Brown Bear
Management Report
of survey-inventory activities
1 July 2000–30 June 2002

Carole Healy, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation
December 2003

ADF&G

Please note that population and harvest data in this report are estimates and may be refined at a later date.

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Ken Whitten

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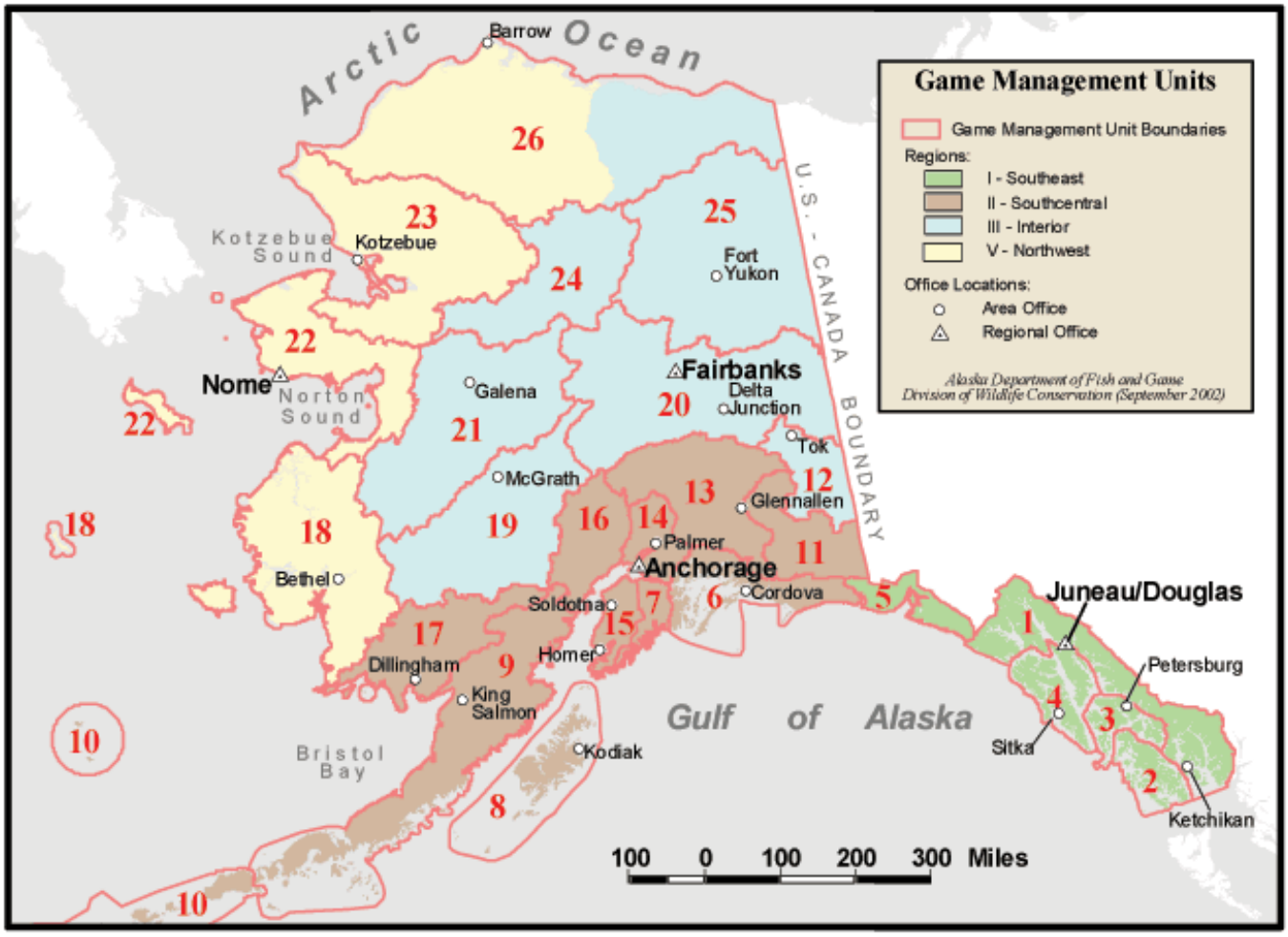
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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. Until recently they were known to coexist with black bears only on mainland portions of the Alexander Archipelago. During recent years there have been scattered reports of brown bears 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 the region's mainland. Most of the information we use to assess and manage mainland brown bear populations has come from hunters' anecdotal information, 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). Hunters were previously 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 by the US Forest Service (USFS). 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.
- Maintain a spring harvest of at least 60% males.
- Reduce the number of bears killed because of garbage and human food conditioning.

METHODS

Unit 1 brown bear hunters are required to obtain registration permits prior to hunting. From the permit 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 hunters' anecdotal 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	15 Sep–31 Dec
by registration permit only	15 Mar–31 May

USFS 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 USFS moratorium issued in summer 2000 limits the level of Unit 4 guide activity (Admiralty, Baranof, and Chichagof islands). 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 Alaska Department of Fish and Game (ADF&G), requested the USFS to restrict Unit 4 guides to the average of their 1997 and 1998 client levels. When the Unit 4 Brown Bear Management Team (Team) was created in January 1999, concerns were raised that if any Unit 4 restrictions were put in place the likelihood of redirected hunting pressure would impact Unit 1. Unit 4 restrictions became a reality and Unit 1 witnessed an increased effort and higher harvest immediately after the Unit 4 moratorium went into effect. Beginning in spring 2001, big-game guides operating under USFS special use permits will be limited by the number of hunts they conduct annually in Unit 1.

At the request of ADF&G, the USFS agreed to limit the number of Unit 1 guided brown bear hunts starting in 2001. 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 studies on Admiralty and Chichagof islands. Although 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 hunting on federal lands are held to the mean of the 1998 and 1999 FS Special Use Permit levels.

Unit 1D is the only area in Southeast with substantial amounts of state land. Consequently the changes made by the USFS to cap guide-use permits on federal land would not affect Unit 1D guide use. Responding to growing concerns for the sustainability of the increasing harvest (mostly by guided nonresidents) ADF&G biologists submitted proposals to the Board of Game (Board) recommending a more conservative harvest. During their fall 2002 meeting, the Board voted to change the Unit 1D nonresident brown bear registration permit hunt to a drawing permit hunt. This was in response to an increasing nonresident harvest, and was implemented to cap the harvest at the current level.

Hunter Harvest. Unit 1D continued to account for the highest proportion of the Unit 1 harvest during the report period (2000–01), 47 and 43%, respectively. During this 2-year report period the proportion of bears killed by subunit (1A, B, C, and D) was 15%, 30%, 11%, and 45%, respectively. The Unit 1 ten-year mean harvest percentage by subunit (1A–1D) was 19%, 21%, 14%, 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 for both spring and fall), with spring harvests 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, such sows become legal 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 half of the total ($\bar{x}$ = 47%). The spring harvest of female bears during the past 10 years has consistently been lower ($\bar{x}$ = 18%) (Table 2).

The mean male skull size during 2000 ($\bar{x}$= 21.7, n= 21) and 2001 ($\bar{x}$=22.6, n=15) was similar to the long-term average ($\bar{x}$ = 22.2). The average female skull sizes during 2000 ($\bar{x}$= 20.8, n= 16) and 2001 ($\bar{x}$= 20.1, n= 13) were also similar to the long-term average (20.2 inches) (Table 3).

The 2000 mean age of harvested male bears (6.4, n= 19, range 2–18) was lower than past years and is below our management objective of 6.5 years. The 2000 harvest includes 4 two-year old male bears all killed by guided nonresidents in Unit 1D. The mean age of male bears during the subsequent 2001 season was much higher (9.8, n=10, range 3–23). The 2000 mean female age was 6.2 years (n=2, range 2–16) and below the long-term average of 7.5 years. Similar to the higher 2001 male average, female ages were also significantly higher (9.4, n=10, range 3–18) (Table 3).

Permit Hunts. Registration permits have been required for Unit 1 brown bear hunters since fall 1989. During the 2000 and 2001 seasons, 344 and 339 registration permits were issued, respectively. Consistent with the long-term average, about 50% of those permittees who registered actually hunted, and 19% of those hunting were successful. Fewer hunters were successful during this report period compared to the 10-year average (10.2 %) (Table 4). Compliance with permit conditions has been fair during recent seasons, although it has required post-season effort reminding delinquent hunters to submit required hunt reports.

Hunter Success and Residency. Of the 176 hunters afield in 2000, 22% were successful, and during 2001 a total of 170 hunters went afield with 17% success. This success rate was similar to the 10-year average (20%, range 15–41%). During spring 2001 more hunters registered than ever before (186). Registration permits issued for spring 2002 were the third highest since 1989. However, even though there were more hunters who actually went afield during spring 2001 and 2002, they were less successful than past spring seasons (Table 4).

During both 2000 and 2001, nonresidents harvested 19 bears from Unit 1. The 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 residents' success. 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. Local residents on average harvest 12 (range 2–17) bears per year. However, during the 2001 season locals only took 2 bears (Table 6).

Successful hunters spent 4.9 and 3.8 days to harvest a bear during 2000 and 2001, respectively, compared to the 10-year average of 4.3 days (range 2.9–6.6 days).

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 near saltwater where bears concentrate. This makes the majority of the bear population available during a short period for 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. The 2001 season was an exception with only 39% of the harvest occurring during spring (Table 7).

The majority of brown bears harvested from the unit have historically been taken during May ($\bar{x}$ = 13, range 8–22. September was the second highest annual harvest period ($\bar{x}$ = 8, range 2–17), accounting for the majority of fall bears (Table 8).

Transport Methods. Most Unit 1 brown bear hunters continue to use boats to access remote, mostly roadless hunting areas. During the past 10 years, boat use has accounted for an average of 70% of the reported transport methods. Highway vehicles (16%), aircraft (7%), and ORVs (5%), are used much less frequently (Table 9). The only Unit 1 area with highway access is near Haines in Unit 1D.

Other Mortality

To estimate the total human-caused mortality we added the reported harvest, DLP kills, known and estimated unreported/illegal/accidental kills, and research related kills (Table 2). 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 2000, 4 bears were reported as non-hunter kills, including 3 males and one female. One male was killed illegally near Haines, ADF&G staff killed a male near Haines, and the third male was killed near Hyder after fatally mauling a Hyder resident. During 2001, one female cub was killed by a vehicle near Haines. When these other sources of dead bears are added to the legal Unit 1 harvest the total human-caused mortality was 37 bears in 2000 and 29 bears in 2001. An open landfill was recently closed near Haines while other communities such as Hyder still have open pits allowing bears access to garbage. Until the issue of landfills is addressed, garbage will continue to be a problem and bring bears in direct conflict with humans.

Not all bears killed are reported or sealed, and some DLP mortalities occur during the hunting season and are tagged and sealed as hunter-killed bears. This can provide an artificially low estimate of the number of bears killed under DLP provisions. We are increasing education for higher public awareness to reduce non-hunting mortality.

HABITAT

Assessment

As noted above, most of Unit 1 has healthy brown bear habitats, primarily under USFS jurisdiction. Within Unit 1A 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. 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. 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 USFS Special Use Permit system and a nonresident drawing hunt in Unit 1D will provide a degree of control over the growing brown bear harvest.

The recent trend in DLP bear mortality shows a reduction from previous years and met our objective of reducing the number of bears killed because of human food conditioning. 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.

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. Other than the 2002 regulatory changes in Unit 1D, we see no reason to modify the season or bag limit at this time.

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Table 1 Unit 1 brown bear harvests, by subunit, 1985–2001[a]

Regulatory	Unit 1A		Unit 1B		Unit 1C		Unit 1D		Total
year	Harvest	% of total	Harvest	% of total	Harvest	% of total	Harvest	% of total	harvest
1985	1	(4)	7	(30)	6	(26)	9	(39)	23
1986	2	(13)	2	(13)	5	(33)	6	(40)	15
1987	8	(24)	4	(12)	3	(9)	18	(55)	33
1988	4	(25)	2	(12)	3	(19)	7	(44)	16
1989	4	(20)	4	(20)	1	(5)	11	(55)	20
1990	5	(19)	5	(18)	4	(15)	13	(48)	27
1991	4	(15)	6	(24)	4	(15)	12	(46)	26
1992	7	(19)	8	(21)	4	(11)	18	(49)	37
1993	4	(17)	3	(12)	6	(25)	11	(46)	24
1994	8	(28)	5	(17)	3	(10)	13	(45)	29
1995	3	(15)	8	(40)	1	(5)	8	(40)	20
1996	4	(13)	4	(13)	7	(22)	16	(52)	31
1997	5	(14)	4	(12)	5	(14)	21	(60)	35
1998	6	(17)	7	(20)	4	(11)	18	(52)	35
1999	13	(33)	6	(15)	6	(15)	15	(37)	40
2000	4	(12)	9	(27)	5	(15)	16	(47)	34
2001	5	(18)	9	(32)	2	(7)	12	(43)	28
$\bar{x}$	5	(18)	5	(20)	4	(15)	13	(47)	28

[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, by season, 1985–2001

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

Table 2 Contd.

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 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
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	2	1	0	0	(58)	(42)	0	46
Fall 2000	(42)	(58)	0	19	3[k]	1[l]	0	0	(45)	(55)	0	23
Spring 2001	(71)	(29)	0	17	0	1[m]	0	0	(71)	(29)	0	17
Total	(57)	(43)	0	36	1	1	0	0	(58)	(42)	0	37
Fall 2001	(41)	(59)	0	17	0	1	0	0	(39)	(61)	0	18
Spring 2002	(82)	(18)	0	11	0	0	0	0	(82)	(18)	0	11
Total	(61)	(39)	0	28	0	1	0	0	(60)	(40)	0	29
$\bar{x}$	(65)	(35)	0	19	1	1	0	0	(65)	(35)	0	23

[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.

[d] One female was illegally killed and left along Fish Creek in Hyder.
[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.
[K.] One male killed illegally, and 2 males DLP.
[l.] One female killed by vehicle.
[m.] One 2-year old male involved in fatal mauling near Hyder, killed DLP.

Table 3 Unit 1 age and skull size of harvested brown bears, 1985–2001

Regulatory year	Mean skull size[a]				Mean age[b]			
	Male	Nr.	Female	Nr.	Male	Nr.	Female	Nr.
1985	22.3	12	20.5	8	9.1	11	6.5	8
1986	23.2	7	20.7	7	9.4	7	10.2	7
1987	21.4	18	20.6	11	5.5	17	7.7	7
1988	22.7	12	19.4	4	8.4	11	5.2	3
1989	21.2	14	20.6	5	6.7	13	7.4	5
1990	21.5	22	18.7	5	7.9	20	5.2	5
1991	21.6	13	20.4	8	7.4	14	7.9	6
1992	21.9	24	20.0	13	7.4	24	7.4	14[c]
1993	21.9	16	20.3	6	6.4	16	3.4	5
1994	22.9	18	20.5	11[c]	7.9	13	7.3	12[c]
1995	21.7	18[d]	21.4	4	6.6	12	16.0	3
1996	22.7	22	19.9	10	8.5	22	6.6	10
1997	22.8	27	20.8	10	7.3	24	7.8	14
1998	22.8	24	19.7	13	7.9	24	5.4	10[e]
1999	21.7	26	19.4	16	8.2	17	6.4	14
2000	21.7	21	20.8	16	6.1	20[f]	6.2	9
2001	22.6	15	20.1	13	9.8	10	9.4	10
$\bar{x}$	22.2	18	20.2	9	7.6	16	7.5	8.0

[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.
[f.] Includes one male DLP.

Table 4 Unit 1 brown bear registration permit hunt data, 1989–2001

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)	(88)	(13)	(50)	(50)	0	12
272F	1992	149	(46)	(69)	(31)	(56)	(44)	0	25
272F	1993	146	(53)	(83)	(17)	(75)	(25)	0	12
272F	1994	135	(58)	(79)	(21)	(42)	(58)	0	12
272F	1995[b]	164	(55)	(88)	(12)	(67)	(33)	0	9
272F	1996[b]	147	(54)	(81)	(19)	(54)	(46)	0	13
272F	1997	175	(52)	(81)	(19)	(63)	(37)	0	16
272F	1998[d]	148	(53)	(81)	(19)	(23)	(77)	0	13
272F	1999	176	(56)	(74)	(26)	(35)	(65)	0	20
272F	2000	158	(56)	(68)	(32)	(50)	(50)	0	22
272F	2001	159	(54)	(75)	(25)	(47)	(53)	0	18
(Spring)									
278S	1990	60	(0)	(88)	(12)	(71)	(29)	0	7
278S	1991	59	(0)	(85)	(15)	(100)	(0)	0	9
272S	1992	142	(49)	(81)	(19)	(79)	(21)	0	14
272S	1993	131	(43)	(85)	(15)	(91)	(9)	0	11
272S	1994	133	(50)	(82)	(18)	(75)	(25)	0	12
272S	1995[c]	156	(43)	(81)	(19)	(76)	(24)	0	17
272S	1996	139	(44)	(85)	(15)	(83)	(17)	0	12
272S	1997	144	(40)	(79)	(21)	(78)	(22)	0	18
272S	1998	152	(46)	(77)	(23)	(84)	(16)	0	19
272S	1999	155	(50)	(71)	(29)	(86)	(14)	0	22
272S	2000[d]	167	(44)	(79)	(21)	(80)	(20)	0	20
272S	2001	186	(43)	(84)	(16)	(67)	(33)	0	17
272S	2002	180	(46)	(89)	(11)	(82)	(18)	0	11

Table 5 Unit 1 fall and spring registration permit hunts combined, by regulatory year (1989–2001)

Spring/fall	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bear harvest			
						Males (%)	Females (%)	Unknown	Total
	1989	104	(0)	(91)	(9)	(67)	(33)	0	9
	1990	126	(0)	(79)	(21)	(81)	(19)	0	27
	1991	324	(48)	(84)	(16)	(65)	(35)	0	26
	1992	280	(44)	(71)	(29)	(64)	(36)	0	36
	1993	279	(51)	(83)	(17)	(75)	(25)	0	24
	1994	291	(49)	(80)	(20)	(62)	(38)	0	29
	1995	303	(50)	(87)	(13)	(80)	(20)	0	20
	1996	291	(47)	(78)	(22)	(68)	(32)	0	31
	1997	327	(49)	(78)	(22)	(74)	(26)	0	35
	1998	303	(51)	(78)	(22)	(63)	(37)	0	35
	1999	343	(50)	(77)	(23)	(58)	(42)	0	40
	2000	344	(49)	(80)	(20)	(59)	(42)	0	34
	2001	339	(48)	(83)	(17)	(61)	(39)	0	28
	$\bar{x}$	281	(41)	(80)	(20)	(68)	(33)	0	29

[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 6 Unit 1 successful brown bear hunters, by residency, 1985–2001[a]

Regulatory year	Local resident[b] (%)	Nonlocal resident (%)	Nonresident (%)	Unknown	Total successful hunters
1985	(61)	(26)	(13)	0	23
1986	(60)	(27)	(13)	0	15
1987	(58)	(27)	(12)	3	33
1988	(56)	(19)	(25)	0	16
1989[c]	(45)	(25)	(30)	0	20
1990	(63)	(7)	(26)	1	27
1991	(65)	(4)	(23)	2	26
1992	(47)	(8)	(45)	1	37
1993	(54)	(21)	(25)	0	24
1994	(38)	(21)	(41)	0	29
1995	(30)	(15)	(55)	0	20
1996	(29)	(16)	(55)	0	31
1997	(26)	(23)	(31)	0	35
1998	(37)	(23)	(40)	0	35
1999	(25)	(12)	(63)	0	40
2000	(34)	(9)	(57)	0	34
2001	(7)	(4)	(69)	6	28
$\bar{x}$	(43)	(16)	(37)	0	28

[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 7 Unit 1 brown bear harvest, by season, 1985–2001[a]

Regulatory year	Fall		Spring	
	Harvest	Percent of total	Harvest	Percent of total
1985	12	(52)	11	(48)
1986	5	(33)	10	(67)
1987	16	(48)	17	(52)
1988	11	(69)	5	(31)
1989	10	(50)	10	(50)
1990	18	(67)	9	(33)
1991	12	(46)	14	(54)
1992	25	(68)	12	(32)
1993	12	(50)	12	(50)
1994	12	(41)	17	(59)
1995	8	(40)	12	(60)
1996	13	(42)	18	(58)
1997	16	(46)	19	(54)
1998	13	(37)	22	(63)
1999	20	(50)	20	(50)
2000	19	(56)	17	(50)
2001	17	(61)	11	(39)
$\bar{x}$	14	(50)	14	(50)

[a] Does not include illegal kills.

Table 8 Unit 1 brown bear harvest, by month, 1985–2001[a]

Regulatory year	Harvest periods							
	September	October	November	March	April	May	June	Total
1985	6	4	1	0	0	12	0	23
1986	6	2	2	0	1	4	0	15
1987	9	4	4	0	0	15	1	33
1988	2	2	1	0	0	10	1	16
1989	2	7	1	0	0	10	0	20
1990	9	8	1	0	1	8	0	27
1991	8	2	2	1	0	13	0	26
1992	14	10	1	0	3	9	0	37
1993	6	5	1	0	1	11	0	24
1994	8	3	1	0	1	16	0	29
1995	3	4	1	0	0	12	0	20
1996	10	3	0	0	3	15	0	31
1997	7	9	0	0	1	18	0	35
1998	7	6	0	0	0	22	0	35
1999	15	5	0	0	0	20	0	40
2000	17	3	0	0	2	13	0	35
2001	7	9	1	0	1	10	0	28
$\bar{x}$	8	5	1	0	1	13	0	28

[a] Does not include illegal kills.

Table 9 Unit 1 successful brown bear hunter transport methods, 1985–2001[a]

Regulatory year	Percent of harvest						Nr.
	Airplane	Boat	Walk	ORV	Highway vehicle	Other/ unknown	
1985	(4)	(61)	(4)	(9)	(13)	(9)	23
1986	(7)	(53)	(0)	(13)	(27)	(0)	15
1987	(12)	(52)	(9)	(12)	(6)	(9)	33
1988	(6)	(63)	(6)	(6)	(13)	(6)	16
1989	(10)	(70)	(5)	(5)	(5)	(5)	20
1990	(15)	(52)	(7)	(15)	(4)	(7)	27
1991	(8)	(62)	(0)	(8)	(3)	(19)	26
1992	(17)	(50)	(0)	(3)	(30)	(0)	37
1993	(0)	(71)	(4)	(0)	(25)	(0)	24
1994	(3)	(76)	(7)	(0)	(14)	(0)	29
1995	(0)	(70)	(5)	(0)	(25)	(0)	20
1996	(3)	(71)	(3)	(3)	(20)	(0)	31
1997	(3)	(66)	(0)	(0)	(31)	(0)	35
1998	(0)	(83)	(3)	(0)	(14)	(0)	35
1999	(8)	(72)	(0)	(0)	(20)	(0)	40
2000	(3)	(77)	(0)	(0)	(17)	(0)	35
2001	(15)	(68)	(0)	(3)	(11)	(3)	28
$\bar{x}$	(7)	(66)	(4)	(5)	(16)	(3)	28

[a] Does not include illegal or DLP kills.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

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

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

BACKGROUND

Brown bears inhabit all 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 for both complete elimination of and for more reasonable conservation of brown bears. Market hunting for hides and calls for the elimination of bears were gradually overcome by support for greater protection for the valuable bear resource (ADFG 1998), and ADF&G 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 US Forest Service (USFS). 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 impact brown bear density and distribution.

Unit 4 includes the most important brown bear hunting area in Southeast Alaska. Unit 4 has an estimated 70% of Southeast's brown bears (Miller 1993*a*) and has produced 67% of the region's 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 on non-federal land.

Increasing numbers of brown bear guides and hunters, as well as increased tourism in Unit 4 during recent years, has led to user conflicts. In July 1998, the Alaska Department of Fish and Game (ADFG) 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 (Board) in January 1999 with 15 members nominated by organizations representing consumptive and nonconsumptive user groups. The Team's purpose was to review issues of bear management and any human activities in Unit 4 that affect brown bears. The Team agreed to several elements of a comprehensive management strategy, and a report was published (ADFG 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.

During 2000–2002, 66 brown bears were captured and outfitted with radio transmitters to enable a capture-mark-resight (CMR) population estimate on Northeast Chichagof Island. The survey was completed in July 2002.

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.
- Minimize 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 rest 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

Registration permits for Unit 4 brown bear hunting were issued to the public at ADFG offices. Successful bear hunters were required to present skulls and hides to a representative of the Division of Wildlife Conservation (DWC) or the 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 (if any), and primary transportation. A commercial laboratory determined ages through cementum annuli analyses in premolars. All permittees were required to submit a report 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 up to 2 reminder letters, the second by certified mail, to improve reporting compliance. FWP cited permittees who failed to report.

Project personnel attempted to reduce DLP incidents through education and cooperation with community authorities and other agencies.

In an effort to update current population estimates, a total of 66 (Appendix A) bears were captured through helicopter darting or foot-snaring techniques and outfitted with telemetry devices. These bears were considered the marked sample in a capture-mark-resight (CMR) population estimation effort completed in July 2002.

Personnel from DWC and USFS 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.

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 some areas of the unit continue to warrant close scrutiny. Expansion of logging roads, 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). Although data analysis is preliminary, it appears that the bear population on northeast Chichagof Island has increased significantly between 1991 and 2002. Current estimates, based on the recently-completed CMR effort, place the estimated bear density at 1.7 bears/mi^2.

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 and are also used as a baseline for estimating bear densities in other parts of the region. 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. These numbers will be re-calculated in the future using updated information gathered in July 2002 from Northeast Chichagof Island. 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

Population composition data are limited on the Unit 4-wide brown bear population. The number of bears captured during ADFG 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 2000–01 harvest by hunters was 76% males (*n* = 119) and 24% females (*n* = 38). The 2001–02 harvest was 82% males (*n* = 107) and 18% females (*n* = 24). 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) (Rod Flynn and LaVern Beier *pers. comm*.).

MORTALITY

Harvest

Season and Bag Limit	Resident and Nonresident Hunters
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 2002 meetings, members of the Board reiterated their endorsement of the findings of the Unit 4 Brown Bear Management Team, supporting the USFS in their attempts to decrease hunter crowding issues and limit the number of guides (thus, nonresident harvest) in Unit 4. Additionally, a small area at Medvejie Salmon Hatchery near Sitka was closed to the taking of brown bears.

Hunter Harvest.

Regulatory Year 2000–01: Hunters took 49 brown bears in fall 2000 and harvested 108 in spring 2001. The total for the year was 157 bears. An additional 9 bears are known to have died, bringing the year's total to 166 bears.

Regulatory Year 2001–02: Hunters took 40 bears in fall 2001 and 91 in spring 2002. Hunting accounted for 131 bears and 12 other bears were reported killed in other situations; the combined mortality for the year was 143 bears. Data concerning brown bear harvests for the past 5 years are presented in Tables 1 and 2.

Long-term trends in skull measurements and mean ages of harvested bears closely match those found in the long-term 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. All Unit 4 permit hunts are administered under a single registration permit. Hunting pressure in each area is determined from the permit hunt reports at the end of the season. Table 4 summarizes the data for each area with distinct season dates.

Local residents of Unit 4 take a small percentage of the total annual harvest (Table 3), although that proportion appears to be increasing. Most bears were taken by nonresidents or Alaska hunters from outside Southeast. In 2000–01 nonlocal Alaska hunters and nonresidents harvested 87% of the bears. In 2001–02 nonresidents and nonlocal Alaskans took 83% of the bears.

Spring and fall hunting effort is presented in Table 4. In fall 2000, 94 Alaska residents hunted a total of 359 days, while 52 nonresidents spent 334 days afield. In fall 2001, 89 residents hunted 418 days and 31 nonresidents hunted 172 days. Spring seasons produced a larger harvest (Table 1) and have the greater hunting pressure (Table 4). In spring 2001, 135 residents hunted 537 days and 118 nonresidents hunted 681 days. In spring 2002, 165 residents hunted 658 days and 109 nonresidents hunted 804 days. Fall seasons produced 1 bear for every 14.4 hunt days, and spring seasons produced 1 bear for every 13.4 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 the streams makes it increasingly difficult to locate bears late in the fall season. The fall harvest is characteristically composed of a high percentage of female bears (Table 1).

The percentage of male bears killed during spring is higher than in the fall, but the actual number of females killed in spring vs. fall is frequently greater (Table 1). The greatest numbers 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 springs exhibiting late "green-up," bears concentrate and feed on grass/sedge flats near salt water. Harvests in such years are higher than in warmer springs that provide bears with more dispersed feeding opportunities.

Transport Methods. Unit 4 bear hunters used boats as the most common form of transportation (Table 6). In 2000–01, 87% of successful hunters used boats. In 2001–02, successful hunters used boats 94% of the time. Aircraft are the second most important means of hunter transport but were used by only 8% and 5% of successful hunters in the 2000–01 and 2001–02 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 been previously habituated to humans.

In 2000–01, 9 nonhunting mortalities were reported (Table 1); 12 occurred in 2001–02. Generally, increasing bear densities lead to more bears in and around human population centers, and increases in bears taken under DLP provisions often result.

Bear Viewing. Public interest in viewing bears has steadily increased at the Stan Price State Wildlife Sanctuary. During summer 2000, 1400 visitor-days were recorded at Pack Creek. In summer 2001, 1366 people visited the sanctuary; in 2002 the number of visitors was 1215. Many tour operators now take visitors to other Unit 4 locales, but quantifying this use has been impossible.

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 3:0.96 in 2000/01 and 3:0.67 in 2001/02, surpassing the management objective of 3:2.

The objective of reducing DLP mortality is difficult to measure. DWC continued to work with USFS and the Alaska Department of Environmental Conservation to address landfill problems in logging camps and communities that contribute to such losses.

For harvest purposes, Admiralty Island, Baranof/Kruzof Islands, Northeast Chichagof, 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 the areas. Hunting pressure on brown bears requires the use of

all available population information for management decisions. None of these subpopulations are currently experiencing excessive human-induced mortality; mortality levels (Table 2) are below the conservative guideline of 4% of the population. Additionally, updated population density figures indicate a significantly higher bear population than previously estimated, so future harvest data will appear to indicate that a smaller percentage of the population is being harvested. Attempts to "micro-manage" Unit 4 bears by 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 to manage on a finer scale.

Expansion of 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 in Unit 4 areas, thus bear habitat here is the least secure in the unit. Continued research on the island's bear population is necessary to provide managers with population information.

The combined annual mortality from harvest and DLP kills in the unit is close to the biological guideline of 4% of the estimated population (Table 2). Increases in harvest may make it necessary to recommend regulatory changes to dampen the trend of increasing bear kills. Because of the USFS moratorium on licensing additional guides, harvests by nonresidents are expected to stabilize.

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.

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Table 1 Unit 4 brown bear harvest, regulatory years 1997–2001

	Hunter kill					Nonhunting kill[a]				
Regulatory year	M	F	(%F)	Unk	Total	M	F	Unk	Total	Total Reported
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	2	7	45
Spring 99	74	16	(18)	0	90	2	0	0	2	92
Total	91	37	(29)	0	128	5	2	2	9	137
1999										
Fall 99	27	21	(44)	0	48	3	2	0	5	53
Spring 00	99	19	(16)	0	118	2	0	0	2	120
Total	126	40	(24)	0	166	5	2	0	7	173
2000										
Fall 00	31	18	(37)	0	49	3	2	2	7	56
Spring 01	88	20	(19)	0	108	1	1	0	2	110
Total	119	38	(24)	0	157	4	3	2	9	166
2001										
Fall 01	32	8	(20)	0	40	4	3	0	7	47
Spring 02	75	16	(18)	0	91	5	0	0	5	96
Total	107	24	(18)	0	131	9	3	0	12	143

[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 Unit 4 brown bear hunting pressure[a] and mortality[b] by major geographic areas, regulatory years 1997–2001

Hunt area	Regulatory year	Nr hunters	M	(%)[c]	F	(%)[c]	Unknown	(%)[d]	Total harvest	Percent estimated population[e]
Northeast Chichagof Island										
	1997	18	7		0		0		7	2.0
	1998	27	5		3		0		8	2.3
	1999	29	9		2		0		11	3.1
	2000	28	8		2		0		10	2.8
	2001	36	4		3		0		7	2.0
Remainder of Chichagof Island										
	1997	86	37		7		0		44	3.7
	1998	99	33		6		0		39	3.3
	1999	113	42		10		0		52	4.3
	2000	118	30		15		0		45	3.8
	2001	139	34		11		0		45	3.8
Baranof and Kruzof islands										
	1997	85	18	(67)	9	(33)	0		27	2.6
	1998	101	18	(51)	17	(49)	0		35	3.5
	1999	116	31	(67)	15	(33)	0		46	4.4
	2000	97	30	(88)	4	(12)	0		34	3.3
	2001	91	25	(89)	3	(11)	0		28	2.7
Baranof and Chichagof islands[f]										
	1997	12								
	1998	0								
	1999	2								
	2000	2								
	2001	2								

Table 2 Unit 4 brown bear hunting pressure[a] and mortality[b] by major geographic areas, regulatory years 1997–2001

Hunt area	Regulatory year	Nr hunters	M	(%)[c]	F	(%)[c]	Unknown	(%)[d]	Total harvest	Percent estimated population[e]
Admiralty Island										
	1997	147	45	(80)	11	(20)	0		56	3.6
	1998	138	35	(76)	11	(24)	0		46	2.9
	1999	152	44	(77)	13	(23)	0		57	3.7
	2000	162	51	(75)	17	(25)	0		68	4.4
	2001	153	44	(86)	7	(14)	0		51	3.3
Unit 4 Totals										
	1997	348	107	(80)	27	(20)	0		134	3.2
	1998	365	91	(71)	37	(29)	0		128	3.1
	1999	412	126	(76)	40	(24)	0		166	4.0
	2000	407	119	(76)	38	(24)	0		157	3.8
	2001	420	107	(82)	24	(18)	0		131	3.2

[a] Registration permit data.
[b] Bear sealing data.
[c] Percentage based on known sex bears.
[d] Percentage based on total bears.
[e] Estimated populations: Chichagof and adjacent islands, 1550; Baranof and adjacent 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, regulatory years 1997–2001

Regulatory year	Local resident[a]	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
1997	13	(10)	30	(22)	91	(68)	134
1998	10	(8)	19	(15)	99	(77)	128
1999	16	(10)	33	(20)	117	(70)	166
2000	21	(13)	25	(16)	111	(71)	157
2001	22	(17)	24	(18)	85	(65)	131

[a] Resident of Unit 4.

Table 4 Unit 4 hunting effort by island, by residency, regulatory years 1995–2001

Island	Season	Nr resident hunters	Nr nonresident hunters	Total hunters	Days hunted by residents	Days hunted by nonresidents	Nr days hunted	Nr bears killed	Effort (Days per bear)
Admiralty									
	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	60	50	110	250	289	539	45	12
	Fall 2000	38	20	58	164	110	274	16	17
	Spring 2001	53	51	104	228	274	502	52	10
	Fall 2001	31	12	43	166	83	249	12	21
	Spring 2002	64	46	110	223	301	524	39	13
Baranof									
	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	36	25	61	92	154	246	24	10
	Fall 2000	28	15	43	64	84	148	12	12
	Spring 2001	29	25	54	108	115	223	22	10
	Fall 2001	29	7	36	90	26	116	10	12
	Spring 2002	36	19	55	135	154	289	18	16
Chichagof									
	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	226	237	463	49	9
Fall 2000	27	17	44	124	140	264	21	13
Spring 2001	52	42	94	199	292	491	34	14
Fall 2001	29	12	41	162	63	225	18	13
Spring 2002	62	44	106	282	349	631	34	19
Admiralty, Baranof, and Chichagof islands, unspecified								
Spring 2002	1	0	1	8	0	8		
Baranof & Chichagof								
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		
Fall 2000	1	0	1	7	0	7		
Spring 2001	1	0	1	2	0	2		
Fall 2001	0	0	0	0	0	0		
Spring 2002	2	0	2	10	0	10		
Unit 4 Totals								
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	159	113	272	570	680	1250	118	11
Fall 2000	94	52	146	359	334	693	49	14
Spring 2001	135	118	253	537	681	1218	108	11
Fall 2001	89	31	120	418	172	590	40	15
Spring 2002	165	109	273	658	804	1444	91	16

Table 5 Unit 4 brown bear harvest chronology, regulatory years 1997–2001[a]

	Fall harvest periods										
Regulatory year	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
1997	13	5	4	0	1	2	1	0	0	0	0
1998	16	11	8	3	0	0	0	0	0	0	0
1999	16	19	10	1	1	0	1	0	0	0	0
2000	22	18	5	0	2	1	0	0	1	0	0
2001	10	18	7	2	0	0	2	1	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
1997	0	1	9	45	43	10	134
1998	0	0	4	21	51	14	128
1999	0	0	8	45	53	12	166
2000	0	0	2	37	55	14	157
2001	0	1	6	17	48	19	131

[a] Includes all hunts.

Table 6 Unit 4 brown bear harvest by transport method, 1997/98-2001/02[a]

Regulatory year	Airplane	Boat	Walked	Off-road vehicle	Highway vehicle	Unknown
1997	13	118	1	0	2	0
1998	8	117	2	0	0	1
1999	6	153	3	3	1	0
2000	12	136	2	0	7	0
2001	6	123	0	0	2	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 2000
To: 30 June 2002

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 Pacific Ocean's 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, 1,000 sport-killed bears have been sealed from Unit 5 (835 from 5A and 165 from 5B). Sixty-six percent of these bears were males, and 65% of the 1000 bears were taken by nonresident hunters. An additional 68 bears have been killed in situations other than legal hunts during the same time period. This mortality resulted from vehicle collisions, the dispatching of nuisance animals, defense of life and property situations, and bears found dead from unknown causes. Under federal subsistence regulations, bears do not have to be sealed if they are not removed from Unit 5.

A 1988 Superior Court decision that deregulated the big game guide industry resulted in an increase in big game guiding activity in Southeast Alaska. From 1980 through 1988, there was an average of 22 guided nonresident brown bear hunters per year in Unit 5. 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 (ADFG) and Division of Fish and Wildlife Protection staff gathered data about harvested bears during sealing. 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 hunting 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 annual harvest has ranged from 27 to 38 bears. Although the average male age and skull size decreased slightly during the years of higher harvest, age and skull size of harvested bears have returned to or now exceed 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 ADFG proposal to require all Unit 5 brown bear hunters to acquire a registration permit prior to hunting. This regulation allows biologists to collect information on brown bear hunting effort from all hunters.

Hunter Harvest. Unit 5 brown bear harvests have stabilized after decreasing from all-time highs in the early 1990s. Bear harvests from 1961 until the early 1990s had constantly increased. 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 about 33 bears, with a mean annual harvest during the current report period of 32 bears. The mean male age increased between the 1970s (5.8 years) and the 1980s (7.0 years), but dropped to a mean of 6.3 years for 1990 through 1999.

During 2000, 25 males and 8 females were reported taken (Table 1). Males composed 76% of the harvest, which is the second highest percentage since 1991, and substantially higher than the mean of 71% in the 1989–1999 harvests. Average male skull size of 23.9 inches was the largest over the past 11 years, and substantially higher than the previous 10-year average of 22.9 inches. The average male age (6.7 years) was slightly higher than the previous 10-year mean of 6.3 years.

In 2001, Unit 5 hunters killed 18 male and 12 female brown bears (Table 1). Males composed only 60% of the harvest, substantially lower than the previous 10-year mean of 71%, but equal to our management objective. Mean male skull size was 22.5 inches, almost 1.5 inches lower than the previous year, but only slightly lower than the previous 10-year mean of 22.9 inches.

Hunter Residency and Success. From 1991 through 1999 nonresidents accounted for an average of 78% of the Unit 5 brown bear harvest (Table 3). The percentage increased slightly during the first year of this report period to 82%, then declined to 58% in 2001. This was the lowest percent harvest by nonresidents in the past 10 years, with only 39% of non-resident hunters being successful. Local resident hunters accounted for 26% of the harvest, which is more than double the next highest percent harvest by local residents since 1989. Part of this take is reflected by the harvest of 2 bears under federal regulations.

Harvest Chronology. From 1989–99 the average proportion of brown bears taken in the spring was 45% with a range of 31 to 60% (Table 2). In 2000 and 2001, this value decreased with 39% and 42% of the bears being killed in the spring, respectively.

Transport Methods. Transportation types used in successful 2000 brown bear hunts included boats (55%), ORV's (21%,) aircraft (15%), and highway vehicles (9%). In 2001, boats were used by 45% of successful brown bear hunters, while the use of aircraft increased to 39%, ORV's declined to 10%, and highway vehicles accounted for 6%. The use of aircraft as bear hunters' transportation mode is likely overreported because of hunter's confusion when completing hunting permits. Many hunters fly into camps via small aircraft then use ATV's or boats while hunting, yet record aircraft as their transportation while hunting. This confusion in recording transportation has been confirmed with guided hunters where we know the hunting methods that were employed.

Other Mortality

This category refers to bears killed in defense of life or property, illegal kills, road kills, and nuisance bears. The Yakutat landfill has been the main area of concern for these types of mortalities for decades. The landfill attracts dozens of brown bears during the course of a year, and some of these are eventually killed. In 2000 only one bear was killed in a non-hunting situation. This bear was killed along the Situk River after it threatened a fisherman. Although this incident occurred away from the landfill, anecdotal evidence suggests this bear was a frequent visitor to the area (Bob Johnson pers com). In 2001, 2 adult male bears died in non-hunting situations. One was found dead from gunshot wounds, and ADFG personnel dispatched another due to public safety concerns.

Douglas Area ADFG staff continue to work with the community of Yakutat 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. Fish waste is no longer being deposited at the landfill, and garbage is being burned immediately after dumping, thereby eliminating many foraging opportunities for bears. We have begun working with the US Forest Service (USFS) to distribute educational materials to Yakutat fish camp permit holders to reduce the illegal killing of bears. Our goal is

to minimize bear attractants at fish camps, thereby easing the concern of fish camp operators and prevent the unnecessary death of bears.

HABITAT

Assessment and Enhancement

We did not conduct any habitat assessment studies or enhancement projects during this report period. The USFS is presently revising the Situk River Management Plan, which may affect brown bear hunting and commercial tourism on the river.

CONCLUSIONS AND RECOMMENDATIONS

Unit 5 male brown bear age objectives for skull size were met in both years of this report period. We also met the age objective for male bears. Bears were harvested in a male-to-female ratio of 3:1 in 2000 and 3:2 in 2001, meeting or exceeding our management objective. We will continue to analyze the age and skull sizes of harvested bears and closely monitor the harvest of breeding-age female bears. Action taken by the Board in fall 2000 implementing a registration permit will allow us to assess hunter effort and success. After a few more years, this data should provide us with valuable harvest-per-unit-effort data.

Many 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.

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Table 1 Unit 5 brown bear harvest, age, skull sizes, and effort, RY 1989 through 2001

Regulatory year	Harvest				Mean age			Mean skull size		Avg days/kill	
	M	F	Unk	Total	M	F	Total	M.....	F	M	F
1989	18	10	1	29	6.6	4.0	5.7	22.8	20.0	3.6	3.6
1990	25	8	2	35	7.9	4.3	6.9	23.2	20.3	5.0	4.0
1991	33	8	0	41	5.3	4.9	5.3	22.4	20.3	5.4	4.3
1992	28	12	0	40	5.0	5.6	5.2	22.2	20.3	4.3	3.8
1993	19	11	0	30	6.7	6.7	6.7	21.3	21.2	3.2	5.6
1994	22	6	0	28	5.5	4.2	5.2	23.0	20.6	4.6	5.7
1995	24	7	0	31	6.7	8.4	7.1	23.5	22.5	4.2	4.0
1996	23	14	1	38	5.4	3.8	4.8	23.1	20.8	4.7	5.6
1997	18	9	0	27	6.1	7.0	6.4	23.4	20.6	4.3	4.3
1998	28	7	0	35	6.2	3.4	5.6	23.5	21.6	4.4	3.0
1999	23	8	0	31	8.4	7.0	8.1	23.5	20.9	5.3	4.4
2000	25	8	0	33	6.9	6.3	6.8	23.9	20.5	4.6	6.1
2001	18	12	1	31	6.5	6.0	6.3	22.5	19.9	3.5	3.3
Means											
2000–01	21.5	9.5	0	31.0	6.7	6.2	6.6	23.2....	20.2	4.1	4.7
1989–99	23.7	9.1	0.4	33.2	6.3	5.4	6.1	22.9	20.8	4.5	4.4

Table 2 Unit 5 brown bear harvest chronology, RY 1989 through 2001

Regulatory Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1989	0	0	10	3	1	0	0	0	0	5	10	0	29
1990	0	0	15	2	1	0	0	0	0	3	14	0	35
1991	0	0	21	2	0	0	0	0	0	2	16	0	41
1992	0	0	21	5	0	0	0	0	0	3	11	0	40
1993	0	0	7	3	1	1	0	0	0	7	11	0	30
1994	0	0	9	2	0	0	1	0	0	6	10	0	28
1995	0	0	12	1	0	0	0	2	0	7	9	0	31
1996	0	0	21	6	0	0	0	0	0	4	8	0	39
1997	0	0	11	7	0	0	0	0	0	4	5	0	27
1998	0	0	10	10	1	0	0	0	0	4	10	0	35
1999	0	0	10	6	2	0	0	0	0	1	12	0	31
2000	0	0	17	3	0	0	0	0	0	3	10	0	33
2001	0	0	16	1	1	0	0	0	0	3	10	0	31

Table 3 Unit 5 successful brown bear hunter residency, RY 1991 through 2001

Regulatory year	Local resident	(%)	Nonlocal resident	(%)	Nonresident	(%)
1991						
Fall 1991	3	(7)	3	(7)	17	(41)
Spring 1992	2	(5)	0	(0)	16	(39)
Total	5	(12)	3	(7)	33	(80)
1992						
Fall 1992	2	(5)	4	(10)	20	(50)
Spring 1993	1	(3)	4	(10)	9	(23)
Total	3	(8)	8	(20)	29	(73)
1993						
Fall 1993	1	(3)	3	(1)	8	(27)
Spring 1994	0	(0)	5	(16)	13	(43)
Total	1	(3)	8	(27)	21	(70)
1994						
Fall 1994	1	(4)	1	(4)	9	(32)
Spring 1995	2	(7)	0	(0)	15	(54)
Total	3	(11)	1	(4)	24	(86)
1995						
Fall 1995	1	(3)	0	(0)	12	(39)
Spring 1996	2	(6)	3	(10)	13	(42)
Total	3	(10)	3	(10)	25	(81)
1996						
Fall 1996	1	(3)	6	(16)	19	(50)
Spring 1997	1	(3)	2	(5)	9	(24)
Total	2	(5)	8	(21)	28	(74)
1997						
Fall 1997	1	(4)	4	(15)	13	(48)
Spring 1998	0	(0)	0	(0)	9	(33)
Total	1	(4)	4	(15)	22	(81)
1998						
Fall 1998	2	(6)	5	(14)	14	(40)
Spring 1999	0	(0)	2	(6)	12	(34)
Total	2	(6)	7	(20)	26	(74)
1999						
Fall 1999	2	(6)	1	(3)	15	(49)
Spring 2000	0	(0)	1	(3)	12	(39)
Total	2	(6)	2	(6)	27	(88)
2000						
Fall 2000	3	(15)	3	(15)	14	(70)
Spring 2001	0	(0)	0	(0)	13	(100)
Total	3	(9)	3	(9)	27	(82)

Table 3 continued

Regulatory year	Local resident	(%)	Nonlocal resident	(%)	Nonresident	(%)
2001						
Fall 2001	3	(18)	5	(29)	9	(53)
Spring 2001	5	(36)	0	(0)	9	(64)
Total	8	(26)	5	(16)	18	(58)

Table 4 Unit 5 transport modes used by successful brown bear hunters, RY 1991 through 2001

Regulatory year	Plane	(%)	Boat	(%)	ORV/4 wheeler	(%)	Highway vehicle	(%)	Foot	(%)	Other	(%)
1991	22	(54)	9	(22)	4	(10)	0	(0)	2	(5)	4	(10)
1992	22	(55)	10	(25)	0	(0)	4	(10)	3	(8)	1	(3)
1993	19	(63)	7	(23)	0	(0)	0	(0)	4	(13)	0	(0)
1994	16	(57)	6	(21)	0	(0)	1	(4)	4	(14)	1	(4)
1995	23	(74)	4	(13)	0	(0)	2	(6)	1	(3)	1	(3)
1996	30	(79)	7	(18)	0	(0)	1	(3)	0	(0)	0	(0)
1997	17	(63)	7	(26)	1	(4)	2	(7)	0	(0)	0	(0)
1998	25	(72)	4	(11)	1	(3)	4	(11)	1	(3)	0	(0)
1999	11	(35)	11	(35)	6	(20)	3	(10)	0	(0)	0	(0)
2000	5	(15)	18	(55)	7	(21)	3	(9)	0	(0)	0	(0)
2001	12	(39)	14	(45)	3	(10)	2	(6)	0	(0)	0	(0)

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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. The fall hunting season on Montague was closed in 1989 and in the spring season in 1994.

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. The 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 = 22–49) 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 855 bears with a stable trend during the reporting period (Table 1). The greatest numbers were in Units 6D (≅320) and 6A (≅270), 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).

Based on spring track and den counts, Montague Island in Unit 6D had an increasing population of about 70 bears (Table 1). After hunting was closed on the island, Montague

bears have been managed under the assumption that they sensitive to overharvest because the population is small and relatively isolated from the mainland. 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 occasionally swim between Hinchinbrook and Montague Islands.

Density estimates for Unit 6 compared favorably to Miller's (1993) estimates from elsewhere in southern 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 25 May for all hunters. Bag limit was 1 bear every regulatory year in Units 6A, 6B, and 6C, and 1 bear every 4 regulatory years for Unit 6D. Bear hunting was open on Montague Island during 2001–2002 (15 October to 30 November) to residents only by registration permit with a harvest quota of 4 bears. Taking cubs (bears ≤ 2 years old) or a female accompanied by cubs was prohibited.

Board of Game Actions and Emergency Orders. The board established a registration hunt for brown bears on Montague Island. The season on Montague was closed by emergency order after 4 bears were harvested.

Hunter Harvest. Reported kill during 2000–2001 and 2001–2002 for Unit 6 was 50 and 44, respectively (Table 1). Most of the harvest occurred in Units 6A (20 and 10 bears per year), and 6D (20 and 23 bears per year). Four bears were killed on Montague Island during 2001–2002.

During 2000–2001 males were 67% of the reported kill, and in 2001–2002 males were 76%, of the reported kill (Table 2). Mean skull sizes among males were 24 and 23 inches, similar to mean skull sizes from the past 5 years. (Table 3).

Reported kill of all bears was ≤ AAH in 7 of 11 harvest areas during 2000–2001 and 8 of 11 during 2001–2002 (Table 1). Reported kill of females >2 years old was ≤ AAH in all harvest areas during both years except in the Cape Suckling–Katalla (Unit 6A) and Rude River-Ellamar (Unit 6D) areas during 2000. AAH was exceeded during the last 5 years in Unit 6A resulting from a liberalization of bear harvest in an attempt to reduce predation on moose calves.

Hunter Residency. Nonresidents harvested the majority of brown bears in Unit 6 during 2000–2001 (52%) and 2001–2002 (50%) (Table 4). In Unit 6C local residents took the highest proportion of the harvest.

Harvest Chronology. Peak brown bear harvests occurred during September and May during 2000–01 and October and May during 2001–02 (Table 5). Seasonal chronology varied by year and unit, with most bears taken in the fall in Unit 6A, and spring in Units 6B, 6C, and 6D during the reporting period

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 (Table 6).

Other Mortality

Nonhunting and estimated illegal kill totaled 10 and 9 bears in 2000–2001 and 2001–2002, 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 may increase. The Alaska Mental Health Trust harvested forest left by previous operators as buffers and wildlife habitat in eastern Unit 6A. The University of Alaska logging operation moved into the Yakataga and Duktoth River watersheds 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 stable 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 continued in areas of concern, including Montague Island and eastern Unit 6D.

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Table 1 Unit 6 brown bear estimated population, annual allowable harvest and reported harvest, RY 1997–2001

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	1997–1998	98	181	9	9	4	2
		1998–1999	97	180	9	10	4	1
		1999–2000	97	180	9	11	4	2
		2000–2001	97	180	9	12	4	3
		2001–2002	95	176	9	2	4	0
	Cape Suckling-Katalla	1997–1998	72	99	5	5	2	1
		1998–1999	75	104	5	16	2	2
		1999–2000	69	96	5	10	2	3
		2000–2001	66	91	5	8	2	5
		2001–2001	66	91	5	8	2	2
	Kayak Island	1997–1998	78	7	0	1	0	0
		1998–1999	78	7	0	0	0	0
		1999–2000	78	7	0	0	0	0
		2000–2001	78	7	0	0	0	0
		2001–2002	78	7	0	0	0	0
6A Total		1997–1998	87	287	14	15	6	3
		1998–1999	88	290	15	26	6	3
		1999–2000	85	282	14	21	6	5
		2000–2001	84	278	14	20	6	8
		2001–2002	83	274	14	10	5	2

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		1997–1998	129	139	7	6	3	0
		1998–1999	134	144	7	12	3	0
		1999–2000	129	139	7	3	3	1
		2000–2001	134	144	7	6	3	1
		2001–2002	129	139	7	8	3	3
6C		1997–1998	108	120	6	7	2	1
		1998–1999	108	120	6	4	2	1
		1999–2000	108	120	6	6	2	1
		2000–2001	108	120	6	4	2	0
		2001–2002	112	125	6	3	3	0
6D	Rude River	1997–1998	84	105	5	16	2	3
	Ellamar	1998–1999	82	103	5	6	2	1
		1999–2000	84	105	5	12	2	2
		2000–2001	84	105	5	9	2	3
		2001–2002	84	105	5	11	2	1
	Valdez Arm	1997–1998	39	36	2	2	1	0
		1998–1999	41	38	2	3	1	0
		1999–2000	41	38	2	1	1	0
		2000–2001	41	38	2	1	1	0
		2001–2002	41	38	2	2	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	1997–1998		17	1	0	0	0
		1998–1999	5	17	1	0	0	0
		1999–2000	5	17	1	0	0	0
		2000–2001	5	17	1	0	0	0
		2001–2002	5	17	1	0	0	0
	Hinchinbrook Island	1997–1998	232	93	5	6	2	2
		1998–1999	244	97	5	9	2	3
		1999–2000	247	99	5	4	2	1
		2000–2001	244	97	5	7	2	0
		2001–2002	247	99	5	4	2	0
	Hawkins Island Island	1997–1998	110	19	1	2	0	0
		1998–1999	110	19	1	0	0	0
		1999–2000	110	19	1	0	0	0
		2000–2001	110	19	1	1	0	0
		2001–2002	110	19	1	0	0	0
	Montague Island	1997–1998	68	52	3	0	1	0
		1998–1999	75	57	3	1	1	0
		1999–2000	79	60	4	1	1	0
		2000–2001	92	69	3	0	1	0
		2001–2002	96	73	4	4	1	1

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		1997–1998	48	328	16	26	7	5
		1998–1999	49	335	17	19	7	4
		1999–2000	50	336	17	18	7	3
		2000–2001	51	344	17	20	7	3
		2001–2002	51	349	17	23	7	2
Unit 6		1997–1998	71	873	44	54	17	10
Total		1998–1999	72	889	44	61	18	8
		1999–2000	71	877	44	48	18	8
		2000–2001	72	885	44	50	18	11
		2001–2002	72	886	44	44	18	7

Table 2 Unit 6 brown bear harvest, RY 1997–2001

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	1997–1998															
	Fall 97	7	5	(42)	0	12	1	0	0	1	8	(62)	5	(38)	1	14
	Spring 98	2	0	(0)	0	2	0	0	0	1	2	(100)	0	(0)	1	3
	Total	9	5	(36)	0	14	1	0	0	2	10	(67)	5	(33)	2	17
	1998–1999															
	Fall 98	11	7	(39)	0	18	0	0	0	1	11	(61)	7	(39)	1	19
	Spring 99	7	0	(0)	0	7	1	0	0	0	8	(100)	0	(0)	0	8
	Total	18	7	(28)	0	25	1	0	0	1	19	(73)	7	(27)	1	27
	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
	2000–2001															
	Fall 00	9	7	(44)	0	16	0	0	0	2	9	(56)	7	(44)	2	18
	Spring 01	2	2	(50)	0	4	0	0	0	1	2	(50)	2	(50)	1	5
	Total	11	9	(45)	0	20	0	0	0	3	11	(55)	9	(45)	3	23
	2001–2002															
	Fall 01	5	2	(29)	0	7	0	1	0	2	5	(63)	3	(38)	2	10
	Spring 02	2	0	(0)	0	2	0	0	0	1	2	(100)	0	(0)	1	3
	Total	7	2	(22)	0	9	0	1	0	3	7	(70)	3	(30)	3	13

Table 2 Continued

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
6B	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
	2000–2001															
	Fall 00	1	1	(50)	0	2	0	0	0	1	1	(50)	1	(50)	1	3
	Spring 01	4	0	(0)	0	4	0	0	0	0	4	(100)	0	(0)	0	4
	Total	5	1	(17)	0	6	0	0	0	1	5	(83)	1	(17)	1	7
	2001–2002															
	Fall 01	1	3	(75)	0	4	0	0	0	1	1	(25)	3	(75)	1	5
	Spring 02	3	1	(25)	0	4	0	0	0	0	3	(75)	1	(25)	0	4
	Total	4	4	(50)	0	8	0	0	0	1	4	(50)	4	(50)	1	9

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	1997–1998															
	Fall 97	3	2	(40)	0	5	0	1	0	1	3	(50)	3	(50)	1	7
	Spring 98	1	0	(0)	0	1	0	0	0	1	1	(100)	0	(0)	1	2
	Total	4	2	(33)	0	6	0	1	0	2	4	(57)	3	(43)	2	9
	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
	2000–2001															
	Fall 00	0	1	(100)	0	1	0	0	0	1	0	(0)	1	(100)	1	2
	Spring 01	2	1	(33)	0	3	0	0	0	0	2	(67)	1	(33)	0	3
	Total	2	2	(50)	0	4	0	0	0	1	2	(50)	2	(50)	1	5
	2001–2002															
	Fall 01	1	0	(0)	0	1	0	0	0	1	1	(100)	0	(0)	1	2
	Spring 02	2	0	(0)	0	2	0	0	0	0	2	(100)	0	(0)	0	2
	Total	3	0	(0)	0	3	0	0	0	1	3	(100)	0	(0)	1	4

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	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	5	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
	2000–2001															
	Fall 00	4	2	(33)	0	6	3	0	0	2	7	(78)	2	(22)	2	11
	Spring 01	9	1	(10)	1	11	0	0	0	0	9	(90)	1	(10)	1	11
	Total	13	3	(19)	1	17	3	0	0	2	16	(84)	3	(16)	3	22
	2001–2002															
	Fall 01	7	4	(36)	0	11	1	0	0	2	8	(67)	4	(33)	2	14
	Spring 02	11	0	(0)	0	11	0	0	0	0	11	(100)	0	(0)	0	11
	Total	18	4	(18)	0	22	1	0	0	2	19	(83)	4	(17)	2	25

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	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
	2000–2001															
	Fall 00	14	11	(44)	0	25	3	0	0	6	17	(61)	11	(39)	6	34
	Spring 01	17	4	(19)	1	22	0	0	0	1	17	(81)	4	(19)	2	23
	Total	31	15	(33)	1	47	3	0	0	7	34	(69)	15	(31)	8	57
	2001–2002															
	Fall 01	14	9	(39)	0	23	1	1	0	6	15	(60)	10	(40)	6	31
	Spring 02	18	1	(5)	0	19	0	0	0	1	18	(95)	1	(5)	1	20
	Total	32	10	(24)	0	42	1	1	0	7	33	(75)	11	(25)	7	51

Table 3 Unit 6 brown bear mean skull size and age, RY 1997–2001

		Males				Females			
Unit	Year	Skull size	*n*	Age	*n*	Skull size	*n*	Age	*n*
6A	1997–1998	24	9	7	9	21	6	6	6
	1998–1999	23	16	5	18	20	6	4	7
	1999–2000	23	14	6	14	21	6	4	6
	2000–2001	23	11	6	11	22	8	6	9
	2001–2002	24	7	3	7	23	3	7	3
6B	1997–1998	23	5	4	5	19	1	2	1
	1998–1999	24	8	9	8	19	3	2	4
	1999–2000	28	2	10	2	20	1	3	1
	2000–2001	24	4	5	5	20	1	3	1
	2001–2002	24	4	5	4	22	4	4	4
6C	1997–1998	25	4	5	4	21	1	2	1
	1998–1999	23	3	4	3	21	1	4	1
	1999–2000	22	5	3	5	22	1	16	1
	2000–2001	25	2	6	2	21	2	3	2
	2001–2002	23	3	2	3		0		0
6D	1997–1998	22	17	5	17	21	5	8	6
	1998–1999	22	12	4	13	22	4	6	4
	1999–2000	24	11	6	8	21	6	6	7
	2000–2001	24	18	6	16	21	3	9	3
	2001–2002	23	18	6	18	20	4	5	4
Unit 6	1997–1998	24	35	5	35	21	13	5	14
Total	1998–1999	23	39	6	42	21	14	4	16
	1999–2000	24	32	6	29	21	14	7	15
	2000–2001	24	35	6	34	21	14	5	15
	2001–2002	23	32	4	32	22	11	5	11

Table 4 Unit 6 brown bear successful hunter residency, RY 1997–2001

Unit	Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Residency unknown	(%)	Total Successful hunters
6A	1997–1998	1	(7)	4	(27)	10	(67)	0	(0)	15
	1998–1999	4	(15)	3	(12)	19	(73)	0	(0)	26
	1999–2000	3	(14)	4	(19)	14	(67)	0	(0)	21
	2000–2001	2	(10)	5	(25)	13	(65)	0	(0)	20
	2001–2002	1	(10)	2	(20)	7	(70)	0	(0)	10
6B	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
	2000–2001	3	(50)	1	(17)	2	(33)	0	(0)	6
	2001–2002	3	(38)	0	(0)	5	(63)	0	(0)	8
6C	1997–1998	5	(71)	1	(14)	1	(14)	0	(0)	7
	1998–1999	4	(100)	0	(0)	0	(0)	0	(0)	4
	1999–2000	5	(83)	1	(17)	0	(0)	0	(0)	6
	2000–2001	3	(75)	1	(25)	0	(0)	0	(0)	4
	2001–2002	2	(67)	0	(0)	1	(33)	0	(0)	3
6D	1997–1998	4	(15)	5	(19)	15	(58)	2	(8)	26
	1998–1999	4	(21)	7	(37)	8	(42)	0	(0)	19
	1999–2000	2	(11)	6	(33)	10	(56)	0	(0)	18
	2000–2001	3	(15)	5	(25)	11	(55)	1	(5)	20
	2001–2002	1	(4)	13	(57)	9	(39)	0	(0)	23
Unit 6 Total	1997–1998	12	(22)	12	(22)	28	(52)	2	(4)	54
	1998–1999	18	(30)	13	(21)	30	(49)	0	(0)	61
	1999–2000	11	(23)	11	(23)	26	(54)	0	(0)	48
	2000–2001	11	(22)	12	(24)	26	(52)	1	(2)	50
	2001–2002	7	(16)	15	(34)	22	(50)	0	(0)	44

Table 5 Unit 6 brown bear harvest chronology by percent, RY 1997–2001

		Harvest periods										
	Regulatory	September		October		November		April		May		
Unit	year	1–15	16–30	1–15	16–31	1–15	16–30	1–15	16–30	1–15	16–31	*n*
6A	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
	2000–2001	(40)	(25)	(5)	(10)	(0)	(0)	(0)	(10)	(5)	(5)	20
	2001–2002	(50)	(20)	(0)	(10)	(0)	(0)	(0)	(0)	(20)	(0)	10
6B	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)	3
	2000–2001	(33)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(33)	(33)	6
	2001–2002	(13)	(0)	(25)	(13)	(0)	(0)	(0)	(13)	(25)	(13)	8
6C	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
	2000–2001	(25)	(0)	(0)	(0)	(0)	(0)	(0)	(50)	(25)	(0)	4
	2001–2002	(0)	(0)	(33)	(0)	(0)	(0)	(0)	(0)	(0)	(67)	3
6D	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
	2000–2001	(0)	(5)	(11)	(26)	(0)	(0)	(5)	(5)	(5)	(42)	19
	2001–2002	(4)	(0)	(9)	(30)	(9)	(0)	(0)	(0)	(17)	(30)	23
Unit 6	1997–1998	(14)	(8)	(18)	(8)	(0)	(0)	(0)	(0)	(20)	(31)	49
Total	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
	2000–2001	(22)	(12)	(6)	(14)	(0)	(0)	(2)	(10)	(10)	(22)	49
	2001–2002	(16)	(5)	(11)	(20)	(5)	(0)	(0)	(2)	(18)	(23)	44

Table 6 Unit 6 brown bear harvest percent by transport method, RY 1997–2001

Unit	Regulatory year	Percent of harvest								
		Airplane	Boat	Airboat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
6A	1997–1998	79	0	7	7	0	0	7	0	14
	1998–1999	77	4	0	12	0	0	0	8	26
	1999–2000	90	0	0	0	0	0	0	10	20
	2000–2001	80	0	0	15	0	0	5	0	20
	2001–2002	67	0	0	22	0	0	0	11	9
6B	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
	2000–2001	50	0	0	0	0	0	50	0	6
	2001–2002	38	13	0	0	13	0	13	25	8
6C	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
	2000–2001	0	0	0	50	0	0	50	0	4
	2001–2002	33	0	0	0	0	0	67	0	3
6D	1997–1998	15	69	0	4	4	0	4	4	26
	1998–1999	24	65	0	0	0	0	6	6	17
	1999–2000	71	24	0	0	6	0	0	0	17
	2000–2001	39	50	0	0	0	0	6	6	18
	2001–2002	39	52	0	4	0	0	0	4	23
Total	1997–1998	37	37	4	8	2	0	10	4	52
	1998–1999	49	24	0	5	3	0	14	5	59
	1999–2000	70	11	0	2	4	0	9	4	46
	2000–2001	54	19	0	10	0	0	15	2	48
	2001–2002	44	30	0	7	2	0	7	9	43

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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 Kenai Peninsula, with the exception of remote ice fields, some coastal portions of Unit 7, and the eastern side of Kachemak Bay. 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 Native Corporation, municipal, state, 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 ADF&G 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 to stay within management objectives only 1 season would be allowable on the Kenai. 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 that is 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 Kenai brown bears by combining results from a habitat-based model and a density estimate using expert interpretation (Del Frate, 1993). We could approximate brown bear density on the Kenai by comparing estimates of bear density to other parts of Alaska. 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. Currently, ADF&G is leading an effort (through the IBBST) to estimate the Kenai brown bear population using DNA sampling techniques. This should produce a more reliable estimate for brown bear numbers, but only estimates males and females in the population. Further research will be needed to obtain detailed information

concerning brown bear population dynamics, including age structure, recruitment, age of first reproduction, reproductive success and age of weaning.

In the spring of 1995, ADF&G 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.

ADF&G 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. The Kenai Peninsula Borough Mayor, the commissioner of ADF&G and a special assistant to the Secretary of the Interior appointed members. 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. This work was completed resulting in the publication of The Kenai Peninsula Brown Bear Conservation Strategy in June 2000. Also in November of 2001, the IBBST published A Conservation Assessment of the Kenai Peninsula Brown Bear. This was produced independent of the Stakeholders process, but the two documents complement each other.

- 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.

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. Season dates since 1999 were 15–31 October for the entire Kenai Peninsula for resident and nonresident hunters. However, this season is usually shortened by emergency order.

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. Since 1999, hunting seasons have been shortened by emergency closure to maintain harvest within objectives.

ADF&G 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, ADF&G 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 became effective for the 2002 spring bear bait season.

During the March 2003 meeting, the Board of Game increased their recommendation for maximum annual human caused brown bear moralities on the Kenai Peninsula. The new recommendations are for an annual maximum of 20 (previously 14) bears, of which, no more than 8 (previously 6) can be females.

Hunter Harvest. There were 13 reported brown bear mortalities during regulatory year 2000–01. Six (5 males and 1 female) were hunter harvests, while 7 (3 male and 4 females) were non-hunting mortalities. During regulatory year 2001–02, there were 16 reported mortalities

of which 2 (both females) were hunter harvests, and 14 (8 males and 6 females) were non-hunting mortalities (Table 1).

Hunter Residency and Success. Local resident hunters harvested 67% (n=4), while non-local residents harvested 33% (n=2) of the brown bears killed by hunters in 2000–01. A local resident hunter and a non-local resident hunter each killed 1 brown bear during the 2001–02 season (Table 2).

Harvest Chronology. All hunter-harvested bears were taken during October during 2000–01 and 2001–02 (Table 3). An Emergency Order closed these seasons to keep total bear mortalities within management objectives.

Transport Methods. Most successful hunters (83%) used a boat for transportation during the 2000–01 season, while a boat or a highway vehicle were used by the 2 successful hunters during 2001–02 (Table 4).

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

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 the last management report, Del Frate (1999) made recommendations for years 1998–2001. Due to a turnover in staff during 2002, and new Board of Game recommendations, brown bear management on the Kenai has been adjusted. Prior to 2002, the allowable annual human caused mortality for female bears was based on female units. These units were calculated by assigning a value of 1 unit for a female older than 3, and 0.5 units for females 3 years old or younger. The new management protocol will consider all females older than cub of the year (COY) to have a value of 1 when calculating allowable female mortalities (8 annually), however, all bear mortalities, including female COY, will count as 1 toward the total allowable (20 annually). Also, the annual number of human caused brown bear mortalities will be based on calendar year instead of regulatory year.

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 are also 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 bears in the more highly impacted areas.

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Table 1 Units 7 and 15 brown bear harvest, RY 1991–2001.

Regulatory year	Reported: Hunter Kill M	F	Unk.	Total	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
2000														
Fall 00	5	1	0	6	1	2	0	6	(67)	3	(33)	0	(0)	9
Spring 01	0	0	0	0	2	2	0	2	(50)	2	(50)	0	(0)	4
Total	5	1	0	6	3	4	0	8	(62)	5	(38)	0	(0)	13
2001														
Fall 01	0	2	0	2	6	5	0	6	(46)	7	(54)	0	(0)	13
Spring 02	0	0	0	0	2	1	0	2	(67)	1	(33)	0	(0)	3
Total	0	2	0	2	8	6	0	8	(50)	8	(50)	0	(0)	16

[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, RY 1985–2001.

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[c]	4	(80)	1	(20)	0	(0)	5
1996–97[c]	2	(33)	4	(67)	0	(0)	6
1997–98[c]	5	(63)	3	(37)	0	(0)	8
1998–99[c]	0	(00)	0	(00)	0	(0)	0
1999–00[c]	8	(80)	1	(10)	1	(10)	10
2000–01[c]	4	(67)	2	(33)	0	(0)	6
2001–02[c]	1	(50)	1	(50)	0	(0)	2

[a] Local resident means residents of Units 7 or 15.
[b] Does not include nonsport harvest.
[c] Closed by Emergency Order.

Table 3 Units 7 and 15 brown bear harvest chronology percent by month, RY 1985–2001

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[b]	0	0	100	5
1996–97[b]	0	0	100	6
1997–98[b]	0	0	100	8
1998–99[b]	0	0	0	0
1999–00[b]	0	100	0	10
2000–01[b]	0	100	0	6
2001–02[b]	0	100	0	2

[a] Does not include nonsport harvest.
[b] Closed by Emergency Order.

Table 4 Units 7 and 15 brown bear harvest percent by transport method, RY 1985–2002.

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[b]	0	0	0	40	0	0	60	0	0	5
1996–97[b]	33	0	33	0	0	0	17	17	0	6
1997–98[b]	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[b]	0	10	40	10	0	10	30	0	0	10
2000–01[b]	0	17	83	0	0	0	0	0	0	6
2001–02[b]	0	0	50	0	0	0	50	0	0	2

[a] Does not include nonsport harvest.
[b] Closed by Emergency Order.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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 (Kodiak NWR) 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 NWR 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 cleanup crews displaced some from traditional feeding and traveling areas. 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. The state subsistence bear hunt 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.

In 2001, a citizens advisory committee was established to work closely with ADF&G and the Kodiak NWR, to develop a management plan addressing the wide variety of issues that impact bears, including hunting, habitat and viewing. The resulting Kodiak Archipelago Bear Conservation and Management Plan (ADF&G 2002) was crafted over a period of several months by a group of representatives from 12 diverse user groups. After hearing from a variety of experts from agencies and extensive public input, the group developed over 270 recommendations for Kodiak bear management and conservation. Most impressively, in spite of the diversity of viewpoints expressed by members of the group, all of the recommendations were by consensus.

The underlying themes of the recommendations were continued conservation of the bear population at its current level, increased education programs to teach people how to live with bears on Kodiak and protection of bear habitat with allowances for continued human use of the archipelago. Although the group was advisory in nature, government management agencies expressed a commitment to work to implement all of the regulations that were feasible and within their legal jurisdictions. How this maturing relationship between bears and people will evolve remains to be seen, but the future looks bright for the continuing existence of the bears of the Kodiak Islands (Van Daele 2003).

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 ADF&G wildlife office in Kodiak 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 15 intensive aerial brown bear surveys from 1987 to 2000 (Table 1). These surveys were in 9 separate areas on Kodiak Island, and 4 areas have been surveyed more than once. 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 Aliulik Peninsula was surveyed twice. The 2001 survey indicated a significant population decline, however, the accuracy of that survey was compromised by a combination of inexperienced observers and later than normal snowmelt and den emergence. More favorable conditions prevailed when we replicated the survey in 2002.

Data from the 2002 survey data indicated that the bear density on the Aliulik had declined somewhat since the last survey in the same area in 1993. Although the data reflected a decrease from 209 independent bears/1000 km^2 in 1993 to 173 independent bears/1000 km^2 in 2002, independent reviews from ADF&G and US Geological Survey biometricians determined that this decline was not statistically significant. Based on these results, we did not recommend any changes in the hunting regulations for the Aliulik Peninsula.

Aerial surveys along salmon streams in southwestern Kodiak Island by the FWS indicated little change in composition of the brown bear population (Table 2). These data reveal considerable interannual variation which is often correlated with berry and salmon abundance and timing. Analysis by 5-year periods dampens these variations, and indicates a stable population during the past decade. Single bears composed 43.4% of the bears classified from 1993 to 1997, and 42.0% from 1998 to 2002. Cubs of the year composed 13.4% of the bears classified during both of the 5-year periods.

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 a bear by drawing permit only. Drawing and registration permits were available for nonresidents guided by a registered or master guide, 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 2001 meeting, the Board of Game addressed a proposal to shift the fall bear hunting season on Kodiak Island, north of Uyak Bay, from 25 October–30 November to 15 October–20 November. There was also a proposal to create a regulation allowing the Board to impose and enforce standards for bear-proof residential garbage containers in municipalities that have not adopted equivalent standards and in the unorganized boroughs. Neither proposal passed.

Hunter Harvest. Hunters harvested 170 bears in regulatory year 2000–01 and 184 bears in 2001–02, a rate somewhat higher than the previous 5-year mean of 160.0 bears (Table 3). There were 49 bears killed in fall 2000 and 60 killed in fall 2001. The mean annual fall harvest for the previous 5 years was 52.8 bears. During the spring of 2001, 121 bears were killed, and in the spring of 2002, 124 bears were killed. These spring harvests were the highest recorded since 1983, and were a result of excellent weather and hunting conditions. The mean annual harvest for the previous 5-year was 107.2 bears. These totals do not include bears killed under federal subsistence regulations: 3 bears (2 males and 1 female) in 2000–01 and 2 bears (1 male and 1 female) in 2001–02.

Males predominated in the harvest, composing 71.1% of the sport harvest in 2000–01 and 79.3% in 2001–02, a rate above the previous 5-year average of 72.6%. 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 49 females in 2000–01 and 38 females in 2001–02, comparable to the annual mean of 43.4 females harvested during the preceding 5 years. Including other human-caused deaths of females, 51 females were killed in 2000–01 and 43 females were killed in 2001–02, compared to the previous 5-year mean of 49.8 females.

Mean total skull sizes of male bears harvested was 25.2” in 2000–02, and 24.7” in 2001–02, 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 21.1” in 2000–01 to 21.9” in 2001–02. The average female skull size during the previous 5 years was 21.9”

(Table 4). The mean age of males harvested in 2000–01 was 8.1 years; the 5-year average was 7.3 years. Female ages averaged 5.2 years in 2000–01, a considerable decline from the 5-year average of 7.2 years. Age data for 2001–02 were not available.

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 51.0 (1995–96 to 2001–02). Nonresident harvest declined from a mean of 30.2 bears (1988–89 to 1993–94) to 25.6 bears (1995–96 to 1999–2000). Nonresident success has stayed essentially the same at 68% (1988–89 to 1993–94) to 67% (1995–96 to 2001–02). The regulation reduced 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 3.0 females/year (1995–96 to 2001–02). Since 1995, 9 permits have been lost because of undersized females being taken.

Permit Hunts. There are 29 drawing hunt areas in Unit 8 for brown bears, with a total of 472 permits obtainable annually. 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 the sex/skull minimums in southwest Kodiak hunt areas. In 2000–01, 339 drawing permits were picked up by successful applicants; in 2001–02, 334 permits were claimed (Table 5). Annual harvest in the drawing permit areas was 162 in 2000–01 and 168 in 2001–02. The average annual harvest during the previous 5 years was 148.4.

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 2000–01 we issued 226 registration permits, and in 2001–02 we issued 232 (Table 6). This was an increase over the mean number of registration permits issued in the previous 5 years (214.6). The number of hunters afield in the registration hunt was 169 in 2000–01 and 162 in 2001–02, also higher than the mean of the previous 5 years (132.0). Annual harvest in the registration permit area was 8 in 2000–01 and 16 in 2001–02. The average annual harvest during the previous 5 years was 11.2.

Hunter Residency and Success. Hunter success in the drawing permit hunts was 50% in 2000–01 and 51% in 2001–02 (Table 5), higher than the mean for the previous 5 years (45.8%). In the registration hunts, hunter success was 5% in 2000–01 and 10% in 2001–02, comparable to the mean for the previous 5 years (8.8 %) (Table 6).

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 2000–01, residents harvested 80 bears and nonresidents took 90 (Table 7). In 2001–02, residents harvested 87 bears and nonresidents took 97 bears. The mean harvest for the previous 5 years was 76.6 for residents and 83.0 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 2000–01, 71% of the harvest occurred during the first third of the fall season, and in 2001–02, 78% 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 76.0%. In 2000–01, 51% of the harvest occurred during the last third of the spring season, and in 2001–02, 61% 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 55.4%.

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 deaths of 12 bears in 2000–01 and 18 in 2001–02 (Table 3). This was comparable to the mean annual nonsport harvest of 17.8 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. 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.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

In February 2002, we completed the Kodiak Archipelago Bear Conservation and Management Plan (ADF&G 2002) (Appendix I). The plan was developed by a Citizen's Advisory Committee consisting of stakeholders from 12 diverse user groups, along with cooperation from an Interagency Planning Group providing government support and prospective. ADF&G funded the project and provided logistical support with assistance from US Fish and Wildlife Service. The final plan included over 270 recommendations (all by consensus) and we have already begun incorporating several into our management program.

The Bear Plan called for maintenance of status quo for the bear population, with consideration of a modest reduction (10%) of the bear population on the road system and development of a "depredation permit" that could be used by ranchers that have problems with bears. We are working on the concept of the "depredation permit" with the Attorney General's office and do not anticipate a need for Board action at this time. All indications suggest that the current bear population is within the levels recommended by the Plan, and we do not recommend any changes to the current regulations.

Interest in bear viewing is increasing annually on Kodiak, and there were several recommendations in the Bear Plan to address this demand in a manner that has minimal impact on bears and bear hunters. This challenge is being dealt with in a subcommittee of the Kodiak Fish and Game Advisory Committee, which includes members of the public, ADF&G, and Kodiak NWR. One of the first issues to be discussed is development of a structured bear viewing area on Kodiak at O'Malley Creek or a comparable area.

Research commenced on Afognak this summer, with 4 bears collared. The project is a joint effort between Afognak Native Corporation, Rocky Mountain Elk Foundation, Kodiak Brown Bear Trust, Kodiak NWR, and ADF&G. We are also working with Kodiak Island Borough and local villages to develop and implement garbage management practices that will reduce bear problems. This project is part of a Capital Improvement Project grant procured by the efforts of local legislators.

Bear/human encounters have declined substantially during this reporting period due in part to increased public education and garbage management actions, but primarily due to abundant natural food supplies for the bears during these years. It is important that we continue these

programs so that we are prepared for the years when bears are more aggressive in their pursuit of human-created food sources.

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 reasonably 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. Since that time, 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 system appears to be a viable alternative to reducing the number of permits.

Intensive aerial surveys and composition counts along streams in southern Kodiak Island indicated that bear populations on Kodiak Island have remained stable during the past 20 years. The Kodiak NWR has included these jointly conducted surveys in their annual management budget, and we plan to continue to cooperate with Refuge biologists with these surveys each year. We will also work to train new personnel, and periodically review the methods to refine data collection and analysis methods and population estimates. This will be especially important in the next couple years as personnel change in both agencies. The current methods are predicated on having experienced observers and survey pilots, and disruption of that continuity could violate critical assumptions and thereby impact accuracy of the data.

Development of the Kodiak Archipelago Bear Management Plan was a successful endeavor that reiterated the importance of this bear population to a wide variety of people. The group took the best available biological information, along with extensive public testimony, and deliberated to develop mutually acceptable recommendations. The common ground, which unified these diverse members of the Citizen's Advisory Committee, was their desire to maintain a healthy population of bears on the archipelago, even if it meant alteration of some human behaviors. The group also recognized the importance of tracking and assisting with implementation of the recommendations. To fulfill that need, the Kodiak Unified Bear

Subcommittee was established as a standing subcommittee of the Kodiak Fish and Game Advisory Committee in October 2002.

Since finalization of the plan, ADF&G has initiated implementation of several of the recommendations. A pilot study on brown bears on Afognak commenced in June 2002, with the intention of developing a comprehensive research project when funding is available. A telemetry study of bears and cattle on the Kodiak road system is being discussed with local ranchers to determine movements and potential management actions to minimize habitat overlap. This investigation would also provide some baseline information on road system bears. Public education projects to develop bear information kiosks on the state ferry Tustumena and at the Kodiak airport terminal are currently underway. ADF&G is also working with bear viewing guides, US Fish and Wildlife Service, and National Park Service to develop a bear viewing guide certification program. This program would be based on the "Best Practices for Viewing Bears" that were produced in a cooperative effort between ADF&G, National Park Service, and the guides during the winter of 2002–03. The Kodiak NWR has addressed many bear-related issues in their planning efforts. Refuge managers began to revise their Comprehensive Conservation Plan (USFWS 1987) for the refuge in 2001, and hope to have it completed by late 2003.

The success of public participation in bear management on the Kodiak islands has gained a worldwide reputation since the inception of the bear management plan. In 2001 the Japanese government sent a contingent of biologists and civic leaders from Hokkaido to Kodiak to learn about our program. They have since adopted several of the things they learned and there have been substantial improvements in the number of problems and injuries bears have caused. In August 2002, a delegation of Russian bear biologists spent a week in south-central Alaska, including Kodiak, gathering information they could use to improve their bear management and public education programs. In December 2002, Canadian and American government representatives invited the Kodiak area wildlife biologist to give the keynote address to a conference aimed at minimizing grizzly bear/human conflicts in the Idaho, Montana, Washington and British Columbia region. They foresee that better human/bear relations are the only way to protect the endangered grizzly population in that area, and in their mind, Kodiak was the best example of a place where bears and people have learned to coexist.

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APPENDIX I

Summary of the Kodiak Archipelago Bear Conservation and Management Plan

In 2001 the Department organized a public process to develop a bear-management plan for the Kodiak archipelago. The plan itself was developed by a Citizen's Advisory Committee, which consisted of stakeholders from 12 diverse user groups, with agency biologists acting as technical advisors, not final decision makers. The final plan included over 270 recommendations (all by consensus).

The plan was initiated because of increased demand for diverse recreational opportunities on Kodiak and the need to minimize negative bear-human interactions. The planning process was designed to bring people who live, work, and recreate in proximity to bears together and to produce a management plan reflecting current research in bear biology, habitat, and behavior while recognizing both traditional and contemporary uses of the resource. The purpose of the plan was to recommend measures to help ensure the sustainability of the Kodiak bear population, to respond to the public's desire for uses of this wildlife resource, and to address public safety concerns.

Although the population of bears on the Kodiak archipelago was healthy and its habitat generally well protected, no management plan had been formalized in the past. Because management of the bears and their habitat is a shared responsibility of the Department and the U.S. Fish & Wildlife Service, which manages Kodiak NWR, it was essential that these 2 agencies pool their resources to work with the public in developing such a document.

Other government agencies—local, state, and federal—also needed to be involved in and committed to the plan's development if it was to be implemented. The public's involvement with, in fact its ownership of, the plan was considered crucial to the planning process. The final management plan needed to reflect the public's desires and concerns for continued use of and coexistence with bears if it was to have credibility and validity. Thus, a combination of public involvement and government commitment were the keys to the success of developing a bear management plan for the Kodiak archipelago.

Recognizing responsibility for quality resource management justified development and prompt implementation of a Kodiak bear-management plan. The healthy status of the Kodiak bear population was considered somewhat unique when compared to most brown or grizzly bears elsewhere in the world. Many have been driven to extinction (California and Great Plains grizzlies), are listed as threatened (Rocky Mountain West), seriously depleted (parts of Russian Far East), or are of growing scientific concern to the extent that hunting seasons have been closed (British Columbia). Only in the remoter parts of Alaska, northern Canada, and Russia do healthy populations remain. Kodiak bears have among the highest population densities. Achieving this plan's proactive goals will ensure the health of the Kodiak bear population into perpetuity.

To provide background information so that the Committee could make recommendations for the conservation and management of Kodiak archipelago bears, the chapters of this plan, each of which covers a different subject area, include introductory text information to provide

bases for the recommendations that follow the issues. To set the stage, a chapter deals with the biology, history, and management of Kodiak bears prior to January 2001, when this plan began to be developed.

Kodiak bears live throughout most of the Kodiak archipelago and use virtually all available habitats from the coast to alpine regions. The archipelago is considered high-quality bear habitat, containing ample food, water, cover, and space. While vegetation is a prominent part of the bears' diet, salmon is the most important source of protein for most Kodiak bears. Currently, the human population and related human development have had minimal impacts on bear habitat. Potential threats include seasonal human use of inland and coastal areas, future developments (e.g., road and energy development) and related problems (e.g., oil spills) and natural occurrences (e.g., reduction in salmon stocks). Kodiak bears are adaptable.

Bear habitat and bear-human relationship are intimately intertwined; if people are not willing to make an effort to live around bears, large expanses of wilderness areas where people rarely go are necessary for sustainable bear populations. With this information in mind, the Committee made a number of recommendations to protect bear habitat on the archipelago. These recommendations cover the following subject areas: land use, acquisition, and planning; activities on Afognak Island; minimizing habitat degradation; road building in bear habitat; motorized access; bear-use areas; human activities in bear habitat; introduced species; and salmon as a part of bear habitat.

Residents and visitors harvest a variety of fish, wildlife, and plant resources on the Kodiak archipelago, and all of these harvest activities are interrelated with bears. Management of the harvest of Kodiak bears is currently based primarily on population assessments and regulation of sport hunting. With a healthy population of bears on the archipelago, the emphasis has been on maintaining a stable bear population that will sustain an annual harvest of 150 bears, composed of at least 60 percent males. Subsistence harvest of bears is presently managed by the U.S. Fish & Wildlife Service. Sport hunting of bears in Game Management Unit 8 (Kodiak archipelago) is regulated by a complex system involving drawing hunts and registration hunts. Nonresident bear hunters are required to use a guide; big-game hunting services provide significant economic resources to the people living on the archipelago. Other resource extraction, including deer hunting, elk hunting, commercial fishing, sport fishing, and harvest of berries and other plants, also directly impacts bear populations. The Committee made recommendations on a number of harvest issues, including the following: management of bear-harvest activities, subsistence use of bears, sport hunting, guiding, other resource-extraction activities, and regulations and their enforcement.

Management objectives for bears on the Kodiak archipelago currently are based on harvest figures. Department biologists, however, make management decisions and harvest recommendations based on both biological carrying capacity and wildlife-acceptance capacity. At present, the total bear population on the Kodiak archipelago is stable and can be sustained at this high level by the natural habitat. Habitat in different areas is capable of sustaining different bear densities. Although the entire Kodiak archipelago is high-quality bear habitat, there are areas where human development and residence take precedence. Thus, biological carrying capacity and wildlife-acceptance capacity may be different. With this

awareness, the Committee recommended a shift to managing the bear population by density rather than by harvest alone. To do this, biologists need accurate data on bear populations and habitat carrying capacities. The Committee also recommended reducing, through liberalized sport hunting seasons in the spring and issuance of appropriate depredation permits, the bear population along the road system of northeastern Kodiak Island by 10–20 percent below the current estimated level.

There are a variety of situations in which bears and humans interact: killing of bears in defense of life or property; solid-waste management and storage of human and pet food; livestock ranching; bear-viewing activities; public-use and remote cabins in bear habitat; other recreational activities in bear habitat, etc. The Committee thoroughly discussed the issues involving bear-human interactions and made recommendations that can have a significant impact on the future management of Kodiak bears.

Kodiak bears have been the subjects of formal research for the past 60 years. Initial research centered on bear-cattle and bear-salmon conflicts. By the 1960s, research activities evolved into a more holistic approach, looking into feeding habits, reproductive potential, growth rates, movements, and population estimations. In the 1980s and 1990s, research expanded to include most of the representative habitats on Kodiak Island. Routine monitoring, based on research results and harvest reports, allows biologists to track and manage human impacts on bears. New research will fill information gaps and will be needed to address increasing and changing demands for the Kodiak bear resource. The Committee recommended that the Department and Kodiak NWR provide funding and staffing adequate to continue conducting research and monitoring of the Kodiak bear population and its habitat. The first priority should be continued monitoring of the harvest and population trends in established survey areas. The Committee recommended that a variety of monitoring and research activities be continued or initiated.

The Committee believes that the widespread dissemination of accurate, fact-based information concerning Kodiak bears is essential for conserving bears and their habitat on the Kodiak archipelago. The primary objectives of current Kodiak bear-education efforts are to reduce negative bear-human interactions and to increase appreciation for and understanding of bears and their habitat. The Committee examined a number of ways to enhance the current educational effort by establishing educational programs that provide accurate information resulting in continued conservation and management of Kodiak bears. The key to any educational effort is cooperation and commitment by all concerned to provide science-based, accurate information in order to cultivate a well-informed public. Those who live, work, and recreate on the Kodiak archipelago need clear and useful information about bears in order to build understanding of bear behavior and to minimize negative bear-human interactions. In addition, with understanding and preparation, people can avoid bear encounters and respond wisely when they do occur. The Committee made recommendations on the development and dissemination of educational and public outreach materials. These recommendations regard the following subjects: general user education, hunter education, off-road vehicle user education, angler education, U.S. Coast Guard education, economic incentives and land management, village and rural residents, and funding for education efforts.

Table 1. Estimated density and observation rates of independent bears in intensive aerial survey areas, Unit 8, 1987–2002.

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
Aliulik Peninsula[a]	2001	5	1.6	3.0	8.1	0.53	152	350	135
Aliulik Peninsula	2002	5	1.4	4.1	9.2	0.53	173	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

a – because of concerns about the accuracy of this survey, it was replicated in 2002.

Table 2. Unit 8 aerial stream counts of brown bears[a], RY 1985–2002.

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	19	818	46	317	18	364	21	273	15	93.3	1,772
1999	14	477	35	300	22	372	27	214	16	97.4	1,363
2000	5	182	57	50	16	78	24	13	4	64.4	322
2001	8	164	42	75	19	65	17	88	22	49.0	392
2002	4[b]	129	30	101	23	162	37	44	10	109.0	436

[a] From Kodiak NWR files; standardized low-level surveys along selected streams on southwestern Kodiak Island.

[b] Five of 6 standard monitoring sites were surveyed on 4 dates.

Table 3. Reported brown bear kill data for the Kodiak archipelago by regulatory year and season, RY 1960–61 to 2001–02.

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 4. Total skull size, age, and sex of brown bears killed by sport hunters in Unit 8, RY 1982–83 to 2001–02.

	Males				Females			
Regulatory year	Mean skull size	*n*	Mean age	*n*	Mean skull size	*n*	Mean age	*n*
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
2000–01	25.2	117	8.1	121	21.1	49	5.2	49
2001–02	24.7	141	---[a]	---[a]	21.9	37	---[a]	---[a]

a Age data for 2001–02 not yet available.

Table 5. Unit 8 brown bear harvest data for drawing permit hunts DB 101–159 and 201–259, RY 1992–93 to 2001–02

	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total[a] harvest
Fall hunts	1992–93	128	127	4	46	35	63	21	37	0	56
(DB101–129)	1993–94	118	118	3	47	34	64	20	36	0	54
(DB201–229)	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
	2000–01	114	113	1	41	32	70	14	30	0	46
	2001–02	113	113	0	46	39	76	12	24	0	51
Spring hunts	1992–93	214	212	2	51	73	68	34	32	0	107
(DB131–159)	1993–94	219	218	4	50	77	74	27	26	1	105
(DB231–259)	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
	2000–01	225	218	2	54	87	75	29	25	0	116
	2001–02	221	220	1	54	94	80	23	20	0	117

	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total[c] harvest
Combined	1992–93	342	339	3	49	108	66	55	34	0	163
Fall and	1993–94	337	336	4	49	111	70	47	30	1	159
Spring Hunts	1994–95	333	329	2	54	102	69	47	31	0	149
(DB101–159)	1995–96	338	336	3	46	92	64	51	36	0	143
(DB201–259)	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
	2000–01	339	331	3	50	119	73	43	27	0	162
	2001–02	334	333	1	51	133	79	35	21	0	168

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, RY 1992–93 to 2001–02.

	Regulatory year	Permits issued[a]	Permits returned	Hunters afield	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total harvest
Fall Hunts (RB230)	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
	2000–01	162	146	99	32	3	2	67	1	33	0	3
	2001–02	126	124	92	26	10	8	89	1	11	0	9
Spring Hunts (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
	2000–01	104	92	70	24	7	0	---	5	100	0	5
	2001–02	106	94	70	26	10	5	71	2	29	0	7

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	1992–93	203	194	137	29	9	5	45	6	55	2	13
Fall and	1993–94	156	154	93	30	5	2	40	3	60	0	5
Spring	1994–95	144	133	97	27	6	5	83	1	17	0	6
Hunts	1995–96	156	151	95	39	9	4	44	5	56	0	9
(RB230	1996–97	166	161	100	38	12	9	75	3	25	0	12
& RB260)	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]	279	271	189	27	9	14	82	3	18	0	17
	2000–01	226	238	169	29	5	2	25	6	75	0	8
	2001–02	232	218	162	26	10	13	81	3	19	0	16

Table 7. Residency of successful brown bear hunters[a] in Unit 8, RY 1992–93 to 2001–02.

Regulatory year	Local residents[b]	(%)	Nonlocal residents	(%)	Nonresidents[c]	(%)	Total successful hunters
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
2000–01	15	9	65	38	90	53	170
2001–02	21	11	66	36	97	53	184

[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: 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, 2000–01–2, and, 2001–02–5.

Table 8. Chronology of the brown bear harvest, by season and period, in Unit 8, RY 1992–93 to 2001–02.

Regulatory year	Fall Season							Spring Season							Regulatory Year Total[a]
	Oct 25–Nov 6		Nov 7–Nov 18		Nov 19–Nov 25		Fall Total	Apr 1–Apr 15		Apr 16–Apr 30		May 1–May 15		Spring Total	
	n	%	*n*	%	*n*	%	*n*	*n*	%	*n*	%	*n*	%	*n*	
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
2000–01	35	71	12	24	2	4	49	4	3	55	45	62	51	121	170
2001–02	47	78	10	17	3	5	60	4	3	44	35	76	61	124	184

[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, RY 1992–93 to 2001–02.

Regulatory Year	Percent of Harvest								*n*
	Airplane	Horse	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway vehicle	Unknown	
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
2000–01	76	0	20	2	0	0	2	0	170
2001–02	72	0	20	4	0	0	4	0	184

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO BOX 25526
JUNEAU, AK 99802-5526

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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 Unit 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 approximately 75% 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, often using various computer models (Tait 1983, Harris 1984) to aid in evaluating 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. In 2002 this technique was used to estimate brown bear densities for all of Unit 9D and Unimak Island.

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. Counts during 1999–2002 averaged 145 independent bears (Table 1). These data indicate a reasonably stable population during the last 5 years.

Population Size

Brown bear densities vary within Unit 9; densities are lower in western Unit 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 in 1993 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 of about made for northern Unit 9B available from line transect surveys flown in 1999 and 2000 (Becker and Sellers in prep.). My extrapolated estimate for this area was 1 bear /7.7 mi^2 versus an estimate of 1 bear/10 mi^2 from the line transects. An additional comparison is now available from Unit 9D where I estimated a total population of 900–1000 bears. Transect surveys in 2002 estimated a population of 1462.

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 over 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 1982–02, a mean of 37% of 14,123 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*).

During 1999 and 2000 a total of 272 brown bears in 167 different groups were classified on the line transects in northern 9B. Sixty (22%) were classified as adult males by virtue of their obvious large size. Of all bears seen, 57% were in family groups and 43% were independent bears. Families of cubs made up 10% of all bears seen, and the average litter size was 1.7. Families with yearling made up 22.4%, and the average litter size was 1.65. Families with young ≥2 years old made up 24%, and the average litter size was 2. Litter sizes of both cubs and yearlings were smaller in 1999 (1.5 and 1.4, respectively) than in 2000 (2 and 1.7, respectively). The high percentage of single bears 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).

In 2002 during transect surveys in Unit 9D, a sample of 633 bears was composed of 52% single bears and 16.6% adult males. The average litter size for both cubs and ≥yearlings was 1.9.

MORTALITY

Harvest

Season and Bag Limit. The hunting season in Unit 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 Board has made no changes since 1999.

The Cold Bay registration hunt in Unit 9D is closed routinely by emergency order after the quota is reached; however, the fall 2001 season was not closed. The May 2002 season was closed on 14 May.

Hunter Harvest. During the 2000–01 regulatory year, only the Naknek registration hunt was open; hunters took 8 bears in the fall and 7 in the spring. The reported harvest for the 2001–02 regulatory year was 667 bears, including 463 males (69%) and 204 females (Table 2). During the 2001 regulatory year 11 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 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 and 2001–02, 178 and 169 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. However, for the 1999–00 and 2001–02 regulatory years, males ≥ 8 years old dropped to 25.8% and 25.7%, respectively, of the total kill.

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 1995–99, an average of 11 bears were killed per regulatory year. During the 2000 and 2001 regulatory years, 15 and 16 bears were killed. 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. Only 1 bear was killed in the fall 2001 season so the season was not closed. Three bears were killed by May 13 in the spring 2002 hunt so the season was closed that day by Emergency Order.

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 nonexistent. 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. Results for this reporting period were not yet available.

Hunter Residency. During the 2001–02 general seasons, nonresidents took 79% 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 and 2001 seasons, 61% and 75% of the kill in Unit 9B occurred during September. For all of Unit 9 in 2001, 58% of the kill occurred prior to 7 October.

Transportation Methods. During 2001–02, 76% 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.

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. The other continuing issue involves perceived conflicts between bear viewing and hunting.

CONCLUSIONS AND RECOMMENDATIONS

Brown bear populations do not lend themselves to convenient methods of monitoring 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 over 6000 bears inhabit the portion of Unit 9 open to bear hunting. With the dramatic increase in harvest recorded since 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.

Given what appear to be reasonable estimates derived from line transect surveys in several parts of the state, I recommend this technique be used in cooperative projects with federal agencies to estimate bear populations in other units on the Alaska Peninsula.

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Table 1 Black Lake aerial stream counts of brown bears, 1990–2002

Regulatory year	Number of surveys attempted	Single bears		Maternal bears		Offspring > 1year old		Cubs of the year		Total
		Number	%	Number	%	Number	%	Number	%	
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
2001	4	353	38	177	19	224	25	176	19	928
2002	4	356	32	234	21	317	29	193	18	1100

Table 2 Unit 9 brown bear harvest, RY 1992–01

Regulatory	Hunter kill						Non-hunting kill[a]			Total reported kill					
Year	M	(%)	F	(%)	Unk	Total	M	F	Unk.	M	(%)	F	(%)	Unk.	Total
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
2000–01															
Fall 00	6	(75)	2	(25)	0	8	4	1	0	10	(77)	3	(23)	0	13
Spring 01	6	(86)	1	(14)	0	7	1	0	0	7	(87)	1	(13)	0	8
	12	(80)	3	(20)	0	15	5	1	0	17	(81)	4	(19)	0	21
2001–02															
Fall 01	211	(62)	131	(38)	0	342	5	2	0	216	(62)	133	(38)	0	349
Spring 02	252	(78)	73	(22)	0	325	0	3	1	252	(77)	76	(23)	1	329
	463	(69)	204	(31)	0	667	5	5	1	468	(69)	209	(31)	1	678

[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, RY 1997–01

Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Successful hunters[b]
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
2000–01	3	(14)	1	(5)	9	(43)	21
2001–02	20	(3)	111	(16)	542	(79)	683

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

Table 4 Unit 9 brown bear harvest chronology percent by month, RY 1997–01

	Harvest periods											
Regulatory	July/August		September		< 7 October		≥7 October		May		June	
Year	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)
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)
2000–01	19	(4)	33	(7)	5	(1)	0	(0)	19	(4)	14	(3)
2001–02	0	(0)	8	(58)	23	(154)	20	(135)	47	(323)	1	(6)

Table 5 Unit 9 brown bear harvest percent by transport method, RY 1997–01

Regulatory year	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk.	*n*
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
2000–01	5	0	20	33	0	0	10	32	21
2001–02	76	0	16	3	0	0	1	3	683

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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. In spring 2002 we used a new line-transect-double-count technique to estimate the number and sex/age composition of bears on Unimak Island.

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 and Composition

Based on extrapolation from the Capture-Mark-Resight population estimate done in 1989 at Black Lake, I estimated 250 brown bears were on Unimak Island. Results of the 2002 line transect survey estimated 293, with 90% confidence intervals of 218–384. This equates to a density estimate of 1 bear:3.8 mi^2. During these surveys, we classified 315 bears consisting of 21% adult males and 64% single bears. Average litter size for cubs was 1.8.

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 to 2 special governor's permits that 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. During 2000 and 2001 regulatory years, 11 (64% males) and 8 (87% males) bears were killed. The harvest rate this reporting period was estimated at 3.2% based on an estimate of 293 bears on the island.

Hunter Residency and Success. Nonresidents accounted for 8% of the harvest during 1981–96 and 52% during 1997–2001.

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, 87% of permittees hunted and their success rate increased to 85%.

Harvest Chronology. Total harvests have been evenly split between the spring and fall seasons.

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.

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Table 1 Unit 10 brown bear harvest data by permit hunt, RY 1997–2001

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								
	1997–98	9[a]	0	0	100	4	5	9
	1998–99	8	12	14	86	6	0	6
	1999–00	8	25	0	100	6	0	6
	2000–01	9[a]	33	0	100	3	3	6
	2001–02	8	12	29	71	4	1	5
376 Spring Unit 10								
	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
	2000–01	7	14	14	86	4	1	5
	2001–02	7	28[b]	60	40	3	0	3
Totals for all permit hunts								
	1997–98	16	0	19	81	5	8	13
	1998–99	15	13	8	92	12	0	12
	1999–00	16	19	0	100	12	1	13
	2000–01	16	25	8	92	7	4	11
	2001–02	15	20	42	58	7	1	8

[a] Includes 1 governor's permit.
[b] Did not report.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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 ADF&G staff and the public suggest 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 various habitats including the many salmon streams in the unit. 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 in 2000–01, and 10 August to 15 June in 2001–02. 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. The Board of Game (BOG) changed the season dates for brown bear during the March 2001 meeting to 10 August to 15 June. During the March 2003 BOG meeting, the board again liberalized brown bear hunting in Unit 11 by changing the bag-limit from 1 bear every 4 years to 1 bear every year and not count against the bag in an area with a one every 4-year limit. The board also dropped the $25 resident tag fee.

Hunter Harvest. Nine brown bears were reported killed during the 2001–02 season, and 11 were killed during 2000–01 (Table 1). Males comprised 56% of the 2001–02 harvest and 73% of the 2000–01 harvest. These are the highest reported harvests since 1990, when 10 bears were reported. The mean age for males was 8.7 years in 2000–01 and 10.3 in 2001–02. Mean ages of bears taken in Unit 11 fluctuate yearly because of the small sample size, but do indicate large, older bears are common, and hunters can hunt for large trophies.

Hunter Residency and Success. Nonresident hunters took 5 bears in 2000–01 and 3 brown bears during the 2001–02 season (Table 2). This is the first real increase in nonresident harvest since the 1989 season. The annual harvest by nonresidents declined between 1961 and 1978 from an average of 11 (range = 2–18) bears per year to an average of 2 per year (range = 0–3) between 1978 and 1999. Local residents harvested 3 bears during the past 2 years and have been averaging about one bear a year for the last 15 years. Successful bear hunters averaged 3.8 days hunting during the 2000–01 season and 3.3 days in 2001–02. Between 1979 and 1999, hunter effort data show a mean of 4.9 days to take a bear in Unit 11.

Harvest Chronology. All of the 2000–01 and 88% of the 2001–02 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. This is especially true now that the bear season opens on 10 August as does the sheep season – 44% of the bears were taken during the 2001–02 season were taken in August. 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). Over the 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, and some of the most popular trails have recently been closed due to negative environmental impacts.

Other Mortality

Reported defense of life or property (DLP) killings during this reporting period were one male per year in both 2000 and 2001. 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

There are few cabins or homesites 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 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

Brown bear harvests increased the last 2 years, averaging 11 bears per year. This is well above the 2.7 average bear harvest observed from 1991–99. Even though the current harvest is up appreciably, harvest levels are still below the 16 bear per year average reported between 1961 and 1978. The decline in bear harvest after 1978 was a direct result of establishing

Wrangell St. Elias National Park and Preserve. National Park Service regulations prohibit sport hunting and aircraft access for subsistence hunting over approximately 60% of Unit 11 designated as park. The increase in bear harvests the last 2 years is thought to be a result of an increased interest in hunting bears. The opportunity to hunt caribou, moose and sheep has decreased dramatically in recent years because these species have demonstrated large population declines. Individuals seeking hunting opportunities with a reasonable chance of success are turning to alternative species such as bears, for which seasons are long and participation not limited by a permit system. Also, increasing the season length to allow complete overlap with sheep season will increase harvests by nonresidents seeking combination hunts. Brown bears are considered abundant in Unit 11. Frequent sightings of sows with cubs suggest good productivity. Studies in Unit 13, which is adjacent to Unit 11, suggests these units have good productivity rates for an interior grizzly bear population. Given the low harvest and large amount of habitat inaccessible to hunters because of both topography and Park Service regulations, current harvest rates are not influencing brown bear population trends. Because hunting has little impact on brown bear numbers in this unit, no changes in bag limits or season dates are recommended.

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Table 1. Unit 11 brown bear harvest, RY 1997–2001.

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
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
1999–2000																
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
2000–01																
Fall 00	8	3	(27)	0	11	--	--	--	--	--	9	(75)	3	(25)	0	12
Spring 01	0	0	(0)	0	0	--	--	--	--	--	0	(0)	0	(0)	0	0
Total	8	3	(27)	0	11	--	--	--	--	--	9	(75)	3	(25)	0	12
2001–02																
Fall 01	5	4	(44)	0	9	--	--	--	--	--	5	(50)	4	(50)	0	9
Spring 02	0	0	(0)	0	0	1	0	0	0	0	1	(100)	0	(0)	0	1
Total	5	4	(44)	0	9	1	0	0	0	0	6	(60)	4	(40)	0	10

[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, RY 1989–2001.

Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	successful hunters
1989–90	4	(33)	3	(25)	5	(42)	12
1990–91	2	(20)	7	(70)	1	(10)	10
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	1	(25)	3	(75)	0	(0)	4
1996–97	0	(0)	0	(0)	2	(100)	2
1997–98	3	(75)	1	(25)	0	(0)	4
1998–99	0	(0)	2	(100)	0	(0)	2
1999–2000	1	(20)	2	(40)	2	(40)	5
2000–01	2	(17)	5	(42)	5	(42)	12
2001–02	1	(10)	6	(60)	3	(30)	10

[a] Local resident means resident of Unit 11 and Unit 13 residents of federally designated subsistence communities .

Table 3. Unit 11 brown bear harvest chronology percent by time period, RY 1989–2001.

Regulatory	Harvest percent					
year	August	September	October	April	May	n
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
1999–2000	--	60	20	--	20	5
2000–01	--	91	9	--	--	11
2001–02	44	44	--	--	12	9

Table 4. Unit 11 brown bear harvest percent by transport method, RY 1989–2001.

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
2000–01	66	0	8	8	0	0	8	0	8	12
2001–02	50	0	0	0	0	0	40	0	10	10

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 12 (9978 mi^2)

GEOGRAPHIC DESCRIPTION: Upper Tanana and White River drainages; including 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 areas not commonly used by bears (approximately 2500 mi^2) are dominated by high mountains (>7000 ft) devoid of vegetation or covered by large ice fields. Little is known about historical population trends; harvest data indicate that most of the unit probably supported densities of grizzly bears that were not limited by harvest. In 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 sought by hunters and periodically by miners in southeastern Unit 12. Bear hunting regulations became more restrictive from statehood through the early 1980s as guiding activity increased. During the 1970s the Unit 12 moose population declined substantially and grizzly bears were found to be an important predator on moose calves. Unit 12 grizzly bear hunting regulations were liberalized in 1981 to reduce the bear population and elevate moose calf survival. A Southcentral Alaska study (Ballard and Miller 1990) indicated that when a grizzly bear population was reduced by at least 60%, moose calf survival increased significantly. Harvest was not expected to reduce the grizzly bear population at that level, but because the sustainable harvest of grizzly bears is low (5–8%), some population reduction was expected, along with increased moose calf survival.

During the mid 1980s, bear harvests increased by 29% in Unit 12. Most of the increase was due to greater harvest by Alaska residents, apparently in response to more liberal seasons and bag limits. Concurrently, 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 Unit 12 where little bear harvest occurred. During the early 1990s moose calf survival declined or remained stable. Management objectives called for elevated grizzly bear harvests until moose numbers approached stated objectives or until harvest was too high to ensure the viability of the bear population. During the 1990s it appeared that reducing the grizzly bear population by harvest

did not have the desired effect on moose calf survival. Also, further analysis of the southcentral moose population data found no evidence that grizzly bear population reduction contributed to the moose population increase (Miller and Ballard 1992). In response, management objectives were changed to offer the greatest 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 harvest does not exceed 28 bears and includes 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 harvest date, specific harvest location, 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., RY01 = 1 Jul 2001 through 30 Jun 2002).

To assess annual berry abundance, I established 5 permanent blueberry sample areas in Unit 12 and 3 in adjacent Unit 20E during summer 2000. Each sample area has 5 1-m^2 plots. Plots were selected by the presence of blueberry plants and for a variety of habitat types, aspects, elevations, and slopes. A rain gauge was placed at each site to monitor precipitation. To measure berry production and abundance, the number of berries within each plot is counted at the same time each year. Comparison of berry production between years and sites may be used to 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 Unit 12 grizzly bear population trend to be stable, with the autumn 2000 population at 350–425 bears (46.6–56.7 bears of all ages/1000 mi^2 of useable habitat; 18.0–21.9 bears of all ages/1000 km^2). The population estimate was based on 1) extrapolations from density estimate surveys conducted in similar habitats in Interior and Southcentral Alaska (Reynolds and Boudreau 1992; Miller et al. 1997), 2) harvest distribution, and 3) sex and age composition of the harvest. The population trend estimate was based on 1) harvest statistics (total harvest, sex ratio, average skull size, and age of harvested bears) and 2) informal public surveys. During the report period (RY00–RY01), harvest exceeded the

estimated sustainable yield in RY00. Harvest probably primarily affected local areas, as about 90% of the harvest occurred in the Tok River drainage and between the Nabesna River and the Alaska–Yukon border within the Wrangell Mountains. In the remainder of the unit, harvest level was light and likely had no effect on population trend. Therefore, grizzly bear population in the entire unit probably remained stable relative to the 2000 estimate but reduced compared to the early 1970s. Bear numbers in the Tok, Nabesna, Chisana, and White River drainages probably declined locally during the report period due to harvest. Comments received from long-term guides and hunters in the area support this assessment.

Based on harvest data, Unit 12 grizzly bear numbers have fluctuated since the 1970s but overall have declined. Grizzly bears 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 (range = 10–29), and were primarily in the northern Wrangell Mountains, Mentasta Mountains, and the Tok River drainages. Due to topography, much of Unit 12 is difficult to access and hunt. 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 where landownership restricts access or by using the areas later in the fall.

Between RY83 and RY87, estimates of grizzly bear numbers in accessible areas continued to decline due to increased harvest ($\bar{x}$ = 24 bears/year, range = 19–30). During RY88–RY99, harvest declined to 15.7 bears/year (range = 8–24). Harvest distribution remained relatively the same. Average skull size of harvested males did not change during RY72–RY82 (20.8 in) or RY88- RY99 (20.8 in). However, average skull size (19.6 in) was smaller during RY83–RY87. The primary difference between these periods was that from RY84–RY87 no grizzly bear tag fee was required. In RY00 and RY01 a grizzly bear tag fee was required and average male skull size was 20.3 and 19.1 inches.

Based on kill density (number of harvested bears/10,000 mi^2), bear numbers were reduced in the accessible areas of 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, the bear population declined by 28% during a period when the kill density was 4.8 bears/10,000 mi^2 (2.2/10,000 km^2; Reynolds, ADF&G, unpublished data). Since RY87, harvest has declined in the accessible areas as well as 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).

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.

Alaska Board of Game Actions and Emergency Orders. No regulatory changes occurred during RY00–RY02. The tag fee requirement was waived in southeastern Unit 20D annually during the board's spring 1995 through spring 2002 meetings, which could have affected the grizzly bear numbers in adjacent northwestern Unit 12. However, based on harvest distribution in Unit 20D, this regulatory change probably 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 requires the board to 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 grizzly bear population if further grizzly bear population reduction is deemed appropriate to benefit moose.

During the spring 2002 Board of Game meeting, the Upper Tanana/Fortymile Fish and Game Advisory Committee submitted a proposal to lengthen the Unit 12 grizzly bear season from 10 August to 30 June. The board extended the season to include June but not August. Most of the August harvest would have been incidental to sheep hunting in the mountains where most grizzly bear harvest already occurred. The board also was concerned that the poor hide quality of bears harvested in August compared to later in autumn would not be the best use of this resource.

Hunter Harvest. Based on the estimated grizzly bear population size and research in Unit 20A (Reynolds, ADF&G, personal communication), the sustainable harvest in Unit 12 was 28 bears, of which 6 could be adult females >5 years old. Reported harvest in Unit 12 during RY00 was 37 (14 females) and during and RY01 was 18 (6 females; Table 1). The preliminary reported autumn RY02 harvest was 8, of which 7 were females. The average age of the females taken in RY00 was 6 years old (n = 12) and 5 were >5 years old. The average age of females taken in RY01 was 7 years old (n = 6) and 3 were >5 years old. The 3-year (RY99–RY01) average harvest was 23.3 bears. The percent males harvested during RY99–

RY01 was 44%, 62%, and 67%, respectively, and the 3-year average was 58%, which met the harvest objective.

Changes in grizzly bear hunting regulations may have affected bear population trend. The Alaska Board of Game enacted regulations designed to reduce grizzly bear numbers in Unit 12 by increasing the harvest bag limit to 1 bear/year in RY82 and eliminating the resident tag fee in spring 1984 (RY83). The increased bag limit resulted in little change in harvest, as less than 2% of the harvest during RY82–RY02 was by repeat hunters. However, in spring 1984, residents harvested 11 bears compared to the RY78–RY82 average spring harvest of 1.2 bears. Residents took 13 bears during autumn 1984 (RY84) compared to the previous 5-year average of 9.2 bears during autumn. While the resident tag fee exemption was in effect (spring 1984 through spring 1988), autumn and spring harvests by residents ranged from 7 to 13 ($\bar{x}$ = 10) and 3 to 11 ($\bar{x}$ = 5.5), respectively. After the tag fee was reinstated the average harvest by residents during RY87–RY91 was 7.4 (3–12).

The resident tag fee was eliminated to encourage more resident hunters to harvest grizzly bears incidental to moose, sheep, and caribou hunts. Harvest data trends indicate residents responded to the regulatory change especially during the first year and grizzly bear harvest was higher when the resident tag fee was waived. However, there was no significant difference between the number of bears harvested during the 3.5 years with no tag fee (treatment) compared to the 5 years pretreatment (tag fee required) ($P \leq 0.38$) and the 5 years post treatment (tag fee required) ($P \leq 0.12$). Spring grizzly harvest by residents was higher during the treatment years compared to pretreatment ($P \leq 0.08$) and post treatment ($P \leq 0.09$), indicating that a combination of an aggressive public awareness campaign and no tag fee brought hunters to Unit 12 for the sole purpose of hunting grizzly bears. The quick response by hunters to the resident tag fee waiver indicates the hunting public was well informed and supportive of the increased opportunity to hunt grizzlies in Unit 12.

Based on nonresident harvest, the higher harvests during the treatment years (spring RY83–RY87) appears to have resulted in a decline in the grizzly bear population in that portion of Unit 12 that received the greatest hunting pressure (Tok, Nabesna, Chisana, and White River drainages). Nonresidents harvested 10 bears/year during RY78–RY82 (pretreatment). During post treatment years (RY87–RY91), nonresidents took significantly fewer bears (5.1 bears/year; $P \leq 0.001$). The same number of guides booked about the same number of nonresident bear hunters in the area. Nonresidents also took a lower percentage of the harvested bears following the treatment years, declining from 54.5% of the harvest to 37.7%. Residents tend to hunt earlier in September than guided nonresidents and may have taken most of the vulnerable bears before most nonresidents were afield. Average annual harvest during RY87–RY91 (post treatment) was also significantly lower compared to average annual harvests during pretreatment RY78–RY82 ($P \leq 0.009$).

If further reduction of bear numbers through increased harvest is desired in Unit 12, the tag fee should be eliminated and accompanied by an intensive public awareness campaign. However, unless the hunt is managed differently than in the past, harvest will be localized in areas where bears are most vulnerable, not necessarily where the population reduction is desired. Also, based on results from other areas with liberal grizzly bear harvest regulations,

hunter demand may be satisfied and harvest could stabilize or decline within a few years with little to no increases in moose calf survival (Gardner 1999). As the number of areas where resident tag fees are waived and bag limits are liberalized, it may become less likely that grizzly bear hunters will be drawn to Unit 12.

Based on recent harvest in Units 12 and 20E, greater grizzly bear hunting opportunity can be maintained without reducing the population by implementing a 1 bear/year bag limit and by offering a June season.

Hunter Residency and Success. Historically, nonresidents took most of the grizzly bears harvested in Unit 12; before RY83 they took 63% of the harvest. During RY83–RY91, residents took 66% of the bear harvest. Harvest by residents increased as a result of regulation changes that allowed 1 bear/year and, periodically, no tag fee. In spring 1991 the bag limit reverted to 1 bear/4 years and resident harvest began to decline (Table 2). Since RY92, nonresidents have taken 59.9% of the harvest even though more liberal regulations favoring residents were reenacted. During RY00 and RY01, nonresidents took 59% and 67% of the harvest. Based on discussions with local and nonlocal residents, they do not hunt for grizzly bears more often in Unit 12 because 1) they have already harvested a grizzly bear or 2) they are not interested in taking a bear while hunting moose or sheep. Some hunters state they would take a grizzly bear if the tag fee was eliminated.

Both residents and nonresidents hunt the area where most grizzly bear harvest occurs in Unit 12, but are usually separated temporally and by land use restrictions. Only the western portion (Tok River drainage) is heavily hunted for moose.

Harvest Chronology. During RY00, RY01, and RY02 (preliminary autumn harvest data), 71%, 75%, and 75% of the harvested grizzly bears were taken during September. The 5-year average for September was 65.4% (Table 3). Historically, most bears were harvested during September when most resident moose and caribou hunters and guided hunters were afield. Since RY94, there has been more interest in spring bear hunting in Unit 12 by guided nonresident hunters in the Nabesna and Chisana River drainages and by resident hunters along the Chisana and Tanana Rivers.

Transport Methods. During RY00 and RY01 most successful grizzly bear hunters used horses or airplanes to access the area (Table 4), similar to historical patterns. During RY89–RY99, hunters using 3- or 4-wheelers as their primary transportation harvested only 12 bears. Few trails in Unit 12 give bear hunters who use 3- or 4-wheelers an advantage. During RY00 and RY01, 5 bears each year were killed by hunters using 4-wheelers. Most were in the Alaska Range, west of the Tok Cutoff where access is easier. Almost exclusively, the use of horses was by guided nonresident hunters within the Nabesna, Chisana, and White River drainages.

Other Mortality

Intraspecific mortality inflicted by adult male bears is probably the greatest source of nonhunting bear mortality in Unit 12. Few grizzly bears were taken in defense of life or property (DLP) incidents. Numerically, a higher number of bears were taken under DLP in autumn RY00 and RY01. During RY00 all 3 bears were taken during one incident. A female

and 2 cubs entered a home in Northway and were shot. In RY01, 2 young bears were shot as DLPs near homes and 1 bear was killed by a hunter as it approached a bear the hunter had just killed.

HABITAT

Assessment

Unit 12 offers moderate-quality grizzly bear habitat with the exception of 2500 mi^2 of unvegetated mountaintops and ice fields. Bear habitat is 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 accessible to bears.

I established 5 blueberry sample areas in Unit 12 and 3 in Unit 20E during July 2000 (Table 5). Two years of data are presented in Table 6. These data and discussions with local berry pickers, hunters, and hikers, indicate that in 2000 blueberries were generally sparse, though abundant in a few locations. Blueberries were more abundant in all habitats in 2001. Coincidently, the highest recorded grizzly bear harvest in Unit 12 since 1973 and a comparatively high harvest in Unit 20E occurred in 2000 when blueberry production was poor. Unfortunately, we were not able to sample during 2002 but our objective is to annually monitor berry production in these areas of Units 12 and 20E and evaluate the effects of berry abundance on bear harvest and problem bear incidents.

Enhancement

Maintaining 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. Other habitat enhancement methods are being considered for areas managed for full fire suppression. 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 from the treatments.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The objective of 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 in the mid-1980s in the one area monitored (Tok River drainage) that received high bear harvest. However, calf survival also 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 reductions in the grizzly bear populations by harvest in portions of these units was not effective at increasing 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 asks for additional bear population reduction

programs. To maintain credibility with the public and the scientific community we must determine under what conditions 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.

Liberal grizzly bear regulations in Units 12 and 20E indicate we can offer increased hunter opportunity by increasing the bag limit to 1 bear/year and extend the season through June without affecting bear population trends. Adding an August season and waiving the resident tag fee requirement can result in higher bear harvests.

Based on the current estimates, 28 grizzly bears, including a maximum of 6 adult females, can be harvested annually in Unit 12 without a population decline, assuming harvest is evenly distributed in the unit. During the past 21 years, the annual female quota has been exceeded twice, and the overall harvest quota 4 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). We have also learned that bear population reductions in Units 12 and 20E have not been sufficient to cause a significant increase in moose calf survival.

CONCLUSIONS AND RECOMMENDATIONS

Grizzly bears continue to be well distributed throughout Unit 12. The 2002 population was near the 2000 estimate of 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 to slightly declining. 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 permanent communities. High levels of harvest during the report period probably caused the population to decline slightly. Grizzly bears are a valued trophy animal and the combination of resident and nonresident hunting has proven to be adequate to maintain the grizzly population at a level lower than the habitat can support. I recommend this grizzly bear population be managed to maintain a high trophy standard, except in the Tok and Tanana River drainages.

The objectives were met to limit harvests so the 3-year mean harvest does not exceed 28 bears and has at least 55% males in the harvest. However, the female harvest in RY98, RY99, and RY01 was higher than desired. The greatest female harvest occurred in autumn 2000 and all were taken in areas that historically receive the greatest harvest. Seven of the female bears were taken by guided nonresidents. Similarly, preliminary harvest data from autumn 2002 indicates that 7 females were harvested, 4 of which were taken in a high-harvest area. In addition, most of the Unit 12 grizzly bear harvest was in a fairly concentrated area. A more thorough analysis of harvest trends in the Tok, Nabesna, Chisana, and White River drainages is needed and possibly, changes in management direction.

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TABLE 1 Unit 12 grizzly bear mortality, regulatory years 1989–1990 through autumn 2002

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

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
1997–1998															
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															
Autumn 2000	15	10	0	25	2	1	0	0	0	17	(61)	11	(39)	0	28
Spring 2001	6	3	0	9	0	0	0	0	0	6	(67)	3	(33)	0	9
Total	21	13	0	34	2	1	0	0	0	23	(62)	14	(38)	0	37
2001–2002															
Autumn 2001	7	5	0	12	3	0	0	0	0	10	(67)	5	(33)	0	15
Spring 2002	2	1	0	3	0	0	0	0	0	2	(67)	1	(33)	0	3
Total	9	6	0	15	3	0	0	0	0	12	(67)	6	(33)	0	18
2002–2003															
Autumn 2002[b]	1	7	0	8	0	0	0	0	0	1	(13)	7	(87)	0	8

[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 2002

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	(79)	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	4	(12)	10	(29)	20	(59)	34
2001–2002	3	(20)	2	(13)	10	(67)	15
2002–2003[a]	2	(25)	1	(13)	5	(63)	8

[a] Preliminary harvest.

TABLE 3 Unit 12 grizzly bear harvest chronology by month, regulatory years 1989–1990 through autumn 2002

Regulatory year	Harvest chronology by month												n[a]
	Sep	(%)	Oct	(%)	Nov	(%)	Apr	(%)	May	(%)	Jun	(%)	
1989–1990	10	(83)	0	(0)	0	(0)	0	(0)	2	(17)	0	(0)	12
1990–1991	11	(69)	0	(0)	0	(0)	1	(6)	4	(25)	0	(0)	16
1991–1992	7	(78)	0	(0)	0	(0)	1	(11)	1	(11)	0	(0)	9
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
1994–1995	11	(73)	0	(0)	0	(0)	1	(7)	3	(20)	0	(0)	15
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
1997–1998	8	(73)	0	(0)	0	(0)	0	(0)	3	(27)	0	(0)	11
1998–1999	9	(56)	1	(6)	0	(0)	0	(0)	6	(38)	0	(0)	16
1999–2000	10	(63)	1	(6)	0	(0)	0	(0)	5	(31)	0	(0)	16
2000–2001	24	(71)	1	(3)	0	(0)	0	(0)	9	(26)	0	(0)	34
2001–2002	12	(75)	0	(0)	0	(0)	0	(0)	3	(25)	0	(0)	15
2002–2003[b]	6	(75)	2	(25)	0	(0)							8

[a] Includes unknowns.
[b] Preliminary harvest.

TABLE 4 Unit 12 grizzly bear harvest by transport method, regulatory years 1989–1990 through autumn 2002

	Harvest by transport method																	
Regulatory year	Airplane		Horse		Boat		3- or 4-wheeler		Snowmachine		ORV		Highway vehicle		Walking		Unk		*n*
	(%)		(%)		(%)		(%)		(%)		(%)		(%)		(%)		(%)		
1989–1990	4	(33)	2	(17)	1	(8)	0	(0)	1	(8)	4	(33)	0	(0)	0	(0)	0	(0)	12
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
1994–1995	4	(27)	7	(47)	0	(0)	1	(7)	0	(0)	0	(0)	2	(13)	0	(0)	1	(7)	15
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	(18)	8	(73)	1	(9)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	11
1998–1999	6	(38)	5	(31)	0	(0)	1	(6)	0	(0)	2	(13)	2	(13)	0	(0)	0	(0)	16
1999–2000	5	(31)	8	(50)	0	(0)	3	(19)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	16
2000–2001	9	(26)	14	(41)	1	(3)	5	(15)	0	(0)	0	(0)	5	(15)	0	(0)	0	(0)	34
2001–2002	3	(20)	5	(33)	0	(0)	5	(33)	0	(0)	0	(0)	0	(0)	2	(13)	0	(0)	15
2002–2003[a]	2	(25)	3	(38)	0	(0)	1	(13)	0	(0)	1	(13)	1	(13)	0	(0)	0	(0)	8

[a] Preliminary harvest.

TABLE 5 Blueberry sample areas in Units 12 and 20E

Area	Unit	Elevation	Aspect[a]	Slope	Primary vegetation
Clearwater	12	1966	Flat	Flat	spruce/muskeg
7-Mile	12	1859	Flat	Flat	spruce/willow
Pipeline	12	1888	5–10	SSW	spruce/willow
RCA	12	2197	15–20	N	spruce/alder
4-Mile	12	2300	5–10	S	spruce/tussock
9-Mile	20E	2722	5–10	NE	1990 burn/willow
Ptarmigan	20E	3643	10–15	W	willow/alder
Fairplay	20E	3640	10	SW	willow

[a] Degrees magnetic.

TABLE 6 Blueberry production in 8 sample units in Units 12 and 20E, 2000–2002

Calendar year	Sample units[a]								Bear harvest[b]	DLP[b,c]
	Clearwater	7-Mile	Pipeline	RCA	4-Mile	9-Mile	Fairplay Ptarmigan	Fairplay 2		
2000	137 (33.6)	3 (0.89)	19 (5.76)	7 (1.95)	55 (2.55)	51 (6.30)	124 (24.31)	46 (9.42)	18	1
2001	285 (64.36)	23 (4.34)	278 (55.86)	23 (3.13)	356 (36.09)	400 (26.24)	379 (79.05)	599 (109.69)	11	0
2002[d]									12	0

[a] Mean number of berries/sample unit. Each sample unit included 5 1-m^2 plots; numbers in parentheses is the variance among plots within a study area.
[b] Unit 20E only.
[c] Number of bears killed in defense of life and property (DLP) also includes bears harvested in Jul.
[d] No berry data collected in summer 2002.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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

ADF&G 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 were 18.75 and 23.31 independent bears/1000 km^2 respectively (Miller 1995). These results were derived using similar census techniques, and were

indicative of 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). The similar estimates between 13E and 13A indicate similar densities between subunits. These densities 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 1970s 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*a*). Based on a model of sustainable harvest rates, 640–1120 bears were estimated to inhabit Unit 13 in 1993 (Miller 1993). In 1995, a second density estimate for the Su-Hydro Study Area was completed, which 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). These parameters are typical of 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 only 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 2000–2001 hunting season dates were 10 August to 15 June in Unit 13, except that portion of 13E west of the Alaska Railroad where the season opened on 10 September and closed 31 May, and Denali State Park where the season was 1 September to 31 March. The season dates in 2001–2002 were 10 August to 15 June unitwide. The bag limit is one bear every 4 years in that portion of 13E within Denali State Park. The bag limit for the remainder of the unit is one bear every year. The resident $25 tag fee requirement in Unit 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 Board of Game (BOG) designated Unit 13 an intensive management area as directed under SB-77 during the 1995 meeting. 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. In order to increase interest in hunting bears, the BOG has been liberalizing seasons ever since. During the 2003 spring meeting, the BOG passed a year round season for brown bears in Unit 13.

Hunter Harvest. The reported 2001–02 sport harvest of brown bears was 116, down 30% from the record harvest of 166 taken in 1999–00 (Table 1). The average annual take was 139 bears/year (range = 116–166) 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 2001–02 brown bear harvest by unit included 13A – 16 bears, 13B – 15, 13C – 3, 13D – 20, and 13E – 62 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 54 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 2001–02 brown bear harvest was 67 (59%) males and 47 (41%) females (Table 1). The mean skull size was 21.8 inches for males and 19.6 inches for females. The mean age was not available for the 2001–02 season, but for the 2000–01 season was 5.7 years for males and 7 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, however, 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. Males comprise 61% of the bears harvested up through the first five year age classes. Given a 50/50 sex ratio at birth, this suggests emigration of young males from lighter or unhunted portions of the unit or adjacent areas (Kontio et al. 1998). 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 older females tend to be taken in the fall because those with cubs during spring may lose them during summer and become legal during fall.

Hunter Residency and Success. Nonresident hunters took 43 (37%) bears in 2001–02 (Table 2). The number of bears taken by nonresidents increased slightly beginning in 1998. During the last 4 years, nonresidents have averaged 43 bears/year compared to an average of 33/year prior to 1998. Local residents took 10 (9%) bears in 2001–02. The number of bears taken by local hunters shows considerable yearly variation. 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 85 bears and are the highest reported since the mid 1980s, 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 4.7 days in the field in 2001–02 and 4.2 days in 2000–01. In Unit 13, hunters have averaged 4.2 days hunting to take a bear during the last 15 years. Hunting effort varies between years, but no trend is evident.

Harvest Chronology. For the 2001–02 regulatory year, hunters harvested 87 bears (75%) during the fall and 29 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). This variation may in part 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 spring snow conditions allowing better access. In contrast, a particularly late break-up would interfere with ORV access later in May.

Males composed 53% (n = 45) of the fall harvest in 2001. This was the fifth 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 76% (n = 22). The percent males taken during the spring has fluctuated between a low of 69% in 2000 and a high of 81% in 1998. Since 1980 when spring seasons started, males have averaged 67% of the harvest. Miller (1990*b*) 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 has not been evident since 1994 as the total males exceed females in every week of the spring season on a total basis for all years between 1994–02.

Transport Methods. Aircraft were the most important method of transportation for brown bear hunters in Unit 13 during 2001–02 (Table 4). Aircraft, 4-wheelers and highway vehicles are consistently important while snowmachine use is highly variable and dependent on snow conditions in the spring season. Snowmachine use has generally been increasing since 1989 when design changes improved agility and reliability, permitting hunters to travel into areas formerly considered too rough or remote. The importance of 4-wheelers as a transportation method for all hunting in Unit 13 has increased the last 10 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 increased in importance.

Hunter Attitudes. We sent hunter questionnaires to 235 successful bear hunters who took a bear in Unit 13 from 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 which 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 18 brown bears (13 males, 5 females) reported killed in defense of life or property (DLP) during the 1997–98 through 2001–02 reporting period. The average of 3.6 bears/year was slightly higher than the 2.9 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 may also not be 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 ADF&G maintain its policy of not relocating problem bears.

CONCLUSIONS AND RECOMMENDATIONS

A major problem faced by brown bear managers is the difficulty in obtaining population data. Observing and counting bears is both difficult and expensive because of their low density and secretive behavior. This is especially true of interior grizzly populations that do not congregate on salmon streams and are wary of motorized vehicles. As a result, 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 2 of the 3 different study areas in Unit 13 indicate that bear numbers are high for an interior grizzly bear population. Data from these census areas through 1998 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 in the heavily hunted areas of Unit 13. 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 until 1998 were high enough to reduce the brown bear population in Unit 13.

Unit 13 is an intensive management area where the primary management objective is to provide high harvests of moose for human use. In a 1979 study where a large number of bears were translocated out of the Upper Susitna study area, the result was increased calf recruitment and data showed that bears killed over 50% of the moose calves. The approach adopted by the Board of Game was to attempt to reduce brown bear numbers in Unit 13 by increasing human harvests.

Brown bear harvests were high in Unit 13 between 1982 and 1987 and since 1995 because of the liberal seasons, bag limits and lack of tag requirement. The brown bear harvest peaked in 1999–2000 with a record 166 bears taken. The 2000–01 harvest dropped slightly from the record but the 2001–02 kill was down appreciably. Reasons for the drop in harvests are unknown but a decline in hunter effort in Unit 13 may well be a factor. The largest drop in harvest occurred during the spring, and spring harvest fluctuations often reflect weather conditions that impact hunter access and effort. Also, Unit 13 has had a large decline in the number of moose and caribou hunters that would result in a lower incidental fall kill. Overall bear hunter effort is not available because effort data is not collected from unsuccessful bear hunters.

The high harvests reported during periods of liberalized regulations exceed sustainable harvest guidelines for brown bears in Unit 13. Miller (1988, 1993) calculated sustainable harvest rates of 5.7% for all bears or 8% for bears $\geq$ 2.0 year, which would give a maximum unitwide sustainable harvest of only 83 bears. As of 1998, census data was unable to detect a population decline. Since 1998, we have monitored harvest data in an attempt to determine population changes but to date no trends are evident.

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 immigration. 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 from 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 re-evaluated. If a rapid or drastic decline in the bear population were desired, some form of population control by ADF&G would be needed.

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Table 1. Unit 13 brown bear harvest, RY 1997–2001.

Regulatory	Hunter kill						Non-hunting kill[a]			Total estimated kill					
Year	M	(%)	F	(%)	Unk	Total	M	F	Unk.	M	(%)	F	(%)	Unk.	Total
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
2000–01															
Fall 00	51	(53)	45	(47)	0	96	2	0	0	53	(54)	45	(46)	0	98
Spring 01	36	(69)	16	(31)	0	52	--	--	--	36	(69)	16	(31)	0	52
Total	87	(59)	61	(41)	0	148	2	0	0	89	(59)	61	(41)	0	150
2001–2002															
Fall 01	45	(53)	40	(47)	2	87	1	2	0	46	(52)	42	(48)	2	90
Spring 02	22	(76)	7	(24)	0	29	--	--	--	22	(76)	7	(24)	0	29
Total	67	(59)	47	(41)	2	116	1	2	0	68	(58)	49	(42)	2	119

[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, RY 1997–2001.

Regulatory Year	Local[a] Resident	(%)	Nonlocal Resident	(%)	Nonresident	(%)	Successful Huntersb
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
2000–01	17	(12)	89	(60)	42	(28)	148
2001–02	10	(9)	63	(54)	43	(37)	116

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

Table 3. Unit 13 brown bear harvest chronology percent by time period, RY 1997–2001.

	Harvest periods																
Regulatory	August		September		October		November		March		April		May		June		n
year	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	
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
2000–01	18	(26)	41	(61)	5	(8)	1	(1)	0	(0)	15	(22)	15	(22)	5	(8)	148
2001–02	25	(29)	46	(53)	3	(4)	1	(1)	0	(0)	11	(13)	8	(9)	6	(7)	116

Table 4. Unit 13 brown bear harvest percent by transport method, RY 1997–2001.

Regulatory year	Airplane	Horse	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk.	n
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
2000–01	25	1	7	19	16	5	18	7	1	148
2001–02	29	3	11	28	4	6	10	7	1	116

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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 in Unit 14 during the late 1980s at 169–262. Harkness (1993) refined the unit 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 1985 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 no more than 5 females greater than 2 years of age.

METHODS

ADF&G 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. All harvest information was entered into the statewide harvest database and made available to staff for analysis. Harvest data were compared to previous years.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Previous biologists have attempted to estimate the Unit 14 brown bear population to the best of their ability (See Background section). There is currently no practical way to census brown bears in a forested environment. However, public reports and human-bear encounters indicated that bears were more common compared to 10–15 years ago.

MORTALITY

Harvest

Season and Bag Limit. For regulatory years 1997 and 1998 the Unit 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 changed to 15 September through May 25. Within Unit 14C brown bear hunting was not allowed in Chugach State Park and several special management areas. The season was extended in Unit 14B to September 1–May 31 in 2001 and remained the same in 2002. No other changes were made to the remainder of Unit 14.

The bag limit for brown bears was 1 bear every 4 regulatory years. Harvesting cubs or 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 2001 the Board of Game increased the season length in Unit 14B. In an attempt to streamline regulations ADF&G

proposed and the Board approved a longer season for the remainder Unit 14 except Chugach State Park in 2003.

Hunter Harvest. During the past 5 years hunters harvested an average of 13.8 bears (range 9–19) (Table 1). This 5-year average is greater than the 8.2 average for the previous 5-year period (range 5–11). The female bear component of the harvest ranged from was less than 33% except in 2001 when the percent females taken by hunters increased to 53%.

The average yearly total of female bears >2 years of age that were killed in the 5-year period 1997 through 2001 was 4.2 (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.

Hunter Residency. Nonresidents harvested an average of 3.4 bears during the 5-year period 1997–2001 (Table 2). Residents of Unit 14 harvested all remaining bears except a nonlocal took one bear in 1997.

Harvest Chronology. Although harvest chronology in Unit 14 has been variable, typically harvest peaked during September (Table 3). In 2000 more bears were actually killed in October probably due in part to a late fall.

Transport Methods. Successful bear hunters preferred using highway vehicles and ORVs this report period (Table 4). Hunters that report taking bears using foot transportation are usually hunting near their residences. We suspect that these hunters may be less likely to tolerate bears near where they live.

Other Mortality

Defense of Life or Property are the primary causes of non hunting mortality. There were 7 non-hunting mortalities in 2000 and 2 in 2001. One bear was killed in a vehicle collision and the rest of the bears killed in defense of life or property. Six of those were killed in Unit 14A and 3 in 14B. No bears were recorded killed in Unit 14C or by trains during the reporting period. We estimated an additional 2 bears per year killed and not reported (Table 1).

CONCLUSIONS AND RECOMMENDATIONS

While the total human use objectives of 10–15 bears have been exceeded, the average number of independent females harvested was below objectives. However the rising trend in harvest indicates that objectives may be exceeded in the future.

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 suggest that a harvest objective of 10–15 bears (AAH of 15) with a maximum of 5 independent females is currently reasonable.

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.

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).

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Table 1 Unit 14 brown bear harvest, RY 1993–2001

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
1993															
Fall 93	2	1	(33)	0	3	2	0	0	1	4	(80)	1	(20)	1	6
Spring 94	1	1	(50)	0	2	0	0	0	1	1	(50)	1	(50)	1	6
Total	3	2	(40)	0	5	2	0	0	2	5	(71)	2	(29)	2	9
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	1	1	6	(55)	5	(45)	2	13
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	1	2	7	(50)	7	(50)	3	17
1996															
Fall 96	2	3	(60)	0	5	1	0	0	1	3	(50)	3	(50)	1	7
Spring 97	4	0	(0)	0	4	5	1	0	1	9	(90)	1	(10)	1	11
Total	6	3	(30)	0	9	6	1	0	2	12	(75)	4	(25)	2	18
1997															
Fall 97	7	2	(22)	0	9	3	1	1	1	10	(77)	3	(23)	2	15
Spring 98	2	1	(33)	0	3	0	0	0	1	2	(67)	1	(33)	1	4
Total	9	3	(25)	0	12	3	1	1	2	12	(75)	4	(25)	3	19
1998															
Fall 98	6	3	(33)	0	9	3	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	6	3	(33)	0	9	3	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	1	0	1	1	6	(86)	1	(14)	2	9
Total	10	5	(33)	0	15	3	1	1	2	13	(68)	6	(32)	3	22

Table 1 cont.

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
2000															
Fall 2000	8	4	(33)	0	12	2	1	0	1	10	(67)	5	(33)	1	16
Spring 2001	2	0	(0)	0	2	3	1	1	1	5	(83)	1	(17)	2	8
Total	10	4	(29)	0	14	5	2	1	2	15	(71)	6	(29)	3	24
2001															
Fall 2001	8	5	(38)	0	13	2	0	0	1	10	(67)	5	(33)	1	16
Spring 2002	1	5	(83)	0	6	0	0	0	1	1	(17)	5	(83)	1	7
Total	9	10	(53)	0	19	2	0	0	2	11	(52)	10	(48)	2	23

[a]Includes DLP kills, illegal kills, other known human-caused accidental mortality.

Table 2 Unit 14 brown bear successful hunter residency, RY 1993–2001

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	(89)	0	(0)	1	(11)	9
1999	11	(73)	0	(0)	4	(27)	15
2000	10	(71)	0	(0)	4	(29)	14
2001	13	(68)	0	(0)	6	(32)	19

[a]Unit 14 residents

Table 3 Unit 14 brown bear harvest chronology percent by month, RY 1993–2001

Regulatory year	Harvest periods							*n*
	August	September	October	November	March	April	May	
1993	0	40	0	0	0	0	60	5
1994	0	20	0	0	0	0	80	5
1995	0	64	18	0	0	0	18	11
1996	0	44	11	0	0	--	11	9
1997	0	67	8	0	0	8	17	12
1998	11	56	33	0	0	0	0	9
1999	0	47	13	0	0	20	20	15
2000	0	36	50	0	0	0	14	14
2001	0	58	11	0	0	21	11	19

Table 4 Unit 14 brown bear harvest percent by transport method, RY 1993–2001

Regulatory year	Percent of harvest							*n*
	Airplane	Horse	Boat	ATV/ORV	Snowmachine	Highway vehicle	Foot	
1993	0	0	0	40	0	20	40	5
1994	0	0	40	20	0	20	20	5
1995	9	0	27	0	0	36	27	11
1996	22	0	0	33	0	33	11	9
1997	17	0	0	33	0	33	17	12
1998	11	0	11	44	0	22	11	9
1999	13	0	0	27	20	40	0	15
2000	29	0	21	14	7	7	21	14
2001	16	0	11	26	21	11	16	19

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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 increased substantially in 1984 following a lengthening of bear hunting seasons in Unit 16 to allow hunting during den emergence (Figure 1). Prior to the liberalization, 1961–1983, harvest ranged from 17 to 46 bears annually. Harvest during 1984 reached 66 bears and then peaked at 89 bears the following year. Harvest has since fluctuated between 41 and 88 bears. During the last 5 years the harvest averaged 68.8 bears.

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.

Griese (1993) first estimated an annual sustainable harvest of 55 bears including no more than 18 females >2 years old. Harvest annually exceeded this 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 ADF&G 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. ADF&G 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. All harvest information was entered into the statewide harvest database and made available to staff for analysis.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Results for the "Quang and Becker survey" were unavailable, however preliminary calculations suggest that the density of brown bears in northern 16B were in the range of 23.3 bears per 1000 km^2 Ear Becker pers. Comm.). Final density estimates will be available in late 2003. 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) estimated the population to be within the range of 586–1156 bears.

MORTALITY

Harvest

The most recent reported 3-year (1999–2001) average annual brown bear mortality in Unit 16 was 85.3 bears. Included in this average were 23.0 females >2 years. The female harvest was within the management objectives. Estimates of unreported kills from wounding loss and poaching (Tables 1 and 2) added 8 additional bears annually to the average; some would likely have been females. The most recent 3-year-average age of male bears in Unit 16B was measured at 6.7 years (n = 140). This was similar to the 6.6 years for the previous 3 years but higher than the 5.7 years for the 3 years prior to that (1993–1995). The average age of female bears for this report period was 6.2 years (n = 80) but was also up from 4.8 and 5.1 during the 2 previous 3-year periods.

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. ADF&G recommended an increase in season length as an alternative in order to reach management objectives. In March of 2001 the Board changed the bag limit to one bear per year however that bear still counted towards the "one in four" areas.

In 2003 the Board removed the "one in four" restriction and further lengthened the season to May 31 for all of Unit 16. In response to a public proposal to close a large portion of 16 B (Redoubt Bay Critical Habitat Area) to brown bear hunting the Board delayed the opening of the season with one mile of the mouth of Wolverine Creek. The justification for this amendment was to allow bears tolerant of people that feed in this area to disperse. Both these regulations will not be in effect till the 2003 regulatory year.

Hunter Harvest. With the exception of 1997, hunter harvest has increased from the low harvest during 1993 to a near record high of 88 bears in 2001. The low harvest during 1997 was the product of poor weather and poor snow conditions during spring. During the last 5 years the harvest averaged 68.8 bears (Tables 1 and 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 nonresident harvest. Nonresidents claimed 63 and 52% of the harvest in 2000 and 2001 respectively (Table 3). Unit resident hunters have only harvested 0–6% of the bears in the past 9 years.

Harvest Chronology. Most bears are taken during the fall portion of the season (Table 4). The higher proportion may be due to one or more of the following factors: weather may be more predictable, hunters may be combining brown bear hunts with moose hunts, and interest in brown bear hunting may be higher in the fall. Some bears may also be taken in incidental to other activities like sport fishing trips. Nevertheless most fall bears are taken in September and most spring bears are taken in April.

Transport Methods. Successful brown bear hunters still preferred using airplanes for transportation (Table 5). During 2000 and 2001 76% and 66% of successful hunters used aircraft respectively. While fears that snowmachine technology would allow more hunters to successfully take bears in the unit (Griese 1998), only 10% or less of successful hunters reported using snow machines.

Other Mortality

During the report period, reported nonhunting kills were 6 bears (83% females) in 2000 and no bears in 2001 (Tables 1 and 2). Anecdotal reports suggest that some bears are killed and not salvaged or reported. Consequently we estimated approximately 8 bears annually might not be reported.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Griese (1998) highlighted dangerous interactions between humans and bears caused by fishing activities at the Wolverine creek sockeye salmon sport fishery. ADF&G 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 continued staffing the site during critical periods of conflict. In addition a public advisory group was convened in late 2002. This group was composed of users of the Wolverine Creek area and was charged with drafting a set of voluntary guidelines for users to follow. The summer of 2003 will be the first summer with these guidelines in place. An evaluation of this program is planned.

CONCLUSIONS AND RECOMMENDATIONS

We believe that management objectives are being met. Although measurement of the predator/prey ratio was not attempted, the human-use objective was close to the desired 3-year average of 28 females >2 years of age. By liberalizing the spring season in Units 16A and 16B and eliminating the resident big game tag in Unit 16B, the Board of Game has increased the likelihood of additional harvests of bears to reach the desired objectives.

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Figure 1. Unit 16 historical brown bear harvest as reported by hunters, 1961–2001.

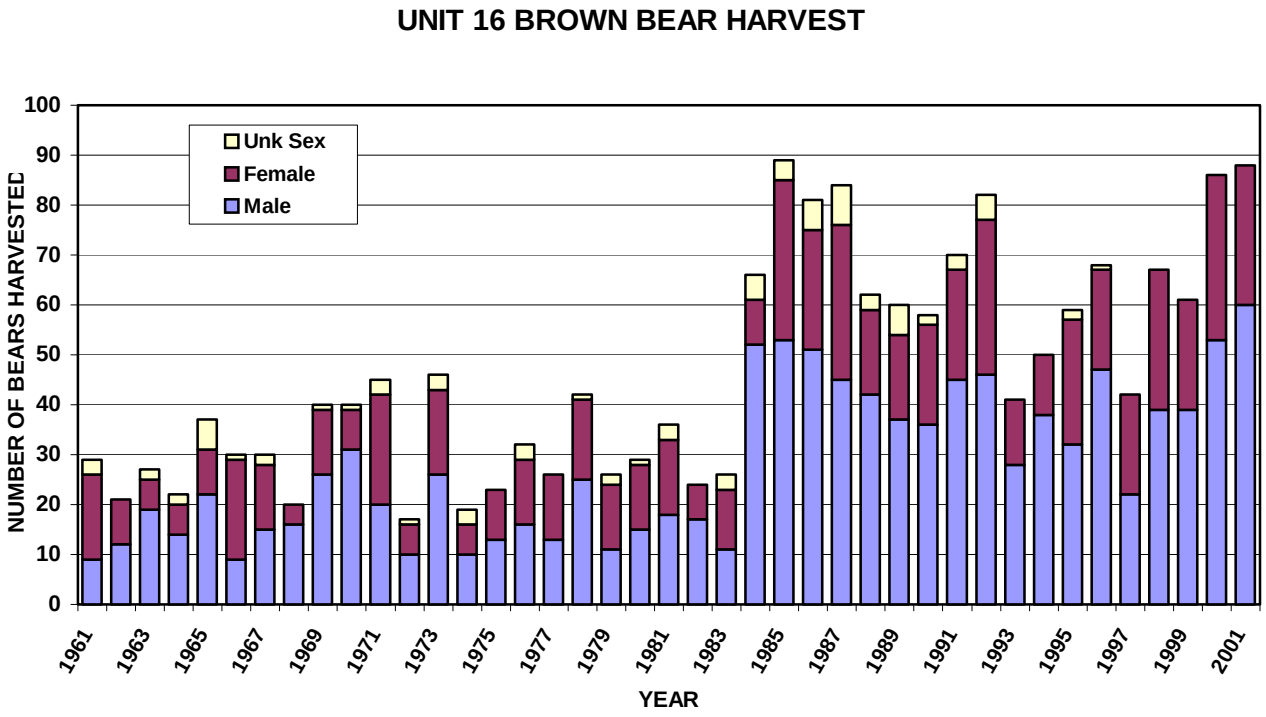

Table 1 Unit 16A human-caused brown bear mortality, RY 1993–2001

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
1993															
Fall 93	0	0	(0)	0	0	0	0	0		0	(0)	0	(0)	0	0
Spring 94	2	0	(0)	0	2	0	0	0		2	(100)	0	(0)	0	2
Total	2	0	(0)	0	2	0	0	0	1	2	(100)	0	(0)	1	3
1994															
Fall 94	3	1	(25)	0	4	0	0	0		3	(75)	1	(25)	0	4
Spring 95	1	2	(67)	0	3	0	0	0		1	(33)	2	(67)	0	3
Total	4	3	(43)	0	7	0	0	0	1	4	(57)	3	(43)	1	8
1995															
Fall 95	1	1	(50)	0	2	0	1	0		1	(33)	2	(67)	0	3
Spring 96	2	2	(50)	0	4	1	0	0		3	(60)	2	(40)	0	5
Total	3	3	(50)	0	6	1	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

Table 1 Cont.

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
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
2000															
Fall 2000	6	3	(33)	0	9	0	0	0		6	(67)	3	(33)	0	9
Spring 01	4	0	(0)	0	4	0	0	0		4	(100)	0	(0)	0	4
Total	10	3	(30)	0	13	0	0	0	2	10	(67)	3	(23)	2	15
2001															
Fall 2001	5	2	(29)	0	7	0	0	0		5	(71)	2	(29)	0	7
Spring 02	1	0	(0)	0	1	0	0	0		1	(100)	0	(0)	0	1
Total	6	2	(25)	0	8	0	0	0	2	6	(75)	2	(25)	2	10

[a]Includes DLP kills, illegal kills, other known human-caused accidental mortality.

Table 2 Unit 16B human-caused brown bear mortality, RY 1993–2001

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
1993															
Fall 93	8	12	(60)	0	20	0	1	0		8	(38)	13	(62)	0	21
Spring 94	18	0	(0)	0	18	0	0	0		18	(100)	0	(0)	0	18
Total	26	12	(46)	0	38	0	1	0	5	26	(67)	13	(33)	6	45
1994															
Fall 94	15	8	(35)	0	23	0	0	0		15	(65)	8	(35)	0	23
Spring 95	19	1	(5)	0	20	0	0	0		19	(95)	1	(5)	0	20
Total	34	9	(21)	0	43	0	0	0	6	34	(79)	9	(21)	6	49
1995															
Fall 95	12	19	(61)	0	31	3	1	2		15	(43)	20	(57)	2	37
Spring 96	14	1	(7)	0	15	0	0	0		14	(93)	1	(7)	0	15
Total	26	20	(43)	0	46	3	1	2	5	29	(58)	21	(42)	7	57
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)	3	(9)	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[b]	5	1	(17)	0	6	0	0	0		5	(83)	1	(17)	0	6
Total	18	16	(47)	0	34	0	1	0	3	18	(51)	17	(49)	3	38
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

Table 2 Cont.

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
1999															
Fall 99	29	19	(40)	0	48	1	3	0		30	(58)	22	(42)	0	52
Spring 00	13	1	(7)	0	14	0	1	0		14	(87)	2	(13)	0	15
Total	41	20	(33)	0	61	1	4	0	6	43	(64)	24	(36)	6	73
2000															
Fall 2000	17	22	(56)	0	39	1	5	0		18	(45)	27	(60)	0	45
Spring 01	25	3	(11)	0	28	0	0	0		25	(89)	3	(11)	0	28
Total	42	25	(37)	0	67	1	5	0	6	43	(59)	30	(41)	6	79
2001															
Fall 2001	22	24	(52)	0	46	0	0	0		22	(48)	24	(52)	0	46
Spring 02	32	2	(6)	0	34	0	0	0		32	(94)	2	(6)	0	34
Total	54	26	(33)	0	80	0	0	0	6	54	(67)	26	(33)	6	86

[a] Includes DLP kills, illegal kills, other known human-caused accidental mortality.

[b] Includes one bear killed where subunit could not be determined.

Table 3 Unit 16 brown bear successful hunter residency, RY 1993–2001

Regulatory year	Local[a] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total[b] successful hunters
1993	2	(5)	8	(20)	30	(75)	40
1994	2	(4)	18	(36)	29	(58)	50
1995	2	(4)	24	(46)	25	(48)	52
1996	2	(3)	24	(38)	37	(58)	64
1997	1	(3)	17	(44)	21	(54)	39
1998	0	(0)	33	(52)	31	(48)	64
1999	5	(6)	39	(51)	32	(42)	77
2000	3	(4)	27	(34)	50	(63)	80
2001	4	(5)	38	(43)	46	(52)	88

[a] Unit 16 residents
[b] Includes unknown residency

Table 4 Unit 16 brown bear harvest chronology percent by month, RY 1993–2001

Regulatory year	Harvest periods							*n*
	August	September	October	November	March	April	May	
1993	0	43	8	0	3	45	3	40
1994	0	50	4	0	4	32	10	50
1995	0	46	15	2	0	27	10	52
1996	0	42	6	0	6	39	6	64
1997	0	62	21	0	3	13	3	39
1998	0	69	9	2	2	16	3	64
1999	16	56	4	1	0	19	4	77
2000	20	39	1	0	1	33	6	80
2001	23	28	8	1	0	33	7	88

Table 5 Unit 16 brown bear harvest percent by transport method, RY 1995–2001

Regulatory year	Percent of harvest							Other/ Unknown	*n*
	Airplane	Horse	Boat	ATV/ORV	Snowmachine	Highway vehicle	Foot		
1993	80	8	0	3	5	0	5	0	40
1994	66	12	2	4	8	8	0	0	50
1995	71	4	6	4	2	4	8	2	52
1996	73	6	9	2	3	6	0	0	64
1997	67	5	15	10	0	3	0	0	39
1998	83	3	8	4	2	0	0	2	64
1999	53	10	9	7	9	4	5	1	77
2000	76	4	5	5	6	1	3	0	80
2001	66	0	9	7	10	2	6		88

Alaska Department of Fish and Game
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BROWN BEAR MANAGEMENT REPORT

From: July 1, 2000
To: June 30, 2002

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 occasionally observed near aggregations of the Mulchatna caribou herd.

Historically there hadn't been as much hunting pressure on the bear population in Unit 17 because bears in Unit 17 are neither as abundant nor quite as large as those found along the Alaska Peninsula. 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 killed in 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 harvests increased and total only slightly less than that of the fall .

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 a field hunting caribou and moose, more bears were killed either incidentally or during "combination" hunts. Increased spring harvest, however, 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, most 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 killed 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 unit wide. Bears living along the Nushagak River in Unit 17B, the Mulchatna River drainage, and in the mountains surrounding the Wood River/Tikchik Lakes 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 lower than those observed along the Alaska Peninsula, but greater than that of interior areas to the north.

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	Sep 10–May 25	1 bear per 4 regulatory year
Unit 17B	Sep 20–May 25	1 bear per 4 regulatory year

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. During their spring 2001 meeting the Board of Game eliminated the October 10 closing date for hunting brown bears in Unit 17. The fall opening dates remained the same, with the hunting season remaining open until the May 25th closing date the following spring. No emergency orders were issued during this reporting period.

Human-Induced Mortality. During the 2000–01 hunting seasons, 104 hunters reported killing brown bears in Unit 17, including 69 males (66%) and 35 females (34%) (Table 1). During the 2001–02 hunting seasons, 93 hunters reported killing brown bears in Unit 17, including 62 males (67%) and 29 females (31%) (Table 1). These reported harvests were higher than the mean annual reported harvest of the previous 5 years (64 bears).

The average skull size of bears presented for sealing in 2000–01 was 22.9" (n = 68) for males and 20.8" (n = 34) for females. The average skull size of bears presented for sealing in 2001–02 was 23.8" (n = 58) for males and 20.7" (n = 29) for females. In 2000–01, 7 bears (6 males, 1 female) were reported killed in Unit 17A; 71 (44 males, 26 females, and 1 bear of unknown sex) were reported killed in Unit 17B; and 26 (19 males and 7 females) were reported from Unit 17C. In 2001–02, 5 bears (3 males, 2 females) were reported killed in Unit 17A, 48 (31 males and 17 females) were reported killed in Unit 17B, and 40 (28 males and 10 females) were reported from Unit 17C. In the past 5 years, 6.8% of the bears reported killed in the unit have been taken in Unit 17A, 63.8% in 17B, and 29.3 in 17C (Table 2).

Hunter Residency and Success. Nonresidents account for most of the brown bear harvest in Unit 17. During the 2000–01 seasons, nonresidents took 87% of the bears reported killed in the unit. During the 2001–02 seasons, nonresidents took 76% of the bears reported killed in the unit (Table 3).

Harvest Chronology. Sixty-one bears were reported killed during the fall 2000 hunting season, and 43 bears were reported killed during the spring 2001 season. Forty-seven bears were reported killed during the fall 2001 hunting season, and 46 bears were reported killed during the spring 2001 season (Table 1). Prior to 1998 most bears were reported killed during the fall in Unit 17. Since the spring season was lengthened, spring harvests have nearly equaled the 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

Ten brown bears were reported killed in defense of life or property in Unit 17 during the 2000–01 regulatory year. No bears were reported killed illegally in Unit 17 during 2000–01, however based on previous years, illegal kills probably occurred. Two brown bears were

reported killed in defense of life or property in Unit 17 during the 1999–00 regulatory year and there were 5 known illegal kills.

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. Abundant ungulates in the unit have also provided an abundant food supply for bears. Human settlements are small relative to urban areas, but village populations are growing. With resultant increase in land uses by local residents, areas used by both humans and bears are increasing. Increased localized food sources around these settlements (human food and garbage) may 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. Demonstration projects to publicize the use of electric fences to protect property from bears were set up in the Dillingham area.

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 closure date for the dump draws near.

RESULTS AND CONCLUSIONS

Despite harvests during the reporting period of almost twice the historical average, 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. The population objective of at least 50% males in the reported harvest has been met in most years, though the sex ratio for all bears killed in the unit is unknown.

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 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.

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Table 1 Unit 17 brown bear harvest, regulatory year 1992– 2001

Regulatory year	Hunter Kill				Nonhunting Kill				Total reported kill			
	Male	Female	Unk	Total	Male	Female	Unk	Total	Male	Female	Unk	Total
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
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

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
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	6	0	44
Total	56	22	0	78	4	2	1	7	60	24	1	85
1999												
Fall '99	23	15	0	38	0	0	1	1	23	15	1	39
Spring '00	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
2000												
Fall '00	33	27	1	61	4	2	4	10	37	29	5	71
Spring '01	36	7	0	43	0	0	0	0	36	7	0	43
Total	69	34	1	104	4	2	4	10	73	36	5	114
2001												
Fall '01	21	25	1	47	0	2	5	7	21	27	6	454
Spring '02	41	4	1	46	0	0	0	0	41	4	1	346
Total	62	29	2	93	0	2	5	7	62	31	7	100

Table 2 Unit 17 brown bear harvest by subunit, regulatory year 1991– 2001

Regulatory year	Unit 17(A)				17(B)				17(C)				Unit 17 total			
	M	F	Unk	Total	M	F	Unk	Total	M	F	Unk	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
2000–01	6	1	0	7	44	26	1	71	19	7	0	26	69	34	1	104
2001–02	3	2	0	5	31	17	0	48	28	10	2	40	62	29	2	93

Table 3 Unit 17 brown bear successful hunter residency, regulatory year 1991– 2001

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
1999–00	9 (11.0)	11 (13.4)	62 (75.6)	82
2000–01	1 (1.0)	13 (12.5)	90 (86.5)	104
2001–02	6 (6.5)	16 (17.2)	71 (76.3)	93

[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, regulatory year 1991– 2001

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
2000–01	4.8%	44.3%	9.6%	1.9%	18.3%	14.4%	6.7%	104
2001–02[d]	6.5%	35.5%	7.5%	6.5%	26.9%	10.8%	4.3%	93[e]

[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

[d] Season dates: Units 17(A)&(C) Sep 10–May 25
Unit 17(B) Sep 20–May 25

[e] Includes one bear taken Oct. 20, 2001, and one bear taken Mar. 29, 2002

Table 5 Unit 17 brown bear harvest percent by transport method, regulatory year 1991– 2001

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
2000–01	77.9	---	7.7	---	10.6	---	---	3.8	---	104
2001–02	61.3	---	11.8	1.1	25.8	---	---	---	---	93

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

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

GEOGRAPHIC DESCRIPTION: Yukon-Kuskokwim Delta

BACKGROUND

Brown 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 as 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 hunting regulations. A brown bear working group made up of representatives of Unit 18 villages was established as a vehicle for local input on brown bear issues. After consultation with this group, the Western Alaska Brown Bear Management Area (WABBMA) was established and regulations were modified to more closely match local cultural needs and to improve harvest reporting. In the WABBMA, a registration permit hunt is administered for subsistence hunters who pursue bears primarily for the meat.

In 1993, a brown bear population study in the Kilbuck Mountains was initiated in response to the creation of more liberal federal hunting regulations. Obtaining a brown bear density estimate in Unit 18 was an objective of this study that will not be achieved because of local sentiment against the use of radiocollars. However, our understanding of this bear population has grown and the need for a population estimate is now less acute. We are completing the study and plan to remove radiocollars during the spring of 2003.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain a viable brown bear population in Unit 18.
- Obtain brown bear population and harvest information.
- Minimize adverse interactions between bears and the public.
- Maintain productive working relationships with local residents and other agencies.

MANAGEMENT OBJECTIVES

- Coordinate with FWS biologists from the Yukon Delta National Wildlife Refuge (YDNWR) and the Togiak National Wildlife Refuge (TNWR) to implement and finalize a study that was designed to estimate the brown bear densities using mark-recapture techniques and record other population parameters in Unit 18.

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

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

- Communicate and cooperate with the Association of Village Council Presidents (AVCP), subsistence brown bear hunters, local village councils, and USFWS to regulate subsistence bear hunting, and develop techniques acceptable to local residents to monitor grizzly bear populations consistent with the cooperative management plan.

METHODS

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

Progress obtaining a brown bear density estimate has been stymied because the working group has not supported the 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 on brown bears in the Kilbuck Mountains. We maintained radiocollars on up to 29 female bears during this reporting period and contributed to a paper detailing this project.

During the 2000–2001 and the 2001–2002 regulatory years, we sent letters requesting harvest and effort information to registered hunters in the WABBMA and monitored the general hunt harvest through our standard sealing requirements. Several local residents shot bears in defense of life and property (DLP) and we assisted them through the administrative process.

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

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

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, which is not feasible because of local opposition to radiocollaring. However, experience within the study area provides a basis for us to estimate that there are approximately 335 bears in the Kilbuck Mountains, 200 bears in the Andreafsky Mountains and 535 bears in Unit 18.

Kovach et al. (unpublished draft) found generally low reproductive parameters probably indicating that the bear population in the Kilbuck Mountains is near carrying capacity. These parameters were:

■ age of first reproduction	7.2 years
■ age of first successful reproduction	9.0 years
■ mean litter size for cubs of the year (COY)	1.98
■ mean litter size at weaning	1.62
■ mean age at weaning	3.00 years
■ reproductive interval	4.6 years
■ mean annual sow productivity	0.35 cubs weaned per year
■ survival rate of cubs from birth to weaning from 1993 to 2000	32.4% (34 weaned of 105 cubs produced)
■ mean annual survival rate for adult females from 1993 to 2000	95.0%

Population Composition

There were no activities to determine brown bear population composition in Unit 18 during the reporting period.

Distribution and Movements

Drainages that include 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.

Home range of female brown bears in the Kilbuck Mountains ranged from 408 km^2 to 549 km^2 (Kovach et al. unpublished draft). We do not have home range information for male 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. In the fall 2001 meeting, Board of Game members extended the general brown bear resident and nonresident season to Sept. 1–May 31 for that portion of Unit 18, north of the south bank of the Kashunuk River, including its sloughs from its mouth to the Yukon River, and north of the south bank of the Yukon River, including its sloughs. This season will take effect during the 2002–2003 regulatory year. The Board of Game also reauthorized the brown bear tag fee exemption associated with the WABBMA registration permit.

Human-Induced Harvest. During the 2000–2001 regulatory year, the Unit 18 reported harvest was 6 bears (1 subsistence and 5 general season) and during 2001–2002 the reported harvest was 9 bears (1 subsistence and 8 general season). Nearly all of the total reported harvest occurs in the area south of the Kuskokwim River; only 2 of 47 bears harvested since 1994 were taken north of the Yukon River. Additional harvest statistics for the general hunt are shown in Table 1.

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 many of the bears killed under DLP circumstances. During this reporting period we processed 2 DLP bears in 2000–2001 and 4 in 2001–2002. All of the reported DLP bears were taken along the Yukon River.

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, the bag limit is one bear per regulatory year, the season is longer, the hide and skull need not be salvaged, hunters must 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 is destroyed by removing the skin of the head and the front claws and these parts are retained by the department. Harvest statistics for the subsistence hunt are shown in Table 2.

In some cases, hunters get the WABBMA registration 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 registration permit offers them a way to do that without paying the $25 tag fee required under the general hunt regulations. In portions of the WABBMA, this is an accepted practice.

Hunter Residency and Success. During the 2000–2001 regulatory year, all 5 brown bears harvested under general hunting regulations were taken by nonresidents. During 2001–2002, 1 resident and 7 nonresidents harvested bears (Table 1). Because nonresidents aren’t eligible to hunt under the WABBMA permit, all of the bears taken under this permit were taken by residents (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 2000–2001, 11% of hunters who reported were successful. In 2001–2002, 16% of them 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 and it did not hold during 2001–2002 because poor snow conditions did not allow travel by snowmachine, which generally provides hunters greater access. Additional harvest chronology data are found in Table 1.

Transport Methods. All 5 successful hunters in 2000–2001 used airplanes, and 7 of 8 successful hunters in 2001–2002 used airplanes. The only hunter to use a boat was also the only resident to harvest a bear in Unit 18 under the general hunting 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, one bear was killed illegally in July 2000 and reported to us by the Alaska Dept. of Public Safety, Division of Fish and Wildlife Protection (FWP). During the previous reporting period, 6 radiocollared bears died of causes unrelated to hunting. The most likely causes of death were: 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 the TNWR, 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. Through our participation in the brown bear study, our understanding of the bear population has grown and reasonable

estimates 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 and the need to complete a census is no longer acute.

While the working group still provides valuable input regarding bear issues in Unit 18, future meetings will be less frequent largely because funding to maintain the group has become more difficult to justify.

CONCLUSIONS AND RECOMMENDATIONS

The lack of objective bear population data hampered management in the past but now the need for this data is less acute because of the results of the Kilbuck Mountains brown bear study. Our understanding of this bear population includes reproductive parameters, reasonable estimates of population size, and the effect harvest on the population. Given our improved understanding, the objections of local residents to radiocollaring bears, and the fact that this population has endured a decade of harvest with no ill effects under the more liberal regulations that prompted the Kilbuck Mountains brown bear study, it is appropriate to conclude this project and remove the radiocollars during the spring of 2003.

The WABBMA working group was instrumental in providing a forum for public discussion of brown bear issues. Now that the study is scheduled to conclude, it is unlikely that additional meetings will be funded and the future of this working group is in limbo. If future meetings are not possible, we recommend that managers continue to solicit public comment through the working group chairs and the local Fish and Game Advisory Committees regarding brown bear management in Unit 18.

Nonresident hunters are required to hire a guide to hunt brown bears. The YDNWR has issued permits to 2 bear hunting guides to operate within the refuge and 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 in Unit 18 but each is permitted to take up to 5 bears per calendar year and there are no plans by either refuge to change that number. Because of this cap on the number of guides we expect nonresident brown bear harvest to remain low.

Inaccurate and incomplete data continue to be a problem. We should continue to encourage local residents to report all bear kills and we should continue efforts to develop reliable brown bear harvest and DLP information.

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Table 1 Unit 18 general hunting season brown bear harvest. (M=male, F=female) RY 1994–2001
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'				
2000–2001	5	F'		M'F'M'M'					
2001–2002	8	M'FM'	F'F'		M'M'F'				
Totals	47	10	9	17	9	1	1		

'Nonresident guided hunter

Table 2 Western Alaska Brown Bear Management Area (WABBMA) brown bear harvest, hunter effort and success, RY 1996–2001.

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
2000–2001	26	20	9	1	1
2001–2002	69	56	19	3	1

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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, bear densities and hunter interest varies among subunits. At 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.

Estimated population densities were 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 1960s when mandatory sealing requirements began, 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 reporting of harvest.

METHODS

Data from sealing certificates provided hunter residency and hunting methods, bear demographics, sex ratio of the harvest, and timing and location of harvest. Similar harvest data were compiled from registration permits for bears taken under Western Alaska Brown Bear Management Area regulations. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY01 = 1 Jul 2001 through 30 Jun 2002).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size and Composition

Population surveys or density estimates have not been conducted in these units. 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 should support a density of 20 bears/1000 mi^2, or 200 bears. Unit 19B 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-quality habitat (20 bears/1000 mi^2 = 30 bears). Unit 19D generally contains poor quality habitat (15 bears/1000 mi^2 = 190 bears). Using these figures, my estimate was 950–1100 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 contain poor

habitat. I estimated density at 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 (15 bears/1000 mi^2 = 175 bears). The total population estimate for Unit 21A was therefore 285–335 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 (15 bear/1000 mi^2 = 105 bears). The total population estimate for Unit 21E was 100–200 bears.

My estimate for the entire 60,352-mi^2 area was 1375–1650 bears, based on extrapolated densities of 15–40 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.	1 Sep–25 May	1 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

Alaska Board of Game Actions and Emergency Orders. The board passed a proposal at their March 2000 meeting to lengthen the Unit 19B season by 10 days in the fall and 6 days in the

spring. This resulted in the season beginning on 1 September instead of 10 September and ending on 31 May instead of 25 May. The Board of Game reauthorized the resident tag fee exemption for Unit 19D at their spring 2001 and 2002 meetings. Resident tag fee exemptions must be reauthorized each year by the board. At the March 2002 meeting the board passed a proposal that changed the bag limit in Unit 19C from 1 bear/4 years to 1 bear/year, which does not count against the bag limits of 1 bear/4 years in other units.

Hunter Harvest. Harvest of grizzly bears was highly variable between units (Table 1). During RY99–RY01, harvest trend for most of the area was stable, however the Unit 19B harvest increased substantially. The Unit 19A average harvest during RY92–RY95 was 7.5 bears/year. During RY96-RY99 it increased to 9.5 bears/year and during RY00–RY01 increased further to 10.5 bears/year. In Unit 19B harvest remained stable; during RY92–RY95 it was 27.3 bears/year and during RY96–RY99 harvest averaged 28.8 bears/year. Harvests increased during RY00–RY01 to an average of 50.5 bears/year. In Unit 19C the average harvest during RY92–RY95 was 15.8 bears/year. Harvest increased during RY96–RY99 to 22.8 bears/year but during RY00–RY01 decreased to 16.5 bears/year. In Unit 19D, annual harvest was either stable or inconsequential; during RY92–RY95 it averaged 2.3 bears/year compared to the RY96–RY99 mean harvest of 3.0 bears/year. During RY00–RY01 the average harvest increased to 6.0 bears/year. Unit 21A and 21E harvests have remained low since RY92, with Unit 21A averaging 1.7 bears/year. Unit 21E annual harvest increased from the RY92–RY95 level of 3.8 bears/year but remained stable at 7.0 bears/year during both the RY96–RY99 and RY00–RY01 period. The unreported harvest of bears taken at fish camps was probably ≤10 bears/year.

The 5-year mean annual harvest (RY97–RY01) in the entire area was 86.2 grizzly bears, an increase of more than 16 bears/year compared to RY95–RY99. The conservative estimate of sustainable harvest was 83–99 bears (6% of 1375–1650 bears; Reynolds 1997). The 5-year average annual harvests are now slightly more than 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 65% (Table 2). It was <50% (44%) during only 1 of the past 10 seasons (spring 1997). The mean percentage of males in the harvest during RY97–RY01 was 66% and varied from a low of 61% (RY99) to a high of 69% (RY00).

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, hunters may not avoid taking females (except those with cubs or yearlings). Unless 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 354 of 430 bears (82%; 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 RY93 and RY01, 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 season (Table 4). The fall harvest was greater primarily due to guided hunts for multiple species. Guided hunters opportunistically killed bears while hunting ungulates. Spring brown bear hunting increased in this area from an average of 12.5 bears during April and May RY93–RY96 to 17 bears during April and May RY97–RY99 and 22.5 bears during April and May RY00–RY01.

Transport Methods. During the past 5 years, 73–88% of successful hunters used airplanes as their primary access method (Table 5). The proportion of hunters using aircraft has not changed substantially since sealing began.

CONCLUSIONS AND RECOMMENDATIONS

Harvests during this reporting period were stable in Units 19A, 19C, 21A and 21E and increased in Units 19B and 19D. The harvest increased in Unit 19B from an average of 24 bears per year during RY94–RY97 to 44 bears/years during RY98–RY01. During RY01 the reported harvest was 55 bears, the highest recorded harvest in Unit 19B. This increase in harvest may be influenced by 1) the addition of 16 days to the season in RY01, 2) increased interest in brown bear hunting by guides due to local declines in the moose populations, and 3) bear populations that may be growing and therefore afford more hunters the opportunity to see and harvest bears. Close monitoring and further investigation of data to address these possibilities should be undertaken during the next reporting period. The harvest in Unit 19D doubled from 3 bears/year during RY96–RY99 to 6 bears/year during RY00–RY01. This increase has stabilized, and harvest is still very low. The increase was likely due to the bag limit liberalization and tag fee exemption in the unit.

Annual review of sealing certificate data will continue. Sex ratios of harvested bears continue to favor males. Compliance with reporting requirements by local residents is low. This could be due to the requirement of a $25 resident brown bear tag except in Unit 19D and by resident hunters who obtain a harvest permit for grizzly bears in the Western Alaska Brown Bear Management Area. It is also likely that most grizzly bears taken out of season in this area are shot as nuisances, not necessarily for hide nor meat. To increase harvest reporting we will continue to emphasize the regulatory requirements for legal harvest and for bears taken in defense of life or property when we make personal contacts in villages and fish camps.

We did not meet our management objective to sustain a mean annual harvest of no more than 70 bears but met our objective of a minimum of 50% males. Through educational efforts we met our objective to increase the reporting of bears taken by local residents. To further improve reported harvest, other parts of Units 19, 21A and 21E may warrant more educational efforts, especially in the schools.

For the next reporting period our objective will be to 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. The following objectives are not quantifiable objectives and will be conducted as

activities: 1) to 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; and 2) to increase reported harvest.

During the next reporting period we should further examine the applicability of density extrapolations and associated guideline harvest limits in these units. Bag limit and season changes should be reassessed in order to maintain our management goals of providing opportunities to hunt large bears, hunt under aesthetically pleasing conditions, and provide increased hunting opportunity.

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TABLE 1 Units 19, 21A, and 21E grizzly bear harvest by season, regulatory years 1990–2001

Regulatory year/	Unit 19 subunits					Unit 21 subunits		
Season	A	B	C	D	Unk	A	E	Total
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								
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

Regulatory year/	Unit 19 subunits					Unit 21 subunits		
Season	A	B	C	D	Unk	A	E	Total
2000–2001								
Fall 2000	13	33	14	6	1	2	0	69
Spring 2001	0	10	6	1	0	1	8	26
Total	13	43	20	7	1	3	8	95
2001–2002								
Fall 2001	5	48	12	4	0	4	1	74
Spring 2002	3	10	1	1	0	0	5	20
Total	8	58	13	5	0	4	6	94
Fall totals	82	283	176	35	2	15	8	601
Fall % of harvest	86%	79%	84%	83%	100%	79%	12%	76%
Fall average	6.8	23.6	14.7	2.9	0.2	1.2	0.7	50.1
Spring totals	13	75	34	7	0	4	57	190
Spring % of harvest	14%	21%	16%	17%	0%	21%	88%	24%
Spring average	1.1	6.2	2.8	0.6	0.0	0.3	4.7	15.8
Grand total	95	358	210	42	2	19	65	791
Annual average	7.9	29.8	17.5	3.5	0.2	1.6	5.4	65.9

TABLE 2 Units 19, 21A and 21E grizzly bear harvest by type of kill, regulatory years 1993–2001

Regulatory	Hunter kill				Nonhunting kill				Total reported kill				
year	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F	(%)	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
2000–2001													
Fall 2000	44	25	0	69	0	0	0	0	44	(64)	25	(36)	69
Spring 2001	22	4	0	26	0	0	0	0	22	(85)	4	(15)	26
Total	66	29	0	95	0	0	0	0	66	(69)	29	(31)	95
2001–2002													
Fall 2001	41	29	1	71	2	1	0	3	43	(59)	30	(41)	74
Spring 2002	18	2	0	20	0	0	0	0	18	(90)	2	(10)	20
Total	59	31	1	91	2	1	0	3	61	(66)	32	(34)	94
1993–2002 Totals:													
Fall total	289	198	3	490	4	2	1	7	293		200		497
Spring total	116	32	0	148	0	0	0	0	116		32		148
Grand total	405	230	3	638	4	2	1	7	409		232		645

TABLE 3 Units 19, 21A, and 21E grizzly bear successful hunter residency and effort, regulatory years 1993–2001

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	20 (22)	71 (78)	1	4.9	92
2000–2001	13 (14)	82 (86)	0	4.9	95
2001–2002	18 (19)	76 (81)	0	5.2	94
Totals	115	526	4	46.3	645
Averages	12.8	58.4	0.4	5.1	71.7

TABLE 4 Units 19, 21A, and 21E grizzly bear harvest chronology by month, regulatory years 1993–2001

Regulatory year	Month of harvest (%)					
	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
2000–2001	60 (63)	7 (7)	16 (17)	10 (10)	2 (2)	95
2001–2002	66 (70)	5 (5)	13 (14)	6 (6)	4 (4)	94
Totals	453	37	84	62	9	645
Averages	50.3	4.1	9.3	6.9	1.0	71.7

[a] Other = Jan, Mar, Jul, Aug, Nov, and Dec. Table includes defense of life or property kills.

TABLE 5 Units 19, 21A, and 21E grizzly bear harvest by transport method, regulatory years 1993–2001

Regulatory year	Harvest by transport method (%)									*n*
	Airplane	Dog Team /Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	
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)	10 (11)	0 (0)	0 (0)	1 (1)	1 (1)	92
2000–2001	84 (88)	0 (0)	3 (3)	3 (3)	2 (2)	1 (1)	2 (2)	0 (0)	0 (0)	95
2001–2002	78 (83)	1 (1)	5 (5)	3 (3)	2 (2)	0 (0)	0 (0)	3 (3)	2 (2)	94
Totals	551	6	21	17	29	3	3	9	6	645
Averages	61.2	0.7	2.3	1.9	3.2	0.3	0.3	1	0.7	71.7

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNITS: 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 final phase of the study examined population recovery (Reynolds 1999). Accordingly, the Alaska 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 higher than in western Unit 20B. 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) did not detect changes in moose calf survival during periods when bear numbers were reduced in Unit 13. In Unit 20A, Valkenburg (1997) identified grizzly bears as important predators of Delta caribou herd neonates. Grizzly bears probably influence moose population dynamics in parts of this management area at different times.

During the 1980s, McNay (1990) noted increasing numbers of hunters and increased interest in hunting grizzly bears. He analyzed harvest and population data from this management area to develop specific management and harvest objectives which he based on a sustainable harvest rate of 8% of the population ≥2 years of age (Miller 1990).

In the early 1990s, Eagan (1995) estimated grizzly bear numbers in the management area at unit, subunit, and subarea (e.g., Unit 20A mountains, Unit 20A Tanana Flats) scales using a stratified approach based on topography, habitat and accessibility to humans. These estimates provided more precise measures of harvest rates across the management area, and subsequently, improved evaluation of harvest-based management objectives.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Units 20A, 20B, 20C, 20F, and 25C

- 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 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.

Units 20A, 20B, 20C, 20F, and 25C

Manage for a 3-year mean annual human-caused mortality of at least 55% males.

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 according to Uniform Coding Units (UCU). During sealing we collected premolars to determine age. ADF&G Wildlife Conservation staff in Fairbanks sealed most of the grizzly bears harvested in this area.

We analyzed grizzly bear harvest data by both regulatory (RY) (RY = 1 Jul through 30 Jun, e.g., RY00 = 1 Jul 2000 through 30 Jun 2001) and calendar years. Many of our harvest objectives are age-specific. Analysis by regulatory year creates difficulties because a cohort passes through 2 age classes within a single regulatory year. 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 monitored recovery of the population. We expected the number of female adult bears to meet prereduction levels by 1998. However, numbers were still estimated to be slightly low by spring 2000. Based on predicted trends and anecdotal information, we suspect the grizzly bear population recovered to prereduction levels by 2002.

The Tanana Flats in Unit 20A provide relatively poor grizzly bear habitat, resulting in low densities. Some grizzly bears on the Tanana Flats probably disperse from higher density areas, or make 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 relatively good 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 probably 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. Eagan (1995) classified the mountainous portion of Unit 25C as 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; 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. From 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. In RY02 the board liberalized the season by 5 days (5 Sep–31 May) based on evidence that the population had recovered to prereduction levels. All other areas covered in this report retained the 1 September opening. These seasons and bag limits applied to both resident and nonresident hunters.

Harvest by Hunters. Recent harvests in Units 20A, 20B, 20C, 20F, and 25C have been relatively stable (Tables 1a–e). Hunters killed 37 bears in all units during RY00 and 30 during RY01. Other human-caused mortality (defense of life or property kills, illegal kills, etc.) resulted in 4 bear deaths in RY00 and 4 deaths in RY01.

Harvest Zones.

Unit 20A Mountains — We estimate the 3-year (1999–2001) mean annual human–caused mortality (12.7 bears) was approximately 10–11% of bears ≥2-years old, assuming Eagan's (1995) population estimates and Reynolds' (1993) population structure (Table 2). This did not

meet our objective to decrease human-caused grizzly bear mortality by managing for a 3-year mean annual human-caused mortality of no more than 6% of the bears ≥2-years old. Average annual proportion of males in the harvest for RY99–RY01 was 62% (n = 37), which met our objective of ≥55% males in the harvest.

Eastern half of Unit 20B — The 3-year (1999–2001) mean annual human–caused mortality of 5.7 bears ≥2 years of age met our objective of a mean of not more than 6 bears/year (Table 2). This was an improvement over the last reporting period when the 3-year mean of 7 bears exceeded the objective. Average annual proportion of males in the harvest during RY99–RY01 was 67% (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 — The 3-year (1999–2001) mean annual human–caused mortality of 15.0 bears ≥2 years of age was 58% below our objective of 26 bears ≥2 years of age (Table 2). Average annual harvest for RY99–RY01 was 56% (n = 54), which met our objective of at least 55% males in the harvest.

We also met our 3-year (1999–2001) mean annual human–caused mortality (bears ≥2 years of age) objectives for the Unit 20A Tanana Flats with a harvest of 1.7 bears, western Unit 20B with 2.7 bears, Unit 20C with 7 bears, Unit 20F with 1 bear, and Unit 25C with 1 bear. Meeting the management objective for the western half of Unit 20B is worth noting, since it was the one area in which harvest (5.7 bears) exceeded the objective of 3 bears during the last reporting period.

Hunter Residency and Success. As in previous years, Alaska residents harvested the majority (72%) 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. One notable exception was RY98 which had uncharacteristic changes in the use of airplanes, highway vehicles, and other ORVs (Table 5).

CONCLUSIONS AND RECOMMENDATIONS

We did not meet the management 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 bear numbers had likely increased resulting in inflated harvest rates. Failing to meet the objective is not of great concern, since it was aimed at increasing bear numbers during the recovery phase, which did increase despite harvest exceeding recommended levels. Post recovery, the management objective is to achieve population stability, which allows for increased rates of harvest. However, with liberalized seasons, areas with high harvest density, such as the Ferry Trail Management Area and the Yanert River drainage, may be subject to localized overharvest.

We must continue to closely monitor harvests, particularly in harvest zones with small harvest quotas, and to encourage the harvest of males over females. We will continue to address this issue through education (e.g., Public Information Service and bear hunting seminars).

Finally, the objective for Unit 20A Mountains will change for the next reporting period from: "*Decrease human-caused grizzly bear mortality by managing for a 3-year mean annual human-caused mortality of no more than 6% of the bears ≥2-years old"* to: *"Manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality of up to 8% of the bears ≥2-years old."* Rationale includes: 1) We currently estimate that the Unit 20A grizzly bear population has recovered to prereduction levels. Therefore, the overall objective of managing for decreased human-caused grizzly bear mortality and subsequent population growth has changed to one of managing to provide for a stable population; and 2) The board liberalized grizzly bear seasons in 2002 to provide additional hunting opportunity and increased harvests.

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TABLE 1A Unit 20A grizzly bear harvest, regulatory years 1997–1998 through 2001–2002

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
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	0	0	0	4	0	0	4	
Total	7	2	0	9	0	0	0	7	2	0	9	78
1999–2000												
Fall 1999	10	4	0	14	0	1	0	10	5	0	15	
Spring 2000	1	0	0	1	2	0	0	3	0	0	3	
Total	11	4	0	15	2	1	0	13	5	0	18	72
2000–2001												
Fall 2000	7	4	0	11	0	0	0	7	4	0	11	
Spring 2001	0	0	0	0	0	0	0	0	0	0	0	
Total	7	4	0	11	0	0	0	7	4	0	11	64
2001–2002												
Fall 2001	5	6	1	12	1	1	0	6	7	1	14	
Spring 2002	0	0	0	0	0	0	0	0	0	0	0	
Total	5	6	1	12	1	1	0	6	7	1	14	46

[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 harvest, regulatory years 1997–1998 through 2001–2002

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
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
2000–2001												
Fall 2000	11	3	0	14	0	0	0	11	3	0	14	
Spring 2001	0	0	0	0	1	1	0	1	1	0	2	
Total	11	3	0	14	1	1	0	12	4	0	16	75
2001–2002												
Fall 2001	1	2	0	3	0	0	0	1	2	0	3	
Spring 2002	3	0	0	3	2	0	0	5	0	0	5	
Total	4	2	0	6	2	0	0	6	2	0	8	75

[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 harvest, regulatory years 1997–1998 through 2001–2002

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
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	1	1	0	3	5	0	8	
Spring 2000	0	0	0	0	0	0	0	0	0	0	0	
Total	2	4	0	6	1	1	0	3	5	0	8	38
2000–2001												
Fall 2000	4	4	0	8	2	0	0	6	4	0	10	
Spring 2001	0	0	0	0	0	0	0	0	0	0	0	
Total	4	4	0	8	2	0	0	6	4	0	10	60
2001–2002												
Fall 2001	0	4	0	4	0	0	0	0	4	0	4	
Spring 2002	3	0	0	3	0	0	0	3	0	0	3	
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 1D Unit 20F grizzly bear harvest, regulatory years 1997–1998 through 2001–2002

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
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
2000–2001												
Fall 2000	0	0	0	0	0	0	0	0	0	0	0	
Spring 2001	1	1	0	2	0	0	0	1	1	0	2	
Total	1	1	0	2	0	0	0	1	1	0	2	50
2001–2002												
Fall 2001	0	0	0	0	0	0	0	0	0	0	0	
Spring 2002	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	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 harvest, regulatory years 1997–1998 through 2001–2002

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
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
2000–2001												
Fall 2000	2	1	0	3	0	0	0	2	1	0	3	
Spring 2001	0	0	0	0	0	0	0	0	0	0	0	
Total	2	1	0	3	0	0	0	2	1	0	3	67
2001–2002												
Fall 2001	3	2	0	5	0	0	0	3	2	0	5	
Spring 2002	0	0	0	0	0	0	0	0	0	0	0	
Total	3	2	0	5	0	0	0	3	2	0	5	60

[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 Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest in 3 zones, calendar years 1997 through 2001

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	3,081[d]	1997	13	(2)	13	11.0	10.3	4.2
		1998	9	(1)	8	10.3	9.3	2.6
		1999	17	(1)	17	13.0	12.7	5.5
		2000	12	(2)	11	12.7	12.0	3.6
		2001	12	(2)	11	13.3	12.7	3.6
Eastern half of Unit 20B	4,929	1997	3	(0)	1	6.7	5.3	0.2
		1998	8	(2)	8	7.0	6.3	1.6
		1999	4	(0)	4	5.0	4.3	0.8
		2000	10	(0)	9	7.3	7.0	1.8
		2001	4	(1)	4	6.0	5.7	0.8
Unit 20A Flats, western half of		1997	12	(0)	12	12.0	12.0	0.5
Unit 20B, Unit 20C outside Denali		1998	14	(3)	14	14.7	14.7	0.5
National Park, Units 20F and 25C	26,278[e]	1999	13	(2)	12	13.0	12.7	0.5
		2000	22	(3)	18	16.3	14.7	0.7
		2001	14	(1)	14	16.7	15.0	0.5

[a] Numbers in 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 m^2.

[d] Excludes about 500 m^2 (1300 km^2) of nonbear habitat in glaciers and above 6000 ft (1850 m).

[e] Excludes 4450 m^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 1997–1998 through 2001–2002

Regulatory year	Resident (%)	Nonresident (%)	Unknown (%)	*n*
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
2000–2001	29 (78)	8 (22)	0 (0)	37
2001–2002	21 (70)	9 (30)	0 (0)	30

[a] Excludes defense of life or property, research mortality, or other human-caused accidental or illegal mortality bears.

TABLE 4 Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest chronology percent by month/day, regulatory years 1997–1998 through 2001–2002

Regulatory	Harvest chronology percent by month/day[a]								
	Sep					May			
year	1–15	16–30	Oct–Nov	Total	Apr	1–15	16–31	Total	*n*
1997–1998	31	42	0	73	0	8	19	27	26
1998–1999	61	17	0	78	0	4	17	22	23
1999–2000	40	43	3	87	0	3	10	13	30
2000–2001	51	35	8	95	0	3	3	5	37
2001–2002	43	27	10	80	7	0	13	20	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 1997–1998 through 2001–2002

Regulatory year	Harvest percent by transport method[a]								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	Other ORV	Highway vehicle	Other/Unk	*n*
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
2000–2001	24	5	11	27	0	0	24	8	37
2001–2002	33	10	3	33	0	3	10	7	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 2000
To: 30 June 2002

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 Alaska Board of Game, manage grizzly bears to reduce the effects of predation on ungulate species in portions of Unit 20D.

MANAGEMENT OBJECTIVES

- Manage for an annual mortality of 5–15 bears/year.

- Manage for a 3-year mean annual human-caused mortality composed of at least 55% males.

METHODS

Successful hunters were required to have brown bears sealed at ADF&G 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 those killed in defense of life or property,

were also sealed. Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (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 (RY00–RY01).

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 the town of Delta, near the landfill, and in the Delta Agricultural Project. Dall sheep, moose, 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 the Gasaway et al. (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 (ADF&G, 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 RY00–RY01 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. The bag limit was 1 bear/year, and no tag fee 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.

Alaska Board of Game Actions and Emergency Orders.

RY00–RY01 — The Board of Game considered and approved annual reauthorizations of 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.

RY00 — Hunters killed 16 bears (Table 1) and exceeded the harvest objective by 1 bear. Two of these bears were killed illegally. Hunter take consisted of 69% males. Hunters killed 9 bears in Unit 20D south of the Tanana River, west of the Gerstle River, where hunting regulations were most restrictive (Table 2). Where hunting regulations were least restrictive, hunters killed 7 bears south of the Tanana River, east of the Gerstle River, and 4 north of the Tanana River.

Four bears were also killed in defense of life or property (Table 1). Three were killed in southern Unit 20D, west of the Gerstle River and 1 was killed south of the Tanana River, east of the Gerstle River. Two of these bears were male and 2 were female.

The total reported mortality of 20 bears consisted of 65% males (Table 1). This was an estimated 10–11% of the unitwide brown bear population and 11–14% of bears ≥2-years old (although 1 illegal kill was a cub).

An estimated 1 bear is killed each year and not reported. Adding this estimated mortality to reported mortality results in estimated total mortality of 21 bears (Table 1).

RY01 —Hunters killed 11 bears (Table 1) and met the harvest objective. One of the kills was illegal. Harvest was composed of 64% male bears. Hunters killed 9 bears in southern Unit 20D with 4 bears taken west of the Gerstle River in the area with most restrictive hunting regulations, and 5 taken east of the Gerstle River in the area with least restrictive hunting regulations (Table 2). Two bears were killed north of the Tanana River, also in the area with least restrictive hunting regulations.

One male bear was killed in defense of life or property west of the Gerstle River (Table 1).

The total reported mortality of 12 bears consisted of 64% males for bears of known sex (Table 1). Total reported mortality was an estimated 6–7% of the unitwide brown bear population and 7–8% of the estimated 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 13 bears (Table 1).

Hunter Residency and Success. No significant changes occurred in previous patterns of residency of hunters who were successful in Unit 20D during this reporting period. Most brown bears continued to be killed by residents. Of the bears taken in RY00 and RY01 by hunters for whom residency was known, Unit 20D residents took 42% of the harvest, nonlocal residents took 46%, and nonresidents took 12% (Table 3).

Harvest Chronology. No substantive changes occurred in previous patterns of harvest chronology during this reporting period. In Unit 20D most brown bears continued to be harvested during the fall hunting season, with most kills occurring in September (Table 4).

Transport Methods. During RY00 and RY01 most successful bear hunters used foot access. Three- or 4-wheelers and airplanes were the other 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 exceeded by 1 bear in RY00 and was met in RY01. Hunters took predominantly male bears both years, allowing us to meet the objective to manage for a 3-year mean annual human-caused mortality of at least 55% males. 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, nuisance bears killed in defense of life or property and nonhunting mortality continues to be a significant source of mortality.

Based on my population estimates, brown bear mortality may be exceeding sustainable levels in southern Unit 20D. A substantial portion of the brown bear mortality west of the Gerstle River is due to nonhunting mortality that results from people living near brown bears. However, 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 and liberal hunting regulations. However, because this area is relatively small and surrounded by areas that have healthy brown bear populations, and because the Alaska Board of Game objective is to reduce predation on ungulates, no reduction in the hunting season dates and bag limits 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. While there is little evidence that increased bear harvest results in increased moose numbers, 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 to determine long-term effects of liberal hunting regulations in portions of the unit and to monitor the population west of the Gerstle River where mortality rates are highest.

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TABLE 1 Unit 20D brown bear mortality[a], regulatory years 1989–2001

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

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
1996–1997													
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
2000–2001													
Fall 2000	7	5	0	12	1	2	0	1	0	8	7	1	16
Spring 2001	4	0	0	4	1	0	0	0	0	5	0	0	5
Total	11	5	0	16	2	2	0	1	0	13	7	1	21
2001–2002													
Fall 2001	6	3	1	10	1	0	0	1	0	7	3	2	12
Spring 2002	1	0	0	1	0	0	0	0	0	1	0	0	1
Total	7	3	1	11	1	0	0	1	0	8	3	2	13

[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 1987–2001

Regulatory year	Southern Unit 20D: West of Gerstle River M	F	Unk	East of Gerstle River M	F	Unk location M	F	Total M	F	Northern Unit 20D M	F	Total Unit 20D M	F	Total bears M+F
	1 bear/4 yr, 1 Sep–31 May, $25 tag[b]													
1987–1988	2	0	0	4	4	1	0	7	4	0	1	7	5	12
1988–1989	1	1	0	1	1	0	0	2	2	2	0	4	2	6
1989–1990	2	0	0	0	0	0	0	2	0	2	0	4	0	4
1990–1991	1	2	0	2	0	0	1	3	3	0	1	3	4	7
1991–1992	2	3	0	0	1	0	0	2	4	0	0	2	4	6
Total kill	8	6	0	7	6	1	1	16	13	4	2	20	15	35
Kill/Year		Avg 3			Avg 3		Avg 0		Avg 6		Avg 1		Avg 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	0	1	1	0	1	5	3	2	0	7	3	10
1993–1994	2	0	0	2	1	0	0	4	1	1	1	5	2	7
1994–1995	3	2	0	1	1	0	0	4	3	0	0	4	3	7
Total kill	9	3	0	4	3	0	1	13	7	3	1	16	8	24
Kill/Year		Avg 4			Avg 2		Avg 0		Avg 7		Avg 1		Avg 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	0	3	1	0	0	7	2	4	3	11	5	16
1996–1997	3	4	0	1	1	0	0	4	5	1	1	5	6	11
1997–1998	3	3	0	0	0	0	0	3	4	2	1	5	4	9
1998–1999	10	3	0	2	0	0	0	12	3	0	1	12	4	16
1999–2000	1	2	0	2	1	0	0	3	3	4	1	7	4	11
2000–2001	6	3	0	3	4	0	0	9	7	4	0	13	7	20
2001–2002	3	1	1	3	2	0	0	7	3	2	0	9	3	12
Total kill	30	17	1	14	10	0	0	45	27	17	7	62	34	96
Kill/Year		Avg 7			Avg 3		Avg 0		Avg 10		Avg 3		Avg 14	
% Male	64			58		0		63		71		65		

[a] Includes nonhunting mortality.
[b] Hunting regulation.

TABLE 3 Residency of successful Unit 20D brown bear hunters (includes legal and illegal harvest; excludes defense of life and property kill), regulatory years 1989–2001

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	5	0	0	0	5
1992–1993	5	4	0	0	9
1993–1994	3	4	0	0	7
1994–1995	2	4	0	0	6
1995–1996	7	6	1	2	16
1996–1997	5	3	0	0	8
1997–1998	5	2	1	0	8
1998–1999	8	5	0	0	13
1999–2000	9	2	0	0	11
2000–2001	6	9	1	1	17
2001–2002	5	3	2	1	11

[a] Residents of Unit 20D.

TABLE 4 Chronology of Unit 20D brown bear harvest and nonhunting mortality by month, regulatory years 1989–2001

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	1	0	7
1995–1996	1	9	1	0	0	2	3	0	16
1996–1997	2	5	1	0	0	1	1	1	11
1997–1998	0	5	1	0	0	2	1	0	9
1998–1999	4	7	0	2	0	3	0	0	16
1999–2000	1	3	2	0	0	2	3	0	11
2000–2001	3	9	2	0	0	2	3	1	20
2001–2002	5	4	1	0	0	0	0	2	12

TABLE 5 Unit 20D percent of brown bear harvest (includes legal and illegal harvest; excludes defense of life or property) by transport method, regulatory years 1989–2001

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	0	4
1990–1991	0	14	0	0	0	57	14	14	0	0	7
1991–1992	0	0	0	0	20	20	0	0	60	0	5
1992–1993	11	11	11	22	0	0	33	11	0	0	9
1993–1994	14	0	29	0	0	0	43	14	0	0	7
1994–1995	17	17	0	33	0	0	17	17	0	0	6
1995–1996	25	0	13	25	0	0	31	6	0	0	16
1996–1997	0	0	25	13	0	13	38	0	13	0	8
1997–1998	13	0	13	25	0	13	13	0	25	0	8
1998–1999	0	0	0	54	0	0	8	39	0	0	13
1999–2000	9	0	9	0	0	9	27	46	0	0	11
2000–2001	12	0	12	29	0	6	12	29	0	0	17
2001–2002	27	0	0	27	0	0	9	36	0	0	11

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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. It is reasonable to assume that the population recovered to about 54 bears/1000 mi^2 (21 bears/1000 km^2) based on estimated grizzly bear densities in areas with comparable habitats (Reynolds 1997), although no studies specifically addressed this question in Unit 20E. 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 grizzly bear tag fee. Annual grizzly bear harvests increased from a mean of 3 during regulatory years (RY) 1966 through RY81 (RY begins 1 Jul and ends 30 Jun; e.g., RY02 = 1 Jul 2002 through 30 Jun 2003) to a mean of 19 during RY82 through RY88. During the mid-1980s, Boertje et al. (1987) estimated the grizzly bear population in a portion of Unit 20E at 31–41 bears/1000 mi^2 (12–16 bears/1000 km^2) indicating a population decline. Changes in harvest rate, sex ratio, and average age of the harvested bears indicated that population reduction followed increased harvest.

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 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 increased bear harvest effects bear population trends and moose and caribou calf survival.

Further analysis of these data indicated that reductions in grizzly bear numbers did not improve moose calf survival in Unit 20E (Gardner 1993, 1995). Grizzly bear regulations were not further liberalized in Unit 20E during RY90–RY01, even though moose calf survival continued to be low and area Fish and Game advisory committees supported a resident tag fee exemption. ADF&G's opposition to the tag fee exemption during this period was because it had already been tried in Unit 20E and was unsuccessful.

One of the premises of liberalized bear regulations is that more bear hunters would be attracted to the area, resulting in a greater bear harvest. Reynolds (ADF&G, unpublished data) found that grizzly bear harvest increased in Unit 20A if bear seasons coincided with times that most moose and caribou hunters were afield. The impacts of the different bear regulatory changes on harvest were reviewed in Gardner (1999). In brief, eliminating the resident tag fee, increasing the season to include June, and increasing the bag limit to 1 bear/year did little to increase harvest in Unit 20E. Lengthening the season to include August did increase harvest during some years indicating that when the bear season coincided with caribou season it increased bear harvest. These results indicate that it is probably not the bear regulations themselves but that a combination of bear regulations and a willingness of caribou/moose hunters to harvest bears incidental to other hunts that will have the greatest effect on bear harvest.

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 autumn 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 and objectives 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). Combining predator and ungulate population and harvest objectives in Unit 20E is necessary now that the Alaska 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 the future the intensive management law may direct Unit 20E's grizzly bear population and harvest management objectives.

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 selected by the presence of blueberry plants and included a variety of habitat types, aspects, elevations, and slopes. We monitored annual rainfall at each site to assess variability of blossom and berry production. We measured berry production by counting the number of berries within each plot at the same time each year. Our objective is to evaluate the relationships between annual berry abundance and bear harvest and the number of problem bear incidents.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

I estimated the autumn 2000 Unit 20E population at 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 (Gardner 2001). 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). Since there were no substantial weather events or change in harvest during RY00–RY02, I believe the Unit 20E grizzly bear population size has remained stable, numbering 475–550 bears.

Reynolds and Boudreau (1992) found that a 6% mortality rate of adult females ≥6-years old resulted 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%. Human-caused mortality included hunter kills, illegal kills, and wounding losses. Additionally, natural deaths accounted for about 2% annual mortality.

Grizzly bear hunting regulations in Unit 20E were liberalized in 1982 with the intent to reduce 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–RY01 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 probably had no 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 (RY82–RY88) 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 harvest can result in a decline of an Interior Alaska grizzly bear population, primarily by reducing the number of resident adult males.

During the report period, harvest was 19 bears in RY00 and 11 in RY01. Harvest was distributed throughout the unit. Harvest totals were below or near sustainable levels and were estimated to have no effect on population trend.

MORTALITY

Harvest

Season and Bag Limit.

Unit and Bag Limit	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.

Alaska Board of Game Actions and Emergency Orders. No regulatory changes for grizzly bears in Unit 20E occurred during the report period. 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 20E grizzly bears (DuBois, ADF&G, personal communication).

During each open board cycle since 1992, the Upper Tanana–Fortymile and Eagle advisory committees have proposed to eliminate the resident tag fee in Unit 20E in an attempt to increase bear harvest to benefit moose. Both committees believed that because moose in most of Unit 20E and the Fortymile caribou herd must be intensively managed (1998 Board of Game decision), additional grizzly bear hunting opportunity is needed. However, the board rejected these proposals because there was no evidence that eliminating the resident tag fee would increase moose calf survival and therefore eliminating the resident tag fee would not meet the legislative intent for use of this regulation (ADF&G 1998).

In spring 2000 the Board of Game substantially liberalized the Fortymile caribou bag limit across the herd's range. This regulation became 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.

In spring 2002 the board adopted a regulation eliminating the resident grizzly bear tag fee in Unit 20E, excluding Yukon–Charley Rivers National Preserve. The board wished to determine: 1) whether increased number of caribou and moose hunters would increase the grizzly bear harvest; 2) if grizzly bear harvest increased whether it would result in a population decline or change in composition; and 3) if harvest did alter the bear population, whether it would result in an increase in moose calf survival. Data collected during RY02–RY05 will be compared to previous years to evaluate the effects of the resident tag fee and number of moose and caribou hunters on grizzly bear harvest.

Hunter Harvest. During the report period, hunters reported taking 18 bears in RY00 and 11 in RY01 (Table 2). The 5-year average harvest was 11 bears. The mean percentage of males taken in the harvest during the past 5 years in Unit 20E was 58%. During RY00 and RY01, males represented 56% and 73% of the harvest, respectively.

Grizzly bear harvests increased substantially 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 combination of more liberal seasons, bag limits, and a public awareness campaign. The annual number of moose and caribou hunters during that period was 330–1326 ($\bar{x}$ =794). Autumn grizzly bear harvests significantly declined between RY89 and RY95 ($\bar{x}$ = 10.9) compared to RY83–RY88 (P = 0.003) even though hunting

regulations remained liberal and number of potential hunters significantly increased ($\bar{x}$ = 1675 hunters; P = 0.0008). This indicated 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. During RY96–RY00 the number of moose and caribou hunters declined significantly compared to RY89–RY95 (P = 0.0006) because of changes in caribou seasons and harvest limits, but grizzly bear harvest remained consistent ($\bar{x}$ = 12/yr).

Reynolds (ADF&G, unpublished data) found that timing the grizzly bear season to encompass the period most caribou hunters were afield in Unit 20A coincided with higher grizzly bear harvests. However, I found no relationship in Unit 20E between grizzly bear harvest and the number of moose, caribou, and total hunters afield (r^2 = 0.02–0.06). The trend indicated that grizzly bear harvest may decline slightly with more hunters, indicating that bears may become less vulnerable with large numbers of hunters afield.

It appears that a large number of big game hunters in the field does not necessarily result in an increase in bear harvest. The variables that differed between RY83–RY88 and RY89–RY95 are 1) the resident tag fee was required during RY89–RY95 but not during RY83–RY88, 2) there was greater publicity and novelty of taking a bear for moose management during RY83–RY88 but not during RY89–RY95, and 3) proliferation of areas with a bag limit of 1 bear/year and resident tag fee waivers likely reduced hunters' interest in any one area. The resident tag fee was not required during autumn RY02 and the harvest was 12 grizzly bears. The average autumn harvest during RY91–RY01 when the tag fee was required was 11.7 bears. Based on hunter interviews, it appeared that many hunters did not know the resident tag fee had been rescinded. A grizzly bear harvest regulation awareness campaign would help determine whether greater public knowledge will cause an increase in bear harvest.

Hunter Residency and Success. Resident hunters took 78% and 100% of the grizzly bear harvest in RY00 and RY01 (25 bears taken by residents/4 taken by nonresidents), compared with the 5-year average of 79% (Table 3). Historically, little guided hunting for grizzly bears occurred in Unit 20E. Nonresidents, accompanied by second-degree of kindred residents, took a few bears while hunting moose or caribou. Since 1995, Unit 20E guides have taken more nonresident grizzly bear hunters to remote portions of the unit, which accounts for 1–3 bears/year.

Harvest Chronology. During the past 12 years, 78% of grizzly bears were harvested during August and September when moose and caribou hunters were afield in Unit 20E (Table 4). Few bears were taken in the spring.

Transport Methods. During RY00 and RY01, airplanes were used by 48% (14/29) of successful grizzly bear hunters in Unit 20E (Table 5). During the previous 5 years, airplanes (56%), highway vehicles/walk (20%), and 3- or 4-wheelers (13%) were the modes of transportation used by most successful bear hunters. Use of airplanes by successful grizzly bear hunters in Unit 20E has increased as more big game hunters access the more remote areas to hunt.

Other Mortality

One bear (a female) was reported taken in defense of life or property (DLP) during this report period. Possible reasons for the lack of reported DLP kills in recent years were 1) the long season (only closed during 1 Jul–9 Aug) so that problem bears were killed by licensed hunters and 2) bear numbers in the vicinity of communities have probably been reduced.

Most nonhunting-caused grizzly bear mortality in Unit 20E is likely 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, except 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, which are known to be important food sources elsewhere. Habitat diversity is improving because implementation of the *Alaska Interagency Fire Management Plan* during the early 1980s allows wildfires and prescribed burns to occur on hundreds of thousands of acres. 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). Two years of data are presented in Table 7. These data and discussions with local berry pickers, hunters, and hikers, indicate that in 2000 blueberries were sparse overall but locally abundant. Blueberries were more abundant in all habitats in 2001. Unfortunately, we were not able to sample during 2002 but our objective is still to monitor berry production annually in these areas of Units 20E and 12 and to 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. 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. During summers 2001 and 2002, fire activity was low in Unit 20E and <30,000 acres burned each year. We conducted 3 prescribed fires during summers 1998 and 1999, burning about 95,000 acres. 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. No additional prescribed burns are planned for Unit 20E during RY03 and RY04.

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). Altering wolf and bear predation simultaneously was recommended by Gasaway et al. (1992) to achieve maximum potential to increase moose numbers. Grizzly bear harvest regulations were liberalized in Unit 20E in 1981 with the intent of reducing 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).

A nonlethal wolf control program was conducted in portions of Unit 20E 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 in the area where grizzly bear numbers were also reduced by harvest. During 1998 through November 2002, I 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 (14–23 calves/100 cows) and yearling bull survival was average to high (9–18/100 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 have been reduced (Gardner, ADF&G, unpublished data).

I presented hypotheses explaining the status and trend of Unit 20E's moose population and the effects of grizzly bear and wolf predation based on output from McNay and DeLong's (1998) pred–prey model (Gardner 2001). In brief, I concluded that 1) the Unit 20E moose population continues to be limited primarily by grizzly bear predation on calves, 2) the effects of nonlethal wolf control will be minimal, 3) high grizzly bear harvests in concentrated areas during the early 1980s may have reduced adult moose mortality but calf mortality was not substantially reduced, and 4) moose numbers would increase if grizzly bear numbers or their predation efficiency on moose calves was reduced.

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 a reduced population of bears is capable of killing the same number of calves, resulting in the same overall calf mortality rate when compared to the periods when bear numbers were not 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. 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.

During RY02–RY05 we will conduct a management experiment to monitor the effects of liberal grizzly bear hunting regulations on grizzly bear harvest, the sex and age composition of the grizzly bear harvest, and moose calf:cow ratios in the areas where most grizzly bear harvest occurred.

CONCLUSIONS AND RECOMMENDATIONS

In autumn 2002 I estimated there were 475–550 grizzly bears in Unit 20E. Harvest data indicated the population 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. Preliminary analyses indicate that increased numbers of moose and caribou hunters did not result in increased grizzly bear harvest. We did not meet our management objective to increase moose or caribou calf survival by reducing the grizzly bear population using liberalized harvest regulations. We are conducting a management experiment to see if more liberal grizzly bear harvest regulations (resident tag fee exemption in combination with long seasons and a liberal bag limit) in conjunction with high numbers of moose and caribou hunters will increase bear harvest and result in reduced bear numbers or changes in the population's sex and age composition. We will attempt to determine whether the grizzly bear population declines and if so, whether moose calf survival increases. To improve the success of this management experiment, we will attempt to better inform the hunting public of bear hunting opportunities in Unit 20E.

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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 2002

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	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													
Autumn 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													
Autumn 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													
Autumn 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													
Autumn 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													
Autumn 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													
Autumn 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													
Autumn 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

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
1997–1998													
Autumn 1997	7	4	0	11	0	0	0	0	1	7 (58)	4 (33)	1	12
Spring 1998	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													
Autumn 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													
Autumn 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													
Autumn 2000	10	8	0	18	0	1	0	0	0	10 (53)	9 (47)	0	19
Spring 2001	0	0	0	0	0	0	0	0	0	0 (0)	0 (0)	0	0
Total	10	8	0	18	0	1	0	0	0	10 (53)	9 (47)	0	19
2001–2002													
Autumn 2001	6	3	0	9	0	0	0	0	0	6 (67)	3 (33)	0	9
Spring 2002	2	0	0	2	0	0	0	0	0	2 (100)	0 (0)	0	2
Total	8	3	0	11	0	0	0	0	0	8 (73)	3 (27)	0	11
2002[b]													
Autumn 2002	6	6	0	12	0	0	0	0	0	6 (50)	6 (50)	0	12

[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 autumn 2002

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	14	(78)	4	(22)	0	(0)	18
2001–2002	11	(100)	0	(0)	0	(0)	11
Autumn 2002[a]	11	(91)	1	(9)	0	(0)	12

[a] Preliminary harvest.

TABLE 4 Unit 20E chronology of brown bear harvest by month, regulatory years 1989–1990 through autumn 2002

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)	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	3	(17)	15	(83)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	18
2001–2002	2	(18)	7	(64)	0	(0)	0	(0)	1	(9)	0	(0)	1	(9)	11
Autumn 2002[a]	3	(25)	9	(75)	0	(0)	0	(0)							12
Totals	43	(22)	111	(57)	4	(2)	0	(0)	4	(2)	19	(10)	13	(7)	194

[a] Preliminary harvest.

TABLE 5 Unit 20E grizzly bear percent harvest by transport method, regulatory years 1989–1990 through autumn 2002

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	44	0	11	33	0	0	11	0	0	18
2001–2002	55	0	9	36	0	0	0	0	0	11
Autumn 2002[a]	17	0	8	33	0	17	8	17	0	12

[a] Preliminary harvest.

TABLE 6 Blueberry sample areas in Units 12 and 20E

Area	Unit	Elevation	Aspect	Slope	Primary vegetation
Clearwater	12	1966	Flat	Flat	spruce/muskeg
7-Mile	12	1859	Flat	Flat	spruce/willow
Pipeline	12	1888	5–10[a]	SSW	spruce/willow
RCA	12	2197	15–20[a]	N	spruce/alder
4-Mile	12	2300	5–10[a]	S	spruce/tussock
9-Mile	20E	2722	5–10[a]	NE	1990 burn/willow
Ptarmigan	20E	3643	10–15[a]	W	willow/alder
Fairplay	20E	3640	10[a]	SW	willow

TABLE 7 Blueberry production in 8 sample units in Units 12 and 20E, 2000–2002

Calendar year	Sample units[a]								Bear harvest[b]	DLP[b,c]
	Clearwater	7-Mile	Pipeline	RCA	4-Mile	9-Mile	Fairplay Ptarmigan	Fairplay 2		
2000	137 (33.6)	3 (0.89)	19 (5.76)	7 (1.95)	55 (2.55)	51 (6.30)	124 (24.31)	46 (9.42)	18	1
2001	285 (64.36)	23 (4.34)	278 (55.86)	23 (3.13)	356 (36.09)	400 (26.24)	379 (79.05)	599 (109.69)	11	0
2002[d]									12	0

[a] Mean number of berries/sample unit. Each sample unit included 5 1-m^2 plots; numbers in parentheses is the variance among plots within a study area.
[b] Unit 20E only.
[c] Number of bears killed in defense of life or property (DLP) also includes bears harvested in Jul.
[d] No berry data collected in summer 2002.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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 (10 bears/1000 mi^2) to moderate (25 bears/1000 mi^2) throughout Units 21B, 21C, and 21D, with highest densities in the mountainous areas. Available information indicates that populations have been stable or slowly increasing. Annual reported harvest was <10 bears per year with an estimated additional human-caused mortality of 10 bears per year that were unreported and probably a result of bear–human conflicts. Unreported kills most likely occurred along the Yukon River during the summer and early fall when fish camps were in operation and bears were 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, did not improve 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.

Sealing was not required in the Northwest Alaska Brown Bear Management Area hunts unless the hide was removed from the unit. 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), which begins 1 July and ends 30 June (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, 21C, and 21D (Woolington 1997) (21B≅50, 21C≅100, 21D≅200). In Unit 21D the best bear habitat is in the Nulato Hills. Unit 21C in its entirety contained the next best grizzly bear habitat. However, for both areas, density estimates were likely underestimated because the best habitat in this reporting area included salmon spawning streams that the referenced habitats were lacking (Miller 1993).

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

Alaska Board of Game Actions and Emergency Orders. During the spring 1996 Alaska 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. No changes to grizzly bear regulations were adopted during the spring 2002 Board of Game meeting.

Hunter Harvest. Grizzly bear harvest in Units 21B, 21C, and 21D was low ($\bar{x}$ = 7.5 bears/yr), and no harvest patterns were clear over the last 6 regulatory years (Table 1). More than half the annual harvest was likely unreported. The number of bears taken and not reported was uncertain, but I estimated it was approximately 10 bears per year based on interviews and previously reported values. Most of the bears that were harvested but unreported were likely taken at fish camps. If this estimate was accurate, the combined mean annual harvest for the last 6 regulatory years was approximately 18 bears/year.

The age and sex composition of the reported harvest shows no indication of overexploitation. From RY96 through fall 2002, males composed 73% of the reported harvest, which was an adequate level to maintain recruitment. The percent of males in the harvest was up from 61% and 68% reported in the 1999 and 2001 Management Reports, respectively. For RY00–RY02 the average age of harvested bears was 10.1, slightly older than the 34-year average of 8.6 years of age for bears harvested in Units 21B, 21C, 21D, and 24.

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. Most grizzly bears were harvested opportunistically. Mean annual harvest over the past 4 regulatory years was 2.0 bears for local hunters, 1.5 for nonlocals, and 8.8 for nonresidents (Table 3). From RY92 through fall 2002 the mean annual number of successful hunters was 6.9, and was unchanged from the previous management report.

Harvest Chronology and Transport Methods. Because harvest was low, sample sizes were not sufficient to show any a statistically significant patterns between harvest during the spring and fall. 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

We achieved 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. The 3-year mean annual harvest (reported and unreported) of 19.7 bears was below the harvest objective of 25 bears and the population was probably increasing. Formerly, data from other areas of Interior Alaska (DuBois 1989) estimated the sustainable harvest rate to be

5–6%, which suggested that an annual total harvest of at least 25 bears was sustainable in Units 21B, 21C, and 21D. The high proportion of males harvested in this management area make it likely that additional harvest can be accommodated. With the current population estimate of 350–400 bears, a sustainable annual harvest of 21–48 grizzly bears may be supported if the composition of males in the harvest remains at present levels. 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, approximately half of the 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.

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TABLE 1 Units 21B, 21C, and 21D brown bear mortality, regulatory year 1996 through fall 2002

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
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
Spring 2001	4	0	0	4	0	0	0	0	5	0	4	0	5	9
Total	12	1	0	13	0	0	0	0	10	0	12	1	10	23
2001–2002														
Fall 2001	1	3	0	4	0	0	0	0	5	0	1	3	5	9
Spring 2002	3	2	0	5	0	0	0	0	5	0	3	2	5	10
Total	4	5	0	9	0	0	0	0	10	0	4	5	10	19
2002–2003														
Fall 2002	1	0	0	1	0	0	0	0	5	0	1	0	5	6

[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 year 1992 through fall 2002[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
2000–2001	1	4	8	13
2001–2002	0	1	8	9
Fall 2002	0	0	1	1

[a] Nonhunting kill not included.

TABLE 3 Unit 21B, 21C, and 21D successful hunter residency, regulatory year 1992 through fall 2002

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
2000–2001	1	3	9	13
2001–2002	3	0	6	9
Fall 2002[b]	0	0	1	1

[a] Units 21B, 21C, and 21D residents.
[b] Preliminary.

ALASKA DEPARTMENT OF FISH AND GAME
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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. The population did not begin to recover until these activities diminished substantially during the 1940s and federal predator control efforts ended at statehood in 1959 (Grauvogel, 1986). Since then, bear numbers have increased in most areas, presumably in response to conservative management policies, higher prey densities, and favorable environmental conditions.

Growth of the Unit 22 bear population has had 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. Predation on moose calves is believed to be depressing moose populations in many parts of the unit. Human-bear encounters in the Nome area and in Unit 22 villages and camps are a serious concern to the public and many local residents believe that bear densities in Unit 22 are excessive. Since 1997, in response to public demand, brown bear hunting regulations have been incrementally liberalized to increase annual harvest and to attempt to reduce bear number in Unit 22.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain the population at levels estimated during the 1991 brown bear census in Unit 22.

Without census data since 1991 we have no means to compare current densities and evaluate the management goal. To remedy this situation, in May 2002, staff developed a measurable management goal based on harvest parameters:

- Maintain a population that sustains a 3-year mean annual reported harvest of at least 50% males.

The revised goal allows maximum opportunity for hunting brown bears in Unit 22, yet allows a method to measure change in population level. By developing a management goal based on harvest data we can evaluate our success in achieving and maintaining the goal.

MANAGEMENT OBJECTIVES

- Assess population trends through field observations and analyses of harvest data.
- Seal bear skins and skulls, determine sex and extract a tooth for aging from brown bears presented for sealing.
- Monitor the brown bear harvest through field observations, brown bear sealing reports, village harvest surveys, subsistence harvest questionnaires, interviews with successful hunters, and analyze data.
- 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.
- Provide information to the Board of Game on brown bear management.

METHODS

Various methods were used to assess the bear population and to meet the management objectives in Unit 22. Population status was assessed 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 to increase hunting opportunity and attempt 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 and Village Public Safety Officers to deter or destroy problem bears. An electric fence bear exclosure was maintained as a demonstration project at a camp with a history of bear problems in the vicinity of Nome. Another fence was available for seasonal loan to people interested in experimenting with this method of avoiding bear problems.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

We believe grizzly bear numbers have increased throughout much of Unit 22 and densities are probably above those previously estimated. A 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 (Miller and Nelson, 1993). Over the last decade observations by staff, guides and residents of Unit 22 indicate brown bear numbers have increased throughout much of the unit in spite of increasingly high harvests. Reports of bear encounters and complaints about nuisance bears were frequent and the take of DLP bears reached an all time high of 10 bears during the 2000–2001 regulatory year. Destruction of cabins and raids on subsistence food caches now occur in 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 1999, went into effect at the beginning of this reporting period. The changes included elimination of the resident tag fee requirement throughout Unit 22 and an increase in the number of nonresident drawing permits from 20 to 27 in Units 22B/22C (Hunt DB685) and from 5 to 8 in Units 22D/22E (Hunt DB690).

2000–2001 and 2001–2002 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

2000–2001 and 2001–2002 Regulatory Year **Unit and Bag Limits**	**Resident Open Season (Subsistence and General Hunts)**	**Nonresident Open Season**
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 27 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 27 permits maybe issued in combination with Unit 22B.		1 Sep–31 Oct 10 May–25 May
Unit 22(D) **RESIDENTS:** One bear every 4 regulatory years	1 Sep–31 May	
NONRESIDENTS: One bear every 4 regulatory years by drawing permit only. Up to 8 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 8 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	1 Sep–31 May	

2000–2001 and 2001–2002 Regulatory Year **Unit and Bag Limits**	**Resident Open Season (Subsistence and General Hunts)**	**Nonresident Open Season**
registration permit in the Northwest Alaska Brown Bear Management Area for subsistence purposes		
NONRESIDENTS:		No Open Season

Board of Game Actions and Emergency Orders. In November 2001, in response to public demand and concern about the effect of bear predation on Unit 22 moose populations, 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 2002–2003 regulatory year: 1) the resident and nonresident general season bag limit for brown bears in Unit 22 was changed from 1 bear every 4 years to one bear every year except in Unit 22C where the bag limit remains 1 bear every 4 years; 2) the opening date for the general and subsistence season for residents and nonresidents was changed from Sept. 1 to Aug. 1; 3) Unit 22C was added to the Northwest Brown Bear Management Area, however the subsistence season dates in Unit 22C mirror general season dates and are Aug. 1–Oct. 31 and May 10–May 25; and 4) The number of nonresident brown bear drawing permits for Units 22D and 22E (Hunt DB690) was increased from 8 to 12. In March 2001 and 2002 the Board reauthorized the brown bear resident tag fee exemption in Unit 22.

Human-Induced Harvest. Harvest has increased substantially in the last 4 years (Figure 1) and remained high during this reporting period, averaging 94 bears per year. Since 1998 the average annual harvest was 95 bears, which is a 76% increase over the 1990–1997 average annual harvest of 54 bears. During the 2000–2001 regulatory year 104 bears were taken which was the highest annual harvest reported in Unit 22. In 2001–2002, 84 bears were taken (Table 1). Plentiful numbers of bears, increasingly liberal regulations, desire by local residents to reduce bear numbers, excellent snow conditions for hunting in the spring of 2001, and more nonresident hunters in Unit 22A where drawing permits are not required were contributing factors to the high harvests in recent years.

Since 1961, annual harvest of male bears has consistently exceeded the female harvest, with male bears averaging approximately 65% of the harvest. In the 2000–2001 regulatory year male bears comprised 68% of the harvest. However, during the 2001–2002 regulatory year only 54% of the harvest was male bears, which is the lowest percentage of males in the harvest since 1992. If we continue to see an increase in the proportion of female bears in the harvest, it may be an indication that harvest is impacting the population.

Since 1967, when Unit 22 age records began, the age of harvested bears has averaged 6.5 years annually. During this reporting period harvested bears averaged 6.7 years (6.4 in 2000 and 6.9 in 2001). The average age of harvested bears was consistently higher in the spring than in the fall until 2001 when the fall harvest averaged 7.6 years and the spring harvest

averaged 6.2 years. 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 whatever bear first presents itself. Large bears are available for serious trophy hunters; 27 of 175 bears (15%) taken during this reporting period had skull sizes of 24 inches or larger. However, the number of record book bears was fewer than in the previous reporting period when 39 skulls (21% of the harvest) measured 24 inches or larger.

Thirteen bears were reported as DLP kills during the 2-year reporting period, 10 of which were taken in the 2000–2001 regulatory year (Table 1). 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 and the extent of illegal harvest are unknown. Nelson (1993) estimated that an additional 10 to 30 bears were killed annually and not reported in Unit 22.

In 2000–2001, 27 Unit 22 residents registered for the NWABBMA subsistence hunt and in 2001–2002, 43 people registered. No bears were harvested with a subsistence permit during this reporting period. 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.

Nome staff continued work on a community harvest assessment project with Subsistence Division and Kawerak Native Corporation in an attempt to better quantify unreported subsistence harvest of big game species, including brown bears, by village residents. During this reporting period the villages of Brevig Mission, Teller, Shishmaref, Wales and Golovin were surveyed. One bear taken by a Teller resident was reported.

Permit Hunts. During this reporting period 27 drawing permits were available annually to nonresident hunters in Units 22B and 22C in combination, and 8 permits were allocated to nonresidents in Units 22D and 22E in combination. A continuous season from 1 September – 31 May, except in Unit 22C, allowed 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 both years when the alternate lists were exhausted.

Hunter Residency and Success. In Unit 22A, where nonresident drawing permits are not required and in Unit 22E where few residents hunt brown bear, 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, resident harvest normally exceeds the nonresident harvest (Table 2).

In 2000–2001 all 27 available nonresident drawing permits for Units 22B and 22C were issued, but in 2001–2002 only 22 of 27 available permits were issued. During this reporting period the nonresident success rate was 65% in Units 22B and 22C. In Units 22D and 22E all 8 available permits were issued annually and the success rate was 80%.

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. In 2000–2001 67% of the harvest occurred in the spring and in 2001–2002 spring harvest was 56% of the total harvest (Table 3) 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.

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. In the fall 4-wheelers followed by boats and highway vehicles were used most frequently. Most hunters use snow machines in the spring. (Table 4). Aircraft use in the unit is primarily limited to registered guides moving clients in and out of camps. Transport methods other than airplanes are used from the camps.

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 reduces calf survival in western Unit 22B (Persons, 1998) and research in other parts of Alaska has shown that brown bear predation can be the primary factor in limiting 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, particularly in the spring, is 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 time 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 has 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.

A new education outreach specialist has been hired in Region 5. In Unit 22 one of the education priorities will be to improve public understanding of bear safety, bear behavior, bear hunting and DLP regulations and methods of minimizing 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 most parts of the unit and we attribute current moose declines to be largely the result of bear predation on calves. As recommended in the previous progress report, we have maximized opportunity to hunt brown bears (except Unit 22C) in an attempt to reduce bear numbers. Although uncertain, the reduction of brown bear density may have the benefit of reducing bear predation on moose calves. In Unit 22C bears are already heavily harvested and the Unit 22C moose population is above our management goal.

The annual Unit 22 brown bear harvest has increased substantially over the last 4 years. The 1998–2001 harvest averaged 94 bears per year. This is a 74% increase in harvest above the 1990–1997 average harvest of 54 bears per year. High harvests resulted in no change in the age or sex composition of the harvest until 2001, when the female component increased to 46% (from an average of 35%) of the annual harvest. Although the proportion of females in the harvest remained relatively low, the number of females harvested increased as harvest increased. Removal of increased numbers of females may result in a population decline. If we continue to see a higher proportion of females in the harvest it may be an indication this is occurring.

We should strive for high harvest rates and reductions in the bear population only as long as necessary to rebuild moose populations that are limited by predation. If high harvests and annual harvests comprised of more than 50% female bears fail to result in improved moose recruitment, bear harvest should be reduced before the bear population is reduced to very low levels.

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.

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Table 1 Unit 22 brown bear harvest[a] for regulatory years 2000–2001 and 2001–2002

Regulatory year	Reported harvest											
	Hunter kill				Non-hunting kill				Total			
	M	F	Unk.	Total	M	F	Unk.	Total	M	F	Unk.	Total
2000–2001												
Fall 2000	14	17	0	31	4	0	3	7	18	17	3	38
Spring 2001	51	12	0	63	1	2	0	3	52	14	0	66
NWABBMA	0	0	0	0	0	0	0	0	0	0	0	0
Total	65	29	0	95	6	1	3	10	71	31	3	104
2001–2002												
Fall 2001	15	21	0	36	0	1	1	2	15	22	1	38
Spring 2002	29	16	0	45	1	0	0	1	30	16	0	46
NWABBMA	0	0	0	0	0	0	0	0	0	0	0	0
Total	44	37	0	81	1	1	1	3	45	38	1	84

[a] Represents the total known harvest including nonresident permit hunt harvest, DLP and other human-caused accidental mortality.

Table 2 Number, residency and success rates of brown bear hunters in Unit 22 for regulatory years 1998–2001

Regulatory Year	Successful hunters						
	Local Residents[a]		Nonlocal Residents		Nonresidents		Total
	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)
1998–1999	30	36%	14	17%	39	47%	83
1999–2000	30	33%	18	20%	43	47%	91
2000–2001	39	41%	10	11%	45	48%	94
2001–2002	34	42%	15	19%	32	40%	81

[a] Hunters residing in Unit 22

Table 3 Sex of Unit 22 brown bear harvest[a] for regulatory years 2000–2001 and 2001–2002

Regulatory Year	Game management unit																	
	22A			22B			22C			22D			22E			Total		
	M	F	U	M	F	U	M	F	U	M	F	U	M	F	U	M	F	U
2000–2001																		
Fall 2000	8	4	0	2	11	0	2	1	1	5	1	2	1	0	0	18	17	3
Spring 2001	13	3	0	17	4	0	10	4	0	7	1	0	5	2	0	52	14	0
2001–2002																		
Fall 2001	3	6	0	6	7	1	2	6	0	4	3	0	0	0	0	15	22	1
Spring 2002	4	2	0	14	6	0	6	3	0	1	3	0	5	2	0	30	16	0

[a] Includes nonresident permit hunts and NWABBMA harvest and non-hunting mortalities.

Table 4 Unit 22 brown bear harvest by transport method for regulatory years 1995–2001

Regulatory Year	Number harvested							
	Airplane	Boat	Snowmachine	ORV	Highway vehicle	Walk	Unknown	Total (*n*)
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
2000–2001	6	10	56	10	10	2	0	94
2001–2002	1	8	42	21	7	2	0	81

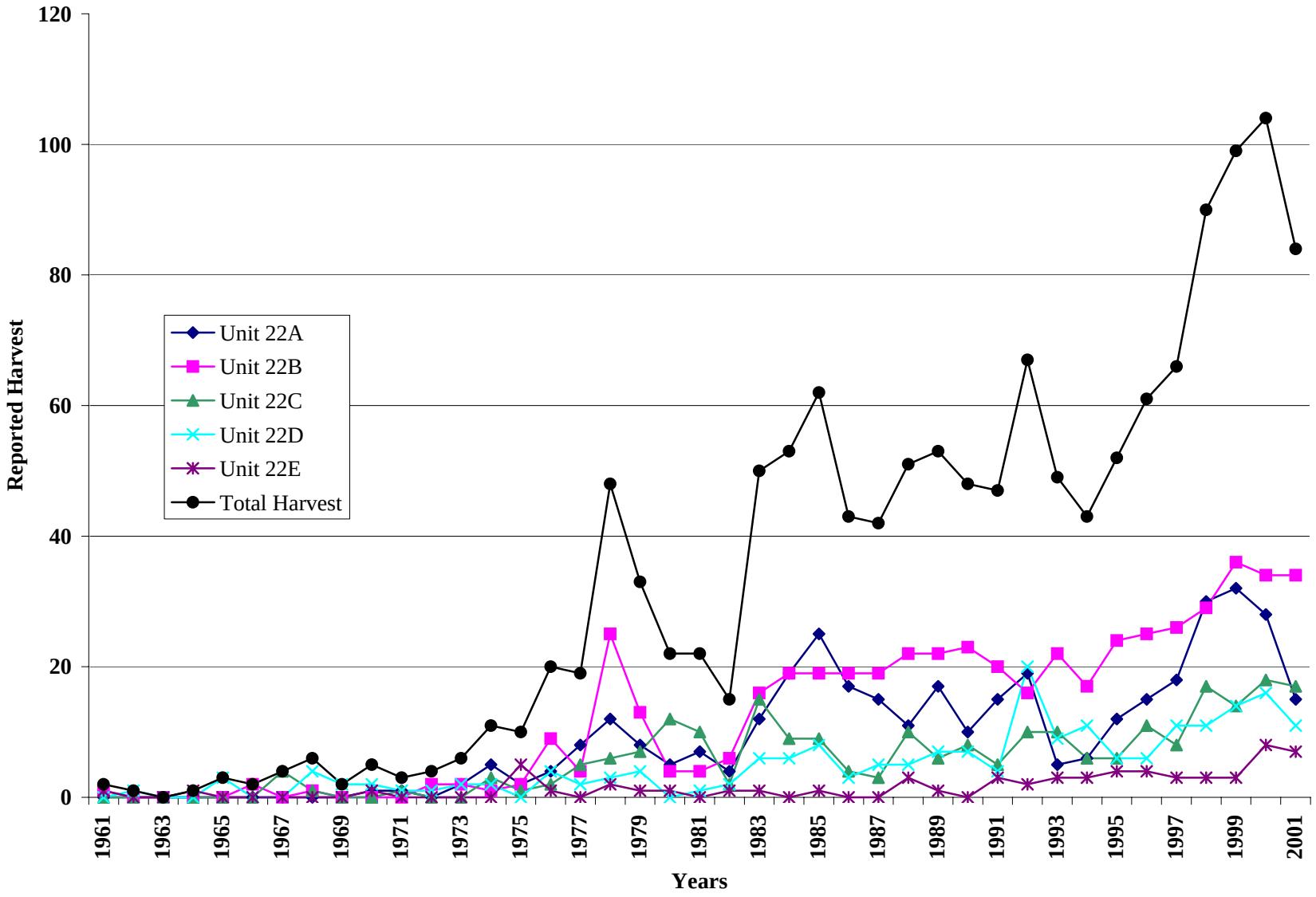

Figure 1 Unit 22 reported brown bear harvest, 1961–2001

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION

907-465-4190 PO BOX 25526
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 23 (43,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Kotzebue Sound and western Brooks Range

BACKGROUND

In 1961 ADF&G established hunting regulations and sealing requirements for brown bears in Unit 23. The Board of Game created regulations assuming the primary use of brown bears was for trophy hunting. However, Inupiat hunters in inland communities of Unit 23 have 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 bear and other species, ADF&G staff began an extensive regulation review in Unit 23 during 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 (DB 781 – fall; DB 791 - spring) for nonresident hunters; 2) a general season hunt for resident hunters; and 3) a subsistence registration permit hunt for resident hunters.

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 during 2004 or 2005. The census should be comparable to the census completed in 1987.
- Continue community-based assessments to collect brown bear harvest information from residents of Unit 23.

METHODS

We obtained harvest information from sealing documents, community harvest assessments and harvest reports. Compliance with brown bear sealing requirements has historically been low for residents of Unit 23; therefore, this data should be viewed as minimal estimates of harvest. In contrast, most nonlocal hunters seal their bears so this data is reasonably accurate.

We believe community-based harvest assessments and harvest reports from the registration subsistence hunt are much more accurate than sealing data. Computer access to archived harvest data continued to improve during this reporting period. Harvest summaries reported in previous management reports were updated based on these computer files. Many brown bears taken under DLP regulations are not reported, and many of those that have been reported have still not been entered into the statewide harvest files. As a result, harvest data in future reports will likely differ from that reported herein after these discrepancies are corrected. Kotzebue staff telephoned subsistence registration permit holders who failed to respond to the harvest report letter.

The 1987 Red Dog brown bear census provided a benchmark for bear abundance in this portion of Unit 23. Since then, our understanding of the current population status of Unit 23 bears has been based largely on qualitative information from local residents, some long-term commercial operators and my opportunistic observations.

To determine whether harvests have affected the sex and age structure of bear populations I plotted the proportion of males in the total Unit 23 harvest through time. I also plotted the size and age of male bears taken by nonlocal hunters because these hunters select for large males compared to many local hunters who are nonselective or select small bears to eat. I assumed that a decreasing proportion of males in the harvest or a decrease in the size or age of males taken by nonlocal hunters would indicate harvests have affected the sex or age structure of the population. I initially plotted this data for the entire Unit. However, most of the trophy harvest in Unit 23 has historically occurred in the Noatak, Wulik and Kivalina drainages. Therefore, I repeated these plots for this reduced area.

The term ‘nonlocal hunter’ used throughout this report refers to resident Alaskans who live outside Unit 23 as well as nonresident and alien hunters. ‘Local hunter’ refers to anyone who resides in Unit 23.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

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). There is no other quantitative data to indicate population trend.

Residents of Unit 23 indicate brown bear numbers have increased since at least the 1940s or 1950s. Several developments over the last 50 years probably contributed to this trend. Moose, caribou and muskox numbers in this region generally increased since the 1950s to provide a stable prey base for large predators. In addition, the presence of these ungulates substantially reduced the subsistence harvest of brown bears (R. Stoney, pers. commun.). In recent years the decline of the commercial salmon fishery in Kotzebue Sound has allowed more salmon to reach spawning areas far inland, increasing food available to bears. State hunting regulations

have probably contributed to the increase of brown bears in Unit 23 as well. For example, from statehood until the early 1990s brown bear hunting regulations provided primarily for trophy hunting and probably discouraged subsistence hunting to some extent. Additionally, regulations make it virtually impossible to harvest sows. In contrast, 'denning' bears and killing all occupants commonly occurred when bears provided the only reliable source of terrestrial hides, meat and fat to local users (R. Stoney, pers. commun.).

Since the mid 1990s many residents of Unit 23 have complained there are "too many bears" in Unit 23. They have reported that bears damage remote camps, take fish from drying racks and scare people while berry picking or hunting. Similarly, some nonlocal moose and caribou hunters have lost meat to brown bears each year. These reports agree with my opportunistic observations while traveling through the unit via plane, snow machine, boat and foot. Bear predation on moose calves may be a primary factor behind low moose recruitment in large portions of the unit since the mid-to-late 1990s.

Beginning in 2002 I began to receive a few reports from guides and local residents that brown bear numbers may have begun to decline in the Noatak River drainage. My opportunistic observations during 2002 seemed consistent with those reports as I saw fewer bears than in previous years. However, in 2003 many of the same individuals who had reported seeing few bears the previous year reported brown bears were again numerous in the Noatak drainage. Likewise, I saw more bears in that area in 2003 compared to 2002. Brown bear population dynamics cannot explain why so many disparate sources would perceive a 1-year decline in brown bear numbers.

MORTALITY

Harvest

Season and Bag Limit.

The following regulations were in effect throughout the 2000–2001 and 2001–2002 regulatory years:

Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 23		
Residents: One bear per regulatory year; a $25.00 tag fee is required	1 Sep–31 May (General hunt)	
Nonresidents: One bear every four regulatory years by drawing permit (24 permits fall; 24 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)

Hunters taking a brown bear under the general season hunt were required to use a big game tag and seal the hide and skull. Salvage of meat was optional under this hunt. The NWABBMA subsistence registration permit hunt has been previously described (Dau 2002).

Game Board Actions and Emergency Orders. There were no emergency orders issued for brown bears during the reporting period. In November 2001 the Board of Game increased the nonresident brown bear bag limit to 1 bear per year throughout Unit 23. This change went into effect during the 2002–2003 regulatory year.

Hunter Harvest. The reported harvest of 78 bears (48 males, 26 females and 4 unknown sex) in 2000–2001 was the highest reported since ADF&G began collecting harvest information in 1961–1962 (Fig 1). Although the 2001–2002 harvest of 50 bears (32 males, 17 females and 1 unknown) was substantially lower than this, harvest in this year was still relatively high. As in the past, few bears were taken under the subsistence registration permit hunt (Table 1).

Brown bear harvests have generally increased since the early 1960s despite substantial annual variability around this trend (Fig 1). Annual variation in harvest levels is probably attributable to weather and snow conditions, especially during spring, which strongly affect access and hence success rates. Although establishment of the brown bear subsistence hunt in 1992 may have improved our harvest data to some degree it likely had little influence on the long-term trend toward increasing harvests because so few bears have been taken under this hunt. We feel the subsistence hunt had no effect on actual harvest levels in Unit 23 because brown bears were taken for subsistence prior to 1992 but were usually not reported.

Community harvest estimates suggest villages within Unit 23 take relatively few brown bears for subsistence. For example, 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 harvests. 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.). Many residents of Unit 23 feel DLP reporting requirements are onerous and, as a result, many bears taken under these regulations are not reported.

As in previous years, more brown bears were reported taken in the Noatak drainage during this reporting period than in any other drainage (Fig 2, Table 2). This is partly because guides and residents of Kotzebue have historically focused their efforts in the Noatak River drainage where brown bears are abundant and easier to hunt than in the more densely forested Kobuk

and Selawik river drainages. Since 1998 brown bear harvests have increased in the Kobuk drainage and, during 2000–2001, were higher in the Selawik drainage than previously recorded. The high harvest of 2000–2001 resulted from peak harvests simultaneously coming from the Noatak, Kobuk and Selawik drainages.

There was no trend in the proportion of males in the total Unit 23 harvest (Fig 3). Likewise, there was no trend in skull size for male bears taken by nonlocal hunters throughout the Unit (Fig 4). Although there was no clear temporal trend in median age of male bears taken throughout the Unit (Fig 5), it appears hunters began taking somewhat younger bears after 1991.

Historically, most hunting for trophy brown bears in Unit 23 has occurred in that portion of the Noatak drainage below the Anisak River, and in the Wulik and Kivalina drainages. Telemetry results indicate bears commonly move among these drainages (Ballard et al. 1991). If hunting has substantially affected the sex or age structure of bears anywhere in Unit 23, it should be most apparent in harvest by nonlocal hunters (who most strongly select for large males bears) in this area. There was no trend in the proportion of males bears taken, or in the size of male bears harvested in this area for the sample of all bears harvested, or for the subsample of bears harvested only by nonlocal hunters (Fig 6).

Brown bear hunting regulations in Unit 23 have been modified many times since 1962. Since 1992 brown bear regulations been incrementally liberalized to provide for traditional subsistence hunting practices and increase opportunity for recreational hunters. These regulatory changes also attempted to slowly reduce bear density to reduce bear-human conflicts and predation on moose. The long-term increasing trend in reported harvest (Fig 1) is probably more a function of increasing numbers of commercial operators and nonlocal hunters in Unit 23 than the result of more liberal brown bear regulations.

Permit Hunts. Participation in the NWABBMA registration hunt continues to be primarily by residents of the NWABBMA, and especially by residents of Unit 23. As in the past Unit 23 hunters harvested the majority of bears taken in the NWABBMA area. Subsistence hunters took 10 bears (7 males and 3 females) in 2000–2001 and 3 bears (2 males and 1 female) in 2001–2002 (Table 1).

Nonresidents were limited to two drawing permit hunts, DB781 (fall hunt) and DB791 (spring hunt) with 24 permits available in each hunt annually. Nonresidents took 6 bears (2 males and 4 females) in Fall 2000, 11 bears (6 males and 5 females) in Spring 2001, 11 bears (11 males and no females) in Fall 2001, and 12 bears (8 males and 4 females) in Spring 2002 (Table 1). The total nonresident harvest in 2000–2001 (n=18) was less than the harvest in 2001–2002 (n=25)(Table 3).

Hunter Residency and Success. Nonlocal resident and nonresident hunters took 67% and 82% of the total reported Unit 23 harvest during 2000–2001 and 2000–2002, respectively (Table 3). Numbers of Alaskan hunters who reside outside Unit 23 increased substantially since the early 1990s (Fig 7). Numbers of nonresident hunters increased after 1997 when the number of nonresident drawing permits was increased to 24 each for the spring and fall hunts. The

increase in harvest levels is primarily attributable to nonlocal hunters. As with moose hunters, numbers of nonlocal brown bear hunters are increasing in Unit 23 (Fig 8).

Harvest Chronology. Most bears were taken during the months of September, April and May regardless of hunt type (Table 4). During 2000–2001, 49% of the harvest occurred during September and 45% occurred during April–May. In 2001–2002 these percentages were 60% and 38%, respectively.

Transport Methods. Most hunters used aircraft to access hunting areas in the fall and snow machines during spring (Table 5). Many guides are now combining use of airplanes and snow machines to hunt bears. The use of ATVs during fall is increasing in Unit 23 as 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

During this reporting period brown bears continued to be viewed as a nuisance or threat to many residents of Unit 23 who encounter them during subsistence activities, e.g. drying fish or picking berries. Many local residents believe brown bears have caused moose numbers to decline in Unit 23 during recent years.

CONCLUSIONS AND RECOMMENDATIONS

- Census a large portion of northwest Unit 23 including the 1987 Red Dog brown bear project study area in 2004 or 2005 to evaluate the effects of development on bear abundance and determine bear density.
- Continue community-based assessments to monitor harvests of brown bears by residents of Unit 23.
- Brown bear regulations in Unit 23 have been incrementally liberalized since the early 1990s. During this time brown bear harvest levels have increased; however, this trend began well before recent regulatory changes. Increases in bear harvests have probably been caused more by increasing numbers of commercial operators and nonlocal hunters throughout Unit 23 than through increased hunting opportunity from liberalized regulations. Although brown bear harvests have clearly increased in Unit 23 over the last 40 years, harvest data do not suggest this has affected the sex or age structure of the

population, or the size of bears available to hunters. Heavily hunted portions of the Unit may be acting as 'population sinks' where bears, especially boars, continually replace those that are harvested through immigration from lightly hunted areas, e.g. the upper Noatak drainage and Brooks Range. Alternatively, harvest data is notoriously insensitive to changes in brown bear population structure. Without census data, human harvests could skew population sex and age structures and not be reflected in harvest data.

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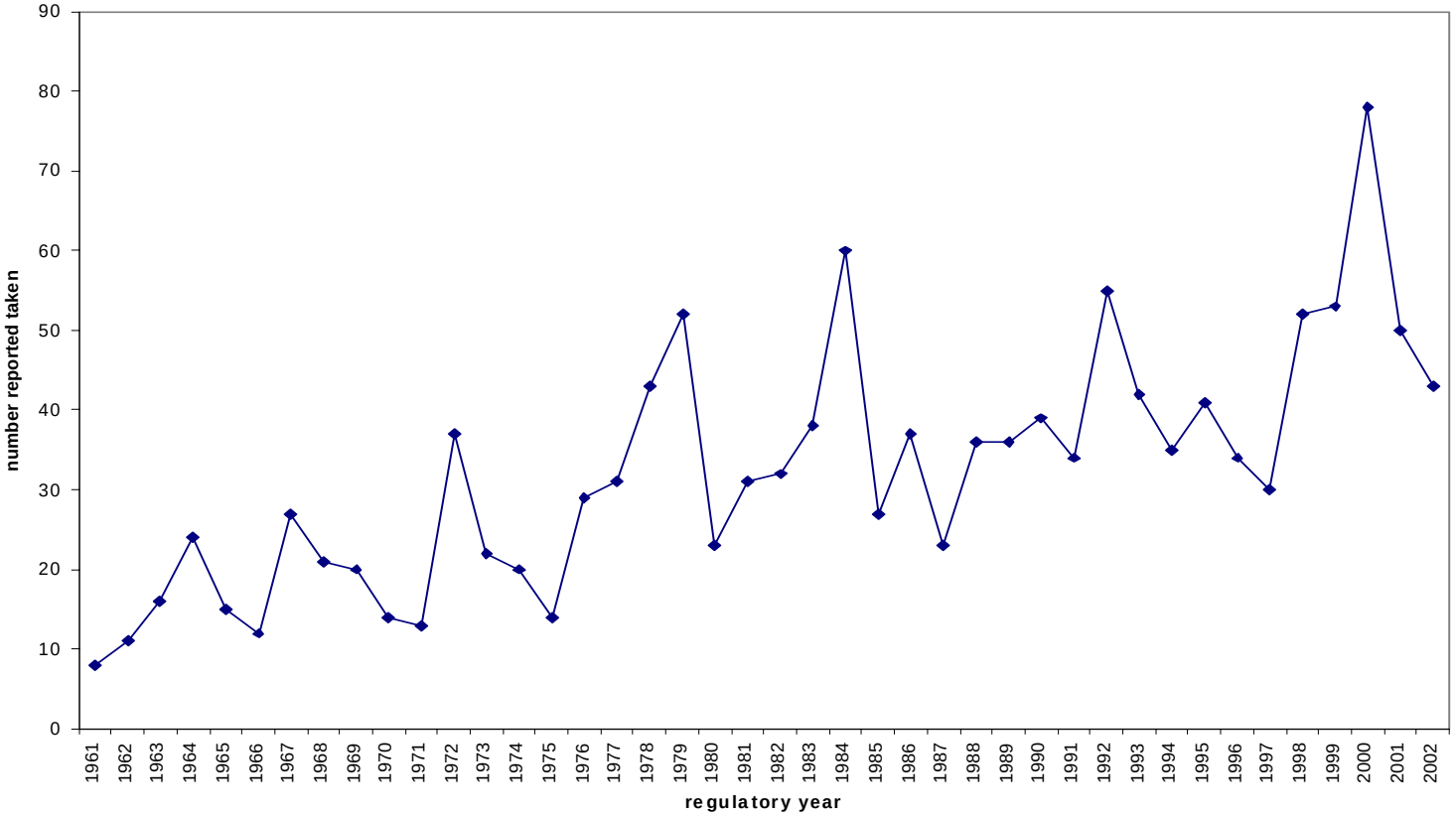

Figure 1 Unit 23 brown bear harvest, RY 1961–1962 to 2002–2003 (sealing and registration permit data)

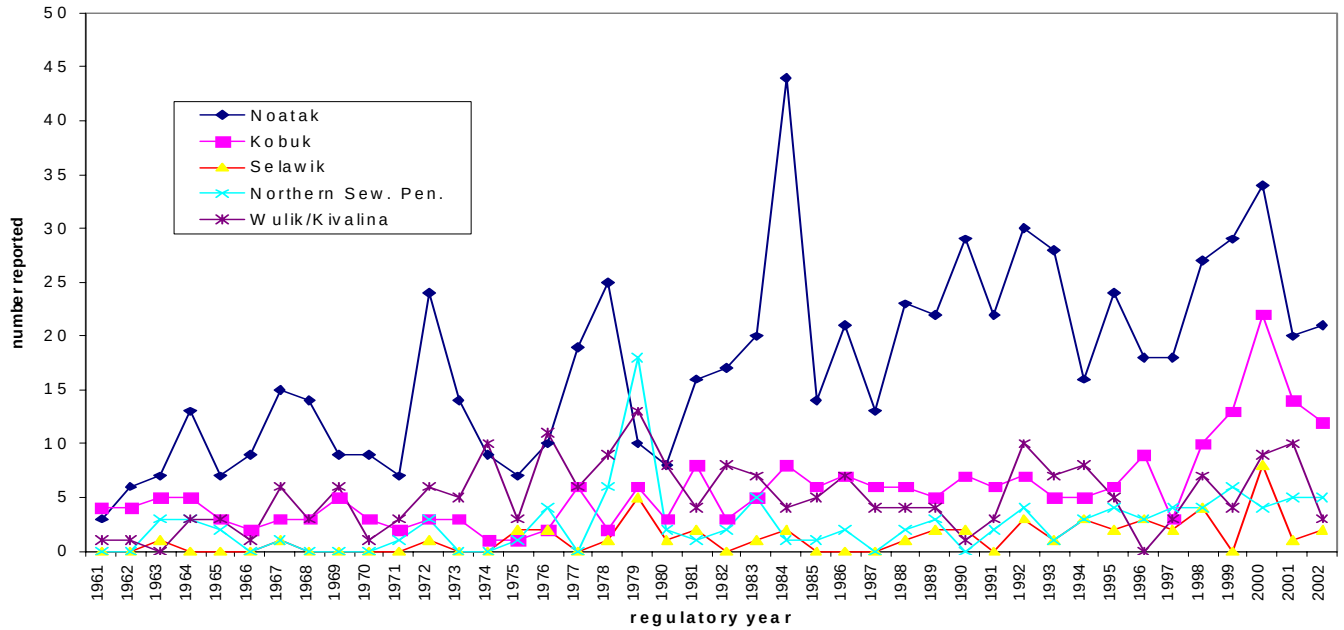

Figure 2 Unit 23 brown bear harvest by drainage, RY 1961–1962 to 2002–2003 (sealing and registration permit data)

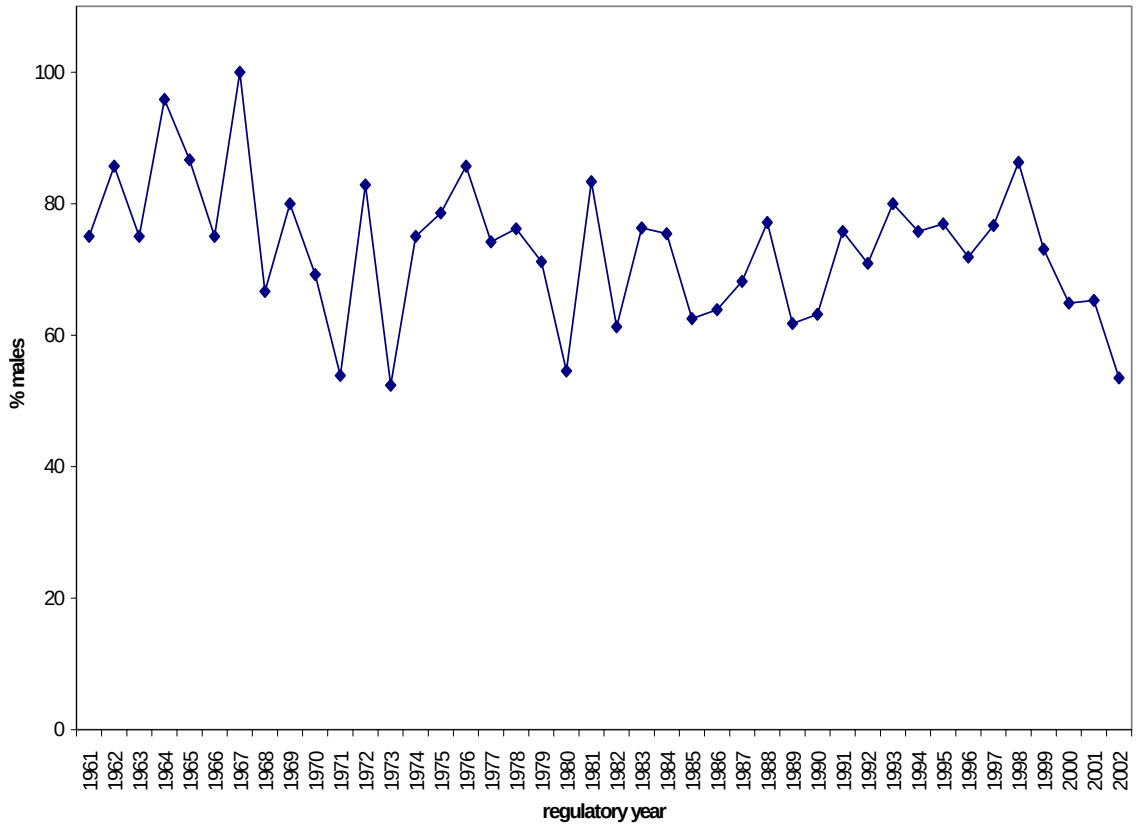

Figure 3 Percentage of males in Unit 23 brown bear harvest, RY 1961–1962 to 2002–2003 (sealing and registration permit data)

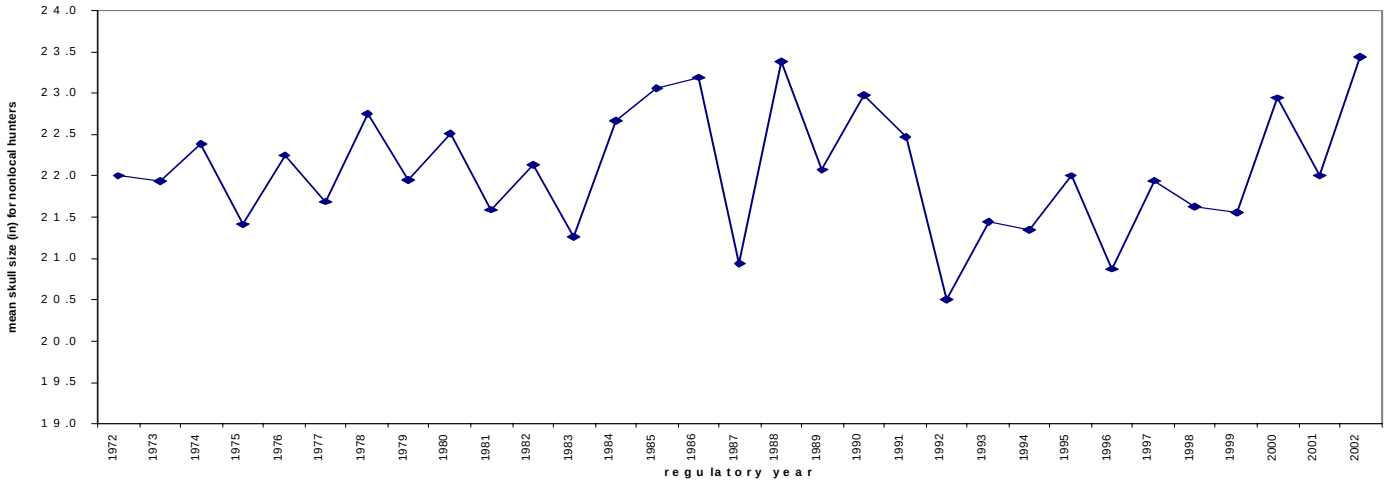

Figure 4 Median skull size of male brown bears taken in Unit 23 by hunters who resided outside the unit, RY 1972–1973 through 2002–2003 (sealing data)

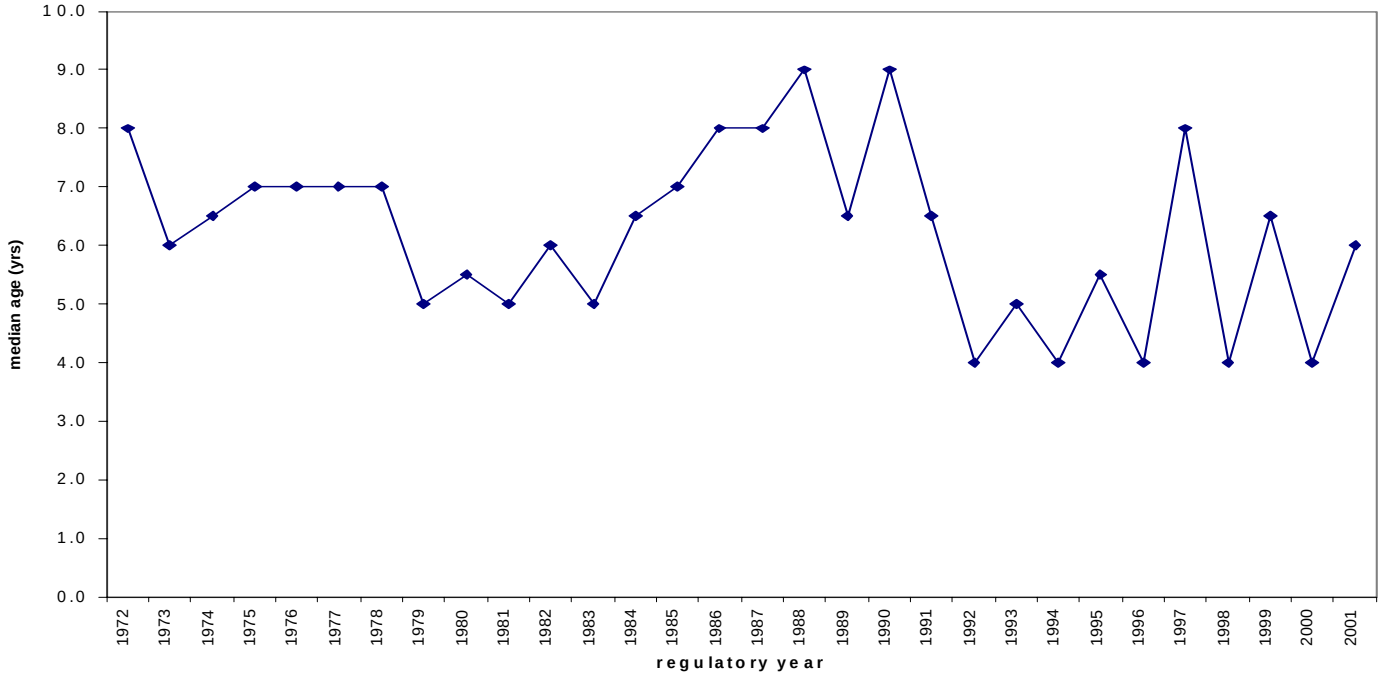

Figure 5 Median age of brown bears harvested in Unit 23, RY 1972–1973 through 2001–2002 (sealing data)

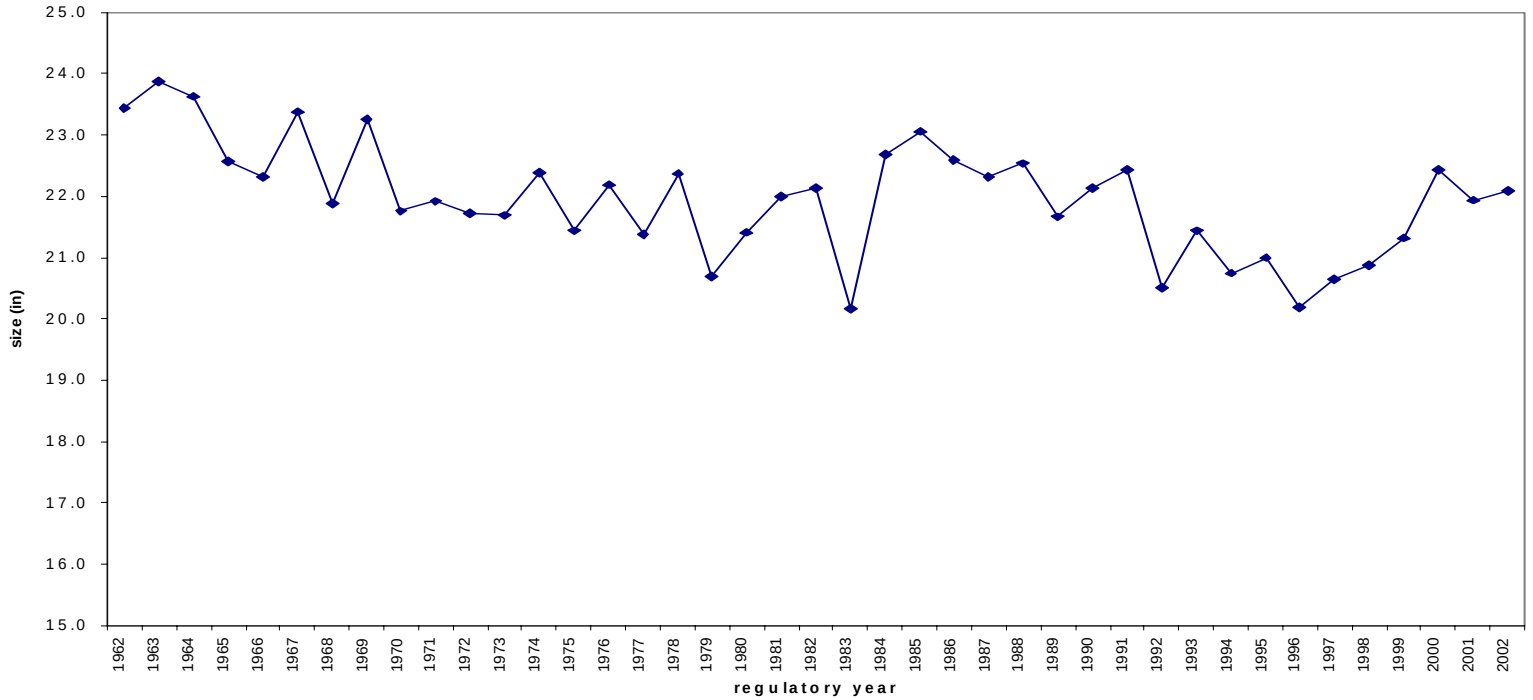

Figure 6 Median skull size of male brown bears taken in that portion of the Noatak drainage below the Anisak R., and in the Wulik and Kivalina drainages, RY 1962–1963 to 2002–2003 (sealing data)

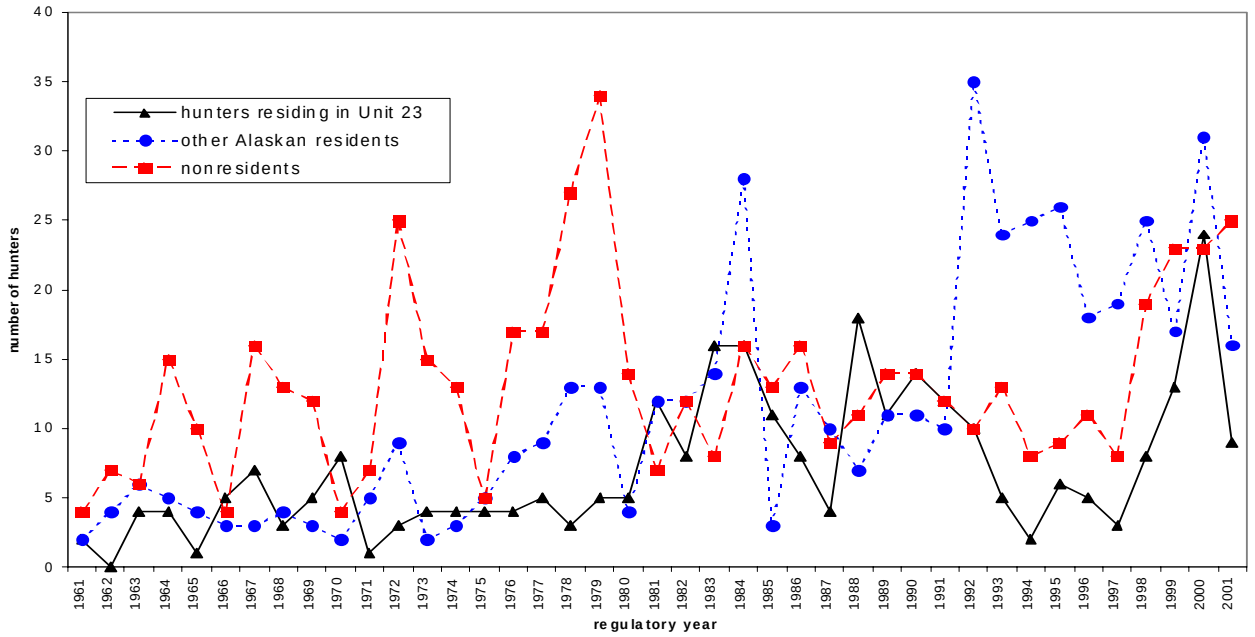

Figure 7 Unit 23 brown bear harvest by hunter residence, RY 1961–1962 to 2001–2002 (sealing and registration permit data)

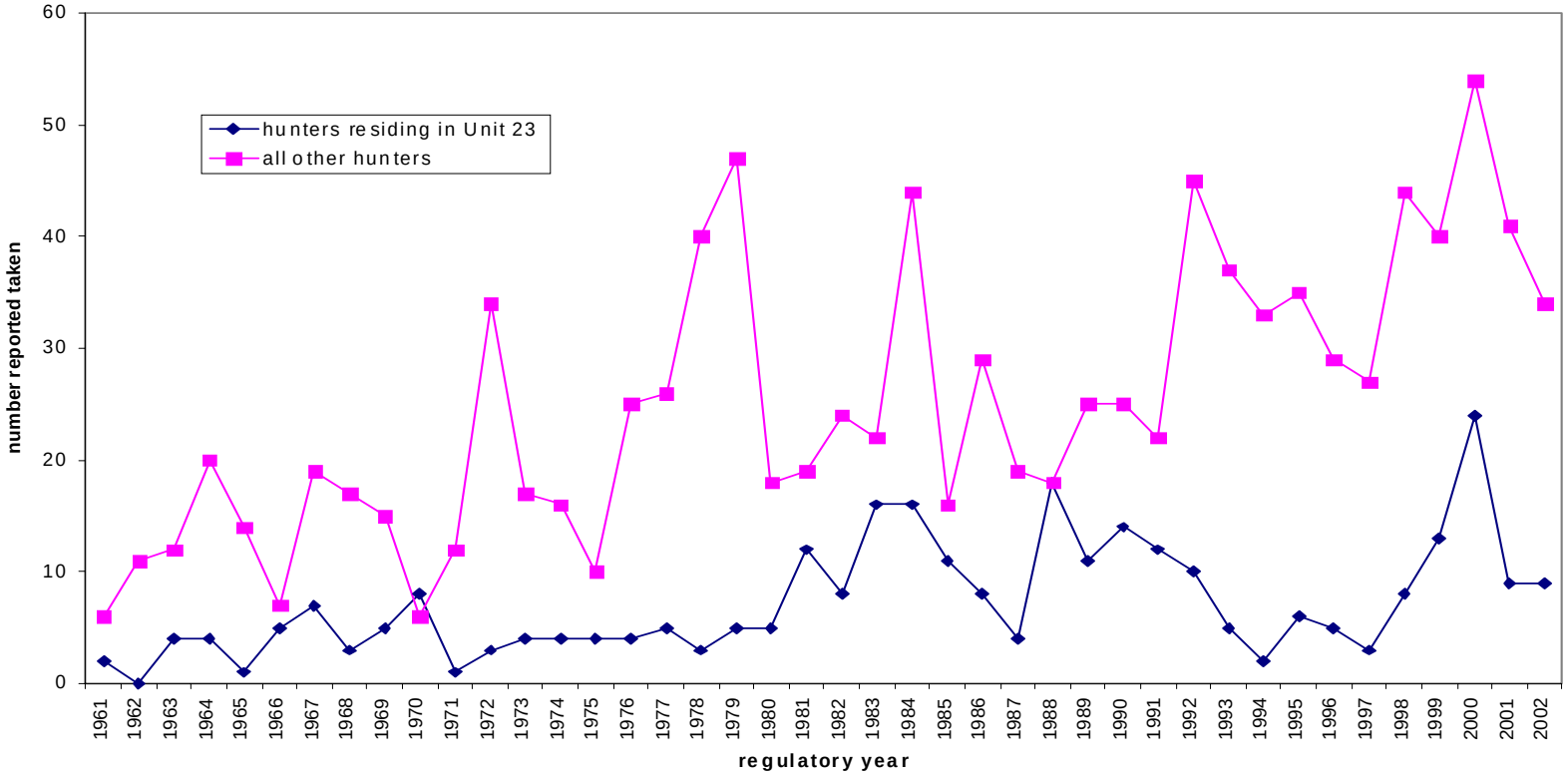

Figure 8 Unit 23 brown bear harvest by hunter residence, RY 1961–1962 to 2002–2003 (sealing and registration permit data)

Table 1 Reported harvest of brown bears in Unit 23, RY 1996–1997 to 2001–2002, by hunt type (excludes bears reported with hunt unknown)

Regulatory year/Hunt type	Male	Female	Unknown	Total
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
2000–2001				
General hunt	28	16	1	45
Fall nonresident (DB781)	2	4	0	6
Spring nonresident (DB791)	11	0	0	11
NWABBMA (subsistence)	6	3	0	9
Non hunting harvest	0	1	1	2
Total	47	24	2	73
2001–2002				
General hunt	16	7	0	23
Fall nonresident (DB781)	6	5	0	11
Spring nonresident (DB791)	8	4	0	12
NWABBMA (subsistence)	2	1	0	3
Non hunting harvest	0	0	1	1
Total	32	17	1	50

Table 2 Reported Unit 23 brown bear harvest by drainage, RY 1979–1980 to 2001–2002 (excludes bears with unknown harvest location)

Regulatory year	Noatak	Kobuk	Selawik	N. Seward Peninsula	Wulik/ Kivalina	Total
1979–1980	10	6	5	18	6	45
1980–1981	8	3	1	2	7	22
1981–1982	16	8	2	1	3	30
1982–1983	17	3	0	2	7	29
1983–1984	20	5	1	5	6	37
1984–1985	44	8	2	1	3	58
1985–1986	14	6	0	1	3	25
1986–1987	21	7	0	2	6	36
1987–1988	13	6	0	0	3	22
1988–1989	23	6	1	2	2	34
1989–1990	22	5	2	3	4	36
1990–1991	29	7	2	0	1	39
1991–1992	22	6	0	2	2	32
1992–1993	30	7	3	4	9	53
1993–1994	28	5	1	1	6	41
1994–1995	16	5	3	3	5	32
1995–1996	24	6	2	4	5	41
1996–1997	18	9	3	3	0	33
1997–1998	18	3	2	4	3	30
1998–1999	27	10	4	4	7	52
1999–2000	29	13	0	6	3	51
2000–2001	34	22	8	4	7	76
2001–2002	20	14	1	5	7	47

Table 3 Unit 23 brown bear harvest[a] by hunter residency, RY 1985–1986 to 2001–2002

Regulatory year	Unit 23 resident	Nonlocal resident	Nonresident	Unk.	Total
1985–1986	11	3	11	2	27
1986–1987	8	13	16	0	37
1987–1988	4	10	9	0	23
1988–1989	18	7	10	1	36
1989–1990	11	11	14	0	36
1990–1991	14	11	13	1	39
1991–1992	12	10	12	0	34
1992–1993	10	35	10	0	55
1993–1994	5	24	12	1	42
1994–1995	2	25	8	0	35
1995–1996	6	26	9	0	41
1996–1997	5	18	11	0	34
1997–1998	3	19	8	0	30
1998–1999	8	25	19	0	52
1999–2000	13	17	23	0	53
2000–2001	24	31	18	5	78
2001–2002	9	16	25	0	50

[a] Includes nonresident permit hunts and excludes non-hunting moralities.

Table 4 Monthly harvest of brown bears in Unit 23, RY 1988–1989 to 2001–2002 (excludes bears with unknown date of kill)

	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1988–1989	1	1	13	2	0	0	0	0	0	12	7	0	36
1989–1990	0	3	18	3	0	0	0	0	0	7	4	1	36
1990–1991	0	0	21	1	0	0	0	0	0	14	3	0	39
1991–1992	0	0	15	1	0	0	0	0	0	12	6	0	34
1992–1993	0	4	36	3	0	0	0	0	1	11	0	0	55
1993–1994	1	0	21	2	0	0	0	0	0	14	3	0	41
1994–1995	1	0	23	1	0	0	0	0	0	6	4	0	35
1995–1996	0	0	26	2	0	1	0	0	0	8	4	0	41
1996–1997	1	0	22	1	0	0	0	0	0	7	2	1	34
1997–1998	1	0	17	1	0	0	0	0	0	9	2	0	30
1998–1999	0	0	32	1	0	0	0	0	2	5	11	0	51
1999–2000	1	3	25	0	0	0	0	0	0	17	6	1	53
2000–2001	0	2	36	1	0	0	0	0	0	22	11	1	73
2001–2002	0	0	30	0	1	0	0	0	0	9	10	0	50

Table 5 Reported Unit 23 brown bear harvest by transport method, RY 1985–1986 to 2001–2002

Regulatory year	Airplane	Boat	4-wheeler	Snow-machine	Foot	Other	Unknown	Total
1985–1986	15	1	0	8	0	2	0	26
1986–1987	20	7	0	6	1	3	0	37
1987–1988	17	4	1	0	0	0	0	22
1988–1989	13	3	0	11	0	2	0	29
1989–1990	24	4	0	6	0	1	0	35
1990–1991	24	6	0	8	0	1	0	39
1991–1992	20	2	0	11	0	1	0	34
1992–1993	32	3	5	1	2	2	10	54
1993–1994	24	0	1	10	0	2	5	42
1994–1995	17	8	1	7	2	0	1	35
1995–1996	20[a]	5[b]	2	7	1	2	5	41
1996–1997	18	3	0	4	1	3	5	34
1997–1998	15	7	1	4	1	1	2	30
1998–1999	25	10	1	7	3	3	6	52
1999–2000	19	3	0	0	1	0	4	46
2000–2001	41	7	1	20	3	6	0	78
2001–2002	26	10	1	12	0	0	0	49

[a] One hunter indicated he used a boat in conjunction with an airplane, 2 hunters indicated they used 4–wheeler's 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 2000
To: 30 June 2002

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 (25 bears/1000 mi^2) throughout Unit 24, with the highest densities (33 bears/1000 mi^2) 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.

Previous reports indicated bear populations were stable or slowly increasing (Woolington 1997). The reported harvest since 1961 rarely exceeded 15–20 grizzly bears/year. 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 reports returned by hunters reporting under the Northwest Alaska Brown Bear Management Area permit regulations. Sealing was not required in the Northwest Alaska Brown Bear Management Area hunts unless the hide was removed from the unit. 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), which begins 1 July and ends 30 June (e.g., RY01 = 1 Jul 2001 through 30 Jun 2002). 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

Alaska 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 was included within the Northwest Alaska Brown Bear Management Area. This action allowed Unit 24 residents who resided within the Dalton Highway Corridor Management Area 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. No changes to grizzly bear regulations were adopted during the spring 2002 Board of Game meeting. However, a limited drawing hunt for moose was adopted in 2002 that will likely reduce the number of bears harvested incidental to moose hunting activities.

Hunter Harvest. The average annual grizzly bear harvest by hunters for RY96 through RY01 was 15.3 bears (Table 1). The reported 3-year average harvest (RY99–RY01) for the northern (north of Allakaket) and southern (remaining) portions of the unit was 17.3 and 0.0 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 (RY96–RY01) for the entire unit was 21.0 bears. Of the reported harvest for that same period, 64% were males and 36% were females. Formerly, the estimated sustainable harvest rate was 5–6% based on data from other areas of Interior Alaska (DuBois 1989), but recent data from bear populations in the Interior suggest harvest rates of up to 10-12% are sustainable. A harvest of 51–102 bears can be sustained in this unit. For RY99 through RY01 the average age of harvested bears was 9.0 years of age.

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. Typically, harvest was in the range of 10–15 bears annually, but hunters reported harvesting 25 bears in RY00, which was the highest harvest since 1973. Harvest in fall 2001 and 2002 returned to historical levels.

Harvest Chronology and Transport Methods. From RY96 through RY01 most kills occurred during the fall (85%), incidental to hunting other game species. Over the past 4 regulatory years, transportation to the hunt area was primarily via highway vehicle (32.7%), boat (20.0%), horseback (14.5%), or airplane (14.5%).

CONCLUSIONS AND RECOMMENDATIONS

The management objective of maintaining a population that could sustain the stated level of harvest was achieved. During this reporting period (RY00–RY01), harvest throughout the unit was very low and was not a factor influencing the population. Although most of the harvest

took place in the northern portion of the unit, the population was capable of sustaining that level of harvest. The southern portion of the unit was underutilized at an average harvest rate of less than 1 bear per year. The objective of maintaining at least 50% male harvest was achieved, with 64% 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 the use of 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.

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TABLE 1 Unit 24 grizzly bear mortality, regulatory year 1996–1997 through fall 2002

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
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
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	14	8	0	22	0	0	0	0	3	2	14	8	5	27
Spring 2001	3	0	0	3	0	0	0	0	0	0	3	0	0	3
Total	17	8	0	25	0	0	0	0	3	2	17	8	5	30
2001–2002														
Fall 2001	5	8	0	13	0	0	0	0	3	2	5	8	5	18
Spring 2002	3	1	0	4	0	0	0	0	0	0	3	1	0	4
Total	8	9	0	17	0	0	0	0	3	2	8	9	5	22
2002–2003														
Fall 2002	6	4	0	10	0	0	0	0	3	2	6	4	5	15

[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 2002

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
2000–2001	2	16	7	25
2001–2002	0	11	6	17
Fall 2002	1	4	5	10

[a] Unit residents.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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 primarily due to aircraft-supported hunting associated with guiding. As a result, beginning in spring 1971, Units 25, 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), which begins 1 July and ends 30 June (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 (RY00–RY01) 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 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, ADF&G, 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

Alaska Board of Game Actions and Emergency Orders. In March 2002, the Board of Game established a drawing permit hunt for brown bears in the Dalton Highway Corridor Management Area (DHCMA) in Unit 26B. Up to 10 permits may be issued, with 6 being issued in RY02. The regulation was prompted by the increasing number of bow hunters using the DHCMA, and the need to restrict opportunistic brown bear hunting in the open terrain in Unit 26B. The board also established a season closing date of 15 June rather than 20 May for all hunters in Units 25A, 25B, and 26C, and for nonresident hunters in Unit 25D. In addition, the board established a season of 1 March–30 November for resident hunters in Unit 25D. The more liberal season for Unit 25D was proposed in connection with the Yukon Flats Cooperative Moose Management Plan, which resulted in a number of regulation proposals designed to reduce predation on moose. During the previous report period ADF&G 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 ADF&G 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, ADF&G closed the remainder of the RY97 season by emergency order. An ADF&G 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 RY01 ranged from 21–35 (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 RY96 and RY97. 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 at or below the currently estimated sustainable harvest of 5%.

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 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 RY00 and 77% in RY01 (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. A total of 3 permits were issued for nonresident hunters in Unit 26B (outside the DHCMA), and 6 permits were issued for bow hunting in the DHCMA beginning in RY02 (Table 6).

Hunter Residency and Success. During the RY00 and RY01 seasons combined, residents of Alaska accounted for all of the reported harvest in Units 25B and 25D, and 82–93% of the harvest in Unit 26B. During the same period, residents took only 37% of reported harvest in Unit 25A and 32% in Unit 26C (Tables 7–10). Only a few local residents reported taking bears. These figures probably under represent 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. The relatively large number of bears taken in defense of life or property in Unit 26B in RY01 reflects ADF&G actions to remove food-conditioned bears in the Prudhoe Bay oilfield area.

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. Existing management objectives are generally suitable for the next period, but harvest objectives for Unit 25D should be revised in view of recent developments relating to moose management.

Management goals and objectives for ungulate populations should be considered in setting grizzly bear management goals for this area. Moose populations are currently limited by

predation and grizzly bears are an important predator on newborn moose calves (Gasaway et al. 1992; Bertram and Vivion 2002). The Board of Game has determined that the moose population in Unit 25D is important for providing high levels of human consumptive use under the State's intensive management law. The board must consider intensive management if regulatory action to significantly reduce moose harvest becomes necessary because of a decline in numbers or productivity. In addition, one of the goals of the Yukon Flats Cooperative Moose Management Plan is to increase moose numbers. The plan identified the need to reduce predation by grizzly bears, black bears and wolves. The following revised grizzly bear management goal and objective will be adopted for Unit 25D during the next reporting period.

MANAGEMENT GOAL

- Provide maximum opportunity to participate in hunting grizzly bears in Unit 25D.

MANAGEMENT OBJECTIVE

- Manage for a temporary reduction in grizzly bear numbers and predation on moose in Unit 25D. After moose populations increase to desired levels, reduce bear harvests to allow the bear population to recover.

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TABLE 1 Units 25A, 25B, 25D, 26B, and 26C brown bear population parameters and estimated sustainable harvest, 1993–2002

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		1183	59
26B	15,500	1.7	263	13
26C	10,272	3.8	390	20
26 subtotal	25,772		653	32
Total	73,712	2.5	1843	92

TABLE 2 Unit 25A brown bear mortality[a,b], regulatory years 1989–1990 through 2001–2002

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

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1995–1996														
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
2000–2001														
Fall 2000	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7
Spring 2001	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

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
2001–2002														
Fall 2001	9	2	(18)	0	11	1	1	0	10	(77)	3	(23)	0	13
Spring 2002	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	10	2	(17)	0	12	1	1	0	11	(79)	3	(21)	0	14

[a] Includes harvest by permit.

[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[a,b], regulatory years 1989–1990 through 2001–2002

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

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1995–1996														
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
2000–2001														
Fall 2000	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 2001	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0
Total	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1

Regulatory year	Reported								Total estimated kill					
	Hunter kill					Nonhunting kill[c]								
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
2001–2002														
Fall 2001	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 2002	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0
Total	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1

[a] Includes harvest by permit.

[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[a,b], regulatory years 1989–1990 through 2001–2002

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	(57)	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

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1995–1996														
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)	1	(100)	0	1
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
2000–2001														
Fall 2000	6	4	(40)	0	10	0	0	0	6	(60)	4	(40)	0	10
Spring 2001	1	0	(0)		0	0	0	0	1	(100)	0	(0)	0	1
Total	7	4	(36)	0	11	0	0	0	7	(64)	4	(36)	1	11

Regulatory year	Reported								Total estimated kill					
	Hunter kill					Nonhunting kill[c]								
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
2001–2002														
Fall 2001	10	3	(23)	0	13	2	3	1	12	(67)	6	(33)	1	19
Spring 2002	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	11	3	(21)	0	14	2	3	1	13	(68)	6	(32)	1	20

[a] Includes harvest by permit.

[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[a,b], regulatory years 1989–1990 through 2001–2002

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	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

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1995–1996														
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
2000–2001														
Fall 2000	8	5	(38)	0	13	1	0	1	9	(64)	5	(36)	1	15
Spring 2001	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0
Total	8	5	(38)	0	13	1	0	1	9	(64)	5	(36)	1	15

Regulatory year	Reported								Total estimated kill					
	Hunter kill					Nonhunting kill[c]								
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
2001–2002														
Fall 2001	5	3	(38)		8	1	0		6	(67)	3	(33)		9
Spring 2002	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	5	3	(38)		8	1	0	0	6	(67)	3	(33)	0	9

[a] Includes harvest by permit.

[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 2001–2002

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
	2000-2001	2	0	0	100	2	0	0	2
	2001-2002	1	0	0	100	0	1	0	1
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

Hunt/Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunt	Percent successful hunters	Males	Females	Unk	Total harvest
	1999–2000	0	0	0	0	0	0	0	0
	2000-2001	0	0	0	0	0	0	0	0
	2001-2002	1	100	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
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	5
	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	2	0	0	100	2	0	0	2
	2001–2002[b]	2	50	0	50	0	1	0	1

[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 2001–2002

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
2000–2001	0	(0)	1	(14)	6	(86)	7
2001–2002	0	(0)	6	(50)	6	(50)	12

[a] Includes harvest by permit.

[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 2001–2002

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
2000–2001	1	(100)	0	(0)	0	(0)	1
2001–2002	0	(0)	1	(100)	0	(0)	1

[a] Includes harvest by permit.

[b] Includes only residents of the subunit.

TABLE 9 Unit 26B residency of successful brown bear hunters[a], regulatory years 1985–1986 through 2001–2002

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 (69)	4 (30)	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
2000–2001	0 (0)	9 (82)	2 (18)	11
2001–2002	0 (0)	13 (93)	1 (7)	14

[a] Includes harvest by permit.

[b] Includes only residents of the subunit.

TABLE 10 Unit 26C residency of successful brown bear hunters[a], regulatory years 1985–1986 through 2001–2002

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
2000–2001	0	(0)	5	(38)	8	(62)	13
2001–2002	0	(0)	2	(25)	6	(75)	8

[a] Includes harvest by permit.

[b] Includes only residents of the subunit.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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 at least 60%.
- Minimize adverse interactions between grizzly bears and the public.

METHODS

There was 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 159º 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 between ADF&G, guides, and hunters.

During their fall 1999 meeting, the board increased the bag limit from 1 bear every 4 years to 1 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. The 1 bear per regulatory year restriction does count against the 1 bear every 4 regulatory years restriction in other units.

Human-Induced Harvest. Eighteen bears were sealed during 2000–2001. No bears were reported killed in defense of life and property (DLP). Six bears were killed in Unit 26A West and 12 in Unit 26A East (Table 1). Fourteen bears were males and 4 were females (Table 2).

Thirteen bears were sealed during 2001–2002. No bears were killed in Unit 26A West and 13 in Unit 26A East (Table 1). Ten bears were males and 3 were females (Table 2). There were no DLPs reported. Preliminary results indicate that 12 bears have been reported harvested during the 2002–2003 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 1989, 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 2000–2001 (18 bears) and 2001–2002 (13 bears) was higher than 1998–1999 (10 bears) and 1999–2000 (11 bears), but was below the average number harvested in past years (27.3). 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 2000–2001, the mean skull size for males was 21.9 inches and 20.8 inches for females; the mean age was 11.0 years for males and 9.0 years for females. During 2001–2002 the mean skull size for males was 21.0 inches and 18.7 inches for females; the mean age was 9.4 years for males and 5.3 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 18 bears sealed in Unit 26A during 2000–2001, 12 were harvested by nonresidents, 3 by a nonlocal Alaska resident, and 3 by a North Slope resident. During 2001–2002, 9 of 13 bears were harvested by nonresidents, 4 by nonlocal Alaska residents, and 0 by North Slope residents (Table 4).

Harvest Chronology. During 2000-2001, 10 bears were harvested during August, 6 in September, and 2 in May. During 2001-2002, 7 bears were harvested in August and 6 in September. (Table 5).

Transport Methods. Most bear hunters continued to use aircraft as transportation in Unit 26A. During 2000–2001, 15 hunters used aircraft for transportation, 1 used a boat, 1used a snogo, and 1 walked. All 13 hunters used aircraft during 2001-2002 (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 18 bears harvested during 2000–2001 and 13 bears during 2001–2002. This was an increase over the past 2 years, but below the average number of bears harvested between 1990 and 1998 (27.3) and well below the allowable sustained yield of approximately 51 bears. Even if unreported harvest is as high as 100% of the reported harvest, the total estimated yearly harvest of 26–36 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, ADF&G 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. In addition, the Board increased the bag limit from 1 bear every 4 years to 1 bear every year in 1999. It has been surprising that, since 1996, the bear harvest has been less than before 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 order to have consistent regulations with other parts of the state, we recommend a change in bag limit so that the one bear per year regulation does not count against one bear per every 4 year restriction in other areas.

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Table 1 Estimated Population Size and Reported harvest of brown/grizzly bears in Unit 26A, 1988–2002

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 Bears

Unit	Estimated population size	5% harvest rate	Reported Harvest	
			2000–2001	2001–2002
26A West	400	20	6	0
26A East	500–720	25–36	12	13
Total	900–1200	45–56	18	13

[a] Includes DLP Bears

Table 2 Unit 26A brown bear harvest[a], 1985–2002

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	0	11	6–12	17–23
2000–2001										
Fall	12	(75)	4	(25)		16				
Spring	2		0			2				
Total	14	(78)	4	(22)		18	0	18	6-12	24-30

Regulatory	Hunter harvest						Non-hunting		Un-reported	Total
Year	M	(%)	F	(%)	Unk.	Total	kill	Total	est. kill	est. kill
2001–2002										
Fall	10	(77)	3	(23)		13				
Spring	0		0							
Total	10		3				0	13	6-12	19-25

[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, 1985–2002

	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
2000–2001	21.9	14	20.8	4	11.0	14	9.0	4
2001–2002	21.0	10	18.7	3	9.4	10	5.3	3

Table 4 Unit 26A brown bear successful hunter[a] residency, 1985–2002

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
2000–2001	3	3	12		18
2001–2002	0	4	9		13

[a]Hunters in permit hunts are included.
[b]Local means North Slope residents.

Table 5 Unit 26A brown bear harvest chronology by time period, 1985–2002

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
2000–2001	10	6	0	0	0	2		18
2001–2002	7	6	0	0	0	0	0	13

Table 6 Unit 26A brown bear harvest[a] percent by transport method, 1985–2002.

	Transport method for brown bear harvest														
Regulatory	Airplane		Horse		Boat		Snowmachine		ORV		Walk		Unknown		Total
Year	*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)									10
1999–2000	11	(100)													11
2000–2001	15	(83)			1	(6)	1	(6)			1	(5)			18
2001–2002	13	(100)													13

[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.

ADF&G