or totals		467	16.3	98

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

Table 3. Black bear harvest by island in Unit 3, 1987.

Island	Area (mi^2)	Annual harvest 1987	Annual harvest 1986	Mi^2/ bear	Males	Females	Unk	Percentage of harvest
Kupreanof	1,090	41	23	27	34	4	3	27
Kuiu	746	75	73	10	61	13	1	49
Mitkof	211	21	25	10	13	4	4	14
Wrangell	220	12	8	18	7	2	3	8
Etolin	343	3	1	114	2	1	0	2
Woewodski	15	1	1	15	0	1	0	0
Totals	2,625	153	131	17[a]	117	25	11	100

[a] The mean for the six islands combined for 1987.

Table 4. Skull size and percentage of males in black bear harvest by island and season in Unit 3, 1987.

Island	Season	Total harvest	Males (%)	Skull size (inches) Males $\bar{x}$	Males n	Females $\bar{x}$	Females n
Kupreanof	Spring	41	83	18.5	30	16.2	3
	Fall	0					
	Total	41	83	18.5	30	16.2	3
Kuiu	Spring	64	84	18.6	52	16.0	9
	Fall	11	64	17.6	7	16.6	3
	Total	75	81	18.5	59	16.1	12
Mitkof	Spring	14	57	17.4	6	15.6	4
	Fall	7	71	16.6	3		0
	Total	21	62	17.1	9	15.6	4

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

STUDY AREA

GAME MANAGEMENT UNIT: 1C (6,500 mi²)

GEOGRAPHICAL DESCRIPTION: The Southeast Alaska mainland and the islands of Lynn Canal and Stephen's Passage lying between Cape Fanshaw and the latitude of Eldred Rock, including Sullivan Island and the drainages of Berner's 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, hunting effort is not quantifiable. There have been no formal black bear research efforts in this subunit.

The propensity of black bears to use human food resources is well documented throughout their range. Bears that have become habituated to human garbage are difficult to discourage, and it is often necessary to destroy such nuisance animals. The human population of Juneau has increased in direct proportion to the number of bear complaints received each year by Department biologists and Public Safety officers, resulting in the destruction of several animals each year. This has become the chief black bear management issue in this subunit.

POPULATION OBJECTIVES

To maintain a mean skull size of at least 17.3 inches for males harvested in this unit.

To maintain a harvest ratio of 3 males:1 female.

To reduce by 50% the number of nuisance bear problems resulting from improper refuse handling and disposal by 1990.

METHODS

Successful bear hunters are required to present the hide and skull for sealing within 30 days of harvesting. The skull is measured, and a rudimentary premolar is extracted for age determination. Other harvest-related data are collected at this time. All data gathered during this reporting period were from sealing and anecdotal information from hunters.

RESULTS AND DISCUSSION

Population Status and Trend

Population data for black bears in this subunit are not available. Harvest data (Table 1), reported sightings, and the marked increase in nuisance black bear complaints in the Juneau vicinity suggest a high population. Most of the animals destroyed by Public Safety officers in Juneau in 1987 were young males. Given the geographical confines of the area, this suggests an increasing population in which dispersal of displaced young males results in increased human contact. Skull sizes have generally remained stable over the last 5 years; i.e., a mean of 17.5 inches, slightly above this year's average of 17.3.

Mortality

Season and Bag Limit:

The hunting season in Subunit 1C 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:

Hunters reported killing a total of 111 black bears in Subunit 1C in 1987. This far surpassed the previous 5-year average of 82. In 1987 males made up 85% of the known-sex harvest, a 78% increase over the 1982-86 average, and well in excess of the current management objective of 75%. Successful sport hunters spent an average of 2.4 days in the field per harvest, identical to the figure for 1986 and similar to that reported for the previous 5 years.

Beginning in the 1987-88 regulatory year, the bag limit for Subunit 1C was increased from 1 to 2 bears. The impact of the regulatory change for this reporting period was minimal; only 2 hunters took advantage of the increased bag limit.

During this reporting period, the nonsport harvest in this subunit was 16 black bears, the highest on record. Eight of these animals were destroyed in control actions by the Juneau Police Department. A Division biologist trapped and killed 1 bear that was determined to be a threat to public safety. The 8 remaining bears were harvested by residents who took them under the defense of life or property provisions of state game regulations.

Hunter Residency and Success. Nonresident hunters took 26 (23%) of the sport-killed bears.

Harvest Chronology. During this reporting period 77% of the harvest occurred in the spring. This is slightly below the 5-year average of 81.6%.

Transport Methods. Hunters used 3 types of transportation to gain access to their hunting areas: boat (66%), highway vehicle or walking (26%), and aircraft (7%).

Habitat

The mineral exploration and development actvities in Berners Bay and the Spaulding Meadows areas may impact bear use there. The impacts of mineral development on brown bear habitat use is being examined on nearby Admiralty Island (Schoen and Beier 1987). Preliminary studies suggest that brown bears avoid developed areas and associated roads.

CONCLUSIONS AND RECOMMENDATIONS

Management objectives for Subunit 1C are currently being met. Skull sizes for 1987 were at the low end of the acceptable range (17.3 inches); however, yearly fluctuations have been common, and the 5-year average (1983-87 = 17.5 inches) remained well within the specified objectives. Although the 1987 harvest was the highest on record, harvest parameters (skull size and male:female ratio) do not give reason for immediate concern. The 1988 harvest will represent the 1st full year in which the liberalized bag limit will have been in effect, and that harvest should be closely monitored.

The number of nuisance bear complaints received by Juneau area Public Safety officers and the subsequent destruction of several black bears during the early summer of 1987 was the highest on record. The situation prompted the Department to assign a full-time person to the problem. During the course of the summer and early fall, Department staff responded to more than 80 bear calls. Deterrent measures, including 12-gauge rubber slugs and explosive noise devices, were employed in an effort to dissuade black bears from entering residential ares in search of human foods. Five bears were radio-collared to allow biologists to monitor the effectiveness of the program. Marked animals from this and future tagging opportunities may also provide insight into population dynamics, movements, denning habits, and habitat use by black bears in the Juneau area.

Juneau's bear-garbage situation is likely to continue until refuse handling and disposal problems have been corrected. As an interim solution the Department will continue to examine both physical and chemical deterrents. The tagging and/or radio-collaring of additional black bears will lead to a better understanding of the biology of the problem and should be continued as funds and manpower allow. The Department of Fish and Game and the City and Borough of Juneau are working cooperatively on a public awareness campaign that commenced in the spring of 1988. The educational effort will be followed by strict enforcement of current refuse containment ordinances. The results of the program will be monitored and its effectiveness examined to determine if more

stringent ordinances or bear-proof garbage containers are indicated.

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Table 1. Black bear harvest parameters for Subunit 1C, 1982-1987.

Year	Sport harvest	Nonsport harvest	Males (%)	Spring harvest(%)	Mean skull size[a]			
					Male		Female	
					x	n	x	n
1982	73	2	85	87	17.3	63	15.7	9
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

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

STUDY AREA

GAME MANAGEMENT UNIT: 1D (2,600 mi²)

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 bears are generally less abundant in Subunit 1D than in the remainder of the unit. Interviews with outdoor recreationists suggest that while brown bears have become more abundant in recent years black bears have become less abundant. The brown bear harvest in Subunit 1D continually accounts for the majority of the harvest in Unit 1, while the black bear harvest is usually among the lowest of the 4 subunits of GMU 1.

POPULATION OBJECTIVES

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

METHODS

Successful black 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 are collected at this time. All data gathered during this reporting period were from sealing and anecdotal information from hunters.

RESULTS AND DISCUSSION

Population Status and Trend

Wide fluctuations in the total black bear harvest and seasonal timing of harvest have been exhibited during recent years. During the same period, skull sizes for both sexes and the percentage of males in the harvest have been relatively constant, suggesting a stable population.

Mortality

Season and bag Limit:

The hunting 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 harvest in Subunit 1D during 1987 was 23 black bears (Table 1); there were no nonsport kills. This harvest represents a substantial decrease from the record harvest of 54 bears in 1986, and it is less than the 1982-86 average of 35 (Table 1); however, it should be noted that annual harvests have fluctuated widely during that 5-year period, ranging from 22 to 54 with no apparent trend.

Males and females made up 65% and 35%, respectively, of the known harvest in 1987. The average skull size for males and females was 17.7 and 15.4 inches, respectively. These figures were similar to the previous 5-year averages of 17.2 and 15.5 inches for males and females, respectively.

Six bears, or 26% of the harvest, were of the cinnamon color phase; the remainder was black. One hunter took 2 bears. Successful hunters in Subunit 1D spent an average of 4.8 days hunting per bear killed, a marked increase over previous years (1982-86 mean = 2.3). The Subunit 1D average also nearly doubled that for the remainder of the unit (mean for Subunits 1A, 1B, and 1C = 2.4).

Hunter Residency and Success. Eighteen percent (n = 4) of the successful hunters were nonresidents, accounting for a total of 5 bears. Two of the 4 nonresidents were accompanied by guides.

Harvest Chronology. Eighty-two percent of the 1987 harvest occurred in the spring. This figure is somewhat higher than the 1982-86 average of 68% (range, 43-82%).

Transportation Methods. Most hunters used boats (44%) or highway vehicles (35%) as their primary means of transportation to hunting sites. The remainder of the hunters used off-road vehicles (17%) and aircraft (4%).

Habitat

A substantial portion (247,000 acres) of the available black bear habitat in this subunit lies within a state forest; therefore, it 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 580 acres). The plan has mitigation and enhancement provisions to ensure that the impacts on wildlife that support commercial, recreational, and subsistence pursuits of the area will be minimized, even in areas where forest management is the primary activity.

At this time little commercial timber harvest is scheduled; however, with the current upswing in timber prices, sales are expected to increase on both the Haines State Forest and associated private lands. Black bears have evolved as forest dwellers and are reluctant to venture far from trees (Herrero 1972). Large clear-cut areas would probably be avoided by black bears. While forest regeneration would probably result in adequate escape cover in a

short period of time (15-25 years), the associated decrease in food resources could be expected to reduce carrying capacity for 25 to 50 years, depending on site characteristics.

CONCLUSIONS AND RECOMMENDATIONS

There is much local concern about brown and black bear predation on moose calves. A better understanding of the interactions between brown bear, black bear, and moose in the Chilkat Valley would enhance management of these resources.

The closure of the moose hunting season in Subunit 1D during 1986 may have contributed to the significant increase in the black bear harvest for that year. The subsequent decline to a harvest of 23 bears in 1987, while notable, is not unprecedented. Harvests have been at or below that level on 2 occasions since 1982. Only successful hunters are required to report hunting activity; effort data for unsuccessful hunters would make trend monitoring more reliable.

Of more concern is the sharp increase in the average number of hunter days per harvested bear. While these figures may be an aberration, the fact that sportsmen also perceive a noticeable decline in black bear numbers suggests close attention be paid to any developing trends in the harvest data.

An economic evaluation of all black bear uses in Southeast Alaska (GMU's 1-5) would be useful in the development of a management system based on measurable objectives. To date such evaluations have not been undertaken.

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Table 1. Black bear harvest parameters for Subunit 1D, 1982-87.

Year	Harvest	Males (%)	Nonresident harvest (%)	Spring Harvest (%)	Days hunted per harvest	Mean Skull Size[a] Male x	Male n	Female x	Female n
1982	22	73	9.1	82	3.3	17.4	13	15.3	4
1983	43	74	4.8	43	1.8	16.8	26	14.9	12
1984	23	71	8.7	74	2.3	16.9	13	15.3	5
1985	32	75	9.4	73	1.9	18.1	15	15.9	6
1986	54	75	6.9	66	2.1	17.0	31	16.0	12
1987	23	65	18.2	82	4.8	17.6	11	15.4	7

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

STUDY AREA

GAME MANAGEMENT UNIT: 2 (3,400 mi²)

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

BACKGROUND

Collection of black bear biological data and hunting information was initiated in 1973, when a regulation requiring sealing of hides and skulls was passed. This program has continued for 15 years, and compliance appears excellent. Unit 2 is an intensively logged and rapidly developing area; i.e., increasing road access and a growing human population. This trend will likely continue. Bear populations are high and probably increasing, because recent clearcutting has been creating favorable habitat in some areas. In the long term (i.e., 20-30 years), these bear populations can be expected to decline as the logged areas mature.

The strategic goal for black bear management in Unit 2 is to provide the greatest opportunity to participate in hunting. Hunter densities have been fairly low because good access to most of Unit 2 and the extended length of the season have allowed good hunter distribution.

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 were collected through a mandatory sealing process for all bears harvested by hunters. A stan dard data form was used to collect hunt and hunter information and basic biological data, including skull measurements. Anecdotal information was obtained from hunters during the sealing process. No population surveys were conducted.

RESULTS AND DISCUSSION

Population Status and Trend

Without survey data of any kind, it is difficult to make definite statements about population trends; however, skull measurements have not changed significantly in 13 years, and discussions with hunters and ADFG personnel suggest that major changes in bear densities have probably not occurred. Based on these facts, the population is believed to be either stable or increasing slightly.

Habitat changes through logging tend to increase bear numbers in certain habitat types for about 20 years; however, after canopy closure, populations will likely drop. Over a 100-year rotation, bear populations should be quite a bit 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 last 20 years).

Population Size

Only rough estimates of population size that have been extrapolated from studies conducted in other areas are available. Unit 2 has some of the best black bear habitat in Southeast Alaska, and based on populations in similar areas of coastal North America, estimated densities are 1.5 bears/mi^2 (i.e., a population of 5100 bears).

Mortality

Season & Bag Limit:

The hunting 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:

The black bear harvest in Unit 2 has increased gradually since data was first collected in 1974. Table 1 shows the annual harvest and sex ratios by season for the last 5 years and also presents data on skull sizes, residency of hunters, and methods of transportation. Skull sizes have remained consistently above the management objectives since measurements were first begun.

In addition to the sport harvest, 24 bears were killed but not sealed within Unit 2: four of these were road kills, four were shot and not sealed, 12 were shot and abandoned, and four were shot in defense of life or property. Although these 24 bears represent an increase over the number normally reported, it is probably the true figure for nonsport mortality.

Spring seasons have always provided the bulk of the harvest in Unit 2, and males generally compose more than 90% of the harvest. Fall harvests, while still skewed toward the more mobile males, are more representative of actual populations and contain more balanced sex ratios and younger bears.

Hunter Residency and Success. Nonresidents have taken about 35% of the harvest for the past 5 years. The total harvest is increasing, but the proportion taken by out-of-state hunters has remained about the same. One hundred forty hunters harvested 154 bears from Unit 2 in 1987. Fourteen hunters took 2 bears each.

Harvest Chronology. Table 2 presents harvest chronology for the last 5 years. The peak harvest occurred between 1 and 20 May; it 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.

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

Natural Mortality:

There has been no substantial 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 from logging, which converts uneven-aged old growth to an even-aged stand. Early successional stages (3 to 25 years) provide excellent black bear habitat; however, upon canopy closure, 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 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 provide sufficient hunter opportunity and a harvest well below sustainable levels. The current regulations appear to satisfy demands and meet the goals and management objectives established for the unit.

CONCLUSION AND RECOMMENDATIONS

The black bear harvest in Unit 2 has fluctuated from year to year, but it has generally been on the increase. 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 Island and the numerous large bears found there. The harvest is currently about 3% of the estimated 5100 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 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 possible the killing of nuisance bears around camps and communities is substantially higher than is currently estimated.

Acreage of logged areas by successional stages should also be tracked to help anticipate expected declines in bear populations as the younger clear cuts become nonproductive second growth. Efforts to educate the public about the effects of clear-cutting on bear populations should be intensified. Trade offs between timber harvesting and the bear resource in Unit 2 should be identified and publicized.

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Table 1. Black bear sport harvest statistics for Unit 2, 1983-1987.

Year	Season	Total harvest	No. males	No. females	Unk. sex	Harvest by nonres.	(%)	Mean skull size in inches Males	(n)	Females	(n)	Transport used % Air	Boat	Roads
	Spring	64	48	10	6	20	(31)	19.7	(44)	16.8	(10)	5	31	64
1983	Fall	24	16	8	0	9	(38)	18.0	(15)	16.8	(7)	38	12	50
	Year	88	64	18	6	29	(33)	19.2	(59)	16.8	(17)	14	26	60
	Spring	95	79	15	1	36	(38)	19.4	(72)	17.0	(14)	28	34	38
1984	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
	Spring	58	46	11	1	8	(14)	19.7	(42)	16.6	(9)	11	53	36
1985	Fall	50	27	20	3	9	(18)	18.2	(19)	16.5	(17)	8	12	80
	Year	108	73	31	4	17	(16)	19.2	(61)	16.6	(26)	9	32	59
	Spring	121	95	24	2	40	(33)	19.1	(74)	16.8	(18)	18	29	52
1986	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
	Spring	114	107	7	0	41	(36)	19.6	(98)	16.3	(6)	11	44	46
1987	Fall	40	27	12	1	10	(25)	17.1	(23)	16.6	(9)	8	3	90
	Year	154	134	19	1	51	(33)	19.2	(121)	16.5	(15)	10	33	57

Table 2. Chronology of the black bear harvest in Unit 2, 1983-87.

	Number of Animals				
Date	1983	1984	1985	1986	1987
April 1-20	3	1	1	8	12
April 21-30	6	6	2	14	12
May 1-10	20	33	15	27	23
May 11-20	11	24	13	37	23
May 21-31	6	17	9	26	23
June 1-10	5	8	3	6	12
June 11-20	7	4	2	2	5
June 21-30	6	1	2	0	4
Sept 1-10	5	12	14	9	16
Sept 11-20	9	2	3	9	4
Sept 21-30	1	1	9	3	5
Oct 1-10	3	2	7	6	3
Oct 11-20	1	1	6	2	4
Oct 21-31	0	1	2	5	7
Nov 1-10	1	1	5	4	1
Nov 11-30	4	0	4	1	0

STUDY AREA

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

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

BACKGROUND

Black bears probably first inhabited Yakutat Forelands after the retreat of ice (i.e., 300 to 500 years ago). Black bears are rarely found in Subunit 5B, which is dominated by the Malaspina Glacier; only eight of 329 bears sealed since 1971 were harvested there. The uncommon blue, or glacier bear, color phase occurs in relative high abundance in Unit 5.

POPULATION OBJECTIVES

To maintain a ratio of 3 males:1 female in the harvest.

To maintain a population capable of supporting an annual harvest of at least 20 bears.

METHODS

Black bear hides and skulls were sealed by ADF&G and Fish and Wildlife Protection staff. Collected biological data included color phase, sex, skull size, and location of harvest. Incidental observations of bear dens were noted during aerial surveys for mountain goats.

RESULTS AND DISCUSSION

Population Status and Trend

Precise population information is not available for black bears in Unit 5. Data gathered from sealing certificates suggest that the population is stable or increasing slightly. While the harvest has increased since 1971 (Fig. 1), male skull size dimensions have remained constant (n = 225, mean = 17.2). Without knowing hunter effort over the years, population trend cannot be ascertained with certainty.

Mortality

Season and Bag Limit:

The hunting 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 (mean = 25) since 1983 (Figure 2); with the exception of 1985, the harvest has remained similar over this period. No explanation is available for the higher-than-average harvest in 1985. The harvest of 18 bears in 1987 is the lowest since 1978. Five blue-color-phase bears were recorded. The remaining 13 were black (Table 1). The high percentage of males (94%) taken in 1987 exceeds the 17-year mean of 76%.

The annual mean length-plus-width dimensions for 94 male bears since 1983 has varied only slightly, ranging from 16.5 to 17.9 inches (Figure 3). This compares closely to the 17-year average of 17.2 inches.

Hunter Residency and Success. Nonresident hunters harvested 13 (72 %) black bears in 1987; while the 1983-1987 mean of 67 % is similar, 1986 stands out with a nonresident harvest of 92% (the historic high). While the local resident harvest has been relatively stable over the last 5 years (range = 4-13%, mean = 7%), the nonlocal resident harvest has varied from 4% to 40% (mean = 25%) of the total harvest. There is no apparent reason for this variation, and while total effort is unknown for black bear hunting in the unit, field observations have indicated no significant change in recent years.

Harvest Chronology. Most black bears are taken in Unit 5 during the spring season (1983-1987 mean = 90%). The 1987 harvest was similar, when 89% of the harvest. Successful hunters averaged 5.8 days per bear in 1987; this compares to the 5-year range of 5.1-7.5 (mean = 6.3).

Transport Methods. Eleven (61%) successful hunters used aircraft, five (28%) used boats, and two (11%) used highway vehicles in 1987; The 1983-1987 averages were 38%, 52%, and 10%, respectively. The relative low percentage of highway vehicles used in black bear hunting may reflect the low amount of effort expended by local residents. The reason for 1987 having a noticeably higher percentage of aircraft hunters, rather than boat hunters, is not understood; however, it does not indicate a changing trend.

CONCLUSIONS AND RECOMMENDATIONS

Population objectives for black bear in Unit 5 are being met. Since 1983 the male-to-female harvest ratio has averaged 4:1 and the annual harvest has averaged 25 black bears.

To be able to measure current population objectives, the size of the bear population must be known. A population survey should be conducted in the near future. A knowledge of hunter effort is desirable so that hunter success can be measured and tracked for indications of changes in bear numbers.

Bears are generally perceived as pests by residents of Yakutat, rather than as a valuable wildlife resource. Years of conflict

over garbage management, both at the city dump and at residences, has exacerbated this situation. Efforts should be continued to work with the citizens of Yakutat to reduce human food attractants and raise the status of bears in the public viewpoint.

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Table 1. Historical Black Bear Harvest in Unit 5, 1982-1987.

Year	Harvest			Total	Color	
	Males	Females	Unknown		Black	Blue
1982	17	13	1	31	28	3
1983	14	3	3	20	15	5
1984	19	5	1	25	22	3
1985	30	9	0	39	33	5
1986	18	6	0	24	24	0
1987	17	1	0	18	13	5
Totals	115	37	5	157	135	21
Means	14.4	4.1	0.6	19.6	15.0	2.3

STUDY AREA

GAME MANAGEMENT UNIT: 6 (14,300 mi²)

GEOGRAPHICAL DESCRIPTION: Prince William Sound and North Gulf Coast

BACKGROUND

Black bears are endemic to most of Unit 6, with the exception of Hinchinbrook, Montague, Kayak, and Middleton Islands as well as several of the smaller ones in Prince William Sound. Within Unit 6 black bears utilize a number of habitat types; however, they use coniferous forests and alder-dominated mountain slopes during most of the nondenning period.

Black bear abundance in Unit 6 has apparently fluctuated in the past. McIlroy (1970) and Modafferi (1982) reported that spring bear hunting in Prince William Sound appeared to affect local populations adjacent to Valdez and Whittier, respectively. Food abundance and delayed spring weather may have also affected abundance to a lesser degree throughout a larger area. Where black bears are sympatric with brown bears, their abundance may have been a product of competition with and predation by brown bears.

Trends in black bear abundance in Unit 6 may be reflected by hunter harvest levels. Since 1974, the first full year that sealing requirements were implemented, the number of sealed bears peaked in 1976 at 158, dropped to a low of 66 in 1980, and rose to a record high of 273 in 1985 (Table 1). Prior to sealing requirements, the reported or estimated black bear annual harvest for Unit 6 ranged from "practically nil" (Robards 1953) to an apparent peak well over 100 during 1965 and 1966 (McIlroy 1970).

Harvest has not been correlated to hunter effort since 1977. McIlroy (1970) suggested the population was declining in the Valdez Arm area between 1966 and 1969, based on declining harvest and hunter success and increasing hunter-days per harvested bear. The number of days that successful unguided hunters spent bear hunting increased from a mean of 3.3 days in 1966 to 44.4 days 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. Black bear density in Prince William Sound was estimated on 3 occasions. Grauvogel (1967) estimated a density of 9.8 bears/mi² in good habitat, and McIlroy (1970) estimated that densities in moderately to heavily hunted "good" habitat ranged between 1.0 and 14.0 bears/mi². McIlroy further estimated that densities might reach 25 bears/mi² in unhunted "good" habitat in Prince William Sound. Modafferi (1982) estimated a density of 1.3 bears/mi² within 30 miles of Whittier in a moderately to heavily hunted area.

The total reported mean annual harvest of black bears in Unit 6 between 1974 and 1986 can be characterized as follows: (1) annual

harvest was 144; (2) sex composition was composed of 70% males, 25% females, and 5% unspecified sex; (3) 86% of the sport harvest occurred during the spring; (4) 81% of all bears came from Subunit 6D, 7% from Subunit 6A, 5% from Subunit 6B, 6% from Subunit 6C, and <1% from an unknown location; (5) the mean annual skull size of sport-killed male bears was 17.0 inches; (6) nonresident hunters accounted for 18% of the sport harvest; and (7) 60% of successful hunters used a boat for transportation to their hunt area, 25% used an airplane, and 15% used some other form of transportation.

The greatest future impacts on black bear abundance will be increasing hunting pressure and loss of habitat. Alaska Department of Natural Resources and U. S. Forest Service staff have proposed greatly increasing recreational opportunities, including bear hunting, in Prince William Sound. Proposed highways connecting Whittier and Cordova to the main highway system will substantially improve access and increase hunting pressure near those communities. Private settlement of public land will increase both the legal and defense-of-life-or-property harvests and reduce available habitat. The single greatest long-term impact on black bear habitat will be caused by proposed clear cutting of timber on private, state, and federal lands.

POPULATION OBJECTIVES

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

METHODS

The hides and skulls of all black bears killed, in Unit 6 are required to be sealed by a Department official. Each hide is checked for sex identifiers, skulls are measured, and a rudimentary premolar tooth is pulled for age assessment. Hunters are asked to report the date of kill, days hunted, location of kill, and type of transportation used to access hunt area.

RESULTS AND DISCUSSION

Population Status and Trend

The peak in sport harvest in 1985 reflected a peak in bear densities between 1983 and 1986. The population has experienced a slight-to-moderate decline since the peak.

Population Size:

Estimates on population size or density have not been attempted since studies were conducted by McIlroy (1970) and Modaferri (1982).

Population Composition:

Population composition has not been assessed since Modaferri (1982) studied the black bear population near Whittier (Subunit 6): "a population dominated by females with few old males."

Mortality

Season and Bag Limit:

The hunting season in Unit 6 is from 1 January to 30 June and from 1 September to 31 December. A bag limit of 1 bear per regulatory year is allowed for subsistence, resident, and nonresident hunters. The harvest of cubs and females accom panied by cubs is prohibited.

Human-induced Mortality:

Sealing records indicated that 245 black bears were killed during 1987. This number represented a 10% decrease from the record high of 273 killed in 1985, but it was the 3rd-highest harvest in as many years (Table 1). The number killed in 1987 was 70% above the 1974-1986 annual mean of 144. The annual mean for 1985-1987 was 262 bears.

The 1987 harvest was composed of 190 (78%) males, 54 (22%) females, and 1 (01%) of unknown sex. This composition was derived from 244 harvested bears and 1 male bear killed in defense of life or property. Sex composition was similar to that of the preceding 13 years of the sport harvest. In the last 3 years, males composed 74% of the sport harvest.

The mean skull size of males killed in Unit 6 in 1987 was 17.1 inches (n = 179). This statistic has varied from 16.8 inches (n = 637) during the period 1974 to 1982 to 17.3 inches (n = 581) during the period 1983 to 1986. The most recent 3-year-mean male skull size for 1985-1987 was 17.2 inches (n = 539).

Eighty percent of harvested bears came from Subunit 6D; the remainder came from Subunit 6A (11%), Subunit 6B (5%), Subunit 6C (3%), or an unspecified location (< 1%). Record harvest levels for individual recording areas (Table 1) occurred in Subunit 6A, Port Nellie Juan to Johnstone Bay in southwestern Subunit 6D, and the island complex from Bainbridge to Latouche Islands in southwestern Subunit 6D.

Hunter Residency and Success. In 1987 nonresident hunters harvested 48 bears, representing 20% of the total sport harvest. Nonresident hunters accounted for 48% of the fall harvest and 17% of the spring harvest.

Harvest Chronology. In 1987 hunters killed 223 (91%) and 21 (9%) bears during the spring and fall, respectively.

Game Board Actions

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

CONCLUSIONS AND RECOMMENDATIONS

Population objectives were attained or exceeded for the 1985-1987 period. Maintaining the objectives in the future will depend on our ability to moderate extreme fluctuations in harvest rates. It may be necessary to disperse spring hunting pressure throughout the unit. The objective for the harvested sex ratio should be reduced to 70% males. Maintaining a sex ratio of 75% males may not be possible, and I can not justify the necessity of exceeding the long-term mean for Unit 6.

I recommend that more management attention be given to monitoring hunter effort in Unit 6. Apparent population reductions occurred near major access points to Subunit 6D in 1986 (Griese 1987) and 1987; similar events appeared to occur near Valdez in 1977 and in the late 1960's (McIlroy 1970). Because hunter effort data are missing, an accurate interpretation of harvest trends is not possible. While our current mode of passive management of black bears seems to be a function of priorities and budgets, anticipating population fluctuations and recommending appropriate regulations to moderate future dramatic fluctuations in hunter success and harvest may be demanded by the public.

I recommend that research be directed at reconstructing the populations studied by Modafferi (1982) and McIlroy (1970) to better understand the significance of high exploitation rates near access points. I believe development of life tables for the females in these populations will enable us to better interpret population fluctuations resulting from hunter-caused mortality.

I further recommend that research be directed at assessing the impact of clear-cutting large tracts of limited timber stands in Unit 6. Anticipating impacts on black bear populations would be purely speculative at this time. Recommendations to land managers and the public to prevent long-term damage to black bear populations should be a high priority.

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Table 1. Unit 6 black bear harvest by subunit, 1974-1987.

Unit	Area	Number of Bears Sealeda													
		1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
6 (A)	Icy Bay-Ragged Mtns.	3	14	5	4	6	10	1	8	7	7	24	23	26	26
6 (B)	Ragged Mtns-Copper River	4	7	4	14	6	4	10	3	5	5	13	9	9	13
6 (C)	Copper River-Cordova	10	6	27	6	2	3	1	6	6	4	15	8	16	8
6 (D)	Prince William Sound														
	Nelson Bay-Sheep Bay	16	5	5	2	1	0	0	6	2	1	11	1	11	9
	Port Gravina-Port														
	Fidalgo	17	7	15	6	7	5	2	10	6	13	16	21	15	13
	Valdez Arm	9	29	25	15	18	14	22	18	40	35	33	54	39	31
	Columbia Bay-Eaglek Bay	14	24	26	21	9	7	4	15	29	11	4	24	38	30
	Port Wells	9	27	16	11	13	14	13	23	20	22	20	51	29	39
	Whittier-Culross Island	12	12	7	14	11	11	10	14	6	14	16	37	34	20
	Port Nellie Juan-Johnstone Bay	10	11	19	14	5	14	2	14	13	12	21	35	37	43
	Bainbridge/Evans/Latouche Islands	1	3	1	1	0	3	1	0	2	3	4	9	9	10
	Knight Island	0	2	2	0	1	2	0	0	1	1	2	0	2	1
	Naked/Peak/Storey/Perry Islands	0	0	4	0	1	0	0	0	0	0	0	0	0	0
	Nonspecific 6(D)	2	3	1	0	0	1	0	2	1	4	7	1	2	1
	Total 6 (D)	90	123	121	84	66	71	54	102	120	116	134	233	216	197
Unit 6 - Nonspecific 1		0	1	0	1	0	0	0	4	1	0	0	0	1	
Total		108	150	158	108	81	88	66	119	142	133	186	273	267	245

[a] Includes illegal and defense of life or property killed bears.

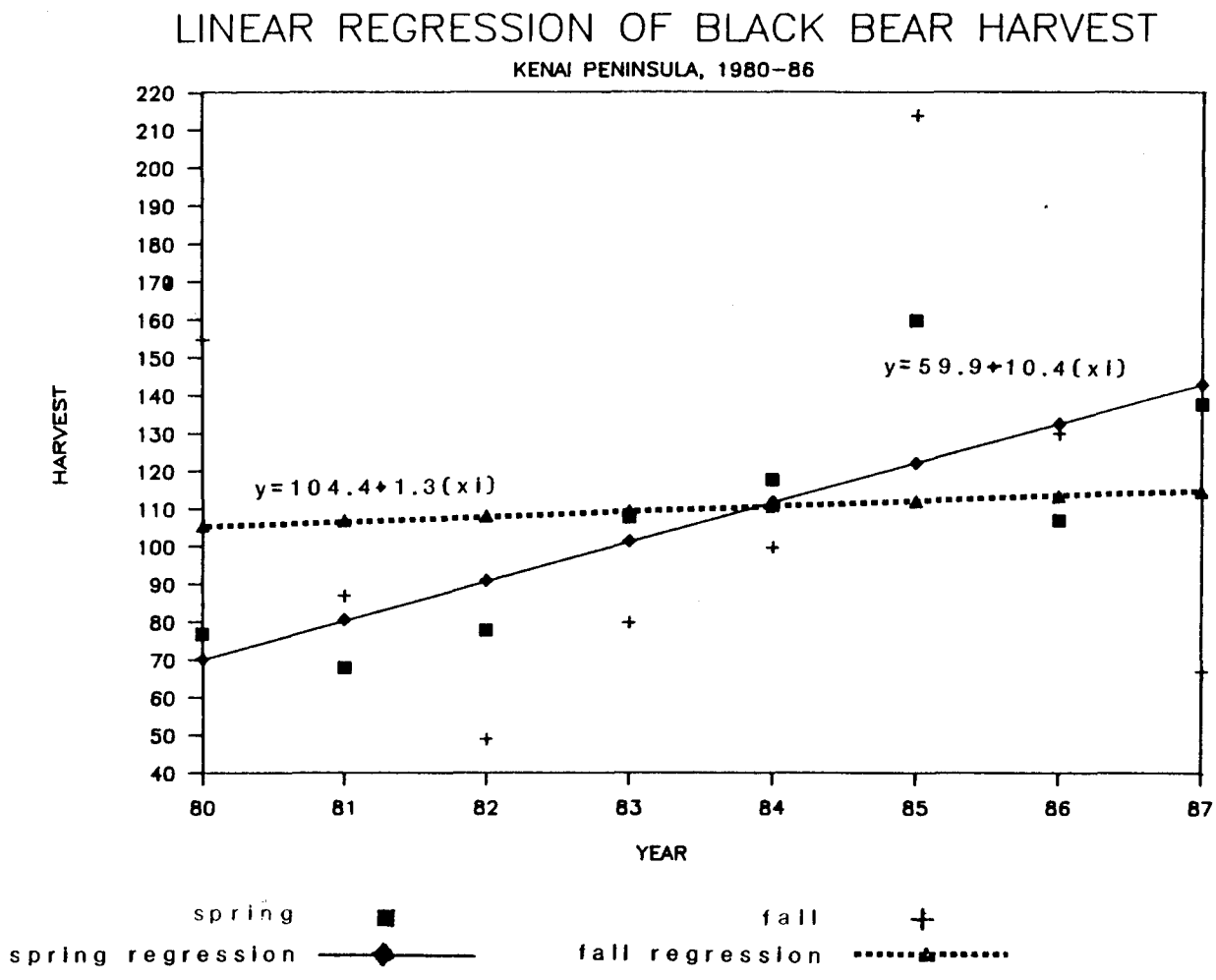

Figure 1. Linear regression of reported fall and spring black bear harvests on the Kenai Peninsula, 1980 - 1987.

STUDY AREA

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

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

BACKGROUND

Black bears are relatively abundant and widely distributed throughout Units 7 and 15. They are most consistently associated with lowland forest habitats; however, heavy 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.

POPULATION OBJECTIVES

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 the 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 and 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 was 1 black bear/2.5 mi^2 of suitable habitat at the Moose Research Center in Subunit 15A. Although current information is insufficient to make accurate estimates of population size and trend, field observations made by Department personnel and outdoor recreationists indicate that black bears remain relatively 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 in 1987 was 205 black bears, including 92 bears in Unit 7 and 113 bears in Unit 15 (Table 1). The 1987 annual harvest was 10% lower than the previous 5-year-mean harvest and 14% lower than the 1986 harvest. Sex composition of the 1987 harvest in Unit 7 was 53% males, 45% females, and 2% unspecified; in Unit 15, the harvest was composed of 65% males and 35% females. The peninsula-wide sex composition was 60% males, 39% females, and 1% unspecified. The 3-year average annual harvest and sex composition of that harvest were 305 bears and 64% males and 36% females, respectively. The sex composition of 5-year increments shows the percentage of males declining in Unit 7 and increasing in Unit 15 (Table 2).

On the Kenai Peninsula, spring harvests (15 April-30 June) have increased at the rate of 10.4 bears per year since 1980 (Fig. 1). Harvest increases have been particularly evident in traditional spring hunting areas such as the coastal portion of Subunit 15C (Table 3) and along the Sterling and Seward Highway corridors in Unit 7. Discussions with hunters, air taxi operators, outfitters, and guides suggest that the upward trend in spring black bear harvests is the result of increasing hunting pressure. Further, there was an increasing number of outfitters and air taxi operators promoting spring black bear hunts along the Peninsula's outside coast (i.e., Koyuktolik Bay to Blying Sound, excluding Kenai Fjords National Park).

In contrast, fall harvests that have occurred primarily in alpine areas have varied widely in magnitude, indicating no clear trend (Fig. 1). Two factors appeared to regulate the magnitude of fall bear harvests: (1) the degree of alpine use by bears; and (2) fall weather conditions. Because bears are easier to see when they are in alpine areas, they were more vulnerable to hunting when they frequented those areas. In Subunit 15C, fall black bear use of alpine areas seemed to be inversely related to the abundance of forest berry crops. During years when forest berries (i.e., primarily highbush blueberry and devil's club) were scarce and alpine berries abundant, black bears were common in the alpine areas and harvests have been high (e.g., fall 1985). Conversely, when forest berry crops were abundant, regardless of the status of alpine berries, few bears were observed in the alpine during September and October and harvests were relatively small (e.g., fall 1987). In southcentral Alaska, long periods of rainy weather, which limited hunter access to alpine bear hunting areas, were common.

Hunter Residency. Nonresidents have taken from 7% to 20% of the annual black bear harvest since 1980. In 1987, 7% of the harvest was taken by nonresidents.

CONCLUSIONS AND RECOMMENDATIONS

If the downward trend observed in 1987 continues, I recommend that harvest in Unit 7 be carefully monitored and regulatory measures be taken to slow the annual increase in black bear harvests. This recommendation is justified because of increasing harvests and the uncertain status of black bear populations in intensively hunted areas. Although the 3-year-mean percentage of males in the peninsula-wide harvest (64%) appears to be typical of a healthy bear population, the proportion of males in the harvest is declining. Linear-regression analysis shows that spring harvests have been responsible for 88% of the total annual harvest increase since 1980. In Unit 7 and Subunit 15C, spring black bear hunting is concentrated in traditional hunting areas, raising concern about local overharvesting. Therefore, if it becomes necessary, regulatory changes should be aimed primarily at decreasing spring black bear hunting.

The current 3-year-average harvest and the 1987 sex composition of the harvest meet the Department's black bear population objectives; however, since these guidelines, in themselves, could lend to overharvesting, decisions to change black bear 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.

Because of their remoteness, it appears some subsistence hunters in the villages of Port Graham and English Bay have not been sealing their black bears; therefore, harvest records for the coastal area between Port Graham and Koyuktolik Bay (Subunit 15C) are probably incomplete. To reduce this problem, I have tentatively arranged to train the Village Public Safety Officer in English Bay to seal bear hides and skulls.

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PREPARED BY:

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SUBMITTED BY:

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Acting Survey-Inventor Coordinator

Table 1. Summary of black bear sport harvests on the Kenai Peninsula, 1980-1987.

Year	Unit 7		Unit 15		Totals	Percentage change
	Spring	Fall	Spring	Fall		
1980	22	48	55	107	232	
1981	26	29	42	58	155	- 33
1982	35	11	43	38	127	- 18
1983	51	28	57	52	188	+ 48
1984	41	22	77	78	218	+ 16
1985	47	82	113	132	374	+ 72
1986	43	51	64	79	237	- 36
1987	63	29	75	38	205	- 14
Totals	328	300	526	582	1,736	

Table 2. Percentage of males in the reported black bear harvests in 5-year increments on the Kenai Peninsula, 1975-1987.

5-year increment	Unit 7 males		Unit 15 males		Total males	
	No.	%	No.	%	No.	%
1975-1979	183	59	265	62	448	60
1980-1984	205	66	370	61	575	63
1985-1987	187	59	337	67	524	64

Table 3. Reported spring black bear harvests along the coastal zone of Subunit 15C from the head of Kachemak Bay southerly to Gore Point, 1980-1987.

Coastal interval	Year								Totals
	1980	1981	1982	1983	1984	1985	1986	1987	
Bradley River-Glacier Spit	--	--	--	--	2	--	--	2	4
Halibut Cove-Jakalof Bay	4	4	3	4	6	15	8	6	50
Kasitsna Bay-Point Adam	2	1	4	--	5	7	4	3	26
Koyuktolik Bay-Chugach Bay	--	3	2	4	2	10	4	8	33
Windy Bay-Gore Point	1	3	2	3	8	7	3	10	37
Totals	7	11	11	11	23	39	19	29	150

STUDY AREA

GAME MANAGEMENT UNIT: 9 (45,500 mi^2)

GEOGRAPHIC DESCRIPTION: Alaska Peninsula

BACKGROUND

Black bears occur in the northern portions of Subunits 9A and 9B. Sealing of black bears has never been required in Unit 9, and no population surveys or other studies were conducted during the reporting period.

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

Occasionally, black bear hunters voluntarily have their bears sealed, providing a scant idea of harvest levels and hunter interest. No other work is accomplished on black bears.

RESULTS AND DISCUSSION

Harvest

One hunter reported taking 2 black bears (1 of each sex) in 1987. Both bears were taken during the summer, and the meat was not salvaged. The 1987 reported harvest was lower than the average of 7 bears per year reported for the previous 10 years. Because sealing black bears is not required in Unit 9, there is no reliable way to assess changes in hunting patterns over the years.

CONCLUSIONS AND RECOMMENDATIONS

Despite the lack of accurate data on harvest of black bears, I believe the overall harvest is well below the level that can be sustained. Consequently, no changes in regulations or management are recommended.

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Acting Survey-Inventory Coordinator

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; wide yearly fluctuations in the number of bears harvested occur, and no trends are evident (Table 1). Black bears are gaining in status as a desirable big game animal, and hunting for them 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 through the mandatory sealing information supplied by successful hunters. The sex and age composition of the harvest was obtained by determining sex, measuring skull size, and extracting a tooth at the time of sealing. Harvest data were analyzed to determine if objectives were being met.

RESULTS AND DISCUSSION

Population Status and Trend

Black bear surveys or censuses to determine the population status have not been conducted in Unit 11; however, field observations and harvest data suggest black bears were abundant wherever their habitat requirements had been met. The lower Chitina River Valley was especially favorable bear habitat; salmon were available in a number of streams. The number of black bears in that area were the highest in the unit. Black bears may be increasing in the lower Chitina Valley, because the exclusion of wildfire has resulted in an increase in the amount of habitat covered by spruce forests.

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 havesting 10 black bears in 1987, an increase of 67% from the 1986 harvest of six and slightly above the 10-year (1976-86) mean of 8 bears/year. The mean skull size for all males was 17.1 inches in 1987, representing an increase from the 15-year (1973-87) mean of 16.9 inches. The mean skull size for females (i.e., 15.8 inches) also represents an increase from the 15-year mean of 15.6 inches.

Data obtained from bear sealing certificates indicate 70% (n = 7) of the successful hunters were specifically hunting black bears, while 30% (n = 3) reported taking a bear incidentally to other hunting activities. In 1987 only 30% (n = 3) of the successful hunters salvaged some or all of the bear meat, compared with 50% (n = 3) during 1986. There were no black bears reported taken over bait during 1987 in Unit 11.

Hunter Residency and Success. Nonresidents took 5 (50%) black bears during 1987. Overall, nonresidents have averaged 3 bears a year, or 30% of the harvest in Unit 11 since 1973. During 1987 all of the successful nonresidents reported using a guide. Only one resident in Unit 11 reported taking a bear during 1987. Successful bear hunters spent 5 days in the field during 1987.

Harvest Chronology. The spring and fall harvests were 4 (40%) and 6 (60%) bears, respectively. Since 1973, 78% of the black bear harvest occurred during fall seasons.

Transportation Methods. Aircraft were used by 80% (n = 8) of the successful hunters, while the remaining 20% (n = 2) used highway vehicles as their primary method of transportation.

Game Board Actions and Emergency Orders

Board of Game actions provided for an adequate opportunity to participate in hunting black bears. There was a year-round hunting season and an annual bag limit of 3 bears.

CONCLUSIONS AND RECOMMENDATIONS

The black bear population in Unit 11 received relatively light hunting pressure that is expected to remain relatively low, because portions of the unit are included in Wrangell-Saint Elias Park/Preserve. National Park Service regulations prohibit sport hunting in those portions. Although subsistence hunting by local rural residents has continued in these park areas, aircraft cannot be used as access. This effectively closes most of the park to all hunting. Sport hunting and aircraft access are allowed in areas designated as preserve.

Black bear harvests have been low, exerting little influence on the unitwide bear population; however, in Unit 13 recommendations to reduce the bag limit for sport hunters from 3 to 1 bear per year have been made. Since the units are adjacent and hunters frequently hunt in both units, I recommend that the bag limit for

black bears in Unit 11 also be reduced to 1 bear per year. Consistent bag limits in adjacent units will reduce confusion, regulatory violations, and bootlegging of bears.

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Table 1. Unit 11 black bear harvests, 1971-1987.

Year	Total harvest	Males	(%)	Females	(%)	Unknown	Nonres. 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	75%	2	33%	0	1	17%	365 Days
1981	8	6	0%	2	25%	0	1	13%	365 Days
1982	0	0	67%	0	0%	0	0	0%	365 Days
1983	12	8	63%	4	33%	0	1	8%	365 Days
1984	16	10	50%	6	38%	0	0	0%	365 Days
1985	2	1	67%	1	50%	0	1	50%	365 Days
1986	6	4	80%	2	33%	0	2	33%	365 Days
1987	10	8	68%	2	20%	0	5	50%	365 Days
Totals	159	105	68%	50	32%	4	47	30%	

STUDY AREA

GAME MANAGEMENT UNIT: 12 (4,500 mi²)

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

The original management goals for black bears in Unit 12 (ADF&G 1976) were to provide the greatest opportunity to participate in hunting (primary goal) and harvesting (secondary goal) of black bears; the current management goals are to provide for subsistence use and the greatest sustained opportunity to hunt them. Interest in hunting black bears, particularly during the spring, has increased in recent years. Baiting has increased in popularity because of its effectiveness and convenience, but some hunters still stalk bears on exposed south slopes during spring. Most fall hunting is incidental to hunts for other species. The meat is salvaged from most black bears harvested by resident hunters.

MANAGEMENT OBJECTIVES

To continue to support the current open season and 3-bear bag limit.

To maintain or increase the harvest from the current average of 28 bears per year.

METHODS

Harvest data are gathered from mandatory sealing of black bear hides and skulls. While premolar teeth are extracted from bears during the sealing process, they have not been sectioned or aged for several years.

RESULTS AND DISCUSSION

Population Status and Trend

While census techniques have not been used to determine black bear numbers, the apparent abundance of bears from year to year indicates that the population is not declining.

Population Size:

No estimates of the size of the black bear population have been made for Unit 12. However, using a density range of 1 bear/3-6 mi²

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.

Population Composition:

Because males are more vulnerable to harvest than females, data on sex and age of harvested bears are not useful for determining population composition. Cubs and females with cubs are protected by regulation. At least in the immediate vicinity of Tok, the bear population appears to be productive; there have been many sightings of family groups composed of cubs or yearlings accompanied by sows. Enhanced cub survival may be due to relatively high harvests of males in this area. These sightings may also suggest that females with cubs are particularly abundant or not secretive in this area.

Based upon casual observations, at least some black bear females tend their offspring until spring of the 3rd year following birth, representing 1 year longer than that reported for black bears in more southern areas; it also suggests a lower reproductive rate than southern bears. Sixteen-month-old yearlings weigh only about 30 pounds and may be too small to fend for themselves. This is probably attributable to the relatively short seasonal period when bears in the area can make net caloric gains for growth and fat accumulation.

Distribution and Movements:

Black bears are well distributed throughout the forested areas of Unit 12. Denning has been observed to occur from the floor of the Tanana Valley up to 4,000 feet in the alpine 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 bear berry understory and sparse aspen overstory is high in May and June. Use of overwintering lowbush cranberries is also high when available. When berries are unavailable, black bears have been observed eating quantities of young horsetails in lowland habitats. Some predation on calf moose also occurs from late May to mid-June.

During summer bears move to lowland bogs where they seek blueberries. As plant phenology progresses, bears move up to subalpine habitats seeking later-ripening blueberries. In 1987 production of blueberries and bear berries was poor and bears remained in valley bottoms longer than expected. Complaints about bears in settled areas were more frequent than normal during July and August.

From 1981 to 1983 an informal investigation of black bear movement was conducted near Tanacross. Two females and 2 males were captured, radio-collared, and periodically relocated. One mature female occupied a home range of 16 mi^2, based on 29 relocations during the 3 summers. The other female, a 3-year-old, inhabited a spring home range of 4 mi^2. This home range size was based on 8 relocations; however, she was killed as a nuisance bear in June 1983. One male, a mature adult, had a home range of 63 mi^2 during

1983 (15 relocations). The other male, a young adult estimated to be 4 years old, occupied a 3-mi² area (7 relocations). A minimum density estimate of 1 black bear/3-6 mi² was calculated, based upon a known minimum population of 8 bears in 36 mi² at the core of the study area.

Mortality

Season and Bag Limit:

The season in Unit 12 is open year round. The bag limit is 3 bears. Cubs and females accompanied by cubs are protected by regulation.

Human-induced Mortality:

In 1987 hunters reported taking 27 black bears in Unit 12; at least 1 additional bear was known to have been fatally wounded but not recovered. This equals the 5-year-average harvest of 28 bears (Table 1). The average harvest for a 9-year period (i.e., 1975-83) was only 21 bears, so the recent interest in black bear hunting has increased the annual harvest by 7 bears, or about 33%. The use of baiting as a spring hunting technique has also increased, contributing to greater harvests.

As usual, the harvest was concentrated along the highway system. Of the 27 bears taken, 14 (52%) were taken along the roads of the Tanana Valley, seven (26%) in the Tok River drainages, three (11%) in the Nabesna River drainage, two (7%) in the Chisana River drainage, and one (4%) in the Robertson River drainage.

Twenty-one (78%) of the bears taken were males and 6 (22%) were females. No trend in the sex composition of the harvest is evident (Table 1). Although a premolar tooth was taken from each bear sealed, age determination was not completed in 1987. The mean skull size of 16.5 inches for males shows no statistically significant change from the 10-year (i.e., 1974-83) average of 16.3 inches. The mean skull size of 15.2 inches for females is also comparable with the mean of 15.6 inches for the same 10-year period.

Hunter Residency and Success:

Twenty-five (93%) of the 27 successful black bear hunters in 1987 were Alaskan residents. For the past 5 years, resident hunters have harvested an average of 86% of the bears taken each year (Table 1).

No measure of black bear hunter success is available because harvest tickets or resident tags are not required; however, sealing documents indicate successful bear hunters spent an average of 5.5 days in the field. Interviews with spring bear hunters using bait suggest that these hunters saw many bears and were willing to hunt longer in hopes of taking larger males. Thirteen (48%) successful hunters hunted only 1 day.

Harvest Chronology. Of the 27 bears harvested, 18 (67%) were taken during the spring and nine (33%) during the fall. This was unusual because harvests have been nearly evenly split between spring and fall for the past 5 years (Table 1). Generally, bears are purposefully sought during spring but in the fall are taken incidentally to other species. Twelve bears were taken in May, six in June, four in July, three in August, and two in September.

Transport Means. Most black bears harvested in Unit 12 were taken by hunters using highway vehicles and riverboats.

Natural Mortality:

Most black bear mortality in Unit 12 is natural, because of the apparently low harvest by humans (i.e., 2-4%). Grizzly bears kill black bears in Unit 12. Adult black bear males are the primary cause of cub mortality in some areas of North America. Hunters have reported observations of the elusive behavior of females with cubs when adult males approach a bait, suggesting that adult males prey on cubs in this area as well.

Habitat

Assessment:

Approximately one-half of Unit 12 is considered to be black bear habitat because of its forested nature. The moderate abundance of grizzly bears probably limit the distribution of black bears to those habitats offering climbable trees for escape. All of the berry-producing plants mentioned previously are abundant throughout the unit; however, climatic conditions vary from year to year and affect berry production. Blueberries are highly preferred during summer and fall, while cranberries are less preferred. Bear berries appear to be eaten primarily during spring. Bears in Unit 12 do not have access to abundant salmon runs; they also experience a much shorter period of berry abundance than bears inhabiting coastal areas. For these reasons, black bears in Unit 12 are smaller, they exist at lower densities, and females tend their young longer than those inhabiting nutritionally richer coastal habitats.

Enhancement:

The implementation of the Alaska Interagency Fire Management Plan is expected to enhance bear habitat over the long term in Unit 12, as different areas are burned each year. Extensive areas of black spruce forest produce little high-quality, preferred black bear forage. If a greater percentage of the area were disturbed by fire, the average age of successional habitats would be lower and a younger, more diverse habitat would result. This change is expected to favor production of food plants preferred by bears.

Game Board Actions and Emergency Orders

At the spring 1988 Board of Game meeting, regulations (effective 1 July 1988) were adopted that will restrict bear baiting to a 15

April to 15 June period. 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 fall will no longer be allowed to do so.

CONCLUSIONS AND RECCOMENDATIONS

During 1987 both management objectives were achieved; however, implementation of more restrictive regulations affecting the use of bait in black bear hunting may compromise continued achievement of these objectives. I expect a reduction in harvest will result from these restrictions. This will not interfere with the ability of the population to support harvest, but any reduction in harvest will compromise the objective of maintaining or increasing the harvest from 28 bears per year. I recommend that black bear hunting regulations remain as liberal as possible. There is no indication that current harvests of black bears (estimated at 2-4% of the population) are excessive.

Harvests are largely restricted to a relatively small percentage of the unit and have little effect on the bear population. Most areas of Unit 12 are not hunted specifically for black bears. 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 by sex, season, and hunter residence, 1983-87.

Year	No. taken	No. males (%)	No. females (%)	No. res (%)	No. nonres (%)	No. spring (%)	No. fall (%)
1983	26	23(88)	3(12)	23(88)	3(12)	12(46)	14(54)
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)
$\underline{x}$	28	18(70)	8(30)	25(86)	3(14)	15(52)	14(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 and are considered greater than in past years. Since 1950 fire suppression activities have all but eliminated the incidence of wildfire, and areas that had been 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 hunting is becoming more popular.

POPULATION OBJECTIVES

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

METHODS

The black bear harvest was monitored through the mandatory sealing information supplied by successful hunters. The sex and age composition of the harvest was obtained by determining sex, measuring skull size, and extracting a tooth at the time of sealing. Harvest data were, and will continue to be, analyzed to determine if objectives were being met.

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 were abundant wherever their habitat requirements had been met. No discernible trend in bear abundance has been documented, but bears may be increasing as more of the unit becomes forested.

Population Size:

In conjunction with the Susitna Hydroelectric Project (Miller 1987), a black bear census was conducted in 1985 along a portion of the Upper Susitna River. Results indicated a density of 1 black bear/4.3 mi^2; however, Miller considered the study area to be marginal black bear habitat, and his results were not 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 in areas like the Kenai Peninsula.

Population Composition:

Female black bears that were radio-collared 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 were found in forested habitats, except during the fall and occasionally in the spring when they moved 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. Subsistence, resident, and nonresident hunters were allowed to harvest 3 bears.

Human-induced Mortality:

The reported harvest of black bears in 1987 was 85, an increase of 23% from the 1986 harvest of 69 and 6% more than the 5-year (1982-86) average harvest of 80 bears (Table 1). Males composed 60% (n = 50) of the harvest and females 40% (n = 34). The mean skull size for males was 16.7 inches in 1987, virtually identical to the 15-year mean of 16.6 inches. The mean skull size for females in the 1987 harvest and 15-year mean average was 15.5 inches.

Data obtained from bear sealing certificates indicate 60% (n = 51) of the successful hunters were specifically hunting black bears. Forty percent (n = 34) reported taking a bear incidentally while hunting other game. In 1987, 75% (n = 62) of the successful hunters salvaged some or all of the bear meat, compared with 66% (n = 45) during 1986. Only 1 bear was reported as having been shot at a bait station in 1987.

Hunter Residency and Success. Nonresidents took 11 (13%) black bears during 1987. Overall, nonresidents have averaged 15 bears per year, or 20% of the harvest, in Unit 13 since 1973. In 1987, 12% of the successful hunters reported using a guide. Most guided hunters were nonresidents. Residents of Unit 13 killed 20 (24%) black bears in 1987, compared with only 11 (16%) the previous year. The remaining 54 (63%) bears were sealed by other Alaskan residents.

Successful black bear hunters spent an average of 3.6 days in the field per bear. Subunit 13D had the highest reported harvest with 43 (51%) bears, followed by Subunits 13E with 27 (32%), 13A with eight (9%), 13C with five (6%), and 13B with two (2%). Historically, hunter success has been much greater in Subunits 13D and 13E; these subunits have accounted for 83% of the unitwide take for the past 6 years.

Harvest Chronology. The spring and fall harvests were 42 (49%) and 43 (51%) bears, respectively. The 1987 spring harvest was 35% higher than the 5-year (1982-86) mean of 31 bears. Overall, 67% of the black bear harvest in Unit 13 has occurred during the fall season since 1973.

Transport Methods. Forty, 24, 11, 9, and 1 successful hunters reported using of highway vehicles or walking (47%), aircraft (28%), boats (13%), ORV's (11%), and a horse (1%), respectively. This proportional breakdown of transportation methods is similar to that observed in previous years, and 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; he also observed natural mortality among radio-collared adult black bears. Miller 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

Current Board of Game actions provide for the greatest opportunity to participate in hunting black bears. This is met by providing a year-round hunting season and an annual bag limit of 3 bears.

Habitat

Preferred habitat for black bears in Unit 13 appears to be extensive tracts of spruce forests with more marginal habitat types, including fingers of forested land bordering rivers but surrounded by upland shrub zones. Subunits 13D and 13E have the most extensive areas of heavily timbered spruce forests and thus contain more bears. Bear habitat has improved in these subunits because fire suppression has eliminated wildfire, resulting in more land supporting a closed-forest canopy. Land management

objectives, however, now call for a reduction in fire suppression activities in remote portions of GMU 13 to allow for restoration of wildfire and the return of a fire mosaic where forested tracts are broken up by large burns. This could result in a reduction of the amount of black bear habitat available in the future.

CONCLUSIONS AND RECOMMENDATIONS

Harvest data were not collected from unsuccessful black bear hunters. We thus have no way of determining total hunting pressure. 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 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 one indication of bear abundance, these data should be collected. I recommend that a system for collecting hunting data from unsuccessful hunters be developed and implemented.

Black bear harvests have increased in Unit 13 since 1980. Overall, males have predominated in the harvests, representing 65% over the past 15 years. However, since 1983 the percentage of males in the harvest has declined to 61%, and it is approaching the management objective of 60% males in the harvest. It may be that if current harvest levels were exceeded, the percentage of males in the harvest could drop below the desired guideline. I recommend that the bag limit for black bears be reduced to 1 bear per year for sport hunters. The reduced bag limit should reduce the overall harvest of female black bears, because hunters will probably become more selective for the larger-bodied males.

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Table 1. Unit 13 black bear harvests, 1973-1987.

Year	Total harvest	Males	(%)	Females	(%)	Nonresident Unknown	Nonresident hunters	Season (%)	Season length
1973	70	42	62%	26	38%	2	34	49%	365 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
Totals	1,101	683	65%	361	35%	56	223	20%	

STUDY AREA

GAME MANAGEMENT UNIT: 14A and 14B (4,780 mi²)

GEOGRAPHICAL DESCRIPTION: Upper Cook Inlet

BACKGROUND

Little information is available on the status of the black bear population in Subunits 14A and 14B. Density surveys have never been conducted. The population has been managed primarily by indirect means 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. There are insufficient data to positively determine the impact of the harvest on the bear population. In the past 5 years the black bear population in Subunits 14A and 14B may have remained stable, but possibly some decline may also have occurred.

POPULATION OBJECTIVES

To maintain a 3-year-mean harvest of 100 bears with 60% males.

METHODS

Research studies or surveys for determining black bear densities or other population parameters have not been conducted in Subunits 14A and 14B. Information about population status was derived primarily by indirect means, drawing heavily on black bear studies conducted in other places in Alaska. Spring and fall harvest data were compiled from sealing information supplied by successful hunters.

RESULTS AND DISCUSSION

Population Status and Trend

Although no density surveys have been conducted, observations by hunters, guides, air-taxi operators, interested members of the public, and Departmental staff indicate that black bears in Subunits 14A and 14B are common. These observations have been too general to detect any major trends in the population, but we believe it has remained relatively stable. Possibly, a slight decrease in the population has occurred as a result of recent increases in black bear harvests. Both subunits have extensive forested habitat, but we believe the black bear density is higher 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 mi² in good black bear habitat; Miller et al. (1987) found that black bear density along the Susitna River in Unit 13 was 1 bear/4.3 mi². Most black bear habitat in Subunits 14A and 14B is below an

elevation of 2500 feet (S. Miller, ADF&G staff, pers. commun.). Using a map (i.e., scale = 1:250,000) and a computer digitizer, we determined that the amount of area in Unit 14 below 2500 feet (including lakes and rivers) was approximately 2,404 mi^2 i.e., Subunit 14A, 1,492 mi^2 and Subunit 14B, 912 mi^2). Because the black bear densities in Subunits 14A and 14B were probably lower than those on the Kenai Peninsula (1 bear/2 mi^2) and in Unit 13 (1 bear/4.3 mi^2), a reasonable estimate of the density in the lower Matanuska-Susitna valley would be 1 bear/3-4 mi^2. Assuming Subunits 14A and 14B have 2,404 mi^2 of black bear habitat and the density is 1 bear/3-4 mi^2, the population would contain from 600 to 800 black bears. If the density were as high as 1 bear/2 mi^2, which is not very likely, then the population would have about 1200 bears. Although no statistical confidence can be placed on these estimates, a range of 600 to 1200 black bears probably includes the actual number of black bears in the population and provides a useful range of reference for making 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 1987 black bear hunters harvested 100 bears: 72 in Subunit 14A and 28 in Subunit 14B. The 1987 harvest was the highest on record, more than doubling the 1982 harvest; i.e., from 45 to 100 black bears (Table 1). Harvests have been as low as 36 bears (1979).

In 1987 male bears accounted for 49% and 78% of the harvests in Subunits 14A and 14B, respectively. Since 1982 the ratio of males to females in the harvest has changed; females have become more prevalent (Table 2). In 1982 females composed 28% of the annual harvest in Subunit 14A, but by 1987 that figure had climbed steadily to 51%. A similar trend occurred in Subunit 14B; from 1982 to 1986 the annual harvest of females increased from 20% to 53%; however, in 1987 females composed only 22% of harvest, a substantial decrease from the 53% female harvest for the previous year.

The harvest of males in Subunit 14B increased from eight in 1986 to 21 in 1987 (Table 2); this increase in Subunit 14B occurred because hunters harvested bears from areas that previously had incurred light hunting pressure. Clearly the dominant trend in the past 5 years has been one of increasing annual harvests as well as an increasing harvest of female bears.

Statistical data on the geographical distribution of the harvest by drainage were compiled for the past 3 years; i.e., 1985-87 (Table 3). This information indicates that harvests have not shifted dramatically into new drainages; rather, bears have been

harvested in the same relative proportions in the 8 and 6 major drainages in Subunits 14A and 14B, respectively (Table 3). Harvests have also continued to increase steadily in all the major drainages in these subunits.

Mean skull size of black bears from Unit 14, including Subunit 14C, has shown little change since 1982; mean skull size of males decreased from 16.9 inches in 1982 to 16.2 inches and 16.3 inches in 1985 and 1986, respectively. In 1987 the mean skull size for males increased to 16.7 inches (Table 4). If this increase represents an actual trend rather than a bias in sample size, hunters may have harvested bears in the more remote areas of the major drainages.

Despite localized urban development, few black bears have been taken in defense of life or property (DLP) in Subunits 14A and 14B. In 1987 only 1 DLP black bear was reported killed; in the past 6 years (1982-1987) only 3 DLP's have been reported (Table 1); however, they probably do not represent an accurate accounting of the number killed. Many people living in Unit 14 consider black bears nuisances, especially when the animals repeatedly visit homes or camp sites. Quite likely, a number of black bears were killed and not reported or were killed and reported as sport harvests. The actual DLP bear harvest was probably several times the reported figures.

Hunter Residency and Success. In Subunits 14A and 14B most of the black bear harvest was taken by residents. During the period from 1982 to 1987 resident hunters never took less than 75% of the annual harvest, and in three of those 6 years residents took 100% of the harvest in either Subunit 14A or 14B (Table 5). Nonresidents generally harvested a higher percentage of bears in Subunit 14B than in Subunit 14A, ranging from 5-25% in Subunit 14B to 2-10% in Subunit 14A.

Harvest Chronology. The largest number of black bears killed in Unit 14 (including Subunit 14C) were taken during the spring, (i.e., 2nd week in May through the 2nd week in June). From 1982 to 1987 approximately 38% of the harvest occurred during this period (Table 6). Weekly chronology of harvest in the spring has varied slightly from year to year, depending on winter snow depth and the emergence of spring vegetation. The second-most successful hunting period during the year was September. From 1982 to 1987 hunters accounted for an average of 27% of the annual harvest during September.

Game Board Actions and Emergency Orders

The regulations that established a year-round hunting season and a bag limit of 3 bears have been in effect since statehood in 1959.

CONCLUSIONS AND RECOMMENDATIONS

Since 1982 the annual harvest of black bears in Subunits 14A and 14B has increased steadily from 45 to 100 bears. No data are

available to determine whether this increase occurred because of an increased success rate among hunters or increased hunting pressure from more hunters in the field. Both of these causes probably contributed to the higher harvests. In the past few years hunters have shown an increased interest in taking black bears and more hunters have been in the field during the hunting seasons; however, the factor that may have been most responsible for the increased harvest has been the increased use of bait stations by hunters, guides, and outfitters. During the 1987 hunting season, 12 of 43 hunters (28%) killed bears over baits; unfortunately no data prior to 1987 are available for comparison. A Fish and Wildlife Division Protection Officer (R. Graham, pers. commun.) indicated that beginning in 1983 outfitters started using and maintaining bait stations as a new service for clients. Many hunters were transported directly to the site of the bait station, and it was not unusual for the transporter to remain at the bait site until a hunter had killed a bear. A steady increase in the bear harvest after 1983 can certainly be attributed, in part, to increased use of bait stations by outfitters, guides, and the general public.

Because the 1987 harvest of 100 bears in Subunits 14A and 14B is an all-time record and the harvest has more than doubled in 6 years, one of the most pertinent questions to be addressed is the impact a harvest of this magnitude has had on the black bear population. Miller and Miller (1988), developed a computer model that used estimated reproductive rates for a black bear population in Unit 13. For a run of this model that assumed low rates of natural mortality for all age classes, Miller and Miller (1988) estimated that the Unit 13 population of bears older than 1 year could support an annual exploitation rate of 11.3%. When Miller and Miller (1988) used reproductive data from the more productive Kenai black bear population, they estimated that the annual exploitation rate for bears older than 1 year with a low rate of natural mortality was 15.0%. Miller and Miller (1988) also converted these exploitation rates for all bears in the population: 13.1% and 18.2% for the Unit 13 and Kenai populations, respectively. Because several assumptions were made, the exploitation rates reported were estimates; however, these estimates suggest that maximum harvest rates of black bears (assuming low natural mortality in all age classes) range from 13% to 18% of the population (i.e., bears > 1 year old) annually.

I estimated that the black bear population in Subunits 14A and 14B ranged from a low of 600-800 bears (1 bear/3-4 mi^2) to a high of 1200 bears (1 bear/2 mi^2). If we assume that Subunits 14A and 14B had 800 black bears, the population could have sustained an annual harvest of 104-145 bears at exploitation rates of 13-18%, or a harvest of 157-217 bears at those rates if there had been 1200 bears in the population. From what we know about density of black bears in Southcentral Alaska, it seems more probable that the population in Subunits 14A and 14B was closer to 800 than 1200 black bears. If this was true, the 1987 harvest of 100 bears approximated the sustained yield at an exploitation rate of 13% (104 bears). This statement also assumes that bears had been harvested uniformly throughout the area, which was not the case.

In 1987 the harvest in Subunit 14A was 72 bears; this area has approximately 1492 mi^2 of black bear habitat. At a density of 1 bear/3-4 mi^2, the population would contain 373-497 bears. At an annual exploitation rate of 13%, the population could sustain a harvest of 48-65 bears. This scenario suggests that black bears may have been overharvested in Subunit 14A.

Although these estimates have been built on a number of assumptions, I believe that recent harvests are approaching or may have exceeded sustained yield, particularly in some portions of Subunit 14A. This assumption is supported by the following facts: (1) the harvest of females has steadily increased in Subunit 14A, where the majority of the harvest has occurred and (2) in some years, the female harvest has exceeded the male harvest. The sustained yield may have been exceeded because the harvest figure of 100 bears does not include DLP bears, and an unknown number of DLP bears have been killed and not reported.

The population objective for Unit 14 (including Subunit 14C) is to maintain a 3-year-mean harvest of 100 bears. The mean harvest in Unit 14 during the past 3 years (1985-1987) was 109 bears (excluding DLP bears). Most of the increased harvest occurred in Subunits 14A and 14B. Because the harvests have exceeded the population objective, some corrective action should be taken. One option would be to amend the objective to make it compatible with the recent increase in harvest; however, the data support a more conservative management approach. Until we have better information to accurately determine the black bear density in Subunits 14A and 14B, a more prudent harvest management objective would be to keep harvests below 90 bears annually.

In light of the recent increase in the annual harvest and the increasing harvest of females, I recommend reducing the bag limit to 1 black bear per year. 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. I believe this is only partially true. A liberal bag limit of 3 bears encourages hunters to shoot the first legal bear they see, regardless of the animal's size or hide quality, because hunters know they will still have an opportunity to try for a "better" bear. Also, with this liberal bag limit, hunters tend to believe that bears are very abundant and the potential for overharvesting is relatively low. Armed with this knowledge, hunters tend to be less selective, and this attitude generally results in higher harvests. The data, however, indicate that the Department should be advocating black bear hunting regulations that are more conservative; this, in turn, should promote a more conservative hunting philosophy among the public.

The increased use of bear baiting as a hunting technique has probably contributed significantly to the doubling of the annual harvest in the past 5 years. In 1987 the only period for which data are available, 28% of the successful hunters took bears over baits, and 60% of the successful hunters who used baits killed their bear in the spring season. The present hunting regulations

still allow the use of baits in the spring. There seems to be little doubt that bear baiting increases the success rate of hunters. If the bag limit is reduced and the black bear harvest still remains high, I recommend eliminating the use of bear baiting in Unit 14. Another option that should be considered is to close the hunting season in the summer between 16 June and 30 August when the quality of hides is usually poor.

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Table 1. Historical summary of black bear harvest in Subunits 14A and 14B, 1976-1981 and 1982-1987.

Year	Hunter Harvest					Non sport
	Subunit 14A		Subunit14B			
	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
Total	326	(74)	117	(26)	443	3
Mean	54.3		19.5		73.8	

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

Table 2. Sex ratio of black bears harvested in Subunits 14A and 14B, 1982-1987

Year	Subunit 14A				Subunit 14B				Total				Un-known	Total
	M	(%)	F	(%)	M	(%)	F	(%)	M	(%)	F	(%)		
1982														
5	45													
1983	27	(63)	16	(37)	12	(86)	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
Total	167	(57)	126	(43)	76	(71)	31	(29)	243	(61)	157	(39)	43	443
Mean	27.8		21.0		12.7		5.2		40.5		26.2		72	

Table 3. Distribution of black bear harvest in Subunits 14A and 14B by major drainage, 1985-1987.

Subunit	1985	% of Subunit	1986	% of Subunit	1987	% of Subunit	Total	% of Subunit
14A								
Willow Cr.	2	(4)	5	(7)	3	(4)	10	(5)
Susitna R. (east bank)	3	(6)	3	(4)	2	(3)	8	(4)
Little Susitna R.	15	(29)	31	(46)	22	(31)	68	(36)
Palmer Knik Arm	9	(18)	6	(9)	5	(7)	20	(10)
Matanuska R. (east bank)	6	(12)	3	(4)	7	(10)	16	(8)
Matanuska R. (west bank)	4	(8)	6	(9)	13	(18)	23	(12)
Knik R. (lower)	11	(22)	12	(18)	13	(18)	36	(19)
Knik R. (upper)	1	(2)	2	(3)	7	(10)	10	(5)
Subtotal	51	(73)	68	(78)	72	(73)	191	(74)
14B								
Sheep R./Iron Cr.	6	(32)	2	(11)	5	(18)	13	(20)
Talkeetna R. (west bank)	1	(5)	1	(5)	0	(0)	2	(3)
Sunshine Cr.	2	(11)	2	(11)	6	(21)	10	(15)
Montana/Sheep Cr.	6	(32)	10	(53)	11	(39)	27	(40)
Kashwitna R.	0		1	(5)	1	(4)	2	(3)
Willow/Little Willow R.	4	(21)	3	(16)	5	(18)	12	(18)
Sub Total	19	(27)	19	(22)	28	(27)	66	(26)
Grand Total	70		87		100		257	

Table 4. Mean skull size of black bears killed in Unit 14 (including Subunit 14C), 1982-1987.

Year	Skull size				Sample size
	Males		Females		
	n	x	n	x	
1982	42	16.9	12	15.3	54
1983	48	16.6	22	15.8	70
1984	50	16.5	29	15.4	79
1985	46	16.2	35	15.3	81
1986	52	16.3	40	15.4	92
1987	57	16.7	52	15.5	109
Total	295	16.5	190	15.5	485

Table 5. Residency of successful black bear hunters in Subunits 14A and 14B, 1982-1987.

Subunit	Year	Resident No.	Resident (%)	Non-Resident No.	Non-Resident (%)	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
	Total	318	(98)	8	(2)	326
	Mean	53		1.3		54.3
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
	Total	109	(93)	8	(7)	117
	Mean	18.2		1.3		19.5
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
	Total	427	(96)	16	(4)	443
	Mean	71.2		2.6		73.8

Table 6. Chronology of annual black bear harvest in Unit 14 (including Subunit 14C), 1983-1987.

Date		1983		1984		1985		1986		1987	
		No.	(%)[a]	No.	(%)[a]	No.	(%)[a]	No.	(%)[a]	No.	(%)[a]
May	1-8	3	(4)	2	(2)	1	(1)	5	(5)	2	(2)
	9-15	7	(8)	4	(4)	3	(3)	4	(4)	11	(9)
	16-22	7	(8)	12	(13)	5	(5)	6	(6)	12	(9)
	23-31	8	(10)	12	(13)	6	(6)	14	(13)	17	(13)
	Total	25	(30)	30	(32)	15	(16)	29	(28)	42	(33)
June	1-8	8	(10)	7	(7)	7	(7)	7	(7)	10	(8)
	9-15	3	(4)	6	(6)	6	(6)	4	(4)	9	(7)
	16-22	3	(4)	0	(0)	6	(6)	3	(3)	8	(6)
	23-30	5	(6)	4	(4)	4	(4)	8	(8)	8	(6)
	Total	19	(23)	17	(18)	23	(24)	22	(21)	35	(27)
July	1-8	5	(6)	0	(0)	2	(2)	7	(7)	5	(4)
	9-15	1	(1)	4	(4)	3	(3)	3	(3)	6	(5)
	16-22	1	(1)	2	(2)	5	(5)	0	(0)	4	(3)
	23-31	2	(2)	3	(3)	1	(1)	2	(2)	2	(2)
	Total	9	(11)	9	(9)	11	(12)	12	(11)	17	(13)

(continued on next page)

Table 6. (cont'd).

Date		1983 No.	1983 (%)[a]	1984 No.	1984 (%)[a]	1985 No.	1985 (%)[a]	1986 No.	1986 (%)[a]	1987 No.	1987 (%)[a]
Aug.	1-8	1	(1)	1	(1)	0	(0)	2	(2)	1	(1)
	9-15	1	(1)	1	(1)	1	(1)	0	(0)	2	(2)
	16-22	2	(2)	2	(2)	2	(2)	2	(2)	2	(2)
	23-31	0	(0)	2	(2)	3	(3)	1	(1)	0	(0)
	Total	4	(5)	6	(6)	6	(6)	5	(5)	5	(4)
Sept.	1-8	9	(11)	16	(17)	17	(18)	10	(10)	8	(6)
	9-15	5	(6)	5	(5)	5	(5)	10	(10)	5	(4)
	16-22	6	(7)	6	(6)	7	(7)	4	(4)	5	(4)
	23-30	0	(0)	3	(3)	5	(5)	3	(3)	5	(4)
	Total	20	(24)	30	(32)	34	(36)	27	(26)	23	(18)
Oct.	1-8	4	(5)	2	(2)	3	(3)	2	(2)	2	(2)
	9-15	2	(2)	1	(1)	1	(1)	3	(3)	2	(2)
	16-22	0	(0)	0	(0)	0	(0)	4	(4)	1	(1)
	23-31	0	(0)	0	(0)	1	(1)	1	(1)	2	(2)
	Total	6	(7)	3	(3)	5	(5)	10	(10)	7	(5)
Grand Total		83		95		94		105		129	

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

STUDY AREA

GAME MANAGEMENT UNIT: 14C (2,091 mi²)

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 1987, 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 in Subunit 14C that will sustain a 3-year-average harvest of 15 to 20 black bears/year composed of at least 60% males.

METHODS

All black bears harvested in Subunit 14C must be sealed by Department personnel. At the time of sealing, data on sex of bear, date of harvest, and site of harvest are recorded.

RESULTS AND DISCUSSION

Population Status and Trend

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

Population Size:

Studies in adjacent units indicate that in suitable habitat black bears exist at densities of 1 per 7 to 13 mi² (Miller 1987, Schwartz et al. 1983). Much of black bear habitat in Subunit 14C is similar to that which exists in these study areas; therefore, Subunit 14C likely supports from 150 and 250 black bears.

Distribution and Movements:

Black bears are found throughout Subunit 14C in nonglaciated terrain below an elevation 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 was 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 was 1 bear.

Human-induced Mortality:

Harvests in Subunit 14C ranged from 4 to 16 black 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 6 years (Table 1). A record harvest of 29 black bears occurred in 1987. Ten additional bears were taken in defense of life or property between 1983 and 1987.

Hunter Residency and Success. Residents of Subunit 14C were responsible for 63% of the total harvest of black bears over the past 5 years. Residents of the remainder of Unit 14 accounted for 33% of the harvest, while nonresidents took 4%. No bears were harvested by state residents residing outside of Unit 14.

Harvest Chronology. All reported black bear harvests during the past 5 years have occurred between 1 May and 31 October. The harvest percentages by month were as follows: May, 45%; June, 18%; July, 3%; August, 0%; September, 21%; and October, 12%. The largest percentage of bears (31%) was taken during the last 2 weeks of May (Table 2).

Transport Methods. The methods of transportation used to access hunting areas has not changed significantly in the past 5 years. Since 1983 most bears (51%) have been harvested with the use of highway vehicles for access (Table 3). Aircraft (31%) were the next most popular means of transportation. Off-road vehicles (9%) and boats (9%) were also used to gain access to bears.

Habitat

The relative abundance of black bears throughout much of the unit suggests that habitat requirements are adequate to support a substantial bear population.

Game Board Actions and Emergency Orders

A March 1987 Game Board action limited the baiting of black bears in Subunit 14C to the Knik River and Lake George drainages outside of Chugach State Park and to the Twentymile River drainage. This action came about as a result of conflicts between persons baiting bears and others recreating near bait stations. No Emergency Orders concerning black bears were issued during 1987.

CONCLUSIONS AND RECOMMENDATIONS

The mean annual harvest of black bears in Subunit 14C between 1982 and 1987 increased 110% over the 1973-1981 mean harvest. As the harvest increased, the percentage of males in the harvest declined from approximately 80% to nearly 50%. The legalization of baiting in 1982 may have been at least partially responsible for this increased harvest. Recent Game Board action closed portions of Subunit 14C where conflicts between baiting activities and other user groups had occurred; however, this closure will not likely have a significant impact on the overall harvest, because bears are numerous at several locations where baiting occurs. In order to reduce the harvest and reach the population objective of at least 60% males in the harvest, further restrictions on baiting are required. I recommend that this be accomplished by limiting baiting to the period between 15 April and 31 May.

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Table 1. Annual harvest of black bears in Subunit 14C, 1979-1987.

Year	Male	Female	Unk.	Total	% 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

Table 2. Black bear harvest chronology in Subunit 14C, 1983-1987.

Year	Hunting Period											
	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
1983	4	5	1	0	0	1	0	0	2	1	1	0
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

Table 3. Transportation methods for successful black bear hunters in Subunit 14C, 1983-1987.

Year	Method of transport				
	Aircraft	ORV	Boat	Horse	Highway vehicle
1983	4	1	3	0	5
1984	8	2	2	0	13
1985	3	1	2	0	17
1986	5	3	2	0	8
1987	13	3	1	0	12

STUDY AREA

GAME MANAGEMENT UNIT: 16 (12,445 mi²)

GEOGRAPHICAL DESCRIPTION: West side of Cook Inlet

BACKGROUND

Black bears are becoming an increasingly important big game animal in Unit 16. Although hunting pressure has grown, annual harvests have been determined as much by environmental conditions as by population abundance. High fall harvests occur if bears can be easily seen while feeding on alpine berry crops, and lower harvests occur if alpine crops are poor and bears feed in mature-forest areas. Annual harvests have ranged from 92 to 246 bears in the past 10 years. Large areas receive light hunting pressure because of limited access.

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

All bears harvested in Unit 16 must be presented to the Department for sealing. At the time of sealing, sex of bear is recorded along with other information.

RESULTS AND DISCUSSION

Population Status and Trend

Local residents and hunters reported that black bears were commonly encountered in the unit.

Mortality

Season and Bag Limits:

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:

The 1987 harvest of 126 black bears was slightly lower than the 5-year average (1983-1987) of 129 bears (Table 1). Hunters reported killing 38 and 84 black bears in Subunits 16A and 16B, respectively. One DLP black bear was reported; the other "nuisance bear" deaths that undoubtedly occurred were claimed as sport harvests. The sex ratio in the harvest was 68% males overall (i.e., 64% males prior to 1 July, and 71% males in the fall). Since 1986 the mean skull sizes for both males and females have

declined to 16.5 (n = 70) and 15.6 inches (n = 31), respectively. These values do not vary significantly from the 15-year average of 16.6 inches (n = 1000)for males and 15.6 inches (n = 539) for females.

Hunter Residency and Success. Nonresident hunters took 28 bears (22% of the total harvest).

Harvest Chronology. The harvest was 64 bears prior to 1 July; 62 bears were harvested after that date. No bears were harvested prior to 16 May, and none were harvested after 6 October. Twenty-three percent of the harvest occurred in May, 28% in June, 7% in July, 7% in August, 32% in September, and 3% in October.

Transport Methods. The methods of transportation used by successful hunters were as follows: aircraft, 42%; boats, 28%, ORV's, 7%; and horses, 4%. "Other" means of transportation were reported by 20% of the successful hunters. Access differences in Unit 16A and 16B are clearly reflected in the transportation data. For Subunit 16A, the "other" transportation category, including automobiles, accounted for 37% of successful hunters, compared with only 13% for Subunit 16B. Aircraft, however, were used by 18% of the hunters in Subunit 16A, compared with 55% for Subunit 16B.

CONCLUSIONS AND RECOMMENDATIONS

Hunting may be affecting the black bear population in Unit 16. Average skull sizes and harvest levels for both sexes have decreased; however, the percentage of males in the harvest has remained above 50%. The harvest objective for this population (i.e., 60% males) was exceeded in 1987. The increasing harvest during the spring reflects the changing status of black bears; hunters are now specifically seeking them. Fall harvest levels, however, continue to reflect the opportunistic nature of bear hunting; either many black bears were taken incidentally while hunters sought other species, or berry crops have made black bears easier to locate. Harvests have been low in much of the unit, because (1) mature forests make bears difficult to locate or (2) few hunters use the areas. Proposed changes in existing land uses, mining and timber activities, or settlement and associated developments may increase hunter access to bears and may require future regulatory changes. No changes in seasons or bag limits are recommended at this time; however, if declines in the percentage of males in the harvest and mean skull size continue, I will recommend that appropriate regulatory changes be implemented.

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Table 1. Annual black bear harvest in Unit 16, 1983-87.

No. Year	No. males	No. females	unid.	Mean male skull size total (inches)
1983	50	40	4	94	17.3
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

STUDY AREA

GAME MANAGEMENT UNIT: 17 (20,350 mi²)

GEOGRAPHICAL AREA: Northern Bristol Bay

BACKGROUND

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

Occasionally, black bear hunters voluntarily had their bears sealed; this effort provided some idea of harvest levels and hunter interest. No other work was accomplished on black bears.

RESULTS AND DISCUSSION

Harvest

Sealing of black bears is not required in Unit 17. Since 1973, the harvest of 33 black bears has been reported in Unit 17; all were from Subunit 17B. While black bears were occasionally sealed in this unit, that number in no way reflects the actual annual harvest. Black bears were most often killed on an opportunistic basis by moose, caribou, or brown bear hunters. Very few hunters came to Unit 17 specifically to hunt black bears.

CONCLUSIONS AND RECOMMENDATIONS

The number of big game hunters in Unit 17 has increased significantly each year, and it is possible that the black bear harvest is limiting the population. As it is in most other units having significant sport hunting pressure, harvest reporting should be required in this unit.

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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 Valleys

BACKGROUND

The current management goals for black bears in Unit 20 are to provide for subsistence use and the greatest sustained opportunity to hunt black bears. Even with the liberal hunting regulations, human use of black bears in Subunits 20A, 20C, and 20F has been low; however, because of good access, black bears in Subunit 20B have been hunted more intensively: 9% of the 1987 reported statewide black bear harvest was from this subunit. Interest in black bear hunting has increased, and baiting is a common hunting technique. Harvests in Unit 20 have been monitored through a sealing requirement since 1974.

Military personnel have demonstrated considerable interest in hunting black bears (McNay 1987). With the anticipated 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 funded by the U.S. Army and initiated by Alaska Department of Fish and Game (ADF&G) in 1987.

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 and sows with cubs has been prohibited since 1972. However, the proportion of males in the harvest is influenced by many factors and will only be used as a guideline to further monitoring. In subunits with low annual harvests, data from several years and/or areas were pooled to provide a more accurate trend with larger sample sizes.

MANAGEMENT OBJECTIVES

To maintain 55% or more males in the combined harvests from the most recent 3 years in Subunit 20A.

To maintain a sustained annual harvest 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 of Subunits 20C and 20F in the most recent 3 years.

METHODS

Black bear sealing documents provide harvest data (i.e., location, date, sex, skull size, salvage of meat, defense of life or property, hunter residency, incidental take, and baiting). The most recent 5 years of data on black bears were compiled to evaluate changes in black bear harvests and to infer changes in populations.

Although the new sealing documents included a question pertaining to whether the bear had been taken over bait, the older documents that were also used in 1987 did not address the matter. 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 for these 2 subunits. Muscle samples taken from bear skulls will be examined for incidence of Trichinella. Premolars collected during sealing were stored for future determination of ages.

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 black bear densities have not been completed in Interior Alaska. Miller et al. (1987) estimated densities of 1 bear/4.3 mi^2 for the upper Susitna River south of the Alaska Range, but densities are probably lower north of the Alaska Range. A study underway on the Tanana Flats in 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:

No information was available on population composition. Sex ratios in the harvest were not representative of the population because the harvesting of sows with cubs is prohibited. In addition, behavioral differences of male and female bears make males more vulnerable to hunters.

Distribution and Movements:

Seasonal variation occurs in habitat use by black bears. During spring, bears use moist lowlands where early-growing vegetation is available. Some salmon spawning streams are used during summer, but opportunities for this type of habitat use are limited in the

Interior. During fall, black bears move into open meadows or alpine areas to feed on berries.

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

Mortality

Season and Bag Limit:

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

Human-induced Mortality:

In 1987, 195 black bears were reported taken from Subunits 20A, 20B, 20C, and 20F (Table 1). The 1982-86 mean annual reported harvest was 141 bears. Sixty-seven percent of the 1987 harvest was from Subunit 20B, where road access and hunters are concentrated.

Although we think recent hunting pressure has probably resulted in localized overharvesting, most areas were lightly harvested. Within Subunit 20B, most bears were harvested in the Tolovana and Goldstream drainages along the Elliott and Parks Highways (Table 2).

Our management objectives for sex ratios in the harvest are currently being met. In 1987, 62% of 130 bears harvested in Subunit 20B were males. The proportions of males in the combined 1985-87 harvests were 66% of 83 bears in Subunit 20A and 54% of 46 bears in Subunits 20C and 20F (Table 1). From 1983 through 1987 the proportion of males in the combined harvests for all subunits was 65% in the spring and 62% in the fall.

From 1983 to 1985 the mean age of black bears harvested in Subunit 20B decreased from 5.8 to 4.2 years for males and increased from 4.6 to 6.8 years for females (Fig. 1). Black bear teeth have not been sectioned since 1985, but they have been stored for sectioning and age determination that will occur in 1989.

During 1987, 68% of the black bears harvested in Subunit 20B were killed at bait stations; however, in Subunit 20A only 23% of the harvest was taken using bait stations. Most baiting occurred near roads, 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 lands at Eielson Air Force Base and Fort Wainwright.

Prior to 1982 black bear baiting was legal and the regulations were minimal. Permits for baiting were required from mid-1982 through

1983. Since 1983 no permits have been required, but the permitrequirements were adopted as regulations.

Since 1983, 45% of 378 black bears harvested during the fall have been reported taken while hunters were pursuing other activities; that is, while not specifically hunting for black bears (Table 3). During spring, only 18% of 365 bears were reported as incidentally taken. The incidental take has been decreasing during the last 5 years.

During the last 5 years, most hunters (92%) reported salvaging some meat (Table 3). Black bear meat may be especially desirable during spring, when few other fresh sources of meat are available.

The number of bears reported taken in defense of life or property (DLP) is lower than actually occurs because a year-round season and a bag limit of three allows such bears to be sealed and possessed as legally hunted animals if taken 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 four whose sex was not specified).

The incidence of DLP bears may increase with the continued development of rural areas. Human-bear conflicts should be minimized by discouraging improper disposal of garbage and the feeding of bears and by informing people about dealing safely with bears.

Hunter Residency and Success. Alaska residents harvested 95% of the black bears killed in these subunits from 1983 through 1987 (Table 4). The number of black bears killed by nonresidents during this period ranged from 5 to 11. Most (72%) nonresidents harvested bears during fall, probably incidental to hunting other species. Military personnel took at least 42% and 27% of the Subunit 20B harvests in 1986 and 1987, respectively. No measure of bear hunter success was available because unsuccessful hunters are not required to report.

Harvest Chronology. Black bears were killed from 29 April through 14 November, but most harvests occurred during May-June and August-September (Fig. 2). During 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; the harvest also declines. During fall black bear hunting resumes when hide quality improves and hunting seasons open for other species.

Transport Methods. Between 1983 and 1987, 62% of the black bear hunters were listed as using "other" modes of transportation (Table 5). In 1987, 56% of the sealing certificates that listed "other" noted use of a highway vehicle. ORV's and boats were the next most commonly used types of transportation. The extensive use of highway vehicles suggests concentrated hunting pressure for blackbears along the road system. Access to remote areas is increasing as roads and trails are built for mineral, housing, and other developments.

Natural Mortality:

Predation by other bears, parasites, and disease contribute to black bear natural mortality. 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).

CONCLUSIONS AND RECOMMENDATIONS

Management objectives for black bears in Subunits 20A, 20B, 20C, and 20F are currently being met. The 1987 harvest in Subunit 20A was 42 bears. The 1983-87 mean annual harvest was 34 bears. Males composed 66% (55/83) of the combined 3-year harvests (i.e., 1985-87). The population objectives called for a minimum of 55% males in those harvests.

The harvest of 130 black bears in Subunit 20B was the highest recorded during the last 5 years, but it was below the maximum harvest objective of 150. Sixty-two percent of the 1987 harvest in Subunit 20B were males.

In Subunits 20C and 20F the 1987 combined harvest was 23 bears. The combined harvests from both subunits for 1985 through 1987 contained 54% (25/46) males. The population objective calls for 50% or more males in the combined harvests from the most recent 3 years. There was a lower percentage of males in the harvests in Subunits 20C and 20F than in Subunits 20A or 20B, because black bear populations there are high while harvests are consistently low. The opportunity to hunt black bears remains at a high level; the seasons and bag limits are liberal.

To more effectively manage black bears in Subunits 20A, 20B, 20C, and 20F, we make the following recommendations:

1. Determine ages for black bears harvested in Subunits 20A and 20B.

2. Consider changes in sealing requirements for black bears that would require only bears in Subunits 20A and 20B to be sealed. Harvest of black bears in Subunits 20C, 20F, and 25C could be adequately monitored through development of an alternate system.

3. Increase public education efforts to reduce human-bear conflicts.

4. Consider modification of bear-sealing documents, including use of metric measurements, addition of highway vehicle to the list of transport methods, and specification of the proportion of meat salvaged (i.e., 25%, 50%, etc.).

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Table 1. Black bear harvest in Subunits 20A, 20B, 20C, and 20F, 1983-87.

Year	Spring			Fall				Annual total					
	Area	Male	Female	Unk.	Tot.	Male	Female	Unk.	Tot.	Male	Female	Unk.	Tot.
1983[a]	20A	14	5	1	20	22	4	2	28	36	9	3	48
	20B	28	15	2	45	33	20	0	53	61	35	2	98
	20C	3	1	0	4	6	1	1	8	9	2	1	12
	20F	1	2	1	4	2	4	0	6	3	6	1	10
	Total	46	23	4	73	63	29	3	95	109	52	7	168
		(67%)				(68%)				(68%)			
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	40	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
										(68%)			
	20B	40	32	2	74	36	15	5	56	76	47	7	130
										(62%)			
	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%)			
1983-87 Total	236	127	14	377	235	146	15	396	471	273	29	773	
	(65%)[b]	(35%)[b]			(62%)[b]	(38%)[b]			(63%)[b]	(37%)[b]			

[a] The boundary between Subunits 20A and 20C changed effective July 1984.

[b] Percentage of known sex.

Table 2. Distribution of black bear harvest in Subunit 20B, 1987.

Area	Spring	Fall	Total	% of total
Tolovana R./Elliott Highway (mi 78-94)	21	10	31	24
Goldstream Cr./Standard Cr./Fox	13	11	24	18
Tatalina R./Minto Flats/Washington Cr./Elliott Highway (mi 20-50)	8	9	17	13
Chatanika R.	11	6	17	13
Chena R./Chena Hot Springs Rd.	10	4	14	11
Bonanza Cr.	6	6	12	9
Salcha R./Johnson Rd./Birch Lk./ Harding Lk.	4	6	10	8
Moose Cr./French Cr./ Eielsen Air Force Base	1	4	5	4
Total	74	56	130	

Table 3. Occurrence of incidental take and salvage of meat for black bears in Subunits 20A, 20B, 20C, and 20F, 1983-87.

Calendar year	Area	Incidental take				Meat salvaged			
		Spring		Fall		Spring		Fall	
		Y	N	Y	N	Y	N	Y	N
1983	20A[a]	6	13	21	6	19	1	23	4
	20B	14	31	13	40	45	0	50	3
	20C[a]	2	2	6	2	4	0	8	0
	20F	1	3	4	1	4	0	5	1
	Total	23	49	44	49	72	1	86	8
			(32%)		(47%)				
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%)				
1983-87		67	298	171	207	335	30	339	40
		(18%)		(45%)	(92%)		(89%)		

[a] The boundary between Subunits 20A and 20C changed effective July 1984.

Table 4. Residency of successful black bear hunters in Subunits 20A, 20B, 20C, and 20F, 1983-87.

Calendar year	Area	Spring			Fall		
		Res.	Nonres.	Unk.	Res.	Nonres.	Unk.
1983	20A[a]	20	0	0	24	4	0
	20B	45	0	0	50	3	0
	20C[a]	4	0	0	7	1	0
	20F	4	0	0	6	0	0
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
5-year total		364	10	3	366	26	4

[a] The boundary between Subunits 20A and 20C changed effective July 1984.

Table 5. Transport methods[a] for successful black bear hunters in Subunits 20A, 20B, 20C, and 20F, 1983-87; S = spring, F = fall.

Calendar year	Area	Airplane S	Airplane F	ORV S	ORV F	Boat S	Boat F	Horse S	Horse F	Other S	Other F	Unknown S	Unknown F
1983	20A[b]	6	9	1	9	5	3	0	1	8	5	0	1
	20B	2	1	3	6	6	4	0	0	33	42	1	0
	20C[b]	0	2	0	2	2	1	0	1	1	2	1	0
	20F	0	1	0	1	2	1	0	0	2	3	0	0
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	3	1	0	1
	20F	0	0	1	2	1	1	0	0	1	1	0	0
1983-87		21	49	48	64	52	48	2	2	241	219	13	14
(% total of unknown harvest of 746)		70 (9%)		112 (15%)		100 (13%)		4 (1%)		460 (62%)		27	

[a] Method of transport means 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] The boundary between Subunits 20A and 20C changed effective July 1984.

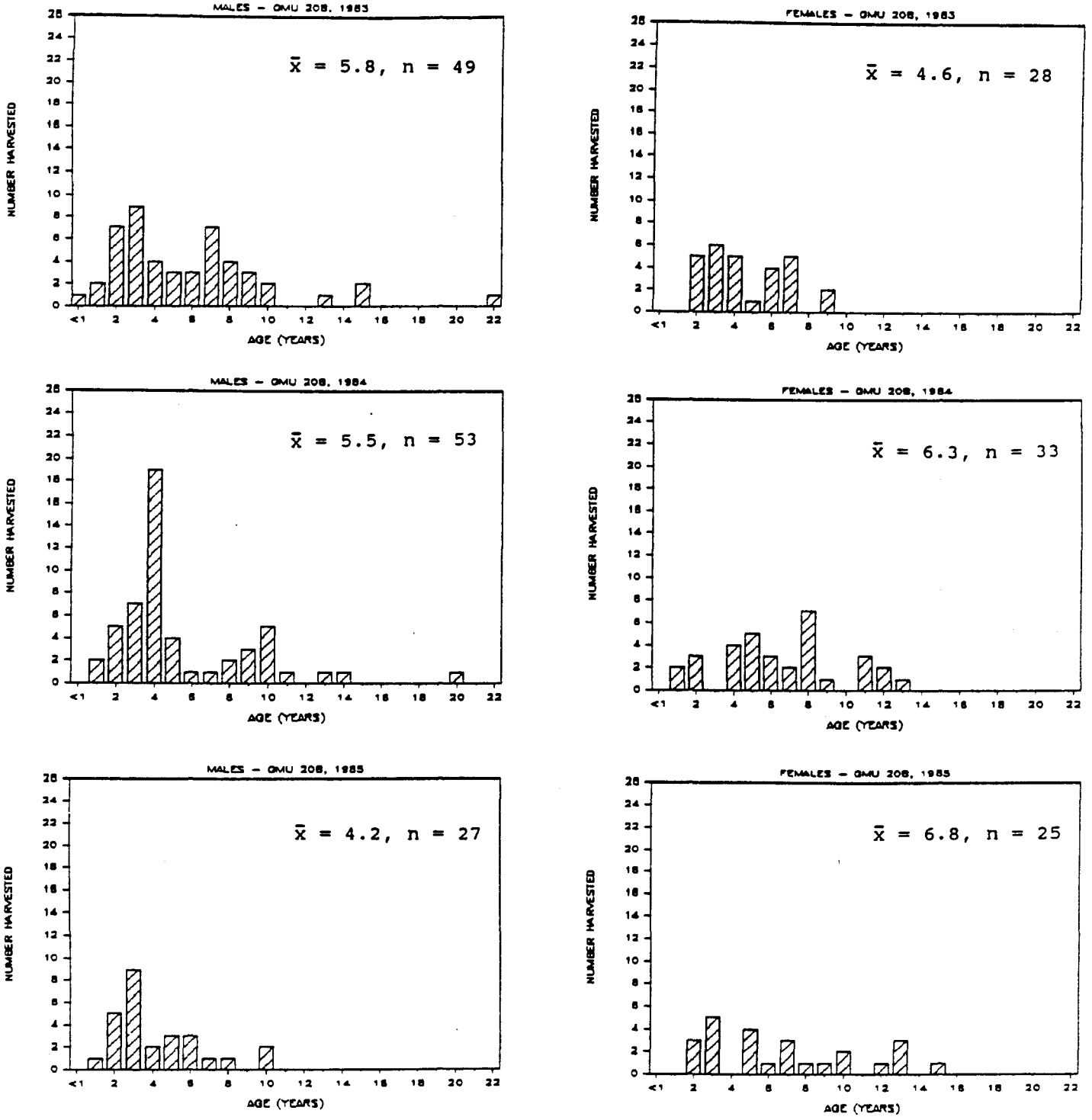

Figure 1. Age structure of black bears harvested in Subunit 20B, 1983-85.

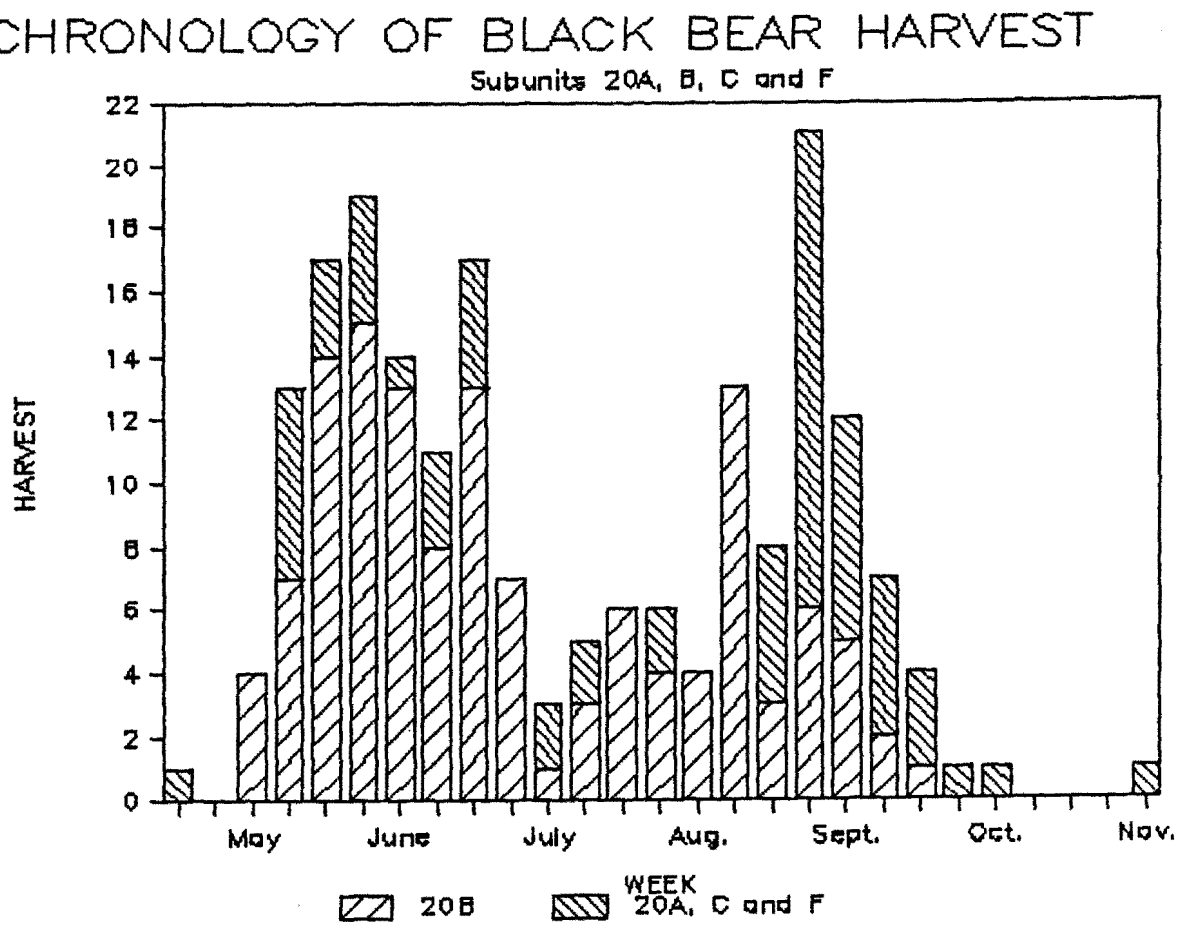

Figure 2. Chronology of black bear harvest in Subunits 20A, B, C, and F, 1987.

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 the Charley River drainage

BACKGROUND

The original management goals for black bears in Subunit 20E (ADF&G 1976) were to provide the greatest opportunity to participate in hunting (primary goal) and harvest (secondary goal) of black bears. These management plans were revised in 1980. The current management goals for black bears in Subunit 20E are to provide for subsistence use and the greatest sustained opportunity to hunt black bears.

Because of the prevalence of grizzly bears in Subunit 20E, it is not a productive black bear hunting area. However, both management objectives have been met.

MANAGEMENT OBJECTIVES

To continue to support the current open season and 3-bear bag limit.

To maintain a harvest of 14 or more black bears per year.

METHODS

Regulations require that hunters present all black bears taken in Subunit 20E for sealing. During the sealing process, data on hunter residency, harvest location and date, sex, skull size, salvage of meat, defense of life or property, and incidental take are recorded. Premolar teeth are also extracted during the sealing process, but they have not been used to determine ages of the harvested bears for several years.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size:

No data regarding the size of the black bear population in Subunit 20E have been gathered. Incidental observations indicate that black bear density is moderate along forested bottom lands of the major river drainages and apparently lower in areas

characterized by subalpine brush fields and tundra, such as the upper reaches of the Middle Fork of the Fortymile River.

Distribution and Movements:

Black bears are widely distributed throughout Subunit 20E, but they appear to be present in greater numbers in valley bottoms.

Mortality

Season and Bag Limit:

In Subunit 20E there is no closed season. The bag limit is 3 black bears, but the taking of cubs and females accompanied by cubs is prohibited.

Human-induced Mortality:

Sealing records indicate that 24 black bears were harvested in Subunit 20E during 1987, representing the largest harvest in the last 5 years (Table 1) and exceeding the mean (14) by 10 bears. Of the 21 known-sex bears taken, 13 (62%) were males and eight (38%) were females. No trend in the sex composition of the harvest is evident. Ages of bears taken were not determined. The harvest was widely distributed throughout the area. Since there was no obvious concentration of hunter effort, the human-induced mortality of black bears in this vast area is believed to be insignificant.

Hunter Residency and Success. Few nonresidents have taken black bears in Subunit 20E during the past 5 years (Table 1). Variation in hunter effort and success cannot be calculated because only successful hunters are required to file reports. Successful hunters reported spending an average of 3.3 days in the field before taking a black bear. This may indicate that black bears are readily available to hunters or most of them are being taken incidentally during hunts for other species during both spring and fall. Fourteen (58%) of the 24 successful hunters reported taking their black bear on the 1st day of hunting.

Harvest Chronology. Ten (42%) of the 24 black bears were taken during spring and 14 (58%) during fall (Table 1). Most black bears taken during the fall were harvested incidentally during hunts for other species. Five black bears were taken in May, five in June, seven in July, two in August, and five in September.

Transport Methods. Most black bears were taken by hunters using highway vehicles along the Taylor Highway . Of the total reported harvest, 14 (58%) were taken by hunters using highway

vehicles for access to hunting areas, five (21%) using off-road vehicles, four (17%) using boats, and one (4%) using aircraft for access.

Habitat

Assessment:

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

Improvement:

The implementation of the Alaska Interagency Fire Management Plan in 184 has allowed wildfires to burn in more areas than previously allowed. As they revegetate, burned-over areas are generally expected to produce more food plants for black bears than mature forests of black or white spruce.

CONCLUSIONS AND RECOMMENDATIONS

The management objectives are currently being met and progress toward reaching the goals is being recorded. Black bears in Subunit 20E are believed to be lightly harvested and able to withstand far larger annual harvests. No changes in seasons or bag limits are recommended.

LITERATURE CITED

Alaska Department of Fish and Game. 1976. Alaska wildlife management plans: interior Alaska. Alaska Dep. Fish and Game. Juneau. 200pp.

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Table 1. Reported black bear harvests in Subunit 20E by sex, season, and hunter residence, 1983-87.

Year	No. taken	No. males (%)	No. females (%)	No. res. (%)	No. nonres. (%)	No. spring (%)	No. fall (%)
1983	6	3(60)	2(40)	6(100)	0(0)	4(67)	2(33)
1984	18	8(47)	9(53)	18(100)	0(0)	6(33)	12(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)
$\bar{x}$	14	7(57)	5(43)	13(98)	0.4(2)	6(48)	8(52)

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