Brown Bear
Management Report
of survey-inventory activities
1 July 1998–30 June 2000

Carole Healy, Editor

Alaska Department of Fish and Game
Division of Wildlife Conservation

Ken Whitten

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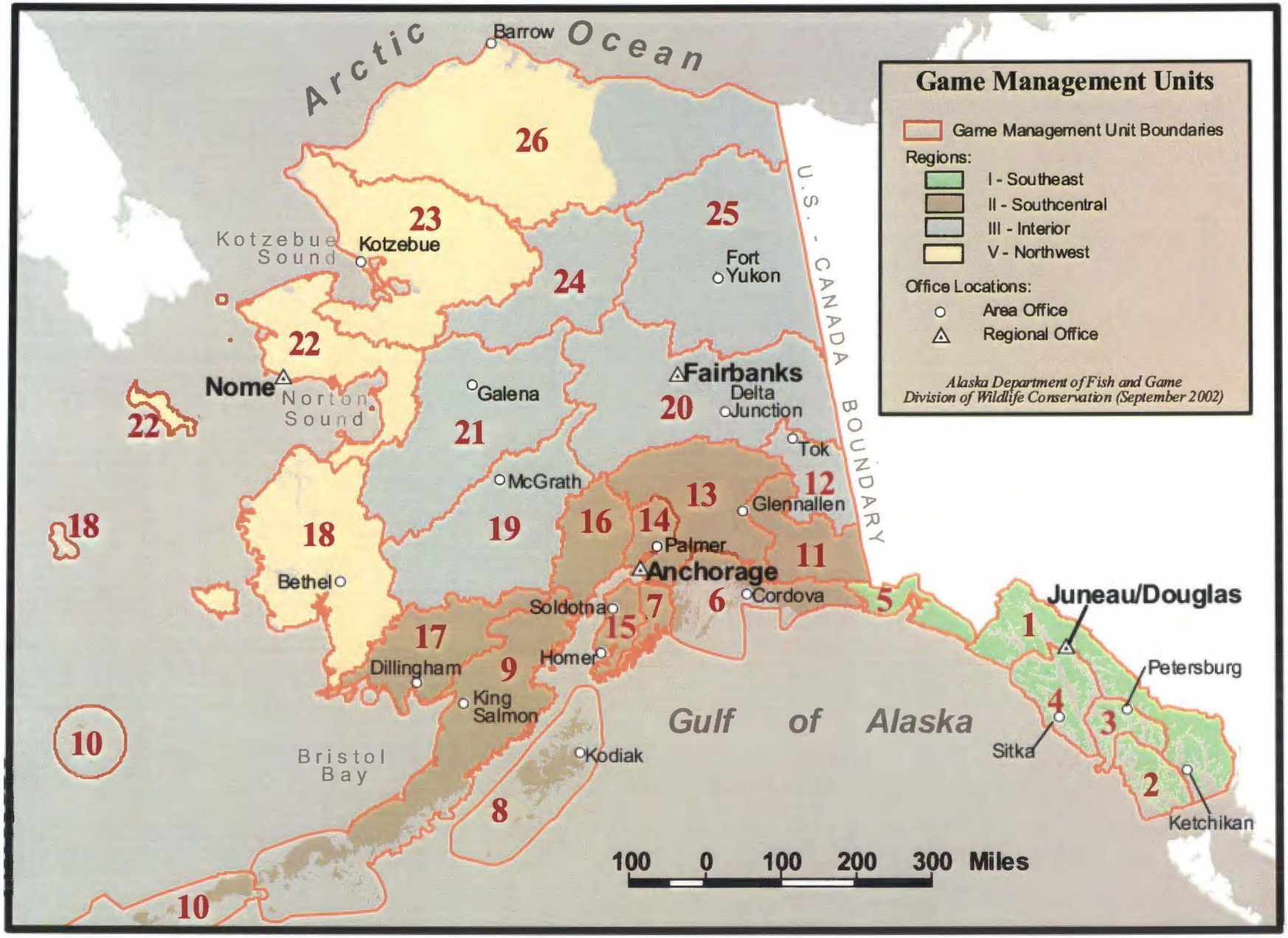
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 1 (18,500 mi^2)

GEOGRAPHIC DESCRIPTION: The Southeast Alaska mainland from Dixon Entrance to Cape Fairweather, and those islands east of Clarence Strait from Dixon Entrance to Caamano Point, and all islands in Stephens Passage and Lynn Canal north of Taku Inlet.

BACKGROUND

Southeast Alaska brown bears inhabit the islands north of Frederick Sound and the coastal mainland; however, until recently they were only known to coexist with black bears on mainland portions of the panhandle. During recent years there have been a number of reports of brown bears on islands in Units 1A, 1D, and 3. Although extensive brown bear research has been carried out on Admiralty and Chichagof islands in Unit 4 (Schoen and Beier 1989, Titus and Beier 1993), no brown bear research has been undertaken on Southeast Alaska's mainland. Most of the information we use to assess and manage mainland brown bear populations has come from anecdotal hunter information, pilot and staff observations, registration permit hunt reports, and mandatory sealing data.

Brown bear sealing requirements have been in effect in Alaska since 1961. Hunters have been required to obtain registration permits before hunting brown bears in Unit 1 since 1989 (McCarthy 1991, Larsen 1993). Before 1989 hunters were only required to obtain a license and metal-locking tag prior to hunting.

Generally about half of the unit's annual brown bear harvest comes from Unit 1D (Haines area), located in the northern part of the region. Units 1A (Ketchikan area), 1B (Petersburg area), and 1C (Douglas area) each account for 5–40% of the annual harvest. Nonresident hunters are required to hunt brown bears with a registered guide or a relative within the second degree of kindred. Because of brown bears' trophy status and because hunters must wait 4 seasons between hunts, hunters (especially residents) often do not select small bears but wait to harvest a large bear. This partly accounts for the relative low success rates noted for resident hunters in Southeast Alaska.

The Tongass National Forest (Tongass) encompasses most Unit 1 brown bear habitat, excluding intertidal and Unit 1D state lands, municipal lands, and Native Corporation lands, and is

managed under a multiple-use concept. The Misty Fiords National Monument within the Tongass on the southern Unit 1 mainland contains large tracts of healthy bear habitat.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain an average age of harvested males no less than 6.5 years, and a male to female harvest ratio of at least 3:2.

- Reduce the number of bears killed because of garbage habituation.

METHODS

Unit 1 brown bear hunters are required to obtain registration permits prior to hunting. From the hunt report we obtain useful information about hunting effort, dates afield, and unsuccessful hunt and/or kill locations. We also collect brown bear harvest data through a mandatory-sealing program. During sealing we record the sex of harvested bears along with the hunt date and kill location. We also measure bear skulls and extract a premolar tooth. At the end of each season, we send all extracted premolars to Matson's Laboratory (Bozeman, Montana USA) for aging.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Quantitative population data are not available for Unit 1 brown bears. Based on anecdotal hunter reports, department staff observations, pilot observations, and sealing records, we believe the population remained stable during this report period.

MORTALITY

Harvest

Season and Bag Limit	Resident and Nonresident Hunters
1 bear every 4 regulatory years by registration permit only	15 Sep–31 Dec 15 Mar–31 May

Forest Service Moratorium for Nonresident Hunters. The number of successful nonresident brown bear hunters in Southeast Alaska has increased considerably, raising concerns about sustainable harvest levels. A US Forest Service (FS) moratorium issued in summer 2000 limits the level of Unit 4 guide activity. Over the past 10 years the number of active Unit 4 big game guides quadrupled. Because the state has no authority to limit guides, the FS, at the request of the Alaska Department of Fish and Game (ADF&G), restricted Unit 4 guides to the average of their 1997 and 1998 client levels. At the time the Unit 4 Brown Bear Management Team (Team) was created in January 1999, the likelihood of a "domino effect" was identified, redirecting hunting pressure elsewhere should any Unit 4 restrictions be put in place. This became a reality in Unit 1 with an increased effort and higher harvest immediately after the Unit 4 moratorium went into effect. Beginning in spring 2001, guides operating under FS special use permits will be limited by the number of hunts they conduct annually in Unit 1.

The Unit 1 brown bear harvest by nonresident hunters increased 23% during the past 10 years while resident success declined by 16%. Twenty-five bears taken by nonresidents during 1999 represented 63% of the unit's harvest, and the 1999 total harvest of 40 bears was 33% higher than the 10-year average. With no authority to regulate guides, ADF&G's only options to reduce harvest is to change the season or bag limits, use a drawing permit, or close a season by emergency order. At the request of ADF&G, the FS agreed to limit the number of guided brown bear hunts in Units 1. ADF&G provided recommendations, population estimates, and historical harvest data to help determine the number of guided hunts each subunit could sustain. Population estimates were based on available bear habitat and brown bear density estimates from Admiralty and Chichagof islands in Unit 4 where research has been conducted (Schoen and Beier 1989, Titus and Beier 1993). Although the Unit 1 density estimates are crude they provide a baseline for conservative management until more accurate information becomes available. Beginning January 2001, Unit 1 brown bear guides will be held to the mean of the 1998 and 1999 FS special-use permits they were issued.

A recent brown bear moratorium in British Columbia has halted all brown bear hunting for the 2001–2004 period. Guided hunters displaced from that closure may show interest in Alaska as one of the few places now available in the world to hunt brown bears.

Hunter Harvest. The 1999 Unit 1 brown bear harvest was unusually high in many respects. The unit-wide harvest of 40 bears, including 13 from Unit 1A, is the highest ever (Table 1). The 1999 harvest also consisted of 42% female bears, the highest female proportion in over 10 years (Table 2). The mean female skull size ($\bar{x}$ = 19.4 inches, n=16) was also one of the smallest on record (Table 3). Unit 1D continued to account for the highest proportion of Unit 1 bears during the report period (1998–99), 52% and 37% respectively. During this 2-year report period the proportion of bears killed by subunit (1A, B, C, and D) was 25%, 17%, 13%, and 44%, respectively. Unit 1B historically has the second highest harvest, however during this report period it dropped to third behind Unit 1A. The 15-year Unit 1 harvest proportion by subunit (1A–1D) has been 18%, 19%, 16%, and 47%, respectively.

During the past 15 years, the average number of bears harvested has remained evenly split between spring and fall ($\bar{x}$ = 14) although spring harvests have historically been skewed toward males. We suspect this is partly because it is illegal to harvest females accompanied by cubs. As sows with second-year cubs separate at the end of spring seasons, sows become legal to hunters, and the proportion of females in the harvest increases substantially during fall. During the past 10 years the fall harvest of female bears has comprised just under ½ of the total ($\bar{x}$ = 47%). The spring harvest of female bears during the same period has consistently been much lower ($\bar{x}$ = 18%). For the first time since registration hunts began in 1985 our management objective of 60% male bears in the harvest was not reached during spring 2000 (Table 2). Male bears comprised 41% (n = 9) of the spring harvest that year and our male to female ratio harvest objective was not met (Table 2). A new Unit 1A guide was responsible for 4 bears in spring 2000, including 3 small females. This guide was not authorized to operate under FS special-use permits in Unit 1 for spring 2001.

The 1998 mean male skull size ($\bar{x}$ = 22.8, n= 24) was slightly above the long-term average ($\bar{x}$ = 22.2), while the 1999 male average ($\bar{x}$ = 21.7, n= 26) was slightly lower. The average female skull sizes during 1998 (19.7, n= 13) and 1999 (19.4, n= 16) were lower than the long-term

average (20.2 inches). The 1999 female mean skull size was also the second lowest on record, and well below the long-term average (Table 3).

The 1998 mean age of harvested male bears (7.9, n= 24) was similar to past years and is well within our objective of 6.5 years. The 1998 mean female age was 5.4 years, (n= 10), the lowest since 1993 and well below the long-term average of 7.4 years. Ages were not yet available from the 1999 harvest for this report.

Permit Hunts. Registration permits have been required for Unit 1 brown bear hunters since fall 1989. During the 1998 and 1999 seasons, 303 and 343 registration permits were issued, respectively. Consistent with the long-term average about 50% of those hunters who registered hunted, and 12% of those hunting were successful (Table 4). Compliance with permit conditions has been excellent during the past several seasons, although it has required post-season effort reminding delinquent hunters to provide required hunt information. Only 1 hunter during each of the 2 most recent seasons failed to file a hunt report.

Hunter Success and Residency. Of the 147 hunters afield in 1998-1999, 24% were successful, and during 1999-2000 a total of 171 hunters went afield with a 23% success rate. Hunter success rates for fall (26%) and spring (25%) were higher during this report period than the 10-year average.

During 1998-1999 nonresidents harvested 14 bears, compared with 25 during 1999-2000. The latter is the first year that nonresidents took more bears than residents (Table 5). The 25 bears taken by nonresidents during 1999 represents 63% of the total Unit 1 harvest. We attribute this in part to a recent increase in big game guiding in the unit. This increasing trend in guided hunters has been a concern for several years (Porter 1998). During the past 15 years there has been a declining trend in the success of Alaska residents and an increasing trend in successful nonresidents. One explanation is that resident hunters are more selective when choosing a bear, and consequently may pass over smaller bears due to the 1 bear every 4 years regulation.

Successful hunters spent 3.4 and 3.2 days to harvest a bear during the 1998 and 1999 seasons, respectively, compared to the 10-year average of 4.3 days (range 2.9–6.6 days). Unsuccessful resident hunters spent an average of 4.3 days hunting during each year of the report period. Unsuccessful nonresidents reported an average of 8.7 hunting days in 1998 and 7.1 days hunting bears during 1999.

Harvest Chronology. The greatest number of bears are available to hunters late in the spring season because most have left their dens and are seeking food. During this period most available food, primarily grasses and sedges, is found at the edge of saltwater where bears concentrate. This makes the majority of the bear population available during a short period to hunters using boats. During most of the past 15 seasons, the Unit 1 brown bear harvest has been somewhat evenly split between fall and spring seasons (Table 6). The majority of brown bears harvested from the unit have historically been taken during May ($\bar{x}$ = 13), with the month of September consistently being the second highest annual harvest period ($\bar{x}$ = 7), accounting for most fall bears (Table 7).

Transport Methods. Most Unit 1 brown bear hunters continue to use boats to access remote, mostly roadless hunting areas. We recorded the highest boat use ever during the 1998 season (83%). During the past 15 years, boat use has accounted for an average of 65% of the reported transport methods (Table 8). Highway vehicles (17%), aircraft (6%), and ORVs (5%) are used much less frequently. The only Unit 1 area with highway access is near Haines in Unit 1D.

Other Mortality

We derived the total estimated human-caused mortality for Unit 1 by adding the reported harvest, defense of life or property (DLP) kills, and known and estimated unreported/illegal harvests (Table 2). Other mortality included in the nonhunting category was either research related or from other known human/caused accidental mortalities. Unreported harvests or illegal kills are reported separately. Unreported kills are estimated at 10% of the reported harvest, although this is considered a conservative estimate (McCarthy 1991) (Table 2). In 1998, 3 male and 2 female bears were reported as DLP kills, and in 1999 four males and 2 females were in that category. When these other sources of dead bears are added to the legal Unit 1 harvest the total human-caused mortality equaled 40 bears in 1998 and 46 bears in 1999. During the previous report period (1996–1998), the nonhunting related mortality was significantly lower and conformed to our management objective of reducing bear/human conflicts (Porter 1998).

A total of 7 bears were killed in fall 1999 and another 5 bears in spring 2000 under DLP terms. One had eaten chickens, one attacked a dog, 6 were killed because residents felt the bears were too close and posed safety threats, and a sow and cub were killed by a big game guide when his hunting party was charged. Better reporting and documentation of DLP kills could explain some of the increase. Not all bears killed are reported or sealed, and some DLP mortalities occur during the regular hunting season and are tagged and sealed as harvested bears. This can give an artificially low estimate of the number of bears killed via DLP provisions. Efforts are now being made to provide better public awareness and education in some of the problem areas to reduce the level of nonhunting mortality.

HABITAT

Assessment

As noted above, most of Unit 1 has healthy brown bear habitats, primarily under FS jurisdiction. Within the unit there is a highway accessible area closed to bear hunting to enhance viewing opportunities, at the Hyder Salmon River Closed Area. Timber harvest, mineral exploration, and other developments pose the most serious threats to brown bear habitat in Unit 1. Although this has been especially true in Units 1B and C, future timber harvest scheduled for the Cleveland Peninsula in Unit 1A will similarly affect bear habitat. Bear/human interactions and conflicts resulting from increased access and development continue to be areas of concern. DLP mortalities are an ever-present possibility where bears become attracted and accustomed to garbage dumps created by new logging and mining camps, or around villages and towns with open dumps.

CONCLUSIONS AND RECOMMENDATIONS

The Unit 1 registration permit hunt initiated in 1989 continues to provide useful information about brown bear hunting effort and success. Hunters continue to use boats as the primary mode

of transportation since this allows them access into much of the unit's roadless areas. Our 3:2 male to female harvest ratio objective was not met during 1999. Due to the existing high number of female bears in fall harvests, it is essential that any future management actions avoid placing additional pressure on females. For the same reason ADF&G supported the Unit 4 Brown Bear Management Team's recommendations, we feel confident that changes in the FS Special-Use Permit system will provide a degree of control over the growing nonresident brown bear harvest.

The harvest objective of maintaining an average age of 6.5 years for male bears was met during both 1998 and 1999. Male bear ages have exceeded the harvest objective in 14 of the past 15 seasons. Female bears accounted for 63% of the 1998 spring harvest, the highest female proportion since 1986. Over 50% of the total 1998 harvest were taken during spring, similar to the 15-year average. Spring and fall hunter success also remained similar during the 1999 season (Table 6).

The recent trend in DLP bear mortality shows a marked increase from previous years and did not meet our objective of reducing the number of bears killed because of garbage habituation. Most of the solution for reducing bear/human conflicts depends upon the willingness of the public, municipalities, and timber and mining industries to adopt and adhere to responsible garbage management practices. An open landfill was recently closed near Haines while other communities such as Hyder still have open pits allowing bears access to garbage. Until areas like Hyder address the issue of landfills, garbage will continue to be a problem and bring bears in direct conflict with humans.

Based on harvest data, staff observations, and reports by the public, we could not determine any change in the Unit 1 brown bear population during this report period. We see no reason to modify the season or bag limit at this time.

LITERATURE CITED

LARSEN, D. N. 1993. Unit 1 brown bear survey–inventory management report. Pages 1–14 *in* S. M. Abbott, ed. Alaska Dep. Fish and Game, Div. Wildl. Cons. Fed. Aid in Wildl. Rest. Proj. W–23–4 and W–23–5, Study 4.0. Juneau. 283pp.

MCCARTHY, T. M. 1991. Unit 1 brown bear survey–inventory management report. Pages 1–11 *in* S. M. Abbott, ed. Alaska Dep. Fish and Game, Div. Wildl. Cons. Fed. Aid in Wildl. Rest. Proj. W–23–3 and W–23–4, Study 4.0. Juneau. 271pp.

PORTER, B 1999. Unit 1 brown bear survey–inventory management report. Pages 1–15 *in* S. M. Abbott, ed. Alaska Dep. Fish and Game, Div. Wildl. Cons. Fed. Aid in Wildl. Rest. Proj. W–24–5 and W–27–1, Study 4.0. Juneau. 306pp.

SCHOEN, J. W., AND L. R. BEIER. 1989. Brown bear habitat preferences and brown bear logging and mining relationships in Southeast Alaska. Alaska Dep. Fish and Game. Fed Aid in Wildl. Rest. Proj. Rep. Proj. W–23–1, Study 4.17. Juneau. 32pp.

TITUS, K., AND L. R. BEIER. 1993. Population and habitat ecology of brown bears on Admiralty and Chichagof Islands. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Research Rep. Proj. W–24–1. Juneau. 40pp.

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Table 1 Unit 1 brown bear harvests, 1985–1999[a]

Regulatory year	Unit 1A		Unit 1B		Unit 1C		Unit 1D		Total harvest
	Harvest	% of total	Harvest	% of total	Harvest	% of total	Harvest	% of total	
1985-1986	1	(4)	7	(30)	6	(26)	9	(39)	23
1986-1987	2	(13)	2	(13)	5	(33)	6	(40)	15
1987-1988	8	(24)	4	(12)	3	(9)	18	(55)	33
1988-1989	4	(25)	2	(12)	3	(19)	7	(44)	16
1989-1990	4	(20)	4	(20)	1	(5)	11	(55)	20
1990-1991	5	(19)	5	(18)	4	(15)	13	(48)	27
1991-1992	4	(15)	6	(24)	4	(15)	12	(46)	26
1992-1993	7	(19)	8	(21)	4	(11)	18	(49)	37
1993-1994	4	(17)	3	(12)	6	(25)	11	(46)	24
1994-1995	8	(28)	5	(17)	3	(10)	13	(45)	29
1995-1996	3	(15)	8	(40)	1	(5)	8	(40)	20
1996-1997	4	(13)	4	(13)	7	(22)	16	(52)	31
1997-1998	5	(14)	4	(12)	5	(14)	21	(60)	35
1998-1999	6	(17)	7	(20)	4	(11)	18	(52)	35
1999-2000	13	(33)	6	(15)	6	(15)	15	(37)	40
$\bar{x}$	5	(18)	5	(19)	4	(16)	13	(47)	27

[a] Does not include bears killed in defense of life or property, research mortalities, illegal harvests, or other human/caused accidental mortalities.

Table 2 Unit 1 brown bear harvest, 1985–1999

Regulatory year	Reported							Estimated kill				
	Hunter kill				Nonhunting kill[a]			Unreported illegal[b]	Total estimated kill			
	M (%)	F (%)	Unk.	Total	M	F	Unk.		M (%)	F (%)	Unk.	Total
Fall 1985	(30)	(70)	1	11	3	0	0	1	(46)	(54)	2	15
Spring 1986	(82)	(18)	1	12	1	0	0	1	(83)	(17)	2	14
Total	(57)	(43)	2	23	4	0	0	2	(64)	(36)	4	29
Fall 1986	(40)	(60)	0	10	0	0	0	1	(40)	(60)	1	11
Spring 1987	(80)	(20)	0	5	0	0	0	1	(80)	(20)	1	6
Total	(53)	(47)	0	15	0	0	0	2	(53)	(47)	2	17
Fall 1987	(73)	(27)	2	17	0	0	0	2	(73)	(27)	4	19
Spring 1988	(53)	(47)	1	16	1	0	0	1	(56)	(44)	2	18
Total	(63)	(37)	3	33	1	0	0	3	(67)	(33)	6	37
Fall 1988	(60)	(40)	0	5	1	1	0	1	(67)	(33)	1	8
Spring 1989	(82)	(18)	0	11	0	0	0	1	(82)	(18)	1	12
Total	(75)	(25)	0	16	1	1	0	2	(72)	(28)	2	20
Fall 1989[c]	(67)	(33)	1	10	0	0	0	1	(67)	(33)	2	11
Spring 1990	(80)	(20)	0	10	0	1	0	1	(73)	(27)	1	12
Total	(74)	(26)	1	20	0	1	0	2	(70)	(30)	3	23
Fall 1990	(72)	(28)	0	18	1	1	2	2	(75)	(25)	2	24
Spring 1991	(100)	(0)	0	9	0	0	0	1	(100)	(0)	1	10
Total	(81)	(19)	0	27	1	1	2	3	(79)	(21)	3	34
Fall 1991	(50)	(50)	0	12	1	1	0	1	(50)	(50)	0	15
Spring 1992	(78)	(22)	0	14	0	0	0	1	(78)	(22)	0	15
Total	(65)	(35)	0	26	1	1	0	2	(64)	(36)	0	30
Fall 1992	(52)	(48)	0	25	0	0	0	3[d]	(52)	(48)	0	28
Spring 1993	(91)	(09)	0	12	4	0	0	1	(94)	(06)	0	17
Total	(64)	(36)	0	37	4	0	0	4	(62)	(38)	0	45
Fall 1993	(75)	(25)	0	12	1	0	0	1	(77)	(25)	0	14
Spring 1994	(75)	(25)	0	12	0	0	0	2[e]	(75)	(25)	0	13
Total	(75)	(25)	0	24	1	0	0	2	(76)	(24)	0	27
Fall 1994	(42)	(58)	0	12	0	1	0	2[f]	(40)	(60)	0	15
Spring 1995	(76)	(24)	0	17	0	0	0	2	(74)	(26)	0	19
Total	(62)	(38)	0	29	0	1	0	4	(59)	(41)	0	34

Table 2 Continued

Regulatory year	Reported							Estimated kill				
	Hunter kill				Nonhunting kill[a]			Unreported illegal[b]	Total estimated kill			
	M (%)	F (%)	Unk.	Total	M	F	Unk.		M (%)	F (%)	Unk.	Total
Fall 1995	(75)	(25)	0	8	0	2	0	2[g]	(58)	(42)	0	12
Spring 1996	(83)	(17)	0	12	0	0	0	2[h]	(86)	(14)	0	14
Total	(80)	(20)	0	20	0	2	0	4	(69)	(31)	0	26
Fall 1996	(54)	(46)	0	13	0	0	0	0	(54)	(46)	0	13
Spring 1997	(78)	(22)	0	18	0	0	0	1[i]	(78)	(22)	0	19
Total	(68)	(32)	0	31	0	0	0	1	(69)	(31)	0	32
Fall 1997	(63)	(37)	0	16	1	1	0	2[j]	(65)	(35)	0	20
Spring 1998	(84)	(16)	0	19	0	0	0	0	(84)	(16)	0	19
Total	(74)	(26)	0	35	1	1	0	2	(74)	(26)	0	39
Fall 1998	(23)	(77)	0	13	1	2	0	0	(25)	(75)	0	16
Spring 1999	(86)	(14)	0	22	2	0	0	0	(92)	(8)	0	24
Total	(63)	(37)	0	35	3	2	0	0	(65)	(35)	0	40
Fall 1999	(80)	(20)	0	20	2	2	0	0	(75)	(25)	0	24
Spring 2000	(35)	(65)	0	20	2	0	0	0	(41)	(59)	0	22
Total	(58)	(42)	0	40	4	2	0	0	(59)	(41)	0	46

[a] Includes DLP kills, research mortalities, and other known human/caused accidental mortalities.
[b] Estimated to be 10% of reported kill (McCarthy 1991).
[c] First season registration permits required for hunting brown bear.
[d] One female was illegally killed and left along Fish Creek in Hyder, AK.
[e] Includes 1 male illegally killed at a black bear bait station in Unit 1D, and 1 female killed in Unit 1C by a hunter who failed to obtain a registration permit.
[f] One male, one female killed by hunters who failed to obtain registration permits.
[g] One male, 1 female taken illegally.
[h] Two males taken by hunters who failed to obtain registration permits.
[i] One male taken by a hunter who failed to obtain registration permit.
[j] One male and 1 female taken by hunters who failed to obtain registration permits.

Table 3 Unit 1 age and skull size of harvested brown bears, 1985–1999

	Mean skull size[a]				Mean age[b]			
Season	Male	Nr.	Female	Nr.	Male	Nr.	Female	Nr.
1985-1986	22.3	12	20.5	8	9.1	11	6.5	8
1986-1987	23.2	7	20.7	7	9.4	7	10.2	7
1987-1988	21.4	18	20.6	11	5.5	17	7.7	7
1988-1989	22.7	12	19.4	4	8.4	11	5.2	3
1989-1990	21.2	14	20.6	5	6.7	13	7.4	5
1990-1991	21.5	22	18.7	5	7.9	20	5.2	5
1991-1992	21.6	13	20.4	8	7.4	14	7.9	6
1992-1993	21.9	24	20.0	13	7.4	24	7.4	14[c]
1993-1994	21.9	16	20.3	6	6.4	16	3.4	5
1994-1995	22.9	18	20.5	11[c]	7.9	13	7.3	12[c]
1995-1996	21.7	18[d]	21.4	4	6.6	12	16.0	3
1996-1997	22.7	22	19.9	10	8.5	22	6.6	10
1997-1998	22.8	27	20.8	10	7.3	24	7.8	14
1998-1999	22.8	24	19.7	13	7.9	24	5.4	10[e]
1999-2000	21.7	26	19.4	16				
$\bar{x}$	22.2	18	20.2	9	7.6	16	7.4	7.8

[a] Skull size equals length plus zygomatic width.
[b] Determined through analyses of extracted premolar teeth.
[c] Includes 1 female taken illegally by a hunter who failed to obtain a registration permit.
[d] Includes 2 males taken illegally in Unit 1C by hunters who failed to obtain registration permits.
[e] Includes 2 female and 1 male DLP.

Table 4 Unit 1 brown bear registration permit data, 1989–1999

Season/ hunt nr.	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bear harvest			
						Males (%)	Females (%)	Unknown	Total
(Fall)									
278F	1989[a]	44	(0)	(95)	(5)	(50)	(50)	0	2
278F	1990	67	(0)	(73)	(27)	(72)	(28)	0	18
272F	1991	182	(47)	(48)	(5)	(50)	(50)	0	12
272F	1992	149	(46)	(37)	(17)	(56)	(44)	0	25
272F	1993	146	(53)	(39)	(8)	(75)	(25)	0	12
272F	1994	135	(58)	(33)	(9)	(42)	(58)	0	12
272F	1995[b]	164	(55)	(39)	(6)	(67)	(33)	0	9
272F	1996[b]	147	(54)	(36)	(9)	(54)	(46)	0	13
272F	1997	175	(52)	(39)	(9)	(63)	(37)	0	16
272F	1998[d]	148	(53)	(38)	(9)	(23)	(77)	0	13
272F	1999	176	(56)	(33)	(11)	(35)	(65)	0	20
(Spring)									
278S	1990	60	(0)	(88)	(12)	(71)	(29)	0	7
278S	1991	59	(0)	(86)	(14)	(100)	(0)	0	9
272S	1992	142	(49)	(41)	(10)	(79)	(21)	0	14
272S	1993	131	(43)	(48)	(9)	(91)	(9)	0	11
272S	1994	133	(50)	(42)	(8)	(75)	(25)	0	12
272S	1995[c]	156	(43)	(46)	(11)	(76)	(24)	0	17
272S	1996	139	(44)	(47)	(9)	(83)	(17)	0	12
272S	1997	144	(40)	(47)	(13)	(78)	(22)	0	18
272S	1998	152	(46)	(41)	(13)	(84)	(16)	0	19
272S	1999	155	(50)	(36)	(14)	(86)	(14)	0	22
272S	2000[d]	167	(44)	(44)	(12)	(80)	(20)	0	20
Total	1989-1990	104	(0)	(91)	(9)	(67)	(33)	0	9
	1990-1991	126	(0)	(79)	(21)	(81)	(19)	0	27
	1991-1992	324	(48)	(45)	(7)	(65)	(35)	0	26
	1992-1993	280	(44)	(43)	(13)	(64)	(36)	0	36

Season/ hunt nr.	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bear harvest			
						Males (%)	Females (%)	Unknown	Total
	1993-1994	279	(51)	(41)	(8)	(75)	(25)	0	24
	1994-1995	291	(49)	(41)	(10)	(62)	(38)	0	29
	1995-1996	303	(50)	(43)	(7)	(80)	(20)	0	20
	1996-1997	291	(47)	(42)	(11)	(68)	(32)	0	31
	1997-1998	327	(49)	(40)	(11)	(74)	(26)	0	35
	1998-1999	303	(51)	(37)	(12)	(63)	(37)	0	35
	1999-2000	343	(50)	(38)	(12)	(58)	(42)	0	40
	$\bar{x}$	270	(40)	(49)	(11)	(69)	(31)	0	28

[a] First season permits required for Unit 1 brown bear hunt.
[b] Three hunters did not return permits.
[c] Two hunters did not return permits.
[d] One hunter did not return permit.

Table 5 Unit 1 successful brown bear hunters by residency, 1985–1999[a]

Regulatory year	Local resident[b] (%)	Nonlocal resident (%)	Nonresident (%)	Unknown	Total successful hunters
1985-1986	(61)	(26)	(13)	0	23
1986-1987	(60)	(27)	(13)	0	15
1987-1988	(58)	(27)	(12)	3	33
1988-1989	(56)	(19)	(25)	0	16
1989-1990[c]	(45)	(25)	(30)	0	20
1990-1991	(63)	(7)	(26)	1	27
1991-1992	(65)	(4)	(23)	2	26
1992-1993	(47)	(8)	(45)	1	37
1993-1994	(54)	(21)	(25)	0	24
1994-1995	(38)	(21)	(41)	0	29
1995-1996	(30)	(15)	(55)	0	20
1996-1997	(29)	(16)	(55)	0	31
1997-1998	(26)	(23)	(31)	0	35
1998-1999	(37)	(23)	(40)	0	35
1999-2000	(25)	(12)	(63)	0	40
$\bar{x}$	(46)	(18)	(33)	0	27

[a] Does not include illegal kills.

[b] Local residents are those hunters who reside in Unit 1.

[c] Before 1989-90 all harvest data were obtained solely from sealing records.

Table 6 Unit 1 brown bear seasonal harvest chronology, 1985–1999[a]

Regulatory year	Fall		Spring	
	Harvest	Percent of total	Harvest	Percent of total
1985-1986	12	(52)	11	(48)
1986-1987	5	(33)	10	(67)
1987-1988	16	(48)	17	(52)
1988-1989	11	(69)	5	(31)
1989-1990	10	(50)	10	(50)
1990-1991	18	(67)	9	(33)
1991-1992	12	(46)	14	(54)
1992-1993	25	(68)	12	(32)
1993-1994	12	(50)	12	(50)
1994-1995	12	(41)	17	(59)
1995-1996	8	(40)	12	(60)
1996-1997	13	(42)	18	(58)
1997-1998	16	(46)	19	(54)
1998-1999	13	(37)	22	(63)
1999-2000	20	(50)	20	(50)
$\bar{x}$	14	(49)	14	(51)

[a] Does not include illegal kills.

Table 7 Unit 1 brown bear monthly harvest chronology, 1985–1999[a]

Regulatory year	Harvest periods							Total
	September	October	November	March	April	May	June	
1985-1986	6	4	1	0	0	12	0	23
1986-1987	6	2	2	0	1	4	0	15
1987-1988	9	4	4	0	0	15	1	33
1988-1989	2	2	1	0	0	10	1	16
1989-1990	2	7	1	0	0	10	0	20
1990-1991	9	8	1	0	1	8	0	27
1991-1992	8	2	2	1	0	13	0	26
1992-1993	14	10	1	0	3	9	0	37
1993-1994	6	5	1	0	1	11	0	24
1994-1995	8	3	1	0	1	16	0	29
1995-1996	3	4	1	0	0	12	0	20
1996-1997	10	3	0	0	3	15	0	31
1997-1998	7	9	0	0	1	18	0	35
1998-1999	7	6	0	0	0	22	0	35
1999-2000	15	5	0	0	0	20	0	40
$\bar{x}$	7	5	1	0	1	13	0	27

[a] Does not include illegal kills.

Table 8 Unit 1 successful brown bear hunter transport methods, 1985–1999[a]

Regulatory year	Percent of harvest						Nr.
	Airplane	Boat	Walk	ORV	Highway vehicle	Other-unknown	
1985-1986	(4)	(61)	(4)	(9)	(13)	(9)	23
1986-1987	(7)	(53)	(0)	(13)	(27)	(0)	15
1987-1988	(12)	(52)	(9)	(12)	(6)	(9)	33
1988-1989	(6)	(63)	(6)	(6)	(13)	(6)	16
1989-1990	(10)	(70)	(5)	(5)	(5)	(5)	20
1990-1991	(15)	(52)	(7)	(15)	(4)	(7)	27
1991-1992	(8)	(62)	(0)	(8)	(3)	(19)	26
1992-1993	(17)	(50)	(0)	(3)	(30)	(0)	37
1993-1994	(0)	(71)	(4)	(0)	(25)	(0)	24
1994-1995	(3)	(76)	(7)	(0)	(14)	(0)	29
1995-1996	(0)	(70)	(5)	(0)	(25)	(0)	20
1996-1997	(3)	(71)	(3)	(3)	(20)	(0)	31
1997-1998	(3)	(66)	(0)	(0)	(31)	(0)	35
1998-1999	(0)	(83)	(3)	(0)	(14)	(0)	35
1999-2000	(8)	(72)	(0)	(0)	(20)	(0)	40
$\bar{x}$	(6)	(65)	(4)	(5)	(17)	(4)	27

[a] Does not include illegal or DLP kills.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: Unit 4 (5800 mi^2)

GEOGRAPHIC DESCRIPTION: Admiralty, Baranof, Chichagof, and adjacent islands

BACKGROUND

Brown bears inhabit the major islands in Game Management Unit 4 (Admiralty, Baranof, Chichagof, Kruzof, Yakobi, and Catherine islands). The population has been isolated from mainland brown/grizzly bear populations for over 40,000 years and is genetically distinct from other bears (Heaton et al. 1996, Talbot and Shields 1996).

Management of Unit 4 brown bears has had a colorful and controversial past. In the early part of the century there were advocates pressing widely differing views – some were for the elimination of brown bears while others wanted better preservation of brown bears. Eventually, support for greater protection of the valuable bear resource (ADF&G 1998) overcame market hunting for hides and calls for the elimination of bears, and the department developed more restrictive harvest regulations.

The Tongass National Forest encompasses most Unit 4 bear habitat and is managed under a multiple-use concept by the U.S. Forest Service (FS). On both federal and private lands there has been extensive long-term habitat alteration by commercial logging. Wilderness designations on Admiralty, south Baranof, and west Chichagof islands, however, contain large areas that should continue to provide bears with pristine environments. Elsewhere in the unit, habitat alteration by logging will continue to affect brown bear density and distribution.

Unit 4 is the most important brown bear hunting area in Southeast Alaska. Unit 4 has nearly 70% of the estimated brown bears (Miller 1993*a*) and has produced 67% of the harvest in recent years (Miller 1993*b*). Federal assumption of subsistence management under the terms of the Alaska National Interest Lands Conservation Act (ANILCA) included authority for brown bears on federal lands. This dual authority with the State of Alaska has confused the public and may deny state wildlife managers the use of options available in other areas.

An increasing number of brown bear guides and hunters, as well as increased tourism in Unit 4, have led to user conflicts. In July 1998, the Alaska Department of Fish and Game (ADF&G) published "Unit 4 Brown Bears – Past, Present, and Future: A Status Report and Issues Paper."

The Unit 4 Brown Bear Management Team (Team) was created by the Board of Game in January 1999, with 15 members nominated by organizations representing most consumptive and nonconsumptive user groups. The purpose was to review bear management issues and any human activities that affected brown bears. The Team agreed to several elements of a comprehensive management strategy, and a report was published (ADF&G 2000).

Three areas in Unit 4 are closed to bear hunting to enhance viewing opportunities: Seymour Canal Closed Area on eastern Admiralty Island, which encompasses the Stan Price State Wildlife Sanctuary; Salt Lake Closed Area at Mitchell Bay on southwest Admiralty Island; and the Port Althorp Closed Area on northern Chichagof Island.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain an average age of harvested males of at least 6.5 years.
- Maintain a male to female harvest ratio of at least 3:2.
- Reduce the number of bears killed in defense of life or property (DLP).
- Maintain the annual human-caused mortality of all brown bears at no more than 4% of each island's population estimate (Admiralty, Baranof, Northeast Chichagof, and the remainder of Chichagof), averaged over a 3-year period.
- Maintain the annual human-caused mortality of females at no more than 1.5% of each island's population estimate, averaged over a 3-year period.

METHODS

Unit 4 brown bear registration hunting permits were issued to the public at ADF&G offices. Successful bear hunters were required to present skulls and hides to a representative of the Division of Wildlife Conservation (DWC) or the Alaska Department of Public Safety, Division of Fish & Wildlife Protection (FWP) for sealing. Bear sealers measured skulls, extracted premolars, confirmed sex, and recorded data on the date and location of kill, hunter residency, hunt length, guide services used, and primary transportation. A commercial laboratory determined ages through premolar cementum annuli analyses. All persons obtaining permits were required to report on hunting activities immediately after taking a bear or following the close of the season.

Data recorded on sealing forms and registration permit reports were entered into a computer database. Delinquent permittees were sent reminder letters and certified letters to improve reporting compliance. FWP cited permittees who failed to report.

Project personnel attempted to reduce defense of life or property (DLP) incidents through education and cooperation with community authorities and other agencies.

In an effort to update population estimates, 40 additional bears were captured through helicopter darting or foot-snaring techniques and outfitted with telemetry devices. These bears will be considered the marked sample in a capture-mark-resight (CMR) population estimation effort planned for completion in July 2001.

Personnel from DWC and FS contacted visitors at Pack Creek in the Stan Price State Wildlife Sanctuary. The program was staffed from late June through August to interpret bear behavior and management, promote public safety, prevent DLP loss of habituated bears, and explain regulations associated with the cooperative management area. In the summers of 1998 and 1999, a total of 1392 and 1351 visits were recorded at Pack Creek associated with brown bear viewing. Summer 2000 saw 1400 Pack Creek visitors.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Unit 4 brown bear populations are stable or slightly increasing. Analysis of historical harvest data indicates that bear numbers probably declined during the mid-1970s but have since recovered (Faro 1997, Whitman 1999). Harvest levels from portions of the unit continue to warrant close scrutiny. Expansion of the logging road system, particularly on northeast Chichagof Island, has increased the vulnerability of bears to hunters. High harvest occurs because logging roads allow hunters greater efficiency in accessing salmon streams, bays, and estuaries (Young 1989, 1990; Titus and Beier 1992).

Population Size

Titus and Beier (1993) reported bear densities on Admiralty and Northeast Chichagof islands study areas. These studies provide the basis for population estimates for major areas of the unit. The current population estimate for the entire unit is 4155 bears; Chichagof and adjacent islands, 1550; Baranof and adjacent islands, 1045; and Admiralty Island, 1560. For management purposes, the lower 95% confidence limit is used as a conservative population level, and we have attempted to maintain harvests at 4% or less of that population.

Population Composition

Data are limited on the population composition of the population of brown bears throughout Unit 4. The number of adult male bears captured during DWC research programs has been small, and we believe capture bias has resulted in a sample not representative of the sexes and age classes of bears in the population. Age and sex data from hunter harvest are biased by hunter selectivity, the vulnerability of young bears, regulations protecting females with offspring, and misidentification of harvested bears by sealers.

In Unit 4 the 1998-1999 harvest by hunters was 71% males (n = 91) and 29% females (n = 37). The 1999-2000 harvest was 76% males (n = 126) and 24% females (n = 40). Table 1 displays sex information for the last 5 regulatory years.

Distribution and Movements

Researchers continued to monitor radiocollared bears on the Northeast Chichagof Controlled Use Area (NECCUA) and Admiralty Island to gather basic life history data. Sample sizes are small, but indications are that adult bears tend to make little change in home ranges once they have become established. Some subadults, particularly males, make extensive movements from their mothers' home ranges. The importance of subadult dispersal in maintaining viable brown bear populations is poorly understood.

MORTALITY

Harvest

Season and Bag Limit	Resident and Nonresident Hunters
Unit 4: Chichagof Island south and west of a line which follows the crest of the island from Rock Point (58°N. lat, 136°21'W. long.) to Rodgers Point (57°35'N. lat., 135°33'W. long.), including Yakobi and other adjacent islands; Baranof Island south and west of a line which follows the crest of the island from Nismeni Point (57°34'N. lat., 135°25'W. long.), to the entrance of Gut Bay (56°44'N. lat., 134°38'W. long.), including the drainages into Gut Bay and including Kruzof and other adjacent islands.	Sep 15–Dec 31 Mar 15–May 31
One bear every 4 regulatory years by registration permit only	
Unit 4: that portion in the Northeast Chichagof Controlled Use Area north of the Spasski Trail and the Gartina Highway	Sep 15–Sep 30 Mar 15–May 20
One bear every 4 regulatory years by registration permit only	
Unit 4: remainder of the Northeast Chichagof Controlled Use Area	Mar 15–May 20
One bear every 4 regulatory years by registration permit only	
Remainder of Unit 4:	Sep 15–Dec 31 Mar 15–May 20
One bear every 4 regulatory years by registration permit only	

Board of Game Actions and Emergency Orders. In their November 2000 meetings, the Alaska Board of Game reviewed and endorsed the findings of the Unit 4 Brown Bear Management Team (ADF&G 2000), supporting the FS in their attempts to decrease hunter crowding issues and limit the numbers of guides (thus, nonresident harvest). The Board adopted no regulatory changes.

Forest Service Moratorium for Nonresident Hunters. The number of successful nonresident brown bear hunters in Southeast Alaska assisted by outfitter/guides has recently increased considerably, raising concerns about sustainable harvest levels. A FS moratorium issued in summer 2000 will limit the level of Unit 4 guide activity beginning spring 2001. Over the past 10 years the number of active Unit 4 hunting guides quadrupled. Because the state lacks authority to limit guides, the FS, at the request of ADF&G, restricted active guides to the average of their 1997 and 1998 client levels. At the time the Unit 4 Brown Bear Management Team was created in January 1999, the Team identified the likelihood of a "domino effect", redirecting hunting pressure should any Unit 4 restrictions be put in place. This became a reality, resulting in increased effort and higher harvest elsewhere in Region I, and has prompted a more comprehensive view of brown bear management by all Region I wildlife managers.

Hunter Harvest.

Regulatory Year 1998/99: Hunters took 38 brown bears in fall 1998 and harvested 90 in spring 1999. The total for the year was 128 bears. An additional 7 bears are known to have died as the result of human-induced causes, bringing the year's total to 135 bears.

Regulatory Year 1999/00: Hunters took 48 bears in fall 1999 and 118 in spring 2000. Hunting accounted for 166 bears and 6 others were reported killed; the combined mortality for the year was 172 bears. Data concerning brown bear harvests for the past 5 years are presented in Tables 1 and 2.

Recent trends in skull sizes and mean ages of harvested bears closely match those found in historical data, indicating stable trends. Ages and skull sizes for Baranof and Chichagof islands are comparable to Admiralty data, also indicating a stable trend.

Hunter Residency and Success. Management of all permit hunt areas is annually administered under a single registration permit. Hunting pressure in each hunt area is determined from permit hunt reports at the end of the season. Table 4 summarizes the data for each area with discrete seasons.

Local residents, defined as residents of Unit 4, take a small percentage of the total annual harvest (Table 3). Most bears were taken by nonresidents or Alaska hunters from other areas of the state. In 1998/99 nonlocal Alaska hunters and nonresidents harvested 92% of the bears. In 1999/00 nonresidents and nonlocal Alaskans took 90% of the bears.

Spring and fall hunting effort is presented in Table 4. In fall 1998, 80 Alaska residents hunted a total of 365 days, while 57 nonresidents spent 349 days afield. In fall 1999, 81 residents hunted 424 days and 54 nonresidents hunted 339 days. Spring seasons produce a larger harvest (Table 1) and have the greater hunting pressure (Table 4). In spring 1999, 101 residents hunted 351 days

and 115 nonresidents hunted 802 days. In spring 2000, 156 residents hunted 570 days and 113 nonresidents hunted 680 days. Fall seasons produced 1 bear for every 17.2 hunt days, and spring seasons produced 1 bear for every 11.6 days.

Harvest Chronology. Most fall harvest occurs during the first 2 weeks of the season (Table 5). The greatest hunting pressure occurs early because weather is generally more favorable and many bears have not yet left salmon streams. Adverse weather and dispersal from streams make it increasingly difficult to locate bears late in the fall. A high percentage of females are characteristically in the fall harvest (Table 1).

The percentage of male bears killed during spring seasons is higher than the percentage of males killed in the fall, but the actual number of females killed in the spring is frequently greater than in the fall (Table 1). A greater number of bears are available to hunters late in the spring season because nearly all bears have left their dens and are seeking food. Most spring bears are killed in May (Table 5). In late spring, bears can concentrate and feed on grass/sedge flats near salt water. In such years, harvests are higher than in years with early "green-up" that provide bears with more dispersed feeding opportunities.

Transport Methods. Unit 4 bear hunters use boats as the most common form of transportation (Table 6). In 1998/99, 91% of successful hunters used boats. In 1999/00, successful hunters used boats 92% of the time. Aircraft are the second most important means of hunter transport but were used by only 6% and 4% of successful hunters in the 1998/99 and 1999/00 seasons, respectively.

Other Mortality

To reduce DLP mortality, we worked with local communities and agencies associated with public safety. Most nonhunting mortality results from bears entering areas developed for human use. Such situations are most effectively addressed by eliminating improper garbage disposal or food storage. Most DLP incidents involve bears that have become habituated to humans.

In 1998/99, 7 nonhunting mortalities were reported (Table 1); 6 occurred in 1999/00. Of these 13 bears, 5 were illegal kills (generally related to hunters not obtaining registration permits), and 8 were taken under DLP provisions.

Bear Viewing. Public interest in viewing bears has steadily increased at the Stan Price State Wildlife Sanctuary. During summer 1998, 1392 people visited the sanctuary, in 1999 the number of visitors was 1351, and in 2000, 1400 visitors were logged. Many tour operators are now taking visitors to other locales in Unit 4, but quantifying this use has been impossible.

HABITAT

Assessment and Enhancement

We did not conduct any habitat assessment studies or enhancement projects during this report period.

CONCLUSIONS AND RECOMMENDATIONS

Management objectives for harvested male brown bear ages were met in both years. Mean ages of harvested bears from all subpopulations exceed the 6.5-year minimum objective. The male to female harvest ratio was 3:1.22 in 1998/99 and 3:0.95 in 1999/00, clearly surpassing the management objective of 3:2.

The objective of reducing bear loss due to DLP mortality is difficult to measure, but declines in non-hunting mortality (Table 1) suggest efforts may be working. DWC continued to work with FS and the Alaska Department of Environmental Conservation to address landfill problems in logging camps and communities to minimize DLP losses.

For harvest purposes, Admiralty Island, Baranof/Kruzof Islands, Northeast Chichagof Island, and the remainder of Chichagof/Yakobi Islands are managed as 4 subpopulations. These areas are large enough to encompass viable bear populations, and water barriers largely restrict dispersal of subadults between areas. Hunting pressure on brown bears requires the use of all available information concerning the population status for management actions. None of these subpopulations are currently experiencing excessive human-induced mortality; mortality levels (Table 2) are close to, yet still below the conservative guideline of 4% of the population, and well below the threshold for total human-caused female mortality. Attempts to "micro-manage" smaller areas could redirect hunting pressure and create a "domino effect" of management problems. Future seasons may require some regulatory change in specific areas that receive high hunter effort to maintain biological or aesthetic standards. More information on Unit 4 brown bear movements is necessary before attempting management of smaller subpopulations. Harvest increases may make it necessary to recommend regulatory changes to dampen the trend in increasing bear kills. Because of the FS moratorium, harvests by nonresidents are expected to stabilize.

Extension of the NECCUA in 1994 to north of Port Frederick due to extensive logging road construction appears to have prevented excessive harvest in that area. Chichagof Island has experienced the greatest long-term habitat alteration from logging of all Unit 4 areas, thus bear habitat on that island is the least secure in the unit. Continuing research on Chichagof's bear population is necessary to provide managers with population information. A survey scheduled for summer 2001 should provide that information.

Funding for the Pack Creek bear viewing program with traditional hunting-generated funds has become increasingly controversial. We need to develop a secure source of funding to maintain this popular nonhunting activity. Currently about 50% of the funds needed to operate the Admiralty Island site come from visitor fees, and the balance from the State General Fund.

ACKNOWLEDGMENTS

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LITERATURE CITED

ADF&G. 1998. Brown Bears of Unit 4 – Past, Present and Future: A Status Report and Issues Paper. July 1998. ADF&G. Juneau. 67 pages.

ADF&G. 2000. Southeast Alaska. Unit 4 Brown Bear Management Strategy. ADF&G. Juneau. 47 pages.

HEATON, H. T., S. L. TALBOT, and G. F. SHIELDS. 1996. An ice age refugium for large mammals in the Alexander Archipelago, Southeast Alaska. Quaternary Research 46, 186–192.

FARO, J. B. 1997. Unit 4 brown bear survey-inventory report. Pages 2–3 *in* M.V. Hicks. Ed. Annual report of survey-inventory activities. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration. Juneau Alaska USA

MILLER, S. D. 1993*a*. Development and improvement of bear management techniques and procedures in Southcentral Alaska. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration Research Progress Report, Project W–24–1, Study 4.24. 40pp.

———. 1993*b*. Brown bears in Alaska: A statewide management overview. Alaska Department of Fish and Game, Federal Aid in Wildlife Technical Bulletin No. 11. 40pp.

TALBOT, S. L. and G. F. SHIELDS. 1996. A phylogeny of the bears (Ursidae) inferred from complete sequences of three mitochondrial genes. Molecular Phylogenetics and Evolution 5:567–575.

TITUS, K. and L. R. BEIER. 1992. Population and habitat ecology of brown bears on Admiralty and Chichagof islands. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Project W–23–4, 29pp.

———. 1993. Population and habitat ecology of brown bears on Admiralty and Chichagof islands. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Project W–24–1, 40pp.

WHITMAN, J. S. 1999. Unit 4 brown bear survey-inventory report. In M.V. Hicks, ed. Annual report of survey-inventory activities. Part I. Vol. V. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Juneau Alaska USA

YOUNG, E. L. 1989. Unit 4 brown bear survey-inventory report. In S. O. Morgan. ed. Annual report of survey-inventory activities. Part I. Vol. V. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Juneau Alaska USA

———. 1990. Unit 4 brown bear survey-inventory report. In S. O. Morgan. ed. Annual report of survey-inventory activities. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Juneau Alaska USA

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Table 1 Unit 4 brown bear harvest, 1995–1999

Regulatory year	Hunter kill					Nonhunting kill[a]				Total
	M	F	(%F)	Unk	Total	M	F	Unk	Total	reported
1995										
Fall 95	23	11	(32)	0						
Spring 96	66	24	(27)	0						
Total	89	35	(28)	0	124	5	7	3	15	139
1996										
Fall 96	23	11	(32)	0						
Spring 97	81	14	(15)	0						
Total	104	25	(19)	0	129	11	5	3	19	148
1997										
Fall 97	14	12	(46)	0						
Spring 98	93	15	(14)	0						
Total	107	27	(20)	0	134	4	3	1	8	142
1998										
Fall 98	17	21	(53)	0	38	3	2	1	6	44
Spring 99	74	16	(18)	0	90	1	0	0	1	91
Total	91	37	(29)	0	128	4	2	1	7	135
1999										
Fall 99	27	21	(44)	0	48	3	1	0	4	52
Spring 00	99	19	(16)	0	118	2	0	0	2	120
Total	126	40	(24)	0	166	5	1	0	6	172

[a] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. Does not include bears that were found dead.

Table 2 Brown bear hunting pressure[a] and mortality[b] by major geographic areas in Unit 4, regulatory years 1995–1999

Hunt area	Year	Nr hunters	M	(%)[c]	F	(%)[c]	Unknown	(%)[d]	Total harvest	Percent Estimated population[e]
Northeast Chichagof Island										
	1995/96		5		3		0		8	2.3
	1996/97		8		1		0		9	2.5
	1997/98		7		0		0		7	2.0
	1998/99		5		3		0		8	2.3
	1999/00		9		2		0		11	3.1
Remainder of Chichagof Island										
	1995/96		28		12		0		40	3.3
	1996/97		35		9		0		44	3.7
	1997/98		37		7		0		44	3.7
	1998/99		33		6		0		39	3.3
	1999/00		42		10		0		52	4.3
Baranof and Kruzof islands										
	1995/96	74	20	(67)	10	(33)	0		30	2.9
	1996/97	63	21	(91)	2	(9)	0		23	2.2
	1997/98	86	18	(67)	9	(33)	0		27	2.6
	1998/99	120	18	(51)	17	(49)	0		35	3.3
	1999/00	92	31	(67)	15	(33)	0		46	4.4
Baranof and Chichagof islands[f]										
	1995/96	9								
	1996/97	7								
	1997/98	12								
	1998/99	0								
	1999/00	2								
Admiralty Island										
	1995/96	126	36	(78)	10	(22)	0		46	2.9
	1996/97	133	40	(75)	13	(25)	0		53	3.4
	1997/98	147	45	(80)	11	(20)	0		56	3.6
	1998/99	138	35	(76)	11	(24)	0		46	2.9
	1999/00	150	44	(77)	13	(23)	0		57	3.7
Unit 4 Totals										
	1995/96		89	(72)	35	(28)	0		124	3.0
	1996/97		104	(81)	25	(19)	0		129	3.1
	1997/98		107	(80)	27	(20)	0		134	3.2

Percent

Hunt area	Year	Nr hunters	M	(%)[c]	F	(%)[c]	Unknown	(%)[d]	Total harvest	Estimated population[e]
	1998/99		91	(71)	37	(29)	0		128	3.1
	1999/00		126	(76)	40	(24)	0		166	4.0

[a] Registration permit data.
[b] Bear sealing data.
[c] Percentage based on known sex bears.
[d] Percentage based on total bears.
[e] Estimated populations: NE Chichagof Island, 354 bears; remainder of Chichagof Island, 1196; Baranof and Kruzof islands, 1045 bears; Admiralty Island, 1560 bears; all Unit 4, 4155 bears.
[f] Unsuccessful hunters who indicated both Baranof and Chichagof islands as hunt locations.

Table 3 Unit 4 brown bear successful hunter residency, 1995–1999

Regulatory year	Local resident[a]	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
1995/96	18	(14)	23	(19)	83	(67)	124
1996/97	16	(12)	17	(13)	96	(75)	129
1997/98	13	(10)	30	(22)	91	(68)	134
1998/99	10	(8)	19	(15)	99	(77)	128
1999/00	16	(10)	33	(20)	117	(70)	166

[a] Resident of Unit 4.

Table 4 Unit 4 hunting effort by residency, by island, 1995–1999

Island	Season	Nr. resident hunters	Nr. nonresident hunters	Total hunters	Days hunted by residents	Days hunted by nonresidents	Nr. days hunted	Nr. bears killed	Days effort per bear
Admiralty Island									
	Fall 1995	30	7	37	112	35	147	10	15
	Spring 1996	53	36	89	204	200	404	36	11
	Fall 1996	23	19	42	106	79	185	13	14
	Spring 1997	56	35	91	195	189	384	40	10
	Fall 1997	26	14	40	140	80	220	10	22
	Spring 1998	64	43	107	283	251	534	46	12
	Fall 1998	24	15	39	146	89	235	9	26
	Spring 1999	50	49	99	165	370	535	37	14
	Fall 1999	24	18	42	118	129	247	12	21
	Spring 2000	58	50	108	249	289	538	45	12
Baranof Island									
	Fall 1995	29	9	38	85	36	121	14	9
	Spring 1996	15	22	37	42	143	185	16	12
	Fall 1996	16	7	23	63	46	109	6	18
	Spring 1997	23	17	40	81	73	154	17	9
	Fall 1997	20	10	30	111	54	165	5	33
	Spring 1998	31	24	55	104	146	250	22	11
	Fall 1998	38	26	64	158	172	330	20	17
	Spring 1999	14	23	37	46	104	150	15	10
	Fall 1999	33	22	55	163	123	286	22	13
	Spring 2000	35	25	60	92	154	246	24	10
Chichagof Island									
	Fall 1995	11	9	20	31	54	85	10	9
	Spring 1996	29	39	68	129	197	326	38	9
	Fall 1996	18	11	29	80	45	125	15	8
	Spring 1997	24	35	59	93	218	311	38	8
	Fall 1997	16	10	26	68	59	127	11	12
	Spring 1998	32	41	73	141	244	385	40	10
	Fall 1998	18	16	34	61	88	149	9	17
	Spring 1999	37	43	80	140	328	468	38	12
	Fall 1999	24	14	38	143	87	230	14	16
	Spring 2000	61	38	99	227	237	464	49	9

TABLE 4 CONTINUED

Island	Season	Nr. resident hunters	Nr. nonresident hunters	Total hunters	Days hunted by residents	Days hunted by nonresidents	Nr. days hunted	Nr. bears killed	Days effort per bear
Baranof & Chichagof islands, unspecified									
	Fall 1996	0	1	1	0	2	2		
	Spring 1997	4	2	6	15	17	32		
	Fall 1997	1	2	3	3	16	19		
	Spring 1998	3	6	9	8	66	74		
	Fall 1998	0	0	0	0	0	0		
	Spring 1999	0	0	0	0	0	0		
	Fall 1999	0	0	0	0	0	0		
	Spring 2000	2	0	2	2	0	2		
Unit 4 Totals									
	Fall 1995	70	26	96	228	129	357	34	11
	Spring 1996	100	101	201	393	556	949	90	11
	Fall 1996	57	38	95	249	172	421	34	12
	Spring 1997	107	89	196	384	497	881	95	9
	Fall 1997	63	36	99	322	209	531	26	20
	Spring 1998	130	114	244	536	707	1243	108	12
	Fall 1998	80	57	137	365	349	714	38	19
	Spring 1999	101	115	216	351	802	1153	90	13
	Fall 1999	81	54	135	424	339	763	48	16
	SPRING 2000	156	113	269	570	680	1250	118	11

Table 5 Unit 4 brown bear harvest chronology, 1995–1999[a]

Regulatory year	Fall harvest periods										
	9/11–9/20	9/21–9/30	10/1–10/10	10/11–10/20	10/21–10/31	11/1–11/10	11/11–11/20	11/21–11/31	12/1–12/10	12/11–12/20	12/21–12/31
1995/96	17	12	2	1	0	1	1	0	0	0	0
1996/97	15	9	3	1	3	1	2	0	0	0	0
1997/98	13	5	4	0	1	2	1	0	0	0	0
1998/99	16	11	8	3	0	0	0	0	0	0	0
1999/00	16	19	10	1	1	0	1	0	0	0	0

	Spring harvest periods						
	4/1–4/10	4/11–4/20	4/21–4/30	5/1–5/10	5/11–5/20	5/21–5/31	Total
1995/96	1	1	10	33	35	10	124
1996/97	0	0	14	32	39	10	129
1997/98	0	1	9	45	43	10	134
1998/99	0	0	4	21	51	14	128
1999/00	0	0	8	45	53	12	166

[a] Includes all hunts.

Table 6 Unit 4 brown bear harvest by transport method, 1995–1999[a]

Regulatory year	Airplane	Boat	Walked	Off-road vehicle	Highway vehicle	Unknown
1995/96	8	112	2	0	2	0
1996/97	7	120	1	0	1	0
1997/98	13	118	1	0	2	0
1998/99	8	117	2	0	0	1
1999/00	6	153	3	3	1	0

[a] Sealing certificate data and registration permit data often differ. Sealing certificate data were used.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 5 (5800 mi^2)
GEOGRAPHIC DESCRIPTION: Cape Fairweather to Icy Bay, Eastern Gulf Coast.

BACKGROUND

Brown bears probably first occurred on the Yakutat and Malaspina forelands following glacial retreat 300 to 500 years ago. Like many other wildlife species, brown bears gained access to the eastern gulf coast by moving from the Alaska/Canada Interior via the Alsek/Tatshenshini corridor.

Since 1961 when brown bears were first sealed in Alaska, 935 sport-killed bears have been sealed from Unit 5 (782 from 5A and 153 from 5B). Sixty-six percent of these bears were males, with 65% taken by nonresident hunters. An additional 64 bears have been taken in situations other than legal hunts during the same time period.

A 1988 Superior Court decision that deregulated the big game guide industry started an increase in guide activity in Southeast Alaska. From 1980 through 1988 the average number of guided nonresident brown bear hunters per year in Unit 5 was 22. Since then, the number has climbed to an average of 26 per year.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a male-to-female harvest ratio of at least 3:2 and an average age of harvested males of at least 6.5 years.

METHODS

Alaska Department and Fish and Game and Division of Fish and Wildlife Protection staff gathered most data while sealing brown bears. State game regulations require brown bear hides and skulls to be sealed within 30 days of harvest. Skulls are measured and a pre-molar tooth is extracted for age determination. Additional information is collected from hunters, such as harvest date and location, transportation method, guide information, and number of days of effort. Hunters also provide anecdotal information from their observations in the field.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population information is not available for Unit 5 brown bears. Data gathered from sealing certificates, incidental observations and hunter interviews indicate no notable changes in the population. However, the 2 highest kills on record occurred in 1991 and 1992 when 41 and 42 brown bears were harvested, respectively. Since that time the harvest has ranged from 27 to 38. Although the average male age and skull size decreased slightly during the years of higher harvest, those measures have returned to or have exceeded long-term averages.

MORTALITY

Harvest

Season and Bag Limit	Resident and Nonresident Hunters
1 bear every 4 regulatory years	Sep 1–May 31

Board of Game Actions and Emergency Orders. During the fall 2000 Board of Game deliberations the Board adopted an ADF&G proposal to require all Unit 5 brown bear hunters to acquire a registration permit prior to hunting. This regulation will assist ADF&G biologists with information on brown bear hunting effort as well as more precise harvest information.

Hunter Harvest. Unit 5 brown bear harvests have stabilized after decreasing from all-time highs in the early 1990s. Prior to the early 1990s, brown bear harvests had constantly increased since sealing began. The average kill from 1971–80 was 21 bears, with a range of 13–28. The 1981–90 mean harvest was 30, ranging from 23–33 bears. Since 1990, the annual average harvest has been 34 bears, with a mean annual harvest during the current report period of 33 bears. The mean male age increased between the 1970s (5.8 years) and the 1980s (7.0 years), but dropped to a mean of 6.1 years for 1990 through 1997. During 1998, 28 males and 7 females were reported taken (Table 1). Males composed 80% of the harvest, which is the highest percentage since 1991, and substantially higher than the mean of 72% in the 1989–1997 harvests. Average male skull size of 23.5 inches was slightly higher than the previous 9-year average of 22.8 inches. The average male age (4.2 years) was more than 2 years below our management objective of 6.5 years.

In 1999, hunters killed 23 male and 8 female brown bears (Table 1). Males composed 74% of the harvest. Mean male skull size was 23.5 inches, but age information is not yet available.

Hunter Residency and Success. From 1991 through 1997 nonresidents accounted for an average of 78% of the Unit 5 brown bear harvest (Table 3). The percentage increased slightly to 81% in 1998-2000.

Harvest Chronology. From 1991–97 the average proportion of brown bears taken in the spring was 45% (Table 2). In 1998 and 1999, this value continued with 40% and 42% of the bears being killed in the spring, respectively.

Transport Methods. Transportation types used in successful 1998 brown bear hunts included aircraft (72%), boats (11%), highway vehicles (11%), ORV's (3%), and walking (3%). In 1999 aircraft were used by only 35% of the successful brown bear hunters, and the use of boats increased to 35%, while ORV's and highway vehicles accounted for 20% and 10%, respectively (Table 4). The decrease in airplane access and increase in ORV use in 1999 may be more a product of hunter interpretation of the question on the sealing certificate than a real change in transportation type, based on the fact that most hunting effort was based out of camps owned and operated by hunting guides, and their modes of operation have not changed.

Other Mortality

This category refers to bears killed in defense of life or property, illegal kills, road kills, and nuisance bears. The Yakutat landfill is the main area of concern for these types of mortalities. The landfill attracts dozens of brown bears throughout the year, and some of these are eventually killed. In 1998, a highway vehicle passing close to the dump killed 1 juvenile female bear. In fall 1999, 2 adult male bears that were aggressive toward people at the dump were dispatched, and 3 others (2 males and 1 female) were killed illegally. Two of these illegal bears were found dead and unclaimed, and a hunter shot the third bear from the highway. It is possible that the unclaimed illegal kills are the result of bears wandering into fish camps. In spring 2000, a highway vehicle passing close to the dump killed a juvenile male bear.

To prevent the unnecessary and illegal death of bears, Douglas area staff continues to work Yakutat community members and the Alaska Department of Environmental Conservation (ADEC) to remedy landfill problems and curtail brown bear attractants. Over the past year there have been several meetings in Yakutat regarding this issue. We have begun working with the FS to distribute educational materials to Yakutat fish camp permit holders to reduce the possibility of illegal bear kills.

HABITAT

Assessment and Enhancement

We did not conduct any habitat assessment studies or enhancement projects during this report period. The US Forest Service (FS) is presently revising the Situk River Management Plan that may affect brown bear hunting and commercial tourism on the river.

CONCLUSIONS AND RECOMMENDATIONS

Unit 5 male brown bear objectives for skull size were met in both years of this report period. We were unable to determine if we met the age objective for male bears as that information was not yet available. Bears were harvested in a male to female ratio of 4:2 in 1998 and 3.7:2 in 1999, exceeding the 3:2 male to female ratio established as management objectives. We will continue to analyze the age and skull sizes of harvested bears and closely monitor the harvest of breeding-aged female bears. Action taken by the BOG in fall 2000 implementing a registration permit will allow us to assess hunter effort and success.

Yakutat residents view brown bears near town as pests. The Yakutat dump has been an attractant to bears for decades and continues to be a problem, with more than a dozen bears consistently present. We will continue to emphasize to local residents the importance of properly managing garbage and work with ADEC to eliminate this fatal attractant to bears.

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APPROVED BY:
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Table 1 Unit 5 brown bear harvest, age, skull sizes, and effort, 1989–1999

Regulatory year	Harvest				Mean Age			Mean Skull Size		Avg Days/Kill	
	M	F	Unk	Total	M	F	Total	M.....	F	M	F
1989–1990	18	10	1	29	6.6	4.0	5.7	22.8	20.0	3.6	3.6
1990–1991	25	8	2	35	7.9	4.3	6.9	23.2	20.3	5.0	4.0
1991–1992	33	8	0	41	5.3	4.9	5.3	22.4	20.3	5.4	4.3
1992–1993	28	12	0	40	5.0	5.6	5.2	22.2	20.3	4.3	3.8
1993–1994	19	11	0	30	6.7	6.7	6.7	21.3	21.2	3.2	5.6
1994–1995	22	6	0	28	5.5	4.2	5.2	23.0	20.6	4.6	5.7
1995–1996	24	7	0	31	6.7	8.4	7.1	23.5	22.5	4.2	4.0
1996–1997	23	14	1	38	5.4	3.8	4.8	23.1	20.8	4.7	5.6
1997–1998	18	9	0	27	6.1	7.0	6.4	23.4	20.6	4.3	4.3
1998–1999	28	7	0	35	4.2	2.4	3.9[1]	23.5	21.6	4.4	3.0
1999–2000	23	8	0	31	NA	NA	NA	23.5	20.9	5.3	4.4
Means report period	25.5	7.5	0	33	NA	NA	NA	23.5....	21.3	4.9	3.7
1989–97	23.3	9.4	0.4	33.2	6.1	5.4	5.9	22.8	20.7	4.4	4.5

[1] Age data available for fall 1998 only.

Table 2 Unit 5 brown bear harvest chronology, 1989–1999

Regulatory Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1989–1990	0	0	10	3	1	0	0	0	0	5	10	0	29
1990–1991	0	0	15	2	1	0	0	0	0	3	14	0	35
1991–1992	0	0	21	2	0	0	0	0	0	2	16	0	41
1992–1993	0	0	21	5	0	0	0	0	0	3	11	0	40
1993–1994	0	0	7	3	1	1	0	0	0	7	11	0	30
1994–1995	0	0	9	2	0	0	1	0	0	6	10	0	28
1995–1996	0	0	12	1	0	0	0	2	0	7	9	0	31
1996–1997	0	0	21	6	0	0	0	0	0	4	8	0	39
1997–1998	0	0	11	7	0	0	0	0	0	4	5	0	27
1998–1999	0	0	10	10	1	0	0	0	0	4	10	0	35
1999–2000	0	0	10	6	2	0	0	0	0	1	12	0	31

Table 3 Unit 5 successful brown bear hunter residency, 1991–1999

Regulatory year	Local resident	(%)	Nonlocal resident	(%)	Nonresident	(%)
1991–1992						
Fall 1991	3	(7)	3	(7)	17	(41)
Spring 1992	2	(5)	0	(0)	16	(39)
Total	5	(12)	3	(7)	33	(80)
1992–1993						
Fall 1992	2	(5)	4	(10)	20	(50)
Spring 1993	1	(3)	4	(10)	9	(23)
Total	3	(8)	8	(20)	29	(73)
1993–1994						
Fall 1993	1	(3)	3	(1)	8	(27)
Spring 1994	0	(0)	5	(16)	13	(43)
Total	1	(3)	8	(27)	21	(70)
1994–1995						
Fall 1994	1	(4)	1	(4)	9	(32)
Spring 1995	2	(7)	0	(0)	15	(54)
Total	3	(11)	1	(4)	24	(86)
1995–1996						
Fall 1995	1	(3)	0	(0)	12	(39)
Spring 1996	2	(6)	3	(10)	13	(42)
Total	3	(10)	3	(10)	25	(81)
1996–1997						
Fall 1996	1	(3)	6	(16)	19	(50)
Spring 1997	1	(3)	2	(5)	9	(24)
Total	2	(5)	8	(21)	28	(74)
1997–1998						
Fall 1997	1	(4)	4	(15)	13	(48)
Spring 1998	0	(0)	0	(0)	9	(33)
Total	1	(4)	4	(15)	22	(81)
1998–1999						
Fall 1998	2	(6)	5	(14)	14	(40)
Spring 1999	0	(0)	2	(6)	12	(34)
Total	2	(6)	7	(20)	26	(74)
1999–2000						
Fall 1999	2	(6)	1	(3)	15	(49)
Spring 2000	0	(0)	1	(3)	12	(39)
Total	2	(6)	2	(6)	27	(88)

Table 4 Unit 5 transport modes used by successful brown bear hunters, 1991–1999

Regulatory year	Plane	(%)	Boat	(%)	ORV–wheeler	(%)	Highway vehicle	(%)	Foot	(%)	Other	(%)
1991–1992	22	(54)	9	(22)	4	(10)	0	(0)	2	(5)	4	(10)
1992–1993	22	(55)	10	(25)	0	(0)	4	(10)	3	(8)	1	(3)
1993–1993	19	(63)	7	(23)	0	(0)	0	(0)	4	(13)	0	(0)
1994–1995	16	(57)	6	(21)	0	(0)	1	(4)	4	(14)	1	(4)
1995–1996	23	(74)	4	(13)	0	(0)	2	(6)	1	(3)	1	(3)
1996–1997	30	(79)	7	(18)	0	(0)	1	(3)	0	(0)	0	(0)
1997–1998	17	(63)	7	(26)	1	(4)	2	(7)	0	(0)	0	(0)
1998–1999	25	(72)	4	(11)	1	(3)	4	(11)	1	(3)	0	(0)
1999–2000	11	(35)	11	(35)	6	(20)	3	(10)	0	(0)	0	(0)

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

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

GEOGRAPHIC DESCRIPTION: Prince William Sound and North Gulf Coast

BACKGROUND

Brown bears inhabit most of Unit 6, with the exception of islands and mainland of western Unit 6D and Middleton Island in the Gulf of Alaska. Brown bears are common on the mainland east of Columbia Glacier to Icy Bay and on Hinchinbrook, Montague, Hawkins, and Kayak Islands. Distribution in Unit 6D appears unchanged from that observed by Heller (1910). Brown bear numbers increased during the mid-to-late 1990s in Unit 6. The bear population on Montague Island is recovering from excessive harvest that occurred during the 1970s and early 1980s.

Harvest is monitored by mandatory sealing that began in 1961. Total annual harvest increased substantially in the late 1980s and continued at a high level through 1992–1993. Average annual kill during regulatory years 1961–1962 through 1986–1987 was 32 bears (range = 14–63). During 1987–1988 through 1991–1992, the average yearly harvest was 50 bears (range = 40–60). Most of the increased harvest was in Unit 6D, probably resulting in a population decline. Because of seasonal restrictions established to reduce harvest, the average harvest in Unit 6 declined to 35 bears (range = 22-48) from 1992–1993 through 1997–1998.

The Board of Game changed the bag limit for brown bears in Units 6A, 6B, and 6C from 1 bear/4 years to 1 bear/year beginning in 1997 for resident hunters only. This was in response to low moose calf survival in Unit 6B and increasing bear numbers in these units.

Logging threatens brown bear abundance and distribution in Unit 6A. Extensive clearcutting of old-growth timber on private and state land is in progress between Icy Bay and Cape Yakataga. Old-growth stands are important habitat for coastal bears (Schoen 1990, Schoen and Beier 1990, Schoen et al. 1986). Logging also provides access roads, increases human activity, and stimulates developments that increase bear-human interactions that lead to increased brown bear mortality (McLellan and Shackleton 1988, Smith and VanDaele 1989). The proposed Carbon Mountain logging road would increase human access to currently remote backcountry in Units 6A and 6B. The Exxon Valdez Oil Spill (EVOS) Trustee Council has recently acquired or protected most lands scheduled for timber harvest in Unit 6D, thus removing the threat of continued, large-scale habitat loss in Prince William Sound (PWS).

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Maintain a brown bear population capable of sustaining a minimum annual harvest of 35 bears to include a minimum of 60% males, with a minimum average skull size of 23 inches.

METHODS

Griese (1991) established baseline estimates of brown bear numbers and density in Unit 6. Bear habitat was defined as non-glaciated land below 3000 ft elevation, quantified by harvest areas (major drainages or other gross geographical characteristic), and summed for each unit. Griese (1991) estimated bear density and numbers within harvest areas using den and track surveys and local knowledge. Densities were extrapolated to entire harvest areas. Bear populations for each harvest area are updated annually, based on the trend and harvest from the previous season, incidental observations, and input from local hunters and guides. A spreadsheet is used to update densities and calculate annual allowable harvest for each of 11 harvest areas (Nowlin 1995).

Annual allowable harvest (AAH) of all bears was estimated as 5% of the total population (Griese 1991, Nowlin 1993). AAH of females greater than 2 years old was estimated as 2% of the population. Because reproduction and survival data were not available for Unit 6, this rate was arbitrarily set at a level slightly more conservative than the 5.7% and 2.5% recommended for ideal conditions (Miller 1988, 1990).

I estimated the total harvest by summing reported harvest and estimated illegal kill. The reported harvest included all bears that were sealed after being taken by hunters or killed for other reasons, such as defense of life or property. Information collected included sex, age, and skull size of the bear, date and location of kill, hunter residency, number of days hunted, and method of transportation. Unsuccessful hunters were not required to report. I estimated the illegal kill based on previous years estimates (Nowlin 1998) and anecdotal information.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

The estimated brown bear population in Unit 6 was 850 bears with an increasing trend (Table 1). The greatest numbers were in Units 6D (≅310) and 6A (≅290), and followed by Units 6B (≅140) and 6C (≅120). In Unit 6D the population had declined by 1991 to about 300 bears because of excessive harvests. Lower harvest (except for 1997-1998) and high productivity in Unit 6D through 1999–2000 resulted in an increase in population (Table 1).

Montague Island in Unit 6D had an increasing population of about 60 bears (Table 1). The fall hunting season was closed in 1989 and in the spring season in 1994. It is particularly sensitive to overharvest because the population is small and isolated from the mainland. Historically, it probably had much higher numbers. Overharvest that began in the 1970s reduced the population (Griese 1990) and threatened its viability. Inbreeding in small, isolated populations, such as Montague Island, probably reduces genetic variability and may increase the danger of extinction (Mills and Smouse 1994, Randi et al. 1994). However, genetic isolation is not complete on Montague. During the last decade 6–8 brown bears were transported from Valdez and Cordova

and released on Montague Island. In addition, anecdotal evidence suggests that bears may occasionally swim from Hinchinbrook Island to Montague.

Density estimates for Unit 6 compared favorably to Miller's (1993) estimates from elsewhere in south coastal Alaska. Hinchinbrook Island was within a high-density range (>175 bears/1000 km^2) that included Kodiak Island, much of the Alaska Peninsula, and parts of Southeast Alaska. Montague Island, eastern PWS, and the north gulf coast had midrange density (40–175 bears/1000 km^2), consistent with contiguous coastal habitat to the southeast and with the northern Alaska Peninsula. Western PWS was low density (<40 bears/1000 km^2), similar to the adjacent Kenai Peninsula.

MORTALITY

Harvest

Season and Bag Limit. The hunting season for all hunters in Units 6A, 6B, and 6C was 1 September to 31 May. The Unit 6D season, except Montague Island, was 15 October to 15 May for all hunters. Before 1997–1998 the bag limit was 1 bear every 4 regulatory years. This was changed to 1 bear every regulatory year for resident hunters in Units 6A, 6B, and 6C in 1997, and the season for Unit 6D was changed to 15 October to 25 May. Taking cubs (bears ≤ 2 years old) or a female accompanied by cubs was prohibited. There was no open season on Montague Island.

Hunter Harvest. Reported kill during 1998–1999 and 1999–2000 for Unit 6 was 61 and 48, respectively (Table 1). Most of the harvest occurred in Units 6A (26 and 21 bears per year), and 6D (19 and 18 bears per year).

During 1998–1999 males were 71% of the reported kill, and in 1999–2000 males were 69%, of the reported kill (Table 2). Mean skull sizes among males were 23 and 24 inches, similar to mean skull sizes from the past 5 years. (Table 3).

Reported kill of all bears was ≤ AAH in 5 of 11 harvest areas during 1998–1999 and 8 of 11 during 1999–2000 (Table 1). Reported kill of females >2 years old was ≤ AAH in all harvest areas during both years except on Hinchinbrook Island in 1998. AAH in the Rude River-Ellamar area of Unit 6D was exceeded during the last 3 years (Table 1) because of increasing popularity of bear hunting in PWS and successful guiding operations. This raises concerns for overharvest. However, average skull size (23 inches) and age (5 years) of male bears in the area during the last 15 years has remained unchanged compared to the harvest of the last 3 years. A continued increase in harvest in the Rude River-Ellamar area may require a regulatory change.

The change in bag limit for resident hunters has had little effect on bear harvest in Unit 6C. Beginning in 1997 there was a shift toward more local hunters and fewer non-local hunters in Unit 6C, but harvest remained average. Local hunter interest resulted in a record high harvest during 1998 in Unit 6B, and an increase in harvest in Unit 6A (Table 4). Allowable harvest was exceeded in the Cape Suckling-Katalla area of Unit 6A during both regulatory years (Table 1). This area is more accessible to local bear and moose hunters than the remainder of 6A, where bear harvest did not substantially increase.

Hunter Residency. Nonresidents harvested the majority of brown bears in Unit 6 during 1998–1999 (49%) and 1999–2000 (54%) (Table 4). In Unit 6C local residents, hunters took the highest proportion of the harvest.

Harvest Chronology. Peak brown bear harvests occurred during September and May each year in Unit 6 (Table 5). Seasonal chronology varies by unit, with most bears taken in the fall in Unit 6A, a tendency toward higher fall harvest in Units 6B and 6C, and higher spring harvest in Unit 6D because of the later fall opening date.

Transport Methods. Airplanes were the most important method of transportation overall in Unit 6 (Table 6). In Unit 6C, highway vehicles and boats predominated because of road and boat launch access. In Unit 6D, boats and aircraft were important because of the sheltered waters of PWS. These patterns were typical of the past 5 years.

Other Mortality

Nonhunting and estimated illegal kill totaled 11 and 12 bears in 1998–1999 and 1999–2000, respectively (Table 2). This was similar to the last reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

As clearcut logging continues in Unit 6A, brown bear habitat quality will decline, access will improve, and nonhunting mortality will probably increase. The Alaska Mental Health Trust continues to log timber left by previous operators as buffers and wildlife habitat in eastern Unit 6A. The University of Alaska logging operation is moving into the Yakataga and Duktoth River Valleys north of Cape Yakataga. Neither state agency is required to protect brown bear habitat.

CONCLUSIONS AND RECOMMENDATIONS

We achieved our management objectives for brown bears in Unit 6. We maintained a population capable of sustaining a harvest of 35 bears and had a minimum of 60% males in the kill with an average skull size of at least 23 inches.

Brown bear numbers were increasing during the reporting period despite exceeding 5% AAH in some hunt areas. We will continue to monitor the effect of the 1-bear/year bag limit in Units 6A–C. The bag limit was changed without scientific evidence that brown bears were contributing significantly to moose calf mortality, although bears are often seen feeding on calves. Harvest in eastern Unit 6D may require regulatory changes if the increasing trend continues.

Brown bear den and track surveys should be resumed in areas of concern, including Montague Island and eastern Unit 6D.

LITERATURE CITED

GRIESE, H.J. 1990. Unit 6 brown bear survey-inventory report. Pages 27–83 *in* S.O. Morgan, ed. Annual report of survey-inventory activities. Part V. Brown bear. Vol. XX. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Progress Report Project W-23-2, Study 4.0. Juneau. 189pp.

———. 1991. Unit 6 brown bear survey-inventory performance report. Pages 33–47 *in* S.M. Abbott, ed. Annual performance report of survey-inventory activities. Part V. Brown Bear. Vol. XXII. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Progress Report Project W-23-4. Study 4.0. Juneau. 271pp.

HELLER, E. 1910. Mammals of the 1908 Alexander Alaska expedition, with descriptions of the localities visited and notes on the flora of the Prince William Sound region. University of California. Publication 5(11):321–360.

MCLELLAN, B.N. AND D.M. SHACKLETON. 1988. Grizzly bears and resource extraction industries: effects of roads on behavior, habitat use and demography. Journal of Applied Ecology. 25:451–460.

MILLER, S.D. 1988. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Final Report Project W-22-6, Job 4.21. Juneau. 151pp.

———. 1990. Population management of bears in North America. International Conference on Bear Research and Management. 8:357–373.

———. 1993. Brown bears in Alaska: a statewide management overview. Wildlife Technical Bulletin Nr. 11. Alaska Department of Fish and Game, Juneau. 40 pp.

MILLS, L.S. AND P.E. SMOUSE. 1994. Demographic consequences of inbreeding in remnant populations. American. Naturalist. 144:412–431.

NOWLIN, R.A. 1993. Unit 6 brown bear management report of survey-inventory activities. Pages 34–48 *in* S.M. Abbott, ed. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. W-23-4 and W-23-5. Study 4.0. Juneau. 283 pp.

———. 1995. Unit 6 brown bear management report of survey-inventory activities. Pages 35–57 *in* M.V. Hicks, ed. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. W-24-1 and W-24-2. Study 4.0. Juneau. 303 pp.

———. 1998. Unit 6 brown bear management report of survey-inventory activities. Pages 32–54 *in* M.V. Hicks, ed. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. W-24-3 and W-24-4. Study 4.0. Juneau. 270 pp.

RANDI, E. L. GENTILE, G. BOSCAGLI, D. HUBER, AND H.U. ROTH. 1994. Mitochondrial DNA sequence divergence among some west European brown bear (*Usus arctos L*) populations. Lessons for conservation. *Heredity*. 73:480–489.

SCHOEN, J.W. 1990. Bear habitat management: a review and future perspective. International Conference on Bear Research and Management. 8:143–154.

———. AND L.R. BEIER. 1990. Brown bear habitat preferences and brown bear-logging relationships in southeast Alaska. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Final Report. Project W-22-6, Job 4.17. Juneau. 27pp.

———, ———, J.W. LENTFER, AND L.J. JOHNSON. 1986. Denning ecology of brown bears on Admiralty and Chichagof Islands. International Conference on Bear Research and Management. 7:293–304.

SMITH, R.B. AND L.J. VAN DAELE. 1989. Impacts of hydroelectric development on brown bears, Kodiak Island, Alaska. International Conference on Bear Research and Management. 8:93–103.

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Table 1 Unit 6 brown bear estimated population, annual allowable harvest and reported harvest, 1995–1999

Unit	Area	Regulatory year	Density (bears/ 1000 km^2)	Nr. bears	Annual allowable harvest (all bears)	Reported harvest (all bears)	Annual allowable harvest (F>2 yr old)	Reported harvest (F>2 yr old)
6A	Icy Bay-Cape Suckling	1995–1996	93	172	9	7	3	0
		1996–1997	95	176	9	7	4	3
		1997–1998	98	181	9	11	4	3
		1998–1999	97	180	9	10	4	1
		1999–2000	97	180	9	11	4	1
	Cape Suckling-Katalla	1995–1996	67	93	5	6	2	1
		1996–1997	69	96	5	4	2	1
		1997–1998	72	99	5	4	2	1
		1998–1999	75	104	5	16	2	2
		1999–2000	73	100	5	10	2	2
	Kayak Island	1995–1996	78	7	0	0	0	0
		1996–1997	78	7	0	0	0	0
		1997–1998	78	7	0	1	0	0
		1998–1999	78	7	0	0	0	0
		1999–2000	78	7	0	0	0	0
6A Total		1995–1996	82	271	14	13	5	1
		1996–1997	84	278	14	11	6	4
		1997–1998	87	287	14	16	6	4
		1998–1999	88	290	15	26	6	3
		1999–2000	87	287	14	21	6	3

Table 1 Continued

Unit	Area	Regulatory year	Density (bears/ 1000 km^2)	Nr. bears	Annual allowable harvest (all bears)	Reported harvest (all bears)	Annual allowable harvest (F>2 yr old)	Reported harvest (F>2 yr old)
6B		1995–1996	120	129	6	5	3	2
		1996–1997	124	134	7	3	3	1
		1997–1998	129	139	7	6	3	0
		1998–1999	134	144	7	12	3	0
		1999–2000	129	139	7	3	3	1
6C		1995–1996	101	112	6	5	2	3
		1996–1997	103	115	6	6	2	1
		1997–1998	108	120	6	6	2	1
		1998–1999	108	120	6	4	2	1
		1999–2000	108	120	6	6	2	1
6D	Rude River-Ellamar	1995–1996	63	78	4	6	2	0
		1996–1997	63	78	4	4	2	1
		1997–1998	64	80	4	16	2	3
		1998–1999	63	78	4	6	2	1
		1999–2000	63	78	4	12	2	2
	Valdez Arm	1995–1996	39	36	2	1	1	0
		1996–1997	39	36	2	1	1	0
		1997–1998	39	36	2	2	1	0
		1998–1999	41	38	2	3	1	0
		1999–2000	41	38	2	1	1	0

Table 1 Continued

Unit	Area	Regulatory year	Density (bears/ 1000 km^2)	Nr. bears	Annual allowable harvest (all bears)	Reported harvest (all bears)	Annual allowable harvest (F>2 yr old)	Reported harvest (F>2 yr old)
6D	Western PWS	1995–1996		17	1	0	0	0
		1996–1997		17	1	0	0	0
		1997–1998		17	1	0	0	0
		1998–1999	5	17	1	0	0	0
		1999–2000	5	17	1	0	0	0
	Hinchinbrook Island	1995–1996	224	90	4	4	2	1
		1996–1997	224	90	4	5	2	2
		1997–1998	232	93	5	6	2	2
		1998–1999	244	97	5	9	2	3
		1999–2000	247	99	5	4	2	1
	Hawkins Island Island	1995–1996	98	17	1	0	0	0
		1996–1997	104	18	1	0	0	0
		1997–1998	110	19	1	2	0	0
		1998–1999	110	19	1	0	0	0
		1999–2000	110	19	1	0	0	0
	Montague Island	1995–1996	60	45	2	0	1	0
		1996–1997	63	48	2	0	1	0
		1997–1998	68	52	3	0	1	0
		1998–1999	75	57	3	1	1	0
		1999–2000	79	60	4	1	1	0

Table 1 Continued

Unit	Area	Regulatory year	Density (bears/ 1000 km^2)	Nr. bears	Annual allowable harvest (all bears)	Reported harvest (all bears)	Annual allowable harvest (F>2 yr old)	Reported harvest (F>2 yr old)
6D Total		1995–1996	-	282	14	11	6	1
		1996–1997	-	285	14	10	6	3
		1997–1998	-	295	15	26	6	5
		1998–1999	-	305	15	19	6	4
		1999–2000	-	309	15	18	6	3
Unit 6		1995–1996	-	794	40	34	16	7
Total		1996–1997	-	812	41	30	16	9
		1997–1998	-	840	42	54	17	10
		1998–1999	-	859	43	61	17	8
		1999–2000	-	854	43	48	17	8

Table 2 Unit 6 brown bear harvest, 1995–1999

Unit	Regulatory year	Reported: Hunter kill M	F	(%)	Unk.	Total	Reported: Nonhunting M	F	Unk.	Estimated illegal kill	Total estimated kill: M	(%)	F	(%)	Unk	Total
6A	1995–1996															
	Fall 95	5	2	(29)	0	7	0	0	0	1	5	(71)	2	(29)	1	8
	Spring 96	6	0	(0)	0	6	0	0	0	1	6	(100)	0	(0)	1	7
	Total	11	2	(15)	0	13	0	0	0	2	11	(85)	2	(15)	2	15
	1996–1997															
	Fall 96	1	5	(83)	0	6	0	0	0	1	1	(17)	5	(83)	1	7
	Spring 97	5	0	(0)	0	5	0	0	0	1	5	(100)	0	(0)	1	6
	Total	6	5	(45)	0	11	0	0	0	2	6	(55)	5	(45)	2	13
	1997–1998															
	Fall 97	7	6	(46)	0	13	1	0	0	1	8	(57)	6	(43)	1	15
	Spring 98	2	0	(0)	0	2	0	0	0	1	2	(100)	0	(0)	1	3
	Total	9	6	(40)	0	15	1	0	0	2	10	(63)	6	(38)	2	18
	1998–1999															
	Fall 98	11	7	(39)	0	18	0	0	0	1	11	(61)	7	(39)	1	18
	Spring 99	7	0	(0)	0	7	1	0	0	0	8	(100)	0	(0)	0	8
	Total	18	7	(28)	0	25	1	00	0	1	19	(73)	7	(27)	1	26
	1999–2000															
	Fall 99	12	4	(25)	0	16	1	0	0	1	13	(76)	4	(24)	1	18
	Spring 00	2	2	(50)	0	4	0	0	0	1	2	(50)	2	(50)	1	5
	Total	14	6	(30)	0	20	1	0	0	2	15	(71)	6	(29)	2	23

Table 2 Continued

Unit	Regulatory year	Reported								Estimated illegal kill	Total estimated kill					
		Hunter kill					Nonhunting									
		M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6B	1995–1996															
	Fall 95	1	2	(67)	0	3	0	0	0	1	1	(33)	2	(67)	1	4
	Spring 96	2	1	(33)	0	3	0	0	0	1	2	(67)	1	(33)	1	4
	Total	3	3	(50)	0	6	0	0	0	2	3	(50)	3	(50)	2	8
	1996–1997															
	Fall 96	2	1	(33)	0	3	0	0	0	1	2	(67)	1	(33)	1	4
	Spring 97	0	0	(0)	0	0	0	0	0	1	0	(0)	0	(0)	1	1
	Total	2	1	(33)	0	3	0	0	0	2	2	(67)	1	(33)	2	5
	1997–1998															
	Fall 97	2	1	(33)	0	3	0	0	0	1	2	(67)	1	(33)	1	4
	Spring 98	3	0	(0)	0	3	0	0	0	1	3	(100)	0	(0)	1	4
	Total	5	1	(17)	0	6	0	0	0	2	5	(83)	1	(17)	2	8
	1998–1999															
	Fall 98	4	3	(43)	0	7	0	0	0	1	4	(57)	3	(43)	1	8
	Spring 99	4	1	(20)	0	5	0	0	0	1	4	(80)	1	(20)	1	6
	Total	8	4	(33)	0	12	0	0	0	2	8	(67)	4	(33)	2	14
	1999–2000															
	Fall 99	0	1	(100)	0	1	0	0	0	1	0	(0)	1	(100)	1	2
	Spring 00	2	0	(0)	0	2	0	0	0	1	2	(100)	0	(0)	1	3
	Total	2	1	(33)	0	3	0	0	0	2	2	(67)	1	(33)	2	5

Table 2 Continued

Unit	Regulatory year	Reported								Estimated illegal kill	Total estimated kill					
		Hunter kill					Nonhunting									
		M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6C	1995–1996															
	Fall 95	1	2	(67)	0	3	0	0	0	1	1	(33)	2	(67)	1	4
	Spring 96	1	1	(50)	0	2	0	0	0	1	1	(50)	1	(50)	1	3
	Total	2	3	(60)	0	5	0	0	0	2	2	(40)	3	(60)	2	7
	1996–1997															
	Fall 96	2	0	(0)	0	2	1	0	0	1	3	(100)	0	(0)	1	4
	Spring 97	2	1	(33)	0	3	0	0	0	1	2	(67)	1	(33)	1	4
	Total	4	1	(20)	0	5	1	0	0	2	5	(83)	1	(17)	2	8
	1997–1998															
	Fall 97	3	1	(25)	0	4	0	1	0	1	3	(60)	2	(40)	1	6
	Spring 98	1	0	(0)	0	1	0	0	0	1	1	(100)	0	(0)	1	2
	Total	4	1	(20)	0	5	0	1	0	2	4	(67)	2	(33)	2	8
	1998–1999															
	Fall 98	3	1	(25)	0	4	0	0	0	1	3	(75)	1	(25)	1	5
	Spring 99	0	0	(0)	0	0	0	0	0	1	0	(0)	0	(0)	1	1
	Total	3	1	(25)	0	4	0	0	0	2	3	(75)	1	(25)	2	6
	1999–2000															
	Fall 99	2	1	(30)	0	3	0	0	0	1	2	(67)	1	(33)	1	4
	Spring 00	3	0	(0)	0	3	0	0	0	1	3	(100)	0	(0)	1	4
	Total	5	1	(17)	0	6	0	0	0	2	5	(83)	1	(17)	2	8

Table 2 Continued

Unit	Regulatory year	Reported								Estimated illegal kill	Total estimated kill					
		Hunter kill					Nonhunting									
		M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6D	1995–1996															
	Fall 95	2	0	(0)	0	2	0	0	0	1	2	(100)	0	(0)	1	3
	Spring 96	7	2	(22)	0	9	0	0	0	2	7	(78)	2	(22)	2	11
	Total	9	2	(18)	0	11	0	0	0	3	9	(82)	2	(18)	3	14
	1996–1997															
	Fall 96	5	3	(38)	0	8	0	0	0	2	5	(63)	3	(38)	2	10
	Spring 97	0	1	(100)	0	1	1	0	0	1	1	(50)	1	(50)	1	3
	Total	5	4	(44)	0	9	1	0	0	3	6	(60)	4	(40)	3	13
	1997–1998															
	Fall 97	2	2	(50)	0	4	3	0	0	1	5	(71)	2	(29)	1	8
	Spring 98	15	4	(21)	0	19	0	0	0	1	15	(79)	4	(21)	1	20
	Total	17	6	(26)	0	23	3	0	0	2	20	(77)	6	(23)	2	28
	1998–1999															
	Fall 98	4	3	(43)	0	7	0	0	0	4	4	(57)	3	(43)	4	11
	Spring 99	9	1	(10)	0	10	1	1	0	0	10	(83)	2	(17)	0	12
	Total	13	4	(24)	0	17	1	1	0	4	14	(74)	5	(26)	4	23
	1999–2000															
	Fall 99	2	3	(60)	0	6	1	0	0	4	3	(50)	3	(50)	4	10
	Spring 00	8	3	(27)	0	11	0	1	0	0	8	(67)	4	(33)	0	12
	Total	10	6	(38)	0	16	1	1	0	4	11	(61)	7	(39)	4	22

Table 2 Continued

Unit	Regulatory year	Reported								Estimated illegal kill	Total estimated kill					
		Hunter kill					Nonhunting									
		M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
Unit 6 Total	1995–1996															
	Fall 95	9	6	(40)	0	15	0	0	0	4	9	(60)	6	(40)	4	19
	Spring 96	16	4	(20)	0	20	0	0	0	5	16	(80)	4	(20)	5	25
	Total	25	10	(29)	0	35	0	0	0	9	25	(71)	10	(29)	9	44
	1996–1997															
	Fall 96	10	9	(47)	0	19	1	0	0	5	11	(55)	9	(45)	5	25
	Spring 97	7	2	(22)	0	9	1	0	0	4	8	(80)	2	(20)	4	14
	Total	17	11	(39)	0	28	2	0	0	9	19	(63)	11	(37)	9	39
	1997–1998															
	Fall 97	14	10	(42)	0	24	4	1	0	4	18	(62)	11	(38)	4	33
	Spring 98	21	4	(16)	0	25	0	0	0	4	21	(84)	4	(16)	4	29
	Total	35	14	(29)	0	49	4	1	0	8	39	(72)	15	(28)	8	62
	1998–1999															
	Fall 98	22	14	(39)	0	36	0	0	0	6	22	(61)	14	(39)	6	42
	Spring 99	20	2	(9)	0	22	2	1	0	2	22	(88)	3	(12)	2	27
	Total	42	16	(28)	0	58	2	1	0	8	44	(72)	17	(28)	8	69
	1999–2000															
	Fall 99	16	9	(36)	0	25	2	0	0	7	18	(67)	9	(33)	7	34
	Spring 00	15	5	(25)	0	20	0	1	0	3	15	(71)	6	(29)	3	24
	Total	31	14	(31)	0	45	2	1	0	10	33	(69)	15	(31)	10	58

Table 3 Unit 6 brown bear mean skull size and age, 1995–1999

		Males				Females			
Unit	Year	Skull size	*n*	Age	*n*	Skull size	*n*	Age	*n*
6A	1995–1996	24	11	6	10	22	2	4	2
	1996–1997	23	6	6	6	22	5	4	5
	1997–1998	24	9	6	9	21	6	6	6
	1998–1999	23	16	5	18	20	6	4	7
	1999–2000	23	13	6	12	21	7	4	4
6B	1995–1996	24	2	4	2	21	3	4	3
	1996–1997	22	2	3	2	23	1	15	1
	1997–1998	23	5	4	5	19	1	2	1
	1998–1999	24	8	9	8	19	3	2	4
	1999–2000	28	2	--	0	20	1	3	1
6C	1995–1996	21	2	2	2	21	3	6	3
	1996–1997	25	3	7	3	22	1	5	1
	1997–1998	25	4	5	4	21	1	2	1
	1998–1999	23	3	4	3	21	1	4	1
	1999–2000	22	4	2	2	22	1	16	1
6D	1995–1996	23	9	6	9	21	2	7	2
	1996–1997	22	5	5	5	20	3	7	4
	1997–1998	22	17	5	17	21	5	8	5
	1998–1999	22	12	4	13	22	4	6	4
	1999–2000	24	11	3	3	21	6	5	3
Unit 6 Total	1995–1996	23	25	6	23	21	10	5	10
	1996–1997	23	16	5	16	21	10	6	11
	1997–1998	23	35	5	35	21	13	6	13
	1998–1999	23	39	5	42	20	14	4	16
	1999–2000	24	30	3	17	21	15	7	9

Table 4 Unit 6 brown bear successful hunter residency, 1995–1999

Unit	Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Residency unknown	(%)	Total Successful hunters
6A	1995–1996	1	(9)	0	(0)	10	(91)	0	(0)	11
	1996–1997	0	(0)	0	(0)	11	(100)	0	(0)	11
	1997–1998	5	(31)	1	(6)	10	(63)	0	(0)	16
	1998–1999	4	(15)	3	(12)	19	(73)	0	(0)	26
	1999–2000	3	(14)	4	(19)	14	(67)	0	(0)	21
6B	1995–1996	2	(33)	1	(17)	3	(50)	0	(0)	5
	1996–1997	1	(33)	2	(67)	0	(0)	0	(0)	3
	1997–1998	2	(33)	2	(33)	2	(33)	0	(0)	6
	1998–1999	6	(50)	3	(25)	3	(25)	0	(0)	12
	1999–2000	1	(33)	0	(0)	2	(67)	0	(0)	3
6C	1995–1996	3	(60)	0	(0)	2	(40)	0	(0)	5
	1996–1997	2	(40)	1	(40)	2	(20)	0	(0)	5
	1997–1998	4	(67)	1	(0)	1	(20)	0	(0)	6
	1998–1999	4	(100)	0	(0)	0	(0)	0	(0)	4
	1999–2000	5	(83)	1	(17)	0	(0)	0	(0)	6
6D	1995–1996	2	(18)	5	(45)	4	(36)	0	(0)	11
	1996–1997	1	(9)	3	(27)	6	(55)	1	(9)	11
	1997–1998	4	(15)	6	(22)	16	(59)	1	(4)	27
	1998–1999	4	(21)	7	(37)	8	(42)	0	(0)	19
	1999–2000	2	(11)	6	(33)	10	(56)	0	(0)	18
Unit 6 Total	1995–1996	8	(24)	6	(18)	18	(58)	0	(0)	33
	1996–1997	4	(13)	6	(20)	19	(63)	1	(3)	30
	1997–1998	15	(27)	10	(18)	29	(53)	1	(2)	49
	1998–1999	18	(30)	13	(21)	30	(49)	0	(0)	61
	1999–2000	11	(23)	11	(23)	26	(54)	0	(0)	48

Table 5 Unit 6 brown bear harvest chronology by percent, 1995–1999

Unit	Regulatory year	Harvest periods										
		September		October		November		April		May		
		1–15	16–30	1–15	16–31	1–15	16–30	1–15	16–30	1–15	16–31	*n*
6A	1995–1996	(36)	(18)	(9)	(0)	(0)	(0)	(0)	(9)	(18)	(9)	11
	1996–1997	(18)	(18)	(9)	(9)	(0)	(0)	(0)	(27)	(18)	(0)	11
	1997–1998	(27)	(27)	(27)	(7)	(0)	(0)	(0)	(0)	(7)	(7)	15
	1998–1999	(46)	(15)	(4)	(4)	(0)	(0)	(0)	(12)	(8)	(12)	26
	1999–2000	(29)	(24)	(29)	(0)	(0)	(0)	(0)	(10)	(5)	(5)	21
6B	1995–1996	(40)	(20)	(0)	(0)	(0)	(0)	(0)	(0)	(20)	(20)	5
	1996–1997	(33)	(33)	(33)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	3
	1997–1998	(17)	(0)	(33)	(0)	(0)	(0)	(0)	(0)	(17)	(33)	6
	1998–1999	(25)	(8)	(25)	(0)	(0)	(0)	(0)	(8)	(25)	(8)	12
	1999–2000	(0)	(33)	(0)	(0)	(0)	(0)	(0)	(67)	(0)	(0)	5
6C	1995–1996	(20)	(0)	(40)	(0)	(0)	(0)	(0)	(0)	(0)	(40)	5
	1996–1997	(25)	(0)	(0)	(0)	(0)	(0)	(0)	(25)	(0)	(50)	4
	1997–1998	(40)	(0)	(40)	(0)	(0)	(0)	(0)	(0)	(0)	(20)	5
	1998–1999	(25)	(25)	(25)	(0)	(0)	(25)	(0)	(0)	(0)	(0)	4
	1999–2000	(17)	(0)	(17)	(17)	(0)	(0)	(33)	(17)	(0)	(0)	6
6D	1995–1996	(0)	(0)	(0)	(9)	(9)	(0)	(0)	(9)	(64)	(9)	11
	1996–1997	(0)	(0)	(11)	(44)	(22)	(11)	(0)	(0)	(11)	(0)	9
	1997–1998	(0)	(0)	(4)	(13)	(0)	(0)	(0)	(0)	(35)	(48)	23
	1998–1999	(0)	(0)	(6)	(29)	(6)	(0)	(0)	(0)	(18)	(41)	17
	1999–2000	(0)	(0)	(6)	(22)	(6)	(0)	(0)	(0)	(28)	(39)	18
Unit 6 Total	1995–1996	(22)	(9)	(9)	(3)	(3)	(0)	(0)	(6)	(31)	(16)	32
	1996–1997	(15)	(11)	(11)	(19)	(7)	(4)	(0)	(15)	(11)	(7)	27
	1997–1998	(14)	(8)	(18)	(8)	(0)	(0)	(0)	(0)	(20)	(31)	49
	1998–1999	(27)	(10)	(10)	(10)	(2)	(2)	(0)	(7)	(14)	(19)	59
	1999–2000	(15)	(13)	(17)	(10)	(2)	(0)	(4)	(10)	(13)	(17)	48

Table 6 Unit 6 brown bear harvest percent by transport method, 1995–1999

Unit	Regulatory year	Percent of harvest								
		Airplane	Boat	Airboat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
6A	1995–1996	92	8	0	0	0	0	0	0	13
	1996–1997	100	0	0	0	0	0	0	0	11
	1997–1998	75	0	6	6	0	0	13	0	16
	1998–1999	81	4	0	12	0	0	0	4	26
	1999–2000	86	0	0	0	0	0	0	14	21
6B	1995–1996	67	17	0	0	0	0	17	0	6
	1996–1997	33	33	0	0	0	0	33	0	3
	1997–1998	67	0	0	17	0	0	17	0	6
	1998–1999	42	8	0	0	17	0	33	0	12
	1999–2000	67	0	0	0	0	0	33	0	3
6C	1995–1996	0	40	0	0	0	0	60	0	5
	1996–1997	0	60	0	0	0	0	20	20	5
	1997–1998	0	17	17	17	0	0	33	17	6
	1998–1999	0	25	0	0	0	0	75	0	4
	1999–2000	0	17	0	17	17	0	50	0	6
6D	1995–1996	27	73	0	0	0	0	0	0	11
	1996–1997	40	40	0	10	0	0	10	0	10
	1997–1998	19	69	0	0	4	0	0	8	26
	1998–1999	21	58	0	0	0	0	5	16	19
	1999–2000	72	22	0	0	6	0	0	0	18
Total	1995–1996	54	34	0	0	0	0	11	0	35
	1996–1997	55	28	0	3	0	0	10	3	29
	1997–1998	39	35	4	6	2	0	9	6	54
	1998–1999	49	23	0	5	3	0	13	7	61
	1999–2000	69	10	0	2	4	0	8	6	48

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNITS: 7 (3520 mi^2) and 15 (4876 mi^2)

GEOGRAPHIC DESCRIPTION: Kenai Peninsula

BACKGROUND

Brown bears are found throughout the remote lowland forests and intermountain valleys of the Kenai Peninsula, excluding coastal portions of Unit 7 and the eastern side of Kachemak Bay. Historical brown bear range remains occupied except in developed areas. Field observations and data analyses indicate brown bear densities are highest in the forested lowlands and subalpine areas west of the Kenai Mountains.

Seventy–one percent of the Kenai Peninsula is federal lands. The U.S. Forest Service (FS) (Chugach National Forest, ca. 2000 mi^2) together with the National Park Service (NPS) (Kenai Fjords National Park, ca. 885 mi^2) are the principle landowners in Unit 7. In Unit 15 the U.S. Fish and Wildlife Service (FWS) (Kenai National Wildlife Refuge) is the primary landowner responsible for management of 3062 mi^2. Ownership of the remaining 29% of the Kenai varies between municipal, state, Native Corporation, and private lands.

Brown bears were first given game status in 1902 (Miller 1990) with liberal seasons and bag limits. For example, in 1937–38 the season was 1 September to 20 June, and the bag limit was 2 brown bears for coastal areas in Southcentral and all of southeastern Alaska. The rest of the state did not have a closed season and there was no bag limit. At the time of statehood, the bag limit was 1 brown bear on the Kenai. The bag limit was further reduced in 1967 from 1 bear per year to 1 bear every 4 years. Cubs and sows with cubs were protected in the early 1970s. The season dates have ranged from 20 to 45 days. In 1978 a 10-day spring season was opened for Unit 15 and extended to the current 15-day season (10–15 May) in 1980. The Unit 7 spring season opened in 1980 concurrently with Unit 15.

More restrictive regulations were needed beginning in 1989 with a reduction of the fall season by 14 days, creating a fall opening date of 15 September. This change was to reduce the incidental take of brown bears by moose hunters. During the spring 1994 Board of Game meeting, the board shortened and moved the fall hunting season to 1–25 October in response to continued high harvests. The board again addressed the bear season in 1997 and authorized the department to operate the hunts as registration permit hunts. The season dates were also changed to 15–31 October. The fall seasons from 1995–1998 and the spring of 1999 were closed by

emergency order because additional harvests would have exceeded management objectives. Because of these closures, we determined that only 1 season would be allowable on the Kenai to stay within management objectives. The Board of Game authorized a fall-only registration hunt beginning in the fall of 1999.

In 1984 representatives of the FWS, FS, and Alaska Department of Fish and Game (ADF&G) formed an Interagency Brown Bear Study Team (IBBST) to discuss brown bear management and research needs on the Kenai Peninsula and to coordinate joint studies. The NPS joined this effort in 1990. This group has coordinated many projects that have increased our understanding of brown bear ecology. The IBBST coordinated a baseline inventory (Bevins *et al.* 1984, Risdahl *et al.* 1986) of salmon streams and known high-use brown bear areas and performed detailed ground and habitat surveys (Schloeder *et al.* 1987 and Jacobs *et al.* 1988).

A cumulative effects model was developed to identify brown bear habitat on the Kenai at risk to human activities (Suring *et al.* 1998). In 1995 ADF&G initiated a research project in cooperation with the other members of the IBBST to evaluate the cumulative effects model, assess brown bear habitat, estimate survival of bears and ultimately model the brown bear population on the Kenai (Schwartz and Arthur 1996, Schwartz *et al.* 1999).

More recently the IBBST has focused research on the dietary requirements of Kenai Peninsula brown bears (Jacoby *et. al.* 1999, Hilderbrand *et al.* 1999a), the importance of marine nitrogen in the ecosystem (Hilderbrand *et al.*1999b) and the physiological effects of diet on reproduction (Hilderbrand *et al.* 2000).

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Maintain a population of 250 brown bears with a sex and age structure that will sustain a harvest of less than 40 % females (3-year average of 6 female units).

METHODS

Cost-effective survey techniques to determine brown bear population size over large forested areas have not been developed and tested. We derived a population estimate for the Kenai by combining results from a habitat-based model and a density estimate using expert interpretation. (Del Frate, 1993) By comparing estimates of bear density to other parts of Alaska, we could approximate brown bear density on the Kenai. Miller (pers commun) suggested that the density of brown bears on the Kenai was probably lower than the 27.1 bears per 1000 km^2 (7.0 bears per 100 mi^2) he reported for his middle Susitna Study Area (1987). Consequently, we estimated the bear density on the Kenai to be 20 bears per 1000 km^2 (5.2 bears per 100 mi^2), and we calculated the suitable habitat to be 13,848 km^2 (5347 mi^2). We derived a brown bear population estimate for Units 7 and 15 by multiplying the suitable habitat by the density estimate.

In the spring of 1995, the department drafted a Brown Bear Management Protocol described in Del Frate (1999). This protocol described the desired management strategies to achieve management objectives. This protocol is evaluated and updated annually with management

recommendations for each calendar year. Those recommendations are listed below for this reporting period.

The Department initiated a strategic planning project in the spring of 1999 with the formation of an Interagency Planning Group charged with formalizing the process and recommending stakeholder candidates. Stakeholders were ultimately appointed by the Kenai Peninsula Borough Mayor, the commissioner of ADF&G and a special assistant to the Secretary of the Interior. Stakeholders were selected to represent a diverse cross-section of the public. This group met 13 times beginning in October 1999 with the following objectives:

- To review the available biological and social science information on Kenai Peninsula brown bears, to evaluate all relevant aspects of bear management that may affect the Peninsula's bear population, and to prepare, by Spring 2000, specific recommendations regarding the management and conservation of brown bears.

- To ensure public support for the Conservation Strategy by involving the public in the stakeholder process.

Since 1961, a mandatory sealing program has provided information on all harvested bears, including distribution and sex-age composition. Harvest data is reported using the division's reporting program BEARSEAL. In addition, agency personnel from either ADF&G or FWP investigated all bears killed in Defense of Life or Property (DLP). An associated DLP report form was completed. We initiated further analysis of the DLP information during this reporting period. Completion of this project is scheduled for 2001 and results will be reported by Suring and Del Frate (In prep).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Assuming that the brown bear density was 20 bears per 1000 km^2 (5.2 bears per 100 mi^2) and the suitable habitat was 13,848 km^2 (5347 mi^2), we estimated the brown bear population for Units 7 and 15 at 277 (range = 250–300). We believe the population is stable or may be slowly increasing.

Distribution and Movements

Brown bears inhabit most of the Kenai Peninsula with the exception of coastal areas of Kenai Fjords National Park and the southern portions of the peninsula (Schloeder *et al.* 1987, Jacobs *et al.* 1988). Recently, members of the public and park personnel have observed brown bears in KFNP (Nuka Bay). Occasionally, individual bears have been observed on the southern side of Kachemak Bay. It is unknown at this time whether this is a result of dispersing bears or range expansion of the population.

MORTALITY

Harvest

Season and Bag Limit. The bag limit for Units 7 and 15 was 1 bear every 4 regulatory years. Both fall and spring hunts for regulatory year 1998 were closed by emergency order. The bear hunting season for 1999 was 15–31 October for the entire Kenai Peninsula for resident and nonresident hunters. However, this season was shortened by emergency order to 15–24 October.

Board of Game Action and Emergency Orders. The Board of Game authorized a fall-only registration permit hunt beginning in the fall of 1999 with season dates of 15–31 October. To stay within objectives, both the fall 1998 and the spring 1999 hunts were closed by emergency order. The BOG permanently closed the spring season on the Kenai Peninsula beginning with the spring of 2000. The fall 1999 season was shortened by closing the season on 24 October by emergency order to maintain harvest within objectives.

The department drafted a proposal to the Board of Fisheries to close Russian Creek (also known as Goat Creek) to fishing for the month of August to protect brown bears feeding in this area. The Department of Law advised the Board of Fisheries that they did not have the authority to regulate a fishery for wildlife conservation purposes. The proposal was redrafted to protect spawning salmon 300 yards upstream from the inlet of upper Russian Lake and passed by the Board of Fisheries in 1999. This closure took effect in August of 1999.

At the request of the Brown Bear Stakeholder Group ADF&G submitted a proposal to eliminate the use of fish or fish parts for black bear bait. The group felt that the presence of fish at black bear bait stations might attract brown bears more than other types of bait. While there is no evidence to support this theory, the Department supported the proposal on the basis that bait stations would be easier to clean up. The Board of Game passed the proposal at the March 2001 meeting and it will become effective in the 2002 spring bear bait season.

Hunter Harvest. Eight bears were reported taken during regulatory year 1998–99 and all were classified as nonsport mortality. In addition, two radio collars from two research bear were recovered and it was determined that these bears were killed and never reported. Because objectives had been previously met, both seasons were closed by emergency order. Of the eight bears taken 5 were taken in the fall (3 in DLP, one illegally, and one capture mortality). Two of these bears were adult females and the others males. Three young bears (2 yearling females and 1 male) were taken DLP in the spring (Table 1).

Seventeen bears were taken during regulatory year 1999–00, all during the fall season. Ten bears (5 males and 5 females) were taken during the general season. The remainder of the bears were taken by nonsport methods. These included 2 males and 1 female by DLP, 2 males killed illegally during closed season, 1 roadkill (female), and one female from unknown causes. The bear that died from unknown causes was a sow with cubs found by a hunter during the fall hunting season (Table 1). One hundred fifty-six permits were issued and 105 reported hunting for the fall registration permit season (RB160). One additional hunter harvested a bear without a permit.

Hunter Residency and Success. Both seasons were closed by emergency order for regulatory year 1998–99. Local residents took 80%, nonlocal residents took 10% and nonresidents took 10% of the bears in 1999–2000 (Table 2).

Harvest Chronology. All hunter-harvested bears were taken during the first 7 days of the fall season during 1999–2000 (Table 3). An Emergency Order closed the season on October 24 to keep the harvest within management objectives.

Transport Methods. Successful brown bear hunters have used all transportation methods with the exception of snow machines during the past 5 years (Table 4). In 1999 most hunters used boats (40%) and highway vehicles (30%). Hunters also used 4-wheelers, ORVs and horses (10% each).

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

As interim chair of the IBBST, I drafted a request to the Commissioner of ADF&G to list the Kenai population of brown bear as a population of special concern. This request was based on the potential for decline in the future because of human encroachment into brown bear habitat. The Kenai brown bear was officially listed on 27 November 1998 as a Species of Special Concern.

Soon after the Species of Special Concern listing, the department initiated a stakeholder-driven planning project. The Kenai Peninsula Brown Bear conservation Strategy was completed and published. (Alaska Department of Fish and Game Division of Wildlife Conservation 2000). The IBBST is currently drafting a conservation assessment that will supplement the conservation strategy.

Timber harvests designed to salvage damaged timber and control the spread of spruce bark beetles (Dick *et al.* 1992) could be a major factor affecting the abundance of brown bears. The Forest Health Management Plan encompasses approximately 60% of the Kenai Peninsula and most of the brown bear habitat. The plan prioritizes over 426,000 acres of forested lands for salvage cutting. Logging mature forests may affect brown bears in numerous ways, including fragmentation of forest habitat and increased public access through an extensive road system. ADF&G and the IBBST have routinely commented on proposed timber sales that could significantly impact brown bears.

CONCLUSION AND RECOMMENDATIONS

In 1995 we drafted a management protocol (Del Frate 1999). This protocol provided a systematic record of decision for management decisions. In 1998 we made the decision to change from calendar-year management to regulatory-year management. This decision was based on the need to coincide with reporting periods and has no net effect on calculating sustained yield. Below is a summary of the decisions for the following regulatory years.

RECOMMENDED ACTION FOR 1998–99

- The harvest objective is 5.6 female units per year or 16.8 for 3 years. Five units were taken in 1996–97 and 7.5 units in 1997–98. The maximum allowable harvest for 1998–99 would then be no more than 4.3 female units.

- Prior to the start of the fall permit season 4 adult female bears were killed. In order to stay within management objectives the fall season was closed by emergency order. By that fall it became evident that the peninsula could only sustain one hunt and the decision was made to recommend a fall only season to the BOG. A proposal was drafted and approved by the BOG to eliminate the spring season. Since the regulation would not become effective in time for the spring 1999 season, the Department decided it was best to close the spring season by Emergency Order.

- Monitor the spring DLP kills for signs of excessive take of females. Only three bears were taken during the spring season including 2 yearling female bears (one additional unit). The female unit will be subtracted from the fall harvest objective.

RECOMMENDED ACTION FOR 1999–2000

- The harvest objective is 5.6 female units per year or 16.8 for 3 years. Seven and one-half units were taken in 1997–98 and 5 units in 1998–99. The maximum allowable harvest for 1999–2000 would then be no more than 4.3 female units.

- Prior to the fall permit season 2 female bears were taken (1 by DLP and 1 roadkill) in addition to 4 males. A remainder of 2.3 female units was left for the permit hunt. Ten bears were taken during the first 7 days of the fall permit season including 5 adult females. In addition, one additional adult female bear was found dead but was never reported. The harvest objective was exceeded and the remainder of the season closed by Emergency Order.

- No bears were reported taken by any means during the spring of 2000. The excess of 3.7 female units will be subtracted from the fall harvest objective.

RECOMMENDED ACTION FOR 2000–2001

- The harvest objective is 5.6 female units per year or 16.8 for 3 years. Five units were taken in 1998–99 and 8 units in 1999–00. The maximum allowable harvest for 2000–01 would then be no more than 3.8 female units.

- Three female units were taken in the fall season in addition to 6 male bears.

- So far one male bear has been taken this spring. There is only 0.8 bears remaining in the quota. Any additional bears taken in excess of the 0.8 bears will be deducted from the Fall permit season allowance.

The number of DLP's and illegally taken bears increased throughout the 1990s but declined slightly during this reporting period. The 5-year average harvest of female bears was 6.6 female units (range = 5–8 units per year). Management objectives have been exceeded and we continue

to monitor and adjust the seasons as necessary. Preliminary data for regulatory year 2000 indicate a reduced harvest however if this trend changes regulatory action may be necessary for the fall season. We are concerned that this trend will continue and long-term management objectives will eventually be exceeded and all hunting opportunity lost.

Taylor *et al.* (1987) noted that survival of adult female bears was the predominant factor affecting population dynamics. To maintain a population of 250 bears on the Kenai Peninsula, our objectives have been set at a 3-year mean annual harvest of 6 females (approximately 40% of the annual harvest objective of 14 bears). A 3-year mean allows for abnormal harvest variations caused by weather, food availability, or temporary changes in human-use patterns. We refined the desired harvest rate quota by using the point system similar to Smith's (1989) to account for young female bears ($\leq$ 2 years of age) taken primarily in nonsport situations. These bears were assumed to have a lower reproductive value (Harris and Metzgar 1990) and assigned lower scores than those of older females. Specifically, female bears $\leq$ 2 years of age were assigned only half the value of older females.

The long-term health of brown bears on the Kenai Peninsula depends upon maintaining quality bear habitat and minimizing the mortality of female bears. There are 2 activities that may negatively affect bear abundance. Forestry practices to salvage timber killed by spruce bark beetles may affect bears through the logging of mature forest stands and the building of roads into previously inaccessible areas (McLellan and Shackleton 1988). Perhaps more importantly, commercial, recreational, and residential developments on the Kenai Peninsula will continue to reduce the quantity and quality of brown bear habitat and restrict travel corridors for bears. Human encroachment into bear habitat will increase bear/human encounters and increase the probability that bears will be killed.

We need to continue to monitor sport and nonsport bear mortality by season, location, and cause to identify tangential management issues that may affect long-term survival. Potential issues have been identified, such as bear/human conflicts, bear/livestock interactions, competition between bears and sport fishermen, big game seasons that overlap with brown bear seasons, brown bears taken near black bear bait stations, and private and borough dumpster problems. Solving many of these management concerns will require innovative approaches. The Kenai Peninsula brown bear conservation strategy provided the type of public collaboration necessary to address many of these issues. The Kenai Peninsula Brown Bear Conservation Strategy was completed in 2000 and lists over 100 recommendations to maintain brown bears and their habitat on the Kenai Peninsula. Many of the recommendations in this report were reiterated in the conservation strategy. Implementation of this strategic plan is necessary to maintain a healthy brown bear population into the future.

The Kenai Peninsula brown bear population is essentially closed. Appreciable immigration is unlikely because the city of Anchorage is adjacent to the Kenai and brown bears are not at high densities in the area around Turnagain Arm. Because the Kenai Peninsula is essentially a closed system, some areas that could support slightly higher harvests can serve as refugia for the more highly impacted areas.

LITERATURE CITED

ALASKA DEPARTMENT OF FISH AND GAME DIVISION OF WILDLIFE CONSERVATION. 2000. *Kenai Peninsula Brown Bear Conservation Strategy*. State of Alaska Department of Fish and Game. 84pp

BEVINS, J., C. SCHWARTZ, E. BANGS, AND K. NELSON. 1984. Kenai Peninsula brown bear studies: Report of the Interagency brown bear study team. 103pp.

DEL FRATE, G. G. 1993. Units 7 and 15 Brown Bear. Pages 49–57 in S. Abbott ed. Management Report of Survey-Inventory Activities 1 July 1990–30 June 1992. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Project, W-23-4 and W-23-5. Study 4.0.

DEL FRATE, G. G. 1999. Units 7 and 15 Brown Bear. Pages 55–71 in M. V. Hicks ed. Management Report of Survey-Inventory Activities 1 July 1996–30 June 1998. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Project, W-24-5 and W-27-1. Study 4.0.

DICK, M. R., P. BUIST, D. WALLINGFORD, P. JOYNER, J. PETERSON, R. BURNSIDE, AND S. PHILLIPS. 1992. Forest health management plan for the western Kenai Peninsula and Kalgin Island. Alaska Department of Natural Resources Division of Forestry. 40pp.

HARRIS, RICHARD B. AND L. H. METZGAR. 1990. Using both theory and simulation to gain insight: and example using reproductive values. Eastern Workshop on Black Bear Research and Management. 10:145–151.

HILDERBRAND, G. V., S. G. JENKINS, C. C. SCHWARTZ, T. A. HANLEY, AND C. T. ROBBINS. 1999a. Effect of seasonal differences in dietary meat intake on changes in body mass and composition in wild and captive brown bears. Canadian Journal of Zoology 77: 1623 – 1630.

HILDERBRAND, G. V., T. A. HANLEY, C. T. ROBBINS, AND C. C. SCHWARTZ. 1999b. Role of brown bears (Ursus arctos) in the flow of marine nitrogen into a terrestrial ecosystem. Oecologia 121:546–550.

HILDERBRAND, G. V., C. C. SCHWARTZ, C. T. ROBBINS, AND T. A. HANLEY. 2000. Effect of hibernation and reproductive status on body mass and condition of coastal brown bears. Journal of Wildlife Management 64(1): 178–183.

——, W. R. STAPLES, N. L. WEILAND, E. E. BANGS, AND C. C SCHWARTZ. 1988. Kenai Peninsula brown bear studies: Report of the interagency brown bear study team, 1987. 17pp.

JACOBY, M. E., G. V. HILDERBRAND, C. SERVHEEN, C. C. SCHWARTZ, S. M. ARTHUR, T. A. HANLEY, C. T. ROBBINS, AND R. MICHNER. 1999. Trophic relations of brown and black bears in several western North American ecosystems. Journal of Wildlife Management 63(3): 921–929.

MCLELLAN, B. N. AND D. M. SHACKELTON. 1988. Grizzly bears and resource-extraction industries: effects of roads on behavior, habitat use and demography. Journal of Applied Ecology 25:451–460.

MILLER, S. D., E. F. BECKER, AND W. B. BALLARD. 1987. Black and brown bear density estimates using modified capture recapture techniques in Alaska. International Conference Bear Research and Management. 7:23–35.

——. 1990. Population management of bears in North America. International Conference Bear Research and Management. 8:357–373.

RISDAHL, G. L., C. A. SCHLOEDER, E. E. BANGS, AND C. C. SCHWARTZ. 1986. Kenai Peninsula brown bear studies: Report of the interagency brown bear study team. 92pp.

SCHLOEDER, C. A., M. J. JACOBS, N. L. WEILAND, E. E. BANGS, AND C. C. SCHWARTZ. 1987. Kenai Peninsula brown bear studies: Report of the interagency brown bear study team, 1986. 52pp.

SCHWARTZ, C. C. AND S. M. ARTHUR. 1996. Cumulative effects model verification, sustained yield estimation, and population viability management of the Kenai Peninsula, Alaska brown bear. Federal Aid in Wildlife Restoration Research Project Progress Report 1 July 1994–30 June 1996. Grant W-24-3, W-24-4 Study 4.27. 9pp.

——, ——, AND G. G. DEL FRATE. 1999. Cumulative effects model verification, sustained yield estimation, and population viability management of the Kenai Peninsula, Alaska brown bear. Federal Aid in Wildlife Restoration Research Project Progress Report. Grant W-24-3, W-24-4 Study 4.27.

SMITH, B. L. 1989. Sex weighted point system regulates grizzly bear harvest. International Conference Bear Research and Management. 8:375–383.

SURING, L. H., K. R. BARBER, C. C. SCHWARTZ, T. N. BAILEY, W. C. SHUSTER, M. D. TETREAU. 1998. Analysis of cumulative effects on brown bears on the Kenai Peninsula, Southcentral Alaska. International Conference Bear Research and Management. 10: 107–117.

SURING, L. H. AND G. G. DEL FRATE. In Prep. Spatial Analysis of locations of brown bears killed in defense of life or property on the Kenai Peninsula, Alaska. Ursus 14:

TAYLOR M. K., D. P. DEMASTER, F. L. BUNNELL, AND R. E. SCHWEINSBURG. 1987. Modeling the sustainable harvest of female polar bears. *Journal Wildlife Management*. 51:811–820.

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Table 1 Units 7 and 15 brown bear harvest, 1991–2000.

Regulatory year	Reported: Hunter Kill M	F	Unk.	Total	Reported: Nonhunting kill[a] M	F	Unk.	Total estimated kill M	(%)	F	(%)	UNK.	(%)	Total
1991														
Fall 91	4	4	0	8	1	1	0	5	(50)	5	(50)	0	(0)	10
Spring 92	3	1	0	4	0	0	1	3	(60)	1	(20)	1	(20)	5
Total	7	5	0	12	1	1	1	8	(53)	6	(40)	1	(7)	15
1992														
Fall 92	4	6	0	10	3	0	1	7	(50)	6	(43)	1	(7)	14
Spring 93	9	4	0	13	0	0	0	9	(69)	4	(31)	0	(0)	13
Total	13	10	0	23	3	0	1	16	(59)	10	(37)	1	(4)	27
1993														
Fall 93	5	3	0	8	3	1	0	8	(67)	4	(33)	0	(0)	12
Spring 94	6	2	0	8	3	0	0	9	(82)	2	(18)	0	(0)	11
Total	11	5	0	16	6	1	0	17	(74)	6	(26)	0	(0)	23
1994														
Fall 94	3	3	0	6	4	3	0	7	(54)	6	(46)	0	(0)	13
Spring 95	2	4	0	6	1	0	0	3	(43)	4	(57)	0	(0)	7
Total	5	7	0	12	5	3	0	10	(50)	10	(50)	0	(0)	20
1995														
Fall 95	0	0	0	0	1	5	0	1	(17)	5	(83)	0	(0)	6
Spring 96	3	2	0	5	2	2	0	5	(56)	4	(44)	0	(0)	9
Total	3	2	0	5	3	7	0	6	(40)	9	(60)	0	(0)	15
1996														
Fall 96	0	0	0	0	3	0	0	3	(100)	0	(0)	0	(0)	3
Spring 97	1	5	0	6	2	0	0	3	(38)	5	(62)	0	(0)	8
Total	1	5	0	6	5	0	0	6	(55)	5	(45)	0	(0)	11
1997														
Fall 97	0	0	0	0	3	3	0	3	(50)	3	(50)	0	(0)	6
Spring 98	4	4	0	8	1	2	0	5	(45)	6	(55)	0	(0)	11
Total	4	4	0	8	4	5	0	8	(47)	9	(53)	0	(0)	17

Table 1 Continued.

Regulatory year	Reported: Hunter Kill M	F	Unk.	Total	Nonhunting kill[a] M	F	Unk.	Total estimated kill M	(%)	F	(%)	UNK.	(%)	Total
1998														
Fall 98	0	0	0	0	3	4[b]	0	3	(43)	4	(57)	0	(0)	7
Spring 99	0	0	0	0	1	2	0	1	(34)	2	(66)	0	(0)	3
Total	0	0	0	0	5	5	0	4	(40)	6	(60)	0	(0)	10
1999														
Fall 99	5	5	0	10	4	3[c]	0	9	(53)	8	(47)	0	(0)	17
Spring 00	0	0	0	0	0	0	0	0	(0)	0	(0)	0	(0)	0
Total	5	5	0	10	4	3	0	9	(53)	8	(47)	0	(0)	17

[a] Includes DLP kills, research mortalities, and other known human-caused mortality.
[b] Two research bears were illegally killed but never reported.
[c] One research bear was found dead but never reported.

Table 2 Unit 7 and 15 brown bear successful hunter residency, 1985–2000.

Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters[b] *n*
1985–86	6	(40)	7	(47)	2	(13)	15
1986–87	11	(69)	4	(25)	1	(6)	16
1987–88	4	(33)	5	(42)	3	(25)	12
1988–89	7	(58)	0	(00)	5	(42)	12
1989–90	4	(67)	1	(17)	1	(17)	6
1990–91	7	(64)	1	(9)	3	(27)	11
1991–92	5	(42)	3	(25)	4	(33)	12
1992–93	11	(48)	8	(35)	4	(17)	23
1993–94	10	(63)	2	(13)	4	(25)	16
1994–95	3	(25)	8	(67)	1	(8)	12
1995–96	4	(80)	1	(20)	0	(0)	5
1996–97	2	(33)	4	(67)	0	(0)	6
1997–98	5	(63)	3	(37)	0	(0)	8
1998–99[c]	0	(00)	0	(00)	0	(0)	0
1999–00	8	(80)	1	(10)	1	(10)	10

[a] Local resident means residents of Units 7 or 15.
[b] Does not include nonsport harvest.
[c] Both fall and spring seasons were closed by Emergency Order.

Table 3 Units 7 and 15 brown bear harvest chronology percent by month, 1985–2000

Regulatory year	Harvest periods September	October	May	n[a]
1985–86	60	20	20	15
1986–87	56	19	25	16
1987–88	42	25	33	12
1988–89	75	0	25	12
1989–90	33	0	67	6
1990–91	55	0	45	11
1991–92	58	8	33	12
1992–93	39	4	57	23
1993–94	13	38	50	16
1994–95	0	50	50	12
1995–96	0	0	100	5
1996–97	0	0	100	6
1997–98	0	0	100	8
1998–99[b]	0	0	0	0
1999–00	0	100	0	10

[a] Does not include nonsport harvest.
[b] Both fall and spring seasons were closed by Emergency Order.

Table 4 Units 7 and 15 brown bear harvest percent by transport method, 1985–2000.

Regulatory year	Percent of Harvest									
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk.	n[a]
1985–86	7	13	33	0	0	13	7	7	20	15
1986–87	12	6	19	0	0	19	12	12	19	16
1987–88	25	33	17	0	0	0	33	0	0	12
1988–89	8	42	8	0	0	17	17	0	8	12
1989–90	17	0	33	0	0	0	0	17	33	6
1990–91	9	27	9	9	0	9	18	9	9	11
1991–92	17	25	17	0	0	8	8	8	17	12
1992–93	13	13	17	13	0	4	30	9	0	23
1993–94	0	6	69	6	0	0	19	0	0	16
1994–95	0	17	17	0	0	0	58	0	8	12
1995–96	0	0	0	40	0	0	60	0	0	5
1996–97	33	0	33	0	0	0	17	17	0	6
1997–98	0	0	12	25	0	0	38	25	0	8
1998–99[b]	0	0	0	0	0	0	0	0	0	0
1999–00	0	10	40	10	0	10	30	0	0	10

[a] Does not include nonsport harvest.
[b] Both Fall and Spring seasons were closed by Emergency Order.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 8 (5,097 mi^2)

GEOGRAPHIC DESCRIPTION: Kodiak and Adjacent Islands

BACKGROUND

Kodiak's geologic character is not conducive to preserving fossil evidence, so there is no way to confirm how long bears have been on the islands. Kodiak bears have, however, been isolated from other bear populations since the last ice age (about 12,000 years ago) and during that time have developed into a unique subspecies (*Ursus arctos middendorffi*). Early human occupants of the archipelago looked to the sea for their sustenance. At that time, people occasionally hunted bears, using their meat for food, hides for clothing and bedding, and teeth for adornment. Traditional stories often revolved around the similarity between bears and humans, and around the mystical nature of bears because of their proximity to the spirit world.

Russian entrepreneurs came to the area in the late 1700s to capitalize on the abundant fur resources. Bear hides were considered a "minor fur" and sold for about the same price as river otter pelts ($10 each). The number of bears harvested increased substantially when sea otter populations declined. After the United States acquired Alaska in 1867, bear harvests on Kodiak increased, peaking at as many as 250 bears per year. Commercial fishing activities increased in the late 1880s and canneries proliferated throughout the archipelago. Bears were viewed as competitors for the salmon resource and were routinely shot when seen on streams or coasts. At the same time, sportsmen and scientists had recognized the Kodiak bear as the largest in the world, and they voiced concerns about overharvesting the population.

Professional interest in guided Kodiak bear hunts and a concern for unregulated resource use in frontier lands such as Alaska prompted the territorial government's newly established Alaska Game Commission to abolish commercial bear hunting (selling the hides) on the archipelago in 1925. The impacts of the new regulations seemed to restore bear populations on the Kodiak islands. By the 1930s, ranchers on northeast Kodiak reported an increase in bear problems and demanded action. The Game Commission sent a biologist and a team of predator hunters to eliminate problem bears on the ranches in 1939. Seven bears were killed; however, in their final report the agents discouraged further bear-control efforts (Sarber 1939).

To address the dilemma of conserving bears while protecting cattle and residents, President Franklin D. Roosevelt created the Kodiak National Wildlife Refuge by Executive Order in 1941.

The refuge withdrew 1,957,000 acres from unreserved public domain to preserve the natural feeding and breeding range of the brown bear and other wildlife.

During the 1940s, the sockeye escapement on the Karluk River dwindled, and bears were cited as a leading cause of the decline. Fishermen called for bear control, and sportsmen across the nation lobbied against it. Studies revealed that bears killed a large number of salmon, but the vast majority (98%) were fish that had already spawned, and that the impact of bears on future salmon runs was minimal. After considering these diverse opinions and the results of the studies, the Alaska Game Commission again opted to forego any bear control or hunting-season liberalization. It did, however, pass a new regulation in 1957 that protected maternal female bears statewide. The next year, that protection was extended to also include dependent cubs.

Alaska achieved statehood in 1959 and assumed responsibility for managing the state's wildlife. The Game Commission's successor, the Alaska Board of Game, reduced bear-hunting seasons on Afognak and Raspberry islands and on the Kodiak National Wildlife Refuge. They also implemented a hide-sealing requirement, established a tag fee for nonresident bear hunters, and stationed a game biologist in Kodiak. At the same time, the Board liberalized bear seasons on non-refuge lands on Kodiak and initiated another investigation into bear-cattle problems on northeast Kodiak.

During the 1960s, state biologists worked with ranchers along the Kodiak road system to examine and reduce the predation problem. Biologists reported that cattle and bears are not compatible on the same ranges (Eide 1964). Potential solutions included poisons, fences to isolate cattle ranges, and reduction of land disposals in areas with bears. Again, sportsmen did not hesitate to voice their support for Kodiak bears. In spite of public pressure, the state continued its involvement in dispatching problem bears and attempted to capture and move some bears. From 1966 through 1969, the state authorized the use of dogs to hunt brown bears on northeast Kodiak.

In late 1970, the state issued a policy curtailing bear-control programs. Ranchers suffering losses could continue to take bears in defense of life or property, but could not shoot bears from airplanes or poison them. Sport hunting was to be the primary means of reducing bear numbers, and hunting regulations were liberalized.

Same-day airborne hunting was prohibited in 1967. In that same year, hunters were required to bring the skulls of harvested bears out of the field, and, in 1968, skull-sealing was required. Population studies around Karluk Lake suggested the local harvest was excessive, so the drainage was closed to fall bear hunting by emergency regulation in 1967 and by regulation in 1968. In an additional effort to better distribute bear harvests on the refuge, a permit-quota system was established in 1968. In 1969, the bag limit for brown bears was reduced to one bear per four years, and for most of the archipelago the winter hunting season was eliminated.

In 1971, the Alaska Native Claims Settlement Act (ANCSA) resolved many long-standing land issues with aboriginal Alaskans statewide. The impacts were felt strongly on the archipelago as large areas of the coastline; the Karluk River drainage; Sitkalidak, Spruce and Whale islands; and most of the forested areas of Afognak and Raspberry islands were conveyed to the Native corporations. Federal management of the National Forest lands on Afognak was threatened, and

the Kodiak National Wildlife Refuge lost control of 310,000 acres of prime bear habitat (more than 17 % of refuge lands).

In 1975, the state created 19 exclusive guiding areas on the archipelago. The state also began distributing most of the bear hunting permits on Kodiak Island by lottery. Twenty-six hunt areas were established, Alaska residents were allocated at least 60 percent of the permits, and all harvested bears had to be inspected by a state biologist in Kodiak.

In 1975, the Forest Service began construction of a logging road between Kazakof (Danger) Bay and Discoverer Bay, and timber harvesting began in 1977. Under ANCSA's provisions, the Native Corporations took over management of their recently acquired lands in 1978. Passage of the Alaska National Interest Lands Conservation Act (ANILCA) in 1980 added the northwest portion of Afognak Island to the Refuge, but it also curtailed the Forest Service's management on the island. In subsequent years, the rate of timber harvest was greatly accelerated over original projections.

In 1979, work began on an environmental impact statement for the Terror Lake hydroelectric project. The project was to include an earthen dam on Terror Lake in the refuge and a 6 mile–long tunnel through a mountain ridge to a penstock and powerhouse in the Kizhuyak River drainage. The proposed project was to be the first significant invasion of inland bear habitat on Kodiak Island. To address the opposition encountered from the public and agencies, a mitigation settlement was negotiated in 1981 which included brown bear research and establishment of the Kodiak Brown Bear Trust. The hydroelectric project was completed in 1985.

Human alteration of bear habitat on Kodiak and Afognak islands spurred renewed interest and funding for bear research on the archipelago, resulting in a surge of baseline and applied bear research on Kodiak through the 1980s and 1990s. Extensive use of radiotelemetry on bears revealed denning, feeding, movement, mortality rates, and reproductive history patterns (Barnes 1986; 1990; Barnes and Smith 1995; Smith and Van Daele 1988; 1990; Van Daele *et al.* 1990). A density estimation technique developed by Miller *et al.* (1987) was applied to 2 study areas on Kodiak Island in 1987, and the brown bear population in Unit 8 was estimated (Barnes et al. 1988). Barnes (1993) monitored movements of brown bears in relation to deer hunting activity on western Kodiak Island, recommending additional effort to document unreported killing of bears and improved educational programs for deer hunters.

Bears were not directly harmed by the *Exxon Valdez* oil spill in 1989, although some were displaced from traditional feeding and traveling areas by cleanup crews. No one was injured by a bear, and no Kodiak bears were killed. To mitigate the adverse impacts of the spill, Exxon reached a settlement with the state and federal governments. Paradoxically, the impacts of the oil spill and the subsequent cleanup and settlement proved to be beneficial to bears on Kodiak. Bear-safety training exposed thousands of workers to factual information about bears, and money from the settlement fund was used for funding land acquisitions. By the close of the 20th century, over 80% of the refuge lands that had been lost as a result of ANCSA were reinstated into the refuge, either through direct purchase or by means of conservation easements. Lands were also purchased on Afognak and Shuyak islands and transferred into state ownership. The Brown Bear Trust coordinated a coalition of sportsmen and other wildlife conservation groups from around the nation to lobby for use of settlement funds to acquire Kodiak lands. The groups

also directly contributed funding to protect small parcels of important bear habitat around the islands.

Except for the changes in issuing permits to nonresidents, only minor changes in bear hunting regulations have occurred since 1976. Afognak and part of northeastern Kodiak Island were changed from an unlimited permit hunt to a limited permit hunt in 1987–88. State hunting regulations allowed for a subsistence bear hunt in 1986/87, with hunters required to salvage all bear meat for human consumption. This regulation was rescinded the next year; however, in spring 1997 a federal hunting regulation reinstated a subsistence season. Under Federal regulation up to 10 permits were available to residents of Kodiak Island villages. Permits were valid only on Federal lands, and seasons were 1–15 December and 1 April–15 May. All meat from bears harvested under this regulation was to be salvaged for human consumption.

Although hunting continued to be the most popular human use of bears on Kodiak in the early 1990s, the area was experiencing an expansion of bear viewing and photography. To address this public demand, a bear-viewing program was administered by the refuge in 1990. The program was cancelled after 1994 because of a legal challenge to the procedures used in awarding the bear-viewing concession. Biologists studied bear-human interactions at the viewing areas and concluded that bears could tolerate viewing programs as long as the human activities were predicable and restricted to specific areas.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

1. Maintain a stable brown bear population that will sustain an annual harvest of 150 bears composed of at least 60% males.

2. Maintain diversity in the sex and age composition of the brown bear population, with adult bears of all ages represented in the population and in the harvest.

3. Limit human-caused mortality of female brown bears to a level consistent with maintaining maximum productivity.

METHODS

We collected harvest data from mandatory hunter reports and the sealing program. During sealing hunters were required to bring the hide and skull of each bear harvested in Unit 8 to the Kodiak ADF&G office for inspection. We determined bear ages from cementum annuli of premolar teeth removed from each bear. Mandatory hunting reports provided information on hunting effort and success. We monitored hunting activity in the field with periodic patrols by boat and aircraft.

Brown bear population estimates were developed for 9 study areas with the "intensive aerial survey technique" (IAS) detailed in Barnes and Smith (1997*a*) and previously reported in Smith (1995). Data from these surveys were extrapolated to develop a unitwide bear density and

population estimate. We also cooperated with Kodiak NWR staff to conduct aerial brown bear composition surveys along selected streams of southern Kodiak Island.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Recent estimates of the Unit 8 brown bear population are comparable with rough estimates made in the 1950s, although a slightly increasing trend in hunting mortality and in nonsport mortality occurred through the 1980s. The bear population has increased in northeast Kodiak Island since the early 1970s because of more restrictive seasons and fewer bears killed to protect livestock. Since 1976 permits have closely regulated hunting in most of the Unit, and the brown bear population is stable to increasing in local areas.

Population Size

We have worked closely with staff from Kodiak NWR to conduct 13 intensive aerial brown bear surveys from 1987 to 2000 (Table 1). These surveys were in 9 separate areas on Kodiak Island, and 3 areas have been surveyed more often. Data from these surveys were extrapolated to estimate the total bear population on the archipelago (Barnes and Smith 1997*a*, Barnes and Smith 1998). The estimated population size was 2980 bears, 2085 of which were independent (>3 years old). There were an estimated 330 bears on the islands north of Kodiak, 208 bears on northeast Kodiak, 665 on southeast Kodiak, 1088 on southwest Kodiak, and 689 on northwest Kodiak. The average density on Kodiak Island was 265 bears/km^2 (0.7 bears/mi^2), and for the northern islands it was 142 bears/1000 km^2 (0.4 bears/mi^2). We have not conducted aerial surveys on northeastern Kodiak, Afognak or the other northern islands where dense Sitka spruce (*Picea sitchensis*) forest makes it difficult to observe bears, so the population estimates for those areas are tentative.

During this reporting period, the Spiridon Peninsula was surveyed. Data from the May 2000 survey indicated that the bear density of the 287 km^2 (111 mi^2) area was comparable to that found in the same area in 1995. Although the data reflect an increase from 118 bears/1000 km^2 in 1995 to 134 bears/1000 km^2 in 2000, there was no significant difference when we applied statistical tests.

Aerial surveys along salmon streams in southwestern Kodiak Island by the FWS indicated little change in composition of the brown bear population (Table 2). Single bears composed 40% and 37% of the bears classified in 1996 and 1997, respectively. No data were yet available from the surveys conducted during this reporting period.

Distribution and Movements

There have been several investigations of brown bear movements and population dynamics on Kodiak Island. Most involved radiotelemetry and lasted at least 3 years. The Karluk Lake area was investigated from 1954 to 1962 (Troyer and Hensel 1967), the Terror Lake area from 1982 to 1987 (Smith and Van Daele 1990), southwest Kodiak from 1983 to 1987 (Barnes 1990), the Aliulik Peninsula from 1992 to 1996 (Barnes and Smith 1997*b*), and the Spiridon Peninsula from 1991 to 1997 (Barnes, in prep). The denning characteristics of bears in the Terror Lake and the

southwest Kodiak areas were described and compared in 1990 (Van Daele *et. al.* 1990). We are currently working on a compendium of these and other research results to develop a more concise picture of bear ecology on the Kodiak archipelago.

MORTALITY

Harvest

Since statehood, the reported sport harvests of bears in Unit 8 have ranged from 77 (1968–69) to 206 (1965–66) per regulatory year (Table 3). In recent years regulations have been more consistent and designed to better distribute the hunting pressure. From 1980–81 to 1989–90 the average annual harvest was 165.4 bears (range = 124–195), and from 1990–91 to 1999–2000 the average was 160.0 bears (range = 149–177). Assuming a stable bear population of 2890 bears (2085 independent bears), we estimate sport hunters are harvesting 5.5% of the bear population annually (7.8% of the independent bears).

Season and Bag Limit. The season for residents and nonresidents in that portion of Kodiak Island east of a line from the mouth of Saltery Creek to Crag Point, and including Spruce Island, was 25 October–30 November and 1 April–15 May. The bag limit was 1 bear every 4 regulatory years by registration permit only. In the remainder of Unit 8, the season dates were the same, and the bag limit was 1 bear every 4 regulatory years by permit only. Residents, and nonresidents accompanied by a resident within the second degree of kindred, could take bear by drawing permit only. Drawing and registration permits were available for nonresidents guided by a registered, master, or Class A assistant guide.

The Federal Subsistence Board authorized an additional hunt on federal lands for subsistence hunters. Under this regulation up to 10 federal permits are issued to residents of remote Kodiak Island villages to harvest 1 bear per year for human consumption. Season dates for the hunt were 1–15 December and 1 April–15 May.

Board of Game Actions and Emergency Orders. During their Spring 1999 meeting, the Board of Game addressed proposals to limit harvest to 1 bear/lifetime and another requiring licenses and permits for individuals accompanying bear hunters in the field. Neither proposal passed.

Hunter Harvest. Hunters harvested 149 bears in regulatory year 1998–99 and 170 bears in 1999–2000, a rate similar to the previous 5-year mean of 159.8 bears (Table 3). There were 54 bears killed in fall 1998 and 60 killed in fall 1999. The mean annual fall harvest for the previous 5 years was 52.2 bears. During the spring of 1999, 95 bears were killed, and in the spring of 2000, 110 bears were killed. The reduced spring harvest in 1999 was a result of unseasonable temperatures and snow depths which kept hunters from accessing many inland areas because large lakes remained frozen throughout most of the season. The mean annual harvest for the previous 5-year was 107.6 bears. These totals do not include bears killed under federal subsistence regulations: 1 bears (1 female) in 1998–99 and 1 (1 male) in 1999–2000.

Males predominated in the harvest, composing 75.8% of the sport harvest in 1998–99 and 74.7% in 1999–2000, a rate above the previous 5-year average of 70.3%. Although the current management objective of 60% males was met both years, Miller (1990*a*) cautioned that using sex and age ratios to set allowable harvest objectives is more likely to result in overexploitation

than using total adult females for setting guideline harvests. Sport hunters harvested 36 females in 1998–99 and 43 females in 1999–2000, well below the annual mean of 47.0 females harvested during the preceding 5 years. Including other human-caused deaths of females, 49 females were killed in 1998–99 and 50 females were killed in 1999–2000, compared to the previous 5-year mean of 53.4 females.

Mean total skull sizes of male bears harvested in both 1998–99 was 24.9", and in 1999–2000 it was 24.7", differing only slightly from the mean skull size of 24.8" for the previous 5 years. Skull measurements from harvested females increased from an average of 21.8" in 1998–99 to 22.4" in 1999–2000. The average female skull size during the previous 5 years was 21.8" (Table 4). The mean age of bears harvested was 6.9 years in 1998–99, and was 7.7 years in 1999-2000 (5-year $\bar{x}$ = 7.3 years) for males. Female ages averaged 5.6 years in 1998–99, and 8.8 years in 1999–2000 (5-year $\bar{x}$ = 7.2 years) for females.

A sex/skull restriction for guided nonresident hunters in permit hunts DB 108–138 to 116–146 became effective in the spring 1995 season. Guided hunters in those areas must harvest male bears or females with skulls that are at least 15" long or 9" wide. Failure to meet these minimum requirements results in loss of a permit during the next season. Since inception of the regulation, the average annual harvest in the affected area has remained relatively stable, going from 53.3 (1988–89 to 1993–94) to 55.5 (1995–96 to 1999–2000). Nonresident harvest declined from a mean of 30.2 bears (1988–89 to 1993–94) to 25.4 bears (1995–96 to 1999–2000). Nonresident success also declined slightly from 68% (1988–89 to 1993–94) to 65% (1995–96 to 1999–2000). The regulation was effective in reducing harvest of female bears by nonresidents. Prior to the restrictions, the average nonresident harvest was 7.8 females/year (1988–89 to 1993–94), after restrictions this average fell to 2.8 females/year (1995–96 to 1999–2000). Since 1995, 8 permits have been lost because of undersized females being taken.

Permit Hunts. There are 29 drawing hunt areas in Unit 8 for brown bears. Each year 319 drawing permits are available to Alaska residents (107 in fall, 212 in spring), and 153 permits are available for nonresidents (53 in fall, 100 in spring). Nonresidents hunting with resident relatives are allocated permits from the resident quota. Nonresident-guided permits may be reduced if hunters fail to adhere to sex/skull minimums. In 1998–99 and again in 1999–2000, 342 drawing permits were picked up by successful applicants (Table 5). Annual harvest in the drawing permit areas was 138 in 1998–99 and 153 in 1999–2000. The average annual harvest during the previous 5 years was 151.8.

The northeastern portion of Kodiak Island is managed as a registration area for bear hunters (RB 230/260). The seasons mirror those in the drawing hunt areas, but there are no limits on the number of permits available. In 1998–99 we issued 264 registration permits, and in 1999–2000 we issued 279 (Table 6). This was a considerable increase over the mean number of registration permits issued in the previous 5 years (166.0) and it continued the trend of annual increases in permits issued each year since 1994–95. The number of hunters afield in the registration hunt was 171 in 1998–99 and 189 in 1999–2000, also higher than the mean of the previous 5 years (98.0). Annual harvest in the registration permit area was 11 in 1998–99 and 17 in 1999–2000. The average annual harvest during the previous 5 years was 8.2.

Hunter Residency and Success. Hunter success in the drawing permit hunts was 42% in 1998–99 and 46% in 1999–2000 (Table 5), slightly below the mean for the previous 5 years (48.8%). In the registration hunts, hunter success was 6% in 1998–99 and 9% in 1999–2000, comparable to the mean for the previous 5 years (8.0%).

Although over two-thirds of the drawing permits and the vast majority of registration permits are issued to Alaska residents, nonresidents usually harvest more bears in Unit 8 than do residents. In 1998–99, residents harvested 68 bears and nonresidents took 81 (Table 7). In 1999–2000, residents harvested 78 bears and nonresidents took 91 bears. The mean harvest for the previous 5 years was 75.4 for residents and 84.2 for nonresidents.

Harvest Chronology. The first third of the fall season (October 25 to November 6) and the last third of the spring season (May 8 to 15) were typically the most productive times for bear hunters (Table 8). In 1998–99, 80% of the harvest occurred during the first third of the fall season, and in 1999–2000, 73% of the harvest occurred in the first third. During the previous 5 years, the mean annual percentage of the harvest in the first third of the fall season was 74.4%. In 1998–99, 60% of the harvest occurred during the last third of the spring season, and in 1999–2000, 57% of the harvest occurred in the last third. The mean annual percentage of the harvest in the last third of the fall season during the previous 5 years was 53.8%.

Transport Methods. Bear hunters in Unit 8 most commonly use aircraft and boats. The proportion of hunters reporting each method varies each year, with aircraft the most common transportation method (Table 9). This annual variation may be more a function of what hunters report rather than actual changes in transportation modes. Most hunters fly into hunt areas and then use a skiff or inflatable raft in the area, and hunters are inconsistent in the way they choose to report these overlapping modes of transportation.

Other Mortality

Defense of life or property (DLP) kills, illegal kills, subsistence harvests, and other nonhunting human-caused mortality resulted in the death of 25 bears in 1998–99 and 23 in 1999–2000 (Table 3). This was considerably higher than the mean annual nonsport harvest of 16.8 bears/year during the previous 5 years.

The incidence of illegal or unreported DLP kills is unknown, however bears that have been shot but not reported are occasionally found, most frequently near the villages of Larsen Bay, Old Harbor, and Port Lions. Cases in which deer hunters, hikers, sport fishers, commercial fishers, photographers and remote area residents killed or wounded bears without reporting it have been documented often enough to warrant continued effort to improve our estimates of unreported kills.

HABITAT

Assessment

Kodiak's inland habitat is contiguous and intact. Coastal areas have much greater human activity, but the activity is generally restricted to isolated areas and small numbers of people, and roads are few and far between. Salmon management for sustained yield is a high priority on the

archipelago, and bear predation is factored in to escapement rates. The only large scale disruption of inland habitat, the Terror Lake hydroelectric project, was completed with minimal direct or indirect adverse impact to bears or their habitat due to a conscious effort to work with and around the bears.

Afognak Island has experienced considerable habitat alteration in the past 25 years due to commercial logging. Although there have been no objective studies, we suspect that these activities have not had major adverse impacts on the bear population because of continued healthy salmon runs, good berry and grass production, little direct persecution and limited general access to logging roads.

There are approximately 3 million acres of brown bear habitat on Kodiak, Afognak, and adjacent islands in Unit 8. Nearly half that acreage is contained within the Kodiak NWR. More than 300,000 acres of the original 1.9 million acres of refuge land, mostly prime coastal and riparian brown bear habitat, was transferred to Native corporations through ANCSA. By 2000, over 80 percent of the refuge lands that had been lost as a result of ANCSA were reinstated into the refuge, either through direct purchase or by means of conservation easements. Lands were also purchased on Afognak and Shuyak islands and transferred into state ownership. Current developments impacting brown bears include ongoing commercial timber harvest on Afognak Island, proposed development of the Watchout Creek hydroelectric project, expanding rural settlement, commercial fishing, and increasing recreational activities in remote areas, including hunting, sport fishing and wildlife viewing.

The unusually cold winter of 1998-99 had a devastating impact on salmonberry and blueberry production throughout the archipelago. Bears appeared to have difficulty satisfying their nutritional requirements in the mid-to-late summer when these berries are an important part of their diet. Although salmon runs were strong in most area streams, many of the runs were later than usual, further impacting bear feeding strategies. The apparent result was more aggressive bear behavior in the fall. Increasing bear/human encounters, including 2 maulings (one fatality), prompted the Department to issue a "Bear Alert" in cooperation with the Kodiak Borough, the FWS and the U.S. Coast Guard. The alert notified hunters and others to use extreme caution while deer or elk hunting for the remainder of the year.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The Kodiak Island Borough completed their electric fence around the landfill in 1998 and by 1999 no bears were reported in the fenced area. The last bear family to leave the landfill in 1998 did not seek natural food when they emerged from their den, but aggressively sought sustenance from dumpsters, back porches and pick-ups. They were not dissuaded by adverse conditioning, and were eventually killed by Fish and Wildlife Protection officers. Separately, in 1999, because of their presence at U.S. Coast Guard (USCG) housing, a sow and 2 cubs were shot by authorities and a third cub was sent to a zoo in Milwaukee. This generated a great deal of public interest and resulted in significant changes in the way USCG security police respond to bear calls and in the way the Base handles its garbage.

The USCG Base and Kodiak Island Borough were thorough in their responses to 1999's bear problems around Kodiak City. Bear resistant trash bins were purchased or leased prior to bear

emergence in the spring, and were placed in many of the rural areas along the road system, including Nemetz housing near the base. Base and Borough staff also worked closely with ADF&G and Fish and Wildlife Protection staff in the design and placement of the bins. Protection officers aggressively enforced waste disposal and littering regulations and ADF&G continued our education efforts. These efforts, coupled with an abundance of natural bear foods, helped to significantly reduce bear problems around Kodiak in 2000. A mauling near Coast Guard housing on 8 October 2000 appeared to have been caused by unfortunate circumstances and was not due to a habituated or rogue bear.

Nuisance bear problems in the 5 remote villages and near Kodiak city continued to be exacerbated by inadequate garbage disposal. Improperly maintained landfills continue to attract bears to villages, resulting in several DLP bear kills annually. Developing environmentally sound and economical garbage disposal methods will require a multiagency approach and close cooperation with local and village governments. Larsen Bay village installed an oil-fired incinerator for garbage in 1993, but the facility has not been fully utilized. The high incidence of bears near Larsen Bay can be attributed to an unmanaged landfill. Reductions in staff and budgets of the Department of Environmental Conservation have hampered that agency's efforts to enforce waste disposal regulations.

Brown bear viewing and photography is a rapidly developing aspect of the summer tourism industry in Kodiak. A trial bear-viewing program, modeled after the McNeil River Sanctuary program, was administered by the FWS at Dog Salmon River in 1990 and 1991 and at O'Malley River in 1992 and 1994 (Smith 1995). The O'Malley program was cancelled after 1994 because of a legal challenge to the procedures used in awarding the bear-viewing concession to Munsey's Bear Camp. There are now no Kodiak NWR-sanctioned bear viewing programs on the refuge; however, some Kodiak-based air taxi services offer bear-viewing trips on Kodiak and to the Alaska Peninsula, and several lodges and outfitters cater to viewers and photographers. A private operator ran a guided bear-viewing program on Koniag Corporation land at Thumb River on Karluk Lake from 1995–1999. The Dog Salmon River fish pass near Frazer Lake remains a popular site for unguided bear viewers. Some outfitters are authorized by the refuge to take clients to watch bears at a distance, minimizing impact to the bears.

An archipelago-wide bear management plan is currently being developed in a cooperative effort between government agencies and the public. The plan will be developed by a Citizen's Advisory Committee (CAC) made up of representatives from various interest groups. With assistance from a professional facilitator, they plan to meet twice a month from November 2000 until March 2001. Agency staff will serve as technical advisors to the CAC but will not participate in the final decisions. A separate Intergovernmental Planning Group (IPG) will select the groups to be represented in the CAC and will write the charter for the CAC. The IPG will also be responsible for implementing the CAC's final decisions. The IPG consists of representatives from ADF&G, U.S. Fish and Wildlife Service, Kodiak Island Borough, Kodiak City, Koniag and each of the villages on Kodiak. ADF&G is funding the planning effort.

CONCLUSIONS AND RECOMMENDATIONS

Bear harvests have been relatively consistent over the past 20 years with most variations attributable to weather and hunter participation. In 1996–97 to 1999–2000, the percent males in

the harvest was the highest ever reported for any period since data began being collected in 1949. In 1998–99 the number of females harvested was the lowest since 1970–71. The management objective of males composing at least 60% of the harvest has been achieved for the past 13 consecutive years and in 32 of 40 years since statehood. The current estimated annual harvest rate of 5.5% of the total bear population is close to the suggested approximate maximum 5.7% exploitation rate from Miller's (1990*b*) population simulation studies on brown bears in Southcentral Alaska. These data indicate that the brown bear population in Unit 8 is healthy, productive and relatively stable, and that the current rate of harvest is sustainable as long as habitat is protected and the number of adult females killed remains low.

The minimum skull size requirement in permit hunts DB108/138–116/146 resulted in a 11% decline in total harvest, a 19% decline in nonresident hunter success, and a 71% decline in the harvest of females by nonresidents in that area during the first 3 years of implementation. In the past 2 years, harvests have improved, resulting in nonresident harvest and success rates comparable to the years before the regulation change. Female harvest has declined substantially, suggesting that nonresident hunters and their guides have become highly selective because of the risk of losing a permit if a bear fails to meet minimum requirements. Overall, there are few complaints about the system, and the systems appears to be a viable alternative to reductions in the number of permits.

A considerable increase in the popularity of the registration hunt along the Kodiak road system, particularly during the fall season, resulted in a dramatic increase in hunter effort and in harvest.

The increase in bear/human encounters in the area during 1999, and the number of large bears harvested or killed in defense of life or property in the area generated additional publicity and local interest in reducing problem bears. The registration hunt area is managed to keep the bear density lower than in other parts of the Unit due to higher concentrations of humans and livestock. The increased harvest remains within the management guidelines, and no actions to reduce harvest are necessary at this time.

Intensive aerial surveys and composition counts along streams in southern Kodiak Island are now included in the Kodiak NWR annual management budget, and we plan to cooperate with NWR biologists as they conduct these surveys each year. Data from these surveys should be periodically reviewed to monitor trends in the bear populations and refine population estimates.

Maintaining optimal brown bear populations is economically important to the tourist industry including hunters and wildlife viewers. The Kodiak NWR has addressed many bear-related issues in their planning efforts, proposing extensive regulations to minimize human impacts in important bear habitat (FWS 1987). These regulations were imposed on commercial operators but have not been extended to private citizens. In 2001 refuge managers began to revise their Comprehensive Conservation Plan for the refuge.

A variety of user groups have urged the department to revisit our bear management objectives for Unit 8. In response, the department has taken the lead in developing a formal bear management plan for the archipelago, garnering involvement from a broad spectrum of agencies and user groups including Kodiak NWR staff and bear hunting guides. The planning process

will emphasize public participation and consensus building, with a targeted completion date of Spring 2001 for the draft and Winter 2001 for the final plan.

LITERATURE CITED

BARNES, V. G. JR. 1986. Progress report–Brown bear studies 1985. U.S. Fish and Wildlife. Service, Denver Wildlife Ref. Centr., Unpubl. Rep. 37 pp.

———. 1990. The influence of salmon availability on movements and range of brown bears on southwest Kodiak Island. International Conference on Bear Research and Management. 8:305–313.

———. 1993. Brown bear-human interactions associated with deer hunting on Kodiak Island. International Conference on Bear Research and Management. 9 (1): 63–73.

BARNES, V. G. JR., AND R. B. SMITH. 1995. Brown bear density estimation and population monitoring on southwest Kodiak Island, Alaska. Final report. U.S. National Biological Service and Alaska Department of Fish and Game. 42 pp.

_____, AND _____ 1997*a*. Population ecology of brown bears on Aliulik Peninsula, Kodiak Island, Alaska. Final Report National Fish and Wildlife Foundation, Project 94–237. U.S. National Biological Service and Alaska Department of Fish and Game. 43 pp.

_____ and _____ 1997*b*. Population ecology of brown bears on Aliulik Peninsula, Kodiak Island, Alaska. Final Report National Fish and Wildlife Foundation, Project 94-237. U.S. National Biological Service and Alaska Department of Fish and Game. 43 pp.

_____, AND _____ 1998. Estimates of brown bear abundance on Kodiak Island, Alaska. Ursus 10:1–9.

_____, _____, AND L. VANDAELE. 1988. Density estimates and estimated population of brown bears on Kodiak and adjacent islands, 1987. U. S. Department of Interior Fish and Wildlife Service and Alaska Department of Fish and Game, Report to Kodiak Brown Bear Research and Habitat Maintenance Trust. Unpublished Report 34 pp.

EIDE, S. E. 1964. Kodiak bear-cattle relationships. Alaska Department of Fish and Game. Juneau, Alaska. 29 pp.

MILLER, S. D., E. F. BECKER, AND W. B. BALLARD. 1987. Density estimates using modified capture-recapture techniques for black and brown bear populations in Alaska. International Conference on Bear Research and Management. 7:23–35.

MILLER, S. D. 1990 *a*. Population management of bears in North America. International Conference on Bear Research and Management. 8:357–373.

_____. 1990 *b*. Impacts of increased hunting pressure on the density, structure and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska

Department of Fish and Game. Federal Aid in Wildlife Restoration Project. Report Project W-23-2. Studies 4.18 and 4.21. Juneau, Alaska. 54 pp.

SARBER, H. R. 1939. Report on the Kodiak bear control projects. Unpublished report. Alaska Game Commission. Juneau, Alaska. 53 pp.

SMITH, R. B. 1995. Unit 8 brown bear management report of survey-inventory activities. Pages 67–87 *in* M. V. Hicks, ed. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Project Report ProjectW-24-1 and W-24-2. Study 4.0. Juneau. 303 pp.

——, AND L. J. VAN DAELE. 1988. Terror Lake Hydroelectric Project. Final report on brown bear studies 1982–86. Alaska Department of Fish and Game. Kodiak, Alaska. 195 pp.

——, AND ——. 1990. Impacts of hydroelectric development on brown bears, Kodiak Island, Alaska . International Conference on Bear Research and Management. 8:93–103.

TROYER, W. A. AND R. J. HENSEL. 1967. The brown bear of Kodiak Island. Unpublished Report. Bureau of Sport Fisheries and Wildlife. Kodiak, AK 232 pp.

U.S. FISH AND WILDLIFE SERVICE. 1987. Kodiak National Wildlife Refuge, comprehensive conservation plan, wilderness review and environmental impact statement. U.S. Fish and Wildlife Service, final internal review. 775 pp.

VAN DAELE, L. J., V. G. BARNES JR., AND R. B. SMITH. 1990. Denning characteristics of brown bears on Kodiak Island, Alaska. International Conference on Bear Research and Management. 8:257–267.

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Table 1 Estimated density and observation rates of independent bears in intensive aerial survey areas, Unit 8, 1987–2000

Survey Area	Year	Replicate Surveys	Survey Rate (min/km^2)	Bears/hr	Bears/100km^2	Sightability	Density Bears/1000 km^2	Size of survey area (km^2)	Size of survey area (mi^2)
Terror Lake	1987	3	1.5	3.1	7.5	0.33	234	355	137
Terror Lake	1997	4	1.7	3.4	9.2	0.33	276	355	137
Southwest Kodiak	1987	4	1.5	3.5	8.8	0.41	218	632	244
Sturgeon River	1987	4	1.6	4.3	12.0	0.41	293	264	102
Sturgeon River	1992/93	4	1.8	2.6	7.7	0.41	190	264	102
Sturgeon River	1998	4	1.9	3.0	9.4	0.41	227	264	102
Aliulik Peninsula	1992/93	8	1.6	4.0	10.8	0.53	216	350	135
Olga Lakes	1992/93	5	1.2	1.8	3.3	0.41	80	262	101
Karluk Lake	1994	4	2.1	5.4	18.0	0.45	400	267	103
Spiridon Lake	1995	4	1.9	1.2	3.8	0.33	118	287	111
Spiridon Lake	2000	4	1.8	1.5	4.4	0.33	134	287	111
Shearwater Pen.	1996	3	2.2	2.6	9.2	0.37	248	274	106
Kiliuda Bay	1996	4	2.5	2.4	10.1	0.37	270	159	61

Table 2 Unit 8 aerial stream counts of brown bears[a], 1985–2000

Regulatory year	Complete surveys	*Single bears*		*Maternal bears*		*Yearlings & cubs*		*Cubs of the year*		Bears per survey	Total
		Number	%	Number	%	Number	%	Number	%		
1985	10	434	54	110	14	189	24	67	8	80.0	800
1986	10	445	55	115	14	191	24	54	7	80.5	805
1987	8	205	53	58	15	92	24	31	8	48.3	386
1988	4	117	51	39	17	50	22	23	10	57.3	229
1989	9	406	46	148	17	284	32	54	6	99.1	892
1990	8	460	44	177	17	273	26	126	12	129.5	1,036
1991	9	529	52	156	15	210	21	129	13	113.8	1,024
1992	5	226	44	92	18	103	20	92	18	102.6	513
1993	6	244	47	88	17	119	23	67	13	86.5	519
1994	5	238	47	85	17	110	22	65	13	100.4	502
1995	4	230	46	86	17	136	27	49	10	125.3	501
1996	3	122	39	62	20	86	27	45	14	105	315
1997	7	195	37	112	21	128	24	92	17	75.3	527
1998[b]	--	--	--	--	--	--	--	--	--	--	--
1999[b]	--	--	--	--	--	--	--	--	--	--	--
2000[b]	--	--	--	--	--	--	--	--	--	--	--

a From Kodiak National Wildlife Refuge files; standardized low-level surveys along selected streams on southwestern Kodiak Island.

b Data not yet available.

Table 3 Reported brown bear kill data for the Kodiak archipelago by regulatory year and season, 1960/61–1999/2000

Regulatory	Fall harvest				Spring harvest				Total sport harvest					Reported non-sport				Total reported bear kill[a]			
year	M	F[c]	UNK[d]	Total[e]	M	F	UNK	Total	M	%M[f]	F	UNK	Total	M	F	UNK	Total	M	F	UNK	Total
1960/61				0	72	25	0	97	72	74%	25	0	**97**	2	1	0	3	74	26	0	**100**
1961/62	19	17	0	36	55	23	0	78	74	65%	40	0	**114**	0	0	0	0	74	40	0	**114**
1962/63	17	16	0	33	50	37	4	91	67	54%	53	4	**124**	4	4	0	8	71	57	4	**132**
1963/64	21	9	0	30	69	45	1	115	90	62%	54	1	**145**	10	7	0	17	100	61	1	**162**
1964/65	23	6	0	29	67	67	3	137	90	54%	73	3	**166**	9	13	0	22	99	86	3	**188**
1965/66	40	26	0	66	77	62	1	140	117	57%	88	1	**206**	14	11	0	25	131	99	1	**231**
1966/67	40	22	1	63	45	31	1	77	85	61%	53	2	**140**	6	4	0	10	91	57	2	**150**
1967/68	30	16	0	46	50	27	0	77	80	65%	43	0	**123**	3	3	0	6	83	46	0	**129**
1968/69	16	12	0	28	32	16	1	49	48	62%	28	1	77	3	1	0	4	51	29	1	**81**
1969/70	11	9	1	21	36	21	6	63	47	56%	30	7	**84**	2	0	0	2	49	30	7	**86**
10-year mean	*24.1*	*14.8*	*0.2*	*39.1*	*55.3*	*35.4*	*1.7*	*92.4*	*77.0*	*60%*	*48.7*	*1.9*	***127.6***	*5.3*	*4.4*	*0*	*9.7*	*82.3*	*53.1*	*1.9*	***137.3***
1970/71	28	12	1	41	47	17	2	66	75	70%	29	3	**107**	5	8	0	13	80	37	3	**120**
1971/72	27	21	2	50	62	31	0	93	89	62%	52	2	**143**	1	2	1	4	90	54	3	**147**
1972/73	33	33	0	66	66	47	1	114	99	55%	80	1	**180**	0	1	1	2	99	81	2	**182**
1973/74	24	38	0	62	52	35	0	87	76	51%	73	0	**149**	2	1	1	4	78	74	1	**153**
1974/75	29	23	0	52	48	25	3	76	77	60%	48	3	**128**	1	5	0	6	78	53	3	**134**
1975/76	18	14	0	32	61	29	0	90	79	65%	43	0	**122**	2	6	0	8	81	49	0	**130**
1976/77	25	16	0	41	55	34	0	89	80	62%	50	0	**130**	1	0	0	1	81	50	0	**131**
1977/78	22	12	0	34	65	38	0	103	87	64%	50	0	**137**	1	3	1	5	88	53	1	**142**
1978/79	22	13	0	35	49	39	1	89	71	57%	52	1	**124**	6	2	2	10	77	54	3	**134**
1979/80	18	18	0	36	77	34	1	112	95	64%	52	1	**148**	1	3	4	8	96	55	5	**156**
10-year mean	*24.6*	*20.0*	*0.3*	*44.9*	*58.2*	*32.9*	*0.8*	*91.9*	*82.8*	*61%*	*52.9*	*1.1*	***136.8***	*2.0*	*3.1*	*1.0*	*6.1*	*84.8*	*56.0*	*2.1*	***142.9***

Table 3 continued

Regulatory year	Fall harvest				Spring harvest				Total sport harvest					Reported non-sport				Total reported bear kill[a]			
	M[b]	F[c]	UNK[d]	TOT[e]	M	F	UNK	Total	M	%M[f]	F	UNK	Total	M	F	UNK	Total	M	F	UNK	Total
1980/81	24	14	0	38	61	25	0	86	85	69%	39	0	**124**	3	6	3	12	88	45	3	**136**
1981/82	21	16	0	37	65	34	0	99	86	63%	50	0	**136**	4	3	3	10	90	53	3	**146**
1982/83	36	26	2	64	102	36	0	138	138	68%	62	2	**202**	6	8	2	16	144	70	4	**218**
1983/84	31	26	0	57	102	36	0	138	133	68%	62	0	**195**	5	7	0	12	138	69	0	**207**
1984/85	33	21	0	54	71	30	0	101	104	67%	51	0	**155**	9	13	0	22	113	64	0	**177**
1985/86	52	32	2	86	70	34	0	104	122	64%	66	2	**190**	6	13	5	24	128	79	7	**214**
1986/87	26	39	0	65	71	30	0	101	96	58%	69	0	**165**	7	8	2	17	103	77	2	**182**
1987/88	25	25	0	50	80	40	1	121	104	61%	65	1	**170**	7	5	4	16	111	70	5	**186**
1988/89	30	23	1	54	73	39	0	112	103	62%	62	1	**166**	2	15	5	22	105	77	6	**188**
1989/90	25	20	0	45	74	32	0	106	99	66%	52	0	**151**	2	11	1	14	101	63	1	**165**
10-year mean	*30.3*	*24.2*	*0.5*	*55.0*	*76.9*	*33.6*	*0.1*	*110.6*	*107.0*	*65%*	*57.8*	*0.6*	***165.4***	*5.1*	*8.9*	*2.5*	*16.5*	*112.1*	*66.7*	*3.1*	***181.9***
1990/91	30	21	0	51	69	29	0	98	99	66%	50	0	**149**	6	7	3	16	105	57	3	**165**
1991/92	25	16	1	42	72	40	2	114	97	62%	56	3	**156**	6	6	4	16	103	62	7	**172**
1992/93	39	23	1	63	74	39	1	114	113	64%	62	2	**177**	5	7	6	18	118	69	8	**195**
1993/94	35	19	0	54	78	30	1	109	113	69%	49	1	**163**	2	6	8	16	115	55	9	**179**
1994/95	42	15	0	57	65	33	0	98	107	69%	48	0	**155**	10	14	3	27	117	62	3	**182**
1995/96	29	20	0	49	67	36	0	103	96	63%	56	0	**152**	2	2	1	5	98	58	1	**157**
1996/97	33	15	0	48	92	22	0	114	125	77%	37	0	**162**	5	7	8	20	130	44	8	**182**
1997/98	36	17	0	53	85	28	1	114	121	72%	45	1	**167**	7	3	6	16	128	48	7	**183**
1998/99	39	15	0	54	74	21	0	95	113	76%	36	0	**149**	7	13	5	25	120	49	5	**174**
1999/2000	44	16	0	60	83	27	0	110	127	75%	43	0	**170**	12	7	4	23	139	50	4	**193**
10-year mean	*35.2*	*17.7*	*0.2*	*53.1*	*75.9*	*30.5*	*0.5*	*106.9*	*111.1*	*69%*	*48.2*	*0.7*	***160.0***	*6.2*	*7.2*	*4.8*	*18.2*	*117.3*	*55.4*	*5.5*	***178.2***

[a] reported kill data derived from sealing records (1960/61 to 1989/90) and annual harvest reports (1990/91 to present).
[b] males
[c] females
[d] unknown or unreported sex
[e] total
[f] percent males in harvest (males/total)

Table 4 Total skull size, age, and sex of brown bears killed by sport hunters in Unit 8, 1980/81–1999/2000

	Males				Females			
Regulatory year	Mean skull size	*n*	Mean age	*n*	Mean skull size	*n*	Mean age	*n*
1980/81	24.0	93	6.2	101	21.6	45	6.9	48
1981/82	24.2	78	6.5	79	21.7	39	7.1	39
1982/83	24.4	89	7.2	98	22.1	55	8.6	59
1983/84	24.6	128	7.4	130	21.6	60	7.9	62
1984/85	24.7	99	7.3	102	22.0	45	7.8	51
1985/86	24.5	116	7.4	120	21.9	57	7.2	64
1986/87	24.8	93	7.6	96	21.9	60	8.5	64
1987/88	24.6	100	6.7	104	21.8	63	6.6	65
1988/89	25.5	98	9.1	103	21.6	53	7.4	61
1989/90	25.4	96	9.0	97	21.6	48	8.7	52
1990/91	25.3	97	8.6	95	21.7	43	8.0	50
1991/92	25.0	91	8.4	96	21.7	52	8.0	56
1992/93	25.1	106	8.2	112	21.9	56	7.8	61
1993/94	24.4	109	6.8	113	21.8	45	7.2	48
1994/95	25.0	103	7.8	107	21.8	46	6.8	48
1995/96	25.2	94	7.5	95	21.8	50	7.4	55
1996/97	24.7	120	7.5	125	21.7	34	7.9	37
1997/98	24.7	117	6.8	120	21.9	44	6.5	44
1998/99	24.9	112	6.9	113	21.8	36	5.6	35
1999/2000	24.7	122	7.7	125	22.4	40	8.8	41

Table 5 Unit 8 brown bear harvest data for drawing permit hunts DB 101–159 and 201–259, 1990/91–1999/2000

	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total[a] harvest
Fall hunts	1990/91	124	123	2	43	30	59	21	41	0	51
(DB101-129)	1991/92	119	119	8	33	21	58	15	42	1	37
(DB201-229)	1992/93	128	127	4	46	35	63	21	37	0	56
	1993/94	118	118	3	47	34	64	20	36	0	54
	1994/95	118	116	2	48	39	82	15	28	0	54
	1995/96	113	113	2	40	29	65	16	35	0	45
	1996/97	120	119	5	39	32	73	12	27	0	44
	1997/98	131	128	2	50	33	67	16	33	0	49
	1998/99	128	126	2	39	32	68	15	32	0	47
	1999/2000	126	126	6	44	37	71	15	29	0	52
Spring hunts	1990/91	221	221	1	44	68	71	28	29	0	96
(DB131-159)	1991/92	227	225	6	50	69	66	35	34	2	106
(DB231-259)	1992/93	214	212	2	51	73	68	34	32	0	107
	1993/94	219	218	4	50	77	74	27	26	1	105
	1994/95	215	213	2	45	63	66	32	34	0	95
	1995/96	225	223	3	45	63	64	35	36	0	98
	1996/97	219	216	2	50	85	80	21	20	0	106
	1997/98	235	218	1	50	83	76	26	24	1	110
	1998/99	214	211	3	44	70	77	21	23	0	91
	1999/2000	216	214	0	48	77	76	24	24	0	101

Table 5 Continued

	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total[c] harvest
Combined	1990/91	345	344	1	43	98	67	49	33	0	147
Fall and	1991/92	346	344	6	43	90	64	50	36	3	143
Spring Hunts	1992/93	342	339	3	49	108	66	55	34	0	163
(DB101-159)	1993/94	337	336	4	49	111	70	47	30	1	159
(DB201-259)	1994/95	333	329	2	54	102	69	47	31	0	149
	1995/96	338	336	3	46	92	64	51	36	0	143
	1996/97	339	335	7	45	117	78	33	22	0	150
	1997/98	366	346	3	50	116	74	42	26	1	158
	1998/99	342	337	5	42	102	74	36	26	0	138
	1999/2000	342	340	3	46	114	75	39	25	0	153

[a] Harvest figures may differ from those in other tables because of differences in classification of illegal kills and unresolved discrepancies in hunter reports.

Table 6 Unit 8 brown bear harvest data for registration permit[a] hunt numbers RB 230 and RB 260, 1990/91-1999/2000

	Regulatory year	Permits issued[a]	Permits returned	Hunters afield	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total harvest
Fall Hunts	1990/91	54	51	--	30	0	0	--	0	--	0	0
(RB230)	1991/92	110	108	--	40	6	4[b]	80	1	20	0	5[c]
	1992/93	103	102	71	30	10	4	67	2	33	1	7
	1993/94	86	86	48	44	2	1	100	0	0	0	1
	1994/95	69	65	52	20	4	2	100	0	0	0	3
	1995/96	71	68	37	48	11	0	0	4	100	0	4
	1996/97	84	83	47	43	9	2	50	2	50	0	4
	1997/98	114	98	71	24	4	3	100	0	0	0	3
	1998/99	157	145	99	32	7	7	100	--	--	0	7
	1999/2000	176	175	110	33	7	7	88	1	12	0	8
Spring	1990/91	63	60	--	37	5	1	50	1	50	0	2
Hunts	1991/92	73	71	--	15	13	3	38	5	62	0	8
(RB260)	1992/93	98	92	66	28	9	1	20	4	80	1	6
	1993/94	70	68	45	34	9	1	25	3	75	0	4
	1994/95	75	68	45	40	7	2	67	1	33	0	3
	1995/96	85	83	58	32	9	4	75	1	25	0	5
	1996/97	82	78	53	32	15	7	88	1	12	0	8
	1997/98	94	55	34	38	12	2	50	2	50	0	4
	1998/99	107	92	72	22	6	4	100	0	--	0	4
	1999/2000[b]	103	96	79	18	11	7	78	2	22	0	9

Table 6 Continued

	Regulatory year	Permits issued[a]	Permits returned	Hunters afield	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total harvest
Combined	1990/91	117	111	--	34	3	1	50	1	50	0	2
Fall and	1991/92	183	179	--	30	9	7[b]	54	6	46	0	13[c]
Spring	1992/93	203	194	137	29	9	5	45	6	55	2	13
Hunts	1993/94	156	154	93	30	5	2	40	3	60	0	5
(RB230	1994/95	144	133	97	27	6	5	83	1	17	0	6
& RB260)	1995/96	156	151	95	39	9	4	44	5	56	0	9
	1996/97	166	161	100	38	12	9	75	3	25	0	12
	1997/98	208	153	105	31	8	5	71	2	29	0	7
	1998/99	264	237	171	28	6	11	100	0	--	0	11
	1999/2000[b]	179	271	189	27	9	14	82	3	18	0	17

[a] No limit on the number of permits issued.

[b] Includes 1 female bear illegally killed by an sport hunter.

Table 7 Residency of successful brown bear hunters[a] in Unit 8, 1990/91–1999/2000

Regulatory year	Local residents[b]	(%)	Nonlocal residents	(%)	Nonresidents[c]	(%)	Total successful hunters
1990/91	7	5	47	32	95	63	149
1991/92	14	9	53	34	88	57	155
1992/93	16	9	58	33	103	58	177
1993/94	6	4	66	40	91	56	163
1994/95	10	6	58	37	87	56	155
1995/96	20	13	61	40	71	47	152
1996/97	10	6	63	39	89	55	162
1997/98	12	7	71	43	83	50	166
1998/99	11	7	57	38	81	54	149
1999/2000	16	9	62	37	91	54	169

[a] Permits required for all hunters; does not include sport hunters who killed bear without a permit, so may differ from other tables.

[b] Includes residents of Game Management Unit 8.

[c] Includes the following successful non-residents guided by next-of-kin: 1990/91 – 2; 1991/92 – 0; 1992/93 – 1; 1993/94 – 1; 1994/95 – 1; 1995/96 – 3; 1996/97 – 1; 1997/98 – 3; 1998/99 – 1; and, 1999/2000 – 2 .

Table 8 Chronology of the brown bear harvest, by season and period, in Unit 8, 1990/91–1999/2000

Regulatory year	Fall Season: Oct 25–Nov 6		Nov 7–Nov 18		Nov 19–Nov 25		Fall Total	Spring Season: Apr 1–Apr 15		Apr 16–Apr 30		May 1–May 15		Spring Total	Regulatory Year Total[a]
	n	%	*n*	%	*n*	%	*n*	*n*	%	*n*	%	*n*	%	*n*	
1990/91	37	73	11	22	3	6	51	5	5	41	42	52	53	98	149
1991/92	28	67	9	21	5	12	42	2	2	48	42	64	56	114	156
1992/93	53	84	4	6	6	10	63	3	3	48	42	63	55	114	177
1993/94	42	78	10	19	2	4	54	6	6	46	42	57	52	109	163
1994/95	38	67	11	19	8	14	57	2	2	40	41	56	57	98	155
1995/96	34	69	13	26	2	4	49	1	1	40	39	62	60	103	152
1996/97	39	81	8	17	1	2	48	6	5	47	41	61	54	114	162
1997/98	41	77	8	15	4	8	53	3	3	59	52	52	46	114	167
1998/99	43	80	9	17	2	3	54	4	4	34	36	57	60	95	149
1999/2000	43	73	10	17	6	10	59	6	5	41	37	63	57	110	169

[a] Totals may differ from those in other tables because of different classifications of illegal sport harvest.

Table 9 Unit 8 brown bear harvest[a] percent by transport method, 1990/91–1999/2000

Regulatory Year	Percent of Harvest								
	Airplane	Horse	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway vehicle	Unknown	*n*
1990/91	72	0	25	0	0	1	1	1	149
1991/92	51	0	41	0	0	1	7	0	156
1992/93	69	1	22	3	0	0	5	0	177
1993/94	72	0	40	2	0	0	1	0	163
1994/95	57	0	38	1	0	0	3	0	155
1995/96	70	1	23	3	0	1	2	0	152
1996/97	48	0	46	0	0	<1	5	0	162
1997/98	70	0	27	0	0	<1	2	0	167
1998/99	73	0	20	3	0	<1	3	0	149
1999/2000	69	0	22	2	0	0	5	2	169

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 9 (33,638 mi^2)

GEOGRAPHIC DESCRIPTION: Alaska Peninsula

BACKGROUND

The Alaska Peninsula is a premiere area for large brown bears, and the Board of Game has placed a high priority on maintaining the quality of this population. Because of reasonably easy aircraft access and the high quality of bear trophies in the unit, an active guiding industry developed during the 1960s. As hunting pressure increased, several studies on brown bear ecology were initiated. During the late 1960s and early 1970s, Alaska Department of Fish & Game (ADF&G) engaged in research at McNeil River State Game Sanctuary to investigate reproductive biology and survival rates of brown bears (Glenn et al. 1976). A succession of graduate students from Utah State University studied bear behavior at McNeil River during the early 1970s. Sellers and Aumiller (1994) analyzed population data collected at McNeil River.

An intensive study was conducted during the early 1970s near Black Lake in the central portion of Subunit 9E. Three hundred and forty-four bears were captured and marked during 1970–75 to acquire information on reproductive performance, movements, and harvest rates. More recently, efforts have been directed at further analyzing the data from this study to better understand the population dynamics of an exploited bear population. In 1988 an interagency study was initiated at Black Lake to assess the current status of the bear population (Sellers and Miller 1991, Sellers 1994, Miller et al. 1997) and to make comparisons with conditions in the early 1970s. The 1989 *Exxon Valdez* oil spill (EVOS) led to another research project to assess damage to the brown bear population along the coast of Katmai National Park. This study continued under National Park Service (NPS) funding with the primary objective of measuring population parameters of an unhunted brown bear population (Sellers et al. 1999).

High harvests that coincided with poor salmon escapements in most drainages in 1972 and 1973 indicated that hunting seasons needed to be reduced. Harvest statistics and the high percentage of marked bears killed in the Black Lake area also supported a reduction in hunting. Emergency closures were declared for all of Unit 9 in the spring of 1974 and for the central portion of the Alaska Peninsula in the spring of 1975. At the spring 1975 board meeting, the present system of alternating seasons (open in the fall of odd-numbered years and the spring of even-numbered years) was adopted to keep harvests within the quota of 150 bears per year for the area south of

the Naknek River. This system reduced harvests substantially from 1976 to 1981 and allowed the bear population to recover.

In 1984 the board abandoned the harvest quota (150 bears) for the area south of the Naknek River and endorsed more flexible objectives (Sellers and McNay 1984): (1) maintain maximum opportunity to hunt bears and avoid a drawing permit system; (2) continue both spring and fall hunts, maintain a desirable sex ratio in the bear population, and allow hunters to select either season; (3) maintain hunting seasons long enough so that severe weather would be unlikely to eliminate the entire season; and (4) handle chronic bear threats to villages through better sanitation, public education, and, only as a last resort when other measures prove ineffective, through special permit hunts.

In the fall of 1988, the Alaska Supreme Court ruled the exclusive guide area system unconstitutional. This allowed the number of registered guides operating in Unit 9 to increase; however, federal land management agencies limited the number of commercial-use licenses to new guides on federal lands. Therefore, most new guide operations used either state or private lands. With over 70% of the Unit 9 harvest coming from guided hunts, stability in the guide industry is a key part of the management program.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

To maintain a high bear density with a sex and age structure that will sustain a harvest composed of 60% males, with 50 males 8 or more years old taken during the combined fall/spring season.

METHODS

Historically, brown bear managers have relied heavily on interpretation of harvest statistics (i.e., total harvest, sex ratio, age composition) to monitor bear populations. In recent years some attention has been given to using various computer models (Tait 1983, Harris 1984) to aid in evaluating usefulness of harvest data. However, models based on harvest data have inherent problems (Miller and Miller 1990). Recently a new model using the Lotka equation has been developed by W. Testa (ADF&G, Anchorage) to estimate the sustainable harvest of females based on estimates of survival and reproductive rates.

Despite the potential utility of models, supplementary means of detecting changes in heavily exploited bear populations are needed. Aerial surveys of bears concentrated along salmon streams have been used periodically since 1958, primarily to detect major changes in population composition. Erickson and Siniff (1963) identified limitations of these surveys, recommending procedures to standardize the technique. Subsequently, ADF&G has conducted surveys near Black Lake, and FWS has conducted surveys in the Izembek and Unimak areas.

In May 1999 and 2000, an experimental line-transect/double count technique, first tried on Kodiak Island (Becker and Quang, in prep.) was used in the northern portion of Unit 9B. A cooperative project with the Lake Clark National Park estimated brown and black bear densities; this project also provided limited information on population composition.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

The brown bear population in Unit 9 was depressed during the mid 1970s because of high harvests, low salmon escapements, and severe winters. With the reduced harvests during the late 1970s, bear densities have increased. From 1985 to 1990, the average annual count of independent bears at Black Lake was 102 (range = 86–109); from 1991 to 1996 the average annual count was 121 (range = 101–144) (Sellers 1994). Poor weather in 1997 and 1998 hampered completion of adequate repetitions of these surveys, but one completed survey in 1998 included 158 independent bears. Four counts in 1999 and 2000 averaged 162 and 140 independent bears, respectively (Table 1). These data indicate a relatively stable population during the late 1980s, followed by an incremental increase during the 1990s.

Population Size

Brown bear densities vary within Unit 9; densities are lower in western Subunit 9B and the Bristol Bay coastal plain. Results from the 1989 CMR (Capture/Mark/Resight) population estimate at Black Lake showed a density of 1 bear/2.08 mi^2 in a 469 mi^2 study area. Within the study area, density varied among count units from 1 bear/1 mi^2 to 1 bear/7 mi^2, depending on habitat type (Miller and Sellers 1992). Results were extrapolated by UCUs (uniform code units) to arrive at estimates of 296, 879, 429, 3176, and 900 bears for 9A, 9B, 9C, 9E, and 9D, respectively (Sellers and Miller 1991). These estimates do not include National Park lands or McNeil River State Game Sanctuary. Thus, in the portion of Unit 9 open to brown bear hunting, the total population was estimated at 5679 bears in 1991, with an overall density of a bear/4.13 mi^2 (93 bears/1000 km^2) (Sellers and Miller 1991). Although these were subjective extrapolations, surveys flown within Katmai National Preserve at the same intensity as the CMR flights produced estimated densities similar to the one made for this area in 1991 (Sellers et al. 1999). A more objective test of the extrapolated density estimate made for northern Unit 9B is pending final computations from line transect surveys flown in 1999 and 2000 (E. Becker, pers. comm.). Assuming that the bear population has grown since 1991, as suggested by stream surveys and opinions of various residents and guides, it is likely that the bear population now is close to 6000. I estimated that McNeil River State Game Sanctuary and national parks within Unit 9 contain an additional 2000–2500 brown bears.

Population Composition

Evidence from the Black Lake study and analysis of harvest data show a change in the population composition since the early 1970s believed to be correlated to differences in harvest rates. The Black Lake capture samples during the early 1970s showed an adult (i.e., ≥ 5 years old) sex ratio of 21 adult males:100 adult females. The 1988–89 capture sample showed a significantly higher ratio of 39 males:100 females (t = 1.62, df = 194, P = 0.052). The average age of adult males increased from a mean of 7.19 years in the early 1970s to 9.92 years in 1988 (Mann-Whitney, T = 87.5, P = 0.080) (Sellers 1994). The average age of adult females also increased from a mean of 9.57 years during the early 1970s to 12.21 years for 1988 (Mann-Whitney, T = 1345, P = 0.003).

Classification of bears during replicate stream surveys at Black Lake also showed changes in population composition believed to reflect significant changes in harvest rates beginning in the mid 1960s. This analysis was based on the percentage of "single" bears (i.e., not in family groups) in the population. Hunting regulations protected family groups of cubs and yearlings, so hunting tended to reduce the proportion of single bears in the population (Sellers and McNay 1984). During 1958–61, when harvests were extremely low, a mean of 46% (range = 37–55%) of 1365 brown bears classified during summer surveys were single bears. This was higher ($t = 6.81$, $P = 0.002$) than the mean of 21% single bears (range = 17–26%) of 2078 bears classified from 1967 to 1976 when the population was affected by excessive harvests. Restrictive regulations, beginning in 1974, led to reduced harvests, and the population began recovering during the late 1970s and early 1980s. During 1982–00, a mean of 37% of 12,095 bears classified during stream surveys were single, significantly higher than during 1967–76 ($P = < 0.001$)

I believe the circumstances of excessive harvests in the early 1970s and subsequent population recovery at Black Lake apply to Unit 9 in general (Sellers in prep).

In May 1999 we classified a total of 178 brown bears in the northern portion of Unit 9B, of which 64% were single bears. This high percentage probably reflects both low harvest pressure and the effect of 2 consecutive poor salmon runs in 1997 and 1998 that may have reduced productivity. The cohorts most likely affected by the scarcity of salmon were cubs and yearlings in 1999. The average litter size for cub and yearlings was 1.5 ($n = 10$) and 1.4 ($n = 12$). In contrast, the average litter size of offspring judged to be older than yearlings was 2.56 ($n = 9$).

MORTALITY

Harvest

Season and Bag Limit. The hunting season in Subunit 9C, Naknek River drainage, was 1 September–31 October and 1 May–30 June. The bag limit was 1 bear every 4 regulatory years by registration permit only.

The open season 9B was 20 September–21 October in odd-numbered years and 10–25 May in even-numbered years. The season for the remainder of Unit 9, including the registration permit hunt in the Cold Bay road system, was 1–21 October in odd-numbered years and 10–25 May in even-numbered years. The bag limit was 1 bear every 4 regulatory years.

Board of Game Action and Emergency Orders. In March 1999 the Board of Game reviewed the status of brown bears in Unit 9 and deliberated over a large number of public proposals to liberalize the seasons. Based on evidence that the population was growing, the board extended the fall season as described above.

The Cold Bay registration hunt in Subunit 9D continues to be closed routinely by emergency order after the quota is reached. The fall season was closed on 4 October 1999; however, the May 2000 season was not curtailed.

Hunter Harvest. During the 1998–99 regulatory year, only the Naknek registration hunt was open; hunters took 13 bears in the fall and 2 in the spring. The reported harvest for the 1999–00 regulatory year was 672 bears, including 451 males (67%) and 219 females (Table 2). During the

1999 regulatory year 19 bears were reported as nonsport kills, but because nonhunting and illegal kills, including DLP kills, are rarely reported. I estimate the nonsport mortality at more than 50 bears. The combined 1999–00 hunter harvest was 15% higher that the previous all time record set in 1997–98.

During 1985–92 and 1993–98, males accounted for 64% and 70% of the harvest, respectively. The mean annual harvest of trophy-sized males, ≥ 8 years old, was 51 (range = 41–58) during the period of population recovery during 1975–82. The mean increased to 73 (range = 61–80) during 1983–88 and jumped to 123 during 1989–98. During 1999–00 178 males ≥ 8 years old were taken. Not only has the number of mature males in the harvest increased, but the proportion of the harvest composed of mature males has also increased for these 3 time periods: 14.3% during 1975–82; 16.9% during 1983–88; 23.4% during 1989–96, and 26.4% in 1997–98. For the 1999–00 regulatory year, males ≥ 8 years old dropped to 25.8% of the total kill.

Total annual average harvest rate for calendar years 1999 and 2000 is estimated to be 5.7%, based on all bears reported killed by humans and an estimation of 6000 bears in areas open to hunting (Sellers and Miller 1991). If estimates of unreported DLP and illegal kills are included, the annual harvest rate now may approach 6%.

I used W. Testa's model as another approach to evaluate whether current harvest levels are sustainable. Input data included an estimated 2700 females in areas of Unit 9 open to hunting (derived by applying composition data from Black Lake [Sellers 1994] to the 1991 estimate of 5679 bears) and preliminary reproductive and survival rates from the Black Lake study (Sellers 1994). Testa's "model 1" estimated a sustainable harvest of 92 females per year. During the past 12 years, the mean annual harvest has been 85 females; but for 1999–00 an average of 111 females were killed per calendar year.

Permit Hunts. The registration permit hunt in the Naknek drainage was designed to minimize bear-human conflicts in the most heavily settled portion of Unit 9. Participation in fall hunts was higher than in spring hunts because some moose and caribou hunters obtained a permit "just in case" they encountered a bear. During 1995–98, an average of 11 bears were killed per regulatory year. During the 1999 regulatory year, 11 were killed during the fall and none were harvested during spring. Since 1987, about half the bears taken in this permit hunt were either confirmed or suspected of having been in conflict with humans.

The registration permit hunt in the Cold Bay area was also designed to minimize bear-human conflicts. In 1983, the Izembek National Wildlife Refuge staff expressed concern that the number of local brown bears was too low; they believed problem bears were not common. Consequently, the Board of Game only authorized this hunt when it was determined that problem bears were present. The hunt was not conducted from 1984 until fall 1989. During this period, the bear population appeared to have increased, and the FWS and the department agreed it was impractical to have a season by emergency announcement in response to nuisance bear complaints. Thus, the registration permit hunt was changed to coincide with the normal unitwide season, with a seasonal quota of 2 bears or a regulatory year quota of 4 bears. By the second day of the fall 1999 season, 4 bears had been killed and the hunt was closed by emergency order. During the spring 2000 season, only 1 bear was killed.

The Chignik Brown Bear Management Area was established in 1994 and was modeled after the Western Alaska Brown Bear Management Area to provide an opportunity for traditional subsistence hunting. Past village household surveys resulted in customary and traditional findings for the villages of Chignik Lake, Perryville, and Ivanof Bay. This hunt overlaps a federal subsistence permit hunt, which complicates issuing permits and collecting results. Since 1996, participation and compliance with the state permit hunt have been virtually nil. The ADF&G Subsistence Division estimated a harvest of 6 bears from these villages in 1996, yet the only permittee was unsuccessful. No permits were issued during this reporting period and no harvest estimates are available.

Unit 9B was included in the Western Alaska Brown Bear Management Area in 1997. During 1999–00 3 bears were reported taken in Unit 9B.

Hunter Residency. During the 1997–98 and 1999–00 general seasons, nonresidents took 78% of the harvest (Table 3). This is slightly above the long-term average.

Harvest Chronology. Prior to 1985, the fall season began on 7 October. When the opening date was moved to 1 October, the pattern of harvest also shifted, and 47% of the fall harvest occurred during the first 6 days of October during 1985–89. The opening date for the general season in 9C, 9D, and 9E was moved back to 7 October in 1991, but again advanced to 1 October for the 1999 season. In addition, 9B was opened on 20 September in 1999. During the fall 1999 season, 61% of the kill in Unit 9B occurred during September and 54% of the kill in the remainder of Unit 9 occurred during the first 6 days of October. Overall, there has been a gradual shift to more harvest in the fall compared to spring hunts.(Table 4).

Transportation Methods. During 1995–1999, 77% of the successful hunters during the general hunts used aircraft, with boats being the next most common method of transportation (Table 5).

Other Mortality

Nonhunting and illegal kills, including DLP kills, are rarely reported. Unsubstantiated reports from villages, remote lodges, canneries, and commercial fishermen suggest that many other unreported bears are killed or wounded, and I estimate the total unreported kill at 50–100 bears per year.

Preliminary estimates of survival rates (excluding hunter kills) from the Black Lake study indicated natural mortality was a significant factor for females and young bears. During the 9 years of this study, annual survival rates for cubs was 0.57, for yearlings was 0.88, for subadult females 0.90, and adult females 0.92 (Sellers in prep).

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Bear-human conflicts continue to be the most serious and intractable problem in Unit 9, as in many other parts of the state. Given the pervasive nature of this problem, it will take a concerted effort to make headway.

CONCLUSIONS AND RECOMMENDATIONS

Brown bear populations do not lend themselves to convenient methods to monitor trends in density or composition. Harvest statistics are useful, but a manager cannot expect to gain a confident appraisal of population status solely from sex and age composition of the harvest. Stream surveys on the Alaska Peninsula should be continued. The Black Lake surveys indicated a relatively stable and high population. Harvests increased significantly during the 1980s, and the population appears to have stopped growing. I estimate that about 6000 bears inhabit the portion of Unit 9 open to bear hunting. With the dramatic increase in harvest recorded during the 1999–00 regulatory year and an estimated unreported illegal/DLP kill of 50 bears per year, the annual rate of human-caused mortality now is estimated at 6%. In recent years, the Board of Game has been asked to drastically increase the brown bear harvest, especially in Units 9C and 9E, to benefit moose and caribou survival. This is not a new sentiment among local residents, but it has taken on added weight with the decline of the Northern Alaska Peninsula caribou herd (NAPCH). A caribou calf mortality study in 1998 did identify brown bears as one of the major predators of young calves; however a more significant portion of the annual mortality of calves occurred overwinter, when bears were not active. Research at Black Lake showed that a relatively small percentage of radiocollared bears made any use of the NAPCH's primary calving grounds during spring. Thus an indiscriminant reduction of the brown bear population in 9C and 9E would realize little reduction in caribou mortality. Throughout Unit 9, brown bear predation on moose calves apparently remains high, but the moose population has remained stable. I do not recommend targeting brown bears in any portion of Unit 9 for reduction to benefit caribou or moose populations.

Pending final analysis of the line transect method of estimating population density in northern 9B, I recommend using this technique to estimate the population size in Unit 9D.

LITERATURE CITED

ERICKSON, A.W., AND D.B. SINIFF. 1963. A statistical evaluation of factors influencing aerial survey results on brown bears. North American Wildlife Conference 28:391–409.

GLENN, L.P., J.W. LENTFER, J.B. FARO, AND L.H. MILLER. 1976. Reproductive biology of female brown bears (*Ursus arctos*), McNeil River, Alaska. International Conference on Bear Research and Management 3:381–390.

HARRIS, R.B. 1984. Harvest age-structure as an indicator of grizzly bear population status. MS thesis, University of Montana, Missoula. 204pp.

MILLER, S.D. AND S. M. MILLER. 1990. Interpretation of Bear Harvest Data. Final Report, Federal Aid in Wildlife Restoration Project W-22-6, Study 4.18. 90pp.

———, AND R. S. SELLERS. 1992. Brown Bears Density on the Alaska Peninsula at Black Lake, Alaska. Alaska Department of Fish and Game, Division of Wildlife Conservation Juneau 57pp.

———, G.C. WHITE, R.A. SELLERS, H.V. REYNOLDS, J.W. SCHOEN, K.TITUS, V.G. BARNES, R.B. SMITH, R.R. NELSON, W.B. BALLARD, AND C.C. SCHWARTZ. 1997. Brown and black bear density estimation in Alaska using radiotelemetry and replicate mark-resight techniques. Wildlife Monographs 133, 1–55.

SELLERS, R.A. 1994. Dynamics of a hunted brown bear population at Black Lake, Alaska. 1993 Annual Progress Report December, 1994. Alaska Department of Fish & Game. Juneau 61pp.

———, AND M. E. MCNAY. 1984. Population status and management considerations of brown bear, caribou, moose and wolves on the Alaskan Peninsula. Report to the Alaska Board of Game, March 1984. 53pp.

———, AND S. D. MILLER. 1991. Dynamics of a hunted brown bear population at Black Lake, Alaska. Third annual Progress Report 1990. Alaska Department of Fish & Game. Juneau 23pp.

———, S.D. MILLER, T.S. SMITH, AND R. POTTS. 1999. Population dynamics of a naturally regulated brown bear population on the coast of Katmai National Park and Preserve. 1999 Final Report. Resource Report NPS/AR/NRTR–99/36. 49pp.

———, AND L.A. AUMILLER. 1994. Population characteristics of brown bears at McNeil River, Alaska. International Conference on Bear Research and Management. 9:283–293.

TAIT, D.E.N. 1983. An analysis of hunter kill data. Ph.D. Thesis, University of British Columbia, Vancouver. 129pp.

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SUBMITTED BY:

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Table 1 Black Lake aerial stream counts of brown bears, 1988–2000

Regulatory year	Number of surveys attempted	Single bears		Maternal bears		Cubs > 1year old		Cubs of the year		Total
		Number	%	Number	%	Number	%	Number	%	
1988	4	182	27	160	23	205	30	137	20	686
1989	5	326	37	178	20	273	31	109	12	888
1990	5	332	36	194	21	232	25	170	18	928
1991	4	357	49	128	17	143	19	106	14	734
1992	3	219	35	126	20	134	22	138	22	617
1993	0									
1994	4	296	36	167	20	206	25	147	18	816
1995	4	370	38	205	21	211	22	182	19	968
1996	4	277	42	131	20	175	26	78	12	661
1997	3	139	40	69	20	48	14	90	26	346
1998	3	172	33	114	22	115	22	121	23	522
1999	4	411	37	236	21	281	25	175	16	1103
2000	4	350	36	205	21	223	23	203	21	987

Table 2 Unit 9 brown bear harvest, 1995–00

Regulatory	Hunter kill						Non-hunting kill[a]			Total reported kill					
Year	M	(%)	F	(%)	Unk	Total	M	F	Unk.	M	(%)	F	(%)	Unk.	Total
1995–96															
Fall 95	133	(58)	97	(42)	0	230	3	2	3	136	(46)	99	(54)	3	238
Spring 96	221	(79)	60	(21)	0	281	--	--	--	221	(79)	60	(21)	0	281
Total	354	(69)	157	(31)	0	511	3	2	3	357	(69)	159	(31)	3	519
1996–97															
Fall 96	3	(43)	4	(57)	0	7	9	6	5	12	(55)	10	(45)	5	27
Spring 97	7	(87)	1	(13)	0	8	--	--	--	7	(87)	1	(13)	0	8
Total	10	(67)	5	(33)	0	15	9	6	5	19	(63)	11	(37)	0	35
1997–98															
Fall 97	184	(64)	102	(46)	0	286	14	10	2	198	(64)	112	(46)	2	312
Spring 98	212	(78)	60	(22)	0	272	--	--	--	212	(78)	60	(22)	0	272
Total	396	(71)	162	(29)	0	558	14	10	2	410	(70)	172	(30)	0	584
1998–99															
Fall 98	10	(77)	3	(23)	0	13	4	3	4	14	(70)	6	(30)	4	24
Spring 99	2	(100)	0	(0)	0	2	--	-	--	2	(100)	0	(0)	0	2
Total	12	(80)	3	(20)	0	15	4	3	4	16	(73)	6	(27)	0	26
1999–00															
Fall 99	224	(60)	148	(40)	1	373	11	4	4	235	(61)	152	(39)	5	392
Spring 00	227	(76)	71	(24)	1	299	--	--	--	227	(76)	71	(24)	1	299
Total	451	(67)	219	(33)	2	672	3	1	0	462	(67)	223	(33)	6	691

[a]Includes Defense of Life or Property kills, research mortalities, and other known human-caused accidental mortality.

Table 3 Unit 9 brown bear successful hunter residency, 1995–00

Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Successful hunters[b]
1995–96	22	(4)	113	(22)	384	(74)	519
1996–97	17	(48)	9	(26)	9	(26)	35
1997–98	17	(3)	112	(19)	455	(78)	584
1998–99	9	(35)	7	(27)	10	(38)	26
1999–00	17	(2)	142	(21)	530	(77)	691

[a] Local resident means resident of Unit 9.
[b] Includes unknown residency.

Table 4 Unit 9 brown bear harvest chronology percent by month, 1995–00

	Harvest periods											
Regulatory	July/August		September		< 7 October		≥7 October		May		June	
year	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)
1995–96	1	(7)	1	(5)	5	(29)	37	(197)	52	(279)	0	(2)
1996–97	18	(6)	29	(10)	12	(4)	9	(3)	21	(7)	12	(4)
1997–98	>1	(11)	>1	(11)	1	(36)	43	(249)	47	(275)	0	(1)
1998–99	21	(5)	42	(10)	8	(2)	12	(3)	8	(2)	17	(23)
1990–00	1	(9)	9	(64)	24	(166)	22	(150)	43	(298)	0	(0)

Table 5 Unit 9 brown bear harvest percent by transport method, 1995–00

Regulatory year	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk.	*n*
1995–96	77	0	17	2	0	0	2	2	519
1996–97	3	0	20	9	0	0	17	51	35
1997–98	75	0	19	1	0	0	1	4	584
1998–99	8	0	42	8	0	0	0	42	26
1999–00	80	0	14	1	0	0	0	4	691

Alaska Department of Fish and Game
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 10 (1536mi^2)

GEOGRAPHIC DESCRIPTION: Unimak Island

BACKGROUND

Unimak Island is the only area in Unit 10 occupied by brown bears. The island is classified as a wilderness area and is managed by the Izembek National Wildlife Refuge (INWR). Brown bear hunting on Unimak Island was administered by the U.S. Fish and Wildlife Service (FWS) from 1949 to 1979 and by the department after 1979. Fifteen drawing permits are issued each year; 7 for the spring hunt and 8 for the fall hunt.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

Provide opportunities to hunt large brown bears under aesthetically pleasing conditions. The number of hunters is limited, and harvests are maintained below maximum-sustained yield.

MANAGEMENT OBJECTIVE

Maintain a high bear density with a sex and age structure that will sustain a harvest of at least 60% males.

METHODS

The FWS periodically conducts aerial bear surveys on Unimak Island in late summer. Interpretation of harvest data to reflect population status is not possible with the very low number of bears killed annually.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

The Unimak Island brown bear population appears to be maintained by natural limiting factors at a relatively stable level.

Population Size

Brown bear population size and density were not specifically evaluated on Unimak Island. Results of past surveys and extrapolation of density estimates made elsewhere in Alaska indicated that over 250 bears inhabited the island.

MORTALITY

Harvest

Season and Bag Limit. The open seasons for residents and nonresidents were 1 October–31 December and 10–25 May. The bag limit was 1 brown bear every 4 regulatory years by drawing permit only; 15 permits were issued annually.

Board of Game Action and Emergency Orders. None

Hunter Harvest. During 1981–96, annual harvests from Unimak Island averaged 5.9 bears (range = 3–9). During the 1997–99 regulatory years, the average annual harvest was 12.3 bears. Part of this recent increase is due 2 special governor's permits which were auctioned off by Safari Club International and Foundation for North American Wild Sheep. These extra permittees were successful in fall 1997 and spring 2000. The Rocky Mountain Elk Foundation auctioned another governor's permit for the 2000–01 regulatory year, but the purchaser was unable to use his permit.

Males composed 73% of the harvest during 1981–96 regulatory years and 81% during 1997–99.

Hunter Residency and Success. Nonresidents accounted for 8% of the harvest during 1981–96 and 54% during 1997–99.

Approximately 38% of permittees did not hunt on Unimak Island between 1981 and 1996, and of those who actually hunted, 63% were successful. Since 1997, 89% of permittees hunted and their success rate increased to 90%.

Harvest Chronology. Total harvests have been evenly split between the spring and fall seasons. Since 1994, when the Board of Game extended the fall season through the end of December, 4 hunters have killed bears after October.

Transport Methods. Since 1995 all successful hunters used aircraft to access Unimak Island.

CONCLUSIONS AND RECOMMENDATIONS

The brown bear population on Unimak Island appears stable, and the drawing permit hunt meets management objectives. Although harvests have increased in recent years, I do not recommend changes in the permit hunt at this time, except to cease issuing special permits for auction unless these permits are subtracted from the number issued through the normal drawing. In addition to continuing late summer aerial surveys flown by the INWR, I recommend using the new line transect population estimator developed by E. Becker on the entire island as soon as funding is secured.

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Wildlife Biologist III

SUBMITTED BY:

Mike McDonald
Wildlife Biologist III

Table 1 Unit 10 brown bear harvest data by permit hunt, 1995–99

Hunt Nr. / Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Harvest		
						Male	Female	Total
375 Fall Unit 10								
	1995–96	8	12	14	86	2	4	6
	1996–97	8	25	12	83	4	1	5
	1997–98	9[a]	0	0	100	4	5	9
	1998–99	8	12	12	86	6	0	6
	1999–00	8	25	0	100	6	0	6
376 Spring Unit 10								
	1995–96	7	57	0	100	3	0	3
	1996–97	7	28	14	80	3	1	4
	1997–98	7	0	43	57	1	3	4
	1998–99	7	14	0	100	6	0	6
	1999–00	8[a]	12	0	100	6	1	7
Totals for all permit hunts								
	1995–96	15	33	10	90	5	4	9
	1996–97	15	27	18	82	7	2	9
	1997–98	16	0	19	81	5	8	13
	1998–99	15	13	7	93	12	0	12
	1999–00	16	19	0	100	12	1	13

[a] Includes 1 governor's permit.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 11 (13,257 mi^2)

GEOGRAPHIC DESCRIPTION: Wrangell Mountains

BACKGROUND

Brown bears were numerous in Unit 11 prior to 1948–1953, when federal poisoning programs directed at controlling wolves incidentally reduced bear numbers. Following cessation of wolf control, bear numbers increased, and by the mid 1970s bears were abundant.

Brown bear harvests averaged 16 (range = 8–27) bears per year throughout the 1960s and 1970s but declined substantially after 1978, when much of Unit 11 was included in Wrangell-Saint Elias National Park and Preserve. Since 1979, hunting pressure has declined and harvests have averaged only 5 bears (range = 2–12) per year.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

To maintain a brown bear population that will sustain an annual harvest of 25 bears composed of at least 50% males.

METHODS

We monitored the brown bear harvest by sealing skulls and hides of harvested bears. We measured skulls of sealed bears and determined the sex of the bears. A premolar tooth was extracted for aging, and information on date and location of the harvest, days afield and mode of transportation was collected from successful hunters.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population data were unavailable for brown bears in Unit 11 because surveys or censuses have not been conducted. Frequent observations of bears by department staff and the public suggested a relatively abundant and well-distributed population of brown bears. A population trend was not evident.

Distribution and Movements

Based on incidental observations and harvest locations, brown bears inhabit most of Unit 11 except high-elevation glaciers. There has not been a bear movement study conducted in Unit 11, but we suspect the movement patterns are similar to those in Unit 13. After den emergence, most bears, except females with cubs of the year (COYS), move into riparian areas to feed on sprouting plants and overwintered berries. They also scavenge carcasses of ungulates that died during winter. Females with COYS tend to stay at higher elevations to avoid contact with other bears. Throughout the summer, brown bears in Unit 11 feed in many habitats. In late summer, bears generally move into subalpine habitats to feed on ripening blueberries. Bears feed on salmon in many streams throughout Unit 11 but especially in the lower Chitina River Valley during late summer and fall.

MORTALITY

Harvest

Seasons and Bag Limits. The open bear seasons in Unit 11 were 1 September to 31 October and 25 April to 31 May. The bag limit was 1 bear every 4 regulatory years.

Board of Game Actions and Emergency Orders. The board determined there was not subsistence use of brown bears in Unit 11 effective 1 July 1989. The National Park Service (NPS) adopted this board subsistence determination and closed all brown bear hunting in those portions of Unit 11 that were designated "park" (as opposed to "preserve") until 1999 when a federal subsistence season for brown bears was established.

Hunter Harvest. Two brown bears were reported killed during the 1998–99 season, and 5 were killed during 1999–00 (Table 1). The percentage of males in the harvest was below current management guidelines for one season but the harvest was only 2 bears. In recent years so few bears have been taken that the percent males in the harvest is considered neither a critical nor meaningful part of brown bear management in this unit. The mean age for males was 8.3 years in 1999–00. Mean ages of bears taken in Unit 11 cannot be used to evaluate the impacts of hunting on the bear population because so few bears are harvested.

Hunter Residency and Success. Nonresident hunters took zero (0) bears in 1998–99 and 2 brown bears during the 1999–00 season (Table 2). The annual harvest by nonresidents has declined from an average of 11 (range = 2–18) bears per year between 1961 and 1978 to an average of 2 per year (range = 0–3) since 1978. Local residents harvested no bears during the past 2 years. Successful bear hunters averaged 2 days hunting during the 1998–99 season and 4 days in 1999–00. Since 1979, hunter effort data show a mean of 4.9 days to take a bear in Unit 11.

Harvest Chronology. Fifty percent of the 1998–99 and 80% of the 1999–00 brown bear harvest occurred during the fall (Table 3). Since initiating sealing records in 1961, over 80% of the Unit 11 brown bear harvest occurred during the fall season, presumably because combination hunts for more than one species were possible. Spring harvests were higher in the 1970s when more guides were active in Unit 11.

Transport Methods. During the past few years, aircraft, highway vehicles and 4-wheelers were the most important method of transportation (Table 4). In previous years more successful hunters reported using aircraft than any other method of transportation. Use of ground transportation in Unit 11 is very restricted; the only access points are along the Nabesna or Chitina-McCarthy Roads.

Other Mortality

The last reported defense of life or property (DLP) killings occurred in 1995 when 2 bears were taken. Although much of the unit is remote with few cabins, most problem bears are killed near homesites and cabins along the Nabesna and McCarthy Roads. More bears are probably killed each year than are reported because of the work involved with salvaging and preserving the hides and skulls of bears taken DLP. Compliance with reporting requirements on DLP bears would be higher if individuals were not required to salvage the hide and skull. Because most summer hides are worthless, DLP requirements could be changed so that during June, July, and August, only skulls and claws need to be surrendered. This would undoubtedly increase reporting compliance but might also increase DLP kills as the requirement to salvage the hide may often be a deterrent to killing bears.

HABITAT

Assessment

Few cabins or homesites are in this remote unit. Future settlement will be limited because much of the land is now included in Wrangell-St. Elias National Park. Private inholdings and Park Service facilities are the only sources of development, especially along the McCarthy Road and at McCarthy. The number of people living and visiting McCarthy has increased appreciably in recent years and as a result, bear problems will become more frequent and could result in more DLP-killed bears. However the NPS has identified this as a problem area and has a good program to minimize bear problems. Overall, Unit 11 is considered good brown bear habitat because of the variety of vegetation types, large tracts of undeveloped land, and numerous salmon streams throughout the unit.

CONCLUSIONS AND RECOMMENDATIONS

From 1961 to 1978, brown bear harvests averaged 16 bears per year; since 1979, harvests have averaged 7 per year. The declines in the total and nonresident harvests were the result of the establishment of Wrangell-St. Elias National Park and Preserve. National Park Service regulations prohibit sport hunting in portions of the unit designated as "park". From 1979 until 1989, subsistence hunting for brown bears by local residents was allowed in "park" designated areas. However, aircraft were not allowed to access park areas, thus effectively closing most of the park to bear hunting. The NPS closed subsistence brown bear hunting in 1989 after the Alaska Board of Game determined that brown bears were not a customary and traditional animal for state subsistence in Unit 11. Aircraft access and sport hunting of brown bears were allowed and continue in areas designated as "preserve," which constitutes less than one-half of Unit 11.

The percent harvest of males has remained consistent since 1961, averaging 61%. This exceeded the management objective of maintaining a minimum of 50% males in the harvest. Sex

composition, mean age, and skull sizes often fluctuate annually because of small sample size. Generally, bears killed in Unit 11 were older and larger than those taken in adjacent Unit 13, where harvest rates were higher.

Brown bear harvests in Unit 11 have been low since 1979, and current harvests do not affect the brown bear population in the unit. I recommend no changes in season length or bag limit at this time.

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Table 1. Unit 11 brown bear harvest, 1995–2000.

Regulatory	Hunter kill					Non-hunting kill[a]			Estimated kill[b] Unreported		Total estimated kill					
Year	M	F	(%)	Unk	Total	M	F	Unk.	illegal		M	(%)	F	(%)	Unk.	Total
1995-96																
Fall 95	1	1	(50)	0	2	1	--	--	--	--	2	(67)	1	(33)	0	3
Spring 96	0	0	(0)	0	0	1	--	--	--	--	1	(100)	0	(0)	0	1
Total	1	1	(50)	0	2	2	0	0	0	0	3	(75)	1	(25)	0	4
1996-97																
Fall 96	1	1	(50)	0	2	0	--	--	--	--	1	(50)	1	(50)	0	2
Spring 97	0	0	(0)	0	0	0	--	--	--	--	0	(0)	0	(0)	0	0
Total	1	1	(50)	0	2	0	0	0	0	0	1	(50)	1	(50)	0	2
1997-98																
Fall 97	2	0	(0)	0	2	0	--	--	--	--	2	(100)	0	(0)	0	2
Spring 98	2	0	(0)	0	0	0	--	--	--	--	2	(100)	0	(0)	0	2
Total	4	0	(0)	0	4	0	0	0	0	0	4	(100)	0	(0)	0	4
1998-99																
Fall 98	0	1	(100)	--	1	--	--	--	--	--	0	(0)	1	(100)	0	1
Spring 99	0	1	(100)	0	1	--	--	--	--	--	0	(0)	1	(100)	0	1
Total	0	2	(100)	0	2	0	0	0	0	0	0	(0)	2	(100)	0	2
1999-00																
Fall 99	3	1	(25)	0	4	--	--	--	--	--	3	(75)	1	(25)	0	4
Spring 00	0	1	(100)	0	1	--	--	--	--	--	0	(0)	1	(100)	0	1
Total	3	2	(40)	0	5	0	0	0	0	0	3	(60)	2	(40)	0	5

[a] Includes Defense of Life or Property kills, research mortalities, and other known human-caused accidental mortality.
[b] Estimated kill by year, not by season.

Table 2. Unit 11 brown bear successful hunter residency, 1989–2000.

Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	successful hunters
1989-90	4	(33)	3	(25)	5	(42)	12
1990-91	2	(22)	6	(67)	1	(11)	9
1991-92	2	(67)	0	(0)	1	(33)	3
1992-93	2	(33)	2	(33)	2	(33)	6
1993-94	0	(0)	2	(50)	2	(50)	4
1994-95	0	(0)	4	(67)	2	(33)	6
1995-96	0	(0)	2	(100)	0	(0)	2
1996-97	0	(0)	0	(0)	2	(100)	2
1997-98	0	(0)	4	(100)	0	(0)	4
1998-99	0	(0)	2	(100)	0	(0)	2
1999-00	0	(0)	3	(60)	2	(40)	5

[a] Local resident means resident of GMU 13 or GMU 11.

Table 3. Unit 11 brown bear harvest chronology percent by time period, 1989–2000.

Regulatory year	Harvest percent				n
	September	October	April	May	
1989-90	33	8	8	50	12
1990-91	89	--	--	11	9
1991-92	67	--	--	33	3
1992-93	50	17	--	33	6
1993-94	50	--	--	50	4
1994-95	67	--	--	33	6
1995-96	50	50	--	--	2
1996-97	50	50	--	--	2
1997-98	50	--	--	50	4
1998-99	50	--	--	50	2
1999-00	60	20	--	20	5

Table 4. Unit 11 brown bear harvest percent by transport method, 1989–2000.

Regulatory year	Percent of harvest									
	Airplane	Horse	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walking	Unk.	n
1989-90	42	8	17	0	0	8	17	0	8	12
1990-91	44	0	0	0	0	11	33	0	11	9
1991-92	33	0	0	0	0	0	33	0	33	3
1992-93	33	0	33	0	0	0	33	0	0	6
1993-94	50	0	0	0	0	0	50	0	0	4
1994-95	50	0	0	50	0	0	0	0	0	6
1995-96	0	0	0	50	0	0	50	0	0	2
1996-97	100	0	0	0	0	0	0	0	0	2
1997-98	0	25	25	0	0	0	25	25	0	4
1998-99	50	0	0	0	0	0	50	0	0	2
1999-00	40	20	0	20	0	0	20	0	0	5

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 12 (9978 mi^2)

GEOGRAPHIC DESCRIPTION: Upper Tanana and White River drainages; includes the northern Alaska Range east of the Robertson River and the Mentasta, Nutzotin, and northern Wrangell Mountains

BACKGROUND

Grizzly bears are distributed throughout most of Unit 12. The only areas (approximately 2500 mi^2) not commonly used by bears are dominated by high mountains (>7000 ft), devoid of vegetation, or covered by large ice fields. Little is known about historical population trends, but based on harvest data, most of the unit probably supported densities of grizzly bears not limited by harvest. In those portions of the unit that were mined extensively or had human settlements, the bear population was regulated at lower levels.

Since 1900, grizzly bears have been actively sought by hunters and periodically by miners in southeastern Unit 12. Bear hunting regulations became more restrictive at the time of statehood until the early 1980s as guiding activity increased in the unit. During the 1970s, the unit's moose population declined substantially and grizzly bears were found to be an important predator on moose calves. In an attempt to obtain elevated moose calf survival in Unit 12, grizzly bear hunting regulations were liberalized in 1981 with the intent of reducing the bear population. Research from a Southcentral Alaska study indicated that when the grizzly bear population was reduced by at least 60%, moose calf survival increased significantly (Ballard and Miller 1990). Harvest was not expected to reduce the grizzly bear population at that level but the hypothesis was that, because the sustainable harvest of grizzly bears is low (5–8%), some population reduction would occur and perhaps result in increased moose calf survival.

During the mid-1980s, bear harvests increased by 29% in Unit 12 in response to the more liberal seasons and bag limits. Concurrently, the survival of moose calves to 5 months of age improved in western Unit 12 where bear harvest was high, and the moose population throughout Unit 12 slowly increased. However, moose calf survival also improved in portions of the unit where little bear harvest occurred. During the early 1990s annual moose calf survival declined or remained stable. Management objectives called for elevated grizzly bear harvests until moose numbers approached stated objectives or harvest levels were too high to ensure the viability of the bear population. During the 1990s it seemed that reducing the grizzly bear population by harvest was not having the desired effect on moose calf survival.

Also, further analysis of the southcentral data found no evidence that bear reduction contributed to the moose population increase (Miller and Ballard 1992). In response, management objectives were changed to offer the greatest amount of hunting opportunity while ensuring protection of the Unit 12 grizzly bear population.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Provide maximum opportunity to hunt grizzly bears in Unit 12.

MANAGEMENT OBJECTIVE

- Manage harvests so 3-year mean harvests do not exceed 28 bears and include at least 55% males in the harvest.

METHODS

All grizzly bears taken in Unit 12 must be sealed before being transported from the unit. During the sealing process we take skull measurements, determine the sex of each bear, extract a premolar tooth, and collect information on date, specific location of harvest and time spent afield by the hunter. Premolar teeth were sent to Matson's Laboratory (Milltown, Montana USA) to determine age. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY99 = 1 Jul 1999 through 30 Jun 2000).

In summer 2000 we established 5 permanent blueberry sample areas in Unit 12 and 3 in adjacent Unit 20E to assess annual berry abundance. Each area has 5 1-m^2 plots. Plots were not selected randomly but by the presence of blueberry plants. We selected for a variety of habitat types, aspects, elevations, and slopes. We placed a rain gauge at each site. Each year we will monitor rainfall and temperatures to determine the effects on blossom and berry production. To measure berry production, we will count the number of berries within each plot at the same time each year. Over time we hope to compare berry production between years and sites and evaluate the effects of berry abundance on bear harvest and the number of problem bear incidents.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

I estimated the fall 2000 Unit 12 grizzly bear population was 350–425 bears (46.6–56.7 bears of all ages/1000 mi^2; 18.0–21.9 bears of all ages/1000 km^2 in useable habitat), and the population trend was stable. My estimate was based on extrapolations from density estimate surveys conducted in similar type habitats in Interior and Southcentral Alaska (Reynolds and Boudreau 1992; Miller et al. 1997) and on harvest distribution, and sex and age composition of the harvest. My estimate of population trend was based on harvest statistics (total harvest, sex ratio, average skull size, and age of harvested bears), and informal public surveys.

Based on harvest data, grizzly bear numbers were reduced in portions of Unit 12 due to high harvest between RY73 and RY82. During that period, annual harvests averaged 20.1 bears/year, and the kill was primarily from the northern Wrangell Mountains, Mentasta Mountains, and the Tok River drainages. Much of Unit 12 is difficult to access and, consequently, harvest by residents is concentrated in the few accessible areas. Guides also hunt primarily in these areas but stay separate from resident hunters by using areas that have restricted access due to landownership patterns.

Between RY84 and RY87, estimates of grizzly bear numbers in accessible areas continued to decline due to increased harvest ($\bar{x}$ = 26 bears/yr) that followed more liberal harvest regulations. Since RY88, harvest declined to 15.3 bears/year. Harvest distribution remained relatively the same. Average skull sizes of harvested males did not change from RY73 through RY83 (20.8 in) and RY87 through RY99 (20.8 in). Average skull size (19.6 in) was smaller during RY84 through RY87. The primary difference between the periods was that from RY84 through RY87 no grizzly bear tag fee was required.

Based on kill density (number of harvested bears/10,000 mi^2), bear numbers were reduced in the more accessible areas in Unit 12 between RY73 and RY86. The estimated kill density within selected portions of the unit was high and ranged from 10.6 bears/10,000 mi^2 (4.1 bears/10,000 km^2) in the northern Wrangell and Mentasta mountains to 9.3 bears/10,000 mi^2 (3.6 bears/10,000 km^2) in the Tok River drainages. In Unit 20A a kill density of 0.8 bears/10,000 mi^2 (2.2/10,000 km^2) occurred during a period when the bear population declined by 28% (Reynolds, unpublished data). Since RY87 harvest has declined in the accessible areas and also in the remainder of Unit 12 (5875 mi^2) and the average kill density declined to 0.2 bears/10,000 mi^2 (0.4 bears/10,000 km^2).

Based on total harvest, percent of females >5 years old, and harvest location during RY98–RY00, the Unit 12 grizzly bear population was stable at a reduced level compared to the early 1970s. Comments received from long-term guides and hunters in the area support this assessment.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 12, 1 bear every regulatory year	1 Sep–31 May (General hunt only)	1 Sep–31 May

A bear taken in this unit did not count against the bag limit of 1 bear every 4 years in other units; however, no person could take more than 1 bear statewide per regulatory year. During the report period a $25 resident tag fee was required to hunt grizzly bears in Unit 12.

Board of Game Actions and Emergency Orders. No regulatory changes for grizzly bears in Unit 12 occurred during RY98–RY00. The tag fee requirement was waived in southeastern Unit 20D annually during the board's spring 1995 through spring 2001 meetings, which potentially could have affected the grizzly bear numbers in adjacent northwestern Unit 12. Based on harvest distribution in Unit 20D, this regulatory change has had little effect on Unit 12 grizzly bears (DuBois, ADF&G, personal communication).

The Board of Game designated the Unit 12 moose population as important for high levels of human consumptive use under the Intensive Management Law. This designation means that the board must consider intensive management if regulatory action to significantly reduce harvest becomes necessary because the population is depleted or has reduced productivity. This decision may affect the Unit 12 brown bear population in the future if further brown bear population reduction is deemed appropriate to benefit moose.

Hunter Harvest. Based on the estimated grizzly bear population size, and research conducted in Unit 20A (Reynolds, ADF&G, personal communication), the Unit 12 sustainable harvest was 28 bears, of which 6 can be adult females (>5 years old). During RY98–RY00 hunters reported taking 17 (RY98), 16 (RY99), and 28 bears (RY00, preliminary harvest total) of which 9, 9, and 11, respectively, were females (Table 1). Ages of harvested bears were not available after fall 1998 for this report. Three of the 4 females taken during fall RY98 were <5 years old. The 3-year average (RY97–RY99) harvest was 14.7 bears. The percent males in the harvest during this period were 85%, 47%, and 44%, respectively, and the 3-year average was 59%, exceeding the harvest objective. I do not know if females were more vulnerable during fall 1999 or it was an artifact of low sample size. In 2000 the preliminary reported fall harvest comprised of 61% male and the distribution of harvest was comparable.

In Unit 12 an assortment of season and bag limit requirements were tried to increase the grizzly bear harvest and reduce the population size. Increasing the bag limit to 1 bear/year in 1982 resulted in little change in harvest. During RY84 and RY85, the grizzly bear tag fee requirement was waived and harvest increased to 30 and 29 bears, respectively. The greatest increase in harvest was during spring 1984, indicating the increase in harvest was not incidental to moose and caribou hunts, but was due more to advertising of the area and to the tag fee exemption. Since RY92, the bag limit has been 1 bear/year and a tag fee was required. Similar to RY82 and RY83, harvest has remained unchanged and comparable to the 2 years when the bag limit was 1 bear every 4 years.

If further reduction of bear numbers through increased harvest is desired in Unit 12, the tag fee would have to be eliminated and accompanied by an intensive public awareness campaign. Even then, based on results from other areas with liberal brown bear harvest regulations, hunter demand will be satisfied and harvest will stabilize or decline within a few years and little to no increases in moose calf survival will occur (Gardner 1999). As the number of areas where tag fees are waived and bag limits increase, it may be less likely that hunters will be drawn to a specific area. In Unit 12 and in adjacent Unit 20E, the 1 bear/year

bag limit offers increased hunting opportunity and ensures adequate protection to the brown bear population.

Hunter Residency and Success. Historically, nonresidents harvested most of the grizzly bears in Unit 12. Before RY82, nonresident hunters took 63% of the harvested grizzly bears. During RY82 through RY91, resident harvest increased as a result of the regulation changes that allowed 1 bear/year and, periodically, no tag fee. During that period, residents took 66% of the bear harvest. During spring 1991 the bag limit reverted to 1 bear/4 years and resident harvest began to decline (Table 2). Since RY92, nonresidents have taken 59% of the harvest even though more liberal regulations favoring residents were reenacted. Preliminary harvest data indicates nonresidents took 64% of the fall RY00 harvest. During RY98 and RY99, nonresidents took 57% of the fall harvest and 55% of the spring harvest. Based on discussions with local and nonlocal Alaskan residents, the 2 reasons why they do not take more brown bears while hunting Unit 12 is because they have already harvested a grizzly bear or because they are not interested in taking a bear while hunting moose or sheep. Some hunters state they would take a brown bear if the tag fee was eliminated.

Harvest Chronology. During RY98 and RY99, 56–63% of the harvested grizzly bears were taken during September. In RY00, preliminary harvest data indicates 89% of the fall harvest was taken during September. The 5-year average for September was 69% (Table 3). Historically, most of the harvest was taken during September when most resident moose and caribou hunters and guided hunters are afield. During RY98–RY00, there was an increased interest in spring bear hunting in Unit 12, particularly by guided nonresident hunters.

Transport Methods. During RY98 and RY99, most successful brown bear hunters used horses or airplanes to access the area (Table 4), which is similar to historical patterns. Hunters using 3- or 4-wheelers as their primary transportation during the past 12 regulatory years have harvested only 12 bears. Few trails exist in Unit 12 that give bear hunters using this type of transportation an advantage. Almost exclusively, the use of horses was by guided nonresident hunters within the Nabesna, Chisana, and Whiter River drainages.

Other Mortality

Intraspecific mortality inflicted by adult male bears is probably the greatest source of nonhunting bear mortality in Unit 12. Incidence of brown bears taken in defense of life or property (DLP) incidents was minimal. Numerically, a higher number of brown bears were taken under DLP during fall RY00, but all were taken during 1 incident. A female with 2 cubs entered a home in Northway and were shot.

HABITAT

Assessment

Unit 12 offers moderate-quality brown bear habitat with the exception of 2500 mi^2 of unvegetated mountaintops and ice fields. Bear habitat remained relatively undisturbed, except near a few small communities, the Alaska Highway, and the Tok Cutoff. Like most other areas in Interior Alaska, streams in Unit 12 do not contain reliable seasonal salmon runs that are accessible to bears.

We established the 5 blueberry sample areas in Unit 12 during July 2000 (Table 5). Based on discussions with local berry pickers, hunters, and hikers, blueberries were locally abundant in 2000, but overall it was a sparse year. Based on the first year's data, blueberries were more common in the higher elevations but were patchy in distribution and uniformly sparse in the lower elevations. We established the sample areas during early July and could not determine blossom production. Our objective is to annually monitor blossom and berry production in these areas of Units 12 and 20E.

Enhancement

Maintenance of a near-natural fire regime through provisions of the *Alaska Interagency Fire Management Plan: Fortymile Area* was the primary action taken in the unit to restore habitat diversity and productivity for all species. In areas that are under full fire suppression, other habitat enhancement methods are being considered. A cooperative ADF&G/Alaska Department of Natural Resources logging project is being planned for the Tok River valley. If implemented, clear cuts of 20–80 acres will be treated to enhance regeneration of deciduous shrubs to mimic natural succession. About 1000 acres will be logged and treated during a 5- to 10-year period. Bears and their prey species are expected to benefit.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The initial objective for liberalizing grizzly bear harvest regulations in Unit 12 in RY82 was to cause a temporary reduction in the bear population to benefit moose calf survival. Moose calf survival increased beginning in the mid-1980s in the areas of the greatest bear harvest. However, we also found that calf survival increased in areas that received little bear harvest in adjacent Unit 20E. After monitoring this management technique for 15 years in Unit 20E and 13 years in Unit 12, I believe that reducing the grizzly bear populations by harvest in portions of these units is not effective in causing an increase in moose calf survival.

Reducing predator populations through conventional hunting and trapping is currently a socially accepted method of predator control. The public believes this method achieves increased moose survival and commonly ask for more bear reduction programs to be initiated. In order to maintain credibility with the public and the scientific community, we need to determine if and when this method is effective in increasing ungulate populations and present these findings to the public. This information will become especially important as more ungulate populations in Alaska are managed under the intensive management law.

During this period of liberal grizzly bear regulations in Units 12 and 20E, we learned that we can offer increased hunter opportunity and, with a few additional safeguards, still ensure adequate protection to the bear population. In Unit 12, based on the current estimated population size, 28 bears, including a maximum of 6 adult females, can be harvested annually without resulting in a bear population decline, assuming that harvest is evenly distributed in the unit. During the past 19 years, the annual female quota has been exceeded only once, and the overall quota 3 times. However, harvest has not been evenly distributed and has caused localized population declines and probable attendant changes to the sex and age composition (Gardner, ADF&G unpublished data). Based on Unit 12's harvest history, we can continue to offer liberal seasons and bag limits but eventually may need to develop techniques that will

result in more even distribution of harvest. Harvest strategies should be developed by regional research biologists that allow for maximum hunter opportunity and adequate protection to the grizzly bear population, while being user-friendly to the hunter and the area management biologist.

CONCLUSIONS AND RECOMMENDATIONS

Grizzly bears continue to be well distributed throughout Unit 12. The 2000 population estimate was 350–425 bears (46.6-57.7 bears of all ages/1000 mi^2; 18.0–21.9 bears of all ages/1000 km^2) and the population trend was estimated to be stable. Harvest regulations were liberal and allowed for maximum hunting opportunity. During the 1980s, due to uneven harvest distribution, bear numbers declined and population sex and age composition changed in the northern Wrangell and Mentasta Mountains, in the Tok River drainages, and near the permanent Unit 12 communities. Harvests have declined since 1988 and bear population declines have ceased, but the population probably is still dominated by young males.

The objectives to limit harvests so the 3-year mean harvest does not exceed 28 bears and has at least 55% males in the harvest was met. Both RY98 and RY99 had female harvests higher than desired. The greatest female harvest occurred during fall 1999. Five of the female bears were taken by residents and 3 by guided nonresidents. Five of the females were taken in the areas that historically have received the greatest harvest. Preliminary harvest data from fall RY00 indicates that males comprised 61% of the harvest with a similar harvest distribution. During the next year, I will monitor the harvest sex ratio closely from the Nabesna, Chisana, and White River drainages to determine if harvest restrictions are necessary to protect the female component of the population. Results will be included in the 2002 management report.

LITERATURE CITED

BALLARD WB AND SD MILLER. 1990. Effects of reducing brown bear density on moose calf survival in southcentral Alaska. *Alces* 26:9–13.

MILLER SD AND WB BALLARD. 1992. Analysis of an effort to increase moose calf survivorship by increased hunting of brown bears in south-central Alaska. *Wildlife Society Bulletin* 20:445–454.

———, GC WHITE, RA SELLERS, HV REYNOLDS, JW SCHOEN, K TITUS, VG BARNES, JR, RB SMITH, RR NELSON, WB BALLARD, AND CC SCHWARTZ. 1997. Brown and black bear density estimation in Alaska using radiotelemetry and replicated mark-resight techniques. *Wildlife Monographs* 133.

GARDNER C. 1999. Unit 20E brown bear management progress report of survey-inventory activities. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grants W-24-5 and W-27-1. Study 4.0. Juneau, Alaska.

REYNOLDS HV AND TA BOUDREAU. 1992. Effects of harvest rates on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-5, W-22-6, W-23-1, W-23-2, W-23-3, and W-23-4. Study 4.19. Juneau, Alaska.

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Table 1 Unit 12 grizzly bear mortality, regulatory years 1989–1990 through autumn 2000

Regulatory year	Reported							Estimated kill		Total estimated kill					
	Hunter kill				Nonhunting kill[a]										
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M	(%)	F	(%)	Unk	Total
1989–1990															
Autumn 1989	5	6	0	11	0	0	0	0	0	5	(45)	6	(55)	0	11
Spring 1990	2	0	0	2	0	0	0	0	0	2	(100)	0	(0)	0	2
Total	7	6	0	13	0	0	0	0	0	7	(54)	6	(46)	0	13
1990–1991															
Autumn 1990	7	4	0	11	0	0	0	0	0	7	(64)	4	(36)	0	11
Spring 1991	2	3	0	5	0	0	0	0	0	2	(40)	3	(60)	0	5
Total	9	7	0	16	0	0	0	0	0	9	(56)	7	(44)	0	16
1991–1992															
Autumn 1991	3	4	0	7	1	0	0	0	0	4	(50)	4	(50)	0	8
Spring 1992	2	0	0	2	1	0	0	0	0	3	(100)	0	(0)	0	3
Total	5	4	0	9	2	0	0	0	0	7	(64)	4	(36)	0	11
1992–1993															
Autumn 1992	11	7	0	18	0	0	0	0	0	11	(61)	7	(39)	0	18
Spring 1993	4	2	0	6	0	0	0	0	0	4	(67)	2	(33)	0	6
Total	15	9	0	24	0	0	0	0	0	15	(63)	9	(37)	0	24
1993–1994															
Autumn 1993	8	7	0	15	1	0	0	0	0	9	(56)	7	(44)	0	16
Spring 1994	2	0	0	2	0	0	0	0	0	2	(100)	0	(0)	0	2
Total	10	7	0	17	1	0	0	0	0	11	(61)	7	(39)	0	18
1994–1995															
Autumn 1994	5	6	0	11	1	0	0	0	0	6	(50)	6	(50)	0	12
Spring 1995	2	1	0	3	1	0	0	0	0	3	(75)	1	(25)	0	4
Total	7	7	0	14	2	0	0	0	0	9	(56)	7	(44)	0	16
1995–1996															
Autumn 1995	4	2	0	6	0	0	0	0	0	4	(67)	2	(33)	0	6
Spring 1996	2	0	0	2	0	0	0	0	0	2	(100)	0	(0)	0	2
Total	6	2	0	8	0	0	0	0	0	6	(75)	2	(25)	0	8
1996–1997															
Autumn 1996	9	8	0	17	0	0	0	0	0	9	(53)	8	(47)	0	17
Spring 1997	3	1	0	4	0	0	0	0	0	3	(75)	1	(25)	0	4
Total	12	9	0	21	0	0	0	0	0	12	(57)	9	(43)	0	21
1997–1998															

Regulatory year	Reported							Estimated kill		Total estimated kill					
	Hunter kill				Nonhunting kill[a]										
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M	(%)	F	(%)	Unk	Total
Autumn 1997	7	1	0	8	1	0	0	0	0	8	(89)	1	(11)	0	9
Spring 1998	3	0	0	3	0	1	0	0	0	3	(75)	1	(25)	0	4
Total	10	1	0	11	1	1	0	0	0	11	(85)	2	(15)	0	13
1998–1999															
Autumn 1998	6	4	0	10	0	1	0	0	0	6	(55)	5	(45)	0	11
Spring 1999	2	4	0	6	0	0	0	0	0	2	(33)	4	(67)	0	6
Total	8	8	0	16	0	1	0	0	0	8	(47)	9	(53)	0	17
1999–2000															
Autumn 1999	3	8	0	11	0	0	0	0	0	3	(27)	8	(73)	0	11
Spring 2000	4	1	0	5	0	0	0	0	0	4	(80)	1	(20)	0	5
Total	7	9	0	16	0	1	0	0	0	7	(44)	9	(56)	0	16
2000–2001[b]															
Autumn 2000	15	10	0	25	2	1	0	0	0	17	(61)	11	(49)	0	28

[a] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

[b] Preliminary harvest.

Table 2 Unit 12 grizzly bear successful hunter residency, regulatory years 1989–1990 through autumn 2000

Regulatory year	Unit resident	(%)	Other residents	(%)	Nonresident	(%)	Total successful hunters
1989–1990	6	(46)	3	(23)	4	(31)	13
1990–1991	2	(12)	7	(44)	7	(44)	16
1991–1992	0	(0)	3	(33)	6	(67)	9
1992–1993	7	(29)	6	(25)	11	(46)	24
1993–1994	1	(6)	6	(38)	9	(56)	16
1994–1995	2	(14)	1	(7)	11	(89)	14
1995–1996	0	(0)	1	(13)	7	(87)	8
1996–1997	5	(24)	4	(19)	12	(57)	21
1997–1998	4	(31)	1	(7)	8	(62)	13
1998–1999	1	(6)	5	(31)	10	(63)	16
1999–2000	3	(19)	5	(31)	8	(50)	16
2000–2001[a]	1	(4)	8	(32)	16	(64)	25

[a] Preliminary harvest.

Table 3 Unit 12 grizzly bear harvest chronology by month, regulatory years 1989–1990 through autumn 2000

Regulatory year	Harvest chronology by month												
	Sep	(%)	Oct	(%)	Nov	(%)	Apr	(%)	May	(%)	Jun	(%)	*n*
1989–1990	10	(77)	0	(0)	0	(0)	0	(0)	2	(15)	0	(0)	13[a]
1990–1991	11	(69)	0	(0)	0	(0)	1	(6)	4	(25)	0	(0)	16
1991–1992	7	(64)	0	(0)	0	(0)	1	(9)	1	(9)	0	(0)	11[b]
1992–1993	14	(58)	2	(8)	2	(8)	0	(0)	6	(25)	0	(0)	24
1993–1994	14	(82)	1	(6)	0	(0)	1	(6)	1	(6)	0	(0)	17[a]
1994–1995	11	(73)	0	(0)	0	(0)	1	(7)	3	(20)	0	(0)	14[a]
1995–1996	6	(75)	0	(0)	0	(0)	0	(0)	2	(25)	0	(0)	8
1996–1997	16	(76)	0	(0)	0	(0)	0	(0)	4	(19)	0	(0)	21[a]
1997–1998	8	(62)	0	(0)	0	(0)	0	(0)	3	(23)	1	(8)	13[a]
1998–1999	9	(56)	1	(6)	0	(0)	0	(0)	6	(38)	0	(0)	16[a]
1999–2000	10	(63)	1	(6)	0	(0)	0	(0)	5	(31)	0	(0)	16
2000–2001[c]	27	(96)	1	(4)	0	(0)	0	(0)	0	(0)	0	(0)	28[d]

[a] Includes 1 defense of life or property (DLP) bear. In RY1998 the DLP was taken in July and not included in this table.
[b] Includes 2 DLP bears.
[c] Preliminary harvest.
[d] Includes 3 DLP bears.

Table 4 Unit 12 grizzly bear harvest by transport method, regulatory years 1989–1990 through autumn 2000

Regulatory year	Harvest by transport method: Airplane (%)	Horse (%)	Boat (%)	3- or 4-wheeler (%)	Snowmachine (%)	ORV (%)	Highway vehicle (%)	Walking (%)	Unk (%)	*n*
1989–1990	4 (31)	2 (15)	1 (8)	0 (0)	1 (8)	4 (31)	0 (0)	0 (0)	1 (8)	13[a]
1990–1991	6 (38)	4 (25)	0 (0)	0 (0)	0 (0)	2 (13)	2 (13)	1 (6)	1 (6)	16
1991–1992	6 (67)	2 (22)	0 (0)	0 (0)	1 (11)	0 (0)	0 (0)	0 (0)	0 (0)	9
1992–1993	7 (29)	10 (42)	0 (0)	1 (4)	2 (8)	0 (0)	2 (8)	0 (0)	2 (8)	24
1993–1994	2 (12)	7 (41)	0 (0)	2 (12)	0 (0)	0 (0)	2 (12)	3 (18)	1 (6)	17[a]
1994–1995	4 (29)	7 (50)	0 (0)	1 (7)	0 (0)	0 (0)	2 (14)	0 (0)	0 (0)	14[a]
1995–1996	1 (13)	7 (86)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8
1996–1997	4 (19)	10 (48)	1 (5)	4 (19)	0 (0)	1 (5)	1 (5)	0 (0)	0 (0)	21
1997–1998	2 (15)	8 (62)	1 (8)	0 (0)	0 (0)	0 (0)	0 (0)	2 (15)	0 (0)	13[b]
1998–1999	6 (35)	5 (29)	0 (0)	1 (6)	0 (0)	2 (12)	2 (12)	0 (0)	1 (6)	17[a]
1999–2000	5 (31)	8 (50)	0 (0)	3 (19)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	16
2000–2001[c]	6 (21)	12 (43)	1 (4)	4 (14)	0 (0)	0 (0)	2 (7)	3 (11)	0 (0)	28[d]

[a] Includes 1 defense of life or property (DLP) bear.
[b] Includes 2 DLP bear.
[c] Preliminary harvest.
[d] Includes 3 DLP bears.

Table 5 Units 12 and 20E blueberry blossom and berry production sample areas, summer 2000

Area	Elevation	Aspect	Slope	Primary vegetation	Rainfall (in)		No. berries/plot					
					Blossom production (May–Jun)	Berry production (Jul–Aug)	1	2	3	4	5	$\bar{x}$
Clearwater	1966	Flat	Flat	spruce/muskeg	–[a]	2.09	14	0	31	84	8	27.4
7-Mile	1859	Flat	Flat	spruce/willow	–[a]	2.26	0	1	2	0	0	0.6
Pipeline	1888	5–10	SSW	spruce/willow	–[a]	2.77	13	6	0	0	0	3.8
RCA	2197	15–20	N	spruce/alder	–[a]	–[b]	3	0	0	0	4	1.4
4-Mile	2300	5–10	S	spruce/tussock	–[a]	2.66	11	7	14	12	11	11.0
9-Mile	2722	5–10	NE	1990 burn/willow	–[a]	2.74	23	9	10	12	7	10.2
Ptarmigan	3643	10–15	W	willow/alder	–[a]	4.40	9	59	1	14	41	24.8
Fairplay	3640	10	SW	willow	–[a]	4.48	14	0	23	2	7	9.2

[a] Rain gauges not working until after blossom production.

[b] Bear destroyed rain gauge.

Alaska Department of Fish and Game
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 13 (22,857 mi^2)

GEOGRAPHIC DESCRIPTION: Nelchina Basin

BACKGROUND

The brown bear harvest in Unit 13 increased substantially over the last forty years. The average annual harvests for the decades of the 1960s, 1970s, 1980s and 1990s were 39, 59, 105, and 113 brown bears, respectively. Interest in brown bear hunting and yearly harvests by recreational hunters increased over the years as seasons were lengthened and bag limits increased. Liberalization of brown bear hunting regulations started in 1980 with the initiation of a spring season. The bag limit was increased to one bear a year between 1983 and 1988 and again starting in 1995. Brown bear harvests have been the highest in those years when the bag limit has been one bear per year.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

To maintain a minimum unit population of 350 brown bears.

METHODS

Department representatives sealed skulls and hides of harvested bears. Skulls were measured, sex was determined and a premolar tooth was extracted for aging. Sealing agents collected information on date and location of harvest and time spent afield by successful hunters.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Brown bear density estimates are available for 2 different study areas in Unit 13E and 1 study area in Unit 13A. The 1979 estimate of 10.5 independent bears/1000 km^2 on the upper Susitna River (13E) was slightly higher than the 1987 estimate of 6.36 independent bears/1000 km^2 (Ballard et al. 1982, Miller 1988, 1995). Miller (1995) concluded that because of differences in survey methods, it could not be statistically demonstrated that a decline in bear numbers occurred though the 1987 point estimate was lower. Density estimates for the Su-Hydro Study Area (13E) in 1985 and 1995 are 18.75 and 23.31 independent bears/1000 km^2, respectively (Miller 1995). These results are comparable because similar census techniques were used,

indicating increasing brown bear numbers in portions of 13E. A 1998 density estimate from the 13A West Nelchina Study Area was 21.3 independent bears/1000 km^2 (Testa, ADF&G memorandum July 1998). Comparison of the estimates between 13E and 13A indicates no difference in population size, and these values are among the highest estimates for brown bears in Interior and northern Alaska (Testa et al. 1998).

Population Size

Four separate population estimates were calculated for Unit 13 in the past 20 years. During the late 1970's an estimate of 1500 brown bears was calculated based solely on field observations, hunter reports, and harvests. Extrapolations from density estimates in the Upper Susitna River and Su-Hydro areas in 1979, 1985, and 1987 (Ballard et al. 1982, Miller 1987, 1988) resulted in a preliminary population estimate of 1228 brown bears, of which 823 were $\geq$ 2.0 years of age (Miller 1990*b*). Based on a model of sustainable harvest rates, 640–1120 bears were estimated to inhabit Unit 13 in 1993 (Miller 1993). Finally, a second destiny estimate for the 1985 Su-Hydro Study Area completed in 1995 resulted in an updated Unit 13 population estimate of 1450 brown bears in 1996 (Miller personal communication).

Population Composition

Miller (1993) reported that during 1980–1988, brown bear litters averaged 2.1 cubs of the year, 1.9 yearlings, and 1.8 two-year-olds. The estimated reproductive interval was 4.1 years, and the observed age at first reproduction was 5.6 years (range = 4–9). Litter size in 1998 on the Nelchina Study Area was 2.3 cubs of the year and 1.8 yearlings (Testa, 1998). Based on these reproductive parameters, the brown bear population in Unit 13 has a typical reproductive potential for an Interior population.

Miller (1995) presented the sex ratios of brown bears in the Su-Hydro Study Area during 2 different censuses 10 years apart. He estimated 82.4 males/100 females present in 1985, compared to 27.8 males/100 females in 1995. He did not find a change between censuses in the mean age of brown bears in the study area. Testa (1998) reported 48 males/100 females observed during the 1998 Nelchina Study Area census.

MORTALITY

Harvest

The 1999–2000 hunting season dates were 10 August to 15 June in all of Unit 13, except that portion of 13E west of the Alaska Railroad, where the season opened on 10 September and closed 31 May. Between 1995 and 1999 the brown bear season closed 15 days earlier on 31 May unitwide. The bag limit of one bear every regulatory year was set in 1995. The resident $25 tag fee requirement in GMU 13 has been reviewed according to legislative mandate and waived every year since 1995 by the Board of Game.

Board of Game Actions and Emergency Orders. The Alaska State Legislature mandated intensive management of moose and caribou for human use in portions of Alaska under SB-77, passed in 1995. During the spring 1995 meeting, the board subsequently designated Unit 13 as an intensive management area. Board of Game findings (during intensive management discussions) were that brown bears were important predators of moose calves, that brown bears

were abundant in Unit 13, and that brown bear numbers should be reduced to increase moose calf survival. At that time, the intent of the board was to attempt to increase the brown bear harvest in Unit 13 by liberalizing the season length and bag limit and eliminating the resident tag fee requirement. The rationale behind these liberalized seasons, bag limits, and tag fee elimination is that they increase the interest in hunting brown bears.

Hunter Harvest. The reported 1999–00 sport harvest of brown bears was 166 (Table 1). This is the highest harvest ever reported in Unit 13, exceeding the previous (1996–97) record of 140 by 18%. The average annual take was 139 bears/year (range = 127–166) during this reporting period. This figure is 11% higher than the 125 bears a year average (range = 97–138) reported during the 5-year period from 1982–87 when the 1 bear/year bag limit was in place. The average annual harvest during the 8-year period from 1987–95, following a reduction in the bag limit and a somewhat reduced hunting season, was 85 bears a year (range = 66–111). The lowest harvest reported in recent years was 66 bears taken in 1993–94.

The 1999–00 brown bear harvest by unit included 13A - 33 bears, 13B - 40, 13C - 12, 13D - 28, and 13E – 57 bears. In all units the reported harvests were well above harvest levels reported before 1995 when brown bear regulations were liberalized. More bears have been reported from 13E over the years than any other unit. The reported average take in 13E for the last 5 years was 53 bears. This is the highest harvest ever reported in 13E, exceeding the average annual harvest of 48 bears a year reported during the 3 peak harvest years 1984–86.

The 1999–00 brown bear harvest was 100 (60%) males and 66 (40%) females (Table 1). Males predominated in the harvest in all units except 13E.

Since regulations were liberalized in 1995, Unit 13E has had the most skewed harvest sex ratio, with females accounting for 54% of the harvest (range = 33–65%).

The mean skull size was 21.1 inches for males and 20.1 inches for females. The mean age was 5.6 years for males and 8.5 years for females. In most years, the mean age of males taken in the fall was lower than males taken in the spring. There is a less definite trend in female ages, but females taken during the fall tend to be older, larger bears compared to females taken in spring.

Interpretation of size and age data in the harvest is difficult (Miller 1993) and can lead to false conclusions. With this in mind, the guarded conclusion reached after looking at Unit 13 data is that a high proportion of the yearly take includes young males, indicating recruitment and/or emigration into the population. There are, however, some old bears taken every year, which means that heavy bear harvests in previous years have not completely cropped the bear population. Because older males are the first to emerge from dens they are more often taken during spring, and hunters can select for older bears by hunting early in April. Young males tend be killed in the fall incidentally by hunters pursuing other big game species. We speculate that more older females are taken in the fall because their cubs that accompanied them during spring may be lost during summer, making females legal during fall.

Hunter Residency and Success. Nonresident hunters took 45 (27%) bears in 1999–00 (Table 2). The number of bears taken by nonresidents has fluctuated between years but no trend is evident in recent years, although the percent of the harvest taken by nonresidents has declined as the

total unit harvest increased. Local residents took 21 (13%) bears, the highest reported harvest by local residents to date. The nonlocal Alaska resident harvest increased appreciably in 1995–96, when hunting regulations were liberalized. Nonlocal Alaska resident bear harvests over the last 5 years have averaged 90 bears and are the highest reported since the mid 1980's, when liberal seasons and bag limits were also in effect. Bear tags were purchased by only 7–13% of successful resident hunters since eliminating the tag fee in 1995. Successful hunters averaged 3.8 days in the field in 1999–00. In Unit 13 hunters have averaged 4.2 days hunting to take a bear during the last 15 years, indicating only a slight decrease in hunting effort recently.

Harvest Chronology. For the 1999–00 regulatory year, hunters harvested 92 bears (55%) during the fall and 74 in the spring (Table 3). Throughout the current reporting period, the fall season has been the most important for bear harvests. Spring harvests have fluctuated between years (Table 1). The reason for this variation is unknown but may be related to snow conditions. Because hunters rely on snowmachines during spring, an increase in the April harvest (Table 3), such as in spring 2000, may be partly due to excellent spring snow conditions and better access. On the other hand, a particularly late break-up would interfere with ORV access later in May.

Males composed 52% (n = 48) of the fall harvest in 1999. This was the third consecutive year that males have predominated in the fall kill since harvest regulations were liberalized (Table 1). Previously, when harvests were high, the percent of males taken in the fall harvest has declined. For example, from 1983–87 with the 1 bear/year bag limit, harvests were high and males averaged only 45% of the fall take.

The percent males in the spring 2000 harvest was 70% (n = 52). The percent males taken during the spring has fluctuated between a low of 49% in 1997 and a high of 81% in 1999. Since 1980 when spring seasons started, males have averaged 67% of the harvest. Miller (1990a) stated that during spring seasons, the percent females taken could increase as the season progressed because of late den emergence by sows. However, this trend is not evident in recent harvests, 7 of 10 bears taken the last week of the June 2000 season were males.

Transport Methods. Snowmachines were the most important method of transportation for brown bear hunters in Unit 13 during 1999–00 (Table 4). This is unusual and was attributed to the deep snow conditions and very late spring that allowed their use into June in the high country. However, snowmachine use has generally been increasing since 1989. Design changes made them more powerful and reliable, permitting hunters to travel into areas formerly considered too rough or remote. Prior to this year, 4-wheelers and aircraft were the most important method of transportation. The importance of 4-wheelers as a transportation method has increased the last 5 years. Unit 13 has many far-reaching trail systems that are ideally suited to 4-wheeler transportation during fall hunting seasons. Caribou and moose hunters report that 4-wheelers have also become the most important method of transportation for them. Because many bear are taken on combination hunts in the fall, it is little wonder that 4-wheelers have exceeded other means in importance. Historically, aircraft were the most important method of transportation for Unit 13 brown bear hunters. Their use, however, has declined because of expense and easier ORV access into the remote areas.

Hunter Attitudes. We sent hunter questionnaires to 235 successful bear hunters who took a bear in Unit 13 between 1995–97. Hunter response was 54% (n = 128). Brown bears were the primary

species hunted by 33% of those responding (n = 40 out of 120), the incidental take was 67%. Incidental harvests are those in which hunters seek different species but also take a bear. Hunters seeking moose and caribou reported taking 85% of the incidental take.

The 10 August opening was important to bear hunters; 60% reported this extension allowed them added hunting opportunity. Successful hunters reported that the regulation change that most influenced their decision to hunt or take a bear was changing the bag limit to 1 bear per year. Forty-nine percent felt they would not have taken a bear without this liberalization. The impact of the bag limit change becomes apparent when 42% of the hunters reported they may hunt brown bears in another unit next year. This is quite high and shows that having the opportunity to hunt bears in another unit is important. The bag limit change was not as important for Unit 13-only hunters; 36% felt they would probably take another bear in Unit 13. However, 72% Unit 13-only hunters said they would take another Unit 13 bear if it was a significantly larger bear or a better trophy. The bag limit change was important here in allowing additional hunting opportunity for a better trophy.

Other Mortality

There were 20 brown bears (15 males, 5 females) reported killed in defense of life or property (DLP) during the 1995–96 through 1999–00 reporting period. The average of 4.0 bears/year was higher than the 2.8 bears/year average since 1961. The reported DLP harvest has always been considered a minimum estimate because some bears are shot and not reported, especially at remote cabins, home sites and mining claims. The state requirement to salvage and surrender the hides of DLP bears often deters individuals from reporting DLP bears. Bears are also not reported because individuals fear they may be cited if Fish and Wildlife Protection does not deem their DLP claim as valid.

Nonregulatory Management Problems/Needs

Intolerance of brown bears in proximity to people and dwellings is becoming more of a problem in Unit 13. Because of increased recreational use and development, bear encounters have become more numerous. Consequently, the Glennallen office has received more complaints of problem bears and requests to tranquilize and relocate bears. Publications, including news articles, about bear problems or conflicts encourage and maintain the public's fear of bears. The frequent "scare" articles in the media are hard to overcome, and perpetuate the bear/human conflict problem. In dealing with bear/human conflicts at remote sites, I recommend the department maintain its policy of not relocating problem bears.

CONCLUSIONS AND RECOMMENDATIONS

A major problem pertaining to brown bear management is the difficulty in obtaining population data. Because of their low density and secretive behavior, observing and counting bears is both difficult and expensive. This is especially true of interior grizzly populations that do not congregate on salmon streams and are wary of motorized vehicles. Because of this, population data are available for only limited portions of Unit 13. The unit bear estimate of 1450 bears was based on an extrapolation of known densities. Problems with this are obvious. Bear numbers may not be consistent throughout the unit, especially because we completed our density

estimates in heavily hunted portions of the unit to determine if bear numbers had declined because of higher harvest rates.

Brown bear density estimates obtained in 3 different study areas in Unit 13 indicate that bear numbers are high for an interior grizzly bear population. Data from these census areas indicate that bear numbers were stable or increasing even with heavy hunting pressure and high harvests. The only detectable consequence of high human harvest was a change in the sex ratio, with males less numerous than females. The mean age of the captured bears did not decline, however, indicating that hunters were not selecting for just older males but taking them as they occurred in the population. It does not appear that harvest rates in recent years are high enough to reduce the brown bear population in Unit 13.

The management objective for the Unit 13 brown bear population is to greatly reduce bear numbers. This board objective is based on data that shows brown bears kill over 50% of the moose calves born every year. Unit 13 is an intensive management area where the primary management objective is to provide high harvests of moose for human use. The board is trying to reduce bear numbers because a 1979 study where a large number of bears were translocated out of the study area resulted in increased calf recruitment. The approach adopted by the Board of Game was to attempt to reduce brown bear numbers in Unit 13 by increasing human harvests. As a result of the liberal regulations, brown bear harvests between 1982 and 1987 and since 1995 were high and exceeded the calculated sustainable harvest rates of 5.7% for all bears or 8% for bears $\geq$2.0 years (Miller 1988, 1993). Under these guidelines, any harvest in excess of 85 bears is not sustainable. However, the prediction that increased bear harvests would result in a population decline was wrong. To date, no detectable decline in brown bear numbers has occurred.

Whether future sport harvests at the current level can reduce bear numbers enough to appreciably reduce brown bear predation on moose calves is unknown. Current regulations that protect the reproductive portion of the population (sows with cubs and cubs) may protect enough sows to maintain recruitment thus prevent ever reducing the population. An adult sow is only legal every third or fourth year. Another reason high sport harvests of brown bears may not have the same impact on bear numbers as predicted using harvest models is that the Unit 13 brown bear population is not closed, and the extent and effects of migration are unknown. Brown bears are fully or partially protected in both Denali and Wrangell St. Elias National Parks. These large parks are adjacent to Unit 13 and provide a source of migration. Also, plotting of kill locations in Unit 13 indicates that timbered portions of the unit serve as refugia because higher harvests are in more open habitats.

I recommend maintaining the current season, bag limit and waived tag fee requirement as a management experiment to determine if sport harvests can reduce the brown bear population in Unit 13. We would be a lot further along in our management objective and knowledge of harvest rates on interior brown bears if we had maintained the liberal regulations we had between 1983–88. Becoming more restrictive without any detectable change in the bear population was a mistake we should not repeat. To monitor population changes, I recommend a periodic census in the 13A and 13E study areas. If a demonstrable decline occurs in the bear population, moose calf

survival in the area should be evaluated. If a rapid or drastic decline in the bear population is desired, some form of population control by the Department would be needed.

LITERATURE CITED

BALLARD, W. B., S. D. MILLER, AND T. H. SPRAKER. 1982. Home range, daily movements, and reproductive biology of brown bear in southcentral Alaska. Canadian Field Naturalist. 96:1–5.

MILLER, S. D. 1987. Big Game Studies. Vol. VI. Final 1986 Report. Susitna Hydroelectric Project. Alaska Department of Fish and Game. Juneau. 276pp.

———. 1988. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-22-6. Job IVG-4.21. Juneau. 149pp.

———. 1990*a*. Denning ecology of brown bears in southcentral Alaska and comparison with a sympatric black bear population. International Conference on Bear Research and Management. 8:279–287.

———. 1990*b*. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-23-3. Study 4.21. 88pp.

———. 1993. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Final Report. Project W-23-5. Study 4.21. 182pp.

———. 1995. Impacts of heavy hunting pressure on the density and demographics of brown bear populations in southcentral Alaska. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-24-3. Study 4.26. 28pp.

TESTA, W. J., W. P. TAYLOR, AND S. D. MILLER. 1998. Impacts of heavy hunting pressure on the density and demographics of brown bear populations in Southcentral Alaska. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-24-5. Study 4.26. Juneau.

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Table 1. Unit 13 brown bear harvest, 1995–2000.

Regulatory	Hunter kill						Non-hunting kill[a]			Total estimated kill					
Year	M	(%)	F	(%)	Unk	Total	M	F	Unk.	M	(%)	F	(%)	Unk.	Total
1995–96															
Fall 95	40	(40)	60	(60)	0	100	0	1	0	40	(40)	61	(60)	0	101
Spring 96	14	(52)	13	(48)	0	27	0	1	0	14	(50)	14	(50)	0	28
Total	54	(43)	73	(57)	0	127	0	2	0	54	(42)	70	(58)	0	129
1996–97															
Fall 96	48	(49)	49	(51)	0	97	--	--	--	48	(49)	49	(51)	0	97
Spring 97	21	(49)	22	(51)	0	43	--	-	--	21	(49)	22	(51)	0	43
Total	69	(49)	71	(51)	0	140	5	0	0	74	(51)	71	(49)	0	145
1997–98															
Fall 97	62	(56)	48	(44)	0	110	--	--	--	62	(56)	48	(44)	0	110
Spring 98	18	(69)	8	(31)	0	26	--	--	--	18	(69)	8	(31)	0	26
Total	80	(59)	56	(41)	0	136	3	1	0	83	(59)	57	(41)	0	140
1998–99															
Fall 98	57	(63)	34	(37)	0	91	--	--	--	57	(63)	34	(37)	0	91
Spring 99	30	(81)	7	(19)	0	37	--	--	--	30	(81)	7	(19)	0	37
Total	87	(68)	41	(32)	0	128	4	1	0	91	(68)	42	(32)	0	133
1999–2000															
Fall 99	48	(52)	44	(48)	0	92	--	--	--	48	(52)	44	(48)	0	92
Spring 00	52	(70)	22	(30)	0	74	--	--	--	52	(70)	22	(30)	0	74
Total	100	(60)	66	(40)	0	166	3	1	0	103	(61)	67	(39)	0	170

[a]Includes Defense of Life or Property kills, research mortalities, and other known human-caused accidental mortality.

Table 2. Unit 13 brown bear successful hunter residency, 1995–2000.

Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	successful hunters[b]
1995–96	4	(3)	87	(69)	34	(27)	127
1996–97	12	(9)	91	(65)	35	(25)	140
1997–98	13	(10)	90	(66)	33	(24)	136
1998–99	2	(2)	82	(64)	44	(34)	128
1999–00	21	(13)	100	(60)	45	(27)	166

[a] Local resident means resident of GMU 13.
[b] Includes unknown residency.

Table 3. Unit 13 brown bear harvest chronology percent by time period, 1995–2000.

Regulatory	Harvest periods																n
	August		September		October		November		March		April		May		June		
year	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	
1995–96	35	(43)	38	(50)	6	(7)	0	(0)	0	(0)	10	(13)	11	(14)	0	(0)	127
1996–97	29	(41)	38	(53)	1	(1)	1	(1)	0	(0)	14	(20)	17	(23)	0	(0)	140
1997–98	22	(30)	50	(68)	9	(12)	0	(0)	1	(1)	6	(8)	12	(17)	0	(0)	136
1998–99	22	(28)	44	(56)	5	(7)	0	(0)	0	(0)	11	(14)	17	(22)	0	(0)	128
1999–00	15	(25)	33	(55)	7	(11)	1	(1)	1	(1)	28	(46)	12	(21)	4	(7)	166

Table 4. Unit 13 brown bear harvest percent by transport method, 1995–2000.

Regulatory year	Airplane	Horse	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk.	n
1995–96	21	11	5	35	6	4	13	3	2	127
1996–97	26	5	9	26	8	5	14	5	1	140
1997–98	22	7	7	27	4	8	18	6	0	134
1998–99	28	5	9	23	7	6	18	4	1	128
1999–00	25	6	6	16	29	3	13	4	1	166

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 14 (6625 mi^2)

GEOGRAPHIC DESCRIPTION: Upper Cook Inlet

BACKGROUND

Brown bear density and distribution has been influenced by urbanization, agricultural settlement and other human activities. Grauvogal (1990) estimated brown bear numbers during the late 1980s at 169–262. Harkness (1993) refined the Unit 14 brown bear population estimate to 185–239 bears. Griese (ADF&G files; Palmer, Alaska) estimated the population range at 125–232 during 1993.

Grauvogal (1990) first estimated the annual sustainable harvest for Unit 14 at 8–19 bears. Harkness (1993) calculated sustainable harvest at 8.2–12.6 bears. Griese (1995) applied a slightly more conservative annual allowable harvest (AAH) of 10 total bears and/or 3 independent females. In 1995 the harvest objective was established at 6–10 bears, including no more than 3 females >2 years old. Since 1986 the objective of 10 bears had been exceeded in all years except 1993 when 6 bears were reported killed. Griese (1998) suggested that future population objectives should reflect the permanent loss of bear habitat in Unit 14 and human-use objectives should reflect allowance of higher harvest to bring the bear population to within a societal carrying capacity. The Board of Game agreed and allowed for a higher human-use objective of 10–15 bears (Griese 1999).

Griese (1998) recommended a strong educational program, possibly using television and radio outlets, to inform visitors and residents how to live near bears. A high incidence of human-bear interactions occurs in Unit 14. Since 1985, 1–8 bears were killed annually unrelated to hunting. In 1995 two humans were fatally mauled by brown bears in Chugach State Park in Unit 14C.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Since 1976 Unit 14A goals have been to provide the maximum opportunity to participate in hunting brown bears and, secondarily, to provide for optimum harvests of brown bears. In Unit 14B the goal has been to provide the maximum opportunity to participate in hunting brown bears. In Unit 14C the goals have been to provide an opportunity to view, photograph, and enjoy brown bears, and, secondarily, to provide an opportunity to hunt brown bears under aesthetically pleasing conditions.

Management Objectives

To maintain a brown bear population that is largely unaffected by human harvest.

Human-Use Objectives

To allow optimum opportunity to hunt brown bears with an annual allowable harvest (AAH) of 10–15 bears, including less than 5 females greater than 2 years of age. See "Board of Game Actions and Emergency Orders" and "Conclusions and Recommendations" for explanation.

METHODS

Department personnel or authorized sealers interviewed hunters when they presented bears for sealing of skulls and hides. Skulls were measured, sex of bears determined, a premolar tooth was extracted for age determination, and information on date and location of kill and hunter effort were collected from successful hunters. Harvest data were compared to previous years.

RESULTS AND DISCUSSION

Population Status and Trend

The lack of field activities (that would provide insight into population status and trend) prevent a meaningful discussion. However, public reports and human-bear encounters indicated that bears were more common than 10–15 years ago.

Mortality

Harvest

Season and Bag Limit. In regulatory year 1998 the Subunit 14B hunting season for brown bears was 15 September through 25 May. In the remainder of Unit 14 the season was 15 September through 10 October and 1–25 May. During 1999 the season for all of Unit 14, except in Unit 14C, changed to 15 September through May 25. Within Subunit 14C brown bear hunting was not allowed in Chugach State Park and several special management areas, and was allowed only within "the remainder of 14C." The bag limit for brown bears was 1 bear every 4 regulatory years. Harvesting cubs and sows accompanied by cubs was prohibited. Residents were required to get a $25 tag for brown bear hunting.

Board of Game Actions and Emergency Orders. During spring 1999 the Board of Game applied the Unit 14B season, 15 September through May 25, to all open hunting areas of Unit 14. The department proposed this liberalization because of an apparent increase in the availability of brown bears. The increased availability was believed to be a function of reduced habitat and increasing bear numbers. The department was hopeful that increased hunter opportunity would produce fewer bear human conflicts and fewer DLP kills in the future.

The board also agreed to department recommendations to increase human-use objectives for the Unit. The department recommended an annual hunter harvest objective of 10–15 bears unitwide with 5 or fewer being females >2 years old.

Hunter Harvest. During the report period hunters harvested 24 bears (Table 1) for an average annual harvest of 12 bears. This 2-year average is greater than the 8.6 average for the previous 5-year period (Griese 1999). The female bear component of the harvest during 1998–1999 was 35%, up from 26% during 1997-1998.

The average yearly total of female bears >2 years of age that were killed in the 3-year period 1997 through 1999 was 2.7 (including DLP and other non-hunting mortality). This average does not include 3 bears of unknown age (2 females and one unknown sex) killed in 1999. The previous 3-year average for 1994–96 was 3.3.

During the report period hunters legally harvested 10 males and 4 females in Unit 14A, and 5 males and 4 females in Unit 14B.

Hunter Residency. Nonresidents harvested 4 bears (17%) this period (Table 2); residents harvested the remaining 83% of the harvest (23 bears).

Harvest Chronology. Although harvest chronology in Unit 14 has been variable, harvest during this period regularly peaked during late September (Table 3). Three bears killed during April 1999 was a notable shift.

Transport Methods. Successful bear hunters preferred using highway vehicles and ORVs this report period (Table 4).

Other Mortality

There were 6 bears killed in defense of life or property during the report period (Table 1). Five of those were killed in Unit 14A (3 males and 2 females). A bear of unknown sex was reported killed by a natural or unknown cause in 14A, and a male in Unit 14B was killed illegally. In Unit 14C, a female was killed by vehicle collision, and a female was killed illegally. No bears were recorded killed by trains or highway vehicles during the reporting period. We estimated an additional 15% unreported illegal harvest above that reported (Table 1).

CONCLUSIONS AND RECOMMENDATIONS

Management objectives appear to have been met, while human-use objectives were exceeded. The recommended AAH was 6-10 bears but it was changed during the 99-00 reporting period to 10-15 bears. (Griese 1999). The prior AAH of 6-10 bears was exceeded during 1998 the new AAH of 10-15 bears was also exceeded in 1999. The AAH harvest of less than 5 females > 2-years-old was not exceeded during the last 3 seasons, although there were 3 bears (2 females of unknown age and another of unknown sex) that could have caused the AAH to be exceeded during 1999. If these unknowns were all > 2 years-old, the 3-year average would have exceeded the objectives.

Contrary to our own recommendations to take a conservative approach (Griese 1998), we recommended an increase in the AAH beginning in 1999 (Griese 1999). At the March 1999 Board of Game meeting, we recommended that the brown bear human-use objective be increased to current harvest levels, which appeared to be sustainable. By all indicators, such as frequency of bear sign observed by biologists, reports from the public, incidence of nuisance bears, and a

steady harvest level, the brown bear subpopulation in the unit seems to be stable or increasing. We suggested a hunter harvest objective of 10–15 bears (AAH of 15) with a maximum of 5 independent females. Reported harvest (excluding estimated unreported kills) since 1987 (Griese 1991, Griese 1995) has exceeded our current AAH nearly every year. The mean annual reported mortality during 1987–1998 was 14.2 bears. We reasoned that the maximum annual allowable harvest could be as high as or higher than this 12-year average.

We also recommended the hunting season be uniform for all of Unit 14 except Chugach State Park, which remains closed to brown bear hunting. The effect would be an increased early spring hunting opportunity in Unit 14A and a small portion of 14C. This overwinter season format is currently standard for most adjacent units and apparently has not affected any substantial population decline. In those adjacent units, increases in harvest have centered on the adult male segment, which we speculate reduces male/female ratios and may produce compensatory effects (Stringham 1983). The Board of Game agreed and adopted our recommendation.

We are meeting management goals for observation and photography of brown bears in the unit. Brown bears in and around Anchorage and the Matanuska-Susitna valleys are seen almost daily during the summer months, creating a tremendous number of calls from concerned citizens.

We should continue to strive for a strong educational program to inform Alaskans and visitors how to act around bears and how to minimize undesirable interactions (Griese 1999).

LITERATURE CITED

GRAUVOGAL, C.A. 1990. Unit 14 brown bear survey-inventory progress report. Pages 84-94. S.O. Morgan, ed. Annual report of survey-inventory activities. Part V. Brown/grizzly bears. Vol. XX. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-23-2. Study 4.0. Juneau. 189pp.

GRIESE, H. J. 1991. Unit 14 brown bear management report. Pages 124–131 *in* Susan M. Abbott, Ed. Annual report of survey-inventory activities. Part V. Brown Bear. Vol. XXII. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Project. Grant W-23-4 and W-23-5. Study 4.0. Juneau, Alaska USA

———. 1995. Unit 14 brown bear management report. Pages 135–141 *in* Mary V. Hicks, ed. Management report of survey-inventory activities, 1 July 1992–30 June 1994. Brown Bear. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration, Grants W-24-1 & W-24-2, Study 4.0. Juneau, Alaska USA

———. 1998. Unit 14 brown bear management report. Pages 132–138 in Mary V. Hicks, Ed. Management report of survey-inventory activities, 1 July 1994–30 June 1996. Brown Bear. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grants W-24-3 and W-24-4. Study 4.0. Juneau, Alaska USA

———. 1999. Unit 14 brown bear management report. Pages 138–145 in Mary V. Hicks, Ed. Management report of survey-inventory activities, 1 July 1996–30 June 1998. Brown

Bear. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grants W-24-5 and W-27-1. Study 4.0. Juneau, Alaska USA

HARKNESS, D. 1993. Unit 14 Brown bear management report. Pages 129-135. M. Hicks, ed. Management report of survey-inventory activities. Brown bear. 1 July 1990–30 June 1992. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. W-23-4 and W-23-5, Study 4.0. Juneau. 283pp.

STRINGHAM, S.F. 1983. Roles of adult males in grizzly bear population biology. International Conference on Bear Research and Management. 5:140-152.

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Table 1 Unit 14 brown bear harvest, 1994–99

Regulatory year	Reported: Hunter kill M	F	(%)	Unk.	Total	Reported: Nonhunting kill[a] M	F	Unk.	Estimated unreported kill	Total estimated kill M	(%)	F	(%)	Unk.	Total
1994															
Fall 94	0	1	(100)	0	1	3	0	1	1	3	(75)	1	(25)	2	6
Spring 95	2	2	(50)	0	4	0	0	1	1	2	(50)	2	(50)	2	6
Total	2	3	(60)	0	5	3	0	2	2	5	(63)	3	(38)	4	12
1995															
Fall 95	4	5	(56)	0	9	2	0	0	1	6	(55)	5	(45)	1	12
Spring 96	1	1	(50)	0	2	0	1	0	1	1	(33)	2	(67)	1	4
Total	5	6	(55)	0	11	2	1	0	2	7	(50)	7	(50)	2	16
1996															
Fall 96	5	0	(0)	0	5	4	1	0	1	9	(90)	1	(10)	1	11
Spring 97	2	3	(60)	0	5	1	0	0	1	3	(50)	3	(50)	1	7
Total	7	3	(30)	0	10	5	1	0	2	12	(75)	4	(25)	2	18
1997															
Fall 97	2	1	(33)	0	3	0	0	0	1	2	(67)	1	(33)	1	4
Spring 98	7	2	(22)	0	9	3	1	1	1	10	(77)	3	(23)	2	15
Total	9	3	(25)	0	12	3	1	1	2	12	(75)	4	(25)	3	19
1998															
Fall 98	5	3	(38)	0	8	4	0	0	1	9	(75)	3	(25)	1	13
Spring 99	0	0	(-)	0	0	0	1	0	1	0	(0)	1	(100)	1	2
Total	5	3	(38)	0	8	4	1	0	2	9	(69)	4	(31)	2	15
1999															
Fall 99	5	4	(44)	0	9	2	1	0	1	7	(58)	5	(42)	1	13
Spring 00	5	1	(17)	0	6	0	2	1	1	5	(63)	3	(37)	2	10
Total	10	5	(33)	0	15	2	1	1	2	12	(67)	6	(33)	3	21

[a]Includes DLP kills, illegal kills, other known human-caused accidental mortality, and nonfatal removal of orphaned cubs.

Table 2 Unit 14 brown bear successful hunter residency, 1993–99

Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
1993	5	(100)	0	(0)	0	(0)	5
1994	5	(100)	0	(0)	0	(0)	5
1995	10	(91)	1	(9)	0	(0)	11
1996	7	(78)	0	(0)	2	(22)	9
1997	9	(75)	1	(8)	2	(17)	12
1998	8	(100)	0	(0)	0	(0)	8
1999	11	(73)	0	(0)	4	(27)	15

[a]Unit 14 residents

Table 3 Unit 14 brown bear harvest chronology percent by month, 1993–99

Regulatory year	Harvest periods								
	September		October		November-March	April	May		
	1–15	16–30	1–15	16–31		1–30	1–15	16–31	*n*
1993	0	40	0	0	--	--	40	20	5
1994	0	20	0	0	--	--	60	20	5
1995	18	45	18	0	--	--	18	0	11
1996	0	44	11	0	--	--	33	11	9
1997	19	50	8	0	0	8	0	17	12
1998	0	63	38	0	0	0	0	0	8
1999	13	33	13	0	0	20	0	20	15

Table 4 Unit 14 brown bear harvest percent by transport method, 1993–99

Regulatory year	Percent of harvest						n
	Airplane	Horse	Boat	ORV	Highway vehicle	Other/ Unknown	
1993	0	0	0	40	20	40	5
1994	0	0	40	20	20	20	5
1995	9	0	27	0	36	27	11
1996	22	0	0	33	33	11	9
1997	17	0	0	33	33	17	12
1998	0	0	13	50	25	13	8
1999	13	0	0	27	40	20	15

Alaska Department of Fish and Game
Division of Wildlife Conservation
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 16 (12,255 mi^2)

GEOGRAPHIC DESCRIPTION: West side of Cook Inlet

BACKGROUND

Although the actual size or density of the brown bear population in Unit 16 has never been measured, Griese (1993) estimated the population at 586–1156. Estimated brown bear densities ranged from no bears on Kalgin Island to a presumed unit-high in the coastal and foothill areas of Redoubt Bay and Trading Bay. Lacking survey data, biologists had tracked harvest data to estimate population trends but more recently have also relied on reports by long-time residents or visitors to refine estimates of trend (Griese 1998). During this report period we began an effort to develop a statistically rigorous estimate of bear density over a large portion of the unit.

Hunter harvest peaked in 1985 following a lengthening of bear hunting seasons in Unit 16 (Figure 1). Prior to the liberalization, 1961–1983, harvest ranged from 17 to 46 bears annually. During 1984 the season was extended allowing hunting during den emergence, March through May. Harvest during 1984 reached 66 bears and then peaked at 89 bears the following year. From 1986 through 1992 harvest varied from 84 to 60 bears, exhibiting a general declining trend. From 1993 through 1995 harvest increased from 40 to 52 bears. Poor spring hunting weather and a reduced number of hunters afield during the fall (Griese 1998) may have influenced this period of low harvest. Moose hunter participation declined in fall 1993 because of newly enacted antler restrictions (Griese 1995). Harvest has since increased reaching 76 bears during 1999 following yet another increase of season length.

The effect of the 1984 season change was a substantial increase in the spring bear harvest and particularly the harvest of the adult male component (Faro 1990). Females generally emerge after the males and their emergence tends to coincide with "rotting" snow conditions and reduced access by hunters. The result was a focused harvest on adult males during March and April. Faro (1990) and Griese (1991) both believed the effect of the higher harvest would be detrimental to the bear population. However, Griese (1999) reported that long-time residents observed an increasing trend in observations of bears over the past 10–20 years, which was most evident in family groups and young bears. Compensatory mechanisms described by Stringham (1983) may be indicated.

Griese (1993) first estimated an annual sustainable harvest of 55 bears including no more than 18 females >2 years old. Harvest annually exceeded this estimate of a sustainable level during 1984–1992. Harvest of the female segment >2-years old exceeded estimated sustainable levels in all but 4 years (1988, 1989, 1993, and 1994). Harvest of >2-year-old females reached or exceeded 30 bears during 1985 (32), 1987 (31), and 1992 (30). Yet, brown bear numbers, at least sows and young, appeared to increase during the 1990s.

Beginning in spring 1994, the Board of Game directed the department to allow the brown bear population in Unit 16 to decline. The board determined that moose was the priority species in Unit 16 and a high population of brown bears conflicted with moose population productivity. Griese (1995) modified the brown bear population objective to reflect that priority. Griese (1998) recommended further modification, producing current management goals and objectives for a declining bear population. Because harvest levels were not reaching objective levels and the ratio of bears to moose appeared to be growing in Unit 16, the Board of Game agreed with our recommendation to adopt an August 10 opening date for bear hunting at their 1999 spring meeting (Griese 1999).

MANAGEMENT DIRECTION

Management Goals

To allow the number of breeding females in the population to decrease by providing optimal opportunity to hunt brown bears.

Population Objectives

To reach desirable predator/prey ratios by allowing the brown bear population to decline.

Human-Use Objectives

To allow human use to reach a 3-year average harvest of 28 females >2 years old.

METHODS

In May 2000 ADF&G research staff, with cooperative funding from Denali National Park, began an investigation of the application of 'an aerial survey sampling of contour transects using double-count and covariate data' (Quang and Becker 1999) to survey bears in northeastern Unit 16 and eastern Unit 13. The results will provide some insight into the density of bears in the area during the survey, providing an opportunity to refine population estimates. Biologists continued to monitor brown bear harvests by sealing skulls and hides of harvested brown bears. Department personnel or designated sealers measured skulls, determined sex of bears, extracted a premolar for age determination, and recorded date and location of kill, hunter effort, and transportation method.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Preliminary results for the "Quang and Becker survey" were unavailable, but harvest trends indicated a stable or increasing population. Staff observations during the past 20 years and comments from unit residents and others who regularly visit the unit suggested a growing brown bear population during the 1990s.

Population Size

Griese (1993) has estimated the population to be within the range of 586–1156 bears.

MORTALITY

Harvest

The most recent reported 3-year (1997–99) average annual brown bear mortality in Unit 16 was 64.0 bears. Included in this average were 16.7 females >2 years. The female harvest did not reach human-use objectives for this period. Estimates of unreported kills from wounding loss and poaching (Tables 1 and 2) added 6–7 additional bears annually to the average; half would probably have been females.

Age and Skull Size of Hunter-Killed Bears. The most recent 3-year-average age of male bears was measured at 5.9 years (n = 118), and the average skull size was 22.6 inches (n =109). The average age remains below the 1985–89 average of 7.8 years (n = 218) (Griese 1995). The average age of female bears for this report period was 5.7 years (n = 64), and average skull size was 20.1 inches (n = 62). Female statistics had also declined since 1984 but are beginning to rebound.

Season and Bag Limit. With the exception of the Denali State Park portion of Unit 16A, the open brown bear hunting season was 1 September–25 May during regulatory year 1998. The season in Denali State Park was 1 September–31 May. During 1999 the season in Unit 16B only changed to 10 August–25 May. The legal bag limit in Unit 16 was 1 bear every 4 regulatory years, and the resident tag fee was required. Cubs and females accompanied by cubs were not legal to take.

Board of Game Actions and Emergency Orders. During March 1999 the Board of Game amended and adopted a proposal that lengthened the Unit 16B fall hunting season, opening it on 10 August. The original proposal was to eliminate resident tag fees and was in reaction to complaints about high bear densities. The department recommended an increase in season length as an alternative in order to reach management objectives.

Hunter Harvest. With the exception of 1997, hunter harvest has increased from the low harvest during 1993. The low harvest during 1997 was the product of poor weather and poor snow conditions during spring. During 1999 the hunter harvest increased to 76 bears. The average harvest for the reporting period was 8.5 bears in Unit 16A (Table 1) and 61.5 bears in Unit 16B (Table 2).

Hunter Residency and Success. The composition of successful hunter residency during this report period changed slightly from previous years with an increase in the nonlocal resident harvest. Nonlocal Alaska residents claimed 51–52% of the harvest (Table 3), while nonresident hunters accounted for 42–48% of bears killed. Unit resident hunters killed 0–7% of the bear harvest.

Harvest Chronology. The shift to fall for the major portion of bear harvest during 1997 and 1998 reported by Griese (1999) continued into 1999 because of the addition of the August season (Table 4). Griese believed the original shift to September was due to poor April and May hunting conditions. During 1998, September harvest was high with 44 brown bears taken. Twelve bears were taken during the August season.

Transport Methods. Successful brown bear hunters still preferred using airplanes for transportation (Table 5). During the report period 53–83% of successful hunters used aircraft. While fears that snowmachine technology would allow more hunters to successfully take bears in the unit (Griese 1998), only during 1999 was there an evident increase in use. A noticeable increase in use of horses to harvest bears suggested that guides were taking advantage of bear abundance, perhaps in the absence of ungulates.

Other Mortality

During the report period, reported nonhunting kills averaged 7.0 bears annually (Tables 1 and 2). The composition was 79% female bears. I indicated an average of 8 bears killed and unreported during the report period based on suggestive remarks of local residents.

A Fish and Wildlife Protection officer discovered a dead male bear evocative of a wounding loss. And an investigation of a dead sow suggested she had been killed by a large boar while protecting her yearling cubs.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Griese (1998) highlighted dangerous interactions between humans and bears caused by fishing activities at the Big River Lakes sockeye salmon sport fishery. The department responded with actions designed to educate users and commercial operators specifically and to develop a multi-divisional management strategy to promote safer conditions for fisherman and bear viewers (Griese 1999). During this report period we began staffing the site during critical periods of conflict.

CONCLUSIONS AND RECOMMENDATIONS

Management objectives were not met during this report period. Although measurement of the predator/prey ratio was not attempted, the human-use objective did not reach the allowed 3-year average of 28 females >2 years. The 1997–1999 average reached only 17 females >2 years. However, by substantially liberalizing fall season in Unit 16B beginning in 1999, the Board of Game has increased the likelihood of future harvests of females to reach the desired objective.

LITERATURE CITED

FARO, J. 1990. Unit 16 brown bear survey-inventory progress report. Pages 95–98 *in* SO Morgan, ed. Brown bear. Vol. XX, Part V. Annual report of survey-inventory activities: 1 January 1988–31 December 1988. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-23-2. Study 4.0. Juneau, Alaska USA

GRIESE, H. 1991. Unit 16 brown bear survey-inventory progress report. Pages 132–141 *in* SM Abbott, ed. Survey-inventory management report. 1 July 1989–30 June 1991. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-23-3 and W-23-4. Study 4.0. Juneau, Alaska USA

———. 1993. Unit 16 brown bear survey-inventory progress report. Pages 136–151 *in* MV Hicks, ed. Management report of survey-inventory activities. 1 July 1990–30 June 1992. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-23-4 and W-23-5. Study 4.0. Juneau, Alaska USA

———. 1995. Unit 16 brown bear survey-inventory progress report. Pages 142–152 *in* MV Hicks, ed. Management report of survey-inventory activities. 1 July 1992–30 June 1994. Brown bear. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-24-1 and W-24-2. Study 4.0. Juneau, Alaska USA

———. 1998. Unit 16, West side of Cook Inlet. Pages 139–146 *in* MV Hicks, ed. Federal aid in wildlife restoration management report, survey-inventory activities 1 July 1994–30 June 1996. Brown bear. Alaska Department Fish and Game. Grants W-24-3 and W-24-4. Study 4.0. Juneau, Alaska USA

———. 1999. Unit 16, West side of Cook Inlet. Pages 139–146 *in* MV Hicks, ed. Federal aid in wildlife restoration management report, survey-inventory activities 1 July 1994–30 June 1996. Brown bear. Alaska Department Fish and Game. Grants W-24-3 and W-24-4. Study 4.0. Juneau, Alaska USA

QUANG, P. X., AND E. F. BECKER. 1999. Aerial survey sampling of contour transects using double-count and covariate data. Pages. 87-97 *in* G. W. Garner, S. C. Amstrup, J. L. Laake, B. F. J. Manly, L. L. McDonald, and D. G. Robertson, A. A. Balkema eds. Marine Mammal Survey and Assessment Methods, Rotterdam. Netherlands,

STRINGHAM, S.F. 1983. Roles of adult males in grizzly bear population biology. International Conference on Bear Research and Management. 5:140–152.

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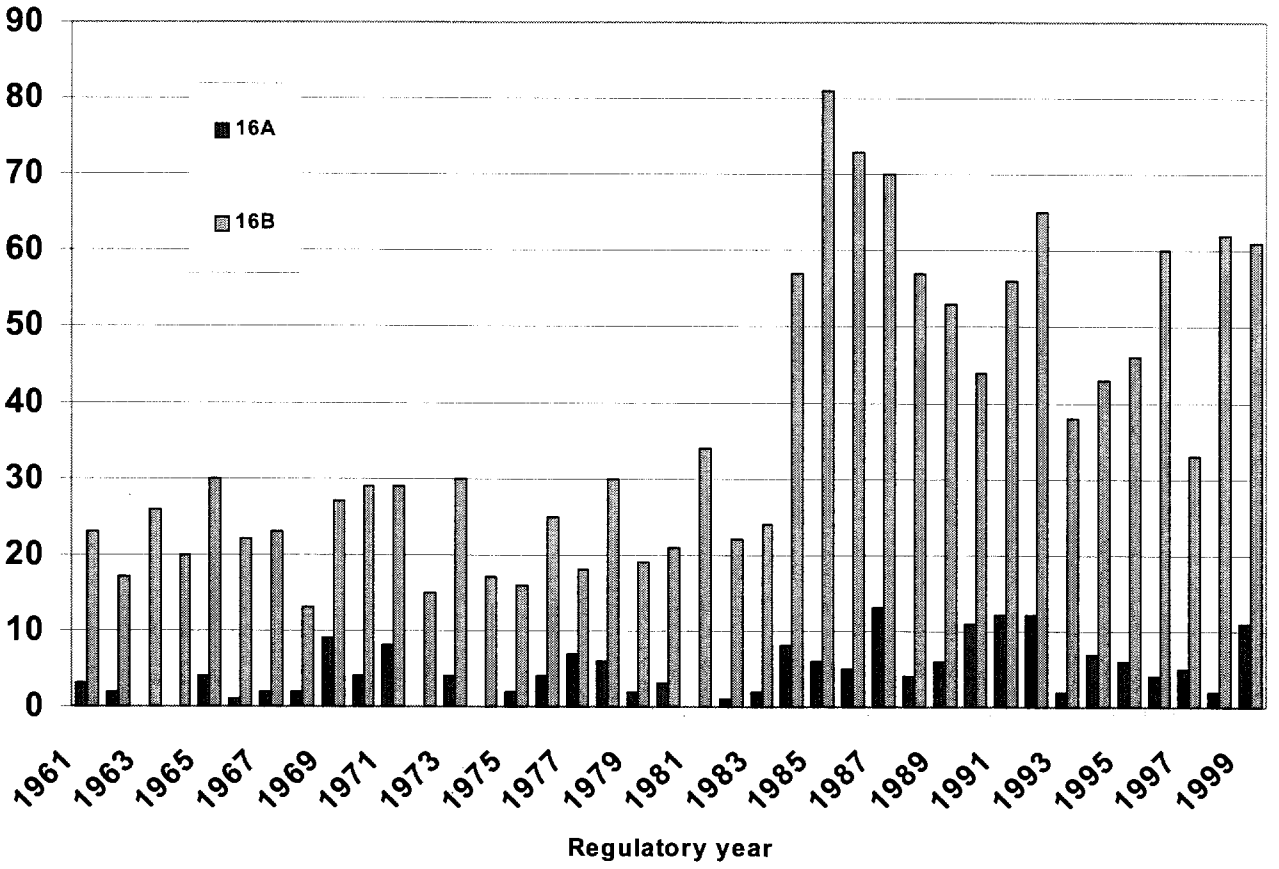

Figure 1. Unit 16A and 16B historical brown bear harvest as reported by hunters, 1961–1999.

Table 1 Unit 16A human-caused brown bear mortality, 1995–99

Regulatory year	Reported: Hunter kill M	F	(%)	Unk.	Total	Reported: Nonhunting kill[a] M	F	Unk.	Estimated unreported kill	Total estimated kill: M (%)	F (%)	Unk.	Total
1995													
Fall 95	1	1	(50)	0	2	0	1	0		1 (33)	2 (67)	0	3
Spring 96	2	2	(50)	0	4	0	0	0		3 (60)	2 (40)	0	5
Total	3	3	(50)	0	6	0	1	0	1	4 (50)	4 (50)	1	9
1996													
Fall 96	1	1	(50)	0	2	0	0	0		1 (50)	1 (50)	0	2
Spring 97	2	0	(0)	0	2	0	0	0		2 (100)	0 (0)	0	2
Total	3	1	(25)	0	4	0	0	0	1	3 (75)	1 (25)	1	5
1997													
Fall 97	2	2	(50)	0	4	0	1	0		2 (40)	3 (60)	0	5
Spring 98	1	0	(0)	0	1	1	0	0		2 (100)	0 (0)	0	2
Total	3	2	(40)	0	5	1	1	0	1	4 (57)	3 (43)	1	8
1998													
Fall 98	0	1	(100)	0	1	0	0	0		0 (0)	1 (100)	0	1
Spring 99	0	1	(100)	0	1	0	0	0		0 (0)	1 (100)	0	1
Total	0	2	(100)	0	2	0	0	0	2	0 (0)	2 (100)	2	4
1999													
Fall 99	9	2	(18)	0	11	0	0	0		9 (82)	2 (18)	0	11
Spring 00	4	0	(0)	0	4	0	1	0		4 (80)	1 (20)	0	5
Total	13	2	(13)	0	15	0	1	0	2	13 (81)	3 (19)	2	18

[a]Includes DLP kills, illegal kills, other known human-caused accidental mortality, and non-fatal removal of orphaned cubs.

Table 2 Unit 16B human-caused brown bear mortality, 1995–99

Regulatory year	Reported								Estimated Unreported kill	Total estimated kill					
	Hunter kill					Nonhunting kill[a]									
	M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
1995															
Fall 95	12	19	(61)	0	31	2	1	2		14	(41)	20	(59)	2	36
Spring 96	14	1	(7)	0	15	0	0	0		14	(93)	1	(7)	0	15
Total	26	20	(43)	0	46	2	1	2	5	28	(57)	21	(43)	7	56
1996															
Fall 96	13	16	(55)	0	29	2	0	0		15	(48)	16	(52)	0	31
Spring 97	28	3	(10)	0	31	1	0	1		29	(88)	4	(12)	1	33
Total	41	19	(32)	0	60	3	0	1	6	44	(70)	19	(30)	7	70
1997															
Fall 97	13	15	(54)	0	28	0	1	0		13	(45)	16	(55)	0	29
Spring 98	4	1	(20)	0	5	0	0	0		4	(80)	1	(20)	0	5
Total	17	16	(48)	0	33	0	1	0	3	17	(50)	17	(50)	3	37
1998															
Fall 98	29	21	(42)	0	50	0	3	0		29	(55)	24	(45)	0	53
Spring 99	10	2	(17)	0	12	0	0	0		10	(83)	2	(17)	0	12
Total	39	23	(35)	0	62	0	3	0	6	39	(60)	26	(40)	6	71
1999															
Fall 99	28	19	(40)	0	47	1	3	0		29	(57)	22	(43)	0	51
Spring 00	13	1	(7)	0	14	2	4	0		15	(75)	5	(25)	0	20
Total	41	20	(33)	0	61	3	7	0	6	44	(62)	27	(38)	6	77

[a]Includes DLP kills, illegal kills, other known human-caused accidental mortality, and nonfatal removal of orphaned cubs.

Table 3 Unit 16 brown bear successful hunter residency, 1995–99

Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total[b] successful hunters
1995	2	(4)	24	(47)	25	(49)	52
1996	2	(3)	24	(38)	37	(59)	64
1997	1	(3)	17	(44)	21	(54)	39
1998	0	(0)	33	(52)	31	(48)	64
1999	5	(7)	39	(51)	32	(42)	76

[a]Unit 16 residents

[b]Includes unknown residency

Table 4 Unit 16 brown bear harvest chronology percent by month, 1995–99

Regulatory	Harvest periods							
year	August %	September %	October %	November %	March %	April %	May %	*n*
1995	--	46	15	2	0	27	10	52
1996	--	42	6	0	6	39	6	64
1997	--	62	21	0	3	13	3	39
1998	--	69	9	2	2	16	3	64
1999	16	55	4	1	0	20	4	76

Table 5 Unit 16 brown bear harvest percent by transport method, 1995–99

Regulatory year	Percent of harvest							
	Airplane %	Horse %	Boat %	Snowmachine %	ORV %	Highway vehicle %	Other/ Unknown %	*n*
1995	71	4	6	2	4	4	10	52
1996	73	6	9	3	2	6	0	64
1997	67	5	15	0	10	3	0	39
1998	83	3	8	2	3	0	2	64
1999	53	11	9	9	8	4	7	76

Alaska Department of Fish and Game
Division of Wildlife Conservation
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 17 A, B, and C (18,800 mi^2)

GEOGRAPHIC DESCRIPTION: Northern Bristol Bay

BACKGROUND

Brown bears are common throughout the northern Bristol Bay area and are seasonally abundant along salmon spawning areas in the Nushagak, Mulchatna, Togiak, and the Kulukak River drainages as well as along the Wood River Lakes. Bears are also observed near aggregations of the Mulchatna caribou herd.

Bears in Unit 17 are neither as abundant nor as large as those found along the Alaska Peninsula; so historically there hadn't been as much hunting pressure on this bear population. Along with increased interest in hunting bears elsewhere in the state, bear hunting in Unit 17 has increased in the last few years. Prior to 1997, annual reported harvests rarely exceeded 50 bears per year. Since 1997, reported bear harvests have increased each year. Prior to 1970, few bears were reported as harvested from the unit. When the Board of Game established alternate year seasons in Unit 9 in 1973, the number of bears reported harvest from Unit 17 increased. From 1972–73 to 1980–81, the harvest was generally balanced between the spring and fall seasons. Between 1982 and 1997 there have been higher harvests during fall seasons than during the spring. Since the increased spring hunting season length during the 1998 regulatory year, spring harvest harvests have exceed that of the fall (Figure 1).

One reason for the increase in the fall harvest up through the mid-1990s was increased hunting pressure on the rapidly growing Mulchatna caribou herd (Van Daele, 1997). Reported moose harvests also increased dramatically during this same period. With more hunters afield hunting caribou and moose, more bears were killed either incidentally or during "combination" hunts. Increased spring harvest, however, also demonstrates the rising interest in hunting brown bears in Unit 17.

Reported harvests are only a part of the brown bears killed in the unit. All villages, including Dillingham, have open landfills that attract bears during the spring, summer and fall. Residential garbage, dog food, and fish-drying racks also bring bears close to humans. Some local residents have a low tolerance for bears near villages and fish sites, and they occasionally kill bears in these areas. Although reporting rates seem to have improved in recent years, many nonhunting mortalities are reported either indirectly or not at all. Because of the widespread occurrence of unreported kills, any conclusions based solely on harvest data must be viewed with caution.

POPULATION OBJECTIVE

Maintain a brown bear population that will sustain an annual harvest of 50 bears composed of at least 50% males.

METHODS

Each brown bear legally harvested or killed in defense of life or property (DLP) in the unit is sealed, the skull is measured, sex determined, and a premolar tooth extracted and aged. We record data on hunter residency, number of days hunted, transportation used, and date and location of kill at the time of sealing. When possible, we investigate circumstances surrounding DLP and illegal kills. We collect subjective population data during caribou and moose surveys. Reports from agency field workers, local residents and hunters are also used to estimate bear population trends.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

No objective data on the status of the bear population in Unit 17 is available. The brown bear population is probably stable to increasing unitwide. This appears to be the case in most of Units 17A, 17C, and the remote portions of Unit 17B. Bears living in portions of Unit 17B along the Nushagak and Mulchatna Rivers experience the greatest harvest pressure.

Population Size

No population size or density estimates have been made for the brown bear population in Unit 17. Densities are probably significantly lower than those observed along the Alaska Peninsula. Incidental observations suggest a population density of at least that observed in the Susitna River study area (2.79 bears/100 km^2) (Miller et al. 1987). This would indicate a population estimate of at least 1350 independent (>2 years old) bears in Unit 17.

Distribution and Movements

We know little about the distribution and movements of brown bears in this unit. Bears concentrate along salmon spawning streams throughout the summer and fall. Individual bears and family groups are commonly observed near calving aggregations of caribou in late May. We have seen den sites in the mountains west of the Wood River Lake system and along the upper Nushagak River.

MORTALITY

Harvest

Season and Bag Limit

Units 17A & 17C	Apr 15–May 25 Sep 10–Oct. 10	1 bear per 4 regulatory years
Unit 17B	Apr 15–May 25	1 bear per 4

	Sep 20–Oct. 10	regulatory years
Western Alaska Brown Bear Management Area (including Unit 17)	Sep 1–May 31	1 bear per regulatory year

Board of Game Actions and Emergency Orders. The Board of Game made no regulatory changes during this reporting period. No emergency orders were issued during this reporting period.

Human-Induced Mortality. During the 1998–99 hunting seasons, 78 hunters reported harvesting brown bears in Unit 17, including 56 males (72%) and 22 females (28%) (Table 1). During the 1999–00 hunting seasons, 82 hunters reported harvesting brown bears in Unit 17, including 58 males (71%) and 24 females (29%) (Table 1). This reported harvest was higher than the mean annual reported harvest of the previous 5 years (47 bears). Four bears were reported harvested in Unit 17 under the provisions of the Western Alaska Brown Bear Management during this reporting period.

The average skull size of bears harvested in 1998–99 was 23.3" (n = 52) for males and 21.1" (n = 21) for females. The average skull size of bears harvested in 1999–00 was 24.0" (n = 56) for males and 21.1" (n = 23) for females. In 1998–99, 4 bears (all males) were reported harvested in Unit 17A; 55 (36 males, 19 females were reported harvested in Unit 17B; and 19 (16 males and 3 females) were reported from Unit 17C. In 1999–00, 10 bears (7 males, 3 females) were reported harvested in Unit 17A, 50 (34 males and 16 females) were reported harvested in Unit 17B, and 22 (17 males and 5 females) were reported from Unit 17C. In the past 5 years, 7.5% of the bears reported harvested in the unit have been taken in unit 17A, 65.6% in 17B, and 26.9 in 17C (Table 2).

Hunter Residency and Success. Nonresidents account for most of the reported brown bear harvest in Unit 17. During the 1998–99 seasons, nonresidents took 90% of the bears reported harvested in the unit. During the 1999–00 seasons, nonresidents took 76% of the bears reported harvested in the unit (Table 3).

Harvest Chronology. Thirty-six bears were reported harvested during the fall 1998 hunting season, and 42 bears were reported harvested during the spring 1999 season. Thirty-eight bears were reported harvested during the fall 1999 hunting season, and 44 bears were reported harvested during the spring 2000 season (Table 1). Prior to 1998, fall has consistently been the time most bears are harvested in Unit 17. Since the spring season was lengthened, spring harvests have exceeded those taken in fall (Table 4).

Transport Methods. Most successful bear hunters in Unit 17 used aircraft for access. Boats and snowmachines were the only other consistently used method of access (Table 5).

Other Mortality

Seven brown bears were reported killed in defense of life or property in Unit 17 during the 1998–99 regulatory year. At least 8 bears were reported killed illegally in Unit 17 during 1998–

99. One brown bear was reported killed in defense of life or property in Unit 17 during the 1999–00 regulatory year.

HABITAT

Assessment

Brown bear habitat in Unit 17 is virtually unaltered and in excellent condition. Salmon stocks are carefully managed, and escapements are adequate for the needs of the current bear population. Increasing ungulate populations in the unit have also provided an abundant food supply for bears. Human settlements are small and unobtrusive, and the increased localized food sources around these settlements (human food and garbage) enhance the areas as bear habitat. However, bears using areas frequented by humans run the risk of being shot.

NONREGULATORY PROBLEMS/NEEDS

A joint ADF&G/U.S. Fish and Wildlife Service (FWS) research project started in 1992 was continued during this reporting period. The objectives of this project are to estimate bear densities, collect baseline population data, and to delineate habitat-use patterns for brown bears in portions of the Togiak and Yukon Delta National Wildlife Refuges (northwestern Unit 17A and Unit 18). Bears radiocollared in 1993, 1994, 1997, and 2000 were tracked at least twice per month.

To reduce nuisance bear complaints and illegal kills, a public education effort was continued in the unit. Radio announcements and public meetings have been used to inform rural residents about bear behavior and to disseminate advice on how to deal with bear problems. The department is working with local city and village government representatives and the Dillingham city police to enforce existing regulations when bear problems are caused by improper food or garbage storage.

The lack of objective data on the population parameters of the Unit 17 bear population and the paucity of information on nonhunting mortality make effective management difficult.

We should continue efforts to encourage local residents to report all bears killed and to educate them on bear behavior and ways to minimize problems with bears. We should also emphasize nonlethal methods of dealing with "nuisance" bears. Concurrent with these efforts, we should work with local village governments and the Department of Environmental Conservation to improve landfills so they are less attractive to bears.

The Dillingham dump was consistently used by an unknown number of individual bears during this reporting period. We will continue to work with the City of Dillingham to explore ways to minimize bear/human conflicts. This will be especially important as the proposed 2001 closure date for the dump draws near.

RESULTS AND CONCLUSIONS

We are meeting our population objective of maintaining a brown bear population that will support a harvest of 50 bears per year. Subjective evidence indicates the population is large

enough to support such a harvest if the level of nonhunting mortality is reduced. The population objective of at least 50% males in the reported harvest has been met in most years, but the sex ratio for all bears killed in the unit is unknown.

Despite harvests during the reporting period of almost twice the historical average, mean skull size of harvested males has increased and, during the 1998 and 1999 regulatory years, exceeded the long term average (Figure 2). The proportion of males in the harvest has generally increased during the last 5 years, and during the 1998 and 1999 regulatory years exceeded the long term average (Figure 3)

It's unknown if the unequal distribution of harvest is due to the distribution of the population or hunter effort. The bear population along the Nushagak and Mulchatna Rivers should be monitored closely to watch for signs of overharvest. Efforts to better distribute hunting pressure to other areas of the unit show some signs of success and should be continued.

Changing the intolerant attitude of many local residents toward bears is a significant challenge. We have instituted a multifaceted approach including education, enforcement and implementation of nonlethal methods to minimize antagonistic bear-human encounters. It is difficult to objectively measure the success of these efforts, but in recent years there probably has been improvement.

LITERATURE CITED

MILLER, S.D., E.F. BECKER, AND W.B. BALLARD. 1987. Black and brown bear density estimates using modified capture-recapture techniques in Alaska. International Conference on Bear Research and Management. 7:23–35.

VAN DAELE, L.J. 1997. Mulchatna caribou survey-inventory management report. Pages 23–36 *in* MV Hicks, editor. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Management Report. Grants W-24-3 and W-24-4. Study 3.0. Juneau, Alaska USA.

PREPARED BY

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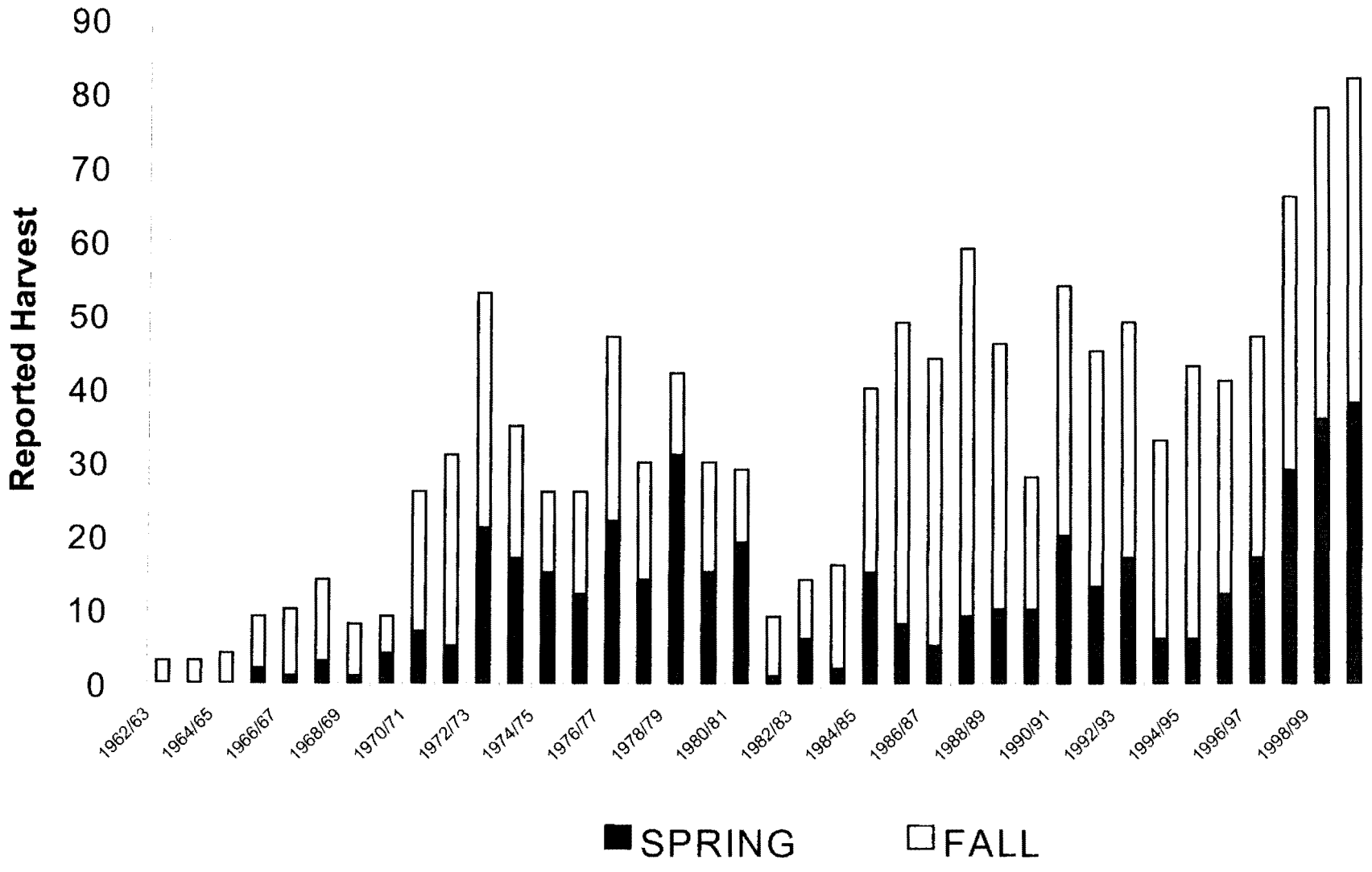
Figure 1 Unit 17 reported brown bear harvest, 1962–63 through 1999–00



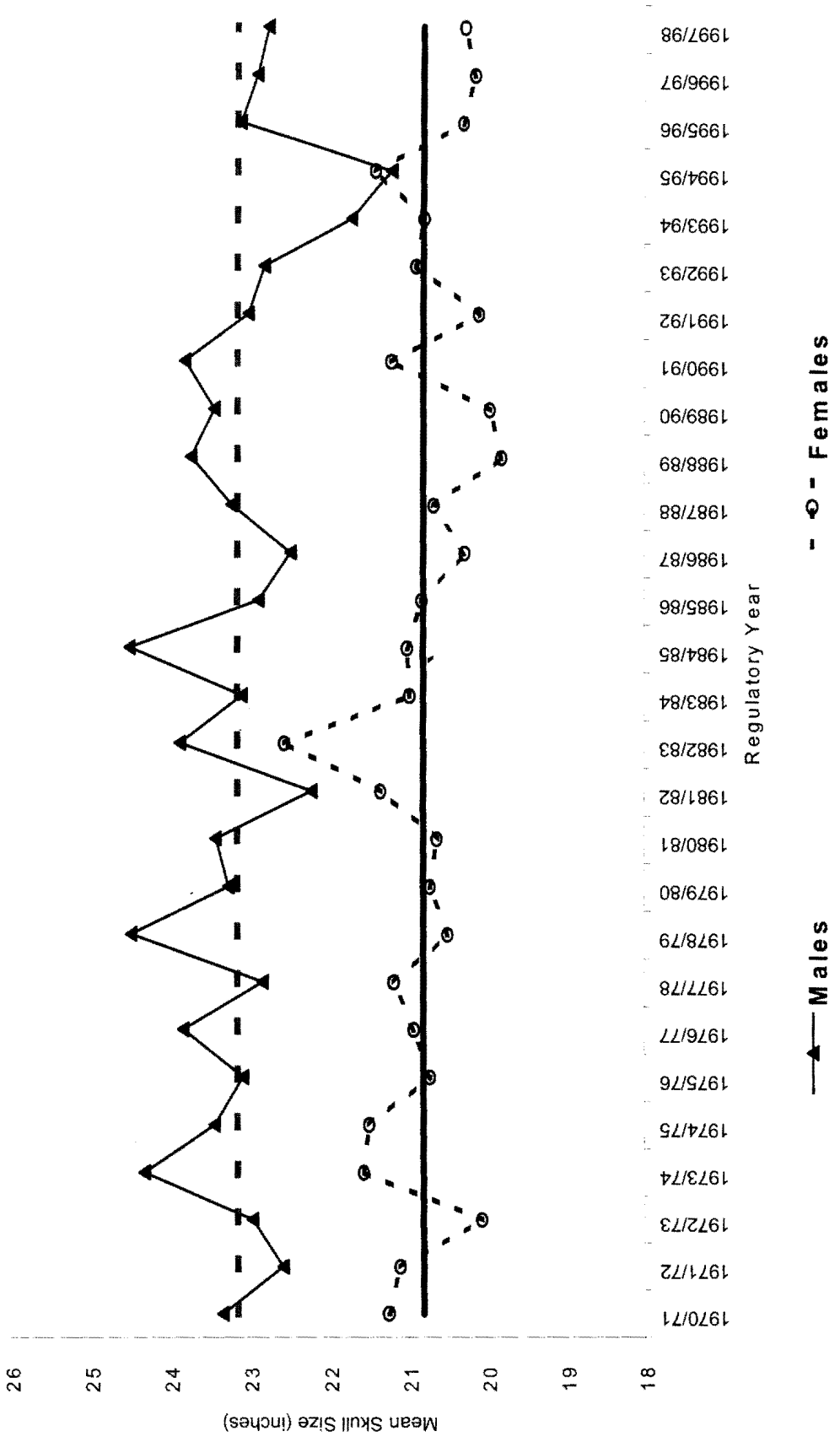


Figure 2 Unit 17 average skull sizes of brown bears, 1970–71 through 1999–00

Figure 3 Percentage of male brown bears in the Unit 17 harvest, 1970–71 through 1999–00

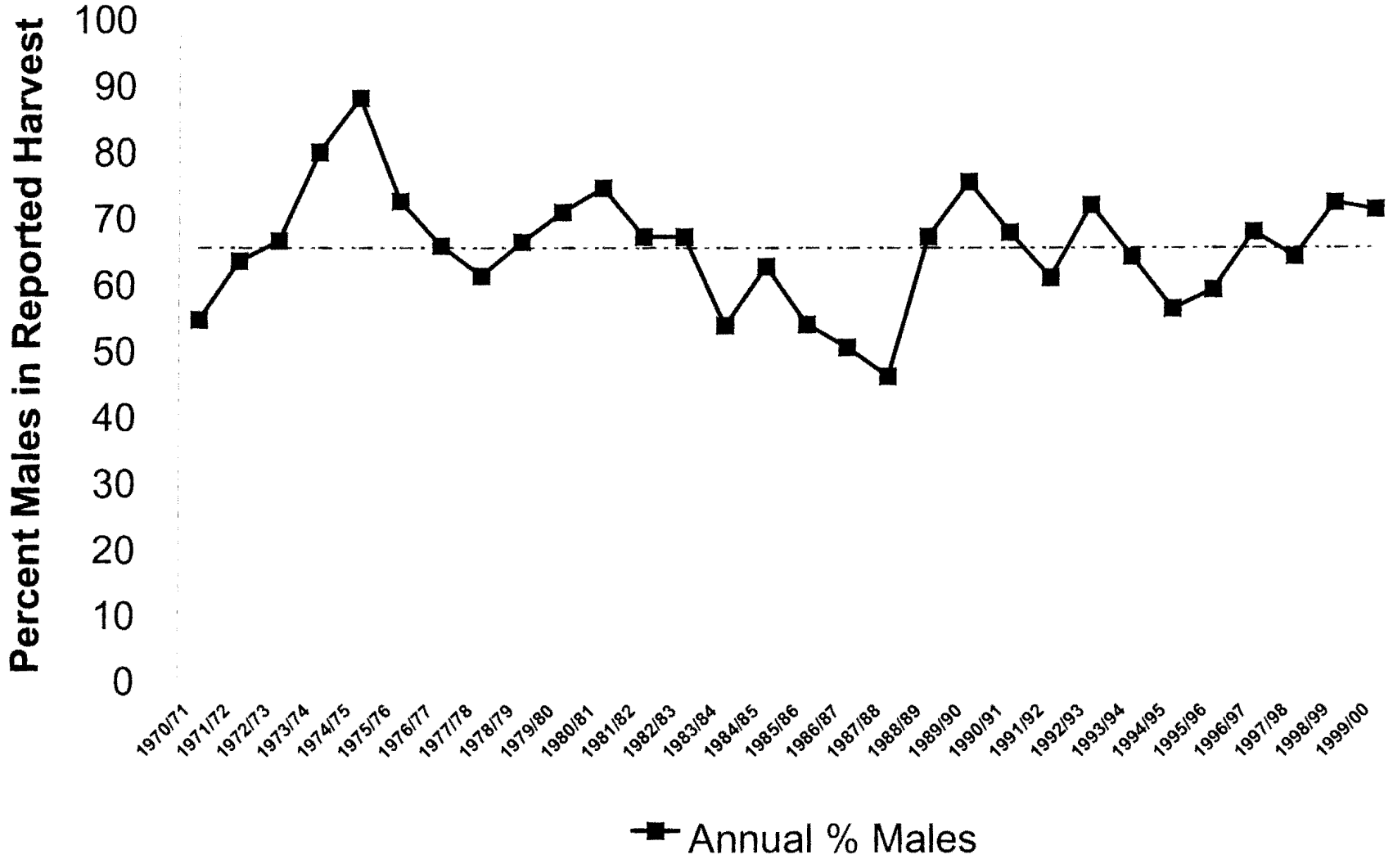


Table 1 Unit 17 brown bear harvest, 1991–92 through 1999–00

Regulatory year	Hunter Kill				Nonhunting Kill				Total reported kill			
	Male	Female	Unk	Total	Male	Female	Unk	Total	Male	Female	Unk	Total
1991												
Fall '91	13	17	2	32	1	1	1	3	14	18	3	35
Spring '92	13	0	0	13	0	1	1	2	13	1	1	15
Total	26	17	2	45	1	2	2	5	27	19	4	50
1992												
Fall '92	24	8	0	32	2	1	0	3	26	9	0	35
Spring '93	11	6	0	17	0	1	0	1	11	7	0	18
Total	35	14	0	49	2	2	0	4	37	16	0	53
1993												
Fall '93	16	11	0	27	1	1	0	2	17	12	0	29
Spring '94	5	1	0	6	0	0	0	0	5	1	0	6
Total	21	12	0	33	1	1	0	2	22	13	0	35
1994												
Fall '94	18	19	0	37	4	2	1	7	22	21	1	44
Spring '95	6	0	0	6	0	0	0	0	6	0	0	6
Total	24	19	0	43	4	2	1	7	28	21	1	50
1995												
Fall '95	14	17	0	31	2	5	0	7	16	22	0	38
Spring '96	13	2	0	15	0	0	0	0	13	2	0	15
Total	27	19	0	46	2	5	0	7	29	24	0	53

Table 1 Continued

Regulatory year	Hunter Kill				Non-hunting Kill				Total reported kill			
	Male	Female	Unk	Total	Male	Female	Unk	Total	Male	Female	Unk	Total
1996												
Fall '96	19	10	1	30	3	0	2	5	22	10	3	35
Spring '97	12	5	0	17	1	0	0	1	13	5	0	18
Total	31	15	1	47	4	0	2	6	35	15	3	53
1997												
Fall '97	20	17	0	37	8	4	0	12	28	21	0	49
Spring '98	22	7	0	29	8	0	1	1	22	7	1	30
Total	42	24	0	66	8	4	1	13	50	28	1	79
1998												
Fall '98	20	16	0	36	2	2	1	5	22	18	1	41
Spring '99	36	6	0	42	2	0	0	2	38	8	0	46
Total	56	22	0	78	4	2	1	7	60	26	1	87
1999												
Fall '99	23	15	0	38	0	0	1	1	23	15	1	39
Spring 2000	35	9	0	44	0	0	0	0	35	9	0	44
Total	58	24	0	82	0	0	1	1	58	24	1	83

Table 2 Unit 17 brown bear harvest by subunit, 1991–92 through 1999–00

Regulatory year	Unit 17(A) M	F	Unk	Total	17(B) M	F	Unk	Total	17(C) M	F	Unk	Total	Unit 17 total M	F	Unk	Total
1991–92	2	2	0	4	18	12	2	32	6	3	0	9	26	17	2	45
1992–93	1	3	0	4	21	7	0	28	13	4	0	17	35	14	0	49
1993–94	1	2	0	3	16	6	0	22	4	4	0	8	21	12	0	33
1994–95	0	3	0	3	17	13	0	30	7	3	0	10	24	19	0	43
1995–96	1	3	0	4	18	13	0	31	8	3	0	11	27	19	0	46
1996–97	3	0	0	3	18	9	1	28	11	6	0	17	31	15	1	47
1997–98	3	0	0	3	28	18	0	46	11	6	0	17	42	24	0	66
1998–99	4	0	0	4	36	19	0	55	16	3	0	19	56	22	0	78
1999–00	7	3	0	10	34	16	0	50	17	5	0	22	58	24	0	82

Table 3 Unit 17 brown bear successful hunter residency, 1991–92 through 1999–00

Regulatory year	Local[a] resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters[b]
1991–92	5 (11.1)	2 (4.4)	38 (84.4)	45
1992–93	8 (16.3)	4 (8.1)	35 (71.4)	49
1993–94	2 (6.0)	2 (6.0)	28 (84.8)	33
1994–95	4 (9.3)	2 (4.7)	37 (86.0)	43
1995–96	2 (4.4)	11 (23.9)	33 (71.7)	46
1996–97	4 (8.5)	4 (8.5)	39 (83.0)	47
1997–98	1 (1.5)	9 (13.6)	56 (84.9)	66
1998–99	5 (6.4)	3 (3.9)	70 (89.7)	78
1997–98	9 (11.0)	11 (13.4)	62 (75.6)	82

[a] residents of Game Management Unit 17.

[b] total may be higher than the sum of the columns because of hunters of unknown residency.

Table 4 Unit 17 brown bear harvest chronology percent by season, 1991–92 through 1999–00

Regulatory	Fall Season			Spring Season				
year	Sep 1–15	Sep 16–30	Oct 1–15	Apr 1–15	Apr 16–30	May 1–15	May 16–30	Total
1991–92[a]	6.7%	53.3%	11.1%	----	----	11.1%	15.6%	45
1992–93[a]	12.2%	46.9%	6.1%	----	----	20.4%	14.3%	49
1993–94[a, b]	9.1%	48.5%	24.2%	----	----	6.1%	12.1%	33
1994–95[a,b]	11.6%	58.1%	16.3%	----	----	4.7%	9.3%	43
1995–96[a,b]	10.9%	45.6%	10.9%	----	----	15.2%	17.4%	46
1996–97[a,b]	6.4%	34.0%	23.4%	----	----	17.0%	19.2%	47
1997–98[c]	7.6%	30.3%	18.2%	----	22.7%	13.6%	7.6%	66
1998–99[c]	1.3%	25.6%	18.0%	----	26.9%	19.2%	9.0%	78
1999–00[c]	3.7%	30.5%	12.2%	4.9%	20.7%	23.2%	4.9%	82

[a] Season dates: Spring - Unit 17 May 10–May 25
Fall - Units 17A & C Sep 10 - Oct 10
Unit 17B Sep 20 - Oct 10

[b] Season dates for 1993–94 through 1996–97 are the same as 1990–91 through 1992–93 with the following addition:

Western Alaska Brown Bear Management Area (including 17A and that portion of 17B that drains into Nuyakuk and Tikchik Lakes) Sep 1–May 31

[c] Season dates: Spring - Unit 17 April 15 - May 25

Fall - Units 17(A)&(C) Sep 10 - Oct 10
Unit 17(B) Sep 20 - Oct 10

Western Alaska Brown Bear Management Area
(including Unit 17) Sep 1–May 31

Table 5 Unit 17 brown bear harvest percent by transport method, 1991–92 through 1999–00

Regulatory year	Percent of harvest									
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unknown	Total
1991–92	80.0	---	15.5	---	---	---	---	---	4.4	45
1992–93	83.6	---	14.2	---	---	---	---	2.0	---	49
1993–94	81.8	---	15.1	---	---	---	---	3.0	---	33
1994–95	83.7	---	16.3	---	---	---	---	---	---	43
1995–96	91.3	---	6.5	---	---	---	2.2	---	---	46
1996–97	78.7	---	17.0	---	---	---	2.1	---	2.1	47
1997–98	74.2	---	18.2	---	6.1	---	---	1.5	---	66
1998–99	73.1	---	7.7	1.3	18.0	---	---	---	---	78
1999–00	58.5	---	17.1	2.4	20.7	---	---	---	1.2	82

Percent Males in Harvest
0
10
20
30
40
50
60
70
80
90
100
1970/71
1972/73
1974/75
1976/77
1978/79
1980/81
1982/83
1984/85
1986/87
1988/89
1990/91
1992/93
1994/95
1996/97
Regulatory Year

Alaska Department of Fish and Game
Division of Wildlife Conservation
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JUNEAU, AK 99802-5526

BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 18 (42,000 mi^2)

GEOGRAPHIC DESCRIPTION: Yukon-Kuskokwim Delta

BACKGROUND

Brown/grizzly bears exist at moderate density, and the population is stable in Unit 18. Highest densities are in the Kilbuck Mountains southeast of Bethel and in the Andreafsky Mountains/Nulato Hills north of the Yukon River. Typically, few bears are reported harvested.

Traditionally, bears were important as food animals for the Yup'ik Eskimo people of Unit 18 and some of their customs surrounding bear hunting were inconsistent with the general regulations. A working group made up of representatives of Unit 18 villages was established and remains a vehicle for local input on brown bear issues. After consultation with this group, regulations were established to more closely match their cultural needs and to improve harvest reporting. As a result, the Western Alaska Brown Bear Management Area (WABBMA) was established. In the WABBMA, a registration permit is available for subsistence hunters who pursue bears primarily for the meat.

Obtaining a brown bear density estimate in Unit 18 is an objective that we have been unable to achieve because of local sentiment against the use of radiocollars. We are continuing our brown bear study to obtain other population parameters and are dealing with the working group to increase acceptance of radiocollars.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain the existing brown bear population.
- Minimize adverse interactions between bears and the public.
- Continue to develop brown bear hunting regulations and harvest assessment techniques that are supported by the local village councils, the U.S. Fish and Wildlife Service (FWS), and other users.

- Continue participation in the cooperative management plan for the Unit 18 brown bear population within the WABBMA in cooperation with the FWS and local villages within the management area.

MANAGEMENT OBJECTIVES

- Coordinate with FWS biologists from the Yukon Delta National Wildlife Refuge (YDNWR) and the Togiak National Wildlife Refuge (TNWR) to implement a study plan using mark-recapture techniques to estimate the brown bear densities in Unit 18.

- Monitor harvests through the sealing program, harvest reports from WABBMA registration permit holders and through contacts with the public.

- Provide educational material through the media and informal channels to improve compliance with brown bear hunting regulations and brown bear harvest reporting requirements.

- Inform the public of methods to minimize bear-human conflicts by reducing the attractiveness of fish camps, dumps and other attractive nuisances.

- Meet with Association of Village Council Presidents (AVCP), subsistence brown bear hunters, and FWS to regulate bear hunting and to gather brown/grizzly bear harvest information. We will achieve this by using WABBMA regulations consistent with the cooperative management plan.

- Continue to cooperate with local village councils, the AVCP, and the FWS in developing techniques acceptable to local residents to monitor grizzly bear populations within the WABBMA and Unit 18.

METHODS

We continued the cooperative project with FWS and the Bureau of Land Management (BLM) to study brown bear density, movements, and population parameters, which began in 1993. Methods used in this effort are found in the summary of capture-recapture techniques for bears developed by Miller *et al.* (1987).

We held a meeting of the WABBMA working group in November 1999 that included participants from area villages, YDNWR, AVCP, and the department. Prior to this meeting the Board of Game delayed action on several public proposals to lengthen the general bear season pending recommendations from the working group. The group did not support any of the proposals and the Board subsequently did not make any regulatory changes.

Work toward the management objective to obtain a brown bear density estimate has been stymied because the working group has not supported the necessary deployment of radiocollars, particularly on boars, required by the census technique. Their support was made mandatory after a 1994 federal court decision put a halt to the use of radiocollars in the Kilbuck Mountains. However, some progress was made during the November 1999 meeting. While the group did not

support deploying any radiocollars on boars, they did support replacing existing radiocollars on sows and radiocollaring additional sows for a total deployment of 30 collars.

We recaptured 17 radiocollared sows and deployed fresh collars on 16 of them during late May and early June 2000. One bear did not receive a fresh collar because she was old and crippled and we did not expect her to survive much longer. We radiocollared 13 additional sows and by the end of the project we had a total of 29 collars deployed in the Kilbuck Mountains.

We included members of the working group as observers during our radiocollaring projects. This is an important aspect of our radiocollaring efforts and has improved acceptance of radiocollars. Village representatives from Mt. Village, Quinhagak, Bethel, and Kwethluk participated in the spring 2000 radiocollaring effort.

We sent letters requesting harvest and effort information to everyone who registered to hunt in the WABBMA during the 1998–1999 and the 1999–2000 regulatory years. We monitored the general hunt harvest through our standard sealing requirements. We assisted several local residents who shot bears in defense of life and property (DLP).

We contacted village leaders, local media, village natural resource personnel, hunters, and law enforcement personnel in an effort to minimize bear-human conflicts at camps and dumps. We relayed reports of illegal activities to the Department of Public Safety, Division of Fish and Wildlife Protection.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

The bear population appears stable, although statistically valid bear density estimates have not been made in Unit 18. Density estimates are possible using a modified capture-recapture technique (Miller *et al.* 1987). However, for an accurate, statistically valid estimate, approximately 50% of the population must be marked. Even with the recent increase of 12 radiocollars, a high enough level of collaring was not achieved due to local opposition and is the main factor in our inability to obtain a density estimate.

Kovach *et al* (unpublished draft) found generally low reproductive parameters for bears in the Kilbuck Mountains. The age of first reproduction is 7.2 years. The age of first successful reproduction is 9.0 years. The mean litter size is 1.9. The mean age at weaning is 3.1 years. The reproductive interval is 4.6 years and the mean annual sow productivity is 0.4 weaned cubs per year.

The survival rate of cubs from birth to weaning from 1993 to 1999 was 31.9% (22 weaned of 69 cubs produced). The mean annual survival rate for adult females from 1993 to 1999 was 95.7%.

Population Size

Population size estimates must be viewed with caution until a statistically valid estimate is completed in Unit 18. Based on information from previous reporting periods and assessments of available habitat, approximately 500–700 grizzly bears inhabit Unit 18.

Population Composition

There were no activities to determine brown bear population composition in Unit 18 during the reporting period.

Distribution and Movements

Salmon streams in Unit 18, such as the Kisaralik and Kwethluk Rivers in the Kilbuck Mountains and the Andreafsky River north of St. Marys, support greater brown bear densities than elsewhere in the unit. Lowland habitats along the forested riparian corridors of the Yukon River and tributaries of the Kuskokwim River support moderate densities of brown bears. Other lowland habitats, including the vast treeless lowland of the Yukon–Kuskokwim Delta (Y-K Delta), contain very few bears.

MORTALITY

Harvest

Season and Bag Limit.

Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 18–General Hunt		
Resident Hunters: 1 bear every four regulatory years	10 Sep–10 Oct 10 Apr–25 May (General hunt only)	
Nonresident Hunters: 1 bear every four regulatory years		10 Sep–10 Oct 10 May–25 May (General hunt only)
Unit 18–Subsistence Hunt		
Resident Hunters: 1 bear per regulatory year by registration permit in the WABBMA for subsistence purposes	1 Sep–31 May (Subsistence hunt only)	
Nonresident Hunters:		No open season (Subsistence hunt only)

Board of Game Actions and Emergency Orders. The Board of Game reauthorized the brown bear tag fee exemption associated with the WABBMA registration permit. There were no other changes made to the bear regulations during this reporting period.

Human-Induced Harvest. During the 1998–1999 regulatory year, the Unit 18 reported harvest was 14 bears (1 subsistence and 13 general season) and during 1999–2000 the reported harvest

was 7 bears (2 subsistence and 5 general season). Additional harvest statistics are shown in Tables 1 and 2.

DLP losses are reported infrequently. By their nature, DLP instances are unplanned; people involved in DLP kills are unprepared for dealing with a dead bear, and generally have poor knowledge of proper procedures. We made some progress with DLP reporting, but we probably don't hear about most bears killed under DLP circumstances. During this reporting period we processed 2 DLP bears.

Permit Hunts. The WABBMA registration permit is available to hunters who take bears primarily for the meat. This permit was designed to make bear hunting regulations more suitable for local residents who include bear meat as part of their subsistence fare. Under this permit; hunters must salvage the meat for human consumption, hunters are able to take one bear per regulatory year, the season is longer, the hide and skull need not be salvaged, hunters report their hunting activity after receiving a prompt by mail, and the sealing requirement is eliminated unless the hide is removed from the management area. If a hide is presented for sealing under this last provision, the trophy value of the hide is destroyed by removing the skin of the head and the front claws and these parts are retained by the department.

The percentage of WABBMA permits issued to residents outside Unit 18 has increased from 5% in 1996–1997 to 38% by 1999–2000. In some cases, hunters get the permit so they can shoot a bear causing problems in camp during hunts for other big game. They often don't want to shoot a bear, but if they have to, they also don't care to relinquish it to the State as required by DLP regulations. Provided the meat is salvaged, the WABBMA permit offers them a way to do that without paying the $25 tag fee required under the general hunt regulations. This is an unintended use of the WABBMA permit and needs to be considered if this type of use increases.

Hunter Residency and Success. During the 1998–1999 regulatory year, 3 residents and 10 nonresidents harvested brown bears under the general hunting regulations. During 1999–2000, 2 residents and 3 nonresidents harvested bears (Table 1).

The YDNWR has issued permits to 2 bear hunting guides to operate within the refuge. The TNWR has issued a permit to 1 guide to operate within the portion of the TNWR within Unit 18. Only 1 of these three guides is active. Each is permitted to take up to 5 bears per calendar year. The higher harvest of bears during the 1998–1999 season (Table 1) is largely explained by the fact that these permits are based on calendar rather than regulatory years.

Only residents are eligible for WABBMA registration permits. In 1998–1999, 4 hunters reported taking bears. Only 1 of these was taken in Unit 18. In 1999–2000, 8 hunters reported taking bears and 2 of these were taken in the Unit 18 portion of the WABBMA (Table 2).

General hunt regulations require hunters to report by having their bear sealed. However, this reporting mechanism does not measure the number of unsuccessful hunters so success rates could not be calculated for this group of hunters.

Success rates are available for those hunters using the WABBMA permits (Table 2). In 1998–1999, 42 of 95 permitees reported their hunts. Of these, 21 did not hunt and 21 reported hunting

bears. Four bears were reported harvested. Only 1 of the 4 bears harvested was taken in the Unit 18 portion of the WABBMA. Approximately 19% of those who hunted were successful. In 1999–2000, 63 of 85 permitees reported their hunts. Of these, 36 did not hunt while 27 reported hunting bears for a reported harvest of 8 bears. Only 2 of the 8 bears harvested were taken in the Unit 18 portion of the WABBMA. Approximately 30% of those who hunted were successful.

Harvest Chronology. Most of the bears taken in Unit 18 are killed in the spring with the largest part taken on or before May 15. However, this pattern is variable. When the snow conditions allow travel by snowmachine, hunters are more successful. Additional harvest chronology data are found in Table 1.

Transport Methods. In 1998–1999, 4 hunters used boats in the fall, 5 used airplanes in the spring and 4 used snowmachines. In 1999–2000, 2 hunters used boats, 1 used an airplane in the spring, and 2 used airplanes in the fall. All of these hunters hunted under the general hunt regulations.

The hunters who use WABBMA permits typically use snowmachines. Since the subsistence season is open from 1 September through 31 May, snowmachines are more practical.

Other Mortality

During this reporting period, hunters did not kill any radiocollared bears, but 6 bears died of causes unrelated to hunting. The most likely causes of death include: 1 caught in an avalanche, 1 died of old age, and as many as 4 died during fights with other bears, possibly while defending cubs.

HABITAT

Assessment

Unit 18 contains approximately 14,000 km^2 of fair to excellent brown bear habitat in the Kilbuck and Andreafsky Mountains. Additional lowland riparian habitats surrounded by tundra, support moderate densities of brown bears along the Yukon River and tributaries of the Kuskokwim. Most brown bear habitat in Unit 18 is protected by the YDNWR, and land status is not expected to change.

Enhancement

Bear habitat is largely intact in Unit 18 and protected by the YDNWR and the TNWR. No enhancement is necessary or anticipated.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The WABBMA working group has been a useful platform for public involvement in bear issues in Unit 18. It was established to bridge the communication gap made apparent by the 1994 lawsuit that brought an end to the Kilbuck Mountains bear census. Since then, our understanding of the bear population has grown and reasonable guesses can be made about the size of the bear population. It is clear that the 1 bear per season bag limit established for the WABBMA permit hunt is sustainable.

The acute need for the working group has faded and funding to maintain the group is more difficult to obtain. While the group still provides valuable input regarding bear issues in Unit 18, future meetings are less certain.

CONCLUSIONS AND RECOMMENDATIONS

The lack of objective bear population data has hampered management in the past and will continue to be an issue until a density estimate can be completed. However, the reproductive data we have gathered and the time spent working with bears in the Kilbuck Mountains has improved our understanding of the Unit 18 bear population and better management decisions are now possible.

Our relationship with members of the WABBMA working group has improved. At the beginning of the project, there was much animosity regarding radiocollaring bears. This has been tempered somewhat as evidenced by the support for deploying additional radiocollars. Having working group members participate in capture operations is a major reason for the increased acceptance.

The arrival of large numbers of Mulchatna caribou in Unit 18 has provided an alternate source of red meat for the people of the Y–K Delta. As a consequence, interest in hunting bears for food has declined, at least in the short term. The contrary impression the reader might get from Table 2 (higher subsistence hunt harvest of bears) is due to the expansion of the WABBMA into other game management units.

We should continue to encourage local residents to report all bear kills. Inaccurate and incomplete data continue to be a problem. We should continue efforts to develop reliable brown bear harvest and DLP information.

LITERATURE CITED

KOVACH S, GH COLLINS, JW DENTON, D FISHER, MT HINKES, RH KACYON, SD MILLER, VG MILLER, JR MORGART, RJ SEAVOY, LJ VANDAELE, JD WOOLINGTON. (Unpublished draft) Brown bear density, movements, and population parameters in the southwestern Kuskokwim Mountains, Alaska 1996–1999. Progress report.

MILLER SD, EF BECKER, AND WB BALLARD. 1987. Black and brown bear density estimates using modified capture-recapture techniques in Alaska. International Conference on Bear Research and Management. 7:23–25.

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Table 1 Unit 18 general hunting season brown bear harvest. Season dates are 10 Sept.–10 Oct. and 10 May–25 May.

		Southeast of the Kuskokwim				North of the Yukon			
		Fall harvest		Spring harvest		Fall harvest		Spring harvest	
Regulatory year	Total harvest	Before 20-Sep	After 20-Sep	Before 15-May	After 15-May	Before 20-Sep	After 20-Sep	Before 15-May	After 15-May
1994–1995	3			M'F'	M'				
1995–1996	4		F'M	F'	M'				
1996–1997	5	M'		F'M'M	M'				
1997–1998	4		MM'F'		M				
1998–1999	13	M'F'M'F'	M'	FM'M' M'M'M'		M	F		
1999–2000	5	M	F'	M'	MM'				
Totals	34	6	7	13	6	1	1		

'Nonresident guided hunter

Table 2 Western Alaska Brown Bear Management Area (WABBMA) brown bear harvest, hunter effort and success, 1996–2000.

Regulatory year	Permits issued	Permits returned	Number Hunting	Bears harvested in WABBMA	Bears harvested in Unit 18
1996–1997	57	28	12	0	0
1997–1998	54	16	6	0	0
1998–1999	95	42	21	4	1
1999–2000	85	63	27	8	2

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNITS: 19, 21A and 21E (59,756 mi^2)

GEOGRAPHIC DESCRIPTION: All Drainages of the Kuskokwim River upstream from the village of Lower Kalskag; Yukon River drainage from Paimiut upstream to, but not including, the Blackburn Creek drainage; the entire Innoko River drainage; and the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna Rivers.

BACKGROUND

Although grizzly bears are distributed throughout Units 19, 21A, and 21E, densities and interest in sport harvest varies. In higher elevations within the Alaska Range and associated foothills (Units 19B and 19C), there is moderate harvest pressure, mainly from nonresident, guided hunters. Harvest pressure is generally light in other portions of the units.

We have no population estimates in this area; thus, estimated densities are based on extrapolations from research in other areas. Harvests have generally fluctuated with season lengths and probably do not provide a good indication of population status or trend. During the first decade following mandatory sealing requirements, harvest was light, averaging about 15 bears annually. During the 1970s, harvest increased dramatically, but seasons were shortened severely, and as a result harvest declined by the early 1980s. Throughout the 1980s, harvests remained relatively low, with a slowly increasing trend until the late 1990s.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

That portion of Units 19D and 19A north of the Kuskokwim River and Units 21A and 21E

- Provide the greatest sustained opportunity to hunt brown bears.

Unit 19C

- Provide an opportunity to hunt brown bears under aesthetically pleasing conditions.

Units 19A and 19B south of the Kuskokwim River and upstream from the Aniak River drainage

- Provide the opportunity to take large brown bears.

- Provide the opportunity to hunt brown bears under aesthetically pleasing conditions.

Western portion of Units 19, 21A within the Western Alaska Brown Bear Management Area, and 21E

- Provide for subsistence uses of brown bears.

MANAGEMENT OBJECTIVES

- Manage brown bear populations to sustain a mean annual harvest of no more than 70 bears with a minimum of 50% males in the harvest.

- Allow an increased legal harvest of brown bears in and around villages, fish camps, and other human habitations during open seasons to reduce human/bear conflicts during closed seasons.

- Increase reported harvest.

METHODS

Data from bear sealing certificates provided data on hunter demographics, sex ratio of the harvest, and timing and location of harvest. Information regarding harvest in the Western Alaska Brown Bear Management Area was also compiled. Harvest data were summarized by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size and Composition

We completed no population surveys or censuses. However, I estimated the population based on known bear densities (Miller et al. 1997) in similar habitats in other game management units in Interior Alaska. The habitat in Unit 19A is of moderate quality, which would support a density of 20 bears/1000 mi^2, or 200 bears. Unit 19B probably contains about 7500 mi^2 of good quality bear habitat, with an estimated density of 40 bears/1000 mi^2 or 300 bears. Unit 19C has about 5200 mi^2 of good habitat (40 bears/1000 mi^2 = 210 bears) and about 1500 mi^2 of moderate habitat (20 bears/1000 mi^2 = 30 bears). Unit 19D generally contains poor habitat (13 bears/1000 mi^2 = 165 bears). Using these figures, my estimate was 900–1000 bears for Unit 19. Pegau (1987) estimated a total of 900 bears for the same area.

I used the same approach to estimate population size in Units 21A and 21E. The higher elevation areas are moderately good bear habitat, and low elevation areas are poor habitat. I used an estimated density of 25 bears/1000 mi^2 in moderately good bear habitat and 10 bears/1000 mi^2 in poor habitat. In Unit 21A there are about 4500 mi^2 of moderately good habitat (25 bears/1000 mi^2 = 113 bears) and about 11,500 mi^2 of poor habitat (10 bears/1000 mi^2 = 115 bears). The total population estimate for Unit 21A was therefore 225–275 bears. Unit 21E consists of about 1000 mi^2 of moderately good habitat (25 bear/1000mi^2 = 25 bears) and about

7000 mi^2 of poor habitat (10 bear/1000 mi^2 = 70 bears). The total estimate for Unit 21E was 90–125 bears.

My estimate for the entire 60,352-mi^2 area was 1200–1400 bears, with densities of 10 to 40 bears/1000 mi^2. The population was probably stable or slowly increasing during the past 10 years, based on field observations, nuisance reports, hunter harvest and sightings.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Units 19A and 19B within the Western Brown Bear Management Area.		
One bear every regulatory year by registration permit.	1 Sep–31 May (Subsistence hunt only)	No open season
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 19A outside the Western Brown Bear Management Area.		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 19B outside the Western Brown Bear Management Area.		
One bear every 4 regulatory years	10 Sep–25 May	10 Sep–25 May
Units 19C, and 19D.		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Units 21A and 21E.		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May

Board of Game Actions and Emergency Orders. The Board of Game reauthorized the resident tag exemption for Unit 19D at their 2000 and 2001 meetings. Resident tag exemptions must be reauthorized each year by the board.

Hunter Harvest. Human use of the grizzly bear population was moderate (Table 1). Over the last 4 years there has been an increasing harvest trend for Units 19A, 19B, and 19C. The Unit 19A average harvest during RY92 through RY95 was 7.5 bears/year, and during RY96 through RY99 the average increased to 9.5 bears/year. In Unit 19B the RY92 through RY95 average harvest was 27.3 bears/year. It was stable at 28.8 bears/year from RY96 through RY99. In Unit 19C the RY92 through RY95 average harvest was 15.8 bears/year. It increased to 22.8 bears/year from

RY96 through RY99. In Unit 19D harvest was stable from 2.3 bears/year during RY92 through RY95 to 3.0 bears/year during RY96 through RY99. Unit 21A and 21E harvests have remained low and stable since RY92, with Unit 21A averaging 1.3 bears/year. There has been an increase in the Unit 21E harvest, with harvest averaging 3.8 bears/year in the period RY92 through RY95, increasing to 7.0 bears/year in the period from RY96 to RY99. The number of unreported bears taken at fish camps was unknown, but it was probably ≤10 bears/year.

The 5-year mean annual harvest (RY95 through RY99) in the entire area was 69.8 grizzly bears. The conservative estimate of sustainable harvest was 70–85 bears (6% of 1200–1400 bears) (Reynolds 1997). The harvests are now approaching the lower limit of the conservative sustainable levels based on the current population estimates.

Generally, the proportion of males in the reported harvest has been near 60% (Table 2). It was <50% (44%) during only 1 of the past 10 seasons (spring 1997). The mean for the past 5 years was 62%. During the last 5 regulatory years the percent males varied from a low of 52% (RY96) to a high of 68% (RY97).

Generally, we assume that a preponderance of males in the harvest reflects a healthy population, given low to moderate hunting pressures. However, many Unit 19, 21A, and 21E grizzly bears are harvested on multi-species hunts, and hunters are not necessarily attempting to take a record-class animal. Therefore, harvest of females (except those with cubs or yearlings) is not avoided. Until grizzly bear hunting effort becomes more intensive, our management objective to harvest >50% males should afford the protection needed to sustain the population, even if harvest levels exceed the guideline of 6% annual harvest of the estimated population.

Hunter Residency and Success. During the past 5 years, nonresidents harvested 221 of 265 bears (83%) (Table 3). This indicates a relatively high use of the area by brown bear guides and their nonresident clients. No information is available on success rates (i.e., number successful versus unsuccessful) for brown bear hunters in the unit. However, between 1995 and 2000, the mean number of days hunted annually by successful hunters fluctuated between 4.4 and 6.0 days.

Harvest Chronology. Most harvest occurred during fall (77%) (Table 4). The fall harvest was greater primarily due to guided hunts for multiple species. Guided hunters opportunistically kill bears while hunting ungulates. Little spring brown bear hunting occurs in this area, but spring harvests have increased from an average of 12.5 bears during April and May RY93 through RY96 to 17 bears for April and May RY97 through RY99.

Transport Methods. During the past 5 years, 73–96% of successful hunters used airplanes as their primary access method (Table 5). The proportion of hunters using aircraft has not changed significantly since sealing began.

CONCLUSIONS AND RECOMMENDATIONS

Seasons and bag limits allowed a moderate brown bear harvest and harvest data did not indicate a decline in the population. Therefore, additional harvest restrictions seem unnecessary. However, following the resident tag exemption in 1998, annual scrutiny of Unit 19D harvest data must occur and changes should be enacted if warranted. Preliminary results of the Unit 19D

moose calf mortality study indicate that grizzly bears are a significant cause of calf mortality in some areas of Unit 19D. This contradicts the previous assumption that grizzly bears were not a significant cause of moose calf mortality in Unit 19D and must also be considered when determining future season dates, bag limits, and resident tag exemptions.

Annual review of sealing certificate data will continue. If sex ratios in the harvest begin to favor females, changes in season lengths should be considered. Compliance with reporting requirements by local residents is low because of the regulation requiring a $25 resident brown bear tag (except for resident hunting in the Western Alaska Brown Bear Management Area and in Unit 19D). During personal contacts in villages and fish camps we will also continue to emphasize the need to document harvests whether bears are taken under hunting regulations or Defense of Life or Property regulations.

We met our management objective to sustain a mean annual harvest of no more than 70 bears with a minimum of 50% males. We made progress increasing the reporting of bears taken by local residents. The Unit 19D resident tag exemption will probably aid in accomplishing this objective. To increase reported harvest, other parts of Units 19, 21A and 21E may warrant resident tag exemptions.

LITERATURE CITED

MILLER S, GC WHITE, RA SELLERS, HV REYNOLDS, JW SCHOEN, K TITUS, VG BARNES, JR, RB SMITH, RR NELSON, WB BALLARD, AND CC SCHWARTZ. 1997. Brown and black bear density estimation in Alaska using radiotelemetry and replicated mark-resight techniques. *Wildlife Monographs* 133.

PEGAU R. 1987. Unit 19 brown bear management progress report of survey-inventory activities. Pages 42–43 *in* B Townsend, editor. Part V. Volume XVIII. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grants W-22-5 and W-22-6. Study 4.0. Juneau, Alaska.

REYNOLDS HV. 1997. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Report. Grants W-24-1, W-24-2, W-24-3, and W-24-2. Study 4.25. Juneau, Alaska.

SPECIES

MANAGEMENT REPORT

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Table 1 Units 19, 21A, and 21E grizzly bear harvest by season, regulatory years 1989–1990 through 1999–2000

Regulatory year	Unit 19					Unit 21		Totals
	A	B	C	D	Unk	A	E	
1989–1990								
Fall 1989	0	12	16	3	0	3	0	34
Spring 1990	0	3	0	0	0	0	3	6
Total	0	15	16	3	0	3	3	40
1990–1991								
Fall 1990	2	7	10	6	0	1	1	27
Spring 1991	0	8	4	1	0	1	2	16
Total	2	15	14	7	0	2	3	43
1991–1992								
Fall 1991	2	14	8	1	0	0	0	25
Spring 1992	2	4	1	1	0	0	5	13
Total	4	18	9	2	0	0	5	38
1992–1993								
Fall 1992	10	22	14	3	0	2	1	52
Spring 1993	1	6	1	1	0	0	4	13
Total	11	28	15	4	0	2	5	65
1993–1994								
Fall 1993	3	21	13	1	0	0	0	38
Spring 1994	1	4	1	0	0	0	4	10
Total	4	25	14	1	0	0	4	48
1994–1995								
Fall 1994	6	22	14	1	0	1	0	44
Spring 1995	2	4	2	1	0	2	4	15
Total	8	26	16	2	0	3	4	59
1995–1996								
Fall 1995	7	27	14	1	0	0	0	49
Spring 1996	0	3	4	1	0	0	2	10
Total	7	30	18	2	0	0	2	59
1996–1997								
Fall 1996	8	6	13	2	0	2	1	32
Spring 1997	1	7	6	0	0	0	2	16
Total	9	13	19	2	0	2	3	48
1997–1998								
Fall 1997	9	23	22	0	0	2	2	58
Spring 1998	1	4	3	0	0	0	8	16
Total	10	27	25	0	0	2	10	74
1998–1999								

Regulatory	Unit 19					Unit 21		
year	A	B	C	D	Unk	A	E	Totals
Fall 1998	6	27	21	5	1	1	0	61
Spring 1999	0	9	3	0	0	0	3	15
Total	6	36	24	5	1	1	3	76
1999–2000								
Fall 1999	11	33	21	5	0	0	2	72
Spring 2000	2	6	2	0	0	0	10	20
Total	13	39	23	5	0	0	12	92
Fall totals	64	214	166	28	1	12	7	492
% of Harvest	86%	79%	86%	85%	100%	80%	13%	77%
Fall average	5.8	19.4	15.1	2.5	0.1	1.1	0.6	44.7
Spring totals	10	58	27	5	0	3	47	150
% of Harvest	14%	21%	14%	15%	0%	20%	87%	23%
Spring average	0.9	5.3	2.4	0.5	0.0	0.3	4.3	13.6
Grand total	74	272	193	33	1	15	54	642
Annual average	6.7	24.7	17.5	3.0	0.1	1.4	4.9	58.3

Table 2 Units 19, 21A, and 21E grizzly bear harvest by type of kill, regulatory years 1993–1994 through 1999–2000

Regulatory	Hunter kill				Nonhunting kill				Total reported kill				
year	M	F	Unk	Total	M	F	Unk	Total	M	(%)[a]	F	(%)[a]	Total
1993–1994													
Fall 1993	20	18	0	38	0	0	0	0	20	(53)	18	(47)	38
Spring 1994	9	1	0	10	0	0	0	0	9	(90)	1	(10)	10
Total	29	19	0	48	0	0	0	0	29	(60)	19	(40)	48
1994–1995													
Fall 1994	24	19	1	44	0	0	0	0	24	(56)	19	(44)	44
Spring 1995	12	3	0	15	0	0	0	0	12	(80)	3	(20)	15
Total	36	22	1	59	0	0	0	0	36	(62)	22	(38)	59
1995–1996													
Fall 1995	29	18	1	48	0	0	1	1	29	(62)	18	(38)	49
Spring 1996	6	4	0	10	0	0	0	0	6	(60)	4	(40)	10
Total	35	22	1	58	0	0	1	1	35	(61)	22	(39)	59
1996–1997													
Fall 1996	18	14	0	32	0	0	0	0	18	(56)	14	(44)	32
Spring 1997	7	9	0	16	0	0	0	0	7	(44)	9	(56)	16
Total	25	23	0	48	0	0	0	0	25	(52)	23	(48)	48
1997–1998													
Fall 1997	36	22	0	58	0	0	0	0	36	(62)	22	(38)	58
Spring 1998	14	2	0	16	0	0	0	0	14	(88)	2	(12)	16
Total	50	24	0	74	0	0	0	0	50	(68)	24	(32)	74
1998–1999													
Fall 1998	39	22	0	61	0	0	0	0	39	(64)	22	(36)	61
Spring 1999	12	3	0	15	0	0	0	0	12	(80)	3	(20)	15
Total	51	25	0	76	0	0	0	0	51	(67)	25	(33)	76
1999–2000													
Fall 1999	38	31	0	69	2	1	0	3	40	(56)	32	(44)	72
Spring 2000	16	4	0	20	0	0	0	0	16	(80)	4	(20)	20
Total	54	35	0	89	2	1	0	3	56	(61)	36	(39)	92
1993–2000													
Fall total	204	144	2	350	2	1	1	4	206	(59)	145	(41)	354
Spring total	76	26	0	102	0	0	0	0	76	(75)	26	(25)	102
Grand total	280	170	2	452	2	1	1	4	282	(62)	171	(38)	456

[a] Percent of known-sex bears harvested.

Table 3 Units 19, 21A, and 21E grizzly bear successful hunter residency and effort, regulatory years 1993–1994 through 1999–2000

Regulatory year	Resident (%)	Nonresident (%)	Unk	Mean effort for successful hunters (days)	Total successful hunters
1993–1994	8 (17)	40 (83)	0	4.5	48
1994–1995	17 (29)	41 (71)	1	5.4	59
1995–1996	9 (16)	48 (84)	2	6.0	59
1996–1997	5 (10)	43 (90)	0	6.0	48
1997–1998	10 (14)	64 (86)	0	4.4	74
1998–1999	15 (20)	61 (80)	0	5.0	76
1999–2000	21 (23)	71 (77)	0	4.9	92
Totals	85 (19)	368 (81)	3	5.1	456
Averages	12	52	0.4	5.1	65

Table 4 Units 19, 21A and 21E grizzly bear harvest chronology by month, regulatory years 1993–1994 through 1999–2000

Regulatory year	Harvest chronology by month (%)					
	Sep	Oct	Apr	May	Other[a]	*n*
1993–1994	35 (73%)	3 (6%)	6 (13%)	4 (8%)	0 (0%)	48
1994–1995	40 (68%)	4 (7%)	7 (12%)	7 (12%)	1 (1%)	59
1995–1996	48 (82%)	0 (0%)	6 (10%)	4 (7%)	1 (1%)	59
1996–1997	30 (63%)	2 (4%)	3 (6%)	13 (27%)	0 (0%)	48
1997–1998	56 (75%)	2 (3%)	11 (15%)	5 (7%)	0 (0%)	74
1998–1999	51 (67%)	10 (13%)	7 (9%)	8 (11%)	0 (0%)	76
1999–2000	67 (73%)	4 (4%)	15 (16%)	5 (6%)	1 (1%)	92
Totals	327 (72%)	25 (5%)	55 (12%)	46 (10%)	3 (1%)	456
Averages	47	4	7	7	0.43	65

[a] Other: One each: Jan, Jul, and Nov. Table includes bears taken under Defense of Life or Property regulations.

Table 5 Units 19, 21A, and 21E grizzly bear harvest by transport method, regulatory years 1993–1994 through 1999–2000

Regulatory year	Harvest by transport method (%)									
	Airplane	Dog Team /Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	*n*
1993–1994	39 (82)	2 (4)	1 (2)	0 (0)	3 (6)	1 (2)	0 (0%)	2 (4)	0 (0)	48
1994–1995	52 (88)	2 (3)	0 (0)	0 (0)	3 (5)	0 (0)	1 (2%)	1 (2)	0 (0)	59
1995–1996	57 (96)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0%)	0 (0)	1 (2)	59
1996–1997	45 (94)	0 (0)	2 (4)	1 (2)	0 (0)	0 (0)	0 (0%)	0 (0)	0 (0)	48
1997–1998	54 (73)	0 (0)	4 (6)	6 (8)	8 (11)	0 (0)	0 (0%)	1 (1)	1 (1)	74
1998–1999	66 (88)	1 (1)	3 (4)	2 (3)	1 (1)	1 (1)	0 (0%)	1 (1)	1 (1)	76
1999–2000	76 (83)	0 (0)	2 (2)	2 (2)	11 (12)	0 (0)	0 (0%)	1 (1)	0 (0)	92
Averages	56 (85)	0.7 (1)	2 (3)	1.6 (2)	4 (6)	0.3 (<1)	0.1 (<1%)	0.9 (1)	0.3 (1)	65

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 20A, 20B, 20C, 20F, and 25C (39,228 mi^2)

GEOGRAPHIC DESCRIPTION: Central and Lower Tanana Valley, and Middle Yukon River drainages

BACKGROUND

Grizzly bears are found throughout this area, with higher densities in the mountainous portions of Units 20A and 20C. We initiated a long-term grizzly bear research project in Unit 20A in 1981 to: 1) gather baseline data on population status and reproductive biology (1981–1985; Reynolds and Hechtel 1986); 2) study the effects of high exploitation rates on grizzly bear population dynamics (1986–1991; Reynolds and Boudreau 1992; Reynolds 1993); and 3) measure recovery. During the second phase of the project, the grizzly bear population was deliberately subjected to high harvest levels (≥11% of the population versus ≤6% before 1981). As a result, Reynolds (1993) documented a 20% decline in the bears (≥2 years old) in this area since 1981. The current phase of the study examines population recovery (Reynolds 1997). Accordingly, the Board of Game reduced season length to increase recruitment and survival of female bears.

State regulations prevent grizzly bear harvest within the Denali National Park portions of Unit 20C, resulting in low harvests in that unit. The eastern half of Unit 20B supports a moderate density of grizzly bears, and harvests are highest in that portion. Grizzly bears inhabit the remainder of the area at lower densities, resulting in low harvests.

Ballard et al. (1981) and Gasaway et al. (1992) identified grizzly bears as significant predators of moose in Units 13 and 20E, respectively. However, Gasaway et al. (1983) determined that grizzly bears played little role in the dynamics of moose within the Tanana Flats portion of Unit 20A, and Miller and Ballard (1992) were unable to detect changes in moose calf survivorship during periods when bear numbers were reduced in Unit 13. Grizzly bears probably influence moose population dynamics in parts of the study area at different times. In Unit 20A, Valkenburg (1997) identified grizzly bears as important predators of Delta caribou herd neonates.

During the 1980s, McNay (1990) noted increasing numbers of hunters and increased interest in hunting grizzly bears. Subsequently, McNay (1990) analyzed harvest and population data from

this study area to develop specific management and harvest objectives. He based harvest objectives on a sustainable harvest rate of 8% of the population ≥2 years of age (Miller 1990).

MANAGEMENT DIRECTION

MANAGEMENT GOALS

All subunits

- Maintain healthy grizzly populations and the ecosystems upon which they depend.
- Provide people with an opportunity to hunt, view, and photograph grizzly bears.
- Avoid human-grizzly bear interactions that threaten human life and property.

Additionally in Unit 20A

- Provide for scientific and educational use of grizzly bears.

Additionally in Unit 20C

- Maintain a grizzly bear population within Denali National Park that is largely unaffected by human activity and is not subjected to hunting within the park.

MANAGEMENT OBJECTIVES

Unit 20A Mountains

- Decrease human-caused grizzly bear mortality by managing for a 3-year mean annual human-caused mortality of no more than 3% of the adult females (≥6 years old) and no more than 6% of the bears ≥2 years old.
- Cooperate with a research project (Reynolds 1997) that has these objectives:
  - Determine the length of time necessary for recovery or stabilization of a reduced grizzly bear population following reductions in human-caused mortality rates.
  - Measure the recovery responses in the dynamics of the population, especially female population size, total population size, and production and survival of offspring.

Eastern half of Unit 20B

- Manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality of up to 6 bears ≥2 years old, with an average of at least 55% males.

Unit 20C within the original boundaries of Denali National Park

- Maintain a closed season on grizzly bear hunting within the park.

Unit 20A Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C

- Manage human-caused mortality in the combined area to provide stable grizzly bear populations with a 3-year mean annual human-caused mortality of no more than 26 grizzly bears ≥2 years old, with an average of at least 55% males.

- Manage the 3-year mean annual human-caused grizzly bear (≥2 years of age) mortality from individual areas with the following harvest objectives: no more than 3 bears from Unit 20A Tanana Flats, 3 from the western half of Unit 20B, 7 from Unit 20C, 7 from Unit 20F, and 6 from Unit 25C.

METHODS

HARVEST

We used data from grizzly bear sealing certificates to obtain date and location of kill, sex, skull size, hunter residency, transportation method, commercial services used and kill type – hunter harvest, illegal kill, research mortality, defense of life or property, etc. We coded location of kill noted on the sealing certificates according to Uniform Coding Units (UCU). During sealing we collected premolars to determine age. Department staff members in Fairbanks sealed most of the grizzly bears harvested in this area.

In this report we analyzed grizzly bear harvest data by both regulatory and calendar years. Many of our objectives are age-specific. Analysis by regulatory year creates difficulties because a cohort passes through 2 age classes within a single regulatory year (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000). Therefore, we analyzed data relevant to age-specific objectives by calendar year to avoid confusion regarding age-class. We based all other analyses on regulatory years.

POPULATION SIZE AND DENSITY

In June 1993, H Reynolds and R Eagan (Eagan 1995) categorized UCUs in Units 20A, 20B, 20C, 20F, and 25C into 4 grizzly bear density strata: low, medium, high, and super. The low-density stratum consisted of areas with significant human development, poorly drained soils (or permafrost) and black spruce. The medium-density stratum included upland forest and tundra habitats at elevations generally between 500 and 1500 ft. The high-density stratum consisted of upland foothills and mountainous areas similar to areas of known density in Units 20A, 20E, and 13E. The super-density stratum included habitat similar to the high-density areas, but where no harvest was permitted.

The total area within each stratum excluded glaciers and land above 6000 ft. Approximately 500 mi^2 (1300 km^2) was excluded from the high-density stratum, and 386 mi^2 (1000 km^2) was excluded from the super-density stratum. Population size was estimated using extrapolations from stratum densities of low, 3–8 bears/1000 mi^2 (1–3 bears/1000 km^2); medium, 13–26 bears/1000 mi^2 (5–10 bears/1000 km^2); high, 36–44 bears/1000 mi^2 (14–17 bears/1000 km^2); and super, 52–78 bears/1000 mi^2 (20–30 bears/1000 km^2).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Unit 20A. Eagan (1995) classified the mountainous portion of Unit 20A as high density based on results from research in the central foothills (Reynolds 1993). High harvest rates intentionally resulted in reduced bear numbers in this portion of Unit 20A during phase 2 of the research. Phase 3 monitors recovery of the population. We expected the number of female adult bears to meet prereduction levels by 1998. However, numbers were still slightly low by March 2000. By March 2002, female adult bear numbers will likely reach prereduction levels (Reynolds 1999). If further data confirms this trend, we will address restoring the fall seasons during the next Board of Game cycle to a 5 September opening date.

The Tanana Flats in Unit 20A provide relatively poor grizzly bear habitat, resulting in low densities. Some grizzly bears on the Tanana Flats are probably dispersing from higher density areas, or are making temporary forays onto the flats. Eagan (1995) estimated that the flats provide habitat for 20 grizzly bears, or 6.5 bears/1000 mi^2 (2.5 bears/1000 km^2).

Unit 20B. Eagan (1995) classified most of Unit 20B as low density because of the moderate habitat, high density of people, and good human access. Better habitat in the Sawtooth Mountains in the western portion was classified as low-density stratum because of good access and human activity. The upper Chena and Salcha Rivers rated medium density because it was better habitat and relatively inaccessible.

Unit 20C. Eagan (1995) classified the mountainous portion of Unit 20C into the super-density stratum (52–78 bears/1000 mi^2 [20–30 grizzly bears/1000 km^2]). Although Dean (1987) estimated 88 bears/1000 mi^2 (34 bears/1000 km^2) for a portion of this area in 1983, he surveyed the area along the Denali Park Road that includes the best habitat. Eagan (1995) assumed lower densities for the remainder of the mountainous portions of Unit 20C, based on densities Reynolds (1993) documented in Unit 20A in 1981.

Eagan (1995) classified a small portion of northwestern Unit 20C as medium density because of higher habitat quality than in the Unit 20C Tanana Flats, and the area also abuts some fair grizzly bear habitat in the upper Kuskokwim drainage. Eagan (1995) felt the remainder of Unit 20C was low density but indicated potential for slightly higher densities than other low density areas because the Unit 20C Tanana Flats have streams where salmon are available and there is relatively low hunting pressure.

Unit 20F. Although very little information exists, the Tozitna River drainage/Ray Mountains portion of Unit 20F contains relatively good grizzly bear habitat and warranted medium density classification. Eagan (1995) classified the remainder of Unit 20F as low density due to relatively poor grizzly bear habitat.

Unit 25C. The mountainous portion of Unit 25C was medium density. This is an extension of the medium density area of eastern Unit 20B and also includes the White Mountains. Although good

habitat abounds, Eagan (1995) noted that roads and trails through the area provide good human access. Hunters take grizzly bears incidental to their pursuit of caribou and moose.

All Subunits. Extrapolating from the stratification above, Eagan (1995) estimated that 446–782 grizzly bears (all ages) inhabit the area. Using the midpoint of the population estimate (614 bears), the combined density for the area is about 16.1 bears/1000 mi^2 (6.2 grizzly bears/1000 km^2).

Population Composition

Reynolds (1993) summarized composition data for his study area in Unit 20A. In 1992, there were more females than males present in adult age classes, and approximately equal numbers of males and females in the subadult age classes. Because the sex ratio of grizzly bears at birth typically approximates 50:50 and hunters generally prefer to shoot the larger, adult males, and because females with cubs <2 years of age are legally protected, we suspect the 1992 composition data is currently applicable.

Distribution and Movements

Reynolds (1997) described movement and dispersal trends for the Unit 20A study area. Females exhibited high fidelity to home ranges and little emigration or immigration (Reynolds 1993).

MORTALITY

Harvest

Season and Bag Limit. In RY90 through RY93, the season for grizzly bears was 1 September–31 May with a bag limit of 1 bear every 4 regulatory years. Cubs (≤2 years of age) and sows accompanied by cubs were illegal to harvest. Commensurate with research objectives, the Board of Game shortened the Unit 20A season by 9 days in RY94 to 10 September–31 May. All other areas covered in this report retained the 1 September opening. There have been no changes to seasons or bag limits since RY94. These seasons and bag limits applied to both resident and nonresident hunters.

Harvest by Hunters. Recent harvest in Units 20A, 20B, 20C, 20F, and 25C seems relatively stable (Tables 1a–e). Hunters killed 23 bears in all units during RY98 and 30 during RY99. Other human-caused mortality (defense of life or property kills, illegal kills, etc.) resulted in 3 bear deaths in RY98 and 3 deaths in RY99.

Harvest Zones.

Unit 20A Mountains — Harvest included 10, 16, and 11 bears (all ages) during calendar years 1998, 1999 and 2000, respectively (Table 2). We estimate the 3-year (1998–2000) average annual harvest rate (12.0 bears) was approximately 10% of bears ≥2 years old, assuming Eagan's (1995) population estimates and Reynolds' (1993) population structure. Age data for female grizzlies that died from human causes were limited. Consequently, we were not able to determine if we met objectives associated with age structure for female grizzlies that died from human causes. Average annual proportion of males in the harvest in Unit 20A for RY98–RY99 was 74% (n = 27).

Eastern half of Unit 20B — The 3-year (calendar years 1998–2000) mean annual mortality of 7 bears ≥2 years of age did not meet our objective for a mean of up to 6 bears/year (Table 2). This overharvest appeared to be the result of a single event (i.e., 10 bears harvested in 2000), rather than an increasing trend in harvest. Average annual proportion of males in the Unit 20B harvest during RY98–RY99 was 72% (n = 18), which met our harvest composition objective of at least 55%.

Unit 20A Tanana Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C — In the combined area, our harvest objective of no more than 26 bears ≥2 years of age was met. The 3-year (1998–2000) mean annual mortality of 15.3 bears ≥2 years of age was only 59% of our maximum harvest objective (Table 2). Average annual harvest of males in Units 20A, 20B, 20C, 20F, and 25C for RY98–RY99 was 66% (n = 59), which met our objective of at least 55% males.

We also met our 3-year (1998–2000) mean harvest (bears ≥2 years of age) objectives for the Tanana Flats in Unit 20A with a harvest of 1.7 bears, Unit 20C with 5, Unit 20F with 1, and Unit 25C with 1. However, the harvest of 5.3 bears did not meet our 3-year (1998–2000) mean harvest objective of no more than 3 bears for the western half of Unit 20B.

Hunter Residency and Success. As in previous years, Alaska residents harvested the majority (74%) of the grizzly bears during the last 3 regulatory years (Table 3).

Harvest Chronology. Hunters harvested bears primarily during the month of September (Table 4), probably because moose and caribou hunters take many bears incidentally during that period.

Transport Methods. The methods of transportation used by successful grizzly bear hunters have not changed substantially in recent years (Table 5). One notable exception was the uncharacteristic changes in the use of airplanes, highway vehicles, and other ORVs during RY98.

CONCLUSIONS AND RECOMMENDATIONS

We did not meet the harvest objective of a 3-year mean annual human-caused mortality of no more than 6% of the bears ≥2 years old in Unit 20A mountains, even with the short season. However, the population estimates used to calculate the percent harvested was from 1992 census data and the population structure may have changed since that time. Since the recovery phase of the long-term grizzly bear research project is at or near completion, we will initiate a proposal in 2002 to return the Unit 20A season start date to 5 September as originally proposed to local advisory committees. However, we must thoroughly investigate and communicate to the public the probability that returning to an earlier September season opening may decrease bear populations. Areas with high harvest density, such as the Ferry Trail Management Area and the Yanert River drainage, warrant the most careful consideration.

In addition, we did not meet our harvest objective of a 3-year mean harvest in both the eastern and western portions of Unit 20B. Although an increasing trend in harvest was not apparent, we must continue to closely monitor the kill within these harvest zones.

Finally, we must continue to closely monitor harvests, particularly in harvest zones with small harvest quotas, and to encourage the harvest of males over females. Through the next Board of Game meeting in March 2002, we plan to address these issues and our Unit 20A objectives with local advisory committees, research staff, and the Board of Game.

Grizzly bear research in Unit 20A is nearing completion and future studies are uncertain at this time. As a result, data regarding the sex and age composition of this population will no longer be available. Therefore, I recommend changing the management objectives for Unit 20A mountains to reflect this change. Because these changes subsequently affect management objectives in the other harvest zones, I also recommend modifying management objectives there by restructuring percent males in the harvest to align with subunits. Recommended management objectives for the next reporting period are as follows:

MANAGEMENT OBJECTIVES

Unit 20A Mountains

- Decrease human-caused grizzly bear mortality by managing for a 3-year mean annual human-caused mortality no more than 6% of the bears ≥2 years old.

Eastern half of Unit 20B

- Manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality of up to 6 bears ≥2 years old.

Unit 20C within the original boundaries of Denali National Park

- Maintain a closed season on grizzly bear hunting.

Unit 20A Tanana Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C

- Manage human-caused mortality in the combined area to provide stable grizzly bear populations with a 3-year mean annual human-caused mortality of no more than 26 grizzly bears ≥2 years old.

- Manage the 3-year mean annual human-caused grizzly bear (≥2 years of age) mortality from individual areas with the following harvest objectives: no more than 3 bears from Unit 20A Tanana Flats, 3 from the western half of Unit 20B, 7 from Unit 20C, 7 from Unit 20F, and 6 from Unit 25C.

All subunits

- Manage for a 3-year mean annual human-caused mortality of at least 55% males.

LITERATURE CITED

BALLARD WB, TH SPRAKER, AND KP TAYLOR. 1981. Causes of neonatal moose calf mortality in southcentral Alaska. *Journal of Wildlife Management* 45:335–342.

DEAN FC. 1987. Brown bear density Denali National Park, Alaska, and sighting efficiency adjustment. International conference bear research and management. 7:37–43.

EAGAN RM. 1995. Units 20A, 20B, 20C, 20F, and 25C. Brown bear management progress report of survey-inventory activities. Pages 192–212 *in* MV Hicks, editor. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grants W-24-1 and W-24-2. Study 4.0. Juneau, Alaska.

GASAWAY WC, RD BOERTJE, DV GRANGAARD, DG KELLEYHOUSE, RO STEPHENSON, AND DG LARSEN. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. *Wildlife Monographs* 120.

———, RO STEPHENSON, JL DAVIS, PE SHEPHERD, AND OE BURRIS. 1983. Interrelationships of wolves, prey, and man in Interior Alaska. Wildlife Monographs 84. *Journal of Wildlife Management.*

MCNAY ME. 1990. Units 20A, 20B, 20C, 20F, and 25C brown bear management progress report of survey-inventory activities. Pages 121–136 *in* SO Morgan, editor. Part V. Volume XX. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Progress Report. Grant W-23-2. Study 4.0. Juneau, Alaska.

MILLER SD. 1990. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-23-3. Study 4.21. Juneau, Alaska.

——— AND WB BALLARD. 1992. Analysis of an effort to increase moose calf survivorship by increased hunting of brown bears in south-central Alaska. *Wildlife Society Bulletin* 20:445–454.

REYNOLDS HV. 1993. Evaluation of the effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grant W-23-5. Study 4.23. Juneau, Alaska.

——— 1997. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-24-1, W-24-2, W-24-3 and W-24-4. Study 4.25. Juneau, Alaska.

——— 1999. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-24-5 and W-27-1. Study 4.28. Juneau, Alaska.

——— AND TA BOUDREAU. 1992. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-5, W-22-6, W-23-1, W-23-2, W-23-3, and W-23-4. Study 4.19. Juneau, Alaska.

——— AND JL HECHTEL. 1986. Population structure, reproductive biology, and movement patterns of grizzly bears in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-21-2, W-22-2, W-22-3, and W-22-4. Study 4.16R. Juneau, Alaska.

VALKENBURG P. 1997. Investigation of regulating and limiting factors in the Delta Caribou Herd. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-23-5, W-24-1, W-24-2, W-24-3, and W-24-4. Study 3.37. Juneau, Alaska.

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Table 1a Unit 20A grizzly bear mortality, regulatory years 1995–1996 through 1999–2000

Regulatory	Reported hunter kill[a]				Nonhunting kill[b]			Total estimated kill[c]				
year	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
1995–1996												
Fall 1995	6	3	0	9	0	0	0	6	3	0	9	
Spring 1996	0	2	0	2	0	0	0	0	2	0	2	
Total	6	5	0	11	0	0	0	6	5	0	11	55
1996–1997												
Fall 1996	4	4	0	8	0	2	0	4	6	0	10	
Spring 1997	1	2	0	3	0	0	0	1	2	0	3	
Total	5	6	0	11	0	2	0	5	8	0	13	38
1997–1998												
Fall 1997	6	4	0	10	0	2	0	6	6	0	12	
Spring 1998	4	0	0	4	1	0	0	5	0	0	5	
Total	10	4	0	14	1	2	0	11	6	0	17	65
1998–1999												
Fall 1998	3	2	0	5	0	0	0	3	2	0	5	
Spring 1999	4	0	0	4	1	0	0	5	0	0	5	
Total	7	2	0	9	1	0	0	8	2	0	10	80
1999–2000												
Fall 1999	10	4	0	14	1	1	0	11	5	0	16	
Spring 2000	1	0	0	1	0	0	0	1	0	0	1	
Total	11	4	0	15	1	1	0	12	5	0	17	71

[a] Includes illegal kills.

[b] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

[c] Percentage includes only bears of known sex.

Table 1b Unit 20B grizzly bear mortality, regulatory years 1995–1996 through 1999–2000

Regulatory	Reported hunter kill[a]				Nonhunting kill[b]			Total estimated kill[c]				
year	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
1995–1996												
Fall 1995	1	3	0	4	0	0	0	1	3	0	4	
Spring 1996	0	0	0	0	0	0	0	0	0	0	0	
Total	1	3	0	4	0	0	0	1	3	0	4	25
1996–1997												
Fall 1996	4	4	0	8	0	0	0	4	4	0	8	
Spring 1997	1	0	0	1	0	0	0	1	0	0	1	
Total	5	4	0	9	0	0	0	5	4	0	9	56
1997–1998												
Fall 1997	2	1	0	3	0	0	0	2	1	0	3	
Spring 1998	0	2	0	2	0	3	0	0	5	0	5	
Total	2	3	0	5	0	3	0	2	6	0	8	25
1998–1999												
Fall 1998	8	0	0	8	1	1	0	9	1	0	10	
Spring 1999	1	0	0	1	0	0	0	1	0	0	1	
Total	9	0	0	9	1	1	0	10	1	0	11	91
1999–2000												
Fall 1999	2	3	0	5	0	0	0	2	3	0	5	
Spring 2000	1	1	0	2	0	0	0	1	1	0	2	
Total	3	4	0	7	0	0	0	3	4	0	7	43

[a] Includes illegal kills.

[b] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

[c] Percentage includes only bears of known sex.

Table 1c Unit 20C grizzly bear mortality, regulatory years 1995–1996 through 1999–2000

Regulatory	Reported hunter kill[a]				Nonhunting kill[b]			Total estimated kill[c]				
year	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
1995–1996												
Fall 1995	0	0	0	0	0	0	0	0	0	0	0	
Spring 1996	2	0	0	2	0	0	0	2	0	0	2	
Total	2	0	0	2	0	0	0	2	0	0	2	100
1996–1997												
Fall 1996	3	2	1	6	0	0	0	3	2	1	6	
Spring 1997	2	1	0	3	0	0	0	2	1	0	3	
Total	5	3	1	9	0	0	0	5	3	1	9	
1997–1998												
Fall 1997	4	0	0	4	0	0	0	4	0	0	4	
Spring 1998	1	0	0	1	0	0	0	1	0	0	1	
Total	5	0	0	5	0	0	0	5	0	0	5	100
1998–1999												
Fall 1998	2	1	0	3	0	0	0	2	1	0	3	
Spring 1999	0	0	0	0	0	0	0	0	0	0	0	
Total	2	1	0	3	0	0	0	2	1	0	3	67
1999–2000												
Fall 1999	2	4	0	6	0	1	0	2	5	0	7	
Spring 2000	0	0	0	0	0	0	0	0	0	0	0	
Total	2	4	0	6	0	1	0	2	5	0	7	29

[a] Includes illegal kills.

[b] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

[c] Percentage includes only bears of known sex.

Table 1d Unit 20F grizzly bear mortality, regulatory years 1995–1996 through 1999–2000

Regulatory year	Reported hunter kill[a]				Nonhunting kill[b]			Total estimated kill[c]				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
1995–1996												
Fall 1995	0	0	0	0	0	0	0	0	0	0	0	
Spring 1996	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0
1996–1997												
Fall 1996	2	1	0	3	0	0	0	2	1	0	3	
Spring 1997	0	0	0	0	0	0	0	0	0	0	0	
Total	2	1	0	3	0	0	0	2	1	0	3	67
1997–1998												
Fall 1997	1	0	0	1	0	0	0	1	0	0	1	
Spring 1998	0	0	0	0	0	0	0	0	0	0	0	
Total	1	0	0	1	0	0	0	1	0	0	1	100
1998–1999												
Fall 1998	1	0	0	1	0	0	0	1	0	0	1	
Spring 1999	0	0	0	0	0	0	0	0	0	0	0	
Total	1	0	0	1	0	0	0	1	0	0	1	100
1999–2000												
Fall 1999	0	1	0	1	0	0	0	0	1	0	1	
Spring 2000	0	0	0	0	0	0	0	0	0	0	0	
Total	0	1	0	1	0	0	0	0	1	0	1	0

[a] Includes illegal kills.

[b] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

[c] Percentage includes only bears of known sex.

Table 1e Unit 25C grizzly bear mortality, regulatory years 1995–1996 through 1999–2000

Regulatory	Reported hunter kill[a]				Nonhunting kill[b]			Total estimated kill[c]				
year	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
1995–1996												
Fall 1995	2	0	0	2	0	0	0	2	0	0	2	
Spring 1996	0	0	0	0	0	0	0	0	0	0	0	
Total	2	0	0	2	0	0	0	2	0	0	2	100
1996–1997												
Fall 1996	1	2	0	3	0	0	0	1	2	0	3	
Spring 1997	0	0	0	0	0	0	0	0	0	0	0	
Total	1	2	0	3	0	0	0	1	2	0	3	33
1997–1998												
Fall 1997	1	0	0	1	0	0	0	1	0	0	1	
Spring 1998	0	0	0	0	0	0	0	0	0	0	0	
Total	1	0	0	1	0	0	0	1	0	0	1	100
1998–1999												
Fall 1998	0	1	0	1	0	0	0	0	1	0	1	
Spring 1999	0	0	0	0	0	0	0	0	0	0	0	
Total	0	1	0	1	0	0	0	0	1	0	1	0
1999–2000												
Fall 1999	0	0	0	0	0	0	0	0	0	0	0	
Spring 2000	1	0	0	1	0	0	0	1	0	0	1	
Total	1	0	0	1	0	0	0	1	0	0	1	100

[a] Includes illegal kills.

[b] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

[c] Percentage includes only bears of known sex.

Table 2 Unit 20A, 20B, 20C, 20F, and 25C grizzly bear harvest in 3 zones, calendar years 1995 through 2000

Harvest zone	Area (mi^2)	Calendar year	Bears killed		3-year mean harvest		Harvest density[c]
			All ages[a]	≥2 years[b]	All ages	≥2 years[b]	
Unit 20A mountains	3081[d]	1995	11 (1)	11	11.3	11.3	3.6
		1996	9 (1)	7	9.6	9.0	2.3
		1997	13 (2)	13	11.0	10.3	4.2
		1998	10 (1)	9	10.7	9.7	2.9
		1999	16 (1)	16	13.0	12.7	5.2
		2000	11 (1)	11	12.3	12.0	3.6
Eastern half of Unit 20B	4929	1995	7	5	3.7	3.0	1.0
		1996	10 (2)	10	6.3	5.7	2.0
		1997	3	1	6.7	5.3	0.2
		1998	7 (2)	7	6.7	6.0	1.4
		1999	4	4	6.7	4.0	0.8
		2000	10	10	7.0	7.0	2.0
Unit 20A Flats, Western half of Unit 20B, Unit 20C Outside Denali National Park, Units 20F and 25C	26,278[e]	1995	6	6	11.0	11.0	0.2
		1996	18 (2)	18	15.0	15.0	0.7
		1997	12	12	12.0	12.0	0.5
		1998	14 (3)	14	14.7	14.7	0.5
		1999	13 (1)	12	9.7	9.3	0.5
		2000	22 (2)	20	16.3	15.3	0.8

[a] Parentheses indicate how many of these bears were killed by other than hunter harvest (i.e., defense of life or property, illegal kills, research activities).

[b] Assuming all bears of unknown age were ≥2 years old.

[c] Bears ≥2 years old harvested per 1000 mi^2.

[d] Excludes about 500 mi^2 (1300 km^2) of non-bear habitat in glaciers and above 6000 ft (1850 m).

[e] Excludes 4450 mi^2 (11,500 km^2) that is closed to hunting in Denali National Park.

Table 3 Unit 20A, 20B, 20C, 20F, and 25C grizzly bear successful hunter residency[a], regulatory years 1995–1996 through 1999–2000

Regulatory year	Alaska residents (%)	Nonresident (%)	Unknown (%)	*n*
1995–1996	12 (63)	6 (32)	1 (5)	19
1996–1997	23 (66)	9 (26)	3 (9)	35
1997–1998	18 (69)	8 (31)	0 (0)	26
1998–1999	20 (87)	3 (13)	0 (0)	23
1999–2000	20 (67)	9 (30)	1 (3)	30

[a] Excludes defense of life or property, research mortality, or other human-caused accidental or illegal mortality bears.

Table 4 Unit 20A, 20B, 20C, 20F, and 25C grizzly bear harvest chronology percent by month, regulatory years 1995–1996 through 1999–2000

Regulatory year	Percent of harvest[a]								
	Sep					May			
	1–15	16–30	Total	Oct	Apr	1–15	16–31	Total	*n*
1995–1996	37	37	74	5	5	16	5	21	19
1996–1997	43	34	77	3	0	9	11	23	35
1997–1998	31	42	73	0	0	8	19	27	26
1998–1999	61	17	78	0	0	4	17	21	23
1999–2000	40	43	83	3	0	3	10	13	30

[a] Excludes defense of life or property, research mortality, or other human-caused accidental or illegal mortality.

Table 5 Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest percent by transport method, regulatory years 1995–1996 through 1999–2000

Regulatory year	Percent of harvest by transport method[a]								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	Other ORV	Highway vehicle	Other/Unk	*n*
1995–1996	21	26	21	21	0	5	5	0	19
1996–1997	29	11	20	20	0	0	14	6	35
1997–1998	23	15	8	31	0	4	8	12	26
1998–1999	4	17	13	22	0	17	13	13	23
1999–2000	30	10	10	27	0	10	3	10	30

[a] Does not include defense of life or property, research mortality, or other human-caused accidental or illegal mortality.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 20D (5637 mi^2)

GEOGRAPHIC DESCRIPTION: Central Tanana Valley near Delta

BACKGROUND

Brown bears are distributed throughout Unit 20D; however, the Tanana River separates brown bear habitat into 2 distinct types within the unit. Unit 20D south of the Tanana River is adjacent and similar to habitat described by Reynolds (1990) for the foothills and mountains of the northcentral Alaska Range. Brown bear habitat in Unit 20D north of the Tanana River is adjacent and similar to habitat described in Unit 20E by Gasaway et al. (1990) for the hills north of the Tanana River. Hunter access to southern Unit 20D is excellent, while hunter access is more difficult in northern Unit 20D.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- As directed by the Board of Game, manage grizzly bears to reduce the effects of predation on ungulate species in portions of Unit 20D.

MANAGEMENT OBJECTIVE

- Manage for an annual mortality of 5–15 bears/year.

METHODS

Successful hunters were required to have brown bears sealed at department offices. Data collected from each brown bear included sex, skull length and width, transportation used by the hunter, number of days hunted, date and location of kill, and hunter name and address. A premolar tooth was extracted from each bear skull for use in age determination. Bears that died from nonhunting mortality sources, such as defense of life or property (DLP) killings, were also sealed. Data were summarized by regulatory year (RY = 1 Jul through 30 Jun; e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

I calculated brown bear population estimates for Unit 20D in May 1993. The Unit 20D estimate was 181–210 total bears, with 143–176 bears ≥2 years old. For the population estimate, I calculated separate estimates for Unit 20D north and south of the Tanana River as described below. I continued to use the 1993 estimates during this reporting period.

Southern Unit 20D. The population estimate for southern Unit 20D was 51–58 brown bears ≥2 years old and a total of 76–86 bears. This estimate was based on density estimates of 25.4–29.0 bears ≥2 years old/1000 mi^2, plus an additional 14% for cubs and yearlings, developed by Reynolds (1993) for similar habitat in the Alaska Range in Unit 20A.

Anecdotal information for southern Unit 20D from local residents, hunters, and pilots indicate that bears are common in most of the area. Residents commonly report bears near town, the landfill, and in the Delta Agricultural Project. Dall sheep hunters, moose hunters, and caribou hunters commonly report seeing bears in the foothills of the Alaska Range.

Northern Unit 20D. The population estimate for northern Unit 20D was 92–109 brown bears ≥2 years old and 105–124 total bears. This estimate was based on Gasaway et al.'s (1990) brown bear density estimates for Unit 20E of 26.9–32.1 bears ≥2 years old/1000 mi^2, plus an additional 14% for cubs and yearlings.

Reynolds (personal communication) plans to refine Alaska Range brown bear density estimates upon which we based the population estimate for southern Unit 20D. He also plans to complete a population model that calculates sustainable harvest levels based on harvest of females, rather than the current model that uses total adult harvest as the basis for estimating harvest goals. When this information is available, the Unit 20D population estimate and management objectives should be reviewed and reevaluated.

Population Composition

Brown bear population composition is unknown for Unit 20D. Because cubs or females accompanied by cubs are illegal to harvest, the sex ratio of the harvest was not used to estimate population composition.

Distribution and Movements

Brown bears are distributed throughout Unit 20D; however, no specific information on patterns of brown bear distribution or movements is available.

MORTALITY

Season and Bag Limit. During RY98 and RY99 those portions of Unit 20D south of the Tanana River and east of the east bank of the Gerstle River, or north of the Tanana River, had a 10 August–30 June hunting season for residents and nonresidents. There was also a bag limit of 1

bear/year, and no $25 tag was required of residents. Hunters taking bears in this area were required to have the bears sealed in Delta Junction or Tok.

The hunting season south of the Tanana River and west of the Gerstle River for residents and nonresidents was 1 September–31 May. The bag limit was 1 bear/4 regulatory years and a $25 tag was required of resident hunters.

Board of Game Actions and Emergency Orders.

RY98 and RY99 — For both periods the Alaska Board of Game, reauthorized the brown bear tag fee exemption for those portions of Unit 20D south of the Tanana River and east of the east bank of the Gerstle River.

Hunter Harvest and Other Mortality.

RY98 — Hunters killed 12 bears (Table 1) and met the harvest objective. Three bears were killed because they were nuisance bears, but sealed as hunter kills. Hunter take consisted of 83% males. All 12 bears were killed south of the Tanana River in southern Unit 20D. Hunters killed 10 bears, including all 3 nuisance bears, west of the Gerstle River where hunting regulations were most restrictive. Two bears were killed east of the Gerstle River where regulations were least restrictive.

Four bears were also killed in nonhunting circumstances (Table 1). Two bears were killed in defense of life or property (DLP) in southern Unit 20D west of the Gerstle River; another was killed illegally in the same area when it was mistaken for a black bear. One DLP bear was killed in northern Unit 20D.

The total reported mortality of 16 bears was composed of 75% males (Table 1). In addition to those killed in nonhunting circumstances (above), 3 bears were killed by hunters because the bears were considered nuisances. Most mortality (13 bears) occurred in southern Unit 20D, west of the Gerstle River where hunting regulations are most restrictive (Table 2). Two bears were killed in southern Unit 20D east of the Gerstle River and only 1 bear was killed north of the Tanana River. Total reported mortality was an estimated 8–9% of the unitwide brown bear population and 9–11% of bears ≥2 years old.

An estimated 1 bear is killed each year and not reported. Adding this estimated mortality to reported mortality results in estimated total mortality of 17 bears (Table 1).

RY99 — All reported mortality resulted from hunter harvest. Hunters killed 11 bears (Table 1) and met the harvest objective. Four of the kills were nuisance bears that were sealed by people with a hunting license. Harvest was composed of 64% male bears. Hunters killed 6 bears in southern Unit 20D with 3 taken west of the Gerstle River in the area with most restrictive hunting regulations, and 3 taken east of the Gerstle River in the area with least restrictive hunting regulations (Table 2). Five bears were killed north of the Tanana River in northern Unit 20D, also in the area with least restrictive hunting regulations. Of those bears that were killed as nuisance bears, 2 were taken east of the Gerstle River, 1 was taken west of the Gerstle River, and 1 was killed north of the Tanana River.

An estimated 1 bear is killed each year and not reported. Adding this estimated mortality to reported mortality results in estimated total mortality of 12 bears (Table 1).

Hunter Residency and Success. No significant changes occurred in previous patterns of residency of successful Unit 20D hunters during this reporting period. Most brown bears continued to be killed by residents. During RY98 and RY99, Unit 20D residents took 70% of the harvest, nonlocal residents 30%, and nonresidents did not take any bears (Table 3).

Harvest Chronology. No substantive change occurred in previous patterns of harvest chronology during this reporting period. In Unit 20D most brown bears continued to be taken during the fall hunting season. During RY98 and RY99, 65% of the bears killed by hunters were taken during August–November (Table 4).

Transport Methods. During the RY98 and RY99 reporting periods, 3- or 4-wheelers, highway vehicles, and foot access continued to be commonly used transportation types for hunting brown bears in Unit 20D (Table 5).

CONCLUSIONS AND RECOMMENDATIONS

The harvest objective of 5–15 bears/year was met in both RY98 and RY99, and hunters took predominantly male bears. The Board of Game reauthorized brown bear tag fee exemptions in portions of Unit 20D as part of an intensive management program to increase numbers of moose and caribou.

Total bear mortality in Unit 20D has increased since the $25 resident tag fee was eliminated in portions of Unit 20D. However, mortality of nuisance bears and nonhunting mortality continues to be a significant source of mortality.

Based on my population estimates, brown bear mortality may be at or near sustainable levels east of the Gerstle River but exceeding sustainable levels west of the Gerstle River. A significant portion of the brown bear mortality west of the Gerstle River is due to nonhunting mortality that results from people living near brown bears.

Although I estimated the brown bear population west of the Gerstle River may be experiencing mortality higher than sustainable, anecdotal observations indicate that bears remain plentiful in the area. This area will likely continue to experience high levels of bear mortality because of the number of human inhabitants. However, because this area is relatively small and surrounded by areas that have healthy brown bear populations, no reduction in the hunting regulations are planned at this time. There is significant demand for human use of moose and caribou in southern Unit 20D, and current population objectives are to increase the size of these ungulate populations. A localized reduction in the brown bear population may benefit survival of moose and caribou calves.

The Unit 20D brown bear population should be monitored closely during the next few years to determine long-term effects of liberalized hunting regulations in portions of the unit and to monitor the population west of the Gerstle River where mortality rates are highest.

LITERATURE CITED

GASAWAY WC, RD BOERTJE, DV GRANGAARD, DG KELLEYHOUSE, RO STEPHENSON, AND DG LARSEN. 1990. Factors limiting moose population growth in Subunit 20E. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-3 and W-23-3. Study 1.37. Juneau, Alaska.

REYNOLDS HV. 1990. Population dynamics of a hunted grizzly bear population in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-23-2. Study 4.19. Juneau, Alaska.

———. 1993. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-24-1. Study 4.25. Juneau, Alaska.

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Table 1 Unit 20D brown bear mortality[a], regulatory years 1989–1990 through 1999–2000

Regulatory year	Reported							Estimated kill		Total reported and estimated kill			
	Hunter kill				Nonhunting kill[a]								
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M	F	Unk	Total
1989–1990													
Fall 1989	2	0	0	2	0	0	0	1	0	2	0	1	3
Spring 1990	2	0	0	2	0	0	0	0	0	2	0	0	2
Total	4	0	0	4	0	0	0	1	0	4	0	1	5
1990–1991													
Fall 1990	3	2	0	5	0	0	0	1	0	3	2	1	6
Spring 1991	0	2	0	2	0	0	0	0	0	0	2	0	2
Total	3	4	0	7	0	0	0	1	0	3	4	1	8
1991–1992													
Fall 1991	0	0	0	0	0	1	0	1	0	0	1	1	2
Spring 1992	2	3	0	5	0	0	0	0	0	2	3	0	5
Total	2	3	0	5	0	1	0	1	0	2	4	1	7
1992–1993													
Fall 1992	4	2	0	6	1	0	0	1	0	5	2	1	8
Spring 1993	2	1	0	3	0	0	0	0	0	2	1	0	3
Total	6	3	0	9	1	0	0	1	0	7	3	1	11
1993–1994													
Fall 1993	5	1	0	6	0	0	0	1	0	5	1	1	7
Spring 1994	0	1	0	1	0	0	0	0	0	0	1	0	1
Total	5	2	0	7	0	0	0	1	0	5	2	1	8
1994–1995													
Fall 1994	2	2	0	4	0	0	0	1	0	2	2	1	5
Spring 1995	1	1	0	2	1	0	0	0	0	2	1	0	3
Total	3	3	0	6	1	0	0	0	0	4	3	1	8
1995–1996													
Fall 1995	8	3	0	11	0	0	0	1	0	8	3	1	12
Spring 1996	3	2	0	5	0	0	0	0	0	3	2	0	5
Total	11	5	0	16	0	0	0	1	0	11	5	1	17
1996–1997													

Regulatory year	Reported							Estimated kill		Total reported and estimated kill			
	Hunter kill				Nonhunting kill[a]								
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M	F	Unk	Total
Fall 1996	4	2	0	6	0	3	0	1	0	4	5	1	10
Spring 1997	1	0	0	1	0	1	0	0	0	1	1	0	2
Total	5	2	0	7	0	4	0	1	0	5	6	1	12
1997–1998													
Fall 1997	3	3	0	6	0	0	0	1	0	3	3	1	7
Spring 1998	2	0	0	2	0	1	0	0	0	2	1	0	3
Total	5	3	0	8	0	1	0	1	0	5	4	1	10
1998–1999													
Fall 1998	8	1	0	9	2	2	0	1	0	10	3	1	14
Spring 1999	2	1	0	3	0	0	0	0	0	2	1	0	3
Total	10	2	0	12	2	2	0	1	0	12	4	1	17
1999–2000													
Fall 1999	4	2	0	6	0	0	0	1	0	4	2	1	7
Spring 2000	3	2	0	5	0	0	0	0	0	3	2	0	5
Total	7	4	0	11	0	0	0	1	0	7	4	1	12

[a] Includes defense of life or property kills, research moralities, and other known human-caused accidental mortality.

Table 2 Unit 20D brown bear mortality[a] with differing hunting regulations, regulatory years 1987–1988 through 1999–2000

Regulatory year	Southern Unit 20D: West of Gerstle River M	West of Gerstle River F	East of Gerstle River M	East of Gerstle River F	Unk location M	Unk location F	Total M	Total F	Northern Unit 20D M	Northern Unit 20D F	Total Unit 20D M	Total Unit 20D F	Total bears M+F
	1 bear/4 yr, 1 Sep–31 May, $25 tag[b]												
1987–1988	2	0	4	4	1	0	7	4	0	1	7	5	12
1988–1989	1	1	1	1	0	0	2	2	2	0	4	2	6
1989–1990	2	0	0	0	0	0	2	0	2	0	4	0	4
1990–1991	1	2	2	0	0	1	3	3	0	1	3	4	7
1991–1992	2	3	0	1	0	0	2	4	0	0	2	4	6
Total kill	8	6	7	6	1	1	16	13	4	2	20	15	35
Kill/Year	3		3		0		6		1		7		
% Male	57		54		50		55		67		57		
			1 bear/4 yr, 1 Sep–31 May, $25 tag[b]						1 bear/yr, 10 Aug–30 Jun, no tag fee[b]				
1992–1993	4	1	1	1	0	1	5	3	2	0	7	3	10
1993–1994	2	0	2	1	0	0	4	1	1	1	5	2	7
1994–1995	3	2	1	1	0	0	4	3	0	0	4	3	7
Total kill	9	3	4	3	0	1	13	7	3	1	16	8	24
Kill/Year	4		2		0		7		1		8		
% Male	75		57		0		65		67		67		
	1 bear/4 yr, 1 Sep–31 May, $25 tag[b]		1 bear/yr, 10 Aug–30 Jun, no tag fee[b]						1 bear/yr, 10 Aug–30 Jun, no tag fee[b]				
1995–1996	4	1	3	1	0	0	7	2	4	3	11	5	16
1996–1997	3	4	1	1	0	0	4	5	1	1	5	6	11
1997–1998	3	3	0	1	0	0	3	4	2	1	5	4	10
1998–1999	10	3	2	0	0	0	12	3	0	1	12	4	16
1999–2000	1	2	2	1	0	0	3	3	4	1	7	4	11
Total kill	21	13	8	4	0	0	29	17	11	7	40	24	64
Kill/Year	7		2		0		9		4		13		
% Male	62		67		0		63		61		63		

[a] Includes nonhunting mortality.
[b] Hunting regulation.

Table 3 Unit 20D residency of successful brown bear hunters, regulatory years 1989–1990 through 1999–2000

Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Unk	Total successful hunters
1989–1990	3	1	0	0	4
1990–1991	4	2	0	1	7
1991–1992	3	0	0	0	3
1992–1993	6	4	0	0	10
1993–1994	3	4	0	0	7
1994–1995	2	4	0	0	6
1995–1996	7	6	1	2	16
1996–1997	5	2	0	0	7
1997–1998	5	2	1	0	8
1998–1999	7	5	0	0	12
1999–2000	9	2	0	0	11

[a] Residents of Unit 20D.

Table 4 Unit 20D chronology of brown bear harvest by month, regulatory years 1989–1990 through 1999–2000

Regulatory year	Harvest by month								
	Aug	Sep	Oct	Nov	Apr	May	Jun	Other	*n*
1989–1990	0	2	0	0	0	2	0	0	4
1990–1991	0	5	0	0	0	2	0	0	7
1991–1992	0	1	0	0	0	4	1	0	6
1992–1993	0	4	2	0	0	3	0	1	10
1993–1994	1	4	0	1	0	1	0	0	7
1994–1995	0	4	0	0	0	2	0	0	6
1995–1996	1	9	1	0	0	2	3	0	16
1996–1997	1	4	1	0	0	1	0	0	7
1997–1998	0	5	1	0	0	2	0	0	8
1998–1999	0	7	0	2	0	3	0	0	12
1999–2000	1	3	2	0	0	2	3	0	11
Total	4	48	7	3	0	24	7	1	94
Percent	4%	51%	7%	3%	0%	26%	7%	1%	

Table 5 Unit 20D percent of brown bear harvest by transport method, regulatory years 1989–1990 through 1999–2000

Regulatory year	Percent harvest by transport method										
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Foot	Other	Unk	*n*
1989–1990	0	0	25	0	0	25	25	25		0	4
1990–1991	0	14	0	0	0	57	14	14		0	7
1991–1992	0	0	0	0	17	17	0	67		0	6
1992–1993	10	10	20	20	0	0	30	10		0	10
1993–1994	14	0	29	0	0	0	43	14		0	7
1994–1995	17	17	0	33	0	0	17	17		0	6
1995–1996	25	0	13	25	0	0	31	6		0	16
1996–1997	0	0	29	14	0	14	43	0		0	7
1997–1998	13	0	13	25	0	13	13	0	25	0	8
1998–1999	0	0	0	58	0	0	8	33	0	0	12
1999–2000	9	0	9	0	0	9	27	46	0	0	11

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

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

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

BACKGROUND

The grizzly bear population in Unit 20E declined to low levels during the 1950s as a result of an intensive, year-round federal predator control program. After the program ended, bears were lightly exploited throughout the 1960s and 1970s. While no studies specifically addressed this question in Unit 20E, it is reasonable to assume that the population recovered to about 54 bears/1000mi^2 (21 bears/1000 km^2) based on estimated grizzly bear densities in areas with comparable habitats (Reynolds 1997). There are no salmon spawning streams in Unit 20E and the natural density of bears is lower than areas with salmon.

During the early 1980s, moose densities in Unit 20E were low (0.2 moose/mi^2, 0.5 moose/km^2) and predation by grizzly bears was a major factor in limiting this population (Gasaway et al. 1992). In an attempt to reduce the grizzly bear population, hunting regulations were liberalized. Our objective was to reduce the grizzly population through increased harvest to a level that resulted in a substantial decline in bear predation on calf moose. Regulation changes included: lengthening the season; increasing the bag limit from 1 bear/4 years to 1 bear/year; and between 1984 and 1992, revoking the $25 resident tag fee requirement. Annual grizzly bear harvests increased from a mean of 3 during regulatory years 1966 through 1981 to a mean of 19 during regulatory years 1982 through 1988 (i.e. regulatory year 1988 went from July 1, 1988 to June 30 1989). Based on the combination of harvest rate, harvest sex ratio, and average age of the harvested bears, it is reasonable to assume that harvest resulted in reduction in the grizzly bear population in a portion of Unit 20E. Further support for this line of reasoning is that the Unit 20E grizzly bear population was estimated at 31–41 bears/1000 mi^2 (12–16 bears/1000 km^2; Boertje et al. 1987) by the mid-1980s.

Survival of moose calves to 5 months of age in Unit 20E increased between 1982 and 1990, during the period of liberalized bear seasons. We believed this increased calf survival was related to a reduction in predator:prey ratios because moose numbers slowly increased in areas

where bear numbers were decreasing. This interpretation has led to liberalized grizzly bear harvest regulations in other areas even though in many cases there have been no field studies designed to evaluate how moose and caribou calf survival is impacted by the increased harvest of bears and the reduction in the bear population.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Provide maximum opportunity to hunt grizzly bears in Unit 20E.

MANAGEMENT OBJECTIVES

- Manage for temporary reductions in the grizzly bear population or to reduce bear predation where it may be limiting moose population growth (e.g., moose populations are below food-limiting densities with fall calf:cow ratios <25:100).

- After moose populations increase to desired levels, reduce bear harvests to allow for bear population stabilization or recovery.

When developing grizzly bear and wolf management goals for Unit 20E, I also considered the management goals and objectives of the area's moose and caribou populations. Area moose populations are currently limited by predation and grizzly bears are the primary predator on newborn moose calves (Gasaway et al. 1992). Grizzly bears are also an important predator on newborn caribou calves (Boertje and Gardner 1999). The need for combining predator and ungulate population and harvest objectives in Unit 20E has become more apparent after the Board of Game designated the moose population in most of Unit 20E and the Fortymile caribou herd as important for high levels of human consumptive use. Under the intensive management law the board must consider intensive management if regulatory action to significantly reduce harvest becomes necessary because a population is depleted or has reduced productivity. In Unit 20E, intensive management includes reduction of predation on moose and caribou by bears and wolves. In the future, the intensive management law may be the justification behind Unit 20E's population and harvest management.

METHODS

Grizzly bears harvested in Unit 20E must be sealed within the unit or at Tok before being transported out of the area. During the sealing process, we determine the sex of the bear, measure the length and width of the skull, extract a premolar tooth, and collect information on date and location of harvest and time spent afield by the hunter. Premolar teeth were sent to Matson's Laboratory (Milltown, Montana USA) for age determination. Harvest data were summarized by regulatory year.

In summer 2000 we established 3 permanent sampling areas to assess annual berry abundance in Unit 20E and 5 sampling areas in Unit 12. Each area has 5 1-m^2 plots. Sample areas and individual plots were not selected randomly but by the presence of blueberry plants. We selected for a variety of habitat types, aspects, elevations, and slopes. We will monitor annual rainfall and seasonal temperatures at each site to assess variability of blossom and berry production. To

measure berry production, we will count the number of berries within each plot at the same time each year. Over time, we hope to compare berry production between years and sites to evaluate the relationships between berry abundance, bear harvest, and the number of problem bear incidents.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

I estimated that the autumn 2000 Unit 20E population was 475–550 bears (17.1–19.8 bears of all ages/1000 km^2, 44.3–51.3/1000 mi^2) and that the population trend was stable. My estimate was based on radiotelemetry data collected by Boertje et al. (1987), Unit 20E harvest statistics collected since 1977, and bear harvest and population trend data collected from an intensively hunted grizzly bear population in the central Alaska Range (Reynolds and Boudreau 1992).

Reynolds and Boudreau (1992) found that a 6% mortality rate of adult females ≥6 years old would result in a grizzly bear population decline. In addition, Reynolds (1990) reported that an overall harvest of 11% for 8 years resulted in a population decline of 32%. Natural mortality accounted for about 2% annually and human-caused mortality included hunter kills, illegal kills, and wounding losses.

Grizzly bear hunting regulations in Unit 20E were liberalized in 1982 with the intent of reducing the bear population. Since 1982, annual harvests were within sustainable levels in Unit 20E as a whole. However during the 1980s and early 1990s, in that portion of Unit 20E that includes the Dennison, Middle, West, and Mosquito Forks of the Fortymile River and the upper Charley River drainages (3670 mi^2; 9500 km^2), the harvest rate was 6–9% of the estimated population, including harvest rates of 8–20% of the female bears >5 years old.

Using Reynolds and Boudreau (1992) sustainable mortality rates for females and all bears, I estimated that grizzly bear numbers within this area declined by 2% annually between 1982 and 1988. The population probably remained stable during 1989 through 1991 but declined by 2% annually between 1992 and 1996, again due to high harvest rates (harvest density = 8.3/10,000 mi^2; 3.2/10,000 km^2). During RY97 through RY99, the population was probably stable. In the remainder of Unit 20E (about 7000 mi^2; 18,000 km^2), harvest remained low (harvest density = 0.44/10,000 mi^2 or 0.17/10,000 km^2) and had little effect on population trend.

Taken independently, specific harvest statistics indicate that the Unit 20E bear population initially declined as a result of increased harvest. Kill rate data and relationship of percent males in the harvest to age class (Fraser et al. 1982) indicated that the bear population in the high harvest area was heavily harvested following the change in regulations ($t = 0.001$). Average male skull size during the period of increased harvest was significantly smaller compared to the 5 regulatory years before the increase ($t = 0.0003$; Table 1), and the trend showed an increased presence of younger males ($P = 0.059$). These trends indicate that as large males were harvested, increased immigration of young males probably occurred. In contrast, skull size and age of harvested females did not change between the 2 periods. It is unlikely that increased presence of young males in the harvest was due to increases in recruitment of young males because there was no evidence of increased recruitment of young females. These data indicate that liberalizing harvest regulations and initiating a public awareness campaign can cause the population to

decline, primarily by reducing the number of resident males and by changing the composition to a population more dominated by young males.

During the report period, harvest was 12 in RY98 and 5 bears in RY99. Harvest was distributed throughout the unit. Harvest totals were below sustainable levels and were estimated to have no effect on population trend. The preliminary RY00 harvest was 19 bears, 10 of which were males (53%). Factors causing this higher than expected harvest are unknown but an increased grizzly bear harvest also occurred in adjacent Unit 12.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 20E, 1 bear every regulatory year	10 Aug–30 Jun (General hunt only)	10 Aug–30 Jun

A bear taken in this unit did not count against the bag limit of 1 bear every 4 years in other units; however, no person could take more than 1 bear, statewide, per regulatory year. During the report period a $25 resident tag fee was required to hunt grizzly bears in Unit 20E.

Board of Game Actions and Emergency Orders. No regulatory changes for grizzly bears in Unit 20E occurred during the report period. During spring 1998, the Board of Game decided against a resident tag fee exemption in Unit 20E and against reducing the bag limit to 1 bear every 4 regulatory years. Since 1996 the board has waived the grizzly bear tag fee in northern Unit 20D in an attempt to increase harvest; this action may affect the grizzly bear population in adjacent portions of Unit 20E. Based on harvest distribution in Unit 20D, this regulatory change has had little effect on Unit 12 grizzly bears (DuBois, personal communication).

During spring 1998 the Board of Game designated the moose population in portions of Unit 20E and the Fortymile caribou herd as important for high levels of human consumptive use under the intensive management law. These designations mean the board must consider intensive management if regulatory action to significantly reduce harvest becomes necessary because either of these moose or caribou populations become depleted or have reduced productivity. This decision may affect the Unit 20E grizzly bear population in the future if further brown bear population reduction is deemed appropriate to meet the population goals of moose and caribou. Since 1992 the Upper Tanana/Fortymile and Eagle advisory committees have wanted to eliminate the tag fee requirement in Unit 20E to increase bear harvest in the more heavily hunted areas. Both committees believe that because moose in most of Unit 20E and the Fortymile caribou herd are to be intensively managed, additional grizzly bear hunting opportunity is valid.

They plan to submit a proposal to waive the tag fee requirement during the 2002 Board of Game meeting.

During spring 2000 the Board of Game substantially liberalized the Fortymile caribou bag limit across the herd's range. This regulation will become effective in autumn 2001. Grizzly bears are often killed opportunistically by caribou and moose hunters. Therefore, increased caribou hunting opportunity may also increase grizzly bear harvest, especially in Unit 20E along the Taylor Highway and its associated trails and in Unit 25C, south and east of the Steese Highway.

Hunter Harvest. During the report period, hunters reported taking 12 bears in RY98 and 5 bears in RY99 (Table 2). The 5-year average harvest was 15 bears. The mean percentage of males taken in the harvest during the past 5 years in Unit 20E was 51%. During RY98 and RY99 males represented 58% and 40% of the harvest, respectively.

Grizzly bear harvests significantly increased in RY82 ($P = 0.001$) compared with harvest totals during RY77 through RY81. Harvests remained high until RY88 (average annual harvest = 18.9) in response to the more liberal seasons and bag limits. Harvests declined between RY89 and RY92 (average harvest = 12.0) even though hunting regulations remained liberal and hunting pressure increased, indicating the number of legal bears in the more accessible areas of Unit 20E may have declined, were less vulnerable to harvest, or hunter desire for a Unit 20E grizzly was reduced. The increase in harvest between RY93 and RY96 can be explained by greater hunter effort in areas that historically received little hunting pressure and supported a higher density of bears. Another factor that may have caused the grizzly bear harvest to be lower was that since RY96 fewer hunters have been afield compared to the previous 5 years due to reduced hunting opportunity for Fortymile caribou. This caused the incidental harvest of grizzly bears to decline.

Hunter Residency and Success. During the report period, resident hunters took 74% (25 bears taken by residents/34 taken by nonresidents) of the grizzly bear harvest from Unit 20E, compared with the 5-year average of 81% (Table 3). Historically, little guided hunting for grizzly bears occurred in Unit 20E. The few bears taken by nonresidents were killed while hunting moose or caribou with a second degree of kindred relative who was a state resident. Beginning in 1995 several Unit 20E guides began taking more nonresident grizzly bear hunters to remote portions of the unit. I expect grizzly bear harvest in Unit 20E by nonresidents to increase in 2001 as more area guides will be using the area since the nonresident season for Fortymile caribou will be open after a 5-year hiatus.

Harvest Chronology. During the past 12 years, 78% of grizzly bears were harvested during August and September when most moose and caribou hunters were afield (Table 4). In Unit 20E, few bears are taken in the spring.

Transport Methods. During the report period, airplanes were used by 56% (19/34) of successful grizzly bear hunters in Unit 20E (Table 5). During the previous 5 years, airplanes (39%), 3- or 4-wheelers (22%), and highway vehicles/walk (14%) were the modes of transportation used by most successful bear hunters. Use of airplanes to hunt grizzly bears in Unit 20E increased as more hunters gained access to remote areas.

Other Mortality

Two bears (1 male, 1 female) were reported taken in defense of life and property (DLP) incidents during this report period. Possible reasons for the lack of reported DLP kills in recent years were the long season (only closed during 1 Jul–9 Aug) and significantly reduced bear numbers in the vicinity of the communities in Unit 20E. Most natural grizzly bear mortality in Unit 20E is probably the result of intraspecific strife and cannibalism (Boertje et al. 1987). Reynolds (1997) estimated natural mortality at 2.5% for females ≥2 years of age and 1.9% for females ≥6 years of age.

HABITAT

Assessment

All of Unit 20E is suitable grizzly bear habitat. Few human developments exist with the exception of the Taylor Highway and the small communities of Eagle, Boundary, and Chicken. The unit offers a variety of forbs and berries for grizzly bears. However, there are no arctic ground squirrels and few opportunities for salmon, food types known to be important food sources elsewhere. Habitat diversity was affected by the high level of wildfire suppression during the 1960s and 1970s. Almost all habitat types are used by grizzly bears in the unit and average home range sizes for adult male and female bears are 1409 km^2 (544 mi^2, s = 695) and 391 km^2 (151 mi^2, s = 318.3), respectively (Boertje et al. 1987).

We established 3 blueberry sample areas in Unit 20E and 5 sample areas in Unit 12 during July 2000 (Table 6). Based on discussions with local berry pickers, hunters, and hikers, it was a poor berry year in Unit 20E but there were patches of local abundance. Based on the first year's data, blueberries were more common in the higher elevations but were patchy in distribution. Our selection of the sample areas during early July was too late to determine blossom production. Our objective is to annually monitor blossom and berry production in these areas of Units 20E and 12 and evaluate the effects of berry abundance on bear harvest and problem bear incidents.

Enhancement

The Alaska Interagency Fire Management Plan: Fortymile Area was implemented in the early 1980s and dictates that over 60% of the area will receive only limited fire suppression. This means that fires in this area will be monitored but not suppressed except under exceptionally severe fire conditions. Recurring wildfires increase habitat heterogeneity and productivity for bears and their primary prey. Under the prescribed fire burn plan for Unit 20E, about 95,000 acres burned in 3 different areas during 1998 and 1999. Two of these areas were dominated by climax spruce forest and one by decadent willow/birch/alder shrub. Based on range recovery in adjacent burns, grizzly bears will likely benefit from these fires within 10–15 years.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Research in Unit 20E and other parts of Alaska demonstrated that grizzly bear and wolf predation can be the primary limiting factor in moose and caribou population growth (Gasaway et al. 1992). They recommended altering wolf and bear predation simultaneously to achieve maximum potential for increases in moose numbers. Grizzly bear harvest regulations were

liberalized in Unit 20E in 1981 with the intent of reducing in the bear population to benefit moose. This led to a reduction in the bear population and a change in the sex and age composition in a portion of Unit 20E. Initial analyses demonstrated that survival of neonatal moose increased substantially after 8 years of increased grizzly bear harvest and an estimated 2% annual decline in the bear population (Gasaway et al. 1992). However, subsequent analysis indicated that further reductions in grizzly bear numbers did not improve moose calf survival in Unit 20E (Gardner 1999).

In portions of Unit 20E, a nonlethal wolf control program was conducted during 1997 through May 2001. Wolf numbers were reduced by 75–80% within 15 wolf territories through translocation, sterilization, and take by trappers. Six of these wolf pack territories were located in the area where grizzly bear numbers were also reduced by harvest. During 1998 through November 2000, I have conducted moose population estimation surveys within a portion of the area where wolf and grizzly bear populations have been reduced. As of November 2000, moose numbers have remained relatively stable. Moose composition data indicate that calf survival to 5 months old remained low (17–23 calves/100 cows) and yearling bull survival was high (13–18/100 cows). It appears that grizzly bear predation may still be responsible for mortalities of a high proportion of the calves, but the effect of wolf predation may be declining (Gardner, unpublished data).

I modeled current population status and trend data for moose and their predators using McNay and DeLong's (1999) pred/prey model. The application of this model using data from Unit 20E predicts that the moose population within the nonlethal wolf control area will continue to be primarily limited by grizzly bear predation on calves. Gasaway et al. (1992) estimated that between 1981 and 1988, 65% of calf mortality was due to grizzly bears. In order for the model to track current population status, grizzly bears would have had to cause 60% of the calf mortality during 1997–1999.

Assuming grizzly bear predation rates remain relatively constant during the next 5 years, the model predicts that the effect of nonlethal wolf control will be minimal on population trend (annual growth rates = 0.97–1.00), and that calf:cow ratios will be 20 to 25 calves:100 cows.

In contrast, the model predicts moose numbers would increase 8–10% annually if the number of grizzly bears or their predation efficiency were reduced. This would result in a decline in the mortality of calves from a rate of 60% to a rate of 45%. The objective for liberalizing the Unit 20E grizzly bear regulations in 1981 was to reduce the grizzly bear population through harvest. Harvest increased in portions of the unit and the bear population declined. The model output predicts that reductions in the bear population prior to wolf control may have reduced adult moose mortality but that calf mortality was not substantially reduced. Observations of the moose population and application of the model indicate that a similar number of moose calves were killed by grizzly bears both before and after the bear population reduction. This low recruitment of calves caused the moose population to remain relatively stable. If intensive management is to be effectively implemented in Unit 20E, new ideas of how to manage bear predation on calves may be necessary. It does not appear that the increase in the grizzly bear harvest under the current harvest regulations have been substantial enough to result in reductions in bear numbers.

To reduce the effects of grizzly bear predation on calves, either the number of bears would have to be reduced to a level at which predation is no longer a factor, or bear efficiency as a predator on calves would have to be reduced. My observations during calf mortality studies and moose composition data collected in areas of reduced grizzly bear numbers indicate fewer bears can kill more calves, resulting in the same overall predation rate compared to before bears were reduced. Boertje et al. (1988) reported that there were no differences in calf moose kill rates between sex and age classes of grizzly bears. These data indicate restricting harvest to males and females not accompanied by cubs may not reduce the bear population sufficiently to override the predation efficiency and compensatory abilities of the remaining bears. To reduce bear predation efficiency other methods would be necessary. Two possibilities for Unit 20E are supplementary feeding of bears or creating a situation in which bears are not as efficient as a predator. Bear predation efficiency declined in early successional habitats following wildfires (Schwartz and Franzmann 1989). Combining liberal grizzly bear harvests with habitat enhancement programs may provide a means of increasing moose calf survival until other methods of publicly acceptable bear population control are found.

CONCLUSIONS AND RECOMMENDATIONS

During fall 2000 I estimated there were 475–550 grizzly bears in Unit 20E. Harvest data indicated the population has declined only slightly since 1981 despite very liberal hunting regulations. Due to the inaccessibility of most of the unit, harvest had little impact on the total population size. However, in the central portion of Unit 20E, harvest increased significantly in RY82 and remained high until RY89. Harvest was also high between RY93 and RY96. Annual kill densities were 1.92–4.35 bears/10,000 mi^2 (0.74–1.68/10,000 km^2). Bear numbers within this area declined by an estimated 2% annually. Since 1994, harvest has become more dispersed across the unit. Population trend is currently stable.

Grizzly bear management in Unit 20E provides maximum bear hunting opportunity, which meets our management goal. However, we did not meet our management objective to increase moose or caribou calf survival by reducing the grizzly bear population using liberalized harvest regulations.

Even though data do not indicate that harvest-caused reductions in bear populations have resulted in enhanced calf survival in Unit 20E, I recommend the current management objectives for liberalized harvest be retained. During the past 4 years, trappers and nonlethal wolf control activities have reduced the wolf population in a portion of the unit. Research and management efforts in conjunction with the Fortymile Caribou Management Plan will benefit from documenting the effects harvest has on bear predation on moose calves in the same area in which wolves were reduced.

Recommendations for future changes in the harvest regulations will depend on the effects of increased hunting pressure beginning in 2001. I am concerned that grizzly bear harvest in both Units 20E and 25C may become excessive after 2001. Thousands of hunters may be attracted to the area as Fortymile caribou seasons are liberalized, which may result in increased incidental take of bears. To ensure adequate protection to grizzly bears in the future, harvest management should be based on the combination of total harvest and numbers of females taken. Hunters

would have to be more selective while hunting grizzly bears but, if successful, could ensure high levels of hunter opportunity without jeopardizing the bear population.

LITERATURE CITED

ALASKA DEPARTMENT OF FISH AND GAME. 1996. Recommendations for improved intensive management of Unit 13 – Report to the Board of Game. ADF&G files. Juneau, Alaska.

———. 1998. Resident brown bear bag limits and tag fees. Report to the Board of Game, October 23, 1998. ADF&G files. Juneau, Alaska.

BOERTJE RD AND C GARDNER. 1999. Reducing mortality on the Fortymile caribou herd. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-27-2. Study 3.43. Juneau, Alaska.

———, WC GASAWAY, DV GRANGAARD, DG KELLEYHOUSE, AND RO STEPHENSON. 1987. Factors limiting moose population growth in Subunit 20E. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Project W-22-5. Job 1.37. Juneau, Alaska.

———, ———, DG KELLEYHOUSE, AND DV GRANGAARD. 1988. Predation on moose and caribou by radiocollared grizzly bears in east-central Alaska. *Canadian Journal of Zoology* 66:2492–2499.

FRASER DJ, F GARDNER, GB KOLENOSKY, AND S STRATHERN. 1982. Estimation of harvest rate of black bears from age and sex data. *Wildlife Society Bulletin* 10(1):53–57.

GARDNER C. 1999. Grizzly bear management progress report of survey-inventory activities. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grants W-24-5 and W-27-1. Study 4.0. Juneau, Alaska.

GASAWAY WC, RD BOERTJE, DV GRANGAARD, DG KELLEYHOUSE, RO STEPHENSON, AND DG. LARSEN. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. *Wildlife Monographs* 120.

MCNAY ME AND RA DELONG. 1999. Predprey-predator-prey computer model for use making management decisions. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration. Study 1.46. Grants W-24-1 and W-24-5. Juneau, Alaska.

REYNOLDS HV. 1990. Population dynamics of a hunted grizzly bear population in the Northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-23-2. Study 4.19. Juneau, Alaska.

———. 1997. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration.

Research Final Report. Grants W-24-1, W-24-2, W-24-3, and W-24-4. Study 4.25. Juneau, Alaska.

——— AND TA BOUDREAU. 1992. Effects of harvest rates on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-5, W-22-6, W-23-1, W-23-2, W-23-3, and W-23-4. Study 4.19. Juneau, Alaska.

SCHWARTZ CC AND AW FRANZMANN. 1989. Bears, wolves, moose, and forest succession, some management considerations on the Kenai Peninsula, Alaska. *Alces* 25:1–11.

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Table 1 A comparison of male skull size and harvest density in the pretreatment versus treatment periods

Test	Hypothesis[a]	Pretreatment	Treatment	*t*-test	Interpretation
Harvest density	H_O: Pre=Treat	5	16	0.0003	Harvest density > during treatment.
	H_A: Pre<Treat			0.0001	Satterthwaite correction.
Male skull size	H_O: Pre=Treat	5	16	0.0003	Male skull size > during pretreatment.
	H_A: Pre<Treat			0.0095	Satterthwaite correction.

[a] Pre=Treat, pretreatment sample is not different from the treatment or intensive harvest sample; Pre<Treat, pretreatment sample is less than the treatment or intensive harvest sample.

Table 2 Unit 20E grizzly bear mortality, regulatory years 1989–1990 through autumn 2000–2001

Regulatory year	Reported							Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill[a]								
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M (%)	F (%)	Unk	Total
1989–1990													
Fall 1989	4	2	0	6	0	0	0	0	0	4 (67)	2 (33)	0	6
Spring 1990	3	1	0	4	0	0	0	0	0	3 (75)	1 (25)	0	4
Total	7	3	0	10	0	0	0	0	0	7 (70)	3 (30)	0	10
1990–1991													
Fall 1990	7	3	0	10	0	0	0	0	0	7 (70)	3 (30)	0	10
Spring 1991	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3
Total	9	4	0	13	0	0	0	0	0	9 (69)	4 (31)	0	13
1991–1992													
Fall 1991	2	4	0	6	0	0	0	0	0	2 (33)	4 (67)	0	6
Spring 1992	3	2	0	5	0	0	0	0	0	3 (60)	2 (40)	0	5
Total	5	6	0	11	0	0	0	0	0	5 (45)	6 (55)	0	11
1992–1993													
Fall 1992	7	3	1	11	0	0	0	0	0	7 (64)	3 (27)	1	11
Spring 1993	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3
Total	9	4	1	14	0	0	0	0	0	9 (64)	4 (29)	1	14
1993–1994													
Fall 1993	9	10	0	19	0	0	0	0	0	9 (47)	10 (53)	0	19
Spring 1994	0	2	0	2	0	0	0	0	0	0 (0)	2 (100)	0	2
Total	9	12	0	21	0	0	0	0	0	9 (43)	12 (57)	0	21
1994–1995													
Fall 1994	6	4	0	10	0	0	0	0	2	8 (75)	4 (25)	0	12
Spring 1995	1	0	0	1	0	0	0	0	0	1 (100)	0 (0)	0	1
Total	7	4	0	11	0	0	0	0	2	9 (69)	4 (31)	0	13
1995–1996													
Fall 1995	6	8	0	14	0	0	0	0	0	6 (43)	8 (57)	0	14
Spring 1996	5	2	0	7	0	0	0	0	0	5 (71)	2 (29)	0	7
Total	11	10	0	21	0	0	0	0	0	11 (52)	10 (48)	0	21
1996–1997													
Fall 1996	8	10	0	18	0	0	0	0	1	9 (47)	10 (53)	0	19
Spring 1997	2	2	0	4	0	0	0	0	0	2 (50)	2 (50)	0	4
Total	10	12	0	22	0	0	0	0	1	11 (48)	12 (52)	0	23
1997–1998													

Regulatory year	Reported							Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill[a]								
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M (%)	F (%)	Unk	Total
Fall 1996	7	4	0	11	0	0	0	0	1	7 (58)	4 (33)	1	12
Spring 1997	0	0	0	0	0	0	0	0	0	0 (00)	0 (00)	0	0
Total	7	4	0	11	0	0	0	0	1	7 (58)	4 (33)	1	12
1998–1999													
Fall 1998	6	5	0	11	1	0	0	0	0	7 (58)	5 (42)	0	12
Spring 1999	0	0	0	0	0	0	0	0	0	0 (0)	0 (0)	0	0
Total	6	5	0	11	1	0	0	0	0	7 (58)	5 (42)	0	12
1999–2000													
Fall 1999	0	2	0	2	0	0	0	0	0	0 (0)	2 (100)	0	2
Spring 2000	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3
Total	2	3	0	5	0	0	0	0	0	2 (40)	3 (60)	0	5
2000–2001[b]													
Fall 2000	10	8	0	18	0	1	0	0	0	10 (53)	9 (47)	0	19

[a] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

[b] Preliminary harvest.

Table 3 Unit 20E residency of successful grizzly bear hunters, regulatory years 1989–1990 through 2000–2001

Regulatory year	Resident	(%)	Nonresident	(%)	Unknown	(%)	Total successful hunters
1989–1990	9	(90)	1	(10)	0	(0)	10
1990–1991	12	(92)	1	(8)	0	(0)	13
1991–1992	11	(100)	0	(0)	0	(0)	11
1992–1993	12	(86)	2	(14)	0	(0)	14
1993–1994	20	(95)	1	(5)	0	(0)	21
1994–1995	8	(73)	2	(18)	1	(9)	11
1995–1996	9	(43)	9	(43)	3	(14)	21
1996–1997	21	(91)	2	(9)	0	(0)	23
1997–1998	9	(82)	2	(18)	0	(0)	11
1998–1999	8	(73)	3	(27)	0	(0)	11
1999–2000	3	(60)	2	(40)	0	(0)	5
2000–2001[a]	14	(78)	4	(22)	0	(0)	18

[a] Preliminary harvest.

Table 4 Unit 20E chronology of brown bear harvest by month, regulatory years 1989–1990 through 2000–2001[a]

Regulatory year	Harvest by month														
	Aug	(%)	Sep	(%)	Oct	(%)	Nov	(%)	Apr	(%)	May	(%)	Jun	(%)	*n*
1989–1990	1	(10)	5	(50)	0	(0)	0	(0)	1	(10)	2	(20)	1	(10)	10
1990–1991	2	(15)	7	(54)	0	(0)	0	(0)	0	(0)	3	(23)	1	(8)	13
1991–1992	3	(27)	2	(18)	1	(9)	0	(0)	0	(0)	1	(9)	4	(36)	11
1992–1993	4	(29)	5	(36)	2	(14)	0	(0)	0	(0)	1	(7)	2	(14)	14
1993–1994	6	(29)	12	(57)	1	(5)	0	(0)	1	(5)	1	(5)	0	(0)	21
1994–1995	2	(15)	10	(77)	0	(0)	0	(0)	0	(0)			1	(8)	13
1995–1996	3	(14)	10	(48)	0	(0)	0	(0)	1	(5)	6	(29)	1	(5)	21
1996–1997	7	(30)	12	(52)	0	(0)	0	(0)	0	(0)	2	(9)	2	(9)	23
1997–1998	2	(18)	9	(82)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	11
1998–1999	5	(45)	6	(55)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	11
1999–2000	0	(0)	2	(40)	0	(0)	0	(0)	0	(0)	3	(60)	0	(0)	5
2000–2001[a]	3	(17)	15	(83)	0	(0)	0	(0)							
Totals	38	(22)	95	(56)	4	(2)	0	(0)	3	(2)	19	(11)	12	(7)	171

[a] Preliminary harvest.

Table 5 Unit 20E grizzly bear percent harvest by transport method, regulatory years 1989–1990 through 2000–2001[a]

Regulatory year	Percent harvest by transport method									
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	*n*
1989–1990	40	0	10	0	0	0	20	20	10	10
1990–1991	23	0	15	8	0	0	46	0	8	13
1991–1992	27	0	9	18	0	0	36	9	0	11
1992–1993	43	0	0	21	0	7	29	0	0	14
1993–1994	29	0	10	14	0	19	5	24	0	21
1994–1995	23	0	8	31	0	8	15	15	0	13
1995–1996	57	0	10	10	0	4	4	10	4	21
1996–1997	43	4	0	9	0	9	26	9	0	23
1997–1998	45	0	0	45	0	0	0	10	0	11
1998–1999	73	0	0	0	0	18	0	9	0	11
1999–2000	60	0	0	0	0	0	40	0	0	5
2000–2001[a]	44	0	11	33	0	0	11	0	0	18

[a] Preliminary harvest.

Table 6 Blueberry sample areas in Units 20E and 12

Area	Elevation	Slope	Aspect	Primary vegetation	Rainfall (in)		No. berries/plot					
					Blossom production (May–Jun)	Berry production (Jul–Aug)	1	2	3	4	5	$\bar{x}$
Clearwater	1966	Flat	Flat	spruce/muskeg	–[a]	2.09	14	0	31	84	8	27
7-Mile	1859	Flat	Flat	spruce/willow	–[a]	2.26	0	1	2	0	0	0
Pipeline	1888	5–10[a]	SSW	spruce/willow	–[a]	2.77	13	6	0	0	0	3
RCA	2197	15–20[a]	N	spruce/alder	–[a]	–[b]	3	0	0	0	4	1.9
4-Mile	2300	5–10[a]	S	spruce/tussock	–[a]	2.66	11	7	14	12	11	11
9-Mile	2722	5–10[a]	NE	1990 burn/willow	–[a]	2.74	23	9	10	12	7	10
Ptarmigan	3643	10–15[a]	W	willow/alder	–[a]	4.40	9	59	1	14	41	24
Fairplay	3640	10[a]	SW	willow	–[a]	4.48	14	0	23	2	7	9

[a] Rain gauges not working until after blossom production.

[b] Bear destroyed rain gauge.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNITS: 21B, 21C, and 21D (20,655 mi^2)

GEOGRAPHIC DESCRIPTION: Middle Yukon River, including lower Koyukuk River, lower Nowitna River and Melozitna River drainages

BACKGROUND

Grizzly bear density is low to moderate throughout Units 21B, 21C, and 21D, and most of the bears inhabit the mountainous areas. Populations have been stable or slowly increasing, with annual reported harvests of <10 bears per year. Stemming from bear/human conflicts, an equal number of grizzly bears are estimated killed but not reported. These unreported kills most likely occur along the Yukon River during the summer and early fall when fish camps are in operation and bears are attracted to the sites.

Historically, grizzly bears were an important source of food and hides, but hunting effort by local residents has declined in recent years. The registration regulations and fee exemption for the Northwest Alaska Brown Bear Management Area, which includes all of Unit 21D, has improved harvest reporting among local residents.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Protect, maintain and enhance the grizzly bear population and its habitat in concert with other components of the ecosystem.

MANAGEMENT OBJECTIVE

- Manage a grizzly population that will sustain a 3-year mean annual harvest of at least 25 bears, with at least 50% males in the reported harvest.

METHODS

Harvest was monitored through sealing requirements of general hunts and reporting requirements of the Northwest Alaska Brown Bear Management Area subsistence hunts. Data collected during sealing included sex, location of harvest, skull measurements, and age if teeth were submitted for aging. Data specific to harvest such as transportation methods, time of harvest, and commercial services utilized were also recorded. Data collected from bears

harvested under subsistence regulations were limited to sex, location of kill and date of harvest. Bear/human conflicts were addressed through education, legal harvest of problem bears, and changes in regulations. Harvest data were summarized by regulatory year (RY = 1 Jul–30 Jun, e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Field observations, nuisance reports, and hunter sightings indicated the population was stable or slowly increasing during the past 10 years. We did not conduct surveys in the area; however, we made population estimates based on known bear densities in similar habitats in other Interior Alaska game management units (Reynolds and Hechtel 1984; Reynolds 1989). Assuming 25 bears/1000 mi^2 in the highest density bear habitat and 10 bears/1000 mi^2 in the remainder of the reporting area, we estimated 350–400 grizzly bears inhabited Units 21B, C, and D (Woolington 1997) (21B≅50, 21C≅100, 21D≅200). The Nulato Hills in Unit 21D had the best bear habitat. Unit 21C in its entirety contained the next best grizzly bear habitat. However, because the best habitat in this reporting area included salmon spawning streams, the density estimates based on similar habitats without spawning salmon (Miller 1993), were likely underestimated.

MORTALITY

Harvest

Seasons and Bag Limits.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Units 21B and 21C		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 21D		
One bear every regulatory year by registration permit.	1 Sep–15 Jun (Subsistence hunt only)	No open season
One bear every regulatory year.	1 Sep–15 Jun	1 Sep–15 Jun

Board of Game Actions and Emergency Orders. During the spring 1996 Board of Game meeting, Unit 21D was included within the Northwest Alaska Brown Bear Management Area. This regulation change allowed a bag limit of 1 bear every regulatory year under a subsistence registration permit. This regulation also required salvage of meat for human consumption, but the hide and skull did not need to be sealed unless they were removed from the management area. If the hide was removed from the management area, the Alaska Department of Fish and Game took the skin of the head and the front claws. At the spring 2000 Board of Game meeting, the season was extended to 15 June for both the subsistence and general seasons in Unit 21D.

The bag limit was also liberalized to allow for the harvest of 1 bear every year under the general hunt.

Hunter Harvest. Grizzly bear harvest in Units 21B, 21C, and 21D was low, and no harvest patterns were clear over the last 6 regulatory years (Table 1). For RY94 through fall 2000, males comprised 68% of the reported harvest, an adequate level to maintain recruitment. More than half the annual harvest was likely unreported. The number of bears taken and not reported was uncertain, but I estimated it was <10 bears per year based on previously reported values. Most were likely taken at fish camps. If this estimate is accurate, the combined mean annual harvest for the last 6 regulatory years was approximately 16 bears/year. The age and sex composition of the reported harvest shows no indication of overexploitation. For RY97–RY99, the average age of harvested bears was 8.9, slightly older than the 32-year average of 8.3 years of age for bears harvested in Units 21B, 21C, 21D and 24. The trend in age of harvested bears was steadily increasing. Based on the estimated sustainable harvest rate of 5–6% in other areas of Interior Alaska (DuBois 1989), an annual total harvest of up to 25 bears seems to be sustainable.

Most grizzly bear harvest was in Unit 21D (Table 2) where the most moose hunting also occurs. Unit 21C sustained the second greatest harvest, which was supported by the relatively high density of bears in that area.

Hunter Residency and Success. There was no pattern of harvest among user groups (Table 3) because most grizzly bears were harvested opportunistically. Mean annual harvest over the past 4 regulatory years was 2.0, 1.8, and 4.3 bears for local, nonlocal, and nonresident hunters, respectively. From RY92 through fall 2000 the mean annual number of successful hunters was 6.9.

Harvest Chronology and Transport Methods. Because harvest was low, no patterns demonstrating greater harvest during the spring versus fall was apparent. Spring bear hunters typically use snowmachines for transportation. Fall bear harvest is often incidental to moose hunting activity, and hunters typically use boats for transportation.

CONCLUSIONS AND RECOMMENDATIONS

The management objective to manage for a grizzly population that will sustain a 3-year mean annual harvest of at least 25 bears, with at least 50% males in the reported harvest was achieved. The population was stable or slightly increasing and was capable of supporting an annual harvest of at least 25 bears. The 3-year mean annual harvest (reported and unreported) of 17.7 bears did not exceed the estimated sustainable yield of 25 bears annually. Because males continued to be harvested at more than twice the rate of females and the average age of harvested bears was relatively high, the population was most likely maintaining a high level of reproductive potential with a gradually maturing age-class structure. Although Miller (1993) cautioned about using the proportion of males in the harvest to determine the composition of the population, most bears are harvested in the fall so the bias of a greater number of male bears in the spring harvest was diminished. Unless regulations or hunting habits change dramatically, the harvest will have a negligible effect on grizzly populations in these units. A more accurate assessment of the unreported harvest and a better estimate of the population size should be addressed in the next reporting period.

LITERATURE CITED

DUBOIS SD. 1989. Unit 20D brown/grizzly bear management progress report of survey-inventory activities. Pages 119–127 *in* SO Morgan, editor. Part V. Volume XIX. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grant W-23-1. Study 4.0. Juneau, Alaska.

MILLER S. 1993. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-22-6, W-23-1, W-23-2, W-23-3, W-23-4, and W-23-5. Study 4.21. Juneau, Alaska.

REYNOLDS HV. 1989. Units 24, 25A, B, D, and 26B and C brown/grizzly bear management progress report of survey-inventory activities. Pages 174–184 *in* SO Morgan, editor. Part V. Volume XIX. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grant W-23-1. Study 4.0. Juneau, Alaska.

——— AND JL HECHTEL. 1984. Structure, status, reproductive biology, movements, distribution, and habitat utilization of a grizzly bear population. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-21-1, W-21-2, W-22-1, and W-22-2. Study 4.14R. Juneau, Alaska.

WOOLINGTON J. 1997. Unit 21 brown bear management progress report of survey-inventory activities. Pages 208–212 *in* MV Hicks, editor. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grants W-24-3 and W-24-4. Study 4.0. Juneau, Alaska.

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Table 1 Units 21B, 21C, and 21D brown bear mortality, regulatory years 1994–1995 through fall 2000

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill[a]									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
1994–1995														
Fall 1994	1	3	0	4	0	0	0	0	5	0	1	3	5	9
Spring 1995	3	1	0	4	0	0	0	0	5	0	3	1	5	9
Total	4	4	0	8	0	0	0	0	10	0	4	4	10	18
1995–1996														
Fall 1995	0	1	0	1	0	0	0	0	5	0	0	1	5	6
Spring 1996	1	2	0	3	0	0	0	0	5	1	2	2	5	9
Total	1	3	0	4	0	0	0	0	10	0	2	3	10	15
1996–1997														
Fall 1996	2	1	0	3	1	0	0	1	5	0	3	1	5	9
Spring 1997	0	0	0	0	0	0	0	0	5	0	0	0	5	5
Total	2	1	0	3	1	0	0	1	10	0	3	1	10	14
1997–1998														
Fall 1997	4	2	3	9	0	0	0	0	5	0	4	2	8	14
Spring 1998	1	0	0	1	0	0	0	0	5	0	1	0	5	6
Total	5	2	3	10	0	0	0	0	10	0	5	2	13	20
1998–1999														
Fall 1998	2	2	0	4	0	0	1	1	5	0	2	2	6	10
Spring 1999	1	0	0	1	0	0	0	0	5	0	1	0	5	6
Total	3	2	0	5	0	0	1	1	10	0	3	2	11	16
1999–2000														
Fall 1999	2	1	0	3	0	0	0	0	5	0	2	1	5	8
Spring 2000	4	0	0	4	0	0	0	0	5	0	4	0	5	9
Total	6	1	0	7	0	0	0	0	10	0	6	1	10	17
2000–2001														
Fall 2000	8	1	0	9	0	0	0	0	5	0	8	1	5	14

[a] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 2 Unit 21 reported brown bear harvest by subunit, regulatory years 1992–1993 through fall 2000[a]

Regulatory year	Unit			Total
	21B	21C	21D	
1992–1993	2	0	7	9
1993–1994	0	2	4	6
1994–1995	0	3	5	8
1995–1996	0	0	4	4
1996–1997	1	2	0	3
1997–1998	1	1	8	10
1998–1999	0	2	4	6
1999–2000	1	0	6	7
Fall 2000	1	4	4	9

[a] Nonhunting kill not included.

Table 3 Unit 21B, 21C, and 21D successful hunter residency, regulatory years 1992–1993 through fall 2000

Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total successful hunters
1992–1993	2	1	6	9
1993–1994	2	2	2	6
1994–1995	2	3	3	8
1995–1996	2	0	2	4
1996–1997	1	2	0	3
1997–1998	4	1	5	10
1998–1999	2	1	3	6
1999–2000	2	2	3	7
Fall 2000[b]	0	3	6	9

[a] Unit 21B, C, and D residents.
[b] Preliminary.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 22 (25,200 mi^2)

GEOGRAPHICAL DESCRIPTION: Seward Peninsula and that portion of the Nulato Hills draining west into Norton Sound

BACKGROUND

We believe that brown bear numbers in Unit 22 declined during the early 1900s after the introduction of the gold mining and reindeer herding industries. It was not until these activities declined substantially during the 1940s and when federal predator control efforts ended at statehood in 1959 that bear numbers began to slowly recover (Grauvogel 1986). The population has since continued to increase in most areas, presumably in response to higher prey densities, favorable environmental conditions and conservative management policies.

The increasing number of bears in Unit 22 has many effects and consequences. There is considerable interest in hunting by residents, principally from the Nome area, and by nonresidents through general season and drawing permit hunts. Human-bear encounters in the Nome area, and in Unit 22 villages and camps are increasingly common. Predation on moose calves is believed to be depressing moose populations in many parts of the unit, and reindeer herders report that predation by brown bears on reindeer continues to be a significant problem. Many local residents believe that bear densities in Unit 22 are excessive.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

The management goal for brown bears in Unit 22 is to maintain populations at levels estimated during the 1991 bear research study and census. The density estimate for adult brown bears in the study area in Unit 22C and portions of Units 22B and 22D was 1 bear per 27 mi^2.

MANAGEMENT OBJECTIVES

- Assess population trends through field observations and analyses of harvest data.
- Seal bears and monitor the harvest.
- Improve communication with the public to reduce illegal and unreported harvest, and improve understanding of defense of life and property situations.

- Provide opportunity for subsistence hunting of brown bears.
- Assist the public in dealing with nuisance bear problems.
- Educate the public about bear behavior and safety to minimize conflicts between bears and the public.

METHODS

A variety of methods have been used to assess the bear population and meet the management objectives in Unit 22. Assessments of population status were derived from observations made during other wildlife surveys and fieldwork. Information was also gathered through general conversation with knowledgeable local residents. Bear hunting regulations were liberalized in an effort to slow population growth. Efforts were made to inform residents about regulation changes and to increase understanding of Defense of Life and Property (DLP) regulations. Bears were sealed by Nome staff and approved sealing agents in several Unit 22 villages. Harvest data were summarized from sealing certificates, harvest reports from nonresident drawing permits and subsistence registration permits, village-based big game harvest surveys and DLP reports. Problems with nuisance bears were addressed through public education and by working with Fish and Wildlife Protection officials and Village Public Safety Officers to deter or destroy problem bears. An electric bear exclosure fence was set up and used as a demonstration to alleviate bear problems at a camp in the vicinity of Nome.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

We believe that grizzly bear numbers are increasing throughout much of Unit 22 and are probably above densities previously estimated. A bear research study and census, completed during the early 1990s, estimated the brown bear population in eastern Unit 22B, Units 22C, 22D and 22E at 458 bears >2 years-old (density: 1 bear per 27 mi^2). The density estimate varied almost two-fold within the study area with the highest densities (1 bear per 20 mi^2) in the western portion of Unit 22B, and the lowest densities (1 bear per 39 mi^2) in the southern portion of Unit 22E.

Observations by staff, guides and residents of Unit 22 indicate brown bear numbers have increased throughout much of the unit over the last decade in spite of increasingly high harvests. Reports of bear encounters, complaints about nuisance bears and the take of DLP bears have continue to increase during the reporting period. Destruction of cabins and raids on subsistence food caches have expanded to the westernmost parts of the unit where bears previously were seldom seen.

Population Composition

There were no activities to determine population composition in Unit 22 during the reporting period.

Distribution and Movements

There were no activities to determine distribution and movements in Unit 22 during the reporting period.

MORTALITY

Harvest

Season and Bag Limit.

Liberalized bear hunting regulations, adopted by the Board of Game in October 1997, went into effect at the beginning of this reporting period. Spring and fall seasons for general and drawing permit hunts were replaced with a continuous season, except in Unit 22C where a split season remains in effect. Also, Unit 22 except for Unit 22C was included in the Northwest Alaska Brown Bear Management Area.

1998–1999 and 1999–2000 Regulatory Year **Unit and Bag Limits**	**Resident Open Season (Subsistence and General Hunts)**	**Nonresident Open Season**
Unit 22(A) **RESIDENTS & NONRESIDENTS:** One bear every 4 regulatory years	1 Sep–31 May	1 Sep–31 May
Unit 22(B) **RESIDENT HUNTERS:** One bear every 4 regulatory years	1 Sep–31 May	
NONRESIDENT HUNTERS: One bear every 4 regulatory years by drawing permit only. Up to 20 permits maybe issued in combination with Unit 22C.		1 Sep–31 May
Unit 22(C) **RESIDENTS:** One bear every 4 regulatory years	1 Sep–31 Oct 10 May–25 May	
NONRESIDENTS: One bear every 4 regulatory years by drawing permit only. Up to 20 permits maybe issued in combination with Unit 22B.		1 Sep–31 Oct 10 May–25 May
Unit 22(D) **RESIDENTS:** One bear every	1 Sep–31 May	

1998–1999 and 1999–2000 Regulatory Year **Unit and Bag Limits**	**Resident Open Season (Subsistence and General Hunts)**	**Nonresident Open Season**
4 regulatory years **NONRESIDENTS:** One bear every 4 regulatory years by drawing permit only. Up to 5 permits maybe issued in combination with Unit 22E.		1 Sep–31 May
Unit 22(E) **RESIDENTS:** One bear every 4 regulatory years	1 Sep–31 May	
NONRESIDENTS: One bear every 4 regulatory years by drawing permit only. Up to 5 permits maybe issued in combination with Unit 22D.		1 Sep–31 May
Units 22(A), 22(B), 22(D), 22(E) – Subsistence Hunt **RESIDENTS:** One bear per regulatory year by registration permit in the Northwest Alaska Brown Bear Management Area for subsistence purposes	1 Sep–31 May	
NONRESIDENTS:		No Open Season

Board of Game Actions and Emergency Orders. In October 1999, in response to public concern about the effect of bear predation on moose calves in some parts of Unit 22, department staff recommended regulatory changes that were intended to further increase bear harvest in Unit 22. The Board adopted the following regulations effective during the 2000-2001 regulatory year: the resident tag fee requirement was eliminated throughout Unit 22 and the number of nonresident drawing permits was increased from 20 to 27 in Units 22B/22C (Hunt DB685) and from 5 to 8 in Units 22D/22E (Hunt DB690).

Human-Induced Harvest. Harvest increased substantially during this reporting period averaging 95 bears per year, a 76% increase over the 1990–1997 average annual harvest of 54 bears. During the 1998–1999 regulatory year 90 bears were harvested and 99 bears were taken during the 1999–2000 regulatory year (Table 1). We do not attribute the increase in harvest to the regulatory changes that lengthened the season and established a subsistence hunt. Only 3 bears were taken with a subsistence permit and 4 bears were taken during the period from 31 October –

15 April when the season was previously closed. Factors contributing to the high harvests in recent years include large numbers of bears, desire by local residents to reduce bear numbers, exceptional snow conditions for hunting in the spring of 1999, more non-local Alaska resident hunters, and more nonresident hunters in Unit 22A where drawing permits are not required.

In spite of recent increases in harvest, no change in sex and age composition of the overall Unit 22 harvest is apparent. Annual harvest of male bears has consistently exceeded the female harvest. During this reporting period 125 (66%) male bears and 64 (34%) females were harvested (Table 2). The percent of males in the harvest has averaged approximately 65% since 1961 with no deviation from this trend (Figure 1).

The trend-line of the average age of harvested bears has remained constant at 6.5 years since Unit 22 age records began in 1967 (Figure 2). The average ages of bears harvested in the spring are consistently higher than those taken in the fall. The fall hunt generally targets bears in the most accessible places where most of the older, larger bears have now been eliminated. Much of the harvest is by local recreational hunters who are not selective and shoot whichever bear first presents itself. However large bears are available for serious trophy hunters; 39 of 189 bears (21%) taken during this reporting period had skull sizes of 24 inches or larger.

Fourteen bears were reported as non-hunting kills during the 2-year reporting period (Table 1), 9 DLPs were taken and one was a mercy killing. Compared to previous reports, this is the highest number of DLP bears in Unit 22. Whether this represents an actual increase in the number of bears killed or better compliance with reporting is unknown. These totals do not represent the actual number of non-hunting kills for the reporting period. Each year, we receive unverified reports of bears being shot and left unattended, or of not being sealed. The accuracy of these reports is unknown. Nelson (1993) estimated that an additional 10 to 30 bears were killed annually and not reported in Unit 22.

In 1998–1999 14 individuals registered for the NWABBMA subsistence hunt and 1 bear was taken by a Wales hunter. In 1999–2000 23 people registered and 2 bears were taken by hunters from Wales and Elim. In Unit 22 brown bears are seldom hunted for food and most people register so they may keep the hide and skull if they are forced to kill a bear under DLP circumstances.

During this reporting period a community harvest assessment project was initiated in cooperation with the ADF&G Subsistence Division and Kawerak Native Corporation in an attempt to better quantify unreported subsistence harvest of big game species, including bears, by village residents. During this reporting period the villages of Koyuk, Shaktoolik, White Mountain and Elim were surveyed. Only one bear taken by a Koyuk resident was reported.

Permit Hunts. During this reporting period 20 drawing permits were allocated annually to nonresident hunters in Units 22B and 22C in combination, and 5 permits to nonresidents in Units 22D and 22E in combination. In regulatory year 1998 the split fall and spring seasons were replaced with a continuous season from 1 September – 31 May in all but Unit 22C, allowing drawing permit holders to hunt during either spring or fall. To increase opportunity for nonresidents, all qualified drawing permit applicants are maintained on alternate lists and permits are issued to alternates in ranked order if drawing permit winners decline their permits

and chose not to hunt. Over-the-counter permits were issued when the alternate list was exhausted in each regulatory year of the reporting period.

Hunter Residency and Success. In Unit 22A, where nonresident drawing permits are not required, the size of the nonresident harvest surpasses the resident harvest. In the remainder of the Unit where nonresident effort has been restricted by a drawing permit quota, the size of the resident harvest normally exceeds the nonresident harvest (Table 3). The number of non-local resident hunters is increasing, perhaps because the Seward Peninsula is gaining a reputation as a place where record book bears are taken regularly.

During this reporting period, all 20 nonresident drawing permits for Units 22B and 22C and the 5 drawing permits for Units 22D and 22E were issued annually by drawing or over the counter. In Units 22B and 22C, 55% of the nonresident permittees reported successful harvests. In Units 22D and 22E, 70% of the nonresident permittees were successful.

We cannot easily evaluate hunter effort and success for resident hunters under the present harvest reporting system because unsuccessful hunters are not required to report. However, it appears hunter success is normally higher in the spring, particularly when suitable snow conditions exist for snowmachine travel and tracking.

Harvest Chronology. Historically, more bears are taken during the spring season because bears are more easily observed and tracked, hunter effort is greater, and bears tend to be more accessible to hunters using snowmachines as transportation (Nelson 1993). This was the case in 1998–1999 when 58% of the annual harvest occurred in the spring. However, in 1999–2000, only 43% of the annual harvest occurred in the spring (Table 2).

Transport Methods. The Nome road system makes it possible for bear hunters to use highway vehicles as the primary transportation for hunting or to use roads as access points for boats, 4-wheelers and snowmachines. Most hunters use snow machines in the spring. In the fall 4-wheelers followed by boats and highway vehicles were most frequently used. Aircraft use in the unit is primarily limited to registered guides moving clients in and out of camps. Other transport methods are used from the camps (Table 4).

Other Mortality

There were no observations of other mortality during the reporting period.

HABITAT

Assessment

There were no brown bear habitat assessment activities in Unit 22 during the reporting period.

Enhancement

There were no brown bear habitat enhancement activities in Unit 22 during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Moose research in Unit 22B indicates that brown bear predation on moose calves significantly reduces calf survival in western Unit 22B, and research in other parts of Alaska has shown that brown bear predation can be the primary limiting factor on moose population growth. Moose recruitment rates have declined to less than 10% in much of Unit 22 over the last 10 years, during which time bear numbers are believed to have increased. Anecdotal evidence suggests bear predation on adult moose is increasingly common.

During much of the last decade winters were relatively mild and berry crops were noted to be particularly bountiful between 1995 and 1998. During this same period informal and anecdotal evidence suggests productivity, litter sizes and cub survival were high. In 1998 and 1999 reliable reports of sows with 4 cubs came from 4 widely separate parts of the unit. In recent years there have been an abundance of bears of younger age classes that are often less wary and more likely to inhabit accessible areas and to venture into areas of human habitation, resulting in bear/human conflicts.

CONCLUSIONS AND RECOMMENDATIONS

Over the last decade we believe Unit 22 brown bear numbers have increased above the density estimated in the bear census and research study reported in 1991. During the same period moose populations and recruitment rates have declined in many parts of the unit and we attribute the moose decline to be largely the result of increased bear predation on calves. In areas such as western Unit 22B and eastern Unit 22D where moose hunting opportunity has been greatly reduced, we should consider maximizing hunting opportunity of brown bears to reduce and maintain the bear population at the density observed in 1991. This can be achieved by revising the management objective to provide maximum hunting opportunity of brown bears in selected portions of Unit 22. Although uncertain, the reduction of brown bear density may have the benefit of reducing bear predation on moose calves.

During this reporting period the reported harvest increased by 76% over the previous 10-year average harvest, but no change is evident in the age or sex composition of the harvest. The department will consider recommending further liberalization of hunting regulations to promote continued high harvest rates including: 1) changing the bag limit for general season hunts from one bear every 4 years to one bear per year, and 2) opening the bear season in August to increase the chance of harvesting sows not accompanied by cubs and to allow the public to use a hunting license to eliminate problem bears at camps during August.

In other parts of Alaska, liberalized bear hunting regulations have not been effective at reducing bear densities to allow improved ungulate calf survival. In Unit 22, particularly along the Nome road system in western Unit 22B and eastern Unit 22D, liberalized seasons and bag limits may increase harvest more than in other areas of the state because bears are particularly vulnerable in the open country, especially during the long spring snow machine season on the Seward Peninsula. Also, there is great interest in bear hunting in Nome and a widespread desire to reduce bears numbers in the area. We should strive for high harvest rates and reductions in the bear population only as long as necessary to rebuild moose populations that have been limited by predation.

It is important to increase educational efforts aimed at understanding bear behavior, bear safety and minimizing bear/human conflicts, emphasizing the importance of clean camps and not leaving food, dog food, scraps or garbage unattended or accessible to bears. We should continue efforts to improve understanding of hunting and DLP regulations in the villages.

LITERATURE CITED

GRAUVOGEL, C. A. 1986. GMU 22 brown/grizzly bear survey-inventory progress report. Pages 46 56 in B. Townsend, ed. Annual report of survey-inventory activities. Part V. Brown/Grizzly Bear. Vol. XVII. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-22 4 and W-22-5. Job. 4.0 Juneau. 70pp.

MACHIDA, S. 1998. Unit 22 brown bear survey-inventory progress report. Management Report of Survey-Inventory Activities. Brown Bear. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Progress Report Grant W–24–3 and W–24–4. Study 4.0. Juneau.

MILLER, SD AND RN NELSON. 1993. A brown bear density and population estimate for a portion of the Seward Peninsula, Alaska. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Management Report Supplement Grant W–23–4 and W– 23–5. Study 4.0. Juneau. 48pp.

NELSON, R N 1993. Unit 22 brown bear survey-inventory progress report. Pages 226-237 in S. Abbott, ed. Management Report of Survey-Inventory Activites. Brown Bear. Alaska Dep. Fish and Game. Fed Aid in Wildl. Rest. Prog. Rep. Proj. W-23-4 and W-23-5. Study 4.0. Juneau. 283pp.

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Table 1 Unit 22 brown bear harvest[a] for regulatory years 1998–1999 and 1999–2000

Regulatory year	Reported harvest											
	Hunter kill				Non-hunting kill				Total			
	M	F	Unk.	Total	M	F	Unk.	Total	M	F	Unk.	Total
1998–1999												
Fall 1998	19	16	0	35	4	1	0	5	23	17	0	40
Spring 1999	34	14	0	48	0	1	0	1	34	15	0	49
NWABBMA	1	0	0	1	-	-	-	-	1	0	0	1
Total	54	30	0	84	4	2	0	6	58	32	0	90
1999–2000												
Fall 1999	29	23	0	52	3	1	0	4	32	24	0	56
Spring 2000	32	5	0	37	2	2	0	4	34	7	0	41
NWABBMA	2	0	0	2	-	-	-	-	2	0	0	2
Total	63	28	0	91	5	3	0	8	68	31	2	99

[a] Represents the total known harvest including nonresident permit hunt harvest, DLP and other human-caused accidental mortality.

Table 2 Sex of Unit 22 brown bear harvest[a] for regulatory years 1998–1999 and 1999–2000

Regulatory year	Game Management Unit											
	22A		22B		22C		22D		22E		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
1998–1999												
Fall 1998	9	6	6	5	6	6	1	2	0	0	22	19
Spring 1999	10	5	14	4	4	1	4	4	3	0	35	14
1999–2000												
Fall 1999	13	8	10	9	5	4	4	3	0	0	32	24
Spring 2000	9	2	15	2	3	2	6	1	3	0	36	7

[a] Includes nonresident permit hunts and NWABBMA harvest and non-hunting mortalities.

Table 3 Number, residency and success rates of brown bear hunters in Unit 22 for regulatory years 1996–1999

Regulatory Year	Successful hunters						
	Local Residents[a]		Nonlocal Residents		Nonresidents		Total
	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)
1996–1997	25	44%	10	17%	23	39%	58
1997–1998	30	51%	5	8%	24	41%	59
1998–1999	30	36%	14	17%	39	47%	83
1999–2000	30	33%	18	20%	43	47%	91

[a] Hunters residing in Unit 22

Table 4 Unit 22 brown bear harvest by transport method for regulatory years 1993–1999

Regulatory Year	Number harvested							
	Airplane	Boat	Snowmachine	ORV	Highway vehicle	Walk	Unknown	Total (*n*)
1993–1994	7	4	20	8	5	0	0	44
1994–1995	1	4	27	6	4	0	0	42
1995–1996	7	1	29	6	5	0	0	48
1996–1997	9	5	14	15	12	3	0	58
1997–1998	7	6	28	8	10	0	0	59
1998–1999	4	13	42	13	8	3	0	83
1999–2000	7	8	35	25	12	2	0	91

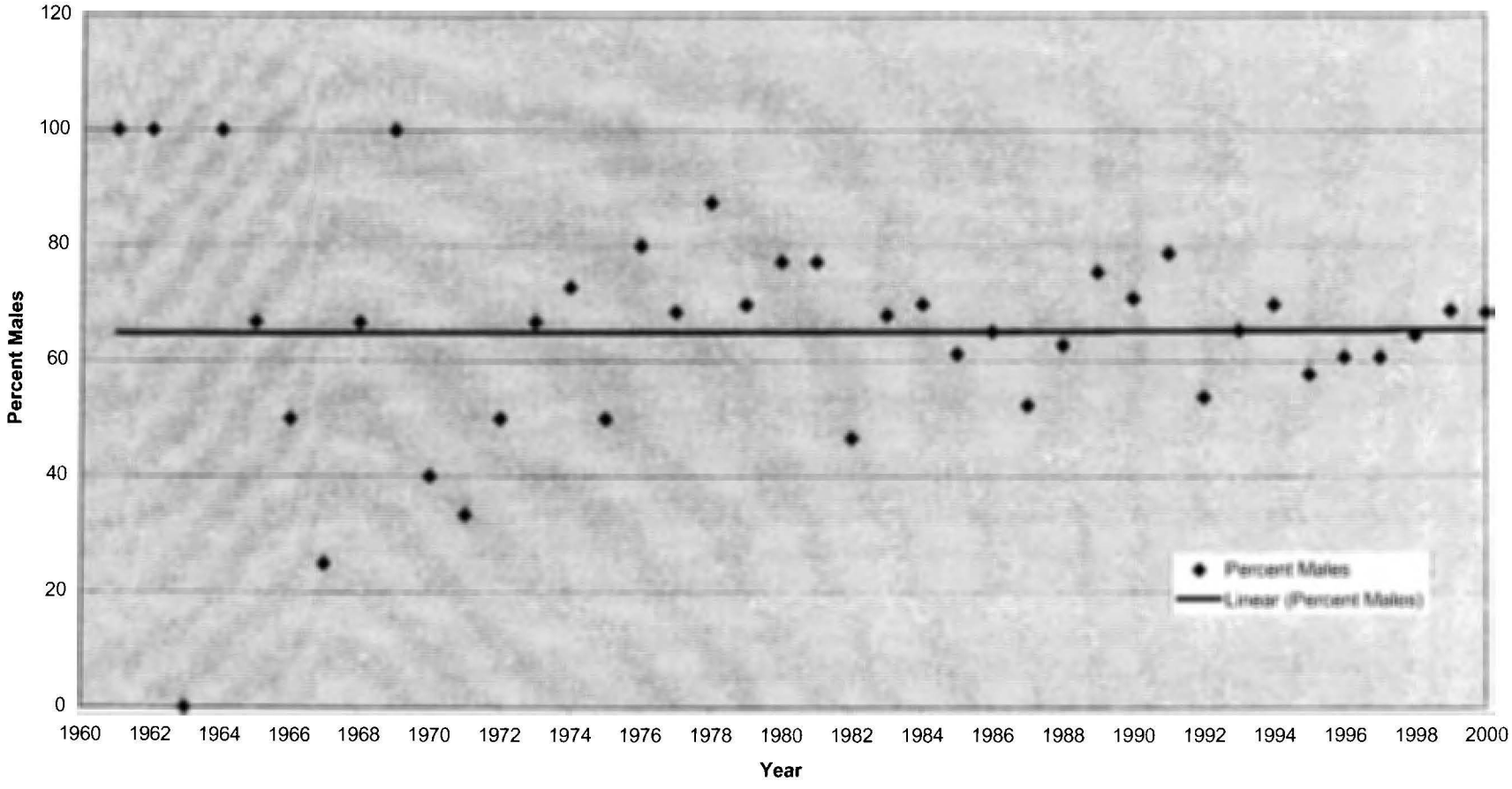

Figure 1 Trend of percent male brown bears in Unit 22 harvest, 1960-2000

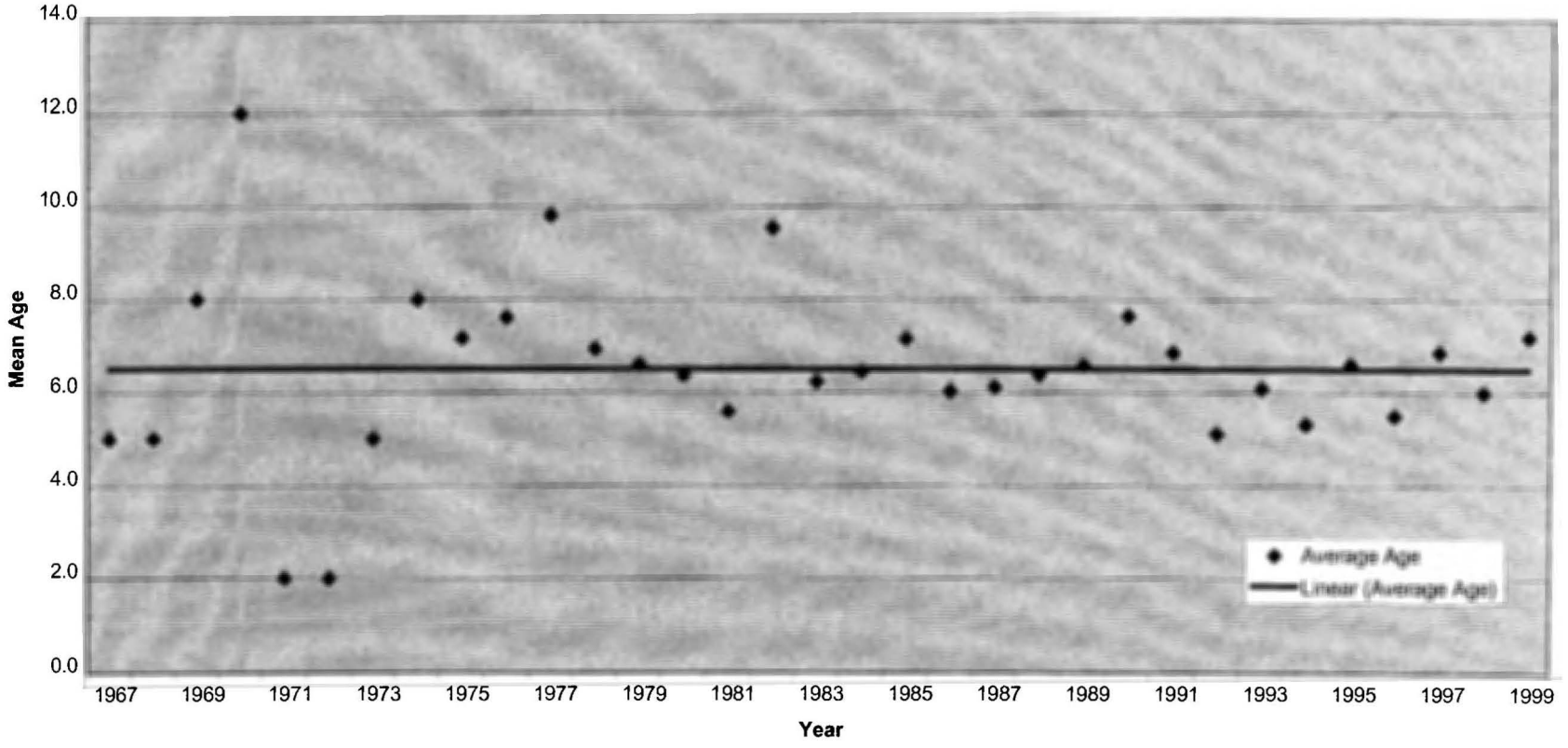

Figure 2 Trend of mean age of reported brown bear harvest in Unit 22, 1967 – 2000

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 23 (43,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Kotzebue Sound and western Brooks Range

BACKGROUND

In 1961 the department established brown bear hunting regulations and sealing requirements for Unit 23. The Board of Game created regulations under the assumption that the primary use of brown bears was for general season (trophy) hunting. However, Inupiat hunters in inland communities of Unit 23 traditionally harvested brown bears for meat, fat and hides (Loon and Georgette 1989). In response to frustration expressed by local residents over hunting regulations for brown bears and other species, department staff began an extensive regulation review in Unit 23 in 1988. This review provided the basis for establishing the Northwest Alaska Brown Bear Management Area (NWABBMA) subsistence registration hunt in 1992. Since 1992, 3 types of brown bear hunts have existed in Unit 23: 1) 2 drawing permit hunts (1 each during spring and fall) for nonresident hunters seeking trophy hunting opportunities; 2) a general season hunt for residents; and 3) a subsistence registration permit hunt for residents.

Biological research on brown bears in Unit 23 consists of a baseline study of density, movements and productivity in the vicinity of the Red Dog Mine (Ballard et al. 1991).

MANAGEMENT DIRECTION

MANAGEMENT GOALS

The management goal for brown bears in Unit 23 is to maintain a minimum density of one adult bear per 25.7 mi^2 in the Noatak drainage.

MANAGEMENT OBJECTIVES

- Conduct a census in the Noatak drainage before further development occurs. The census should be comparable to the census completed in 1987.
- Continue community-based assessments to collect harvest information from residents of Unit 23.

METHODS

We obtained harvest information from sealing documents and harvest reports. We encountered several problems compiling harvest information for this report. 1) Compliance with license and reporting requirements has historically been low for residents of Unit 23. This reduced the accuracy of harvest information for this and previous reports. 2) Harvest information from the

1999-2000 regulatory year was incomplete at the time of this report. Although we report this data it should be viewed as minimal estimates of harvest and will likely be updated for future reports. 3) Archived harvest data recently became available to Area Biologists through computer files and access systems (Info Access). While using this system it became evident that brown bears harvested under the NWABBMA subsistence hunt had not been reported to the statewide harvest section. As for past Unit 23 reports, this data was compiled by hand. It also became clear that many brown bears taken under DLP regulations have not been entered in the statewide harvest files. Although none of these difficulties were serious, harvest data in future reports will likely be slightly different after these discrepancies are corrected.

Kotzebue staff telephoned subsistence registration permit holders who did not respond to the first harvest report letter. Community based harvest assessments were conducted in Kiana, Noatak, Selawik and Shungnak during the reporting period (S. Georgette, pers. commun.). Our understanding of the current population status of bears in Unit 23 is based largely on qualitative information from local residents, some long-term commercial operators and my opportunistic observations.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Brown bears currently appear to be abundant throughout Unit 23 in relation to previous years, and in relation to other portions of northern Alaska (ADF&G, unpub. data). The only brown bear population census conducted in Unit 23 occurred during 1987 and estimated a density of one adult bear (2.5+ years) per 25.7 mi^2 in the vicinity of the Red Dog Mine (Ballard et al. 1991). We have no other quantitative data to indicate population trend.

Many residents of Unit 23 indicate brown bear numbers have increased since about 1990. Several developments over the last 50 years have probably contributed to this. Local residents speculate that the abundance of moose and caribou in this region since the 1950s provided a stable prey base for brown bears to thrive and multiply. In addition, the presence of these ungulates substantially reduced the subsistence harvest of brown bears for food (R. Stoney, pers. commun.). The practice of exhuming bears from their dens and killing all cubs and adults was reportedly a common practice when bears provided the only reliable source of terrestrial hides, meat and fat. Also, since the decline of the commercial fishery in Kotzebue Sound, more salmon appear to be reaching spawning areas compared to previous years.

Population Composition

There were no activities to determine brown bear population composition in Unit 23 during the reporting period.

Distribution and Movements

There were no activities to determine brown bear distribution and movements in Unit 23 during the reporting period.

MORTALITY

Harvest

Season and Bag Limit.

Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 23		
Residents: One bear every 4 regulatory years	1 Sep–31 May (General hunt)	
Nonresidents: One bear every four regulatory years by drawing permit (18 permits fall; 18 permits spring)		1 Sep–10 Oct 15 Apr– 25 May
Residents: One bear per regulatory year by registration permit in the Northwest Alaska Brown Bear Management Area for subsistence purposes	1 Sep-31 May (Subsistence hunt)	
Nonresidents:		No open season

During this reporting period resident hunters could hunt brown bears in Unit 23 under a general season or the NWABBMA subsistence registration permit hunt. The general season bag limit was 1 bear per 4 regulatory years and hunters were required to use a big game tag and seal the hide and skull.

Since July 1992 subsistence hunting has been allowed under the NWABBMA subsistence registration permit hunt. During this reporting period the NWABBMA consisted of Unit 21D, Units 22A, B, D and E; Unit 23 excluding the Baldwin Peninsula north of the Arctic Circle; Unit 24; and Unit 26A. The bag limit was 1 bear per regulatory year and the season was 1 September-31 May. A brown bear tag was not required for hunters to participate in this hunt. Hunters could not use aircraft for transportation to the field and were required to salvage all meat for human consumption. There was no requirement to salvage the hide or skull of a bear taken for subsistence; however, if the hide or skull was salvaged and transported out of the management area the hide had to be sealed. Trophy value of the hide was destroyed at the time of sealing by removing the skin of the head and the front claws. The portions of the hide removed during sealing were retained by the state.

Board of Game Actions and Emergency Orders. There were no emergency orders issued for brown bears during the reporting period. The number of spring nonresident drawing permits (DB791) was increased from 7 to 18 at the fall 1997 Board of Game meeting. This change went into effect during the 1998-1999 regulatory year. The number of nonresident brown bear drawing permits was again increased to 24 for the fall hunt (DB781) and 24 for the spring hunt (DB791) at the fall 1999 Board meeting. These increases went into effect during the 2000-2001 regulatory year. At the fall 1999 Board meeting board members also informally discussed modifying Defense of Life Property (DLP) requirements to make them less onerous to residents of Region V and thus increase compliance with reporting requirements. Several potential changes were identified and the Board directed Region V staff to prepare proposals for a subsequent Board meeting. These modifications were not supported by department staff in other regions or by Department of Public Safety staff and no proposals were submitted. Units 22A, B, D and E were added to the NWABBMA beginning 1 July 1998.

Human-Induced Harvest. Fifty four brown bears (44 males, 6 females and 4 unknown sex) were reported taken during 1998-1999, and 54 (32 males, 15 females and 7 unknown sex) in 1999-2000 (Table 1). An usually large number of bears were taken under DLP circumstances during 1999-2000 (3 of which were cubs of the year taken after their mother had been killed).

Sealing data for brown bears in Unit 23 should be viewed with caution. Compliance with reporting requirements has historically been low for all species taken by local residents. Compliance with reporting requirements was especially low for bears taken for subsistence prior to establishment of the NWABBMA subsistence hunt and for bears taken in DLP situations (Loon and Georgette 1989). Therefore, the figures reported here are minimum estimates of actual harvest. The additional opportunity afforded by establishing the subsistence hunt in 1992 did not increase harvest levels. Rather, it provided local hunters a means of legally practicing traditional hunts and improved our harvest data to some degree. The NWABBMA subsistence hunt now collects harvest information for a portion of the subsistence take that used to go unreported. Community harvest estimates suggest villages within Unit 23 take relatively few brown bears for subsistence: only 7 bears were reported taken by the 4 villages surveyed during 1998-1999 (S. Georgette, unpub. data). The unreported harvest associated with DLP kills and illegal take (for selling gall bladders, claws, etc.) is probably greater than the unreported component of legitimate subsistence harvest. For example, several years ago 8 brown bears were taken illegally between Kivalina and Cape Thompson within a period of several days for their gall bladders (C. Bedingfield, pers. commun.). We think trophy hunters' compliance with reporting requirements has approached 100% for many years.

As in previous years, most brown bears reported harvested in Unit 23 during this reporting period were taken in the Noatak River drainage (Fig. 1, Table 2). Since 1961, the proportion of total harvest taken from the Noatak River drainage has averaged 54% (SD=12), and the correlation between Noatak harvest and total harvest has been high, $r = 0.86$. This is partly because guides and residents of Kotzebue who tend to report their harvests concentrate on the Noatak River drainage where brown bears are abundant and easier to hunt than in the more densely forested Kobuk and Selawik river drainages.

Brown bear hunting regulations in Unit 23 have been modified many times since 1962. Since 1992 these regulations have become incrementally more liberal to provide for traditional subsistence hunting practices and increase opportunity for recreational hunting. These regulatory changes have also attempted to slowly reduce bear density to reduce bear-human conflicts and reduce predation on moose. Despite these regulatory changes the long-term trend in reported brown bear harvest has increased only slowly in the Noatak River drainage and remained essentially stable in all other drainages since 1961 (Fig. 1). The large variability in harvest among years (Fig. 2) suggests harvests are affected more by short-term factors, e.g. favorable weather and snow conditions, than by regulatory changes.

Permit Hunts. It has taken guides several years to fully utilize the increased number of nonresident brown bear drawing permits in Unit 23. The increase from 7 to 18 nonresident brown bear drawing permits for the spring hunt (DB791) during the 1998-1999 regulatory year resulted in under-subscription for this hunt. All 9 hunters who applied for a permit received one leaving 9 permits to be issued over-the-counter. Four of these permits were issued. Likewise, in the 1999-2000 regulatory year, 11 nonresident drawing permits were available over-the-counter and 6 were issued. During the 2000-2001 regulatory year (after this reporting period) 12 permits were available over-the-counter and all were issued. Success rates for both drawing permit hunts have generally been high (Table 3).

Participation in the NWABBMA registration hunt continues to be primarily by residents of the NWABBMA, and especially by residents of Unit 23 (Table 4). As in the past Unit 23 hunters harvested the majority of bears taken in the NWABBMA area. Overall harvest continued to be low during this reporting period (Table 5). Males comprised 90-100% of the harvest (Table 6).

Hunter Residency and Success. Nonlocal resident and nonresident hunters took 83% and 77% of all brown bears reported taken in Unit 23 during 1998-1999 and 1999-2000, respectively (Table 7).

Harvest Chronology. Most bears were taken during the months of September, April and May for the NWABBMA subsistence permit hunt (Table 8), general hunt and nonresident drawing permit hunt (Table 9).

Transport Methods. Most hunters used aircraft to access hunting areas in the fall, and snow machines during spring (Table 10). The use of ATVs in Unit 23 is increasing as more guides and outfitters base ATVs at remote camps.

Other Mortality

There were no estimates of other mortality for brown bears in Unit 23 during the reporting period.

HABITAT

Assessment

There were no habitat assessment activities in Unit 23 during the reporting period.

Enhancement

There were no habitat enhancement activities in Unit 23 during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The Red Dog Mine appears to have had little impact on bears in that area. Cominco staff remedied initial problems by improving garbage incineration procedures and facilities. Development plans call for increased staffing and production at the current lead-zinc deposit. The need for additional gravel may increase the possibility of disturbing bears near the mine.

CONCLUSIONS AND RECOMMENDATIONS

- Repeat a census in the 1987 Red Dog brown bear project study area before further development occurs.
- Continue community-based harvest assessments to collect information from residents of Unit 23.
- Continue to inform local residents of subsistence brown bear regulations especially in upper Kobuk River villages. Also, continue to issue permits by mail and collect harvest information by telephone.
- Solicit information and observations on the distribution and numbers of bears near the Red Dog mine from NANA/Cominco, Inc. environmental staff. There should be a special emphasis on identifying and protecting bear denning habitat.

LITERATURE CITED

BALLARD, WB, LA AYRES, KE RONEY, DJ REED AND SG FANCY. 1991. Demography of Noatak grizzly bears in relation to human exploitation and mining development. Final Report. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Grant W–23–1, W–23–2, and W–23–3 Study 4.20. Juneau. 227pp.

LOON, H AND S GEORGETTE. 1989. Contemporary brown bear use in NW Alaska. Alaska Department Fish and Game, Division of Subsistence. Tech. Paper No. 163. Kotzebue, AK.

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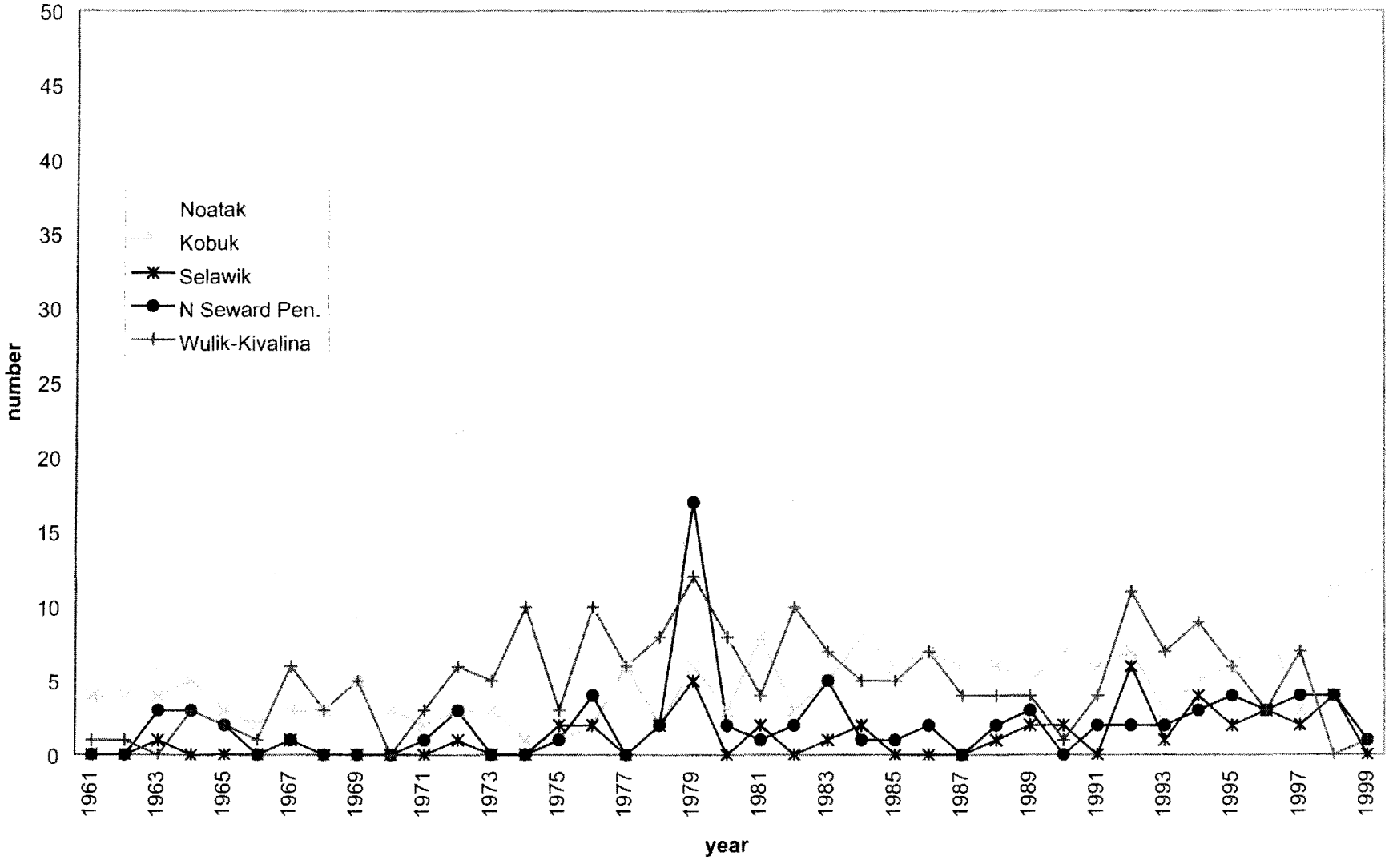

Figure 1 Unit 23 brown bear harvest by major drainage through time, 1961-1962 through 1999-2000

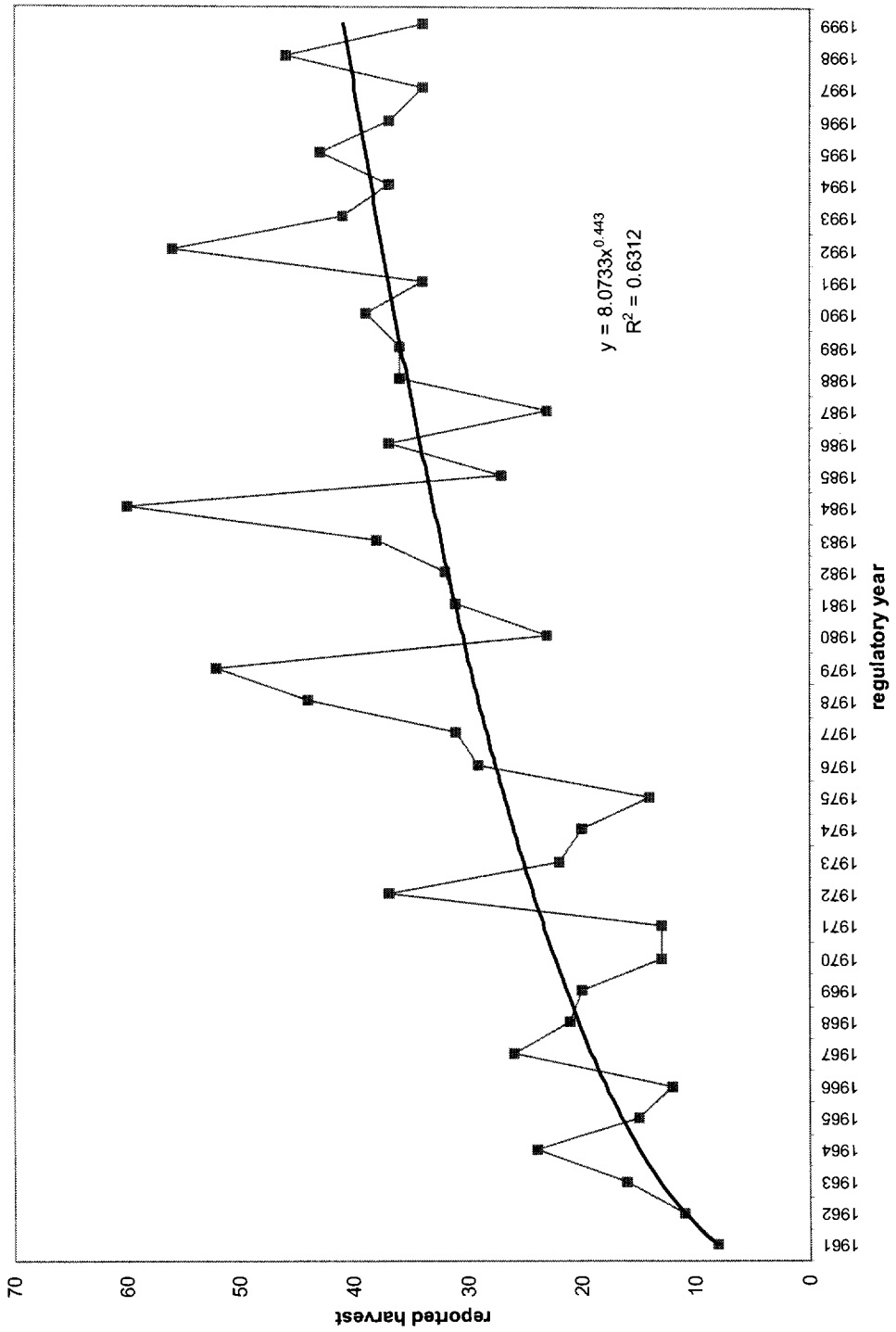

Figure 2 Total reported brown bear harvest for Unit 23, 1961-1999

Table 1 Reported harvest[a] of brown bears in Unit 23, 1995–1996 through 1999-2000

Regulatory year/Hunt type	Male	Female	Unknown	Total
1995-1996				
General hunt	19	7	0	26
Fall nonresident (DB781)	6	2	0	8
Spring nonresident (DB791)	1	0	0	1
NWABBMA (subsistence)	4	0	2	6
Non hunting harvest	1	0	0	1
Total	31	9	2	42
1996-1997				
General hunt	12	7	2	21
Fall nonresident (DB781)	4	1	2	7
Spring nonresident (DB791)	3	0	0	3
NWABBMA (subsistence)	5	1	0	6
Non hunting harvest	3	1	0	4
Total	27	10	4	41
1997-1998				
General hunt	15	5	0	20
Fall nonresident (DB781)	2	2	0	4
Spring nonresident (DB791)	3	0	0	3
NWABBMA (subsistence)	2	0	0	2
Non hunting harvest	2	0	1	3
Total	24	7	1	32
1998-1999				
General hunt	22	4	1	27
Fall nonresident (DB781)	9	2	2	13
Spring nonresident (DB791)	5	0	1	6
NWABBMA (subsistence)	7	0	0	7
Non hunting harvest	1	0	0	1
Total	44	6	4	54
1999-2000				
General hunt	6	6	0	12
Fall nonresident (DB781)	7	4	0	11
Spring nonresident (DB791)	9	1	0	10
NWABBMA (subsistence)	4	1	0	5
Non hunting harvest	6	3	7	16
Total	32	15	7	54

Table 2 Reported Unit 23 brown bear harvest by drainage, 1983-1984 through 1999–2000 (excludes bears with unknown harvest location)

Regulatory year	Noatak	Kobuk	Selawik	N. Seward Peninsula	Wulik/ Kivalina	Total
1983-1984	20	5	1	5	7	38
1984-1985	44	8	2	1	5	60
1985-1986	14	6	0	1	5	27
1986-1987	21	7	0	2	7	37
1987-1988	13	6	0	0	4	23
1988-1989	23	6	1	2	4	36
1989-1990	22	5	2	3	4	36
1990-1991	29	7	2	0	1	39
1991-1992	22	6	0	2	4	34
1992-1993	29	7	6	2	11	56
1993-1994	27	3	1	2	7	41
1994-1995	16	5	4	3	9	37
1995-1996	25	6	2	4	6	43
1996-1997	18	9	3	3	3	37
1997-1998	17	3	2	4	7	34
1998-1999	27	11	4	4	0	46
1999-2000	20	12	0	1	1	34

Table 3 Results of Unit 23 nonresident brown bear fall (DB781) and spring (DB791) drawing permit hunts, 1989-1990 through 1999-2000

	Number of drawing permittees					Number of applicants	Permits available
	Successful		Unsuccessful	Did not hunt	No report		
Season	*n*	(%)	*n*	*n*	*n*	*n*	*n*
1989 Fall	7	(58)	5	5	1	42	18
1990 Spring	5	(100)	0	2	0	13	7
1990 Fall	7	(58)	5	2	0	31	18
1991 Spring	6	(100)	0	1	0	15	7
1991 Fall	7	(47)	8	1	0	26	18
1992 Spring	5	(83)	1	0	0	6	7
1992 Fall	7	(64)	4	7	0	21	18
1993 Spring	2	(100)	0	4	1	11	7
1993 Fall	7	(54)	6	1	1	21	18
1994 Spring	5	(83)	1	1	0	7	7
1994 Fall	4	(36)	7	4	3	23	18
1995 Spring	3	(75)	1	3	0	8	7
1995 Fall	8	(50)	8	1	1	24	18
1996 Spring	1	(14)	1	1	0	7	7
1996 Fall	7	(44)	9	1	1	38	18
1997 Spring	3	(50)	3	0	0	6	7
1997 Fall	4	(31)	9	3	2	27	18
1998 Spring	3	(43)	4	0	0	7	7
1998 Fall	13	(72)	2	3	0	27	18
1999 Spring	6	(33)	3	0	0	9	18
1999 Fall	11	(61)	1	0	6	33	18
2000 Spring	10						18

Table 4 Residency of hunters participating in the Northwest Alaska Brown Bear Management Area subsistence registration hunt, 1992–1993 through 1999-2000

Regulatory year	Unit 21D	Unit 22	Unit 23	Unit 24	Unit 26A	Other	Total
1992–1993	-	-	65	10	14	4	93
1993–1994	-	-	63	9	9	6	87
1994–1995	-	-	27	10	5	3	45
1995–1996	-	-	52	24	1	4	81
1996–1997	12	-	45	31	7	7	102
1997–1998	16	-	47	29	13	5	110
1998-1999	14	20	61	23	8	8	114
1999-2000	15	25	106	20	9	13	188

Table 5 Harvest of brown bears taken under the Northwest Alaska Brown Bear Management Area subsistence registration hunt by Game Management Unit, 1992-1993 through 1999-2000

Regulatory year	Unit 21D	Unit 22	Unit 23	Unit 24	Unit 26A
1992-1993	-	-	10	1	1
1993-1994	-	-	4	2	1
1994-1995	-	-	2	0	0
1995-1996	-	-	6	0	1
1996-1997	-	-	6	1	0
1997-1998	3	-	2	0	1
1998-1999	0	1	7	1	1
1999-2000	0	3	5	1	1

Table 6 Sex of brown bears harvested in the Northwest Alaska Brown Bear Management Area subsistence registration hunt, 1992-1993 through 1999-2000

Regulatory year	Male	Female	Unknown	Total
1992-1993	9	3	0	12
1993-1994	6	0	1	7
1994-1995	1	0	1	2
1995-1996	5	0	2	7
1996-1997	5	1	0	6
1997-1998	2	0	4	6
1998-1999	10	0	0	10
1999-2000	9	1	0	10

Table 7 Unit 23 brown bear harvest[a] by hunter residency, 1985–1986 through 1999-2000 (excludes bears with unknown date of kill)

Regulatory year	Unit 23 resident	Nonlocal resident	Nonresident	Total
1985–1986	9	3	19	22
1986–1987	6	12	15	33
1987–1988	4	10	9	23
1988–1989	17	8	9	34
1989–1990	9	9	13	31
1990–1991	12	11	13	36
1991–1992	9	14	12	35
1992–1993	12	27	9	48
1993–1994	10	14	12	36
1994–1995	10	15	7	32
1995–1996	10	16	8	34
1996–1997	10	9	10	29
1997–1998	11	9	8	28
1998-1999	7	16	19	42
1999-2000	11	14	22	47

[a] Includes nonresident permit hunts and excludes non-hunting moralities.

Table 8 Monthly harvest of brown bears in the Northwest Alaska Brown Bear Management Area subsistence registration hunt, 1992–1993 through 1999-2000

Regulatory	Number of brown bears harvested										
year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Unk	Total
1992–1993	5	1	-	-	-	-	1	5	-	-	12
1993–1994	1	1	-	-	-	-	-	4	1	-	7
1994–1995	-	-	-	-	-	-	-	2	-	-	2
1995–1996	2	1		1				2	1	-	7
1996–1997	3	1	-	-	-	-	-	2	-	-	6
1997–1998	3	-	-	-	-	-	-	2		1	6
1998-1999	2	-	1	-	-	-	-	2	4	1	10
1999-2000	1	-	1	-	-	-	-	4	4	-	10

Table 9 Reported harvest of brown bears in Unit 23 by month, 1986–1987 through 1999-2000 (excludes bears with unknown date of kill)

Regulatory	August		Septembe		October		April		May		Other		
year	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	Total
1986–1987	0	(0)	20	(61)	0	(0)	8	(24)	5	(15)	0	(0)	33
1987–1988	0	(0)	17	(74)	3	(13)	1	(4)	3	(9)	0	(0)	23
1988–1989	0	(0)	13	(38)	2	(6)	12	(35)	7	(21)	0	(0)	34
1989–1990	1	(3)	16	(52)	3	(10)	7	(23)	4	(13)	0	(0)	31
1990–1991	0	(0)	18	(50)	1	(3)	14	(39)	3	(8)	0	(0)	36
1991–1992	0	(0)	15	(43)	1	(3)	16	(46)	3	(8)	0	(0)	35
1992–1993	0	(0)	34	(71)	2	(4)	12	(25)	0	(0)	0	(0)	48
1993–1994	0	(0)	19	(53)	0	(0)	14	(39)	3	(8)	0	(0)	36
1994–1995	0	(0)	21	(66)	1	(3)	6	(19)	4	(12)	0	(0)	32
1995–1996	0	(0)	24	(70)	1	(3)	5	(15)	3	(9)	1[b]	(3)	34
1996–1997	0	(0)	19	(65)	1	(3)	7	(24)	2	(7)	0	(0)	29
1997–1998	0	(0)	16	(57)	1	(4)	9	(32)	2	(8)	0	(0)	28
1998-1999	0	(0)	32	(76)	1	(2)	3	(7)	5	(12)	1	(2)	42
1999-2000	0	(0)	23	(48)	0	(0)	16	(33)	9	(19)	0	(0)	48

[a] Excludes non-hunting moralities.
[b] Harvested in December.

Table 10 Reported Unit 23 brown bear harvest by transport method, 1985–1986 through 1999-2000

Regulatory year	Airplane	Boat	4-wheeler	Snowmachine	Other	Unknown	Total
1985–1986	15	1	0	8	2	2	27
1986–1987	20	7	0	6	1	3	37
1987–1988	17	4	1	0	1	0	23
1988–1989	13	3	7	11	0	2	36
1989–1990	24	4	1	6	0	1	36
1990–1991	24	6	0	8	0	1	39
1991–1992	20	2	0	11	0	1	34
1992–1993	32	3	5	1	3	2	46
1993–1994	24	0	1	10	0	2	37
1994–1995	17	8	1	7	2	0	35
1995–1996	20[a]	5[b]	2	7	1	2	37
1996–1997	18	3	0	4	1	2	29
1997–1998	15	7	1	4	1	0	28
1998–1999	25	10	1	7	3	0	46
1999–2000	19	3	0	0	0	7	29

[a] One hunter indicated he used a boat in conjunction with an airplane, 2 hunters indicated they used 4–wheelers in conjunction with an airplane.
[b] Three hunters used both a boat and 4–wheeler to harvest brown bears.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 24 (26,092 mi^2)

GEOGRAPHIC DESCRIPTION: Koyukuk River drainage upstream from the Dulbi River

BACKGROUND

Grizzly bears are found in moderate numbers throughout Unit 24, with the highest densities in mountainous areas of the Brooks Range in the northern portion of the unit. Specific data on grizzly bear populations in Unit 24 are limited. Information from studies conducted on the northern slopes of the Brooks Range in Unit 26 (Crook 1972; Reynolds 1976; Reynolds and Hechtel 1984) or in the southwestern Brooks Range in Unit 23 (Ballard et al. 1988) has been used to describe bear populations in Unit 24.

The reported harvest since 1961 rarely exceeded 15–20 grizzly bears/year. An exception occurred during the early 1970s when bear hunting on the Alaska Peninsula was closed on an alternate-year basis, resulting in increased bear hunting pressure over the rest of the state. The annual harvest of bears in Unit 24 reached a maximum of 33 during that period. To prevent overharvest, a drawing permit system was in place during 1977–1985.

Previous reports indicate bear populations were stable or were slowly increasing (Woolington 1997). Local hunters (residents of Unit 24) took very few bears, and although the opening of the Dalton Highway to the public increased the number of potential nonlocal hunters, an increase in harvest has not occurred. Historically, grizzly bears were an important source of food and hides for local people. However, with the exception of Anaktuvuk Pass residents, recent hunting effort for grizzly bears by unit residents has declined.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Protect, maintain, and enhance the grizzly bear population and its habitat in concert with other components of the ecosystem.

MANAGEMENT OBJECTIVE

- Manage a grizzly population that will sustain a 3-year mean annual reported harvest of at least 20 bears in the northern portion of the unit (north of Allakaket) and at least 15 bears in the southern (remaining) portion of the unit, with at least 50% males in the reported harvest.

METHODS

We monitored harvest through sealing requirements and information provided by hunters reporting under the Northwest Alaska Brown Bear Management Area permit regulations. Data collected during sealing included sex, location of harvest, skull measurements, and age if teeth were submitted for aging. Data specific to harvest such as transportation methods, time of harvest, and commercial services used were also recorded. Data collected from bears harvested under permit regulations were limited to sex, location, and date of harvest. Harvest data were summarized by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000). Bear/human conflicts were addressed through education, legal harvest of problem bears and changes in regulations.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The grizzly bear population in Unit 24 was likely stable or slowly increasing based on field observations, nuisance reports, and hunter sightings of bears during the past 10 years. However, no surveys were conducted in the area during the reporting period.

Reynolds (1989) estimated densities of 33 bears/1000 mi^2 within Gates of the Arctic National Park (7000 mi^2), 33/1000 mi^2 in the Brooks Range outside the park (6500 mi^2), and 22–33 bears/1000 mi^2 in the remainder of Unit 24 to the south (14,500 mi^2). He estimated 450 bears in northern Unit 24 (north of Allakaket) and 320–480 in the remainder of the unit (south of Allakaket). Earlier work in similar habitats in Interior and Arctic Alaska provided a basis for these estimates (Reynolds 1976; Reynolds and Hechtel 1984).

MORTALITY

Harvest

Seasons and Bag Limits.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 24		
One bear every regulatory year by registration permit.	1 Sep–15 Jun (Subsistence hunt only)	No open season
One bear every regulatory year.	1 Sep–15 Jun	1 Sep–15 Jun

Board of Game Actions and Emergency Orders. In 1990 the Board of Game eliminated all requirements for drawing permits and made a uniform season throughout Unit 24, which was aligned with seasons in Units 19, 20 and 21. In 1992 the board established the Northwest Alaska

Brown Bear Management Area that included portions of the unit west of the Dalton Highway Corridor Management Area. The season remained the same, but the bag limit changed to 1 bear/year. Also, all meat had to be salvaged, sealing requirements were waived if the hide and skull remained within the management area, there was no resident tag fee, and aircraft could not be used. During the spring 1996 Board of Game meeting, the portion of Unit 24 within the Dalton Highway Corridor Management Area (DHCMA) was included within the Northwest Alaska Brown Bear Management Area. This action allowed Unit 24 residents residing within the DHCMA to participate in the subsistence hunt and transport bear hides to their residences without sealing. At the spring 2000 Board of Game meeting, the season was extended to 15 June for both the subsistence and general seasons. The bag limit was also liberalized to allow for the harvest of 1 bear every year under the general harvest regulation.

Hunter Harvest. The average annual grizzly bear harvest by hunters for RY93 through RY99 was 12 bears (Table 1). The reported 3-year average harvest (RY97–RY99) for the northern (north of Allakaket) and southern (remaining) portions of the unit was 11.3 and 1.0 bears, respectively. The number of bears taken by fisherman or trappers and not reported is unknown, but was likely <4 bears annually. The 5-year mean annual reported and estimated unreported harvest (RY95–RY99) for the entire unit was 17.8 bears. Of the reported harvest for that same period, 63% were males and 37% were females. Based on the estimated sustainable harvest rate of 5–6% in other areas of Interior Alaska (DuBois 1989), a harvest of 39–47 bears can be sustained in this unit. For RY97 through RY99, the average age of harvested bears was 8.9 years of age, which is just above the 32-year average of 8.3 years of age (for Unit 24 and neighboring Units 21B, 21C, and 21D combined). The trend in age of harvested bears was steadily increasing.

Hunter Residency and Success. Residents of Alaska who did not live in Unit 24 accounted for most of the reported harvest (Table 2). Most of this harvest was incidental to fall moose hunting. Nonresident and local residents took relatively few bears. Each year over the past 6 regulatory years (not including fall 2000) there were 8–16 successful hunters. Although RY00 data was preliminary at the time of this report, at least 21 hunters reported harvesting a bear. This is the highest harvest since 1973.

Harvest Chronology and Transport Methods. From RY93 through RY99 most kills occurred during the fall (84%), incidental to hunting other game species. Over the past 4 regulatory years, transportation to the hunt area was primarily via airplane (27.0%), highway vehicle (26.0%), or boat (18.5%).

CONCLUSIONS AND RECOMMENDATIONS

The management objective of maintaining a population that could sustain the stated level of harvest was achieved. During the reporting period, harvest throughout the unit was very low and was not a factor influencing the population. Although most of the harvest takes place in the northern portion of the unit, the population was capable of sustaining that level of harvest. The southern portion of the unit is probably underutilized at an average harvest rate of 1 bear per year. The objective of maintaining at least 50% male harvest was achieved, with 63% of the harvest being males. The trend of increasing age of harvested bears suggests that the population has not been heavily harvested. Although Miller (1993) cautioned about using the proportion of males in the harvest to determine the composition of the population, most bears in this unit are

harvested in the fall so the bias of a greater number of male bears in the spring harvest was diminished.

Although some localized overhunting could occur in Unit 24, the grizzly bear population as a whole is probably not susceptible to overharvest because hunting is restricted within Gates of the Arctic National Park, where most brown bear habitat occurs. Much of the remainder of the unit is more heavily forested and difficult to hunt. Also, for most hunters hunting with firearms is prohibited within 5 miles of the Dalton Highway.

Education, improved reporting compliance, and cooperative activities with federal agencies will continue to be given high priority during the next reporting period. Age and sex ratios of harvested animals are the standard for monitoring large predator populations in the absence of intensive population investigations, and that information will continue to be collected.

LITERATURE CITED

BALLARD WB, KE RONEY, DN LARSEN, AND LA AYRES. 1988. Demography of Noatak grizzly bears in relation to human exploitation and mining development. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grants W-22-5 and W-22-6. Study 4.20. Juneau, Alaska.

CROOK JL. 1972. Grizzly bear survey-inventory activities. Alaska Department of Fish and Game. Mimeo. 38 pp.

DUBOIS SD. 1989. Unit 20D brown/grizzly bear management progress report of survey-inventory activities. Pages 119–127 *in* SO Morgan, editor. Part V. Volume XIX. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grant W-23-1. Study 4.0. Juneau, Alaska.

MILLER S. 1993. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-22-6, W-23-1, W-23-2, W-23-3, W-23-4, and W-23-5. Study 4.21. Juneau, Alaska.

REYNOLDS HV. 1976. North Slope grizzly bear studies. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-17-6 and W-17-7. Study 4.8R, 4.9R, 4.10R, and 4.11R. Juneau, Alaska.

———. 1989. Units 24, 25ABD, and 26B&C brown/grizzly bear management progress report of survey-inventory activities. Pages 174–184 *in* SO Morgan, editor. Part V. Volume XIX. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grant W-23-1. Study 4.0. Juneau, Alaska.

——— AND JL HECHTEL. 1984. Structure, status, reproductive biology, movements, distribution, and habitat utilization of a grizzly bear population. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Projects W-21-1, W-21-2, W-22-1, and W-22-2. Job 4.14R. Juneau, Alaska.

WOOLINGTON J. 1997. Unit 24 brown bear management progress report of survey-inventory activities. Pages 235–240 *in* MV Hicks, editor. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grant W-24-3 and W-24-4. Study 4.0. Juneau, Alaska.

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Table 1 Unit 24 grizzly bear mortality, regulatory years 1993–1994 through fall 2000

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill[a]									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
1993–1994														
Fall 1993	5	0	0	5	0	0	1	1	3	2	5	0	6	11
Spring 1994	3	0	0	3	1	0	0	1	0	0	4	0	0	4
Total	8	0	0	8	1	0	1	2	3	2	9	0	6	15
1994–1995														
Fall 1994	6	8	0	14	0	0	0	0	3	2	6	8	5	19
Spring 1995	1	1	0	2	0	0	0	0	0	0	1	1	0	2
Total	7	9	0	16	0	0	0	0	3	2	7	9	5	21
1995–1996														
Fall 1995	4	4	0	8	0	1	0	1	3	2	4	5	5	14
Spring 1996	0	1	0	1	0	0	0	0	0	0	0	1	0	1
Total	4	5	0	9	0	1	0	1	3	2	4	6	5	15
1996–1997														
Fall 1996	9	4	0	13	0	0	0	0	3	2	9	4	5	18
Spring 1997	1	1	0	2	0	0	0	0	0	0	1	1	0	2
Total	10	5	0	15	0	0	0	0	3	2	10	5	5	20
1997–1998														
Fall 1997	6	2	0	8	0	1	0	1	3	2	6	3	5	14
Spring 1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	6	2	0	8	0	1	0	1	3	2	6	3	5	14
1998–1999														
Fall 1998	8	6	0	14	2	0	0	2	3	2	10	6	5	21
Spring 1999	2	0	0	2	0	0	0	0	0	0	2	0	0	2
Total	10	6	0	16	2	0	0	2	3	2	12	6	5	23

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill[a]									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
1999–2000														
Fall 1999	6	3	0	9	0	0	0	0	3	2	6	3	5	14
Spring 2000	2	1	0	3	0	0	0	0	0	0	2	1	0	3
Total	8	4	0	12	0	0	0	0	3	2	8	4	5	17
2000–2001														
Fall 2000	13	8	0	21	0	0	0	0	3	2	13	8	5	26

[a] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 2 Unit 24 grizzly bear successful hunter residency, regulatory years 1992–1993 through fall 2000

Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total successful hunters
1992–1993	3	9	5	17
1993–1994	1	5	2	8
1994–1995	1	11	4	16
1995–1996	1	7	1	9
1996–1997	2	7	6	15
1997–1998	0	4	4	8
1998–1999	2	10	4	16
1999–2000	0	9	3	12
Fall 2000	0	14	7	21

[a] Unit residents.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNITS: 25A, 25B, 25D, 26B, and 26C (73,755 mi^2)

GEOGRAPHIC DESCRIPTION: Upper Yukon River Drainage and the eastern North Slope of the Brooks Range

BACKGROUND

There was a decline in brown bear numbers during the 1960s resulting primarily from aircraft-supported hunting associated with guiding. As a result, in regulatory year 1971-1972, Units 26B and 26C were closed to brown bear hunting. In subsequent years a variety of regulations were used to limit harvest and increase brown bear numbers. Regulations have been gradually liberalized as populations recovered. A harvest objective of no more than 5% of estimated populations has been used in recent years.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Protect, maintain and enhance brown bear populations and habitat in concert with other components of the ecosystem.
- Provide the opportunity to hunt brown bears under aesthetically pleasing conditions in the eastern Brooks Range.
- Provide the greatest sustained opportunity to participate in hunting brown bears in the upper Yukon and Porcupine drainages.

MANAGEMENT OBJECTIVES

- In Unit 25, maintain a brown bear population capable of sustaining mean annual harvests of 30 bears in Unit 25A and 29 bears in Units 25B and 25D, with a minimum of 60% males in the harvest.
- In Units 26B and 26C, maintain a brown bear population capable of sustaining a mean annual hunter harvest of 13 bears in Unit 26B and 19 bears in 26C, with a minimum of 60% males in the harvest.

METHODS

Brown bear population density estimates for Units 25A, 25B, 25D, 26B, and 26C were revised in 1993 based on studies done in portions of these areas (Reynolds 1976; Garner et al. 1984; Reynolds and Hechtel 1984) or in similar habitat elsewhere (Reynolds 1992), taking into consideration observations by area residents and others with long-term experience in the area. Harvest data are obtained from mandatory sealing documents. Harvest data were summarized by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Conservative regulations, including a drawing permit system that was in use from 1977 until recently, fostered a recovery in the number of brown bears in Units 25A, 26B, and 26C. During this reporting period bear numbers in Unit 25A were likely stable or increasing and the trend in Units 26B and 26C was likely stable. The long-term population trend in Units 25B and 25D is less well known, but brown bears are common throughout the area and numbers during this period were probably stable or increasing. North Slope residents reported that brown bears were abundant compared to historic levels. Similarly, residents of the Yukon Flats reported that brown bears were scarce during much of this century but were abundant during this reporting period. Numbers have increased in the Yukon Flats area during the last 10–20 years, probably because of a decline in the number of bears harvested by local residents.

Population Size

We estimate there are approximately 1800 brown bears in the eastern Brooks Range and upper Yukon River drainage. We revised population estimates in 1993 and have since used those estimates in our management program (Table 1). The revision was part of a statewide effort to update brown bear population information. We based our estimates on extrapolation from studies in the area or in similar habitat (Reynolds 1976, 1992; Reynolds and Hechtel 1984; Reynolds and Garner 1987), field observations on bear abundance and population trend, and on more accurate calculations of land area based on computer digitization of game management units.

Current estimates of bear numbers are somewhat higher than estimates made prior to 1993, largely because increased knowledge of bear densities and, to a lesser extent, because previous calculations of land area were lower than current measurements.

Distribution and Movements

Brown bears are distributed throughout the area. Densities were generally highest in the foothills of the Brooks Range and lowest on the coastal plain of the North Slope. An artificially high concentration of bears developed near Prudhoe Bay (23 in 1500 mi^2; R Shideler, personal communication) because discarded food was available in dumpsters and in the Prudhoe Bay landfill. We observed movement of some brown bears from the mountains to the Porcupine caribou herd calving area on the coastal plain. Brown bears are also known to concentrate near salmon spawning areas on the lower Sheenjek River in Unit 25A.

MORTALITY

Season and Bag Limit.

Units and Bag Limits	Resident Open Season	Nonresident Open Season
Unit 25A RESIDENT AND NONRESIDENT HUNTERS: One bear every 4 regulatory years.	1 Sep–20 May	1 Sep–20 May
Units 25B RESIDENT AND NONRESIDENT HUNTERS: One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 25D RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	1 Sep–31 May	1 Sep–31 May
Unit 26B RESIDENT HUNTERS: One bear every 4 regulatory years.	1 Sep–31 May	
NONRESIDENT HUNTERS: One bear every 4 regulatory years by drawing permit only; up to 10 permits will be issued.		1 Sep–20 May
Unit 26C RESIDENT AND NONRESIDENT HUNTERS: One bear every 4 regulatory years.	20 Aug–31 May	20 Aug–31 May

Board of Game Actions and Emergency Orders. There were no regulatory actions during this reporting period. During the previous report period the department issued an emergency order that closed the spring 1998 brown bear season in Unit 26B. This was followed by board actions that reinstated a drawing hunt for nonresidents and changed the season opening date from 20 August to 1 September in this unit. The board also liberalized brown bear hunting regulations in Unit 25D, eliminating the tag fee for resident hunters and establishing a bag limit of 1 bear per year beginning in RY98. These regulation changes occurred because harvests in the area were extremely low and less restrictive regulations could provide for additional hunting opportunity. The estimated sustainable harvest in Unit 25D was 19 bears, whereas the reported annual harvest was <5 bears.

Drawing permits were required for all brown bear hunters in Units 25A, 26B, and 26C beginning in RY77. As bear populations recovered, regulatory changes included applying the permit requirement only to nonresidents and increasing the number of permits issued in some areas. The requirement for a drawing permit for nonresidents only was applied in Units 25A and 26C beginning in RY84, and in Unit 26B beginning in RY87.

The need for the nonresident permit system in Units 25A, 26B, and 26C was reevaluated in 1993. The improved status of bear populations, a low level of harvest relative to a conservative estimate of sustainable harvest, and the cumbersome nature of the permit system prompted the department to propose eliminating the drawing permit system for nonresident hunters in Units 25A and 26C. The Board of Game adopted this proposal in March 1994, with the understanding that harvests would be closely monitored and that the average annual harvest in each unit during a 2-year period should not exceed the estimated sustainable harvest (Table 1).

Similarly, the permit system for nonresidents in Unit 26B was reevaluated and eliminated by the Board of Game beginning in RY96. The board also established an earlier season opening date of 20 August in Units 26B and 26C. This occurred in response to the closure of the September moose hunting season in most of Unit 26 that took effect in RY96. A decline in brown bear harvest during September was expected to accompany the decline in moose hunting activity during this period. These regulations worked as intended in Units 25A and 26C, but resulted in an unacceptable increase in the harvest in Unit 26B. Following the harvest of 25 bears in Unit 26B during RY96, and 25 during fall 1997, the department closed the remainder of the RY97 season by emergency order. A department proposal to restore a drawing permit hunt for nonresident hunters and open the season on 1 September rather than 20 August was passed by the board in March 1998. However, in view of the high harvests during the previous 2 years, no permits were issued to nonresidents in RY98, and only 3 bears were reported taken by resident hunters. Up to 3 drawing permits were issued for nonresident hunters in RY99 and RY00, with a 1 September–31 October open season.

Hunter Harvest. The total annual hunter harvest during RY89 through RY99 ranged from 21–31 (Tables 2–5). Most were taken in Units 25A, 26B and 26C. The overall harvest was nearly stable in recent years, except in Unit 26B where the number of bears taken increased during the previous report period. Increased bear numbers and a gradual liberalization of regulations resulted in harvests that were higher than during the late 1970s and early 1980s but were still below the estimated allowable take of 5%, except in Unit 26B.

Despite high harvests in RY96 and RY97, reports from hunters and casual observations indicated that bears were still common in Unit 26B. However, access and hunting pressure adjacent to the Dalton Highway indicate the situation should be closely monitored. The emergency closure of the spring RY97 season, the reinstatement of the permit requirement for nonresidents in RY98, the decision to not issue permits in RY98, and the change in the season opening date reduced harvest significantly. The reported harvest in Unit 25D continued to be low, despite the more liberal regulations established in RY98.

The proportion of males in the overall harvest was 63% in RY98 and 72% in RY99 (Tables 2–5). The number of female bears taken in Units 25, 26B, and 26C during this reporting period was relatively low. Most bears were taken during fall hunts.

Permit Hunts. Drawing permits were required for nonresident hunters in Unit 26B, but not for Alaska residents. No permits were issued in RY98 and no bears were reported taken by permit holders in RY99 (Table 6).

Hunter Residency and Success. During the RY98 and RY99 seasons combined, residents of Alaska accounted for most of the reported harvest in Units 25B and 25D (71%), as well as in Unit 26B (100%) where no nonresidents were issued drawing permits. During the same period, residents took only 30% of reported harvest in Unit 25A and 9% in Unit 26C (Tables 7–10). Only a few local residents reported taking bears. These figures probably underrepresent the number taken by local hunters, particularly in Units 25A, 25B and 25D, where a few additional bears are taken but not sealed.

Transport Methods. Most brown bears were harvested during aircraft-supported hunts, with a few taken by hunters using snowmachines and boats. Highway vehicles provided access for some hunters near the Dalton Highway.

Other Mortality

The number of brown bears taken and not reported is unknown, but there were occasional reports of bears being killed but not sealed, especially near villages in Unit 25. Some of this harvest probably occurred in defense of life or property. Local residents of this area do not often specifically hunt bears, but commonly encounter them in the course of other activities. Continued efforts are necessary to encourage local residents to report harvest and seal bears.

Relatively little is known about natural mortality of brown bears in northeastern Alaska. Reynolds and Hechtel (1984) observed natural mortality rates in the western Brooks Range of 47% for cubs, 12% for yearlings, and 13% for 2-year-olds.

CONCLUSIONS AND RECOMMENDATIONS

Management objectives were met, and harvests in Units 25A, 25B, 25D, and 26C were at or below levels specified in management objectives. The elimination of nonresident drawing permits in Units 25A and 26C has not resulted in an appreciable increase in harvest. Regulatory changes that took effect in RY98 significantly mitigated the overharvest of brown bear harvest in Unit 26B during RY96 and RY97. Existing management objectives are suitable for the next period, although change in the harvest objective for Unit 25D may result from the development of a moose management plan for this area.

LITERATURE CITED

GARNER GW, HV REYNOLDS, LD MARTIN, TJ WILMERS, AND TJ DOYLE. 1984. Ecology of brown bears inhabiting the coastal plain and adjacent foothills and mountains of the northeastern portion of the Arctic National Wildlife Refuge. Pages 330–358 *in* GW Garner and PE Reynolds, editors. Arctic National Wildlife Refuge coastal plain resource assessment–1983 update report; baseline study of the fish, wildlife, and their habitats. US Fish and Wildlife Service, Fairbanks, Alaska.

REYNOLDS HV. 1976. North Slope grizzly bear studies. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Report. Jobs 4.8R, 4.9R, 4.10R, and 4.11R. Grants W-17-6 and W-17-7. Juneau, Alaska.

———. 1992. Grizzly bear population ecology in the western Brooks Range, Alaska. Alaska Department of Fish and Game. Progress Report to National Park Service, Alaska Regional Office. Fairbanks, Alaska.

——— AND GW GARNER. 1987. Patterns of grizzly bear predation on caribou in northern Alaska. International Conference on Bear Research and Management 7:59–68.

——— AND JL HECHTEL. 1984. Structure, status, reproductive biology, movement, distribution, and habitat utilization of a grizzly bear population. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Study 4.14R. Grants W-21-1, W-21-2, W-22-1, and W-22-2. Juneau, Alaska.

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Table 1 Units 25A, 25B, 25D, 26B, and 26C brown bear population parameters and estimated sustainable harvest, 1993–2000

Unit	Area (mi^2)	Estimated density/100 mi^2	Estimated population size	Allowable harvest @ 5%
25A	21,280	2.8	596	30
25B and D	26,660	2.2	587	29
25 subtotal	47,940		1164	58
26B	15,500	1.7	262	13
26C	10,272	3.8	391	19
26 subtotal	25,772		653	32
Total	73,712	2.5	1843	92

Table 2 Unit 25A brown bear mortality[ab], regulatory years 1989–1990 through 1999–2000

Regulatory year	Reported								Total estimated kill					
	Hunter kill					Nonhunting kill[c]								
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1989–1990														
Fall 1989	6	6	(50)	0	12	1	1	1	7	(50)	7	(50)	1	15
Spring 1990	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	6	6	(50)	0	12	1	1	1	7	(50)	7	(50)	1	15
1990–1991														
Fall 1990	6	3	(33)	0	9	0	0	0	6	(67)	3	(33)	0	9
Spring 1991	3	2	(40)	0	5	0	0	0	3	(60)	2	(40)	0	5
Total	9	5	(36)	0	14	0	0	0	9	(64)	5	(36)	0	14
1991–1992														
Fall 1991	7	3	(30)	2	12	0	0	0	7	(70)	3	(30)	2	12
Spring 1992	3	0	(0)	0	3	0	0	0	3	(100)	0	(0)	0	3
Total	10	3	(30)	2	15	0	0	0	10	(77)	3	(23)	2	15
1992–1993														
Fall 1992	11	5	(31)	0	16	1	0	0	12	(71)	5	(29)	0	17
Spring 1993	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	11	5	(31)	0	16	1	0	0	12	(71)	5	(29)	0	17
1993–1994														
Fall 1993	5	3	(38)	0	8	0	0	0	5	(62)	3	(38)	0	8
Spring 1994	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	5	3	(38)	0	8	0	0	0	5	(62)	3	(38)	0	8
1994–1995														
Fall 1994	9	3	(25)		12	0	0	0	9	(75)	3	(25)	0	12
Spring 1995	0	1	(100)		1	0	0	0	0	(0)	1	(100)	0	1
Total	9	4	(31)	0	13	0	0	0	9	(69)	4	(31)	0	13
1995–1996														

Regulatory year	Reported								Total estimated kill					
	Hunter kill					Nonhunting kill[c]								
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
Fall 1995	10	4	(29)	0	14	0	0	0	10	(71)	4	(29)	0	14
Spring 1996	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	10	4	(29)	0	14	0	0	0	10	(71)	4	(29)	0	14
1996–1997														
Fall 1996	11	9	(45)	0	20	0	0	0	11	(55)	9	(45)	0	20
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	11	9	(45)	0	20	0	0	0	11	(55)	9	(45)	0	20
1997–1998														
Fall 1997	6	5	(45)	0	11	1	0	0	7	(58)	5	(42)	0	12
Spring 1998	0	2	(100)	0	2	0	0	0	0	(0)	2	(100)	0	2
Total	6	7	(54)	0	13	1	0	0	7	(50)	7	(50)	0	14
1998–1999														
Fall 1998	8	4	(33)	1	13	0	0	0	8	(67)	4	(33)	1	13
Spring 1999	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0
Total	8	4	(33)	1	13	0	0	0	8	(67)	4	(33)	1	13
1999–2000														
Fall 1999	11	3	(21)	0	14	0	0	0	11	(79)	3	(21)	0	14
Spring 2000	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	11	3	(21)	0	14	0	0	0	11	(79)	3	(21)	0	14

[a] Includes permit harvest.

[b] No estimate was made of unreported or illegal kills.

[c] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 3 Unit 25B and 25D brown bear mortality[ab], regulatory years 1989–19990 through 1999–2000

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1989–1990														
Fall 1989	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Spring 1990	3	0	(0)	0	3	0	0	0	3	(100)	0	(0)	0	3
Total	4	1	(20)	0	5	0	0	0	4	(80)	1	(20)	0	5
1990–1991														
Fall 1990	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3
Spring 1991	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	2	3	(60)	0	5	0	0	0	2	(40)	3	(60)	0	5
1991–1992														
Fall 1991	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 1992	0	1	(100)	0	1	0	0	0	0	(0)	1	(100)	0	1
Total	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
1992–1993														
Fall 1992	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 1993	2	1	(33)	0	3	0	0	0	2	(66)	1	(33)	0	3
Total	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
1993–1994														
Fall 1993	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Spring 1994	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
1994–1995														
Fall 1994	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Spring 1995	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
1995–1996														

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
Fall 1995	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 1996	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
1996–1997														
Fall 1996	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
1997–1998														
Fall 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Spring 1998	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
1998–1999														
Fall 1998	0	0	(0)	1	1	0	0	0	0	(0)	0	(0)	1	1
Spring 1999	1	0	(0)	0	0	0	0	0	1	(100)	0	(0)	0	1
Total	1	0	(0)	1	2	0	0	0	1	(100)	0	(0)	1	2
1999–2000														
Fall 1999	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Spring 2000	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	4	2	(33)	0	6	0	0	0	4	(67)	2	(33)	0	6

[a] Includes permit harvest.

[b] No estimate was made of unreported or illegal kills.

[c] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 4 Unit 26B brown bear mortality[ab], regulatory years 1989–1990 through 1999–2000

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1989–1990														
Fall 1989	6	5	(45)	0	11	1	0	0	7	(58)	5	(42)	0	12
Spring 1990	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Total	9	6	(40)	0	15	1	0	0	10	(63)	6	(37)	0	16
1990–1991														
Fall 1990	3	5	(62)	0	8	0	0	0	3	(38)	5	(62)	0	8
Spring 1991	4	0	(0)	0	4	0	0	0	4	(100)	0	(0)	0	4
Total	7	5	(42)	0	12	0	0	0	7	(58)	5	(42)	0	12
1991–1992														
Fall 1991	8	5	(38)	0	13	0	0	0	8	(62)	5	(38)	0	13
Spring 1992	4	0	(0)	0	4	0	0	0	4	(100)	0	(0)	0	4
Total	12	5	(29)	0	17	0	0	0	12	(71)	5	(29)	0	17
1992–1993														
Fall 1992	7	4	(36)	0	11	0	1	0	7	(58)	5	(42)	0	12
Spring 1993	1	1	(50)	1	3	0	0	0	1	(50)	1	(50)	1	3
Total	8	5	(38)	1	14	0	1	0	8	(53)	6	(40)	1	15
1993–1994														
Fall 1993	4	5	(56)	1	10	0	1	0	4	(40)	6	(60)	1	11
Spring 1994	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	5	6	(55)	1	12	0	1	0	5	(42)	7	(58)	1	13
1994–1995														
Fall 1994	6	4	(40)	0	10	0	0	0	6	(60)	4	(40)	0	10
Spring 1995	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Total	8	4	(33)	0	12	0	0	0	8	(66)	4	(33)	0	12
1995–1996														

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
Fall 1995	7	2	(22)	0	9	0	0	0	7	(78)	2	(22)	0	9
Spring 1996	0	2	(100)	0	2	0	0	0	0	(0)	2	(100)	0	2
Total	7	4	(36)	0	11	0	0	0	7	(64)	4	(36)	0	11
1996–1997														
Fall 1996	15	7	(32)	0	22	1	0	0	16	(70)	7	(30)	0	23
Spring 1997	1	2	(66)	0	3	0	0	0	1	(33)	2	(66)	0	3
Total	16	9	(36)	0	25	1	0	0	17	(65)	9	(35)	0	26
1997–1998														
Fall 1997	17	8	(32)	0	25	0	1	0	17	(65)	9	(35)	0	26
Spring 1998	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	17	8	(32)	0	25	0	1	0	17	(65)	9	(35)	0	26
1998–1999														
Fall 1998	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3
Spring 1999	0	0	(0)	0	0	0	1	0	0	(0)	0	(0)	0	0
Total	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3
1999–2000														
Fall 1999	2	2	(50)	0	4	0	0	0	2	(50)	2	(50)	0	4
Spring 2000	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	2	2	(50)	0	4	0	0	0	2	(50)	2	(50)	0	4

[a] Includes permit harvest.

[b] No estimate was made of unreported or illegal kills.

[c] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 5 Unit 26C brown bear mortality[ab], regulatory years 1989–1990 through 1999–2000

Regulatory year	Reported											
	Hunter kill					Nonhunting kill[c]			Total estimated kill			
	M	F	(%)	Unk	Total	M	F	Unk	M (%)	F (%)	Unk	Total
1989–1990												
Fall 1989	1	1	(50)	0	2	1	0	0	2 (67)	1 (33)	0	3
Spring 1990	0	0	(0)	0	0	0	1	0	0 (0)	1 (100)	0	1
Total	1	1	(50)	0	2	1	1	0	2 (50)	2 (50)	0	4
1990–1991												
Fall 1990	3	1	(25)	0	4	0	0	0	3 (75)	1 (25)	0	4
Spring 1991	2	0	(0)	0	2	0	0	0	2 (100)	0 (0)	0	2
Total	5	1	(17)	0	6	0	0	0	5 (83)	1 (17)	0	6
1991–1992												
Fall 1991	4	2	(33)	0	6	2	0	2	6 (75)	2 (25)	2	10
Spring 1992	1	1	(50)	0	2	0	0	0	1 (50)	1 (50)	0	2
Total	5	3	(38)	0	8	2	0	2	7 (70)	3 (30)	2	12
1992–1993												
Fall 1992	0	5	(100)	0	5	0	0	0	0 (0)	5 (100)	0	5
Spring 1993	1	0	(0)	0	1	0	0	0	1 (100)	0 (0)	0	1
Total	1	5	(83)	0	6	0	0	0	1 (17)	5 (83)	0	6
1993–1994												
Fall 1993	6	0	(0)	0	6	0	0	0	6 (100)	0 (0)	0	6
Spring 1994	0	1	(100)	0	1	0	0	0	0 (0)	1 (100)	0	1
Total	6	1	(14)	0	7	0	0	0	6 (86)	1 (14)	0	7
1994–1995												
Fall 1994	1	2	(67)	0	3	0	0	0	1 (33)	2 (67)	0	3
Spring 1995	1	0	(0)	0	1	0	0	0	1 (100)	0 (0)	0	1
Total	2	2	(50)	0	4	0	0	0	2 (50)	2 (50)	0	4
1995–1996												

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
Fall 1995	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7
Spring 1996	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7
1996–1997														
Fall 1996	5	3	(38)	0	8	0	0	0	5	(63)	3	(38)	0	8
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	5	3	(38)	0	8	0	0	0	5	(63)	3	(38)	0	8
1997–1998														
Fall 1997	4	2	(33)	0	6	0	0	0	4	(66)	2	(33)	0	6
Spring 1998	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Total	6	2	(25)	0	8	0	0	0	6	(75)	2	(25)	0	8
1998–1999														
Fall 1998	2	1	(33)	0	3	0	0	0	2	(67)	1	(33)	0	3
Spring 1999	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	2	1	(33)	0	3	0	0	0	2	(67)	1	(33)	0	3
1999–2000														
Fall 1999	6	2	(25)	0	8	0	0	0	6	(75)	2	(25)	0	8
Spring 2000	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	6	2	(25)	0	8	0	0	0	6	(75)	2	(25)	0	8

[a] Includes permit harvest.

[b] No estimate was made of unreported or illegal kills.

[c] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 6 Unit 26B brown bear harvest data by permit hunt, regulatory years 1987–1988 through 1999–2000

Hunt/Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunt	Percent successful hunters	Males	Females	Unk	Total harvest
Fall hunts									
(DB288)	1987–1988	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1988–1989	n/a	n/a	25	75	1	2	0	3
	1989–1990	n/a	n/a	n/a	n/a	n/a	n/a	4	4
	1990–1991	6	33	0	67	1	2	1	4
	1991–1992	6	33	0	67	4	0	0	4
	1992–1993	6	50	0	50	1	3	0	4
(DB987)	1993–1994	6	50	17	33	0	2	0	2
	1994–1995	6	50	0	50	3	0	0	3
	1995–1996	6	0	17	83	4	1	0	5
	1996–1997[a]								
	1997–1998[a]								
	1998–1999	0	0	0	0	0	0	0	0
	1999–2000	3	100	0	0	0	0	0	0
Spring hunts									
(DB297)	1987–1988	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1988–1989	n/a	n/a	n/a	n/a	3	0	0	3
	1989–1990	n/a	n/a	n/a	n/a	0	0	3	3
	1990–1991	4	0	0	100	4	0	0	4
	1991–1992	4	25	0	75	3	0	0	3
	1992–1993	2	0	50	50	0	0	1	1
(DB997)	1993–1994	0	0	0	0	0	0	0	0
	1994–1995	0	0	0	0	0	0	0	0
	1995–1996	0	0	0	0	0	0	0	0
	1996–1997[a]								
	1997–1998[a]								
	1998–1999	0	0	0	0	0	0	0	0
	1999–2000	0	0	0	0	0	0	0	0
Totals for	1987–1988	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Hunt/Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunt	Percent successful hunters	Males	Females	Unk	Total harvest
all permit	1988–1989	n/a	n/a	n/a	n/a	4	2	0	6
hunts	1989–1990	n/a	n/a	n/a	n/a	n/a	n/a	7	7
	1990–1991	10	20	0	80	5	2	1	8
	1991–1992	10	30	0	70	7	0	0	7
	1992–1993	8	38	12	50	1	3	1	4
	1993–1994	6	50	17	33	0	2	0	2
	1994–1995	6	50	0	50	3	0	0	3
	1995–1996	6	0	17	83	4	1	0	5
	1996–1997[a]								
	1997–1998[a]								
	1998–1999[a]	0	0	0	0	0	0	0	0
	1999–2000	3	100	0	0	0	0	0	0
	2000–2001[b]	2							

[a] The nonresident drawing hunt in Unit 26B was eliminated in regulatory year 1996–1997 and reinstated in regulatory year 1998–1999.
[b] Preliminary data.

Table 7 Unit 25A residency of successful brown bear hunters[a], regulatory years 1985–1986 through 1999–2000

Regulatory year	Local[b] resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1985–1986	1 (11)	2 (22)	6 (67)	9
1986–1987	0 (0)	6 (50)	6 (50)	12
1987–1988	0 (0)	3 (23)	10 (77)	13
1988–1989	1 (5)	8 (38)	12 (57)	21
1989–1990	1 (8)	2 (17)	9 (75)	12
1990–1991	2 (14)	6 (43)	6 (43)	14
1991–1992	1 (7)	4 (27)	10 (67)	15
1992–1993	0 (0)	6 (38)	10 (62)	16
1993–1994	0 (0)	4 (50)	4 (50)	8
1994–1995	0 (0)	8 (62)	5 (38)	13
1995–1996	0 (0)	4 (29)	10 (71)	14
1996–1997	0 (0)	2 (10)	18 (90)	20
1997–1998	0 (0)	3 (23)	10 (77)	13
1998–1999	1 (7)	3 (23)	9 (69)	13
1999–2000	0 (0)	4 (29)	10 (71)	14

[a] Includes permit harvest.

[b] Includes only residents of the subunit.

Table 8 Unit 25B and 25D residency of successful brown bear hunters[a], regulatory years 1985–1986 through 1999–2000

Regulatory year	Local[b] resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1985–1986	0 (0)	0 (0)	2 (100)	2
1986–1987	0 (0)	1 (25)	3 (75)	4
1987–1988	0 (0)	2 (40)	3 (60)	5
1988–1989	1 (25)	0 (0)	3 (75)	4
1989–1990	1 (20)	1 (20)	3 (60)	5
1990–1991	1 (20)	3 (60)	1 (20)	5
1991–1992	0 (0)	0 (0)	2 (100)	2
1992–1993	1 (25)	0 (0)	3 (75)	4
1993–1994	0 (0)	2 (100)	0 (0)	2
1994–1995	2 (50)	2 (50)	0 (0)	4
1995–1996	0 (0)	1 (50)	1 (50)	2
1996–1997	1 (33)	0 (0)	2 (67)	3
1997–1998	0 (0)	0 (0)	0 (0)	0
1998–1999	1 (50)	0 (0)	1 (50)	2
1999–2000	4 (80)	0 (0)	1 (20)	5

[a] Includes permit harvest.

[b] Includes only residents of the subunit.

Table 9 Unit 26B residency of successful brown bear hunters[a], regulatory years 1985–1986 through 1999–2000

Regulatory year	Local[b] resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1985–1986	0 (0)	0 (0)	6 (100)	6
1986–1987	0 (0)	2 (40)	3 (60)	5
1987–1988	0 (0)	6 (46)	7 (54)	13
1988–1989	0 (0)	4 (44)	5 (56)	9
1989–1990	0 (0)	7 (47)	8 (53)	15
1990–1991	0 (0)	4 (33)	8 (66)	12
1991–1992	0 (0)	10 (59)	7 (41)	17
1992–1993	0 (0)	9 (64)	4 (29)	13
1993–1994	0 (0)	10 (83)	2 (17)	12
1994–1995	0 (0)	9 (75)	3 (25)	12
1995–1996	0 (0)	6 (55)	5 (45)	11
1996–1997	1 (4)	11 (44)	13 (57)	25
1997–1998	0 (0)	9 (35)	16 (64)	25
1998–1999	0 (0)	3 (100)	0 (0)	3
1999–2000	0 (0)	4 (100)	0 (0)	4

[a] Includes permit harvest.

[b] Includes only residents of the subunit.

Table 10 Unit 26C residency of successful brown bear hunters[a], regulatory years 1985–1986 through 1999–2000

Regulatory year	Local[b] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
1985–1986	0	(0)	4	(67)	2	(33)	6
1986–1987	0	(0)	6	(67)	3	(33)	9
1987–1988	0	(0)	5	(63)	3	(37)	8
1988–1989	0	(0)	3	(50)	3	(50)	6
1989–1990	0	(0)	0	(0)	2	(100)	2
1990–1991	0	(0)	3	(50)	3	(50)	6
1991–1992	0	(0)	4	(50)	4	(50)	8
1992–1993	1	(17)	1	(17)	4	(66)	6
1993–1994	1	(14)	6	(86)	0	(0)	7
1994–1995	0	(0)	2	(50)	2	(50)	4
1995–1996	0	(0)	0	(0)	7	(100)	7
1996–1997	0	(0)	4	(50)	4	(50)	8
1997–1998	2	(25)	0	(0)	6	(75)	8
1998–1999	0	(0)	0	(0)	3	(100)	3
1999–2000	0	(0)	1	(12)	7	(88)	8

[a] Includes permit harvest.

[b] Includes only residents of the subunit.

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BLACK BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 26A (56,000 mi^2)

GEOGRAPHIC DESCRIPTION: Western North Slope

BACKGROUND

Densities of brown/grizzly bears vary widely in Unit 26A, with densities highest in the foothills of the Brooks Range and lowest in the northern portion of the unit. Bear populations were reduced during the 1960s by hunting, but are currently stable or slowly increasing. Hunters, particularly those from out of state, have continued to show an interest in hunting bears in Unit 26A. Subsistence hunting regulations for the Northwest Alaska Brown Bear Management Area (NWABBMA) allow residents to hunt brown bears primarily for food in Units 21D, 22 except 22C, 23 except Baldwin Peninsula, 24, and 26A.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain the existing brown bear population.

MANAGEMENT OBJECTIVES

- Maintain a grizzly bear population of approximately 800 bears or greater.
- Maintain a harvest success rate of least 60%.
- Minimize adverse interactions between grizzly bears and the public.

METHODS

There has been a radiotelemetry study in the southern portion of Unit 26A for a number of years, with methods previously reported in research progress reports (Reynolds 1984, 1989) and management reports (Trent 1985, 1989; Carroll 1993).

Population densities for broad habitat zones in Unit 26A were estimated using subjective comparisons to areas of the North Slope with known bear densities. The habitat zones include the coastal plain (<800 ft elevation), the foothills (800–2500 ft elevation), and mountains (>2500 ft elevation). Bear densities within these habitat zones are available from studies in the western

Brooks Range (1992), the Arctic National Wildlife Refuge (1982–1990), the Canning River and Ivashak River drainages (1973–1975), and the Prudhoe Bay oilfield area (1990–1993).

We used brown bear sealing certificates to determine seasonal harvests. For sealed bears we summarized the date and location of taking, skull sizes, and sex/age composition of harvested animals. Hunting activity was summarized by residency of hunters and their methods of transportation. For reporting population estimates and harvest summaries, we divided Unit 26A at 159° W longitude into Unit 26A East and Unit 26A West.

The sealing certificate system has not proven to be an effective method to determine local harvest, so we reviewed several community-based harvest assessment studies to get an insight into local harvest. Some of the communities have been studied more than once so we were able to calculate mean harvests for these villages. In 1992 nearly all the villages were studied so we determined the total harvest for that year. For the villages of Anaktuvuk Pass and Nuiqsut, which are on the border of Unit 26A, we assumed that half of their bear harvest came from Unit 26A.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The most recent bear density information comes from June 1992 for the Utukok and Kokolik drainages in Unit 26A West. The density was calculated at 29.5 bears/1000 km^2 with a 95% confidence interval of 28.1–31.5 bears/1000 km^2 (Reynolds, personal communication).

The current population estimate for bears in Unit 26A is 900–1120 bears (Reynolds 1989). We estimate there are 400 bears in Unit 26A West and 500–720 bears in Unit 26A East (Table 1). This represents a substantial increase from the pre–1987 population estimate of 645–780 bears.

Bear populations in the Brooks Range apparently declined during the 1960s due to guided hunting (Reynolds, personal communication) and have been recovering since permit hunts were instituted during the 1977–78 regulatory year (Trent 1989). Bear densities appear to be at high levels relative to carrying capacity of the habitat.

Population Composition

The most recent population composition and productivity data are available from Reynolds (1984) for the western portion of the unit in the Utukok and Kokolik drainages. The sex ratio for bears older than 1 year was approximately 40 males/60 females; for cubs and yearlings it was approximately 50:50, but may have slightly favored females.

Age composition was as follows: cubs of the year - 13%; yearlings - 10%; 2-year-olds - 14%; 3 and 4-year-olds - 11%; and bears over 5 years - 52%. Mean age at first reproduction was 8.0 years, mean litter size was 2.0 cubs, mean reproductive interval was 4.0 years, and mean productivity was 0.5 cubs/year.

Distribution and Movements

We estimate densities for habitat zones in Unit 26A at 0.5–2 bears/1000 km^2 on the coastal plain, 10–30 bears/1000 km^2 in the foothills, and 10–20 bears/1000 km^2 in the mountains. These densities yield an estimated total of 1007 bears, with 81 in the coastal plain, 666 in the foothills, and 260 in the mountains.

MORTALITY

Harvest

Season and Bag Limit.

Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 26A Resident and Nonresident Hunters: 1 bear every regulatory year.	20 Aug–31 May (General hunt only)	20 Aug–31 May (General hunt only)
Unit 26A Resident Hunters: 1 bear per regulatory year by registration permit in the Northwest Alaska Brown Bear Management Area for subsistence purposes.	20 Aug–31 May (Subsistence hunt only)	
Nonresident Hunters		No open season

Board of Game Actions and Emergency Orders. During their spring 1996 meeting, the Board eliminated the drawing permit requirements for nonresident brown bear hunters in Unit 26A and lengthened the season to 20 August–31 May. The change was made to simplify the complex permit system. The harvest in Unit 26A had been well below the maximum sustained yield and the permit hunt was undersubscribed. Our goal will be to keep the harvest at or below an average of 5% of the bear population during any 2-year period. Therefore, the maximum allowable harvest will be 31 bears per year in Unit 26A East and 20 bears in Unit 26A West. If this quota is exceeded during one year then the quota for the next year will be reduced by as much as it was exceeded during the first year. If the average is exceeded, more restrictive regulatory action, including emergency orders, will be considered. The system depends upon open lines of communication among the department, guides, and hunters.

During their fall 1999 meeting, the board increased the bag limit from one bear every 4 years to one bear every year. This was done to provide more opportunity for hunters because the bear harvest had remained well below the maximum sustained yield level.

Human-Induced Harvest. Ten bears were sealed during 1998–1999. One bear was reported killed in defense of life and property (DLP). Four bears were killed in Unit 26A West and 6 in Unit 26A East (Table 1). Six bears were males and 4 were females (Table 2).

Eleven bears were sealed during 1999–2000. Seven bears were killed in Unit 26A West and 4 in Unit 26A East (Table 1). Seven bears were males and 4 were females (Table 2). Preliminary results indicate that 16 bears have been reported harvested during the 2000–2001 season.

The sealing certificate system has not proven to be an effective method to determine actual local harvest, so we reviewed several community-based harvest assessment studies to get an indication of local harvest. We determined that the total of the mean number of bears harvested per year was approximately 11–12 bears (Braund et. al. 1991, 1993; Brower and Opie 1996, 1997; Fuller and George 1997; Hepa et. al. 1997; Pedersen 1987, 1995, 2001). These numbers are reflected in Unreported Kill in Table 2. Fuller and George (1997) obtained information from nearly every village in 1992, which indicated that local residents harvested at least 9–10 bears that year. Sealing certificates indicated a reported local harvest of 3 bears in 1992.

The reported harvest in 1998–1999 (10 bears) and 1999–2000 (11 bears) was well below average number harvested in past years. The harvests reported in 1990–1991 (32 bears) and 1991–1992 (34 bears), remain the highest reported harvests for Unit 26A (Table 2).

For bears harvested during 1998–1999, the mean skull size for males was 22.1 inches and 19.4 inches for females; the mean age was 6.0 years for males and 7.3 years for females. During 1999–2000 the mean skull size for males was 21.7 inches and 18.4 inches for females; the mean age was 10.0 years for males and 5.5 years for females (Table 3).

Permit Hunts. There were no permit hunts for brown bears in Unit 26A. Permit hunts were discontinued by Board action as of the 1996-1997 regulatory year.

Hunter Residency and Success. Of the 10 bears sealed in Unit 26A during 1998–1999, 8 were harvested by nonresidents, 1 by a nonlocal Alaska resident, and 1 by a North Slope resident. During 1999–2000, 8 of 11 bears were harvested by nonresidents, 3 by nonlocal Alaska residents, and 0 by North Slope residents (Table 4).

Harvest Chronology. During 1998–1999 6 bears were harvested during August and 4 in September. In 1999–2000 3 bears were harvested in August and 5 in September. No bears were reported harvested during the spring months for either year. (Table 5).

Transport Methods. Most bear hunters continued to use aircraft as transportation in Unit 26A. During 1998–1999, 9 hunters used aircraft for transportation and 1 used a boat. All 11 hunters used aircraft during 1999–2000 (Table 6).

Other Mortality

No recent estimate of natural mortality for grizzly bears in Unit 26A is available. However, Reynolds and Hechtel (1983) reported mortality rates among offspring accompanied by marked adult females in the western Brooks Range to be 44% for cubs, 9% for yearlings, and 14 % for 2-year-olds from 1977–81.

HABITAT

Assessment

Most of the brown bear habitat in Unit 26A remains undisturbed and supports a fairly large and growing population of bears. It would be difficult to evaluate many of the food sources for brown bears in Unit 26A, such as herbivorous forage and ground squirrels. Caribou represent a large food resource available to bears for at least part of the year. The decline in the Colville River moose population in the early 1990s and the current recovery may have affected bear numbers.

Potential hazards to brown bear habitat include oil, gas, and mineral exploration and development. Exploration is currently underway in Unit 26A, including areas within the foothills on the north side of the Brooks Range.

Some areas in Unit 26A, particularly some east/west-oriented ridges, are used much more heavily than the surrounding area by brown bears for at least part of the year (Reynolds, personal communication). An attempt should be made to catalogue as many of these areas as possible. These areas should be considered critical habitat for brown bears and given special protection in the future.

Enhancement

There were no habitat enhancement activities in Unit 26A during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

There were no activities related to nonregulatory management problems/needs in Unit 26A during the reporting period.

CONCLUSIONS AND RECOMMENDATIONS

Hunters reported 10 bears harvested during 1998–1999 and 11 bears during 1999–2000. This was well below the average number of bears harvested since 1990 (27.3) and the allowable sustained yield of approximately 51 bears. The reported harvests in Unit 26A East, of 6 bears in 1998–1999 and 4 bears in 1999–2000, and Unit 26A West, of 4 bears in 1998–1999 and 7 in 1999–2000, were well below the allowable limits of 31 and 20, respectively. Even if unreported harvest is as high as 100% of the reported harvest, the total estimated yearly harvest of 20–22 bears would still be well within safe harvest limits.

Oil, gas, and mineral exploration and development are potential hazards to brown bear habitat. Reynolds has stated that some areas, particularly some east/west-oriented ridges, have very high brown bear densities. We should identify these critical habitat areas and catalogue them so they can be given special protection during upcoming mineral exploration and development projects.

A significant management problem in Unit 26A continues to be unreported harvest and non-compliance with bear hunting regulations. To accommodate rural hunting practices, the Board of Game established the Northwest Alaska Brown Bear Management Area (NWABBMA) with alternate hunting regulations for subsistence users in 1992. The regulations are designed for

people who hunt bears for food. The regulations eliminate tags and sealing procedures and allow harvest reports by mail. Hopefully, these regulations will improve harvest reporting and compliance.

One problem not addressed by the current regulatory system or the special management area regulations is that accurate harvest information still depends upon hunters buying licenses and reporting their harvest. Many local hunters do not buy hunting licenses or report their harvest. To help alleviate this problem, department personnel worked with the North Slope Borough to develop a harvest documentation system that is more acceptable to local residents. Harvest monitors have been hired in some villages and are collecting harvest information for several species.

In order to approximate local harvest, we used data from the North Slope Borough and other community-based harvest assessment studies. We determined that the total of the mean number of bears harvested in Unit 26A villages per year was approximately 11–12 bears. Fuller and George obtained information from most villages in 1992 which indicated that local residents harvested approximately 9–10 bears in Unit 26A that year. Sealing certificates indicated a reported local harvest of 3 bears in 1992. While not all harvested bears are reported, the local unreported harvest does not appear to be at a level that creates a biological problem.

In 1996 the Board of Game discontinued the brown bear drawing permit system and lengthened the season in Unit 26A. It was surprising that in 1996–1997 and in 1997–1998 bear harvest was less than average even though the regulations were liberalized. This might be explained by a lack of a concurrent moose season and hunters that would have secondarily harvested bear while hunting moose. Eliminating the drawing permit system has reduced paper work and time spent administering the hunt and has not led to overharvest. We will continue communicating with the guides and urge them to limit their harvests and to be selective toward males. In 1999 the board increased the bag limit from 1 bear every 4 years to 1 bear every year. Preliminary results indicate that 16 bears have been reported harvested during the 2000–2001 season. This indicates an increase over the previous 2 years, but is still well below the harvestable surplus. We do not recommend any changes in seasons or bag limits at this time.

LITERATURE CITED

BRAUND, SR & ASSOCIATES, AND INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH. 1991. North Slope Subsistence Study - Barrow, 1987, 1988, and 1989. Technical Report No. 149. Prepared for the U.S. Department of Interior, Minerals Management Service.

———. 1993. North Slope Subsistence Study - Wainwright, 1988 and 1989. Technical Report No. 147. Prepared for the U.S. Department of Interior, Minerals Management Service.

BROWER, HK AND RT OPIE. 1996. North Slope Borough Subsistence Documentation Project: Data for Anaktuvuk Pass, Alaska for the Period July 1, 1994 to June 30, 1995. North Slope Borough Department of Wildlife Management Report. 36 pp. Available from North Slope Borough Department of Wildlife Management, Box 69, Barrow, Alaska 99723 USA.

———, AND ———. 1997. North Slope Borough Subsistence Documentation Project: Data for Nuiqsut, Alaska for the Period July 1, 1994–June 30, 1995. North Slope Borough

Department of Wildlife Management Report. 44 pp. Available from North Slope Borough Department of Wildlife Management, Box 69, Barrow, Alaska 99723 USA.

CARROLL, GM 1991. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 262–271 *in* SM. Abbot, ed. Annual performance report of survey-inventory activities, 1 July 1990–30 June 1991. Vol. XXII, Part V. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–23–4, Study 4.0. Juneau. 271pp.

———. 1993. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 271–283 *in* SM. Abbot, ed. Management report of survey-inventory activities, 1 July 1990–30 June 1992. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–23–1 and W–23–5, Study 4.0. Juneau. 283pp.

HEPA, RT, HK BROWER AND D BATES. 1997. North Slope Borough Subsistence Harvest Documentation Project: Data for Atqasuk, Alaska for the Period July 1, 1994 to June 30, 1995. Department of Wildlife Management, North Slope Borough, Barrow, Alaska. 40 pages.

PEDERSEN, S. 1987. Pt. Lay Subsistence Land and Resource Use. In Impact Assessment, Inc: Pt. Lay Case Study. Technical Report No.139. U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, Anchorage, Alaska.

———. 1995. Nuiqsut. Chapter XXII, Vol.5. In J. Fall and C. Utermohle, eds. An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska. Technical Report No.160. U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, Anchorage, Alaska.

———. 2001. Subsistence Harvest Levels and Spatial Dimensions of Caribou, Moose, Brown bear and Muskox Hunting in Nuiqsut during Regulatory Year 2000. Draft Report: Division of Subsistence, Arctic Region, Alaska Department of Fish and Game, Fairbanks, Alaska.

REYNOLDS, HV AND JL HECHTEL. 1983. Reproductive biology, movement, distribution, and habitat utilization of a grizzly bear population. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report. Grant W–22–1. Job 4.14R. Juneau. 22pp.

REYNOLDS, HV 1984. Unit 24–26 brown/grizzly bear survey-inventory progress report. Pages 94–96 in JA Barnett, ed. Annual report of survey-inventory activities. Part I. Brown/grizzly Bears. Vol. XIV. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–22–1 and W–22–2. Job 17.0 and 4.0. Juneau. 96pp.

———. 1989. Unit 24–26 brown/grizzly bear survey-inventory progress report. Pages 174–184. SO Morgan, ed. Annual report of survey-inventory activities, 1987. Vol. XIX, Part V. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–23–1, Study 4.0. Juneau. 189pp.

TRENT, JN 1985. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 65–69 in B Townsend, ed. Annual report of survey-inventory activities. Part V. Brown Bears. Vol. XVI. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–22–4. Job 4.0. Juneau. 69pp.

———. 1989. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 174–184. SO Morgan, ed. Annual report of survey-inventory activities, 1987. Vol. XIX, Part V. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report. Grant W–23–1, Study 4.0. Juneau. 189pp.

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Table 1 Estimated Population Size and Reported harvest of brown/grizzly bears in Unit 26A, 1988–2000

Unit	Estimated population size	5% harvest rate	Reported harvest											
			1988–1989	1989–1990	1990–1991	1991–1992	1992–1993	1993–1994	1994–1995	1995–1996	1996–1997	1997–1998	1998-1999	1999-2000
26A West	400	20	25	12[a]	16	13[a]	16	9[a]	7	6	8	6	4[a]	7
26A East	500–720	25–36	6	14	16[a]	21	13	17	13	17	12	14	6	4
Total	900–1200	45–56	31	26[a]	32[a]	34[a]	29	26[a]	20	23	20	20	10[a]	11

[a] Includes DLP-killed bears

Table 2 Unit 26A brown bear harvest[a], 1985–2000

Regulatory	Hunter harvest						Non-hunting		Un-reported	Total
year	M	(%)	F	(%)	Unk.	Total	kill	Total	est. kill	est. kill
1985–1986										
Fall 1985	3	(43)	4	(57)		7				
Spring 1986	2	(40)	3	(60)		5				
Total	5	(42)	7	(58)		12	2	14	5–7	19–21
1986–1987										
Fall 1986	10	(77)	3	(23)		13				
Spring 1987	6	(86)	1	(14)		7				
Total	16	(80)	4	(20)		20		20	8–11	28–31
1987–1988										
Fall 1987	11	(58)	8	(42)		19				
Spring 1988	2	(67)	1	(33)		3				
Total	13	(59)	9	(41)		22		22	8–12	30–34
1988–1989										
Fall 1988	12	(71)	5	(29)		17				
Spring 1989	11	(79)	3	(21)		14				
Total	23	(74)	8	(26)		31		31	12–17	43–48
1989–1990										
Fall 1989	10	(53)	9	(47)		19				
Spring 1990	7	(100)	0			7				
Total	17	(63)	9	(33)	1	27		27	8–13	34–39
1990–1991										
Fall 1990	15	(75)	5	(25)		20				
Spring 1991	8	(73)	3	(27)		11				
Total	23	(74)	8	(26)		31	1	32	5–12	37–44
1991–1992										
Fall 1991	22	(81)	5	(19)		27				
Spring 1992	6	(100)	0			6				
Total	28	(82)	5	(15)	1	34	0	34	5–10	39–44
1992–1993										
Fall 1992	18	(95)	1	(5)		19				
Spring 1993	8	(80)	2	(20)		10				
Total	26	(90)	3	(10)		29	0	29	6–12	35–41

Regulatory	Hunter harvest						Non-hunting		Un-reported	Total
year	M	(%)	F	(%)	Unk.	Total	kill	Total	est. kill	est. kill
1993–1994										
Fall 1993	11	(79)	3	(21)		14				
Spring 1994	8	(89)	1	(11)		9				
Total	19	(83)	4	(17)		23	3	26	6–12	32–38
1994–1995										
Fall 1994	9	(75)	3	(25)		12				
Spring 1995	7	(88)	1	(12)		8				
Total	16	(80)	4	(20)		20	0	20	6–12	26–32
1995–1996										
Fall 1995	7	(53)	6	(47)		13				
Spring 1996	6	(60)	3	(30)	1(10)	10				
Total	13	(57)	9	(39)	1(10)	23	2	23	6–12	29–35
1996–1997										
Fall 1996	11	(69)	5	(31)		16	0			
Spring 1997	2	(67)	1	(34)		3	0	3	1	
Total	13	(68)	6	(32)		19	1	20	6–12	06–32
1997–1998										
Fall 1997	11	(69)	5	(31)		16	0			
Spring 1998	2	(50)	2	(50)		4				
Total	13	(65)	7	(35)		20	0	20	6–12	26–32
1998–1999										
Fall 1998	6	(60)	4	(40)		10	0			
Spring 1999	0		0			0	0			
Total	5	(56)	4	(44)		9	1	10	6–12	16–22
1999–2000										
Fall	7	(64)	4	(36)		11				
Spring	0		0			0				
Total	7	(64)	4	(36)		11		11	6–12	17–23

[a] Permit hunt harvest included.

[b] Includes DLP kills, research mortalities, and other known human caused accidental mortality.

Table 3 Unit 26A brown bear skull size and age, 1985–2000

	Mean skull size, inches				Mean age, years			
Regulatory year	Male	*n*	Female	*n*	Male	*n*	Female	*n*
1985–1986	20.6	5	20.2	5	8.8	5	10.3	5
1986–1987	20.9	10	19.2	5	8.2	12	4.6	5
1987–1988	22.5	16	20.0	9	11.1	16	11.9	9
1988–1989	22.0	14	19.9	6	11.2	13	9.2	6
1989–1990	21.5	17	19.7	8	9.8	16	11.7	9
1990–1991	21.1	22	19.5	8	10.1	22	7.8	8
1991–1992	20.0	28	19.9	5	7.9	25	16.6	4
1992–1993	21.2	17	19.0	1	8.3	17	3.0	1
1993–1994	20.9	11	19.0	3	8.0	10	4.3	3
1994–1995	21.4	16	18.8	4	7.7	14	3.5	4
1995–1996	21.2	13	19.1	7	8.1	12	6.1	4
1996–1997	20.9	12	19.5	6	7.8	12	6.0	6
1997–1998	21.4	10	19.3	6	8.5	11	7.6	5
1998–1999	22.1	5	19.4	4	6.0	3	7.3	4
1999–2000	21.7	7	18.4	4	10.0	6	5.5	4

Table 4 Unit 26A brown bear successful hunter[a] residency, 1985–2000

Regulatory year	Local resident	Nonlocal resident	Nonresident	Unknown	Total hunters
1985–1986	2	7	2	1	12
1986–1987	0	8	12		20
1987–1988	1	8	13		22
1988–1989	1	10	20		31
1989–1990	2	12	13		27
1990–1991	1	9	21		31
1991–1992	2	15	16		33
1992–1993	1	8	20		29
1993–1994	1	10	12		23
1994–1995	0	5	15		20
1995–1996	6	4	13		23
1996–1997	2	0	18	0	20
1997–1998	1	1	18	0	20
1998–1999	1	1	8		10
1999–2000	0	3	8		11

[a] Hunters in permit hunts are included.
[b] Local means North Slope residents.

Table 5 Unit 26A brown bear harvest chronology by time period, 1985–2000

Regulatory year	Aug	Sep	Oct	Nov	Apr	May	June	*n*
1985–1986		6	1	0	0	5	0	12
1986–1987		13	0	0	0	7	0	20
1987–1988		19	0	0	0	3	0	22
1988–1989		17	0	0	0	14	0	31
1989–1990	1	18	1	0	0	7	0	27
1990–1991	1	18	1	0	1	10	0	31
1991–1992	0	25	2	0	3	3	0	33
1992–1993	0	18	1	0	6	4	0	29
1993–1994	0	13	1	0	4	5	0	23
1994–1995	0	12	0	0	0	8	0	20
1995–1996	0	11	2	0	2	8	0	23
1996–1997	5	11	1	0	1	2	0	20
1997–1998	11	5	0	0	1	3	0	20
1998–1999	6	4	0	0	0	0	0	10
1999–2000	3	8	0	0	0	0	0	11

Table 6 Unit 26A brown bear harvest[a] percent by transport method, 1985–2000.

Regulatory year	Transport method for brown bear harvest														Total
	Airplane		Horse		Boat		Snowmachine		ORV		Walk		Unknown		
	n	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*
1985–1986	7	(50)	2	(14)			3	(22)			1	(7)	1	(7)	14
1986–1987	19	(95)							1	(5)					20
1987–1988	20	(92)					1	(4)	1	(4)					22
1988–1989	27	(87)			3	(10)			1	(3)					31
1989–1990	21	(78)			3	(11)	1	(4)	1	(4)					27
1990–1991	26	(84)							3	(10)			2	(6)	31
1991–1992	30	(91)					2	(6)					1	(3)	33
1992–1993	24	(83)					5	(17)							29
1993–1994	15	(65)			3	(13)	4	(18)			1	(4)			23
1994–1995	15	(75)			1	(5)	3	(15)			1	(5)			20
1995–1996	12	(52)			2	(9)	7	(30)			2	(9)			23
1996–1997	15	(75)					1	(5)	1	(5)	2	(10)	1	(5)	20
1997–1998	17	(85)			1	(5)	2	(10)							20
1998–1999	9	(90)			1	(10)									
1999–2000	11	(100)													

[a] Permit hunt harvest is included.

The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sales of handguns, sporting rifles, shotguns, ammunition and archery equipment. The Federal Aid program allots funds back to states through a formula based on each state's geographic area and number of paid hunting license holders. Alaska receives a maximum 5% of revenues collected each year. The Alaska Department of Fish and Game uses federal aid funds to help restore, conserve and manage wild birds and mammals to benefit the public. These funds are also used to educate hunters to develop the skills, knowledge and attitudes for responsible hunting.

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