

# **Brown Bear Management Report**

**of survey-inventory activities  
1 July 2000–30 June 2002**

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Division of Wildlife Conservation  
December 2003**



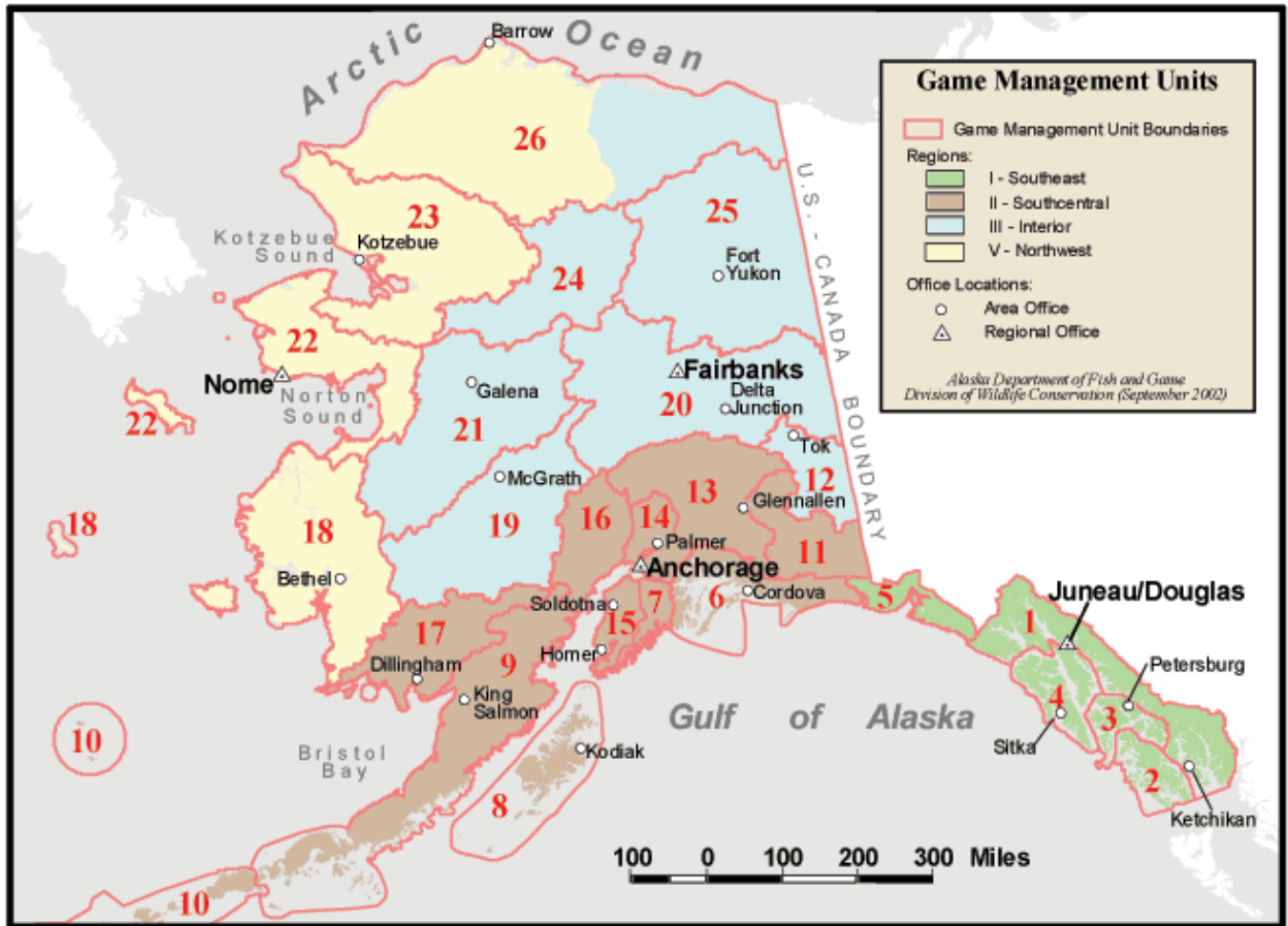
**ADF&G**

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

If this report is used in its entirety, please reference as: Alaska Department of Fish and Game. 2003. Brown bear management report of survey-inventory activities 1 July 2000–30 June 2002. C. Healy, editor. Juneau, Alaska.

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Funded through Federal Aid in Wildlife Restoration, project 4, grants W-27-4 and W-27-5.



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**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000  
To: 30 June 2002

**LOCATION**

**GAME MANAGEMENT UNIT:** 1 (18,500 mi<sup>2</sup>)

**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

1 bear every 4 regulatory years  
by registration permit only

#### Resident and Nonresident Hunters

15 Sep–31 Dec  
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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Please cite any information taken from this section, and reference as:

Porter, B. 2003. Unit 1 brown bear management report. Pages 1–18 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Unit 1 brown bear harvests, by subunit, 1985–2001<sup>a</sup>

Regulatory year	Unit 1A		Unit 1B		Unit 1C		Unit 1D		Total harvest
	Harvest	% of total	Harvest	% of total	Harvest	% of total	Harvest	% of total	
1985	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

<sup>a</sup> 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 <sup>a</sup>			Unreported illegal <sup>b</sup>	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 <sup>c</sup>	(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 <sup>d</sup>	(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 <sup>e</sup>	(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 <sup>a</sup>			Unreported illegal <sup>b</sup>	Total estimated kill			Total
	M (%)	F (%)	Unk.	Total	M	F	Unk.		M (%)	F (%)	Unk.	
Fall 1994	(42)	(58)	0	12	0	1	0	2 <sup>f</sup>	(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 <sup>g</sup>	(58)	(42)	0	12
Spring 1996	(83)	(17)	0	12	0	0	0	2 <sup>h</sup>	(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 <sup>i</sup>	(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 <sup>j</sup>	(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 <sup>k</sup>	1 <sup>l</sup>	0	0	(45)	(55)	0	23
Spring 2001	(71)	(29)	0	17	0	1 <sup>m</sup>	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

<sup>a</sup> Includes DLP kills, research mortalities, and other known human/cause accidental mortalities.

<sup>b</sup> Estimated to be 10% of reported kill (McCarthy 1991).

<sup>c</sup> First season registration permits required.

- <sup>d</sup> One female was illegally killed and left along Fish Creek in Hyder.
- <sup>e</sup> 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.
- <sup>f</sup> One male, one female killed by hunters who failed to obtain registration permits.
- <sup>g</sup> One male, 1 female taken illegally.
- <sup>h</sup> Two males taken by hunters who failed to obtain registration permits.
- <sup>i</sup> One male taken by a hunter who failed to obtain registration permit.
- <sup>j</sup> One male and 1 female taken by hunters who failed to obtain registration permits.
- <sup>k</sup> One male killed illegally, and 2 males DLP.
- <sup>l</sup> One female killed by vehicle.
- <sup>m</sup> 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 <sup>a</sup>				Mean age <sup>b</sup>			
	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 <sup>c</sup>
1993	21.9	16	20.3	6	6.4	16	3.4	5
1994	22.9	18	20.5	11 <sup>c</sup>	7.9	13	7.3	12 <sup>c</sup>
1995	21.7	18 <sup>d</sup>	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 <sup>e</sup>
1999	21.7	26	19.4	16	8.2	17	6.4	14
2000	21.7	21	20.8	16	6.1	20 <sup>f</sup>	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

<sup>a</sup> Skull size equals length plus zygomatic width.

<sup>b</sup> Determined through analyses of extracted premolar teeth.

<sup>c</sup> Includes 1 female taken illegally by a hunter who failed to obtain a registration permit.

<sup>d</sup> Includes 2 males taken illegally in Unit 1C by hunters who failed to obtain registration permits.

<sup>e</sup> Includes 2 female and 1 male DLP.

<sup>f</sup> 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 <sup>a</sup>	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 <sup>b</sup>	164	(55)	(88)	(12)	(67)	(33)	0	9	
272F	1996 <sup>b</sup>	147	(54)	(81)	(19)	(54)	(46)	0	13	
272F	1997	175	(52)	(81)	(19)	(63)	(37)	0	16	
272F	1998 <sup>d</sup>	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 <sup>c</sup>	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 <sup>d</sup>	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

<sup>a</sup> First season permits required for Unit 1 brown bear hunt.

<sup>b</sup> Three hunters did not return permits.

<sup>c</sup> Two hunters did not return permits.

<sup>d</sup> One hunter did not return permit.



Table 6 Unit 1 successful brown bear hunters, by residency, 1985–2001<sup>a</sup>

Regulatory year	Local resident <sup>b</sup> (%)	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 <sup>c</sup>	(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

<sup>a</sup> Does not include illegal kills.

<sup>b</sup> Local residents are those hunters who reside in Unit 1.

<sup>c</sup> Before 1989/90 all harvest data were obtained solely from sealing records.

Table 7 Unit 1 brown bear harvest, by season, 1985–2001<sup>a</sup>

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)

<sup>a</sup> Does not include illegal kills.

Table 8 Unit 1 brown bear harvest, by month, 1985–2001<sup>a</sup>

Regulatory year	Harvest periods							Total
	September	October	November	March	April	May	June	
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

<sup>a</sup> Does not include illegal kills.

Table 9 Unit 1 successful brown bear hunter transport methods, 1985–2001<sup>a</sup>

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

<sup>a</sup> 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<sup>2</sup>)

**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 1993a) and has produced 67% of the region's harvest in recent years (Miller 1993b). 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<sup>2</sup>.

#### *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*

<u>Season and Bag Limit</u>	<u>Resident and Nonresident Hunters</u>
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.

## **ACKNOWLEDGMENTS**

DWC staff contributed significantly to the Unit 4 brown bear management program. The following deserve specific mention: LaVern Beier, Bruce Dinneford, Tom Paul, Anne Post, Linda Schmidt, and Kim Titus. Additional support came from the Department of Public Safety, Division of Fish and Wildlife Protection, especially from Clyde Campbell and Thomas Akelkok.

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Please cite any information taken from this section, and reference as:

Whitman, J.S. 2003. Unit 4 brown bear management report. Pages 19–34 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

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

Regulatory year	<u>Hunter kill</u>					<u>Nonhunting kill<sup>a</sup></u>				Total Reported
	M	F	(%F)	Unk	Total	M	F	Unk	Total	
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

<sup>a</sup> 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<sup>a</sup> and mortality<sup>b</sup> by major geographic areas, regulatory years 1997–2001

Hunt area	Regulatory year	Nr hunters	M (%) <sup>c</sup>	F (%) <sup>c</sup>	Unknown (%) <sup>d</sup>	Total harvest	Percent estimated population <sup>e</sup>
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 <sup>f</sup>							
	1997	12					
	1998	0					
	1999	2					
	2000	2					
	2001	2					

Table 2 Unit 4 brown bear hunting pressure<sup>a</sup> and mortality<sup>b</sup> by major geographic areas, regulatory years 1997–2001

Hunt area	Regulatory year	Nr hunters	M (%) <sup>c</sup>	F (%) <sup>c</sup>	Unknown (%) <sup>d</sup>	Total harvest	Percent estimated population <sup>e</sup>
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

<sup>a</sup> Registration permit data.

<sup>b</sup> Bear sealing data.

<sup>c</sup> Percentage based on known sex bears.

<sup>d</sup> Percentage based on total bears.

<sup>e</sup> Estimated populations: Chichagof and adjacent islands, 1550; Baranof and adjacent islands, 1045 bears; Admiralty Island, 1560 bears; all Unit 4, 4155 bears.

<sup>f</sup> 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 <sup>a</sup>	(%)	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

<sup>a</sup> 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		
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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<sup>a</sup>

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

<sup>a</sup> Includes all hunts.

Table 6 Unit 4 brown bear harvest by transport method, 1997/98-2001/02<sup>a</sup>

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

<sup>a</sup>Sealing certificate data and registration permit data often differ. Sealing certificate data were used.

## **BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000

To: 30 June 2002

### **LOCATION**

**GAME MANAGEMENT UNIT:** 5 (5800 mi<sup>2</sup>)

**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

1 bear every 4  
regulatory years

#### Resident and Nonresident Hunters

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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Please cite any information taken from this section, and reference as:

Barten, N. 2003. Unit 5 brown bear management report. Pages 35–42 in C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.



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)

## **BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000

To: 30 June 2002

### **LOCATION**

**GAME MANAGEMENT UNIT:** 6 (10,140 mi<sup>2</sup>)

**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 ( $\cong$ 320) and 6A ( $\cong$ 270), and followed by Units 6B ( $\cong$ 140) and 6C ( $\cong$ 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<sup>2</sup>) 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<sup>2</sup>), consistent with contiguous coastal habitat to the southeast and with the northern Alaska Peninsula. Western PWS was low density ( $<40$  bears/1000 km<sup>2</sup>), 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  $\leq 2$  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  $\leq$  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  $\leq$  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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Please cite any information taken from this section, and reference as:

Crowley, D.W. 2003. Unit 6 brown bear management report. Pages 43–61 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

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 <sup>2</sup> )	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 <sup>2</sup> )	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 Ellamar	1997–1998	84	105	5	16	2	3
		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 <sup>2</sup> )	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	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 <sup>2</sup> )	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 Total		1997–1998	71	873	44	54	17	10
		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					Estimated									
		Hunter kill			Unk.	Total	Nonhunting			illegal kill	Total estimated kill					
M	F	(%)	M	F			Unk.	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					Estimated										
		Hunter kill			Unk.	Total	Nonhunting			illegal kill	Total estimated kill						
		M	F	(%)			M	F	Unk.		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									
		Hunter kill			Nonhunting		illegal kill	Total estimated kill								
		M	F	(%)	Unk.	Total		M	F	Unk.		M	(%)	F	(%)	Unk.
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									
		Hunter kill			Unk.	Total	Nonhunting			illegal kill	Total estimated kill					
		M	F	(%)			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									
		Hunter kill			Unk.	Total	Nonhunting			illegal kill	Total estimated kill					
	M	F	(%)	M			F	Unk.	M		(%)	F	(%)	Unk.	Total	
Unit 6	1997–1998															
Total	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

Unit	Year	Males				Females			
		Skull size	<i>n</i>	Age	<i>n</i>	Skull size	<i>n</i>	Age	<i>n</i>
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 <sup>a</sup> 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

Unit	Regulatory year	Harvest periods										<i>n</i>
		September		October		November		April		May		
		1–15	16–30	1–15	16–31	1–15	16–30	1–15	16–30	1–15	16–31	
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 Total	1997–1998	(14)	(8)	(18)	(8)	(0)	(0)	(0)	(0)	(20)	(31)	49
	1998–1999	(27)	(10)	(10)	(10)	(2)	(2)	(0)	(7)	(14)	(19)	59
	1999–2000	(15)	(13)	(17)	(10)	(2)	(0)	(4)	(10)	(13)	(17)	48
	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							Unknown	<i>n</i>
		Airplane	Boat	Airboat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle		
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

## **BROWN BEAR MANAGEMENT REPORT**

From: 1 July 1998

To: 30 June 2000

### **LOCATION**

**GAME MANAGEMENT UNITS:** 7 (3520 mi<sup>2</sup>) and 15 (4876 mi<sup>2</sup>)

**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<sup>2</sup>) together with the National Park Service (NPS) (Kenai Fjords National Park, ca. 885 mi<sup>2</sup>) 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<sup>2</sup>. 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<sup>2</sup> (7.0 bears per 100 mi<sup>2</sup>) 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<sup>2</sup> (5.2 bears per 100 mi<sup>2</sup>), and we calculated the suitable habitat to be 13,848 km<sup>2</sup> (5347 mi<sup>2</sup>). 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<sup>2</sup> (5.2 bears per 100 mi<sup>2</sup>) and the suitable habitat was 13,848 km<sup>2</sup> (5347 mi<sup>2</sup>), 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 mortalities 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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Please cite any information taken from this section, and reference as:

Selinger, J. 2003. Units 7 and 15 brown bear management report. Pages 62–74 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

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

Regulatory year	Reported							Total estimated kill						
	Hunter Kill				Nonhunting kill <sup>a</sup>			M	(%)	F	(%)	UNK.	(%)	Total
	M	F	Unk.	Total	M	F	Unk.							
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							Total estimated kill						
	Hunter Kill				Nonhunting kill <sup>a</sup>			M	(%)	F	(%)	UNK.	(%)	Total
	M	F	Unk.	Total	M	F	Unk.							
1998														
Fall 98	0	0	0	0	3	4 <sup>b</sup>	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 <sup>c</sup>	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

<sup>a</sup> Includes DLP kills, research mortalities, and other known human-caused mortality.

<sup>b</sup> Two research bears were illegally killed but never reported.

<sup>c</sup> 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 <sup>a</sup> resident		Nonlocal resident		Nonresident		Total successful hunters <sup>b</sup>
		(%)		(%)		(%)	<i>n</i>
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 <sup>c</sup>	4	(80)	1	(20)	0	(0)	5
1996–97 <sup>c</sup>	2	(33)	4	(67)	0	(0)	6
1997–98 <sup>c</sup>	5	(63)	3	(37)	0	(0)	8
1998–99 <sup>c</sup>	0	(00)	0	(00)	0	(0)	0
1999–00 <sup>c</sup>	8	(80)	1	(10)	1	(10)	10
2000–01 <sup>c</sup>	4	(67)	2	(33)	0	(0)	6
2001–02 <sup>c</sup>	1	(50)	1	(50)	0	(0)	2

<sup>a</sup> Local resident means residents of Units 7 or 15.

<sup>b</sup> Does not include nonsport harvest.

<sup>c</sup> Closed by Emergency Order.

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

Regulatory year	Harvest periods			<i>n</i> <sup>a</sup>
	September	October	May	
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 <sup>b</sup>	0	0	100	5
1996–97 <sup>b</sup>	0	0	100	6
1997–98 <sup>b</sup>	0	0	100	8
1998–99 <sup>b</sup>	0	0	0	0
1999–00 <sup>b</sup>	0	100	0	10
2000–01 <sup>b</sup>	0	100	0	6
2001–02 <sup>b</sup>	0	100	0	2

<sup>a</sup> Does not include nonsport harvest.

<sup>b</sup> 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									<i>n</i> <sup>a</sup>
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk.	
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 <sup>b</sup>	0	0	0	40	0	0	60	0	0	5
1996–97 <sup>b</sup>	33	0	33	0	0	0	17	17	0	6
1997–98 <sup>b</sup>	0	0	12	25	0	0	38	25	0	8
1998–99 <sup>b</sup>	0	0	0	0	0	0	0	0	0	0
1999–00 <sup>b</sup>	0	10	40	10	0	10	30	0	0	10
2000–01 <sup>b</sup>	0	17	83	0	0	0	0	0	0	6
2001–02 <sup>b</sup>	0	0	50	0	0	0	50	0	0	2

<sup>a</sup> Does not include nonsport harvest.

<sup>b</sup> Closed by Emergency Order.

## **BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000

To: 30 June 2002

### **LOCATION**

**GAME MANAGEMENT UNIT:** 8 (5,097 mi<sup>2</sup>)

**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 20<sup>th</sup> 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 (1997a) 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 1997a, 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<sup>2</sup> (0.7 bears/mi<sup>2</sup>), and for the northern islands it was 142 bears/1000 km<sup>2</sup> (0.4 bears/mi<sup>2</sup>). 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<sup>2</sup> in 1993 to 173 independent bears/1000 km<sup>2</sup> 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 1997b), 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 (1990a) 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 perspective. 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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Please cite any information taken from this section, and reference as:

Van Daele, L.J. 2003. Unit 8 brown bear management report. Pages 75–102 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

## 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 <sup>2</sup> )	Bears/hr	Bears/100km <sup>2</sup>	Sightability	Density Bears/1000 km <sup>2</sup>	Size of survey area (km <sup>2</sup> )	Size of survey area (mi <sup>2</sup> )
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 <sup>a</sup>	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<sup>a</sup>, RY 1985–2002.

Regulatory year	Complete surveys	<i>Single bears</i>		<i>Maternal bears</i>		<i>Yearlings &amp; cubs</i>		<i>Cubs of the year</i>		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 <sup>b</sup>	129	30	101	23	162	37	44	10	109.0	436

<sup>a</sup> From Kodiak NWR files; standardized low-level surveys along selected streams on southwestern Kodiak Island.

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



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

Regulatory year	Males				Females			
	Mean skull size	<i>n</i>	Mean age	<i>n</i>	Mean skull size	<i>n</i>	Mean age	<i>n</i>
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	--- <sup>a</sup>	--- <sup>a</sup>	21.9	37	--- <sup>a</sup>	--- <sup>a</sup>

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 <sup>a</sup> 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 <sup>c</sup> 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<sup>a</sup> hunt numbers RB 230 and RB 260, RY 1992–93 to 2001–02.

	Regulatory year	Permits issued <sup>a</sup>	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 <sup>b</sup>	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 <sup>a</sup>	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 <sup>b</sup>	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<sup>a</sup> in Unit 8, RY 1992–93 to 2001–02.

Regulatory year	Local residents <sup>b</sup>	(%)	Nonlocal residents	(%)	Nonresidents <sup>c</sup>	(%)	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

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

<sup>b</sup> Includes residents of Game Management Unit 8.

<sup>c</sup> 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 <sup>a</sup>
	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	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	
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

<sup>a</sup> Totals may differ from those in other tables because of different classifications of illegal sport harvest.

Table 9. Unit 8 brown bear harvest<sup>a</sup> percent by transport method, RY 1992–93 to 2001–02.

Regulatory Year	Percent of Harvest								<i>n</i>
	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



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**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000  
To: 30 June 2002

**LOCATION**

**GAME MANAGEMENT UNIT:** 9 (33,638 mi<sup>2</sup>)

**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 unharmed 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<sup>2</sup> in a 469 mi<sup>2</sup> study area. Within the study area, density varied among count units from 1 bear/1 mi<sup>2</sup> to 1 bear/7 mi<sup>2</sup>, 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<sup>2</sup> (93 bears/1000 km<sup>2</sup>) (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<sup>2</sup> versus an estimate of 1 bear/10 mi<sup>2</sup> 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.,  $\geq 5$  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  $\geq 2$  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  $\geq$ 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,  $\geq 8$  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  $\geq 8$  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  $\geq 8$  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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Please cite any information taken from this section, and reference as:

Sellers, R.A. 2003. Unit 9 brown bear management report. Pages 103–113 in C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.



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 Year	Hunter kill						Non-hunting kill <sup>a</sup>			Total reported kill					
	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

<sup>a</sup>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 <sup>a</sup> resident		Nonlocal resident		Nonresident		Successful hunters <sup>b</sup>
		(%)		(%)		(%)	
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

<sup>a</sup> Local resident means resident of Unit 9.

<sup>b</sup> Includes unknown residency.

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

Regulatory Year	Harvest periods											
	July/August		September		< 7 October		≥7 October		May		June	
	%	( <i>n</i> )	%	( <i>n</i> )	%	( <i>n</i> )	%	( <i>n</i> )	%	( <i>n</i> )	%	( <i>n</i> )
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)
1999–00	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			ORV	Highway vehicle	Unk.	<i>n</i>
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	

## **BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000

To: 30 June 2002

### **LOCATION**

**GAME MANAGEMENT UNIT:** 10 (1536mi<sup>2</sup>)

**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<sup>2</sup>. 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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Please cite any information taken from this section, and reference as:

Sellers, R.A. 2003. Unit 10 brown bear management report. Pages 114–117 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

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 <sup>a</sup>	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 <sup>a</sup>	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 <sup>a</sup>	12	0	100	6	1	7
	2000–01	7	14	14	86	4	1	5
	2001–02	7	28 <sup>b</sup>	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

<sup>a</sup> Includes 1 governor's permit.

<sup>b</sup> Did not report.

## **BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000

To: 30 June 2002

### **LOCATION**

**GAME MANAGEMENT UNIT:** 11 (13,257 mi<sup>2</sup>)

**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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Please cite any information taken from this section, and reference as:

Tobey, R.W. 2003. Unit 11 brown bear management report. Pages 118–125 in C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

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

Regulatory Year	Hunter kill					Non-hunting kill <sup>a</sup>			Estimated kill <sup>b</sup>		Total estimated kill					
	M	F	(%)	Unk	Total	M	F	Unk.	Unreported 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

<sup>a</sup> Includes Defense of Life or Property kills, research mortalities, and other known human-caused accidental mortality.

<sup>b</sup> Estimated kill by year, not by season.

Table 2. Unit 11 brown bear successful hunter residency, RY 1989–2001.

Regulatory year	Local <sup>a</sup>		Nonlocal		Nonresident		successful hunters
	resident	(%)	resident	(%)		(%)	
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

<sup>a</sup> 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 year	Harvest percent					n
	August	September	October	April	May	
1989–90	--	33	8	8	50	12
1990–91	--	89	--	--	11	9
1991–92	--	67	--	--	33	3
1992–93	--	50	17	--	33	6
1993–94	--	50	--	--	50	4
1994–95	--	67	--	--	33	6
1995–96	--	50	50	--	--	2
1996–97	--	50	50	--	--	2
1997–98	--	50	--	--	50	4
1998–99	--	50	--	--	50	2
1999–2000	--	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									n
	Airplane	Horse	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walking	Unk.	
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

## **BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000  
To: 30 June 2002

### **LOCATION**

**GAME MANAGEMENT UNIT:** 12 (9978 mi<sup>2</sup>)

**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<sup>2</sup>) 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<sup>2</sup> 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<sup>2</sup> of useable habitat; 18.0–21.9 bears of all ages/1000 km<sup>2</sup>). 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<sup>2</sup>), 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<sup>2</sup> (4.1 bears/10,000 km<sup>2</sup>) in the northern Wrangell and Mentasta Mountains to 9.3 bears/10,000 mi<sup>2</sup> (3.6 bears/10,000 km<sup>2</sup>) 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<sup>2</sup> (2.2/10,000 km<sup>2</sup>; Reynolds, ADF&G, unpublished data). Since RY87, harvest has declined in the accessible areas as well as the remainder of Unit 12 (5875 mi<sup>2</sup>) and the average kill density declined to 0.2 bears/10,000 mi<sup>2</sup> (0.4 bears/10,000 km<sup>2</sup>).

## 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<sup>2</sup> 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. Coincidentally, 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<sup>2</sup>; 18.0–21.9 bears of all ages/1000 km<sup>2</sup>) 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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Please cite any information taken from this section, and reference as:

Gardner, C.L. 2003. Unit 12 brown bear management report. Pages 126–140 in C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.



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 <sup>a</sup>			Unreported	Illegal	M	(% )	F	(% )	Unk	Total
	M	F	Unk	Total	M	F	Unk								
<i>1989–1990</i>															
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
<i>1990–1991</i>															
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
<i>1991–1992</i>															
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
<i>1992–1993</i>															
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
<i>1993–1994</i>															
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
<i>1994–1995</i>															
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
<i>1995–1996</i>															
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
<i>1996–1997</i>															
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 <sup>a</sup>			Unreported	Illegal	M	(% )	F	(% )	Unk	Total
	M	F	Unk	Total	M	F	Unk								
<i>1997–1998</i>															
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
<i>1998–1999</i>															
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
<i>1999–2000</i>															
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
<i>2000–2001</i>															
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
<i>2001–2002</i>															
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
<i>2002–2003</i>															
Autumn 2002 <sup>b</sup>	1	7	0	8	0	0	0	0	0	1	(13)	7	(87)	0	8

<sup>a</sup> Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

<sup>b</sup> 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 <sup>a</sup>	2	(25)	1	(13)	5	(63)	8

<sup>a</sup> 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									<i>n</i> <sup>a</sup>
	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 <sup>b</sup>	6 (75)	2 (25)	0 (0)							8

<sup>a</sup> Includes unknowns.

<sup>b</sup> Preliminary harvest.

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

Regulatory year	Harvest by transport method										<i>n</i>
	Airplane (%)	Horse (%)	Boat (%)	3- or 4- wheeler (%)	Snowmachine (%)	ORV (%)	Highway vehicle (%)	Walking (%)	Unk (%)		
1989–1990	4 (33)	2 (17)	1 (8)	0 (0)	1 (8)	4 (33)	0 (0)	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)	1 (6)	16
1991–1992	6 (67)	2 (22)	0 (0)	0 (0)	1 (11)	0 (0)	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)	2 (8)	24
1993–1994	2 (12)	7 (41)	0 (0)	2 (12)	0 (0)	0 (0)	2 (12)	3 (18)	1 (6)	1 (6)	17
1994–1995	4 (27)	7 (47)	0 (0)	1 (7)	0 (0)	0 (0)	2 (13)	0 (0)	1 (7)	1 (7)	15
1995–1996	1 (13)	7 (86)	0 (0)	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)	0 (0)	21
1997–1998	2 (18)	8 (73)	1 (9)	0 (0)	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)	0 (0)	16
1999–2000	5 (31)	8 (50)	0 (0)	3 (19)	0 (0)	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)	0 (0)	34
2001–2002	3 (20)	5 (33)	0 (0)	5 (33)	0 (0)	0 (0)	0 (0)	2 (13)	0 (0)	0 (0)	15
2002–2003 <sup>a</sup>	2 (25)	3 (38)	0 (0)	1 (13)	0 (0)	1 (13)	1 (13)	0 (0)	0 (0)	0 (0)	8

<sup>a</sup> Preliminary harvest.

TABLE 5 Blueberry sample areas in Units 12 and 20E

Area	Unit	Elevation n	Aspect <sup>a</sup>	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

<sup>a</sup> Degrees magnetic.

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

Calendar year	Sample units <sup>a</sup>												Bear harvest <sup>b</sup>	DLP <sup>b,c</sup>
	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 <sup>d</sup>									12	0				

<sup>a</sup> Mean number of berries/sample unit. Each sample unit included 5 1-m<sup>2</sup> plots; numbers in parentheses is the variance among plots within a study area.

<sup>b</sup> Unit 20E only.

<sup>c</sup> Number of bears killed in defense of life and property (DLP) also includes bears harvested in Jul.

<sup>d</sup> No berry data collected in summer 2002.

## **BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000

To: 30 June 2002

### **LOCATION**

**GAME MANAGEMENT UNIT:** 13 (22,857 mi<sup>2</sup>)

**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<sup>2</sup> on the upper Susitna River (13E) was slightly higher than the 1987 estimate of 6.36 independent bears/1000 km<sup>2</sup> (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<sup>2</sup> 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<sup>2</sup> (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 1990a). 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 to 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 (1990b) 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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Please cite any information taken from this section, and reference as:

Tobey, R.W. 2003. Unit 13 brown bear management report. Pages 141–151 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

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

Regulatory Year	Hunter kill						Non-hunting kill <sup>a</sup>			Total estimated kill					
	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

<sup>a</sup>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 <sup>a</sup>		Nonlocal		Nonresident		Successful Hunters <sup>b</sup>
	Resident	(%)	Resident	(%)		(%)	
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

<sup>a</sup> Local resident means resident of Unit 13.

<sup>b</sup> Includes unknown residency.

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

Regulatory year	Harvest periods														n		
	August		September		October		November		March		April		May			June	
	%	(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.	<u>n</u>
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

## **BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000

To: 30 June 2002

### **LOCATION**

**GAME MANAGEMENT UNIT:** 14 (6625 mi<sup>2</sup>)

**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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Please cite any information taken from this section, and reference as:

Del Frate, G. 2003. Unit 14 brown bear management report. Pages 152–160 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

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

Regulatory year	Reported					Nonhunting kill <sup>a</sup>			Estimated unreported kill	Total estimated kill					
	Hunter kill		Unk.	Total	Unk.	Unk.	M	F		M	F	Unk.	Total		
M	F	(%)							(%)					(%)	(%)
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					Estimated unreported kill	Total estimated kill						
	Hunter kill		Nonhunting kill <sup>a</sup>				M	(%)	F	(%)	Unk.	Total	
	M	F	(%)	Unk.	Total	M	F	Unk.		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

<sup>a</sup>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 <sup>a</sup>		Nonlocal		Nonresident		Total successful hunters
	resident	(%)	resident	(%)		(%)	
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

<sup>a</sup>Unit 14 residents

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

Regulatory year	Harvest periods							<i>n</i>
	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							<i>n</i>
	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

## **BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2000

To: 30 June 2002

### **LOCATION**

**GAME MANAGEMENT UNIT:** 16 (12,255 mi<sup>2</sup>)

**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<sup>2</sup> (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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Please cite any information taken from this section, and reference as:

Del Frate, G. 2003. Unit 16 brown bear management report. Pages 161–173 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.



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

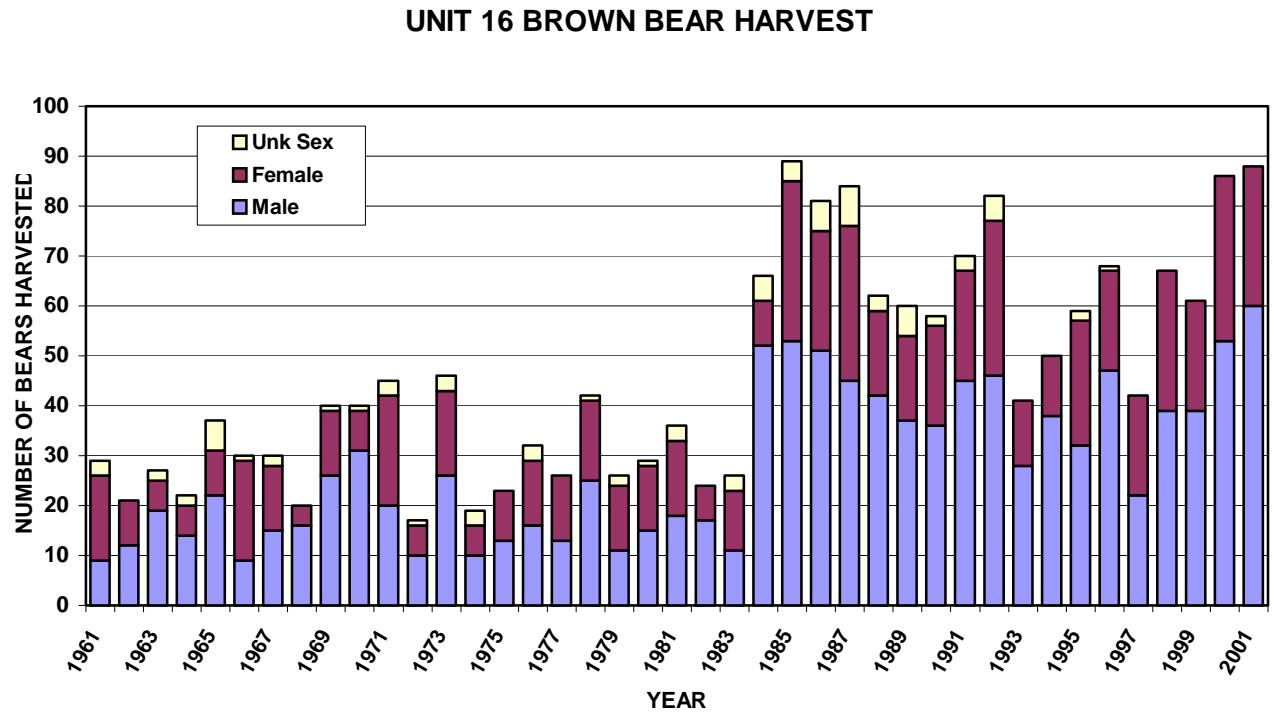


Table 1 Unit 16A human-caused brown bear mortality, RY 1993–2001

Regulatory year	Reported					Estimated unreported kill	Total estimated kill								
	Hunter kill		Unk.	Total	Nonhunting kill <sup>a</sup>			Unk.	Total						
M	F	(%)			M	F	Unk.			M (%)	F (%)				
1993															
Fall 93	0	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	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	0	4
Spring 95	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	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	0	3
Spring 96	2	2	(50)	0	4	1	0	0	3	(60)	2	(40)	0	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	0	2
Spring 97	2	0	(0)	0	2	0	0	0	2	(100)	0	(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	0	5
Spring 98	1	0	(0)	0	1	1	0	0	2	(100)	0	(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	0	1
Spring 99	0	1	(100)	0	1	0	0	0	0	(0)	1	(100)	0	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			Unk.	Total		Nonhunting kill <sup>a</sup>			Unk.	Total				
	M	F	(%)				M	F	Unk.			M (%)	F (%)		
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

<sup>a</sup>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		Unk.	Total	Nonhunting kill <sup>a</sup>			Unk.	Total						
M	F	(%)			M	F	Unk.			M (%)	F (%)				
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 <sup>b</sup>	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					Estimated unreported kill	Total estimated kill								
	Hunter kill		Unk.	Total	Nonhunting kill <sup>a</sup>			Unk.	Total						
M	F	(%)			M	F	Unk.			M (%)	F (%)				
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

<sup>a</sup> Includes DLP kills, illegal kills, other known human-caused accidental mortality.

<sup>b</sup> 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 <sup>a</sup> resident		Nonlocal resident		Nonresident		Total <sup>b</sup> 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

<sup>a</sup> Unit 16 residents

<sup>b</sup> Includes unknown residency

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

Regulatory year	Harvest periods							<i>n</i>
	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	<i>n</i>
	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

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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<sup>2</sup>)

**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

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 25<sup>th</sup> 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.

### **LITERATURE CITED**

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Please cite any information taken from this section, and reference as:

Woolington, J.D. 2003. Unit 17 brown bear management report. Pages 174–184 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

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												Unit 17 total			
	17(A)				17(B)				17(C)				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 <sup>a</sup> resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters <sup>b</sup>
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

<sup>a</sup> residents of Game Management Unit 17.

<sup>b</sup> 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 year	Fall Season			Spring Season				Total
	Sep 1–15	Sep 16–30	Oct 1–15	Apr 1–15	Apr 16–30	May 1–15	May 16–30	
1991–92 <sup>a</sup>	6.7%	53.3%	11.1%	----	----	11.1%	15.6%	45
1992–93 <sup>a</sup>	12.2%	46.9%	6.1%	----	----	20.4%	14.3%	49
1993–94 <sup>a, b</sup>	9.1%	48.5%	24.2%	----	----	6.1%	12.1%	33
1994–95 <sup>a, b</sup>	11.6%	58.1%	16.3%	----	----	4.7%	9.3%	43
1995–96 <sup>a, b</sup>	10.9%	45.6%	10.9%	----	----	15.2%	17.4%	46
1996–97 <sup>a, b</sup>	6.4%	34.0%	23.4%	----	----	17.0%	19.2%	47
1997–98 <sup>c</sup>	7.6%	30.3%	18.2%	----	22.7%	13.6%	7.6%	66
1998–99 <sup>c</sup>	1.3%	25.6%	18.0%	----	26.9%	19.2%	9.0%	78
1999–00 <sup>c</sup>	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 <sup>d</sup>	6.5%	35.5%	7.5%	6.5%	26.9%	10.8%	4.3%	93 <sup>e</sup>

<sup>a</sup> Season dates: Spring - Unit 17 May 10–May 25  
 Fall - Units 17A & C Sep 10–Oct 10  
 Unit 17B Sep 20–Oct 10

<sup>b</sup> 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

<sup>c</sup> 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

<sup>d</sup> Season dates: Units 17(A)&(C) Sep 10–May 25  
 Unit 17(B) Sep 20–May 25

<sup>e</sup> 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									Total
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unknown	
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