

# **Brown bear management report of survey-inventory activities, 1 July 2010–30 June 2012**

**Patricia Harper and Laura A. McCarthy, editors**



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# **Brown bear management report of survey-inventory activities, 1 July 2010–30 June 2012**

Alaska Department of Fish and Game  
Division of Wildlife Conservation  
P.O. Box 115526  
Juneau, Alaska 99811-5526



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**Cover Photo:** A brown bear with the chum salmon it caught in Kennel Creek on Chichagof Island. ©2012 ADF&G. Photo by Phil Mooney.

# BROWN BEAR MANAGEMENT REPORT

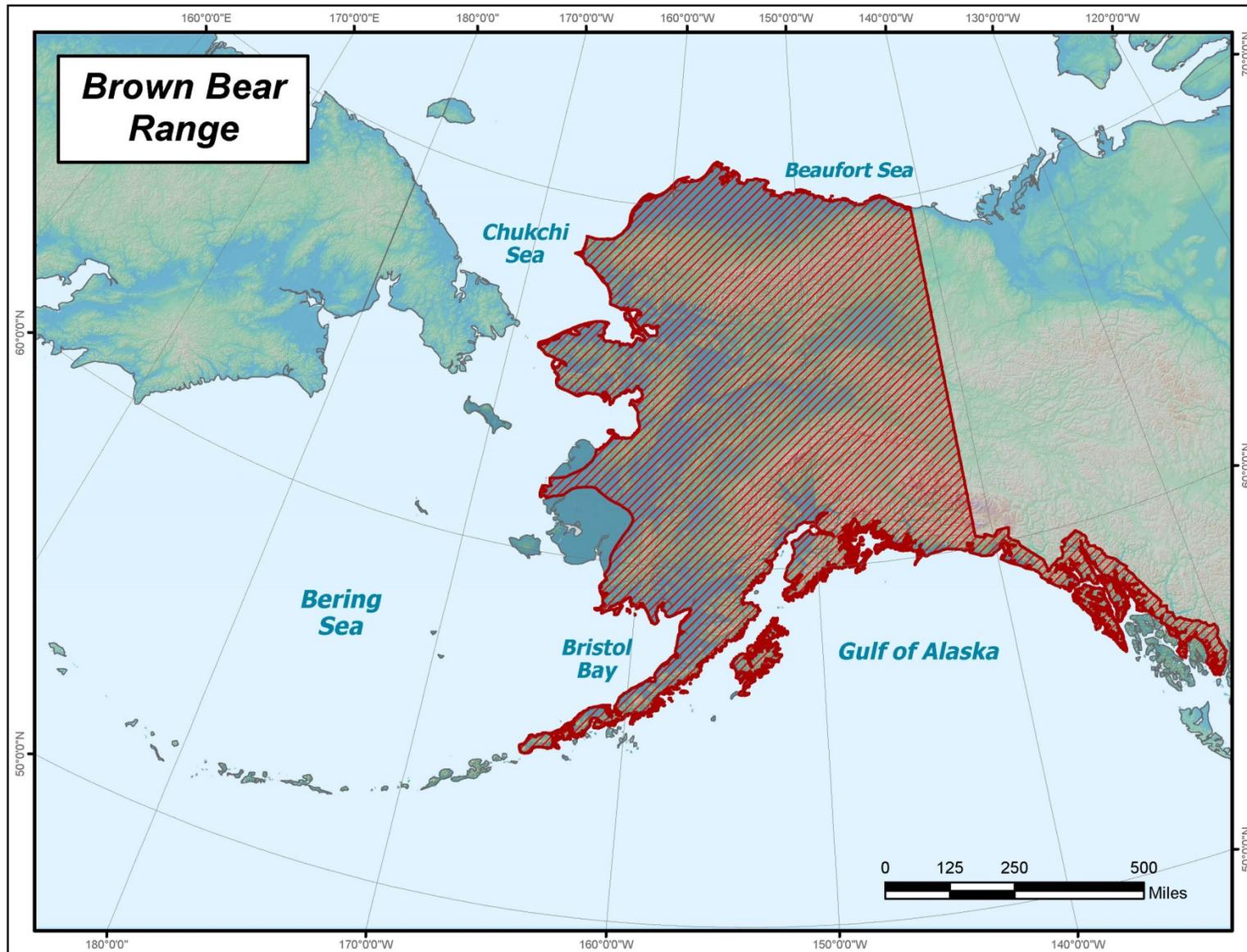
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To: 30 June 2012

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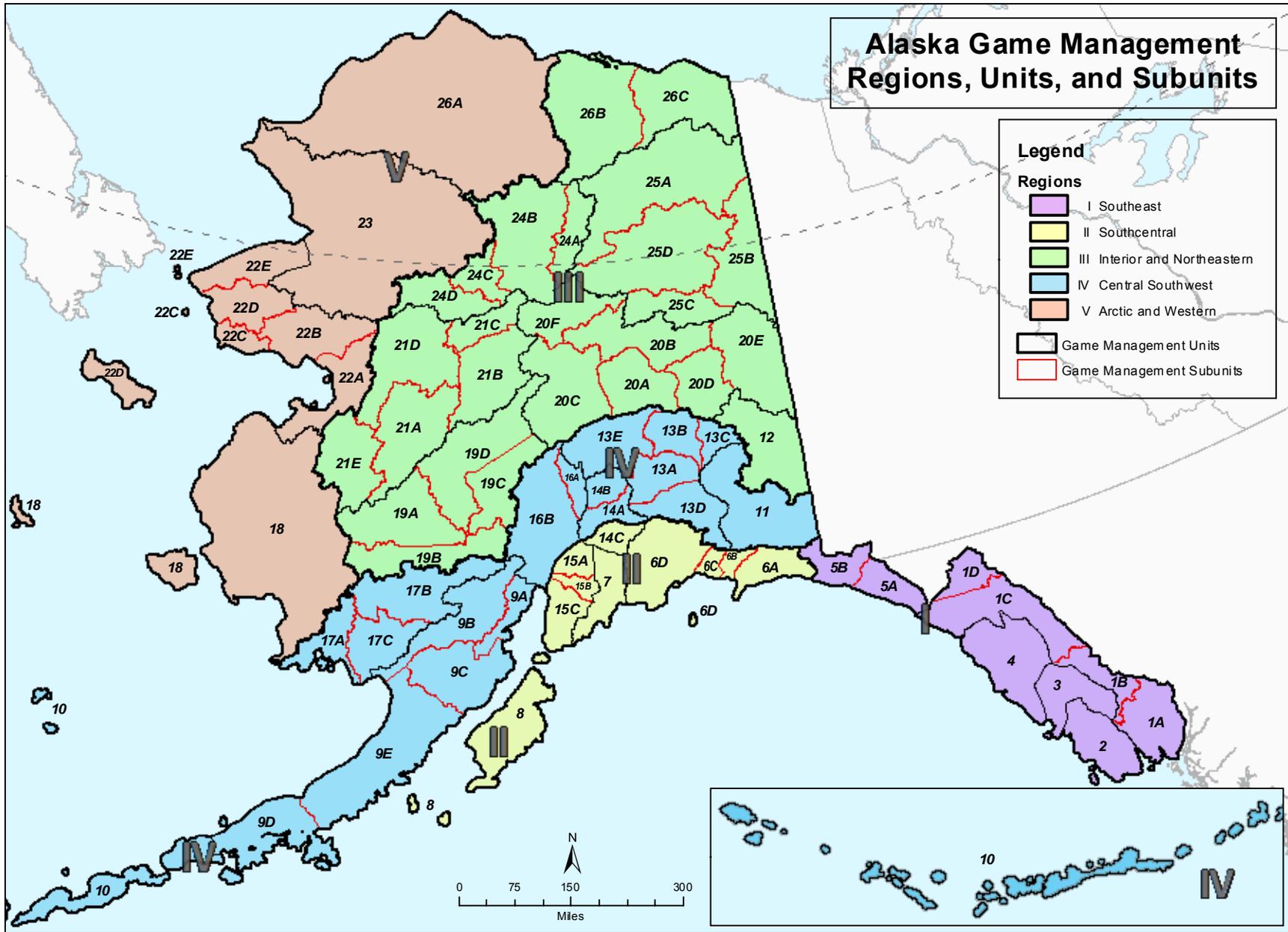


# Alaska Game Management Regions, Units, and Subunits

## Legend

### Regions

- I Southeast
  - II Southcentral
  - III Interior and Northeastern
  - IV Central Southwest
  - V Arctic and Western
- 
- Game Management Units
  - Game Management Subunits



AI

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
907-465-4190 PO BOX 115526  
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**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012

**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. 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), only recently has brown bear research been undertaken on the part of the region's mainland, which makes up Unit 1. 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.

During this reporting period approximately 47% of the unit's brown bear harvest occurred in Unit 1D (Haines area), located in the northern part of the region. The remainder of the harvest taken in other areas included 23% in Unit 1A (Ketchikan area), 11% in Unit 1B (Petersburg area), and 19% in Unit 1C (Juneau area); harvest percentages were similar to the last reporting period and the long-term averages. Nonresident hunters are required to hunt brown bears with a registered guide or a relative within the second degree of kindred. Because trophy status brown bears are available in the unit and because hunters must wait 4 regulatory years between successful hunts, hunters are very selective and strive for a large bear in prime condition.

The Tongass National Forest (Tongass) encompasses most Unit 1 brown bear habitat, excluding intertidal and Unit 1D state lands, municipal lands, and Alaska Native corporation lands, and is managed under a multiple use concept by the U.S. Forest Service (USFS). The Misty Fjords

National Monument within the Tongass on the southern portion of Unit 1 mainland contains large tracts of quality bear habitat.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVES**

- Maintain an average age of harvested males of 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. Currently, registration permits are issued for fall (RB062) and spring (RB072) hunting seasons in Units 1A, 1B, and 1C. In Unit 1D, registration permits RB050 and RB051 are issued for fall and spring hunting seasons, respectively. From the permit report we obtain information about hunting effort, dates afield, and 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 for aging. At the end of each season, we send all extracted premolars to Matson's Laboratory (Bozeman, Montana, USA) for age determination. All of the data we collect is tallied by regulatory year for our management purposes. For the purposes of this report, a regulatory year runs from 1 July through 30 June; e.g. RY10 = 1 July 2010–30 June 2011.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

Quantitative brown bear population data is not available for most areas in Unit 1. Exceptions to this include portions of Unit 1B in the Bradfield Canal and Unuk River area, and Berners Bay in Unit 1C. Utilizing DNA mark-recapture techniques, research staff has estimated the Bradfield Canal brown bear population at approximately 48 bears (95% CI 45–58). Given a sampled area of 1,094 km<sup>2</sup>, the density of Bradfield Canal brown bears in the late summer would be about 44 bears/1,000 km<sup>2</sup> with a 95% CI 41–53 bears/1,000 km<sup>2</sup> (Flynn et al. 2006). The Unuk River brown bear population was estimated to be approximately 45 bears (95% CI 30–60) in 2007. Given a sampled area of 877 km<sup>2</sup>, the density of Unuk River brown bears in the late summer would be about 51 bears/1,000 km<sup>2</sup> with a 95% CI 34–68 bears/1,000 km<sup>2</sup> (Flynn et al. 2010). In Berners Bay the population is estimated to be approximately 60 bears (95% CI 46.5–96.4; Flynn et al. 2012). Based on anecdotal reports from hunters and guides, department staff observations, and sealing records, we believe the brown bear population across Unit 1 is relatively stable. However, brown bear observations have increased from the Taku River south to Endicott Arm. With continuing mainland research we hope to more accurately estimate populations throughout the region.

## **MORTALITY**

### *Harvest*

#### Season and Bag Limit

#### Resident and Nonresident Hunters

1 bear every 4 regulatory years  
by registration permit only

15 September–31 December  
15 March–31 May

Board of Game Actions and Emergency Orders. The Board of Game made no regulatory changes to the brown bear seasons or bag limits in Unit 1 during this period.

Hunter Harvest. Subunit 1D continued to account for the highest proportion of the Unit 1 harvest during this report period with 55% and 39% of the take during RY10 and RY11 respectively. During RY10 the proportion of bears killed by subunit (1A, 1B, 1C, and 1D) was 16%, 13%, 16%, and 55% respectively. During RY11 it was 30%, 9%, 21%, and 39% respectively. The Unit 1 12-year (RY98–RY09) mean harvest percentage by subunit (1A–1D) is 24%, 18%, 15%, and 43%, respectively (Table 1).

The Unit 1A harvests during RY10–RY11 were 5 and 10 bears, respectively, which is similar to the 14-year mean annual harvest of 8 bears for this subunit.

The Unit 1B harvests during RY10–RY11 were 4 and 3 bears respectively, which is slightly lower than the long-term (RY98–RY09) annual average of 6 bears for this subunit. Brown bears are believed to occur throughout Unit 1B but population densities vary greatly across the subunit. The overwhelming majority of the brown bear harvest in this subunit is concentrated in and around the Bradfield Canal area. Harvest records indicate that since 1960 just 3 brown bears have been harvested on that portion of the Unit 1B mainland located north of the Stikine River drainage.

Guided nonresident hunters account for the majority of the brown bears harvested in Unit 1B, with Alaska residents accounting for an average of only 1–3 bears annually between 1998 and 2011. Anecdotal evidence and unconfirmed reports suggest that at least some illegal brown bear harvest is occurring in the subunit. Some people believe that by reducing brown and black bear numbers they are aiding moose and deer populations. Although the extent to which this illegal harvest is occurring is not known, it is thought to be most prevalent along the Stikine River drainage, where moose hunting is very popular with local hunters.

The Unit 1C harvests during RY10–RY11 were 5 and 7 bears respectively, which is similar to the 12-year (RY98–RY09) annual average of 5 bears. No bears were taken from the Juneau road system during this report period and haven't been since RY04–RY05 when 4 bears were taken in this area. Other traditional areas of harvest in Unit 1C include St. James Bay, Berners Bay, Taku River and Port Houghton. Although Unit 1C provides some opportunity to hunt and harvest brown bears, most serious bear hunters travel to nearby Unit 4, where the brown bear density is much higher.

The Unit 1D brown bear harvest during RY10–RY11 was 17 and 13 bears, respectively. Again, this is similar to the 12-year (RY98–RY09) annual average of 14 bears. It is important to note that the Guideline Harvest Level (GHL) for brown bears in Unit 1D is 16 bears annually, which was met or exceeded in 3 recent regulatory years (RY08–RY10). A combined harvest of 30 bears was recorded for this reporting period indicating a slightly lower harvest than the previous reporting period, which had the highest combined harvest since RY98 when 33 bears were harvested. Similarly, female brown bears comprised 44% and 52% of the bears harvested in Unit 1D in RY10 and RY11 respectively. The female mortality during this reporting period exceeds the management objective of  $\leq 40\%$  brown bear harvested. Unit 1D managers will continue to monitor the harvest level in Unit 1D to ensure future sustainability. Specifically, we will monitor the harvest sex ratio and age structure closely to ensure the female brown bear harvest remains at or below the management objective.

During this reporting period the spring harvest accounted for 64% of the bears taken; 36% of bears were harvested in the fall (Table 3). Over the past 12 years (RY98–RY09), the spring season has produced more bears (62%) than the fall season (38%; Table 3). During this reporting period, females represented 61% of fall-harvested bears and 29% of the spring-harvested bears. The lower rate of females harvested in the spring is likely due to the presence of the female bears accompanied by cubs, which are not legal for harvest. Some of these same bears will separate from their cubs during the summer months, and so will be alone by the fall season and available for harvest.

The mean male skull size of harvested bears across Unit 1 during RY10 ( $\bar{x} = 23.3$ ,  $n = 15$ ) was higher than the long-term (RY98–RY09) mean of 22.2 inches; the RY11 skull size ( $\bar{x} = 21.5$ ,  $n = 22$ ) is slightly lower than the long-term average. Male skull sizes in RY10 were similar to that of RY07 when we recorded an average skull size of 23.5 inches, 1.3 inches greater than the long-term average, and quite an anomaly. The average female skull sizes during RY10 ( $\bar{x} = 20.0$ ,  $n = 15$ ) and RY11 ( $\bar{x} = 20.9$ ,  $n = 11$ ) are both similar to the long-term average of 20.1 inches and are an increase from the previous reporting period (Table 4).

Mean ages of harvested male bears in RY10 (9.0 years,  $n = 16$ ), and RY11 (8.3 years,  $n = 4$ ) are higher than the long-term (RY98–RY09) average of 7.5 years. Similarly, the RY10 average is the highest average age in the last 12 years. Our management objective of at least 6.5 years of age was met and exceeded for males in both regulatory years. However, mean female age was 5.9 years ( $n = 15$ ) in RY10, and 14.7 years ( $n = 6$ ) in RY11. Female ages for RY10 were well below the 12-year mean (7.2 years), and the average age in RY11 was almost twice the 12-year mean. Overall, male and female ages were above the long-term averages (Table 4) except the average age of females in RY10 was the second lowest age since RY00 (5.1 years). The high mean skull size is most likely due to individual variation and a small sample size rather than indicating a population characteristic. Managers will continue monitoring these skull size changes.

Permit Hunts. Registration permits have been required for hunting brown bears in Unit 1 since fall 1989. During the 2010 and 2011 regulatory years, 429 and 409 registration permits were issued respectively, with 41% of the permittees actually going hunting (Tables 5 and 6). Though this percentage of hunters who actually participate seems low, it is likely that many hunters pick up brown bear permits just in case an opportunity presents itself to harvest a bear while hunting

for other species, or for the insurance of being able to keep a bear that is killed in defense of life or property (DLP). Compliance with permit conditions continues to improve. A regulation passed by the BOG in 2003 made failure to report (FTR) a misdemeanor offense. During this reporting period only 2 and 3 hunters respectively failed to report after receiving a reminder letter and were placed on the FTR list. As there are often late reports, information presented in tables 5 and 6 is subject to revision as additional information is received.

Hunter Success and Residency. Of the 175 permittees who hunted during RY10 only 18% were successful in harvesting a bear, and in RY11 a total of 168 hunters went afield with 19% success (Tables 5 and 6). Variability in harvest is expected and can be associated with multiple factors such as weather, forage availability for bears, and objectives and persistence of hunters. The number of registration permits issued in RY10 (429) and RY11 (409) were much higher than the previous 10-year average (RY00–RY09) of 356 permits (Tables 5 & 6). Although the number of permits issued is a good measure of hunting effort for nonresidents (nearly all of them actually go afield), the same does not apply for resident hunters. This is because, as stated previously, many resident hunters will get a permit and locking tag simply to take advantage of an opportunity to harvest a bear should they encounter one while engaged in other activities.

During RY10 and RY11, nonresidents harvested 19 and 16 bears, respectively. The nonresident hunter harvest was slightly higher than the previous 10-year average (RY00–RY09) of 18 bears. Success rates were 61% and 48%, during RY10 and RY11 respectively. Local residents of Unit 1 enjoyed success rates of 39% and 48% respectively during this reporting period; high relative to nonlocal residents' success rates of just 0% and 3% respectively (Table 7).

Successful hunters spent 4.7 days to harvest a bear during RY10 and 2.8 days in RY11, compared to the previous 10-year average (RY00–RY09) of 4.2 days (range 1–15 days). Combining all successful hunters across the unit, a total of 259 days was spent hunting during the RY10 season and a total of 93 days during the RY11 season.

Harvest Chronology. The greatest numbers of bears are taken during the spring portion of the season, with May being the predominant period of harvest. During the spring most available food, primarily grasses and sedges, are found near saltwater, where bears often concentrate. This makes a large portion of the bear population available for hunters using boats and looking for bears along shorelines. The 12-year harvest trend (RY98–RY09) indicates that spring hunters are more successful than those hunting in fall (62% and 38%, respectively). During RY10 and RY11, 61% and 67% of the bears harvested respectively were taken in the spring.

The majority of brown bears harvested from the unit have historically been taken during May ( $\bar{x}$  = 19, range 13–27), with September/October the second highest harvest period ( $\bar{x}$  = 11, range 1–15). During RY98–RY09 September saw slightly higher harvests than October (6.8 vs. 4.6), however, during this reporting period October had a slightly higher harvest. Together the 3 months September, October, and May, account for almost all of the Unit 1 brown bear harvest. During this reporting period, May accounted for 40 of 64 bears harvested and September/October accounted for 22 bears for percentages of 63 and 34 respectively (Table 8).

Transport Methods. Most Unit 1 brown bear hunters use boats to access remote, mostly roadless hunting areas. During this report period, boat use accounted for 86% of the reported transport

methods for successful brown bear hunters. Highway vehicles (10%), off-road vehicles (3%), and airplanes (0%) are used much less frequently (Table 9). The only Unit 1 area with major highway access is near Haines in Unit 1D, which explains hunters' reliance on other methods of access elsewhere in the unit.

### *Other Mortality*

To estimate the total human-caused mortality we review the reported harvest, defense of life or property (DLP) kills, known and estimated unreported/illegal/accidental kills, research-related kills, and natural mortalities. During this report period, 21 bears were reported as nonhunter kills, including 11 males, 5 females and 5 bears of unknown sex. Six bears were killed under DLP regulations, 8 were poached illegally, 4 were agency kills, 2 were natural or unknown mortalities and one was a vehicle collision. Nonhunting brown bear mortalities are incorporated into the overall management of the Unit 1 brown bear population and can affect the number of bears available to hunters. When we add other sources of bear mortality to the legal Unit 1 hunter harvest, total human-caused mortality was 40 bears in RY10 and 45 bears in RY11.

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 to provide better public awareness of the problem and reduce nonhunting mortality.

## **HABITAT**

### *Assessment*

As noted above, most areas of Unit 1 have healthy brown bear habitats, which are primarily under USFS jurisdiction. Within Unit 1A there is a highway-accessible area near Hyder, Alaska, (Salmon River Closed Area) that is closed to bear hunting to enhance viewing opportunities. A similar bear-viewing situation exists in Haines at Chilkoot State Park. The park area is within the Lutak Road Closed Area, where the harvest of big game is prohibited. Although these viewing areas provide refuge for bears and their habitats, there are other areas where potential habitat loss and or disturbance to bears are of concern. These include a proposed hydroelectric project at Connelly Lake in the Chilkoot River drainage of Unit 1D, as well as proposed hydroelectric projects for Sweetheart Creek in Unit 1C, and for the Hyder area in Unit 1A. Timber harvest, mineral exploration, and other human 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 concern us.

Between 2006 and 2011 a brown bear habitat use and genetic study was implemented on Berners Bay in response to the possible construction of the Juneau Access Road (Flynn et al. 2012). Forty-three brown bears (21 males and 22 females) equipped with global positioning system (GPS) collars provided researchers with spatial and temporal movement data in these areas. Final analysis of the GPS data provided evidence that male home ranges were 4 times that of females. Data also indicate extensive movement along the proposed road corridor areas in Berners Bay. Researchers also collected genetic samples from captured bears and from hair traps strategically placed in close proximity to salmon spawning streams. Both the telemetry and genetics information facilitated estimates of the bear abundance in the Berners Bay area. Genetic analysis

indicates Berners Bay brown bears are unique, genetically, among Southeast Alaska brown bear populations (Flynn et al. 2012).

## **CONCLUSIONS AND RECOMMENDATIONS**

Unit 1 brown bears will continue to attract both resident and nonresident hunters. The current registration permit hunt, initiated in 1989, provides useful information about brown bear hunting effort and success. Recently enacted penalties for not reporting on permit hunt activities are providing a more complete dataset to be used in managing brown bears. Hunters continue to use boats as the primary mode of transportation to access much of the unit's roadless areas. Due to the existing high number of female bears in the fall harvests, it is essential that any future management actions avoid placing additional pressure on females. ADF&G will continue to work with the USFS and other land managers to distribute the nonresident harvest throughout Unit 1.

We met our management objective of a 3:2 male to female harvest ratio and 60% male harvest component in spring hunting seasons, however, in the fall the female harvest component objective was exceeded. Extensive educational products (videos, brochures, etc.) are provided to hunters in order to assist hunters in determining the sex of bears in the field and in selecting males over females. We did not meet our objective of reducing the number of bears killed because of human food conditioning.

During the current report period 21 bears were killed under DLP regulations, killed by agency actions, killed illegally, or killed by vehicle collisions. This is approximately triple the number of nonhunting mortalities as during the previous reporting period. We believe the number of bears taken in nonhunting situations can be reduced. Education is the key to reducing food conditioned related mortalities as well as to reducing DLP and illegal harvests. With access to more information about bears, people are less likely to find themselves in a situation that requires killing a brown bear. Much of the solution for reducing bear/human conflicts depends on 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, the brown bear population appears to be stable to increasing across Unit 1. The area between the Taku River and Port Houghton in Unit 1C seems to have an increasing brown bear population based on reports from resident hunters as well as guides who have traditionally targeted that area for black bears. Their long-term use of the area and insight on changes in the bear population provide us with some valuable information. Another area in 1C that seems to be experiencing an increase in brown bears based on reports from hunters is St. James Bay to Point Couverden on the west side of Lynn Canal. Subsequent management reports will include refined population data for Berners Bay as it becomes available. At this time the available data indicate little change is needed in the parameters used to manage the Unit 1 brown bear population and changes to the Unit 1 brown bear hunting seasons or bag limit are not necessary.

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Table 1. Unit 1 brown bear harvest by subunit; regulatory years 1998–2011<sup>a</sup>.

Regulatory Year	Unit 1A		Unit 1B		Unit 1C		Unit 1D		Total harvest
	harvest	% of total							
1998	6	(17)	7	(20)	4	(11)	18	(51)	35
1999	13	(33)	6	(15)	6	(15)	15	(38)	40
2000	4	(12)	9	(27)	4	(12)	16	(48)	33
2001	5	(16)	9	(29)	2	(6)	15	(48)	31
2002	5	(22)	6	(26)	2	(9)	10	(43)	23
2003	13	(35)	6	(16)	6	(16)	12	(32)	37
2004	6	(26)	4	(17)	6	(26)	7	(30)	23
2005	6	(20)	3	(10)	5	(17)	16	(53)	30
2006	8	(23)	7	(20)	6	(17)	14	(40)	35
2007	6	(24)	5	(20)	5	(20)	9	(36)	25
2008	9	(24)	4	(11)	7	(19)	17	(46)	37
2009	12	(32)	5	(14)	4	(11)	16	(43)	37
2010	5	(16)	4	(13)	5	(16)	17	(55)	31
2011	10	(30)	3	(9)	7	(21)	13	(39)	33
$\bar{x}$	8	(24)	6	(18)	5	(15)	14	(43)	32

<sup>a</sup> Does not include DLP kills, research mortalities, illegal harvests, or other human-caused accidental mortalities.

Table 2. Unit 1 brown bear mortality by season; regulatory years 1998–2011.

Regulatory Year	Reported										
	Hunter Kill				Nonhunting Kill <sup>a</sup>			Total Estimated Kill			
	M (%)	F (%)	Unk.	Total	M	F	Unk.	M (%)	F (%)	Unk.	Total
Fall 1998	(23)	(77)	0	13	1	2	0	(25)	(75)	0	16
Spring 1999	(91)	(9)	0	22	1	1	0	(88)	(13)	0	24
Total	(66)	(34)	0	35	2	3	0	(63)	(38)	0	40
Fall 1999	(40)	(60)	0	20	5	3	0	(46)	(54)	0	28
Spring 2000	(75)	(25)	0	20	3	0	0	(78)	(22)	0	23
Total	(58)	(43)	0	40	8	3	0	(61)	(39)	0	51
Fall 2000	(50)	(50)	0	18	3	2	0	(52)	(48)	0	28
Spring 2001	(67)	(33)	0	15	1	0	0	(69)	(31)	0	23
Total	(58)	(42)	0	33	4	2	0	(59)	(41)	0	39
Fall 2001	(41)	(59)	0	17	0	1	0	(39)	(61)	0	18
Spring 2002	(86)	(14)	0	14	1	0	0	(87)	(13)	0	15
Total	(61)	(39)	0	31	1	1	0	(61)	(39)	0	33
Fall 2002	(60)	(40)	0	10	1	0	1	(58)	(33)	1	12
Spring 2003	(69)	(31)	0	13	4	0	0	(76)	(24)	0	17
Total	(65)	(35)	0	23	5	0	1	(69)	(28)	1	29
Fall 2003	(58)	(42)	0	12	1	1	0	(57)	(43)	0	14
Spring 2004	(80)	(20)	0	25	0	0	0	(80)	(20)	0	25
Total	(73)	(27)	0	37	1	1	0	(72)	(28)	0	39
Fall 2004	(75)	(25)	0	4	2	0	1	(71)	(14)	1	7
Spring 2005	(89)	(11)	0	19	1	0	0	(90)	(10)	0	20
Total	(87)	(13)	0	23	3	0	1	(85)	(11)	1	27
Fall 2005	(60)	(40)	0	10	0	0	0	(60)	(40)	0	10
Spring 2006	(80)	(20)	0	20	1	0	0	(81)	(19)	0	21
Total	(73)	(27)	0	30	1	0	0	(74)	(26)	0	31

Table 2. continued.

Regulatory Year	Reported										
	Hunter Kill				Nonhunting Kill <sup>a</sup>			Total Estimated Kill			
	M (%)	F (%)	Unk.	Total	M	F	Unk.	M (%)	F (%)	Unk.	Total
Fall 2006	(50)	(50)	0	8	1	2	0	(45)	(55)	0	11
Spring 2007	(81)	(19)	0	27	0	0	0	(81)	(19)	0	27
Total	(74)	(26)	0	35	1	2	0	(71)	(29)	0	38
Fall 2007	(75)	(25)	0	8	1	0	0	(78)	(22)	0	9
Spring 2008	(88)	(12)	0	17	0	0	0	(88)	(12)	0	17
Total	(84)	(16)	0	25	1	0	0	(85)	(15)	0	26
Fall 2008	(60)	(40)	0	15	2	4	0	(52)	(48)	0	21
Spring 2009	(91)	(9)	0	22	1	0	0	(91)	(9)	0	23
Total	(78)	(22)	0	37	3	4	0	(73)	(27)	0	44
Fall 2009	(62)	(38)	0	13	1	1	0	(60)	(40)	0	15
Spring 2010	(71)	(29)	0	24	0	0	0	(71)	(29)	0	24
Total	(68)	(32)	0	37	1	1	0	(67)	(33)	0	39
Fall 2010	(33)	(67)	0	12	3	1	3	(37)	(47)	3	19
Spring 2011	(63)	(37)	0	19	2	0	0	(67)	(33)	0	21
Total	(52)	(48)	0	31	5	1	3	(53)	(40)	3	40
Fall 2011	(45)	(55)	0	11	2	2	2	(41)	(47)	2	17
Spring 2012	(77)	(23)	0	22	4	2	0	(75)	(25)	0	28
Total	(67)	(33)	0	33	6	4	2	(62)	(33)	2	45

<sup>a</sup> Includes DLP and illegal harvests, research mortalities, natural mortalities, and other known human-caused accidental mortalities.

Table 3. Unit 1 brown bear harvest by season; regulatory years 1998–2011.

Regulatory Year	Fall		Spring	
	Harvest	Percent of Total	Harvest	Percent of Total
1998	13	(37)	22	(63)
1999	20	(50)	20	(50)
2000	18	(55)	15	(45)
2001	17	(55)	14	(45)
2002	10	(43)	13	(57)
2003	12	(32)	25	(68)
2004	4	(17)	19	(83)
2005	10	(33)	20	(67)
2006	8	(23)	27	(77)
2007	8	(32)	17	(68)
2008	15	(41)	22	(59)
2009	13	(35)	24	(65)
2010	12	(39)	19	(61)
2011	11	(33)	22	(67)
$\bar{x}$	12	(38)	20	(62)

Table 4. Unit 1 age and skull size of harvested brown bears; regulatory years 1998–2011.

Regulatory Year	Mean skull size <sup>a</sup>				Mean age <sup>b</sup>			
	Male	N=	Female	N=	Male	N=	Female	N=
1998	22.9	23	20.1	12	8.3	22	5.3	9
1999	21.3	23	17.8	17	7.1	22	7	16
2000	20.6	19	20.9	14	16.2	17	5.1	7
2001	21.5	19	20.4	12	8.5	17	8.6	12
2002	22.2	15	20.7	8	7.7	10	9.8	4
2003	22.3	27	20.5	10	6.5	27	6.3	8
2004	22.9	20	20.9	3	8.5	18	7.3	3
2005	22.3	22	21.4	8	7.7	22	8.8	8
2006	22.2	26	20.9	9	7.4	26	8.1	9
2007	23.5	21	21.3	4	7.9	19	8.5	4
2008	22.1	29	19.3	8	5.8	28	6.1	8
2009	22.9	25	19.5	12	8.6	24	6.1	12
2010	23.3	15	20.0	15	9.0	16	5.9	15
2011	21.5	22	20.9	11	8.3	4	14.7	6
$\bar{x}$	22.2	22	20.3	10	7.5	19	7.2	9

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

<sup>b</sup> Determined through successful analyses of extracted premolar teeth. Some samples are not viable for aging.

Table 5. Unit 1A, 1B, 1C brown bear registration permit hunt data; regulatory years 1998–2011 <sup>a</sup>.

Spring/ Fall Hunt Nr	Regulatory Year	Permits Issued	Number Hunted	Number Did Not Hunt	Percent Successful Hunters	Bear harvest			
						Males	Females	Unknown	Total
(Fall)									
RB062	1998	148	69	78	(19)	3	10	0	13
RB062	1999	176	78	98	(26)	7	13	0	20
RB062	2000	158	69	89	(26)	8	10	0	18
RB062	2001	159	80	73	(21)	7	10	0	17
RB062	2002	181	74	103	(14)	6	4	0	10
RB062	2003	98	30	68	(27)	4	4	0	8
RB062	2004	106	39	66	(8)	2	1	0	3
RB062	2005	93	23	69	(13)	3	0	0	3
RB062	2006	112	34	77	(6)	0	2	0	2
RB062	2007	128	40	88	(5)	2	0	0	2
RB062	2008	133	34	97	(18)	3	3	0	6
RB062	2009	134	41	93	(15)	3	3	0	6
RB062	2010	107	16	91	(6)	1	0	0	1
RB062	2011	114	29	85	(14)	3	1	0	4

Table 5. continued.

Spring/ Fall Hunt Nr	Regulatory Year	Permits Issued	Number Hunted	Number Did Not Hunt	Percent Successful Hunters	Bear harvest			
						Males	Females	Unknown	Total
(Spring)									
RB072	1998	155	78	77	(28)	19	3	0	22
RB072	1999	155	77	78	(26)	17	3	0	20
RB072	2000	186	106	80	(14)	10	5	0	15
RB072	2001	180	97	82	(13)	11	2	0	13
RB072	2002	144	88	52	(15)	9	4	0	13
RB072	2003	129	76	50	(19)	13	1	0	14
RB072	2004	129	78	49	(17)	12	1	0	13
RB072	2005	112	57	55	(18)	9	1	0	10
RB072	2006	134	72	60	(26)	15	3	1	19
RB072	2007	143	73	69	(19)	12	2	0	12
RB072	2008	187	94	93	(13)	10	2	0	10
RB072	2009	190	89	100	(18)	11	5	0	16
RB072	2010	207	95	112	(14)	8	5	0	13
RB072	2011	180	74	105	(20)	13	2	0	15

<sup>a</sup> Includes Unit 1D for regulatory years 1998–2002.

Table 6. Unit 1D fall and spring registration and drawing hunt<sup>a</sup> permits by regulatory year, 2003–2011.

Spring/ Fall Hunt Nr	Regulatory year	Permits Issued	Number Hunted	Number Did Not Hunt	Percent Successful Hunters	Bear harvest				
						Males	Females	Unknown	Total	
(Fall)										
DB052	2003	6	4	2	(0)	0	0	0	0	0
DB052	2004	11	5	6	(20)	1	0	0	0	1
RB050	2003	60	39	21	(8)	2	1	0	0	3
RB050	2004	60	29	28	(0)	0	0	0	0	0
RB050	2005	49	24	25	(25)	3	3	0	0	6
RB050	2006	58	37	21	(16)	4	2	0	0	6
RB050	2007	63	41	22	(17)	4	3	0	0	7
RB050	2008	62	37	23	(24)	6	3	0	0	9
RB050	2009	67	29	36	(28)	6	2	0	0	8
RB050	2010	70	37	33	(32)	4	8	0	0	12
RB050	2011	77	41	36	(17)	2	5	0	0	7
(Spring)										
DB053	2003	13	10	3	(80)	5	3	0	0	8
DB053	2004	9	7	0	(71)	4	0	1	0	5
RB051	2003	35	22	13	(5)	1	0	0	0	1
RB051	2004	28	17	10	(0)	0	0	0	0	0
RB051	2005	41	27	14	(37)	7	3	0	0	10
RB051	2006	39	25	13	(32)	5	3	0	0	8
RB051	2007	35	18	17	(17)	3	0	0	0	3
RB051	2008	44	29	15	(28)	8	0	0	0	8
RB051	2009	41	27	14	(0)	6	2	0	0	8
RB051	2010	45	27	18	(22)	4	2	0	0	6
RB051	2011	38	24	14	(25)	3	3	0	0	6

<sup>a</sup>Drawing permit hunt during 2003–2004 only.

Table 7. Unit 1 successful brown bear hunters, by residency; regulatory years 1998–2011.

Regulatory Year	Local Resident <sup>a</sup> (%)	Nonlocal Resident (%)	Nonresident (%)	Unknown (%)	Total Successful Hunters
1998	(43)	(14)	(43)	(0)	35
1999	(28)	(8)	(65)	(0)	40
2000	(21)	(0)	(79)	(0)	33
2001	(26)	(3)	(71)	(0)	31
2002	(17)	(9)	(74)	(0)	23
2003	(38)	(8)	(54)	(0)	37
2004	(39)	(0)	(61)	(0)	23
2005	(43)	(3)	(53)	(0)	30
2006	(54)	(3)	(43)	(0)	35
2007	(44)	(0)	(56)	(0)	25
2008	(43)	(3)	(54)	(0)	37
2009	(43)	(5)	(51)	(0)	37
2010	(39)	(0)	(61)	(0)	31
2011	(48)	(3)	(48)	(0)	33

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

Table 8. Unit 1 brown bear harvest by month; regulatory years 1998–2011.

Regulatory Year	Harvest periods							Total
	September	October	November	March	April	May	June	
1998	7	6	0	0	0	22	0	35
1999	15	5	0	0	1	19	0	40
2000	14	3	1	0	2	13	0	33
2001	7	9	1	0	1	13	0	31
2002	7	3	0	0	0	13	0	23
2003	7	3	2	0	0	25	0	37
2004	3	1	0	0	1	18	0	23
2005	5	4	1	0	0	20	0	30
2006	4	4	0	0	0	27	0	35
2007	4	4	0	0	0	17	0	25
2008	5	6	3	0	3	19	0	37 <sup>a</sup>
2009	4	7	2	0	0	24	0	37
2010	5	6	1	0	1	18	0	31
2011	5	6	0	0	0	22	0	33

<sup>a</sup> Includes 1 bear harvested in December

Table 9. Unit 1 successful brown bear hunter transport methods; regulatory years 1998–2011.

Regulatory Year	Percent of Hunters						Nr Successful Hunter
	Airplane	Boat	Walk	ORV	Highway Vehicle	Other/ Unknown	
1998	(0)	(80)	(6)	(0)	(11)	(3)	35
1999	(10)	(73)	(0)	(0)	(18)	(0)	40
2000	(3)	(79)	(0)	(0)	(18)	(3)	33
2001	(13)	(71)	(0)	(3)	(13)	(0)	31
2002	(0)	(65)	(4)	(4)	(22)	(4)	23
2003	(0)	(86)	(3)	(0)	(8)	(3)	37
2004	(0)	(78)	(0)	(9)	(13)	(0)	23
2005	(0)	(80)	(0)	(7)	(13)	(0)	30
2006	(0)	(83)	(6)	(0)	(11)	(0)	35
2007	(0)	(84)	(0)	(4)	(12)	(0)	25
2008	(0)	(73)	(0)	(14)	(14)	(0)	37
2009	(5)	(81)	(0)	(3)	(8)	(3)	37
2010	(0)	(87)	(0)	(0)	(10)	(3)	31
2011	(0)	(85)	(0)	(3)	(9)	(3)	33

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
907-465-4190 P.O. BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** 3 (3,000 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Islands of the Petersburg, Kake, and Wrangell area, including Mitkof, Wrangell, Zarembo, Etolin, Kupreanof, Kuiu and adjacent smaller islands in central southeast Alaska

**BACKGROUND**

Southeast Alaska brown bears are thought to inhabit only those Unit 3 islands separated from the mainland by relatively short water crossings. Anecdotal information and staff observations indicate that small numbers of bears regularly occur on Deer, Wrangell, Etolin, Mitkof and Woronkofski islands. The department has no population estimates for Unit 3 brown bears.

Research recently completed on the Unit 1B mainland appears to confirm previous speculation that population interchange regularly occurs between those Unit 3 islands inhabited by brown bears and the nearby Unit 1B mainland. Although we are uncertain about the ability of the Unit 3 islands to support a sustainable harvest by themselves, based on the high likelihood of population interchange between the Unit 3 islands and the adjacent 1B mainland, in fall 2004 the Board of Game authorized a limited Unit 3 brown bear season. Under this management plan the Unit 3 brown bear population is to be managed as a segment of the mainland population. This change in regulation makes brown bear management consistent with Unit 1A, where relatively small numbers of brown bears on Revillagigedo Island are managed as part of the adjacent mainland population.

Prior to 1985 a 15 September–31 May hunting season existed for brown bears in Unit 3. In June 1985 the Board of Game voted to eliminate that season, and from July 1985 to June 2005 there was no open season for brown bear in the unit. During this period the Board of Game considered and rejected numerous proposals to reestablish a brown bear season in Unit 3. In fall 2004 the Board of Game authorized a resident-only spring season for brown bear in Unit 3. While the original intent of the proponents was to establish both spring and fall seasons a clerical error in the proposal resulted in the inadvertent omission of fall season dates. Because of uncertainties about the size of bear population, and in order to limit hunting pressure, the Unit 3 brown bear season is open only to Alaska residents.

During recent years we have received relatively few anecdotal reports of brown bears inhabiting Unit 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 conducted to date in Unit 3. Recently completed research on brown bears inhabiting the Bradfield Canal area of Unit 1B has confirmed speculation that population interchange occurs between Units 1A, 1B, 3, and British Columbia, Canada (Flynn et al., 2010).

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 Region I since 1989 (McCarthy 1991; Larsen 1993). Prior to the implementation of a registration permitting requirement in 1989, hunters were only required to obtain a license and metal-locking tag to hunt brown bear.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVES**

- Manage Unit 3 brown bear population as a segment of the Unit 1B mainland population.
- Limit the annual harvest in Unit 3 to no more than 3 bears annually.
- Limit the number of females in the harvest.
- Minimize the number of bears killed because of garbage and human food conditioning.

## **METHODS**

Unit 3 brown bear hunters are required to obtain registration permits prior to hunting. The permit reports provide 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, extracted premolars are sent to Matson's Laboratory (Milltown, Montana, USA) for age determination. All of the data we collect is tallied by regulatory year for our management purposes. Other information we use to assess and manage mainland brown bear populations in Unit 3 comes from hunters' anecdotal information, staff observations, and defense of life and property (DLP) kill records. For the purposes of this report, a regulatory year runs from 1 July through 30 June; e.g. RY08 = 1 July 2008–30 June 2009.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

Quantitative population data are not available for Unit 3 brown bears. Based on hunters' anecdotal reports, department staff observations, pilot observations, and sealing records, we believe the population is stable at low levels.

## **MORTALITY**

### *Harvest*

#### Season and Bag Limit

1 bear every 4 regulatory years  
by registration permit only

#### Residents Only

15 March–31 May

Game Board Action and Emergency Orders. The Board of Game took no actions, and we issued no emergency orders regarding Unit 3 brown bears during this report period.

Hunter Harvest. No brown bears were harvested in the unit during the report period. Registration permits (RB075) are required for Unit 3 brown bear hunters. Unlike other brown bear hunts in the region, the hunt in Unit 3 is limited to the spring season. During spring 2011, 17 registration permits were issued. Two (12%) of those permittees reported going afield to hunt brown bear and none were successful. During spring 2012, 28 registration permits were issued. Seven (25%) of those permittees reported going afield to hunt brown bear and none were successful (Tables 1, 2, and 3). Although not specifically targeting brown bear, many hunters register for the Unit 3 brown bear hunt in the event they have an opportunity to harvest a bear incidental to other activities.

Hunter Success and Residency. The Unit 3 brown bear hunt is closed to nonresidents. For the 2011 spring hunt, both of the hunters who actually took to the field were local residents of Unit 3. In spring 2012, 5 of the 7 hunters that took to the field were local residents of Unit 3, and 2 were nonlocal residents of Alaska. None of those who took to the field during RY10 or RY11 were successful (Table 4).

Harvest Chronology. In the absence of a fall season, bears are only available to hunters late in the spring season when 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 often concentrate. This potentially makes a large portion of the bear population available during a short period for hunters using boats or glassing along shorelines. No bears were harvested during the report period, so we were unable to gather any data on harvest chronology.

Transport Methods. Of the 2 hunters who took to the field in spring 2011, 1 reported using a boat to access hunting areas, and 1 reported using a highway vehicle. Of the 7 hunters who took to the field in spring 2012, 5 reported using boats to access hunting areas, 1 reported using a highway vehicle, and 1 reported using an off-road vehicle.

### *Other Mortality*

Since 1978 there have been 5 reported instances of Unit 3 brown bears having been killed in defense of life and property, but none were reported during this report period. Anecdotal reports suggest that some brown bears have succumbed to unreported harvest, although it is impossible to estimate the extent to which this is occurring.

## **HABITAT**

### *Assessment*

The Tongass National Forest (Tongass), managed by the U.S. Forest Service (USFS), encompasses most Unit 3 brown bear habitat except for intertidal and Unit 3 state lands, municipal lands, and Alaska Native corporation lands. The Tongass is managed under a multiple use concept by the USFS. Timber harvest, road construction, mineral exploration, and other human developments pose the most serious threats to brown bear habitat in the unit. Although rare, bear-human interactions and conflicts resulting from increased access and development cause us concern. DLP mortalities are an ever-present possibility where bears are likely to come into contact with people.

## **CONCLUSIONS AND RECOMMENDATIONS**

Most brown bear hunting in Unit 3 is probably incidental to other outdoor activities. Some hunters who obtain a brown bear registration permit probably do so only on the chance they may encounter a brown bear while engaged in other outdoor activities. The Unit 3 registration permit hunt will provide information about brown bear distribution, hunting effort and success in Unit 3. As anticipated, the harvest of Unit 3 brown bears has thus far been low; however, we are concerned by the high percentage of females in the harvest. Three of 4 bears taken since the Unit 3 hunt was reauthorized in 2005 have been females. Although reports of brown bear sightings on Mitkof Island have increased in recent years, no brown bears have been taken on the island since the hunt was reauthorized. We were able to meet all of our management objectives during this report period, most importantly no female bears were taken nor were any bears killed DLP.

Reported DLP brown bear mortality has remained low in Unit 3 over the last decade. Much of the solution for reducing bear/human conflicts depends on the willingness of the public, municipalities, and timber and mining industries to adopt and adhere to responsible garbage management practices.

No research has been conducted on Unit 3 brown bears, however inferences can be made based on brown bear research conducted in neighboring Unit 1B (Flynn et al., 2010). Because most of the brown bears in the Unit 1B research project use the estuary and beach fringe habitats favored by hunters during the late spring and fall, the bears, especially the males, are highly vulnerable to hunting. It is likely Unit 3 bears exhibit similar habitat preferences as Unit 1B bears. In addition, brown bear management on the mainland coast and Unit 3 needs to consider greater movements of individual bears, both males and females. These larger movements make them more vulnerable to exploitation and disturbance.

The primary threat to brown bear populations in Unit 3 is habitat loss associated with clearcut logging. The construction of roads to facilitate forest management activities improves access to brown bear habitat and increases the likelihood of human caused mortality.

Although no brown bears were harvested in Unit 3 during the report period, we recommend no changes to the current season or bag limit at this time.

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Table 1. Unit 3 brown bear harvest, regulatory years 2004–2011<sup>a</sup>.

Regulatory Year	Unit 3 harvest
2004	No open season
2005	1
2006	1
2007	2
2008	0
2009	0
2010	0
2011	0

<sup>a</sup> Includes all reported human-caused mortalities

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Table 2. Unit 3 age and skull size of harvested brown bears, regulatory years 2004–2011.

Regulatory year	Mean skull size <sup>a</sup>				Mean age <sup>b</sup>			
	Male	Nr	Female	Nr	Male	Nr	Female	Nr
2004	N/A		N/A		N/A		N/A	
2005	24.5	1	0	0	11	1	0	0
2006	0		22.4	1	0		N/A	1
2007	0		18.7	2	0		2.5	2
2008	0		0	0	0		0	0
2009	0		0	0	0		0	0
2010	0		0	0	0		0	0
2011	0		0	0	0		0	0

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

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

Table 3. Unit 3 brown bear registration permit hunt data, regulatory years 2004–2011.

Season/ hunt nr	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bear harvest			
						Males (%)	Females (%)	Unknown	Total
(Spring)									
RB075	2004	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RB075	2005	9	(44)	(80)	(20)	(100)	(0)	0	1
RB075	2006	16	(50)	(88)	(13)	(0)	(100)	0	1
RB075	2007	14	(57)	(67)	(33)	(0)	(100)	0	2
RB075	2008	25	(64)	(100)	(0)	(0)	(0)	0	0
RB075	2009	25	(56)	(100)	(0)	(0)	(0)	0	0
RB075	2010	17	(88)	(100)	(0)	(0)	(0)	0	0
RB075	2011	28	(71)	(100)	(0)	(0)	(0)	0	0

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Table 4. Unit 3 number of brown bear hunters, by residency, regulatory years 2004–2011.

Regulatory year	Local Resident <sup>a</sup>	Nonlocal Resident	Nonresident	Total hunters	Total successful hunters
2004	N/A	N/A	N/A	N/A	N/A
2005	5	0	N/A	5	1
2006	5	3	N/A	8	1
2007	3	3	N/A	6	2
2008	7	2	N/A	9	0
2009	7	3	N/A	10	0
2010	2	0	N/A	2	0
2011	5	2	N/A	7	0

<sup>a</sup> Local residents are those hunters who reside in Unit 3

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
907-465-4190 PO BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010

To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** Unit 4 (5,820 mi<sup>2</sup>)

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

**BACKGROUND**

Brown bears in Southeast Alaska inhabit all areas in Game Management Unit 4 including 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). Extensive brown bear research has been conducted on Admiralty and Chichagof islands from the early 1980s through 2004 (Schoen and Beier 1990; Titus and Beier 1993; Flynn et al. 2004).

Management of Unit 4 brown bears has a colorful and controversial past. In the early part of the 20th century, there were advocates for both complete elimination of and for more reasonable conservation of brown bears. Market hunting for hides and the calls for elimination of bears were gradually overcome by support for greater protection of the valuable bear resource. As a result, the Alaska Department of Fish and Game (ADF&G) developed more restrictive harvest regulations for brown bears in Unit 4 (ADF&G 1998).

Brown bear sealing requirements were established in Alaska in 1961. Since 1989, hunters have also been required to obtain registration permits before hunting brown bears in Unit 4 (ADF&G 1998). Prior to 1989, hunters were only required to obtain a hunting license and metal-locking big game tag. The database contains records for about 5,800 bears from the unit in all categories of human-caused mortality (hunting, defense of life and property, public safety, vehicle collisions, and research). However, 94% of these records reflect hunter harvest. (ADF&G 2012)

The Tongass National Forest encompasses most Unit 4 bear habitat and is managed under a multiple use concept by the U.S. Forest Service (USFS). Commercial logging has resulted in extensive long-term habitat alteration and road access on both federal and private lands. The wilderness designations on Admiralty, south Baranof, and west Chichagof islands contain large areas that should continue to provide bears with pristine environments. Elsewhere in the unit, habitat alteration by logging and associated road infrastructure affects brown bear density and distribution.

Unit 4 includes the most important brown bear hunting area in Southeast Alaska. The unit has an estimated 70% of Southeast's brown bears (Miller 1993a) and has produced 70-80% of the region's harvest since 1960 (ADF&G 2010). 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. Regulations adopted by the Federal Subsistence Board allowing the sale of brown bear parts including claws, skulls, teeth, and bones are prohibited by state law. The dual authority of federal and state management has confused the public and may deny state wildlife managers the use of management options normally available on nonfederal land.

Increasing numbers of brown bear guides and nonresident hunters, as well as increased tourism in the unit during recent years, has led to user conflicts. In July 1998, ADF&G published *Unit 4 Brown Bears – Past, Present, and Future: A Status Report and Issues Paper*. The Unit 4 Brown Bear Management Team was created by the Board of Game (BOG) 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 affecting brown bears. The team agreed to several elements of a comprehensive management strategy that were published in a report, *Southeast Alaska Unit 4 Brown Bear Management Strategy* (BBMS) (ADF&G 2000). The status report on the implementation and progress with the recommendations proposed by the team was presented to the Board of Game at its November 2006 meeting and subsequently adopted (Mooney 2009).

Illegal guiding during 1999–2003 contributed to increased harvest above guidelines recommended by the Brown Bear Management Team. A combined federal and state enforcement effort during that period is believed to be part of the reason harvest declined in the 2004–2005 seasons. The Record of Decision for the USFS's Shoreline Outfitter/Guide Assessment Environmental Impact Statement was released in December 2004. The original 1998 proposed action made specific recreation carrying capacity allocations for big game guided hunting, primarily for brown bear hunting. Following public comment and additional analysis this focus was determined to be too narrow. The proposed action was expanded to include all commercial recreation providers in the commercial recreation allocations. Big game guided hunting operations are now included within the overall commercial recreation allocations in the alternatives. Specific allocations to individual guiding businesses occur through the Special Uses administration process (USDA-FS, 2004). This process will undoubtedly affect the number and distribution of guides within Unit 4. A reallocation of some hunts to existing or new guides through a prospectus offering may also occur.

In 2000, the Brown Bear Management Team determined that the hunting success rate of guided nonresident hunters in Unit 4 was about 50%. That determination was based on historical hunt records as well as data from former and current registered guides. However, for many of the 10 years since the Brown Bear Management Strategy (BBMS) was implemented, the percentage of successful hunts has been 60-85%. That has resulted in a bear harvest that is at or slightly above the mortality guidelines established for the unit.

Guiding nonresident hunters on private lands was not formally considered in the BBMS in 2000. However, guiding on private lands is increasing and it will be necessary to reallocate hunts with private landowners at the table so the BBMS recommended nonresident hunt numbers are not exceeded.

Three areas in Unit 4 are closed to bear hunting to enhance viewing opportunities. The Seymour Canal Closed Area on eastern Admiralty Island encompasses the Stan Price State Wildlife Sanctuary and the Pack Creek bear viewing area. The Salt Lake Closed Area is located near Angoon at the northeast end of Mitchell Bay on southwest Admiralty Island. The Port Althorp Closed Area is on northern Chichagof Island near Elfin Cove.

The Stan Price Wildlife Sanctuary was established in 1990. The Pack Creek permit system for visitors was initiated in 1989 and revised in 1992. This system, along with close U.S. Forest Service and department on-site monitoring, effectively limits guided and unguided use and provides a consistent and benign human presence to the bears. Together with the USFS, the area is managed as the Pack Creek Cooperative Management Area (PCCMA) and encompasses an area from Swan Cove to Windfall Harbor.

During spring 2004, the Icy Strait-Point Sophia development (at Hoonah) began operations offering cruise ship passengers a bear viewing tour from an elevated platform built parallel to Spasski Creek. A proposal to house and display bears was initiated in Sitka in 2002 and entered a department project analysis phase in 2003. The project, Fortress of the Bear, continued with a demonstration phase using surrogate domestic animals in 2004. A final department decision to place bears in the Sitka facility was approved in July 2007 and the first 2 orphaned cubs were placed that summer (Mooney 2009). During this reporting period, 5 brown bears currently occupy the facility.

## **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 estimated population (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 estimated population, averaged over a 3-year period.

## METHODS

Registration permits for Unit 4 brown bear hunting were issued to the public at ADF&G offices during both years of the report period, and were also made available on-line during RY2009. (RY=Regulatory Year. A regulatory year begins 1 July and ends 30 June; e.g. RY 2009 = 1 July 2009–30 June 2010.) Also, one license vendor in Hoonah is permitted, under strict guidelines, to issue registration permits for brown bear hunting in Unit 4. This exception was made to help accommodate hunters in the communities of Hoonah, Elfin Cove, and Pelican. Recent efforts to establish online access to registration permits have improved public access electronically, while maintaining accurate hunter data.

Successful bear hunters were required to present skulls and hides to a representative of the Division of Wildlife Conservation (DWC) or the Alaska Wildlife Troopers (AWT) 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 to the field. A commercial laboratory determined ages through cementum annuli analyses in premolars. All permittees were required to submit a hunt report within 10 days after taking a bear. Unsuccessful permittees or those who did not hunt were required to submit a report following the close of the season.

We entered data recorded on sealing certificates and registration permit reports into a computer database. We mailed up to 2 reminder letters to delinquent permittees, the second by certified mail, to improve reporting compliance. AWT cited permittees who failed to report.

Area and regional personnel attempted to reduce DLP incidents through education and cooperation with community authorities, other agencies, and nongovernmental organizations. In April 2008, the Sitka City and Borough passed a local ordinance prohibiting negligent or unintentional access to trash by bears, joining other Alaska cities and towns trying to reduce habituation of bears to human-related food sources. During May through July 2010, we captured 2 female bears with multiple cubs and fitted them with GPS radio collars within residential areas of Sitka to help provide movement data through the community. We ear tagged all of their cubs. A litter of 3 cubs belonging to one of the collared sows was also bleached-marked with 12" tall numbers to help members of the public see and report the bears if they caused a nuisance.

During summer 2007, we fitted a single male bear with a GPS radio collar at Pack Creek. The intent was to gather data on how bears use the Pack Creek area, and to determine if bears at Pack Creek travel out of the closed area and are available to hunters. Data collection by the bear ceased when it shed the collar in October 2007. In May 2010 we fitted another male brown bear with a GPS radio collar at Windfall Harbor, just south of Pack Creek. We plan to deploy several more GPS collars during several years to continue gathering information on brown bear movements in various parts of the unit.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

Unit 4 brown bear populations are believed to be stable. Analysis of historical harvest data indicates bear numbers probably declined during the mid 1970s but have since recovered (Faro 1997, Whitman 1999). Eventually, second growth timber stands will regenerate in clearcut timber harvest units and reduce summer forage available to bears (e.g. blueberry [*Vaccinium, sp.*] red huckleberry [*Vaccinium parvifolium*] and salmonberry [*Rubus spectabilis*]). Stem exclusion periods (where dense conifer growth shades out most understory grasses, forbs, and shrubs) will persist for a number of decades. Bear harvest levels from some areas of the unit continue to warrant close scrutiny. Development and expansion of logging roads in the mid 1980s thru the mid 1990s (particularly on Northeast Chichagof Island), increased the vulnerability of bears to hunters. High hunting harvest occurs because logging roads allow hunters greater efficiency in accessing salmon streams, bays, and estuaries (Young 1989, 1990; Titus and Beier 1992).

#### *Population Size*

Titus and Beier (1993) reported bear densities of study areas on Admiralty and northeast Chichagof islands. 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 4,155 bears; Chichagof and adjacent islands, 1,550; Baranof and adjacent islands, 1,045; and Admiralty Island, 1,560. These estimates have remained unchanged since 1998. For management purposes, the lower 95% confidence limit is used as a conservative population estimate, and attempts are made to maintain harvests at 4% or less of that population. The 3-year mean annual human-caused mortality guideline is 166 bears for the unit (Admiralty Island, 62 bears; Baranof/adjacent islands, 42 bears; Chichagof /adjacent islands, 62 bears. Research data analysis does show that portions of the estimated bear population on Northeast Chichagof Island increased between 1991 and 2004. Current estimates, based on the recently completed Capture-Mark-Recapture (CMR) effort, place the estimated bear density as high as 1.7 bears/mi<sup>2</sup> in a couple of specific watersheds within the research project area (Rod Flynn, ADF&G wildlife biologist, personal communication). Some of the increases may lie in recent habitat changes favorable to bears preceding a stem exclusion period from clearcut timber harvest.

Short-term fluctuations in wildlife populations are a natural occurrence and often more than one factor is responsible for them. For example, extremely high snow depth during the late winter of 2006–2007 reduced the NE Chichagof Island deer population by an estimated 75–85%. This resulted in hundreds of deer carcasses being available to bears during the spring of 2007 and they undoubtedly benefitted from this abundant resource. However, in the following springs of 2008–2012, almost no carcasses were available due to very low winterkill. Salmon runs in streams on Northeast Chichagof Island during the summers of 2008, 2010, and 2012 were minimal and many bears dispersed to other areas of the island in search of food. We noted more unaccompanied subadult bears in communities in 2012 than records indicate have occurred in the previous 20 years. In such circumstances, increased competition for limited food resources may cause greater mortality of juvenile bears.

### *Population Composition*

Population composition data for the unit as a whole are limited. The number of bears captured during ADF&G research programs has been relatively few. It is possible a capture bias has resulted in a sample not fully 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, and regulations protecting females with offspring.

In Unit 4 the RY2010 harvest by hunters was 79% males ( $n = 111$ ) and 21% females ( $n = 29$ ). The RY2011 harvest was 79% males ( $n = 97$ ) and 21% females ( $n = 26$ ). Wounding loss includes only those reported by hunters. Unknown sex of bears in wounding loss is counted as female harvest when measured against harvest guidelines. Table 1 displays sex, wounding loss, and nonhunting mortality information for the last 5 regulatory years.

### *Distribution and Movements*

The collared male bear from Pack Creek on Admiralty Island shed its collar in October 2007 (Chad Rice, ADF&G wildlife technician, personal communication). GPS data downloaded after the collar was retrieved showed the bear had moved in and out of the closed area. Another male bear collared at Windfall Harbor in May 2010 has had portions of the GPS location data downloaded remotely this year. Preliminary analysis of that data indicates seasonal movements between Windfall Harbor and Pack Creek as well as outside of the closed area.

Collar data from 2 female bears in the Sitka area during 2010 showed a routine pattern of movement in and out of residential areas. One sow was killed illegally only 6 days after the collar was placed on her and her 2 year old cubs had to be euthanized. The second sow was killed illegally 26 days after being captured. Her 3 cubs of the year were placed at the Fortress of the Bear facility in Sitka. A sub-adult male bear (bear 19Y) was captured in Sitka, radio-collared, relocated and released. He crossed between Baranof and Chichagof islands 7 times in a 1-year period and had a travel perimeter of 370 miles.

A female bear with 2 cubs of the year was fitted with a GPS radio collar at the Port Armstrong hatchery, southern Baranof Island during the fall of 2010 as part of the research conducted with electronic control devices. The collar was retrieved in the fall of 2011 and showed a den site above a bay on the western side of the Island, approximately 9 miles away. Her seasonal movements were directed to returning to the hatchery in early July and staying in that vicinity through October when she returned to the west side of the island.

## MORTALITY

### Harvest

Unit 4 Bag Limit	Resident and Nonresident Open Season
Chichagof Island south and west of a line that 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 that 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	15 September –31 December 15 March–31 May
1 bear every 4 regulatory years by registration permit only	
Unit 4, that portion within the Northeast Chichagof Controlled Use Area	15 September–31 December 15 March–20 May
1 bear every 4 regulatory years by registration permit only	
Remainder of Unit 4:	15 September–31 December 15 March–20 May
One bear every 4 regulatory years by registration permit only	

Board of Game Actions and Emergency Order: The Board of Game heard management and status reports at both the November 2008 meeting in Juneau and the November 2010 meeting in Ketchikan but took no actions concerning brown bear management in the unit. Due to scheduling changes, the next Board meeting is scheduled to occur in Sitka, January 2013.

In 2011, we closed the fall brown bear registration hunt (RB077) by emergency order on Chichagof, Baranof, and Admiralty islands during early October when harvest objectives were met.

Hunter Harvest and Other Mortality: In RY10, hunters took 36 bears in fall 2010 and 112 bears in spring 2011. Hunter harvest accounted for 148 bears including 8 bears from reported wounding loss; an additional 13 bears are known to have died from nonhunting situations,

bringing the year's total combined mortality to 161 bears. The 3-year mean annual human-caused mortality rose to 171, above the guideline harvest of 166.

In RY11, hunters took 21 bears in fall 2011 and 109 bears in spring 2012. Hunter harvest accounted for 130 bears including 7 bears from reported wounding loss; an additional 14 bears are known to have died from nonhunting situations, bringing the year's total combined mortality to 144 bears. The 3-year mean annual human-caused mortality dropped to 161, declining below the guideline harvest of 166. Data concerning brown bear harvests for the past 5 years are presented in Tables 1 and 2.

Skull measurements and mean ages of harvested bears closely match those found in the long-term data. Age data for both males and females indicate an overall increase during the last decade. This is a departure from the relative stability indicated previously, but we have not determined what factors may be responsible for that change. Ages and skull sizes for Baranof and Chichagof islands are comparable to Admiralty Island data.

Hunter Residency and Success: Local residents of Unit 4 take a small percentage of the total annual harvest (Table 3), averaging about 11% over the last 5 years. Most bears were taken by nonresidents or Alaska hunters from outside Southeast. In 2010-11 (RY10) nonlocal Alaska hunters and nonresidents harvested 86% of the bears. In RY11 nonlocal Alaskans and nonresidents took 86% of the bears. In this reporting period, local resident harvest increased 2% over the previous reporting period (RY08–RY09). Nonlocal resident harvest declined 6.7% from the previous period. Nonresident harvest has increased 4.7% over the last 2 years. Part of the nonresident increase is attributed to the worldwide economic improvement affecting many businesses and disposable income.

Harvest Chronology Spring Unit 4 permit hunts are administered through 2 registration permits. The outside drainages are covered under permit RB088, while the inside drainages are covered under permit RB089. All fall Unit 4 permit hunts are administered under a single registration permit (RB077). 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.

Spring and fall hunting effort is presented in Table 4. In fall 2010, 56 Alaska residents hunted a total of 243 days, and 36 nonresidents spent 198 days afield. In fall 2011, 27 residents hunted 86 days and 36 nonresidents hunted 179 days. The fall 2011 season was closed in October for all of Unit 4 by Emergency Order because harvest objectives were met or exceeded.

Spring seasons produced a larger harvest (Table 1) and greater hunting pressure (Table 4). In spring 2011, 126 residents hunted 450 days and 133 nonresidents hunted 675 days. In spring 2012, 112 residents hunted 367 days and 115 nonresidents hunted 504 days. Over the last 5 years, fall seasons produced an average of 1 bear for every 13.2 hunt days, and spring seasons produced 1 bear for every 9 days. The fall combined average declined to a combined average of 12.5 hunt days per bear in 2010 (RY10) and 2011 (RY11). Spring effort in 2011 (RY10) increased to 11 days per bear and then decreased to 8 days per bear in 2012 (RY11).

Most fall harvest (greater than 70%) occurs during the first 20 days 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, declining daylight period, and bears dispersing from the streams make it increasingly difficult to locate bears late in the fall season. The fall hunter harvest is characteristically composed of a high female percentage (5-year average [RY07–RY11] of (35%) with a single season high of (52%) of female bears (Table 1). During this report period, we experienced an average fall female hunter harvest of (36%), and the single year high of (52%) total female mortality, which helped to trigger the October 2011 season closure. High female hunter harvest in the fall remains a management concern and may require changes in the fall season to maintain the guideline mortality levels of the Brown Bear Management Strategy.

A much higher number and percentage of male bears (5-year average of 87% with a high year of 94% and a low year of 81%) are taken in the spring than in the fall season whereas with female bears the opposite is usually true (Table 1). Fall bear hunting is usually on streams in fairly thick vegetation. Hunters do not have the luxury of watching a bear for a long time as they do in the spring, and so they are not as selective. Also, in the fall, some of the females have separated from their cubs, making them legal targets.

Generally speaking, hunters prefer to hunt the spring season because bears are easier to locate and they may have longer hair (if not rubbed) than in the fall, making for a better trophy hide. The greatest number of bears is available to hunters late in the spring season because nearly all bears have left their dens to seek food, and breeding season approaches. Most spring bears are killed in May (Table 5). When green-up occurs late in the spring, bears concentrate and feed on grass/sedge flats near salt water. Harvests in such years are higher compared to years with earlier, warm springs that provide bears more dispersed feeding opportunities. During this reporting period, both spring seasons were delayed by cold conditions and a later than normal green-up. As a result, the first 10-day period in May also saw 30-40% decline in the number of bears harvested.

Transport Methods: Unit 4 bear hunters overwhelmingly used boats as the most common form of transportation (Table 6). In RY10, 98% of successful hunters used boats. In RY11, successful hunters also used boats 98% of the time. Aircraft are the second most important means of hunter transport but were used by only 1% of successful hunters in RY10 and by 2% of successful hunters in the RY11.

#### *Other Mortality*

To reduce DLP mortality, the department worked with local communities, agencies associated with public safety, and nongovernmental organizations. A significant amount of 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 food-conditioned by access to human associated food/garbage. In Sitka, a collaborative group of private citizens and agencies worked as a committee to reduce the incidence of improper garbage disposal and storage through greater awareness, education, and the design of a local ordinance. Even with this effort, Sitka has few

trash receptacles that are, at a minimum, bear resistant, primarily because of the cost to replace 3,200 cans.

At Hoonah, Angoon, Pelican, Elfin Cove, Tenakee Springs, Funter Bay, and Port Alexander landfills are used or communities don't have an organized garbage control program. As a result, there are varying degrees of failures in keeping bears from becoming food-conditioned. Other places like the Green's Creek mine, Little Port Walter Research Station, and Port Armstrong Hatchery have adopted aggressive/proactive methods and procedures to keep bears from accessing garbage or attractants such as fish food and have been relatively successful.

Even with continuing department educational efforts and work with community bear task forces, 11 bears were killed in DLP and agency/public safety actions associated with communities and garbage during the reporting period. Another 16 bears in the nonhunting kill category shown in Table 1 include bears killed illegally.

Deer and mountain goat hunting have also lead to DLP confrontations between hunters and bears in the unit. Educational materials related to bear behavior, field etiquette and safety, and bear "awareness" are available through the area and regional offices, and department web site. Regional staff assisted in educational programs directed at school children using college student volunteers to present programs.

In the summer of 2007, 2 brown bear cubs orphaned and captured on Killisnoo Island entered a permitted facility in Sitka (Fortress of the Bear) where area school children have been able to experience a number of educational programs on bear behavior and safety through demonstrations with the bears. In 2010, another 3 cubs, orphaned when their mother was killed illegally in Sitka, were placed in the Fortress of the Bear facility in Sitka. The programs are designed to allow students to discover firsthand how quickly a bear is able to find unsecured food at a campsite or from improperly stored residential garbage as they travel through and around the neighborhoods in the community. These types of projects help to provide a sense of ownership in bears' welfare around communities where food conditioning puts them at risk.

The department formally initiated research work with Electronic Control Devices (ECDs), also known as tasers, in 2009. The hope was to develop a tool that could be used in hazing and aversive conditioning for large animals such as bears and moose to reduce human encounters in residential/urban and work areas. In 2010, research work moved to Port Armstrong Hatchery on south Baranof Island where large numbers of brown bears congregate around the fish hatchery when salmon move into the area. To date, the bear response to ECD exposures has resulted in a 100% flight response and a marked increase in avoidance to people in the work and residential areas of the hatchery. During this reporting period, approximately 8 bears had ECD exposures and fled the area that would have likely been killed in DLP scenarios with conventional firearms.

In RY10, 13 nonhunting mortalities were formally reported (Table 1) and 14 occurred in RY11. Generally, high bear densities lead to more bears in and around human population centers or remote work sites, and often increase the numbers of bears taken under DLP

provisions. In recent years, known illegal kills of bears often represent 15–30% of nonhunting mortality and have represented 24% of all known nonhunting mortality over the last 45 years. (Mooney 2009)

### **BEAR VIEWING**

Public interest in viewing bears continues at the Stan Price State Wildlife Sanctuary; however visitor numbers have declined recently. During summer 2009, 805 visitors (both guided and unguided) were recorded at PCCMA. In summer 2010 the number of visitors declined to 711 (the lowest number in the past 10 years). High fuel prices and the economic downturn affecting the country have had a significant impact on travelers. Some tour operators now take visitors to other Unit 4 locales (such as Kalinin Bay on Kruzof Island and Lake Eva on northeast Baranof Island, and Pavlof Bay on Northeast Chichagof Island), but the PCCMA area remains the premier spot for consistent bear viewing within the unit. In 2010, the Fortress of the Bear viewing facility in Sitka added 3 orphaned cubs to the 2 already housed there making a total of 4 males and a female (see above).

### **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 in RY2010 and RY2011, achieved the management objective of no more than 3:2.

The 3-year (RY's 2008–2010) mean annual human-caused mortality was 168 bears and exceeded the management guideline of 166 bears. However with reductions in human-caused mortality in RYs 2010 and 2011, in part due to hunter awareness and emergency closures when hunter harvest objectives were achieved, the 3-year (RY's 2009–2011) mean annual human-caused mortality was 161 bears and did not exceed the guideline of 166 bears.

Success with the objective of reducing DLP mortality is difficult to measure. The division continues to work with communities, USFS, and the Alaska Department of Environmental Conservation to address landfill and residential garbage problems in communities that contribute to such losses through food-conditioned bears.

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. A few areas within the subpopulations are currently experiencing excessive human-induced mortality levels (Table 2) near or at the conservation guideline of 4% of the population. Research appears to indicate a higher bear population in some watersheds than previously estimated. If so, harvest data in the future will appear to indicate a smaller percentage of the population is being harvested. Attempts to micromanage 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 the Northeast Chichagof Controlled Use Area (NECCUA) in 1994 to north of Port Frederick due to extensive logging road construction continues to minimize excessive harvest in that area. Chichagof Island has experienced the greatest long-term habitat alteration from logging in Unit 4. Timber harvest on native corporation lands and second growth silvicultural thinning continues to alter the landscape more so here than any other location within the unit. Thus, changes to bear habitat remain in flux. Continued research on the island's bear population is necessary to provide managers with population information.

The combined annual mortality from harvest and other human-caused mortality in the unit exceeded the biological guideline of 4% of the estimated population in RY 2008 and were close to exceeding it RY 2009 (Table 2). Both RYs 2010 and 2011 saw the numbers drop well below the 4% guideline, reversing the previous 3-year increases. Part of the decline can be attributed to Emergency Orders closing islands or the entire hunt area because harvest objectives were met. If the 2-year decline reverts back to a situation seen in RY 07-09, it may be necessary to modify existing seasons, place quotas on the number of registration permits issued, and establish mortality quotas by unit, island, or Guide Use Areas. Recommendations for regulatory changes may be needed if the previous alternative measures fail. The USFS moratorium on licensing additional guides and enforcement action against illegal guiding activities appears to have had only a short-term effect on the trend to larger harvests. Bear harvest by nonresidents has increased as the hunt efficiency (success rate) has increased. The total number of guides continues to remain considerably above the BBMS's recommendations on guide numbers and reductions of guide numbers to BBMS recommended levels through attrition have not occurred. Reinstatement of the state Big Game Commercial Services Board (BGCSB) has provided better oversight of guides and transporters, but increased communication and coordination is needed between the BGCSB, U.S. Forest Service, Native corporations, outfitter/guides, and the department to adhere to short-term and long-term strategies and recommendations of the BBMS.

## **ACKNOWLEDGMENTS**

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Table 1. Unit 4 brown bear harvest, regulatory years 2007–2011.

Regulatory year	<u>Hunter kill</u>					<u>Nonhunting kill<sup>a</sup></u>				Total Reported
	M	F	(%F)	Unk <sup>b</sup>	Total	M	F	Unk	Total	
<u>2007</u>										
Fall 07	21	16	(43)	0	37	7	3	0	10	47
Spring 08	106	8	(7)	0	114	3	0	0	3	117
Total	127	24	(16)	0	151	10	3	0	13	164
<u>2008</u>										
Fall 08	24	10	(29)	1	35	4	1	0	5	40
Spring 09	100	21	(16)	16	131	3	0	0	3	134
Total	124	31	(19)	11	166	7	1	0	8	174
<u>2009</u>										
Fall 09	20	10	(31)	2	32	6	6	0	12	44
Spring 10	116	8	(6)	4	128	3	3	0	6	134
Total	136	18	(11)	6	160	9	9	0	18	178
<u>2010</u>										
Fall 10	26	9	(25)	1	36	8	4	0	12	48
Spring 11	85	20	(19)	7	112	1	0	0	1	113
Total	111	29	(21)	8	148	9	4	0	13	161
<u>2011</u>										
Fall 11	9	11	(52)	1	21	4	3	1	8	29
Spring 12	88	15	(15)	6	109	2	4	0	6	115
Total	97	26	(21)	7	130	6	7	1	14	144

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

<sup>b</sup> Wounding loss

Table 2. Unit 4 brown bear hunting pressure <sup>a</sup> and hunter harvest <sup>b</sup> by major geographic areas, regulatory years 2007–2011.

Hunt area	Regulatory Year	# hunters	M	(%) <sup>c</sup>	F	(%) <sup>c</sup>	Unknown	(%) <sup>d</sup>	Total harvest	Percent estimated population <sup>e</sup>
<u>Northeast Chichagof Island <sup>f</sup></u>										
	2007-08	38	11	(79)	3	(21)	0	0	14	354* (4.0)
	2008-09	32	9	(69)	4	(31)	0	0	13	(3.7)
	2009-10	27	7	(70)	3	(30)	0	0	10	(2.8)
	2010-11	33	7	(78)	2	(22)	0	0	9	(2.5)
	2011-12	27	12	(71)	5	(29)	0	0	17	(4.8)
<u>Remainder of Chichagof Island</u>										
	2007-08	161	43	(84)	8	(16)	0	0	51	1,196* (4.3)
	2008-09	152	31	(76)	7	(17)	3	(7)	41	(3.4)
	2009-10	153	52	(85)	7	(11)	2	(3)	61	(5.1)
	2010-11	114	39	(76)	12	(24)	0	0	51	(4.3)
	2011-12	95	30	(77)	9	(23)	0	0	39	(3.3)
<u>Baranof and Kruzof Islands</u>										
	2007-08	101	26	(90)	3	(10)	0	0	29	1,045* (2.8)
	2008-09	104	27	(68)	8	(20)	5	(13)	40	(3.8)
	2009-10	65	27	(84)	3	(9)	2	(6)	32	(3.1)
	2010-11	90	26	(79)	7	(21)	0	0	33	(3.2)
	2011-12	67	16	(73)	6	(27)	0	0	22	(2.1)
<u>Admiralty Island</u>										
	2007-08	132	47	(82)	10	(18)	0		57	1,560* (3.7)
	2008-09	158	57	(79)	12	(17)	3	(4)	72	(4.6)
	2009-10	137	50	(88)	5	(9)	2	(4)	57	(3.7)
	2010-11	114	39	(83)	8	(17)	0	0	47	(3.0)
	2011-12	100	39	(87)	6	(13)	0	0	45	(2.9)

Table 2 continues next page

Table 2 continued.

Hunt area	Regulatory year	# hunters	M	(%) <sup>c</sup>	F	(%) <sup>c</sup>	Unknown	(%) <sup>d</sup>	Total harvest	Percent estimated population <sup>e</sup>
<u>Unit 4 Totals</u>										
	2007-08	432	127	(84)	24	(16)	0		151	(3.6)
	2008-09	446	124	(75)	31	(19)	11	(7)	166	(4.0)
	2009-10	382	136	(85)	18	(11)	6	(4)	160	(3.9)
	2010-11	353	111	(79)	29	(21)	0	0	140	(3.4)
	2011-12	293	97	(79)	26	(21)	0	0	123	(3.0)

<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: NE Chichagof Island, 354 bears; remainder of Chichagof Island, 1,196; Baranof and Kruzof Islands, 1045 bears; Admiralty Island, 1,560 bears; all Unit 4, 4,155 bears.

<sup>f</sup> X35 only.

\*guideline population estimate

Table 3. Unit 4 brown bear successful hunter residency, regulatory years 2007–2011.

Regulatory year	Local resident <sup>a</sup>	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
2007-08	10	(7)	31	(21)	110	(73)	151
2008-09	20	(12)	40	(24)	106	(64)	166
2009-10	17	(11)	35	(22)	108	(68)	160
2010-11	17	(12)	25	(18)	98	(70)	140
2011-12	18	(15)	18	(15)	87	(71)	123

<sup>a</sup> Resident of Unit 4.

Hunt kill ONLY. Other kill types NOT included.

Table 4. Unit 4 hunting effort by island, by residency, regulatory years 2007–2011.

Island	Season	# resident hunters	# nonresident hunters	Total hunters	Days hunted by residents	Days hunted by nonresidents	# days hunted	# bears killed	Effort (Days per bear)
<u>Admiralty</u>									
RY 2007	Fall 2007	28	19	47	113	61	174	12	15
	Spring 2008	42	43	85	152	227	379	45	8
RY 2008	Fall 2008	27	13	40	93	64	157	12	13
	Spring 2009	68	50	118	207	232	439	60	7
RY 2009	Fall 2009	23	17	40	96	63	159	8	20
	Spring 2010	47	50	97	202	263	465	49	9
RY 2010	Fall 2010	20	9	29	73	50	123	10	12
	Spring 2011	50	35	85	206	226	432	39	11
RY 2011	Fall 2011	14	11	25	52	51	103	6	17
	Spring 2012	35	40	75	126	221	347	39	9
<u>Baranof</u>									
RY 2007	Fall 2007	35	11	46	74	51	125	9	14
	Spring 2008	30	25	55	89	125	214	20	11
RY 2008	Fall 2008	23	10	33	74	42	116	11	11
	Spring 2009	42	29	71	91	147	238	29	8
RY 2009	Fall 2009	15	5	20	38	37	75	9	8
	Spring 2010	23	22	45	67	85	152	23	7
RY 2010	Fall 2010	17	10	27	73	61	134	13	10
	Spring 2011	34	29	63	128	116	244	20	12
RY 2011	Fall 2011	6	10	16	21	64	85	6	14
	Spring 2012	31	20	51	60	87	147	18	8

Table 4 continued.

Island	Season	# resident hunters	# nonresident hunters	Total hunters	Days hunted by residents	Days hunted by nonresidents	# days hunted	# bears killed	Effort (Days per bear)
<u>Chichagof</u>									
RY 2007	Fall 2007	30	45	75	136	129	265	16	17
	Spring 2008	51	73	124	166	274	440	49	9
RY 2008	Fall 2008	23	32	55	68	110	178	12	15
	Spring 2009	45	84	129	123	298	421	42	10
RY 2009	Fall 2009	19	28	47	50	116	166	15	11
	Spring 2010	49	84	133	175	310	485	56	9
RY 2010	Fall 2010	19	17	36	97	87	184	14	13
	Spring 2011	42	69	111	116	333	449	46	10
RY 2011	Fall 2011	7	14	21	12	58	70	9	8
	Spring 2012	46	55	101	181	196	377	51	7
<u>Unit 4 Totals</u>									
RY 2007	Fall 2007	93	75	168	323	241	564	37	15
	Spring 2008	123	141	264	407	626	1033	114	9
RY 2008	Fall 2008	73	55	128	235	216	451	35	13
	Spring 2009	155	163	318	421	677	1098	131	8
RY 2009	Fall 2009	57	50	107	184	216	400	32	13
	Spring 2010	119	156	275	444	658	1102	128	9
RY 2010	Fall 2010	56	36	93	243	198	441	37	12
	Spring 2011	126	133	260	450	675	1125	105	11
RY 2011	Fall 2011	27	36	65	86	179	265	21	13
	Spring 2012	112	115	228	367	504	872	108	8

Table 5. Unit 4 brown bear harvest chronology, regulatory years 2007–2011<sup>a</sup>.

Regulatory year	Fall harvest periods											Total
	9/11– 9/20	9/21– 9/30	10/1– 10/10	10/11– 10/20	10/20– 10/31	11/1– 11/10	11/11– 11/20	11/2– 11/31	12/1– 12/10	12/11– 12/20	12/21– 12/31	
2007-08	14	15	5	2	1	0	0	0	0	0	0	37
2008-09	15	11	2	3	1	0	0	2	0	1	0	35
2009-10	11	13	6	2	0	0	0	0	0	0	0	32
2010-11	17	8	6	0	1	0	3	0	0	0	0	35
2011-12	10	6	4	0	0	0	0	0	0	0	0	20

	Spring harvest periods							RY Total
	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	
2007-08	0	0	10	35	55	14	114	151
2008-09	0	0	4	38	70	18	130	166
2009-10	0	1	10	54	51	12	128	160
2010-11	0	0	6	29	57	13	105	140
2011-12	0	0	6	19	61	17	103	123

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

Table 6. Unit 4 brown bear harvest by transport method, 2007–08 through 2011–12.

Regulatory year	Airplane	Boat	Walked	Off- road vehicle	Highway vehicle	Unknown
2007-08	12	138	0	1	0	0
2008-09	7	156	3	0	0	0
2009-10	10	149	0	1	0	0
2010-11	2	137	0	1	0	0
2011-12	3	120	0	0	0	0

Hunt kill ONLY, other kill types NOT included.

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
907-465-4190 P.O. BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** 5 (5,800 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.

Unit 5 is composed of 2 game management subunits, 5A and 5B, that are separated by Yakutat Bay. Although they are geographically similar and adjacent to one another, they face vastly different pressure from bear hunters. Unit 5A is fairly accessible with 40–50 miles of gravel roads plus many all-terrain-vehicle (ATV) trails. There are numerous airstrips that provide access for small aircraft, and many of these have rental cabins associated with them that hunters use as base camps. There are also several navigable rivers that can be accessed via the road system that provide hunters with additional access. Unit 5B has just a few miles of gravel logging roads near Icy Bay, and has a limited ATV trail system in this same area. There are only a couple of airstrips and a single rental cabin for hunters to use as a base. Most of the lands in 5A are within the Tongass National Forest or Glacier Bay National Preserve and are open to hunting. In contrast, much of Unit 5B is off limits to hunting because it is designated national park land. Also, areas of the subunit are owned by Native corporations and are open to hunting only with a permit from the corporation.

Since 1961, when brown bears were first sealed in Alaska, approximately 1,200 sport-killed bears have been sealed from Unit 5. During this same time period, nonhunter harvest mortality (vehicle collisions, the dispatching of nuisance animals, defense of life and property (DLP) situations, and bears found dead from unknown causes) have accounted for 121 bears. Approximately 81% of the hunter harvested bears were from Unit 5A, and 19% from Unit 5B. Although hunters from around Alaska hunt bears in Unit 5, the majority of the harvest is by guided nonresident hunters. Nonresident hunters took 67% of brown bears harvested during the period 1961–2011. Under federal subsistence regulations, bears do not have to be sealed if they are not removed from Unit 5.

## 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 (ADF&G) and Alaska Wildlife Trooper staff gathered data about harvested bears during sealing. State game regulations require brown bear harvests to be reported within 10 days of the kill, and hides and skulls to be sealed within 30 days of harvest. Skulls are measured and a premolar 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. However, beginning in the summer of 2008, biologists began radio collaring brown bears in both units 5A and 5B to begin efforts to understand the ecology of bears in this area, as well as lay the groundwork for conducting population estimates. At present, management biologists estimate the brown bear populations for units 5A and 5B are 522 bears and 108 bears respectively. These numbers were calculated using density estimates of .5 bears/mi.<sup>2</sup> and .2 bears/mi.<sup>2</sup> for units 5A and 5B respectively (Miller 1993). Managers derived these density estimates by comparing the habitat quality available to brown bears in Unit 5 to what is available to bears on Admiralty and Chichagof islands where mark-recapture studies were used to estimate brown bear density..

Data gathered from sealing certificates, incidental observations, and hunter interviews indicate no notable changes in the Unit 5 brown bear populations in recent years. The highest annual mortality on record occurred in 2003 when 45 brown bears were killed. Eleven of these bears were killed under defense of life and property (DLP) regulations. We were concerned that this high mortality might develop into a pattern when during the previous report period (RY08–RY09) total brown bear mortality increased to 41 in RY08. However, total mortality decreased to 28 bears in RY09 which is more consistent with pre-2003 levels. During this report period 20 bears were killed in RY10 and 31 bears in RY11. For purposes of this report, a regulatory year runs from 1 July through 30 June; e.g. RY 2010 = 1 July 2010–30 June 2011.

### MORTALITY

#### *Harvest*

#### Season and Bag Limit

1 bear every 4  
regulatory years

#### Resident and Nonresident Hunters

1 September–31 May

Board of Game Actions and Emergency Orders. The Board of Game took no actions and we issued no emergency orders associated with Unit 5 brown bears during this report period.

Hunter Harvest. During RY10, 12 male and 2 female bears were reported taken (Table 1). Males were 86% of the harvest, which achieves our management objective of at least 60% male bears. The mean male skull size of 23.5 inches is nearly the same as the previous 8-years' (RY02–RY09) average of 23.6 inches. The average male age (7.9 years) is younger than the mean age of bears in the previous report period (8.9 years) and nearly the same as the previous 10-years' mean age of 7.8 years. The number of days required to take a brown bear in RY10 was equal to the previous 10-years' average of 4.5 days/bear.

In RY11, Unit 5 hunters killed 14 male and 11 female brown bears (Table 1). Males were 56% of the harvest; the percentage of male bears in the harvest failed to meet management objectives in regulatory year 2011. Mean male skull size was 23.0 inches, and the mean age was 6.0 years. The average male skull size is similar to the previous 8-years' (RY02–RY09) mean skull size of 23.6 inches (Table 1); but the mean male age is 1.6 years younger than the previous 8-years' (RY02–RY09) mean age of 7.6 years (Table 1). In RY11, hunters took 4.5 days to harvest a bear, similar to the previous 10-years' (RY00–RY09) mean number of days to harvest a brown bear.

Harvest Chronology. Since 2002, the majority of Unit 5 brown bears have been taken during the fall (58%). During the report period 23 bears (59%) were harvested during the fall season, and 16 bears (41%) were taken in spring (Table 2). The months of September and May produce the highest harvest for their respective seasons; between RY02 and RY11, 102 bears were taken in September and 90 were taken in May.

Hunter Residency and Success. Nonresident hunters took 57% and 72% of the brown bears in RY10 and RY11, respectively (Table 3). Nonresident hunters have historically taken the majority of bears in Unit 5; however, the percentage of Alaska residents from outside Unit 5 taking bears increased significantly over the last 3 years. Alaska residents from outside Unit 5 took 25% of the brown bears during the report period; the same group took 29% of the bears in the previous report period. Unit 5 residents have taken 2–6 bears annually over the last 10 years, and took 1 and 2 brown bears, respectively, during RY10 and RY11.

Transport Methods. Transportation types used in successful brown bear hunts during this report period included airplanes (41%), off road vehicles (31%), boats (20%), and highway vehicles (8%) (Table 4).

#### *Other Mortality*

This category includes DLP kills, illegal kills, road kills, and nuisance bear kills. During RY10, 5 bears were killed under DLP regulations, and 1 bear was taken illegally (Table 5). Three of the DLP bears were killed in urban settings; 2 were killed in a remote area of Unit 5B; and 1 bear was killed and left in the field near the Situk River. In RY11, 4 bears were killed under DLP regulations. Three bears were killed in urban settings, and 1 was killed in a remote area of Unit 5B. Two additional bear mortalities were discovered but cause of death was not established. One of these bears was found on the mud flats in Dry Bay, and the other was found in the field near the mouth of the Situk. The bear found at the Situk River was missing all front claws.

The Yakutat landfill has been the focus of concern for nonhunting mortalities for decades. The landfill attracts dozens of brown bears during the course of a year, and once food conditioned and near the community, many of these animals are eventually killed in nonhunting situations.

Douglas Area ADF&G staff continues to work with the community of Yakutat and the Alaska Department of Environmental Conservation (DEC) to remedy landfill problems and curtail brown bear attractants. Fish waste is no longer being deposited at the landfill, and for a time, garbage was buried under soil at the end of the day. Additional insight into the behavior of bears utilizing the landfill has been gathered through a radiocollaring project initiated in RY09 at the Yakutat landfill. A total of 17 bears (11 males and 6 females) have been collared at the landfill (ADFG, unpublished data). Preliminary data suggest bears are not dependent on the landfill and move extensively on the Yakutat forelands in search of food. In addition, bears collared at the landfill have a high mortality rate; 71% of the bears collared at the landfill have died. Ongoing research should continue to provide insight into local bear population dynamics and may be valuable in education and outreach efforts to reduce unnecessary bear mortality.

## **HABITAT**

### *Assessment and Enhancement*

We did not conduct any habitat assessment studies or enhancement projects during this report period. The department continues to collect preliminary habitat selection data from GPS equipped radio-collared bears, and anecdotal information gathered during capture operations and telemetry surveys in both Unit 5A and 5B. These data suggest bears in Unit 5A are well distributed across the Yakutat forelands throughout the year. Bears show preference for specific habitats (stream, rivers, beaches, etc.) seasonally, and appear to be active through most of the year. Little data is available from Unit 5B bears due to difficulty in retrieving collars; more information will be available in future reports.

## **CONCLUSIONS AND RECOMMENDATIONS**

We met male to female harvest ratio management objectives in RY10 only; 44% of the RY11 harvest were female bears, exceeding the objective of 40% or less. The average age for hunter-harvested male bears was 9.0 yrs. in RY10, and 6.0 yrs. in RY11; the male bear age management objective of 6.5 years was not met in RY11. Even with a slight increase in female harvest and decrease in male ages, long term monitoring of these metrics suggests the productivity of this population is not being compromised by the present level of mortality. The mean age of male bears increased significantly in RY10 and managers will monitor the age data very closely to look for patterns or trends that might give insight into the age structure of the population. No changes to current Unit 5 brown bear hunting seasons or bag limits are recommended at this time.

Current hunter harvest in Unit 5 appears to be sustainable based on skull size and age indices. These indices help us anticipate the harvest year to year, as does the limit the USFS places on nonresident hunts in the Tongass National Forest. We remain concerned about nonhunter harvest, specifically about DLP kills associated with human food and refuse which is substantial some years. Bears using the Yakutat landfill and feeding on trash in residential areas are killed each year. Convincing Yakutat residents that brown bears are a valuable wildlife resource rather than pests has not been easy. Current brown bear research efforts in the Yakutat area include radiocollaring bears in the Yakutat landfill. Some of these bears likely spend time in and around Yakutat neighborhoods. Data from GPS equipped radio collars shows that bears frequenting the landfill and residential garbage cans also spend much of their time and foraging activity in areas outside of town. This information suggests that by eliminating human food attractants through

community education, bears will likely spend less time in town, and some may stop their urban forays entirely. In addition to using radio collar data for community education, department biologists continue to work with the City of Yakutat to construct an electric fence around the landfill. During the report period we hoped the fence would be installed but equipment malfunctions delayed the project. We will continue to emphasize to local residents the importance of properly managing bear attractants.

Mainland brown bear research is currently underway in both Units 5A and 5B (Flynn et. al. 2012). Data from GPS equipped radio collars will provide habitat selection and movement pattern data. A DNA based brown bear population estimate is not planned, but GPS equipped radiocollar data can be used to formulate a plan to collect brown bear population data utilizing DNA mark-recapture techniques. Brown bear hunting is an important economic resource in the Yakutat area. The department has been asked to consider increasing guideline harvest levels (GHL), and increasing the Unit 5A bag limit to 2 bears every 4 years. Based on brown bear density estimates by Miller (1993), the mortality rates between RY02 and RY11 have ranged between 4% and 9% of all bears. Factors contributing to brown bear mortality are cyclic and whereas 4% mortality maybe conservative, 9% may be above sustainable levels. Without additional population information managers are unable to support any increase in harvest as suggested above. Miller (1993) estimated brown bear density at .5 bears/mi<sup>2</sup> in Unit 5A, and at .2 bears/mi<sup>2</sup> in Unit 5B and managers believed the population was stable or decreasing at the time. The Unit 5A density estimate is the highest on mainland Southeast Alaska. The current population is unknown but appears to be able to support the current level of mortality.

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Table 1. Unit 5 brown bear harvest, age, skull sizes, and effort, RY02 through RY11.

Regulatory year	Harvest				Mean age		Mean skull size		Avg days/kill	
	M	F	Unk	Total	M	F	M	F	M	F
2002	16	6	0	22	9.3	5.0	24.6	22.0	4.2	3.8
2003	28	3	0	31	8.0	16.0	23.7	20.8	4.2	6.0
2004	24	9	0	33	6.1	8.9	22.8	22.0	5.3	5.3
2005	25	8	0	33	8.6	5.3	24.0	21.9	5.0	4.0
2006	20	8	0	28	7.7	7.4	24.0	21.0	5.6	3.6
2007	18	8	0	26	6.5	4.3	22.9	20.7	3.5	4.5
2008	24	14	0	38	7.8	6.8	23.7	20.8	4.5	4.7
2009	19	8	0	27	10.2	7.1	23.7	20.1	4.1	4.6
2010	12	2	0	14	9.0	3.0	23.9	20.9	4.2	3.5
2011	14	11	0	25	6.0	7.0	23.0	21.3	3.5	5.5
<u>Mean</u> 2010–2011	13.0	6.5	0	19.5	7.9	6.1	23.5	21.2	3.8	5.2
<u>Mean</u> 2002–2009	21.6	8.0	0	29.6	7.6	7.1	23.6	21.0	4.6	4.5

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Table 2. Unit 5 brown bear harvest chronology, RY02 through RY11.

Regulatory Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
2002	0	0	11	3	0	1	0	0	0	1	6	0	22
2003	0	0	11	2	1	0	0	0	0	3	14	0	31
2004	0	0	12	1	0	0	0	0	0	6	14	0	33
2005	0	0	11	6	1	0	0	0	0	5	10	0	33
2006	0	0	10	6	0	0	0	0	0	1	11	0	28
2007	0	0	10	8	1	0	0	0	0	1	6	0	26
2008	0	0	9	10	7	0	0	0	0	3	9	0	38
2009	0	0	10	7	1	0	0	0	0	2	7	0	27
2010	0	0	5	3	0	0	0	0	0	1	5	0	14
2011	0	0	13	2	0	0	0	0	0	2	8	0	25

Table 3. Unit 5 successful brown bear hunter residency, RY02 through RY11.

Regulatory year	Unit resident	(%)	Other AK. resident	(%)	Nonresident	(%)
2002						
Fall 2002	2	(13)	2	(13)	11	(74)
Spring 2003	0	(0)	3	(43)	4	(57)
Total	2	(9)	5	(23)	15	(68)
2003						
Fall 2003	2	(14)	1	(7)	11	(79)
Spring 2004	0	(0)	2	(12)	15	(88)
Total	2	(6)	3	(10)	26	(84)
2004						
Fall 2004	0	(0)	5	(38)	8	(62)
Spring 2005	0	(0)	0	(0)	20	(100)
Total	0	(0)	5	(15)	28	(85)
2005						
Fall 2005	2	(11)	2	(11)	14	(78)
Spring 2006	0	(0)	1	(7)	14	(93)
Total	2	(6)	3	(9)	28	(85)
2006						
Fall 2006	0	(0)	0	(0)	16	(100)
Spring 2007	0	(0)	1	(8)	11	(92)
Total	0	(0)	1	(4)	27	(96)
2007						
Fall 2007	3	(16)	5	(26)	11	(58)
Spring 2008	2	(28)	2	(29)	3	(43)
Total	5	(19)	7	(27)	14	(54)
2008						
Fall 2008	4	(15)	6	(23)	16	(62)
Spring 2009	0	(0)	3	(25)	9	(75)
Total	4	(10)	9	(24)	25	(66)
2009						
Fall 2009	1	(6)	6	(33)	11	(61)
Spring 2010	1	(12)	4	(44)	4	(44)
Total	2	(7)	10	(37)	15	(56)
2010						
Fall 2010	0	(0)	3	(37)	5	(63)
Spring 2011	1	(17)	2	(33)	3	(50)
Total	1	(7)	5	(36)	8	(57)
2011						
Fall 2011	0	(0)	2	(13)	13	(87)
Spring 2012	2	(20)	3	(30)	5	(50)
Total	2	(8)	5	(20)	18	(72)

Table 4. Unit 5 transport modes used by successful brown bear hunters, RY02 through RY11.

Regulatory year	Transport Modes											
	Plane	(%)	Boat	(%)	ORV/4- wheeler	(%)	Highway vehicle	(%)	Foot	(%)	Other	(%)
2002	4	(18)	9	(41)	7	(32)	2	(9)	0	(0)	0	(0)
2003	9	(29)	9	(29)	12	(39)	0	(0)	1	(3)	0	(0)
2004	4	(12)	12	(37)	15	(45)	2	(6)	0	(0)	0	(0)
2005	7	(21)	12	(37)	13	(39)	0	(0)	1	(3)	0	(0)
2006	5	(18)	12	(43)	10	(36)	1	(3)	0	(0)	0	(0)
2007	10	(38)	6	(24)	10	(38)	0	(0)	0	(0)	0	(0)
2008	11	(29)	9	(24)	14	(37)	4	(10)	0	(0)	0	(0)
2009	19	(70)	7	(26)	0	(0)	1	(4)	0	(0)	0	(0)
2010	4	(29)	5	(36)	3	(21)	2	(14)	0	(0)	0	(0)
2011	12	(48)	3	(12)	9	(36)	1	(4)	0	(0)	0	(0)

Table 5. Unit 5 brown bear mortality by type, RY02 through RY11.

Regulatory Year	DLP	Unknown/ Natural	Vehicle Collision	Illegal kill	Other	Hunter Kill	Total Mortality
2002	5	0	1	0	0	22	28
2003	11	2	1	0	0	31	45
2004	1	0	0	1	0	33	35
2005	2	0	0	0	0	33	35
2006	9	0	0	0	0	28	37
2007	0	1	0	0	0	26	27
2008	3	0	0	0	0	38	41
2009	1	0	0	0	0	27	28
2010	5	0	0	1	0	14	20
2011	4	2	0	0	0	25	31
<u>Mean</u>							
2010–2011	4.5	1	0	.5	0	19.5	25.5
<u>Mean</u>							
2002–2009	4.0	.4	.3	.1	0	29.8	34.5

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
907-465-4190 PO Box 115526  
Juneau, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012

**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 the smaller 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 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 recovered from excessive harvest during the 1970s and early 1980s. The fall hunting season on Montague was closed in 1989 and the spring season closed in 1994. The Board of Game reopened the Montague bear season in 2001 in response to an increasing population and many complaints of aggressive bears in popular deer hunting areas.

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. Average annual kill from 1961 through 1986 was 32 bears (range = 14–63). During 1987 through 1991, the average yearly harvest was 50 bears (range = 40–60). Most of the increased harvest was in Unit 6D, which may have caused a population decline. Seasonal restrictions were established to reduce harvest, which resulted in an average harvest of 35 bears (range = 22–49) from 1992 through 2002. The average annual harvest from 2003 through 2009 was 25 bears (range 19–36).

The Board of Game changed the bag limit for brown bears in Units 6A, 6B, and 6C from 1 bear every 4 years to 1 bear a year, beginning in 1997 for resident hunters and in 2001 for all hunters. This was in response to low moose calf survival in Unit 6B and increasing bear numbers in these units. In-unit sealing and abbreviated reporting period were discontinued during the early 2000s.

Logging activity probably reduced brown bear abundance and distribution in Unit 6A. Extensive clearcutting of old-growth timber on private and state land occurred between Icy Bay and Cape Yakataga, and continued north in the Yakataga and Duktoth river drainages. 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 and lead to increased brown bear mortality (McLellan and Shackleton 1988; Smith and Van Daele 1989). The Exxon Valdez Oil Spill (EVOS) Trustee Council acquired or protected most lands scheduled for timber harvest in Unit

6D during the 1990s, thus removing the threat of continued, large-scale habitat loss in Prince William Sound (PWS).

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVE**

- Maintain a brown bear population capable of sustaining a minimum annual harvest of 35 bears, to include a minimum of 60% males and 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 nonglaciated land below 3,000 feet elevation, quantified by harvest areas (major drainages or other gross geographical characteristics), 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. In recent years track and den surveys were conducted on Hinchinbrook and Montague islands only. Surveys were timed with the peak emergence of brown bears from dens, which varied annually with snow conditions. An unknown proportion of bears wander the alpine regions of the islands for several days after emergence from dens, leaving easily observable tracks in the snow. Tracks, dens, and bears above 1,000 feet elevation were tallied and linear density estimated as  $[(\text{tracks}/2)+\text{dens}+\text{bears}]/\text{miles searched}$ . I also calculated observations per hour as an additional index for comparison.

The annual allowable harvest of bears on Hinchinbrook and Montague islands was estimated as 5.7% of the total population and for females older than 2 years it was estimated as 2.5% of the population (Miller 1988, 1990). Harvest of all populations was monitored through bear sealing.

I estimated the total harvest by summing reported harvest and estimating illegal kill by regulatory year (RY), which begins 1 July and ends June 30. The reported harvest included all bears sealed after being taken by hunters or killed for other reasons, such as defense of life or property (DLP). 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**

Based on spring track and den surveys and model assumptions, I've estimated both Hinchinbrook and Montague Islands in Unit 6D had populations of about 100 bears each (Table 1). Montague Island had an increasing population while Hinchinbrook was relatively stable. The number of tracks varied widely among survey years, which probably reflected the age and distribution of snow coverage more than the bear population. We managed Montague Island bears under the assumption that they were sensitive to overharvest because the population was small and relatively isolated from the mainland. Inbreeding in small, isolated populations can reduce 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 1980s and 1990s, 6–8 nuisance brown bears were transported from Valdez and Cordova and released on Montague Island. In addition, empirical and anecdotal evidence suggests that bears occasionally swim between Hinchinbrook and Montague Islands, a distance of at least 7 miles in open seas with strong tidal currents.

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>), comparable to Kodiak Island, much of the Alaska Peninsula, and parts of Southeast Alaska. Montague Island had a medium density (40–175 bears/1,000 km<sup>2</sup>) consistent with contiguous coastal habitat to the southeast and with the northern Alaska Peninsula.

## **MORTALITY**

### *Harvest*

Season and Bag Limit. The hunting season for all hunters in Units 6A–C was 1 September–31 May. The Unit 6D season, except Montague Island, was 15 October–25 May for all hunters. Bag limit was 1 bear every regulatory year in Units 6A–C, and 1 bear every 4 regulatory years for Unit 6D. Bear hunting was open on Montague Island 15 October–31 December and 1 April – 25 May by registration permit, with a harvest quota of 5 bears. Taking cubs (bears ≤ 2 years old) or a female accompanied by cubs was prohibited.

Board of Game Actions and Emergency Orders. During the last reporting period the board extended the brown bear season, beginning in 2009, to June 10 for Units 6A – 6C, and to a split season of 15 October – 31 December and 1 April – 25 May open to residents and nonresidents for Montague Island. No actions were taken during the reporting period.

Hunter Harvest. Reported harvests during RY10 and RY11 for Unit 6 were 65 for each (Table 2). In each year, most bears were harvested in Unit 6D (25 and 32 bears, respectively). An annual harvest of 32 bears or more raises concern over sustainability in Unit 6D, but this seems to only occur around once per decade.

During the reporting period females made up 45% and 40% of the reported kill in each of the years, respectively (Table 2). Mean skull size among males was 25 inches, similar to mean skull size during the past 5 years (Table 3). Female skull size remained unchanged at 21 inches. Average ages of males and females were relatively stable during the reporting period (Table 3). Average male age fluctuates regularly between 8 and 10 years.

Hunter Residency. Nonresidents harvested the majority of brown bears in Unit 6 during RY10 (75%) and RY11 (60%) (Table 4). Nonresident harvest was most prevalent in Unit 6A. Local residents took the fewest bears. These harvest characteristics were similar for brown bears taken in previous years.

Harvest Chronology. Peak brown bear harvests typically occurred during months of September and May for this reporting period (Table 5). The extension of the season to June 10 has resulted in the additional harvest of 4 bears, including 2 in RY09, 2 in RY10, and none in RY11.

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*

There were only 2 bears killed in defense of life or property during the reporting period, both were females in Unit 6A (Table 2). Estimated illegal kill totaled 10 bears per year for the entire unit.

## **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. Harvest in 6D was unusually high in RY11 and should be monitored closely.

Brown bear numbers were probably stable during the reporting period. Brown bear den and track surveys should continue on Montague and Hinchinbrook islands. I recommend no new management actions.

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Table 1. Brown bear population estimates and harvest quotas based on indices of linear density and previous year's harvest in Unit 6D.

Area	Regulatory year	Observations			Miles searched	Linear density		Estimated population	Harvest quota		Reported	
		tracks	dens	bear		index [(t/2)+d+b]/mi	Obs/hr		Total bear	Females age >2	Total bear	Females age >2
Hinchinbrook Island	1990–1991	34	8	0	100	0.25	38	116	5	2	5	0
	1993–1994	26	9	0	100	0.22	8	106	5	2	6	4
	2003–2004	124	9	0	148	0.48	25	110	6	3	6	1
	2004–2005	64	6	3	100	0.41	43	110	6	3	13	1
	2005–2006	94	12	0	148	0.40	44	100	6	3	5	0
	2007–2008	95	16	9	148	0.49	25	100	6	3	5	1
	2008–2009	227	26	2	148	0.96	38	104	6	3	7	1
	2011–2012	99	14	7	148	0.48	23	100	6	3	9	4
Montague Island	1989–1990	10	4	0	165	0.05	9	41	2	1	1	1
	2000–2001	58	3	0	210	0.15	18	75	4	2	0	0
	2001–2002	80	3	0	210	0.21	23	80	4	2	4	0
	2002–2003	134	1	0	210	0.32	27	81	5	2	3	0
	2003–2004	74	7	0	163	0.27	31	84	5	2	0	0
	2004–2005	154	2	1	210	0.38	38	90	5	2	5	1
	2005–2006	166	2	3	210	0.42	38	91	5	2	0	0
	2007–2008	221	7	10	210	0.61	26	100	6	2	1	1
	2008–2009	98	7	4	210	0.29	18	100	6	2	4	2
	2009–2010	163	5	1	210	0.42	28	100	6	2	6	1

<sup>a</sup> Midpoint of range estimate (+/- 30% ).

Table 2. Unit 6 brown bear harvest, 2007–2011.

Regulatory year	Reported						Estimated									
	Hunter kill			Unk	Total	Nonhunting kill			illegal kill	Total estimated kill						
	M	F	(%)			M	F	Unk.		M	(%)	F	(%)	Unk.	Total	
6A	6A/Fall 07	12	18	(60)	0	30	0	0	0	2	12	(40)	18	(60)	2	32
	Spring 08	3	1	(25)	0	4	0	0	0	1	3	(75)	1	(25)	1	5
	<b>6A/Total</b>	15	19	(56)	0	34	0	0	0	3	15	(44)	19	(56)	3	37
	6A/Fall 08	7	5	(42)	0	12	0	0	0	2	7	(58)	5	(42)	2	14
	Spring 09	3	0	(0)	0	3	0	0	0	1	3	(100)	0	(0)	1	4
	<b>6A/Total</b>	10	5	(33)	0	15	0	0	0	3	10	(67)	5	(33)	3	18
	6A/Fall 09	9	6	(40)	0	15	0	0	1	2	9	(60)	6	(40)	3	18
	Spring 10	9	2	(18)	0	11	0	0	0	1	9	(82)	2	(18)	1	12
	<b>6A/Total</b>	18	8	(31)	0	26	0	0	1	3	18	(69)	8	(31)	4	30
	6A/Fall 10	8	10	(56)	0	18	0	0	0	2	8	(44)	10	(56)	2	20
	Spring 11	3	0	(0)	0	3	0	0	0	1	3	(100)	0	(0)	1	4
	<b>6A/Total</b>	11	10	(48)	0	21	0	0	0	3	11	(52)	10	(48)	3	24
	6A/Fall 11	9	5	(36)	0	14	0	0	0	2	9	(64)	5	(36)	2	16
	Spring 12	3	2	(40)	0	5	0	0	0	1	3	(60)	2	(40)	1	6
	<b>6A/Total</b>	12	7	(37)	0	19	0	0	0	3	12	(63)	7	(37)	3	22
6B	6B/Fall 07	4	7	(64)	0	11	0	0	0	2	4	(36)	7	(64)	2	13
	Spring 08	0	0	(0)	0	0	0	0	0	0	0	(0)	0	(0)	0	0
	<b>6B/Total</b>	4	7	(64)	0	11	0	0	0	2	4	(36)	7	(64)	2	13
	6B/Fall 08	2	5	(71)	0	7	0	0	0	2	2	(29)	5	(71)	2	9
	Spring 09	8	0	(0)	0	8	0	0	0	0	8	(100)	0	(0)	0	8
	<b>6B/Total</b>	10	5	(33)	0	15	0	0	0	2	10	(67)	5	(33)	2	17
	6B/Fall 09	0	5	(100)	0	5	0	0	0	2	0	(0)	5	(100)	2	7
	Spring 10	4	0	(0)	0	4	0	0	0	0	4	(100)	0	(0)	0	4
	<b>6B/Total</b>	4	5	(56)	0	9	0	0	0	2	4	(44)	5	(56)	2	11
	6B/Fall 10	1	4	(80)	0	5	0	0	0	2	1	(20)	4	(80)	2	7
	Spring 11	3	2	(40)	0	5	0	0	0	0	3	(60)	2	(40)	0	5
	<b>6B/Total</b>	4	6	(60)	0	10	0	0	0	2	4	(40)	6	(60)	2	12

Table 2. continued.

Unit	Regulatory year	Reported						Estimated								
		Hunter kill			Unk.	Total	Nonhunting kill			illegal kill	Total estimated kill					
		M	F	(%)			M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6B	6B/Fall 11	0	3	(100)	0	3	0	0	0	2	0	(0)	3	(100)	2	5
	Spring 12	3	2	(40)	0	5	0	0	0	0	3	(60)	2	(40)	0	5
	<b>6B/Total</b>	3	5	(63)	0	8	0	0	0	2	3	(38)	5	(63)	2	10
6C	6C/Fall 07	1	3	(75)	0	4	0	0	0	1	1	(25)	3	(75)	1	5
	Spring 08	2	1	(33)	0	3	0	0	0	0	2	(67)	1	(33)	0	3
	<b>6C/Total</b>	3	4	(57)	0	7	0	0	0	1	3	(43)	4	(57)	1	8
	6C/Fall 08	3	5	(63)	0	8	1	2	0	1	4	(36)	7	(64)	1	12
	Spring 09	2	0	(0)	0	2	0	0	0	0	2	(100)	0	(0)	0	2
	<b>6C/Total</b>	5	5	(50)	0	10	1	2	0	1	6	(46)	7	(54)	1	14
	6C/Fall 09	4	3	(43)	0	7	0	0	0	1	4	(57)	3	(43)	1	8
	Spring 10	3	0	(0)	0	3	0	0	0	0	3	(100)	0	(0)	0	3
	<b>6C/Total</b>	7	3	(30)	0	10	0	0	0	1	7	(70)	3	(30)	1	11
	6C/Fall 10	2	4	(67)	0	6	0	0	0	1	2	(33)	4	(67)	1	7
	Spring 11	2	1	(33)	0	3	0	0	0	0	2	(67)	1	(33)	0	3
	<b>6C/Total</b>	4	5	(56)	0	9	0	0	0	1	4	(44)	5	(56)	1	10
	6C/Fall 11	1	3	(75)	0	4	0	0	0	1	1	(25)	3	(75)	1	5
	Spring 12	2	0	(0)	0	2	0	0	0	0	2	(100)	0	(0)	0	2
	<b>6C/Total</b>	3	3	(50)	0	6	0	0	0	1	3	(50)	3	(50)	1	7
6D	6D/Fall 07	3	2	(40)	0	5	0	1	0	3	3	(50)	3	(50)	3	9
	Spring 08	11	2	(15)	0	13	0	0	0	1	11	(85)	2	(15)	1	14
	<b>6D/Total</b>	14	4	(22)	0	18	0	1	0	4	14	(74)	5	(26)	4	23
	6D/Fall 08	7	4	(36)	0	11	0	0	0	3	7	(64)	4	(36)	3	14
	Spring 09	12	2	(14)	0	14	0	0	0	1	12	(86)	2	(14)	1	15
	<b>6D/Total</b>	19	6	(24)	0	25	0	0	0	4	19	(76)	6	(24)	4	29
	6D/Fall 09	1	1	(50)	0	2	3	2	0	3	4	(57)	3	(43)	3	10
	Spring 10	18	4	(18)	0	22	0	1	0	1	18	(78)	5	(22)	1	24
	<b>6D/Total</b>	19	5	(21)	0	24	3	3	0	4	22	(73)	8	(27)	4	34

Table 2. Continued.

Unit	Regulatory year	Reported					Estimated									
		Hunter kill			Unk.	Total	Nonhunting kill			illegal kill	Total estimated kill					
		M	F	(%)			M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6D	6D/Fall 10	2	2	(50)	0	4	0	0	0	3	2	(50)	2	(50)	3	7
	Spring 11	15	6	(29)	0	21	0	0	0	1	15	(71)	6	(29)	1	22
	<b>6D/Total</b>	17	8	(32)	0	25	0	0	0	4	17	(68)	8	(32)	4	29
	6D/Fall 11	4	4	(50)	0	8	0	0	0	3	4	(50)	4	(50)	3	11
	Spring 12	17	7	(29)	0	24	0	0	0	1	17	(71)	7	(29)	1	25
	<b>6D/Total</b>	21	11	(34)	0	32	0	0	0	4	21	(66)	11	(34)	4	36
<b>TOTALS</b>	Fall 07	20	31	(61)	0	51	0	1	0	8	20	(38)	32	(62)	8	60
	Spring 08	16	3	(16)	0	19	0	0	0	2	16	(84)	3	(16)	2	21
	<b>Total</b>	36	34	(49)	0	70	0	1	0	10	36	(51)	35	(49)	10	81
	Fall 08	19	19	(50)	0	38	1	2	0	8	20	(49)	21	(51)	8	49
	Spring 09	25	2	(7)	0	27	0	0	0	2	25	(93)	2	(7)	2	29
	<b>Total</b>	44	21	(32)	0	65	1	2	0	10	45	(66)	23	(34)	10	78
	Fall 09	14	15	(52)	0	29	3	2	1	8	17	(50)	17	(50)	9	43
	Spring 10	34	6	(15)	0	40	0	1	0	2	34	(83)	7	(17)	2	43
	<b>Total</b>	48	21	(30)	0	69	3	3	1	10	51	(68)	24	(32)	11	86
	Fall 10	13	20	(61)	0	33	0	0	0	8	13	(39)	20	(61)	8	41
	Spring 11	23	9	(28)	0	32	0	0	0	2	23	(72)	9	(28)	2	34
	<b>Total</b>	36	29	(45)	0	65	0	0	0	10	36	(55)	29	(45)	10	75
	Fall 11	14	15	(52)	0	29	0	0	0	8	14	(48)	15	(52)	8	37
	Spring 12	25	11	(31)	0	36	0	0	0	2	25	(69)	11	(31)	2	38
	<b>Total</b>	39	26	(40)	0	65	0	0	0	10	39	(60)	26	(40)	10	75

Table 3. Unit 6 brown bear mean skull size and age, 2007–2011.

Unit	Year	Males				Females			
		Skull size	<i>n</i>	Age	<i>n</i>	Skull size	<i>n</i>	Age	<i>n</i>
6A	2007–2008	25	15	9	15	21	19	7	19
	2008–2009	24	10	7	9	22	5	7	5
	2009–2010	24	18	7	17	22	8	6	8
	2010–2011	24	11	8	9	22	10	9	10
	2011–2012	25	11	11	6	21	5	8	4
6B	2007–2008	23	4	8	4	20	7	6	7
	2008–2009	26	10	11	10	20	5	6	5
	2009–2010	26	4	7	4	21	5	6	4
	2010–2011	26	4	11	4	21	6	7	6
	2011–2012	24	3	11	2	21	5	8	4
6C	2007–2008	25	2	11	2	21	4	4	4
	2008–2009	23	5	10	4	22	6	4	5
	2009–2010	25	7	10	7	21	3	4	6
	2010–2011	22	3	6	3	22	5	4	4
	2011–2012	27	3	11	3	18	3	2	2
6D	2007–2008	24	12	8	14	21	4	4	4
	2008–2009	24	19	5	19	21	6	8	6
	2009–2010	25	20	10	18	21	8	7	7
	2010–2011	25	17	11	17	21	8	9	5
	2011–2012	25	21	10	19	21	10	8	7
Unit 6 Average	2007–2008	25	33	8	36	21	33	6	34
	2008–2009	24	44	7	42	21	22	7	21
	2009–2010	24	49	9	46	21	24	6	22
	2010–2011	25	35	10	60	22	29	8	25
	2011–2012	25	38	10	50	21	23	7	17

Table 4. Unit 6 brown bear successful hunter residency, 2007–2011.

Unit	Regulatory year	Local <sup>a</sup> resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Residency unknown	(%)	Total Successful hunters
6A	2007–2008	2	(6)	1	(3)	31	(91)	0	(0)	34
	2008–2009	2	(13)	0	(0)	13	(87)	0	(0)	15
	2009–2010	2	(8)	4	(15)	20	(77)	0	(0)	26
	2010–2011	0	(0)	1	(5)	20	(95)	0	(0)	21
	2011–2012	0	(0)	0	(0)	17	(100)	0	(0)	17
6B	2007–2008	2	(6)	1	(3)	31	(91)	0	(0)	34
	2008–2009	8	(53)	1	(7)	6	(40)	0	(0)	15
	2009–2010	3	(38)	2	(25)	3	(38)	0	(0)	8
	2010–2011	3	(30)	1	(10)	6	(60)	0	(0)	10
	2011–2012	0	(0)	2	(25)	6	(75)	0	(0)	8
6C	2007–2008	2	(29)	3	(43)	2	(29)	0	(0)	7
	2008–2009	1	(10)	6	(60)	3	(30)	0	(0)	10
	2009–2010	4	(36)	3	(27)	4	(36)	0	(0)	11
	2010–2011	4	(44)	3	(33)	2	(22)	0	(0)	9
	2011–2012	5	(83)	1	(17)	0	(0)	0	(0)	6
6D	2007–2008	1	(6)	8	(44)	9	(50)	0	(0)	18
	2008–2009	2	(8)	12	(48)	11	(44)	0	(0)	25
	2009–2010	2	(8)	7	(29)	15	(63)	0	(0)	24
	2010–2011	0	(0)	4	(16)	21	(84)	0	(0)	25
	2011–2012	4	(13)	13	(41)	15	(47)	0	(0)	32
Unit 6	2007–2008	7	(8)	13	(14)	73	(78)	0	(0)	93
Total	2008–2009	13	(20)	19	(29)	33	(51)	0	(0)	65
	2009–2010	11	(16)	16	(23)	42	(61)	0	(0)	69
	2010–2011	7	(11)	9	(14)	49	(75)	0	(0)	65
	2011–2012	9	(14)	16	(25)	38	(60)	0	(0)	63

Table 5. Unit 6 brown bear harvest chronology by percent, 2007–2011.

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	2007–2008	(32)	(35)	(12)	(9)	(0)	(0)	(0)	(0)	(3)	(9)	34
	2008–2009	(60)	(13)	(7)	(0)	(0)	(0)	(0)	(0)	(20)	(0)	15
	2009–2010	(23)	(23)	(12)	(0)	(0)	(0)	(0)	(4)	(15)	(23) <sup>a</sup>	26
	2010–2011	(38)	(43)	(5)	(0)	(0)	(0)	(0)	(0)	(10)	(5) <sup>a</sup>	21
	2011–2012	(53)	(12)	(12)	(0)	(0)	(0)	(0)	(6)	(18)	(0)	17
6B	2007–2008	(36)	(36)	(27)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	11
	2008–2009	(40)	(0)	(7)	(0)	(0)	(0)	(7)	(13)	(27)	(7)	15
	2009–2010	(22)	(11)	(22)	(0)	(0)	(0)	(0)	(11)	(22)	(11)	9
	2010–2011	(30)	(10)	(0)	(10)	(0)	(0)	(0)	(0)	(0)	(50)	10
	2011–2012	(25)	(13)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(63)	8
6C	2007–2008	(13)	(13)	(25)	(0)	(0)	(0)	(0)	(0)	(13)	(38)	8
	2008–2009	(30)	(10)	(20)	(20)	(0)	(0)	(0)	(0)	(0)	(20)	10
	2009–2010	(30)	(40)	(0)	(0)	(0)	(0)	(0)	(10)	(0)	(20) <sup>a</sup>	10
	2010–2011	(44)	(11)	(11)	(0)	(0)	(0)	(0)	(0)	(0)	(33) <sup>a</sup>	9
	2011–2012	(0)	(50)	(0)	(0)	(17)	(0)	(0)	(17)	(0)	(17)	6
6D	2007–2008	(0)	(0)	(0)	(24)	(6)	(0)	(0)	(6)	(29)	(35)	17
	2008–2009	(0)	(0)	(8)	(36)	(0)	(0)	(0)	(0)	(16)	(40)	25
	2009–2010	(0)	(0)	(4)	(4)	(0)	(0)	(4)	(4)	(29)	(54)	24
	2010–2011	(0)	(0)	(0)	(12)	(0)	(4)	(0)	(4)	(24)	(56)	25
	2011–2012	(0)	(0)	(3)	(13)	(6)	(3)	(0)	(3)	(31)	(41)	32
Unit 6	2007–2008	(23)	(24)	(13)	(10)	(1)	(0)	(0)	(1)	(10)	(17)	70
Total	2008–2009	(28)	(5)	(9)	(17)	(0)	(0)	(2)	(3)	(17)	(20)	65
	2009–2010	(16)	(16)	(9)	(1)	(0)	(0)	(1)	(6)	(19)	(31) <sup>a</sup>	69
	2010–2011	(23)	(17)	(3)	(6)	(0)	(2)	(0)	(2)	(12)	(34) <sup>a</sup>	65
	2011–2012	(17)	(10)	(5)	(6)	(5)	(2)	(0)	(5)	(21)	(30)	63

<sup>a</sup> One bear was legally killed in early June under the newly extended season.

Table 6. Unit 6 brown bear harvest percent by transport method, 2007–2011.

Unit	Regulatory year	Percent of harvest								<i>n</i>
		Airplane	Boat	Airboat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
6A	2007–2008	68	26	0	6	0	0	0	0	34
	2008–2009	67	13	0	20	0	0	0	0	15
	2009–2010	73	19	0	8	0	0	0	0	26
	2010–2011	52	5	0	33	0	10	0	0	21
	2011–2012	71	0	0	29	0	0	0	0	17
6B	2007–2008	36	0	0	0	0	0	55	9	11
	2008–2009	40	7	0	0	20	0	27	7	15
	2009–2010	25	25	0	0	25	0	13	13	8
	2010–2011	63	13	13	13	0	0	0	0	8
	2011–2012	88	13	0	0	0	0	0	0	8
6C	2007–2008	14	57	0	14	0	0	14	0	7
	2008–2009	10	40	0	0	0	0	30	20	10
	2009–2010	9	27	0	9	9	0	36	9	11
	2010–2011	13	25	0	13	0	0	50	0	8
	2011–2012	17	17	0	0	17	0	50	0	6
6D	2007–2008	39	61	0	0	0	0	0	0	18
	2008–2009	40	60	0	0	0	0	0	0	25
	2009–2010	21	79	0	0	0	0	0	0	24
	2010–2011	28	72	0	0	0	0	0	0	25
	2011–2012	16	81	0	0	0	0	3	0	32
Total	2007–2008	50	34	0	4	0	0	10	1	70
	2008–2009	42	34	0	5	5	0	11	5	65
	2009–2010	39	42	0	4	4	0	7	3	69
	2010–2011	38	35	0	14	0	3	10	0	63
	2011–2012	38	43	0	8	2	0	6	3	65

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
907-465-4190 PO BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010

To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNITS:** 7 (3,520 mi<sup>2</sup>) and 15 (4,876 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Kenai Peninsula

**BACKGROUND**

Brown bears are found throughout the remote lowland forests and intermountain valleys of the Kenai Peninsula, with the possible exception of some coastal portions of Unit 7 and the eastern side of Kachemak Bay. Historical brown bear range remains occupied. 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 land. The U.S. Forest Service (USFS; Chugach National Forest, 2,000 mi<sup>2</sup>) and the National Park Service (NPS; Kenai Fjords National Park, 885 mi<sup>2</sup>) are the principal landowners in Unit 7. In Unit 15 the U.S. Fish and Wildlife Service (USFWS; Kenai National Wildlife Refuge) is the primary landowner responsible for management of 3,062 mi<sup>2</sup>. Ownership of the remaining 29% of the Kenai is split among municipal, state, Native Corporation, and private lands.

Brown bears were first given game status in 1902 (Miller 1990) with liberal seasons and bag limits. For example, in 1937–38 the season was 1 September–June 20, with a bag limit of 2 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 every 4 years. Brown bear regulations have gone through numerous changes since 1967. During 1968–1989, brown bear harvest was regulated through a general season with season dates 1 September–15 October and 10 May–25 May. The bag limit was 1 bear every 4 years. Beginning in regulatory year (RY) 1989 (a regulatory year runs 1 July through 30 June; e.g., RY89 = 1 July 1989–30 June 1990), the fall season was shortened 14 days and ran 15 September–15 October. The spring season remained 10 May–25 May, the hunt was administered through a general season, and the bag limit remained 1 bear every 4 regulatory years. The purpose of the later start for the fall season was to attempt to reduce incidental brown bear harvests by moose hunters. In 1994 the fall season was adjusted to 1 October–25 October, but the other parameters remained the same. This adjustment was made to further address harvest concerns. In 1997 the general season was eliminated and the hunt was managed under a registration permit with season dates 15 October–31 October and 10 May–25 May. Another significant change at this time was setting management objectives at having no more than 14 total human caused brown bear

mortalities (hunting and non-hunting), of which, no more than 6 could be females. This objective was to be calculated on a 3-year running average. During 1999, the spring portion of the registration hunt was eliminated, but everything else remained the same.

In 2003 the management objective was changed to no more than 20 human-caused brown bear mortalities (hunting and non-hunting), of which no more than 8 could be females older than 1 year (still calculated over a 3-year running average). In 2007, the registration season was eliminated and the Alaska Board of Game adopted a drawing permit hunt for brown bears with season dates 1 October–30 November and 1 April–15 June. The management objectives of no more than 20 total and no more than 8 females harvested were retained, but rather than using a 3-year running average, these numbers were based on a calendar year. This assured people who obtained a drawing permit that they would be able to hunt at least 1 of the 2 seasons (the regulatory year runs 1 July–30 June). In 2009 the fall season dates were liberalized to 15 September–30 November, while retaining the same spring season. Additionally, we adopted new management objectives of no more than 10 adult (at least 5 years old) female human-caused brown bear mortalities (hunting and non-hunting) during a calendar year.

In January 2012 the board adopted a new registration permit hunt for brown bears. Season dates will be 1 October–30 November during RY12 then change to 15 September–30 November during RY13. The management objective remained the same until fall 2012. Hunters who obtained drawing permits for the 2012 regulatory year (the application period was November–December 2011) can still hunt, but the drawing permit system will be totally replaced by the new registration permit system after those permits expire (15 June 2013). Since some of these and other actions occurred after this report period they will be addressed in further detail during reporting on the next period (1 July 2012–30 June 2014).

In 1984 representatives of the Alaska Department of Fish and Game (ADF&G), USFWS, and USFS 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 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, Jacobs et al. 1988). More recently the IBBST 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). The IBBST was not active during this reporting period.

A cumulative effects model was developed to identify brown bear habitat on the Kenai at risk from 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 and Del Frate 1999).

## MANAGEMENT DIRECTION

### MANAGEMENT OBJECTIVES

- Maintain a healthy brown bear population.
- Minimize negative brown bear/human interactions.
- Do not exceed 10 human-caused adult female brown bear mortalities annually (1 January–31 December). Note: this management objective was changed during fall 2012 and again in March 2013 and will be described in further detail during the next report period.

### METHODS

Cost-effective survey techniques to determine brown bear population size over large forested areas have not been developed and tested. Del Frate (1993) derived a population estimate for the Kenai by combining results from a habitat-based model and a density estimate using expert interpretation by comparing estimates of bear density to other parts of Alaska. Results from a 2010 census conducted by USFWS and USFS were released in 2013 and will be addressed in the next report period.

The *Kenai Peninsula Brown Bear Conservation Strategy* (Alaska Department of Fish and Game 2000) and *A Conservation Assessment of the Kenai Peninsula Brown Bear* (Interagency Brown Bear Study Team 2001) are used to provide guidelines for management activities. In addition to these documents, all reported brown bear mortalities are recorded and entered into the state bear-sealing database. Individuals who kill a bear in defense of life and property (DLP) are also required to complete a DLP report that is reviewed by area staff and a representative from the Alaska Bureau of Wildlife Enforcement.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

Miller (personal communication) suggested the density of brown bears on the Kenai was probably lower than the 27.1 bears per 1,000 km<sup>2</sup> (7.0 bears per 100 mi<sup>2</sup>) he reported for his middle Susitna Study Area (Miller 1987). Using available information, Del Frate estimated bear density on the Kenai to be 20 bears per 1,000 km<sup>2</sup> (5.2 bears per 100 mi<sup>2</sup>), and calculated the suitable habitat to be 13,848 km<sup>2</sup> (5,347 mi<sup>2</sup>). He derived a brown bear population estimate for Units 7 and 15 by multiplying the estimated suitable habitat by the estimated density. Del Frate (1993) generated the documented estimate for the Kenai brown bear population. The estimate was probably conservative when you consider brown bear densities in other coastal regions of the state, and likely does not accurately reflect current numbers. Over the last decade, we believe the population has increased.

#### *Distribution and Movements*

Brown bears inhabit most of the Kenai Peninsula with the possible exception of some coastal areas of Kenai Fjords National Park (KFNP) 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 eastern side of Kachemak Bay; one adult female was captured (she was with a boar at the time) in that area during spring 2008 and another collared bear was sighted there in October 2008.

## **MORTALITY**

### *Harvest*

Season and Bag Limit. The bag limit for Units 7 and 15 is 1 bear every 4 regulatory years with season dates of 15 September–30 November and 1 April–15 June. Hunting is administered through a drawing permit.

Board of Game Action and Emergency Orders. The Board of Game adopted a registration permit hunt for Kenai brown bears at its January 2012 meeting. The season will run concurrent with the drawing permit season during fall 2012. Drawing permit hunters can hunt during spring 2013, but after that, all brown bear hunting will be managed through registration permits. The registration season dates were 1 October – 30 November for RY12 and changed to 1 September – 31 May beginning with RY13. Also, nonresidents can obtain registration permits.

Hunter Harvest. During RY09, RY10, and RY11 we issued 30, 30, and 39 permits respectively and harvested 5 bears each year (Table 1). All harvests were by Alaska residents (Table 2). Eight of the total harvests (15) over this 3-year period occurred during the spring season (Table 3).

Transport Methods. The transportation methods varied across years and given the relatively small harvest there was no discernable pattern (Table 4).

## **NON-REGULATORY MANAGEMENT PROBLEMS/NEEDS**

In 1998, Kenai Peninsula brown bears were listed as a “Population of Special Concern” under Alaska’s endangered species program. The listing was based on the potential for decline in the future because of human encroachment into brown bear habitat. As of 15 August 2011 the Alaska Department of Fish and Game no longer maintains a Species of Special Concern list.

The *Kenai Peninsula Brown Bear Conservation Strategy* (Alaska Department of Fish and Game Division of Wildlife Conservation 2000) and *A Conservation Assessment of the Kenai Peninsula Brown Bear* (Interagency Brown Bear Study Team 2001) are documents frequently used as references for developing management strategies.

During calendar year 2011, there were 22 reported, non-hunting, human-caused brown bear mortalities, consisting of 12 males, 10 females, and 1 of unknown sex. Seven of these animals were subadults. Seventeen were killed in defense of life or property, 4 were illegal takes, and 1 was found dead, but determined to have died by human causes.

During calendar year 2012, there were 11 reported, non-hunting, human-caused brown bear mortalities, consisting of 5 males, and 6 females. Seven of these animals were subadults. Eight were killed in defense of life or property (this includes 2 yearlings killed by department staff

after the sow was killed by a member of the public), 2 were killed by an automobiles, and 1 was an illegal take at a black bear bait station.

Reducing the bear human interactions and associated human-caused mortalities for brown bears continues to be a high priority for area staff. Also, the department's priority is to design and fund studies to obtain data to assess the overall health of the Kenai Peninsula brown bear population.

## **CONCLUSIONS AND RECOMMENDATIONS**

The long-term health of brown bears on the Kenai Peninsula depends on maintaining quality bear habitat and minimizing the mortality of adult female bears. Logging and development pose potential threats. Roads into previously inaccessible areas (McLellan and Shackleton 1988) to support salvaging timber killed by spruce bark beetles may make some bears more vulnerable. Commercial, recreational, and residential developments will continue to reduce the quantity and quality of brown bear habitat, and increase the exposure of bears to human-generated attractants (garbage, livestock/pet feed, chicken pens, etc.), which put bears and people in close proximity and usually lead to negative bear-human interactions and DLPs. However, this threat is reduced on 71% of the land under federal management with restrictions in place limiting development and general use.

We need to continue to monitor hunting and incidental 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, private and borough garbage management issues, and other human generated attractants. Solving many of these management concerns will require innovative approaches. Non-hunting, human-caused, brown bear mortalities peaked in 2008 but appear to be stabilizing at a lower level in recent years. It is essential that we continue our effort to minimize non-hunting, human caused, brown bear mortalities.

The department continues to provide educational materials to the public in an effort to reduce negative bear-human interactions. In addition, department employees are working with local communities to improve waste management practices to make populated areas less attractive to brown bears. Local ordinances or regulations are needed. However, without a commitment by local and state enforcement agencies, new regulations stand little chance for success.

The Wildlife Conservation Community Program (WCCP) effort was initiated by ADF&G to reduce defense of life and property killings of brown bears. The basis of the program is to minimize bear attractants (mainly garbage) by promoting the use of bear resistant trash containers. During 2006 the City of Kenai was the first municipality to be recognized as a Wildlife Conservation Community. Nonprofit organizations (like Kenai Peninsula Chapter of Safari Club International) applied for federal grants, and the money has been used to reduce the cost of bear-resistant trash receptacles for residents living in target areas. We hope that reducing (or eliminating) access to readily available garbage will decrease bear activity in human populated areas and reduce DLP killings. We hope the program will make our neighborhoods safer, increase property values, and allow for more responsible management and use of our

wildlife resources. Larry Lewis (ADF&G wildlife technician) has been instrumental in promoting this concept. The WCCP is a community driven program and requires acceptance by the public and support by local law enforcement officials. This program is now active in the communities of Homer, Seward, Cooper Landing and Hope, and we have received positive feedback that the City of Soldotna will adopt this program in the near future.

During recent years, efforts have been directed towards liberalizing harvest opportunities for Kenai brown bears. Allowing additional harvests, while continuing efforts to minimize human generated brown bear attractants, should result in fewer negative human/bear interactions in the future. We will continue to monitor brown bear hunts and population status, and will make necessary adjustment to our management strategy.

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Table 1. Units 7 and 15 brown bear harvest, regulatory years 2007–2012.

Regulatory year	Hunting			Nonhunting <sup>a</sup>				All human caused mortality			
	Male	Female	Total	Male	Female	Unknown	Total	Male	Female	Unknown	Total
2007	1	0	1	11	16	0	27	12	16	0	28
2008 <sup>b</sup>	1	5	6	13	18	3	34	14	23	3	40
2009	5	0	5	5	18	2	25	10	18	2	30
2010	1	4	5	11	6	1	18	12	10	1	23
2011	2	3	5	9	15	0	24	11	18	0	29

<sup>a</sup> Includes defense of life or property, road-kill, illegal, and research related mortalities.

<sup>b</sup> Hunting includes one bear taken under a federal subsistence permit.

Table 2. Units 7 and 15 brown bear hunter residency, regulatory years 2007–2012.

Regulatory year	Successful						Unsuccessful					Total hunters
	Resident	Local <sup>a</sup> resident	Nonlocal resident	Non-resident	Total	Percent success	Resident	Local <sup>a</sup> resident	Nonlocal resident	Non-resident	Total	
2007	1	0	1	0	1	7	14	5	9	0	14	15
2008	6	6	0	0	6	29	15	11	4	0	15	21
2009	5	5	0	0	5	23	17	11	6	0	17	22
2010	5	3	2	0	5	28	12	4	8	1	13	18
2011	5	4	1	0	5	22	18	-	-	0	18	23

<sup>a</sup> Local resident resides in Units 7 or 15.

Table 3. Units 7 and 15 brown bear seasonal hunter-harvest chronology, 2007–2012.

Regulatory year	Fall	Spring	Total Harvest
2007	0	1	1
2008	1	5	6
2009	2	3	5
2010	3	2	5
2011	2	3	5

Table 4. Units 7 and 15 successful brown bear hunter harvest transportation methods 2007–2012.

Regulatory year	Airplane	Horse	Boat	3/4 wheel-ATV-ORV	Highway vehicle	Snow-machine	Other-Unknown	Foot	Harvest
2007	0	0	0	0	1	0	0	0	1
2008	0	0	0	3	3	0	0	0	6
2009	0	0	1	1	2	1	0	0	5
2010	0	0	1	0	4	0	0	0	5
2011	0	0	0	2	1	0	1	1	5

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 P.O. BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010

To: 30 June 2012

**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 it is not possible to confirm how long bears have been on the archipelago. Genetic analyses, however, indicate that Kodiak brown bears (*Ursus arctos middendorffi*) have been isolated from other bear populations since the last ice age (about 12,000 years ago) (Talbot et al. 2006) and during that time developed into a unique subspecies. Early human occupants of the archipelago looked to the sea for their sustenance, but they occasionally hunted bears, using meat for food, hides for clothing and bedding, and teeth for adornment. Traditional stories often revolved around the similarity between bears and humans, and the mystical nature of bears because of their proximity to the spirit world.

Russian entrepreneurs came to Kodiak in the late 1700s to capitalize on abundant fur resources. Bear hides were considered a "minor fur" and sold for about the same price as river otter pelts. The number of bears harvested increased substantially when sea otter populations declined. After the United States acquired Alaska in 1867, bear harvests on Kodiak peaked at as many as 250 bears per year. Commercial fishing activities intensified in the late 1880s, and canneries proliferated throughout the archipelago. Bears were viewed as competitors for salmon and routinely were shot when seen on streams or coasts. At the same time, sportsmen and scientists 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 new regulations seemed to help restore bear populations on the Kodiak Islands. By the late 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 (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, sockeye salmon (*Oncorhynchus nerka*) escapement in 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%) was fish that had already spawned, and 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 Kodiak NWR. The board 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 were 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 even authorized the use of dogs to hunt brown bears on northeast Kodiak.

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 an emergency regulation in 1967 and the closure was extended through 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 1 bear every 4 years, and for most of the archipelago the winter hunting season was eliminated.

In late 1970, the state curtailed bear-control programs. Ranchers suffering losses could continue to take bears in defense of life or property (DLP), but could not shoot bears from airplanes or snare them. Sport hunting was to be the primary means of reducing bear numbers, and hunting regulations were liberalized near ranches.

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

Native corporations. Federal management of national forest lands on Afognak was threatened, and Kodiak NWR lost control of 310,000 acres of prime bear habitat (>17% of refuge lands).

In 1975 the state created 19 exclusive guiding areas on the archipelago. They 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.

Also in 1975 the U.S. Forest Service (USFS) began building a logging road between Kazakof (Danger) Bay and Discoverer Bay on Afognak Island, and timber harvesting began in 1977. Under ANCSA's provisions, Native corporations took over management of their recently acquired lands in 1978. Passage of the Alaska National Interest Lands Conservation Act in 1980 added the northwest portion of Afognak Island to the refuge, but it also curtailed Forest Service 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 in north-central Kodiak. 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 project was the first significant impact to inland bear habitat on Kodiak Island. To address the opposition encountered from the public and agencies, a mitigation settlement was negotiated in 1981 that included brown bear research, protection of state lands on the Shearwater Peninsula, and establishment of the Kodiak Brown Bear Research and Habitat Maintenance Trust. The hydroelectric project was completed in 1985.

Human alteration of bear habitat on Kodiak and Afognak islands spurred renewed interest in and funding for bear research, resulting in a surge of baseline and applied bear research on Kodiak through the 1980s and 1990s. Extensive use of radio telemetry on bears revealed denning, feeding, movement, mortality rates, and reproductive history patterns (Barnes 1990; Barnes and Smith 1995; Barnes and Van Daele 2006; Smith and Van Daele 1988, 1990; Van Daele et al. 1990; Van Daele 2007). A density estimation technique developed by Miller et al. (1987) was applied in 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.

Kodiak 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 bears were killed. To mitigate the adverse impacts of the spill, Exxon reached a settlement with state and federal governments. Paradoxically, 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 twentieth century, more than 80% of the lands transferred to Native corporations 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 Kodiak Brown Bear Research and Habitat Maintenance 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 changes in how permits were issued to nonresidents, only minor changes in bear hunting regulations have occurred since 1976. Hunting on Afognak and part of northeastern Kodiak Island was changed from an unlimited permit hunt to a limited permit hunt in regulatory year (RY) 1987 (a regulatory year runs 1 July through 30 June; e.g., RY87 = 1 July 1987–30 June 1988). State hunting regulations allowed for a subsistence bear hunt in RY86, with hunters required to salvage all bear meat for human consumption. The state subsistence bear hunt was rescinded the next year, and in spring 1997 the Federal Subsistence Board 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 experienced an expansion of bear viewing and photography. To address this public demand, Kodiak NWR administered a bear-viewing program in 1990. The program was canceled 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 human activities were predictable and restricted to specific areas.

In 2001 a Citizens Advisory Committee was established to work closely with the Alaska Department of Fish and Game (ADF&G), with the cooperation of Kodiak NWR, to develop a management plan addressing the wide variety of issues that affect bears, including hunting, habitat, and viewing. The resulting Kodiak Archipelago Bear Conservation and Management Plan (ADF&G 2002) was crafted over a several month period by a group of representatives from 12 diverse user groups. After hearing from a variety of experts from agencies and receiving extensive public input, the group developed more than 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 (Van Daele 2003).

One of the most evident products of the bear management plan was the creation and operation of the Kodiak Unified Bear Subcommittee (KUBS), a standing subcommittee of the Kodiak Fish and Game Advisory Committee. This group includes members from various stakeholder groups, as well as ADF&G and Kodiak NWR staff. It meets regularly to share information and address bear-related issues in the area. Since finalization of the plan, KUBS has worked with ADF&G and other agencies to implement plan recommendations, including development of public

outreach materials on bear safety and life history, review of bear research and hunting proposals, and improvement of village landfills.

## **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 gender 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 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” detailed in Barnes and Smith (1997). Data from these surveys were extrapolated to develop a unitwide bear density and population estimate. We cooperate with Kodiak NWR staff to conduct aerial brown bear composition surveys along selected streams of southern Kodiak Island to monitor trends in cub production. We input harvest and population data into a population model to objectively estimate appropriate harvest strategies and guidelines (Van Daele 2007).

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

Recent estimates of the Unit 8 brown bear population are higher than subjective estimates made in the 1950s. The bear population has increased in northeast Kodiak Island since the early 1970s because of more restrictive seasons, increased tolerance of bears near human residences, 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 increasing in most areas.

#### *Population Size*

We worked closely with staff from Kodiak NWR to conduct 21 intensive aerial brown bear surveys from 1987 to 2012 (Table 1). These surveys were in 10 separate areas on Kodiak Island, and 7 areas have been surveyed more than once. Data from these surveys were extrapolated to estimate the total bear population on the archipelago in 1995 (Barnes et al. 1988, Barnes and Smith 1998) and 2005 (Van Daele and Barnes 2010). The estimated population in 2005 was 3,526 bears, 2,378 of which were independent (>3 years old). There were an estimated 430 bears on the islands north of Kodiak, 908 on northwest Kodiak, 101 bears on northeast Kodiak, 744 on

southeast Kodiak, 1,094 on southwest Kodiak, and 249 on the Aliulik Peninsula. The average density on Kodiak Island was 308 bears/1,000 km<sup>2</sup> (0.8 bears/mi<sup>2</sup>), and for the northern islands it was 189 bears/1,000 km<sup>2</sup> (0.5 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 less precise. Extrapolation of intensive aerial survey data from all of the survey units on Kodiak Island, coupled with model predictions, suggested a 16.7% increase in the archipelago-wide bear population from 1995 to 2005 (Van Daele 2009).

We successfully completed an intensive aerial survey of the brown bear population in the Terror Lake area 27–29 May 2011. Survey data indicate that the bear density in this area has remained the same since the last survey was conducted in 1997. We estimated the density of independent bears (not including cubs) in the Terror Lake area at 222/1,000 km<sup>2</sup> in 2011 (SE = 7.81). This estimate was not significantly different ( $P > 0.05$ ) than those derived from surveys conducted in 1987 (228/1,000 km<sup>2</sup>; SE = 25.29) and in 1997 (273/1,000 km<sup>2</sup>; SE = 31.70), and it suggests the population is healthy and productive. Although we modified the survey boundaries slightly to improve efficiency, the methods used and conditions encountered during this year's survey were comparable to those in previous years.

We also successfully completed an intensive aerial survey of the brown bear population on Sitkalidak Island 5–10 June 2012. This was the first objective population survey ever conducted in this area, and it was accomplished using data from 10 bears radiocollared 26–28 May 2012. We estimated there were a total of 84 (+25) bears (including dependent cubs), of which 68 (± 20) were independent bears on the 299 km<sup>2</sup> (116 mi<sup>2</sup>) island. The estimated density of independent bears (not including cubs) on Sitkalidak Island was 228/1,000 km<sup>2</sup> (SE = 23.50; 0.60 independent bears/mi<sup>2</sup>, 0.74 total bears /mi<sup>2</sup>).

Aerial surveys along salmon streams in southwestern Kodiak Island by Kodiak NWR staff indicate considerable interannual variation in composition of brown bears observed and an apparent recent decrease in the proportion of maternal females. Analysis of these data by 5-year periods helps dampen some of the variation and indicates that maternal females comprised 15.4% of the bears classified 1985–1989, 16.8% 1990–1994, 19.6% 1995–1999, and 18.2% 2000–2004. No surveys were conducted in 2006 and 2007, however data collected 2008–2012 indicated maternal females declined to 9.6% of bears observed. This decline may be correlated with berry and salmon abundance and timing but more in-depth investigations and analyses are required to determine these relationships.

#### *Distribution and Movements*

There have been several investigations of brown bear movements and population dynamics on Kodiak Island in the past 50 years. The Karluk Lake area was investigated from 1954 through 1962 (Troyer and Hensel 1969). There were 4 major bear research projects on Kodiak Island from 1982 through 2004, all of which included radio telemetry. Each of these studies addressed specific management questions. The Terror Lake hydroelectric project investigation was designed to address concerns that bears would be displaced or otherwise disturbed by construction and operation of a hydroelectric facility in a remote area of Kodiak Island (Smith and Van Daele 1990). The Zachar/Spiridon study investigated the relationship between bears and deer hunters at a time when there were increasing encounters that were resulting in hunters

losing their game and bears being shot in defense of life or property (Barnes 1994). The southwest Kodiak study was designed to assess annual use patterns of salmon spawning areas by bears and explore the possibility of developing an objective method of determining population trends (Barnes 1990). The Aliulik Peninsula research was primarily descriptive in design, investigating the population dynamics of bears living in a unique habitat on the extreme south end of Kodiak (Barnes and Smith 1997). 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). In 2007 a meta-analysis of data collected during and subsequent to those projects was completed (Van Daele 2007, Van Daele and Barnes 2010, Van Daele et al. 2012). In 2008 we initiated an investigation of bear movements and resource use in the vicinity of Old Harbor and Sitkalidak Island, and near Karluk and Frazer Lakes by deploying GPS radiotelemetry collars on bears in those areas. A similar project was initiated on western Afognak Island in 2012.

## **MORTALITY**

### *Harvest*

Since statehood, the reported sport harvests of bears in Unit 8 have ranged from a low of 77 (RY68) to a high of 250 (RY08) per regulatory year (Table 3). In recent years regulations have been more consistent and designed to better distribute the hunting pressure. From RY80 to RY89 the average annual harvest was 165.4 bears (range = 124–202), from RY90 to RY99 the average was 160.0 bears (range = 149–177), and from RY00 to RY09 the average was 178.0 bears (range = 142–250). If we assume the bear population in the 1980s and 1990s was 2,980 bears (2,085 independent bears), the estimated sport harvest (Table 3) was 5.5% of the total bear population annually (8.0% of the independent bears). If the bear population in the 2000s increased to 3,526 bears (2,378 independent bears), then the estimated annual sport harvest during that period was 5.1% of the total bear population (7.5% of the independent bears).

Season and Bag Limit. The season for resident and nonresident hunters on northeast Kodiak, including all drainages into Chiniak, Antone Larsen, and northeast Ugak (east of the Saltery drainage) bays, and including Spruce, Near, Woody, Long, Ugak and adjacent islands, was 15 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 and bag limit were the same, with drawing permits available in 31 individual hunt areas. Drawing permits were allocated between resident (66%) and nonresident (34%) hunters, and all nonresident hunters were required to hunt with either a registered guide or a resident relative (second degree of kindred).

A federal season for subsistence hunters is open on Kodiak NWR lands 1 April–15 May, and 1–15 December each year. Under this regulation up to 10 federal permits are issued to residents of remote Kodiak Island villages to harvest up to 1 bear per regulatory year for human consumption.

### Board of Game Actions and Emergency Orders.

No changes in Unit 8 bear hunting regulations were made during the 2011 Board of Game meetings; however, the board agreed with department's recommendation to increase permits by 5 in the Aliulik Peninsula/Kaiuganak areas to restore them to pre-2007 levels. No emergency orders were issued during this reporting period.

Hunter Harvest. Hunters harvested 222 bears in RY10 and 200 bears in RY11, a rate similar to the previous 5-year mean of 209 bears (Table 3). There were 98 bears killed in fall 2010 and 87 killed in fall 2011. The mean annual fall harvest for the previous 5 years was 80.6 bears. During the spring of 2011, 124 bears were killed, and in the spring of 2012, 113 bears were killed. The mean annual harvest for the previous 5-year period was 128.4 bears. These totals do not include bears killed under federal subsistence regulations: 1 male bear in RY10 and 2 male bears in RY11.

Males predominated in the harvest, composing 68% of the sport harvest in RY10 and 70% in RY11, a rate below the previous 5-year average of 73.2%. Although the current management objective of 60% males was met both years, sport hunters harvested 71 females in RY10 and 60 females in RY11, higher than the annual mean of 56 females harvested during the preceding 5 years. Including all known deaths of females, 79 females were killed in RY10 and 66 females were killed in RY11, higher than the previous 5-year mean of 65.8 females.

Mean total skull sizes of male bears harvested was 25.4 inches (64.5 cm) in RY10, and 25.6 inches (65.0 cm) in RY11, greater than the mean skull size of 25.1 inches (63.8 cm) for the previous 5 years. Skull measurements from harvested females averaged 22.3 inches (56.6 cm) in RY10 and 22.1 inches (56.1 cm) in RY11. The average female skull size during the previous 5 years was 21.1 inches (56.1 cm; Table 4). The mean age of males harvested in RY10 was 8.7 years; and the mean age in RY11 was 9.4 years (tied for the oldest male mean age on record), considerably older than the average age of male bears harvested during the previous 5 years (7.8 years). Female ages averaged 9.7 years in RY10 (oldest mean age for females on record) and 9.2 years in RY11, also considerably greater than the average age of female bears harvested during the previous 5 years (7.4 years; Table 4).

Permit Hunts. Starting in RY07, the number of drawing hunt areas in Unit 8 for brown bears increased from 29 to 31, and the total number of permits obtainable annually increased from 472 to 501. Drawing permits available to Alaska residents each year increased from 319 (107 in fall, 212 in spring) to 331 (116 in fall, 215 in spring). Nonresident drawing permits increased from 153 (53 in fall, 100 in spring) to 170 (64 in fall, 106 in spring). Nonresidents hunting with resident relatives were allocated permits from the resident quota. Successful applicants had to come to Kodiak to pick up their permits prior to going afield, and in RY10, 327 (66%) successful applicants claimed their permits; in RY11, 324 (65%) permits were claimed (Table 5). Annual harvest in the drawing permit areas was 199 in RY10 and 173 in RY11. The average annual harvest during the previous 5 years was 188.0.

The northeastern portion of Kodiak Island was managed as a registration area for bear hunters (RB 230/260). The seasons mirrored those in the drawing hunt areas, but there were no limits on the number of permits available. In RY10 we issued 264 registration permits, and in RY11 we issued 250 (Table 6). During the previous 5 years, the mean number of registration permits issued was (256.6). The number of hunters afield in the registration hunt was 161 in RY10 and 158 in RY11, as compared to the mean of 172.8 for the previous 5 years. Annual harvest in the registration permit area was 23 in RY10 and 27 in RY11. The average annual registration hunt harvest during the previous 5 years was 21.0.

Hunter Residency and Success. Hunter success in the drawing permit hunts was 62% in RY10 and 53% in RY11 (Table 5). The mean for the previous 5 years was 57.0%. In the registration hunts, hunter success was 14% in RY10 and 17% in RY11, higher than the mean for the previous 5 years (12.0%; Table 6).

Although 66% 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 RY10, residents harvested 106 bears and nonresidents took 116 (Table 7). In RY11, residents harvested 102 bears and nonresidents took 98 bears. The mean harvest for the previous 5 years was 97.6 for residents and 111.4 for nonresidents.

Harvest Chronology. The first third of the fall season (25 October–6 November) and the last third of the spring season (1–15 May) were typically the most productive times for bear hunters (Table 8). In RY10 87% of the harvest occurred during the first third of the fall season, and in RY11 79% 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 76.4%. In RY10 60% of the harvest occurred during the last third of the spring season and in RY11 61% of the harvest occurred in the last third. The mean annual percentage of the harvest in the last third of the spring season during the previous 5 years was 54.8%.

Transport Methods. Bear hunters in Unit 8 most commonly use aircraft and boats to get to their hunting areas. 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 while in the area, and hunters are inconsistent in the way they choose to report these overlapping modes of transportation.

#### *Other Mortality*

DLP kills, illegal kills, subsistence harvests, and other nonsport mortality resulted in the deaths of 38 bears in RY10 and 24 in RY11 (Table 3) that were recovered and sealed. This was higher than the mean annual nonsport mortality of 30.6 bears/year during the previous 5 years, but was biased by a higher than usual number of bears that died of unknown or natural causes.

Reported DLP kill data is most appropriately analyzed on a calendar year basis, rather than regulatory year (Table 10). During 2006 we saw a spike in the number of bears killed in villages as communities transitioned to bear resistant garbage practices, but numbers have generally been declining since then.

## **HABITAT**

### *Assessment*

Kodiak's inland habitat is contiguous and intact. Coastal areas have much greater human activity, but the activity is generally restricted to isolated areas and small numbers of people, and roads are few and far between. Salmon management for sustained yield is a high priority on the archipelago, and bear predation is factored into 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 35 years due to commercial logging. Although there have been no objective studies, we suspect 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 access to logging roads. Bear survival and productivity are also enhanced by land access fees that discourage many hunters from using native corporation lands.

There are approximately 3.2 million acres of brown bear habitat on Kodiak, Afognak, and adjacent islands in Unit 8. Over 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, more than 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 also were purchased on Afognak and Shuyak islands and transferred to state ownership. Current developments affecting brown bears include ongoing commercial timber harvest on Afognak Island, expanding rural settlement, commercial fishing, and recreational activities in remote areas, including hunting, sport fishing, and wildlife viewing.

#### **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

In 2002 we completed the *Kodiak Archipelago Bear Conservation and Management Plan* (ADF&G 2002). 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 that provided government support and perspective. ADF&G funded the project and provided logistical support with assistance from U.S. Fish and Wildlife Service (USFWS). The final plan included more than 270 recommendations (all by consensus), and we are continuing to incorporate several into our management program.

The KUBS group remained active during this reporting period, meeting bi-weekly throughout the winter and spring. The group developed a series of 30 second public service announcements for a local radio station, focusing on bear history, biology, and safety. The common theme of the messages was respect for the bears. KUBS also continued its annual 3-day seminar (1 credit) on responsible bear viewing at Kodiak College that has been conducted since March 2008. The course was typically filled to capacity (24 students) and was well received.

We continued to make progress in our work with area villages to reduce the availability of human food and garbage to bears. The dump renovation at Larsen Bay continues to be a success and is well maintained by local villagers. In 2008 Port Lions completed fencing of their landfill and included an electric fence that was retrofitted to an 8-foot chain-link fence in 2009. Port Lions also installed bear resistant dumpsters outside of the fence and lighted the area, and bear problems were greatly reduced during this reporting period. In 2010 the village of Old Harbor took an active role in cleaning up their dump, initiating a village "bear patrol" to warn residents and haze bears, and local students and teachers used data from our radiotelemetry study to monitor bear movements. The village was also awarded a federal grant for landfill improvements similar to those completed in Larsen Bay and Port Lions and the fence was completed in 2012.

We estimated that at least 20 individual bears were in the vicinity of Kodiak city and Bells Flats during this reporting period. Bears were readily visible every day throughout the summer along

the Buskin River and on the tidal flats in front of Bells Flats. We maintained close coordination with the U.S. Coast Guard military police, Kodiak Police Department, Alaska State Troopers, Alaska State Parks, Kodiak Island Borough, and Alaska Waste to assure effective and consistent responses to bears sighted near the city, and we issued regular media reports. In 2012 there were nightly reports of bears in neighborhoods and near dumpsters. Thanks to diligent efforts by Kodiak Police Department and the State Troopers, by the end of the year there was only minor property damage, no reported human injuries, 1 DLP, and no bears killed by enforcement agency staff.

The prevalence of illegal or unreported DLP kills is unknown; however, bears that have been shot but not reported are occasionally found. Cases in which deer hunters, hikers, sport fishers, commercial fishers, photographers, and remote area residents killed or wounded bears without reporting have been documented often enough to warrant continued effort to improve our estimates of unreported kills. In the past 15 years we have seen a dramatic improvement in the reporting of bears killed in and near villages, coupled with increased efforts to minimize bear/human conflicts in those areas.

In 2010 the Kodiak NWR selected the Koniag Native Corporation for an exclusive bear viewing concession on the O'Malley drainage. The O'Malley drainage has been closed to all human activity 25 June–30 September since 1995. A bear viewing program had been anticipated to commence in 2011; however, coincident with the concession award the number of bears using the O'Malley drainage dropped precipitously, so Koniag did not take any visitors to the area in 2011 or 2012. Koniag is also developing visitor facilities on Camp Island in Karluk Lake and anticipates providing additional bear viewing opportunities at Thumb River and along Karluk Lake within the next couple of years.

Two cubs-of-the-year were orphaned and captured in 2010 in separate instances along the Kodiak road system. Orsa Grönklitt Bearpark in Sweden had previously requested two cubs, so we authorized their transfer to that facility. Alaska Wildlife Conservation Center, near Portage, held the cubs while Grönklitt completed their exhibit and in June 2012 one of the cubs was transported over to its new home. Unfortunately, the other cub escaped a few months prior to transfer and was killed as a DLP within a mile of the conservation center before it could be recaptured. The new facility in Sweden includes a series of lakes and streams that are stocked with live trout as well as education exhibits on Alaska, Kodiak, brown bears and cultural significance of brown bears.

## **RESEARCH**

Our research projects during this reporting period were joint efforts by ADF&G, Kodiak NWR, University of Idaho, Washington State University and the Kodiak Brown Bear Research and Habitat Maintenance Trust. In June 2011 13 bears (12 females and 1 male) were captured in the Karluk basin as part of the Kodiak NWR's ongoing Southwest Kodiak Brown Bear Project. All of the females were fitted with GPS collars.

From 26 May through 2 June 2012, we used a Hughes 500D helicopter and rifle-fired darts to capture 18 brown bears (14 females and 4 males) on Sitkalidak and Afognak Islands. We deployed VHF transmitters on 9 adult female and 1 adult male bear on Sitkalidak and GPS/VHF collars on 5 adult females and 2 adult males on Afognak. The Sitkalidak project was funded in

part by a grant from Safari Club International and was designed to provide sightability information of an intensive aerial survey of the island, and a means of gathering long-term productivity and survival data. The Afognak study was the first phase of a baseline investigation of bear movements on the west side of that island.

We concluded a research project with Washington State University to investigate the nutritional ecology of bears across the archipelago by analyzing hair samples. A graduate student completed his thesis and the results were published in an article entitled “Salmon consumption by Kodiak brown bears with ecosystem management implications” (Van Daele et al. 2013).

Kodiak NWR was also working with a graduate student from University of Idaho to investigate resource selection by bears in the Karluk Lake basin. Several volunteers are assisting in this project by hiking around the basin to investigate areas that were used by collared bears. That project is expected to be completed in 2013.

## **CONCLUSIONS AND RECOMMENDATIONS**

Bear harvests were relatively consistent in the 1980s and 1990s with most variations attributable to weather and hunter participation; however, there has been an increasing trend in the harvest in the 2000s. In every regulatory year from RY96 to RY11, the percent males in the harvest exceeded 68%. The management objective of males composing at least 60% of the harvest has been achieved for the past 25 consecutive years and in 44 of 48 years since statehood.

It is well documented that survival rate of productive adult females is the most critical factor driving brown bear populations, and the model developed with Kodiak data came to the same conclusion, with female survival and productivity the most sensitive parameters driving population trend (Van Daele 2007). The Kodiak bear population has been increasing on many parts of the island, and the bear management plan (ADF&G 2002) recommended maintenance of the bear population within a “wildlife-acceptance capacity.” Rather than attempting to estimate biological carrying capacity, “acceptance capacity” was defined as a population that was no more than 10% larger than the estimated bear population level in 2001. The plan also recommended maintaining the tradition of bear hunting, consistent with a conservative management and regulatory regime that avoided overharvest of the resource (ADF&G 2002).

An increasing number and percentage of trophy males have been in the harvest during the past 30 years; however, model results suggested that the number of trophy-sized males in the harvest may be reaching a maximum and higher levels may not be sustainable. To stabilize the population, maintain the current annual harvest of trophy-sized males, and avoid overcrowding of hunters, the model suggested a slight increase in the harvest of adult females in some subunits. It also suggested harvest rates ranging 5.6–7.9% of the estimated independent bear population would be appropriate in various harvest subunits on Kodiak (Van Daele 2007).

Intensive aerial surveys and composition counts along streams in southern Kodiak Island have provided important tools for monitoring bear populations on Kodiak Island during the past 25 years. The Kodiak NWR has included these jointly conducted surveys in its annual management budget, and we plan to continue to cooperate with refuge biologists to find ways to improve consistency in the stream surveys each year. We will also work to train new personnel and periodically review the methods to refine data collection, analysis methods, and population

estimates. This will be especially important 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.

Harvest and population survey data suggest a healthy bear population in Unit 8 that can support existing harvest pressure and still remain stable while producing adequate numbers of trophy-sized bears. Actions taken by the Board of Game in 2011 to liberalize some bear hunting regulations were intended to accomplish the recommendation of maintaining a stable bear population across the archipelago without jeopardizing hunting quality.

Development of the *Kodiak Archipelago Bear Conservation and 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 that 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 their implementation.

The success of public participation in bear management on the Kodiak Islands has gained a worldwide reputation since 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, including a citizen-driven bear management planning effort, and there have been substantial improvements in the number of problems and injuries bears have caused. In August 2002 and 2008, we worked with the Northern Forum to host a delegation of Japanese and Russian bear biologists as they spent a week in Alaska, including Kodiak, gathering information they could use to improve their brown bear management and public education programs. In March 2004, Russian government representatives invited the Kodiak area wildlife biologist to give the keynote address to a conference in Yakutsk, Russia. In 2005, 2006, 2009, 2010, and 2012 a similar address was given at conferences in Canada, Russia, Sweden and Japan. In 2010, the Russian Republic of Sakha sent 3 representatives (2 wildlife biologists and a translator) to spend 3 weeks in the field with us to learn about our bear survey and capture techniques and our management program. Government representatives in these locales see better human-bear relations as the only way to protect the brown bear populations in their areas, and in their minds Kodiak was an excellent example of a place where bears and people have learned to coexist and where bear hunting is sustainable.

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Table 1. Estimated density and observation rates of independent bears<sup>a</sup> in intensive aerial survey areas, Unit 8, 1987–2012.

Survey Area	Year	Replicate surveys	Survey rate (min/km <sup>2</sup> )	Observed independent bears/hr	Observed independent bears/1000 km <sup>2</sup>	Sightability	Est. density ind. bears / 1000 km <sup>2</sup>	Standard error	Size of survey area (km <sup>2</sup> )
Aliulik Peninsula	1992–93	8	1.6	4.0	108	0.53	216	16.95	350
Aliulik Peninsula	2002	5	1.4	4.1	92	0.53	173	18.32	350
Aliulik Peninsula	2009	3	1.4	6.6	149	0.53	282	27.15	350
Karluk Lake	1994	4	2.1	5.4	180	0.45	400	25.76	267
Karluk Lake	2003	4	2.3	5.8	223	0.45	496	30.53	267
Kiliuda Bay	1996	4	2.5	2.4	101	0.37	270	24.52	159
Kiliuda Bay	2005	4	2.2	3.6	134	0.37	363	23.51	159
Olga Lakes	1992–93	5	1.2	1.8	33	0.41	80	-----	262
Shearwater Peninsula	1996	3	2.2	2.6	92	0.37	252	28.87	269
Shearwater Peninsula	2005	4	1.8	4.8	147	0.37	398	17.41	269
Sitkalidak Island	2012	3	1.8	3.2	94	0.41	228	23.50	274
Southwest Kodiak	1987	4	1.5	3.5	88	0.41	218	-----	632
Spiridon Lake	1995	4	1.9	1.2	38	0.33	118	24.26	287
Spiridon Lake	2000	4	1.8	1.5	44	0.33	134	23.28	287
Sturgeon River	1987	4	1.6	4.3	120	0.41	293	22.32	264
Sturgeon River	1992–93	4	1.8	2.6	77	0.41	190	18.20	264
Sturgeon River	1998	4	1.9	3.0	94	0.41	227	4.43	264
Sturgeon River	2007	4	1.5	3.9	95	0.41	231	24.72	264
Terror Lake	1987	3	1.5	3.1	75	0.33	234	29.75	355
Terror Lake	1997	4	1.7	3.4	92	0.33	276	31.70	355
Terror Lake	2011	4	1.4	3.1	73	0.33	222	7.81	400

<sup>a</sup> Does not include cubs still with mother

Table 2. Unit 8 aerial stream counts of brown bears<sup>a</sup>, 2003–2012.

Regulatory year	Complete surveys	Single bears		Maternal bears		Yearlings & older cubs		Cubs of the year		Bears per survey	Total
		Number	%	Number	%	Number	%	Number	%		
2003	5	107	45	43	18	75	32	11	5	47.2	236
2004	6	255	51	83	17	122	24	42	8	83.7	502
2005	6	174	60	39	13	46	16	30	10	48.2	289
2006 <sup>b</sup>	--	--	--	--	--	--	--	--	--	--	--
2007 <sup>b</sup>	--	--	--	--	--	--	--	--	--	--	--
2008	10	428	71	63	10	76	13	37	6	60.4	604
2009	15	573	69	91	11	88	11	77	9	55.2	829
2010	7	299	83	23	3	30	8	10	3	51.7	362
2011	13	482	58	119	14	134	16	95	11	64.8	830
2012	9	231	80	21	7	27	9	11	4	32.2	290

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

<sup>b</sup> No surveys conducted.

Table 3. Reported brown bear kill data for the Kodiak archipelago by regulatory year and season, regulatory years 1960 through 2011.

Regulatory year	Fall harvest				Spring harvest				Total sport harvest				Reported nonsport				Total reported bear kill <sup>a</sup>				
	M <sup>b</sup>	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
RY1960				0	72	25	0	97	72	74%	25	0	<b>97</b>	2	1	0	3	74	26	0	<b>100</b>
RY1961	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>
RY1962	17	16	0	33	50	37	4	91	67	56%	53	4	<b>124</b>	4	4	0	8	71	57	4	<b>132</b>
RY1963	21	9	0	30	69	45	1	115	90	63%	54	1	<b>145</b>	10	7	0	17	100	61	1	<b>162</b>
RY1964	23	6	0	29	67	67	3	137	90	55%	73	3	<b>166</b>	9	13	0	22	99	86	3	<b>188</b>
RY1965	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>
RY1966	40	22	1	63	45	31	1	77	85	62%	53	2	<b>140</b>	6	4	0	10	91	57	2	<b>150</b>
RY1967	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>
RY1968	16	12	0	28	32	16	1	49	48	63%	28	1	<b>77</b>	3	1	0	4	51	29	1	<b>81</b>
RY1969	11	9	1	21	36	21	6	63	47	61%	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>61%</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>
RY1970	28	12	1	41	47	17	2	66	75	72%	29	3	<b>107</b>	5	8	0	13	80	37	3	<b>120</b>
RY1971	27	21	2	50	62	31	0	93	89	63%	52	2	<b>143</b>	1	2	1	4	90	54	3	<b>147</b>
RY1972	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>
RY1973	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>
RY1974	29	23	0	52	48	25	3	76	77	62%	48	3	<b>128</b>	1	5	0	6	78	53	3	<b>134</b>
RY1975	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>
RY1976	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>
RY1977	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>
RY1978	22	13	0	35	49	39	1	89	71	58%	52	1	<b>124</b>	6	2	2	10	77	54	3	<b>134</b>
RY1979	18	18	0	36	77	34	1	112	95	65%	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 3. continued.

Regulatory year	Fall harvest				Spring harvest				Total sport harvest				Reported nonsport				Total reported bear kill <sup>a</sup>				
	M <sup>b</sup>	F <sup>c</sup>	UNK <sup>d</sup>	TOT <sup>e</sup>	M	F	UNK	Total	M	%M <sup>f</sup>	F	UNK	Total	M	F	UNK	Total	M	F	UNK	Total
RY1980	24	14	0	38	61	25	0	86	85	69%	39	0	<b>124</b>	3	6	3	12	88	45	3	<b>136</b>
RY1981	21	16	0	37	65	34	0	99	86	63%	50	0	<b>136</b>	4	3	3	10	90	53	3	<b>146</b>
RY1982	36	26	2	64	102	36	0	138	138	69%	62	2	<b>202</b>	6	8	2	16	144	70	4	<b>218</b>
RY1983	31	26	0	57	102	36	0	138	133	68%	62	0	<b>195</b>	5	7	0	12	138	69	0	<b>207</b>
RY1984	33	21	0	54	71	30	0	101	104	67%	51	0	<b>155</b>	9	13	0	22	113	64	0	<b>177</b>
RY1985	52	32	2	86	70	34	0	104	122	65%	66	2	<b>190</b>	6	13	5	24	128	79	7	<b>214</b>
RY1986	26	39	0	65	71	30	0	101	96	58%	69	0	<b>165</b>	7	8	2	17	103	77	2	<b>182</b>
RY1987	25	25	0	50	80	40	1	121	104	62%	65	1	<b>170</b>	7	5	4	16	111	70	5	<b>186</b>
RY1988	30	23	1	54	73	39	0	112	103	62%	62	1	<b>166</b>	2	15	5	22	105	77	6	<b>188</b>
RY1989	25	20	0	45	74	32	0	106	99	66%	52	0	<b>151</b>	2	11	1	14	101	63	1	<b>165</b>
<i>10-year mean</i>	<i>30.3</i>	<i>24.2</i>	<i>0.5</i>	<i>55.0</i>	<i>76.9</i>	<i>33.6</i>	<i>0.1</i>	<i>110.6</i>	<i>107.0</i>	<i>65%</i>	<i>57.8</i>	<i>0.6</i>	<i>165.4</i>	<i>5.1</i>	<i>8.9</i>	<i>2.5</i>	<i>16.5</i>	<i>112.1</i>	<i>66.7</i>	<i>3.1</i>	<i>181.9</i>
RY1990	30	21	0	51	69	29	0	98	99	66%	50	0	<b>149</b>	6	7	3	16	105	57	3	<b>165</b>
RY1991	25	16	1	42	72	40	2	114	97	63%	56	3	<b>156</b>	6	6	4	16	103	62	7	<b>172</b>
RY1992	39	23	1	63	74	39	1	114	113	65%	62	2	<b>177</b>	5	7	6	18	118	69	8	<b>195</b>
RY1993	35	19	0	54	78	30	1	109	113	70%	49	1	<b>163</b>	2	6	8	16	115	55	9	<b>179</b>
RY1994	42	15	0	57	65	33	0	98	107	69%	48	0	<b>155</b>	10	14	3	27	117	62	3	<b>182</b>
RY1995	29	20	0	49	67	36	0	103	96	63%	56	0	<b>152</b>	2	2	1	5	98	58	1	<b>157</b>
RY1996	33	15	0	48	92	22	0	114	125	77%	37	0	<b>162</b>	5	7	8	20	130	44	8	<b>182</b>
RY1997	36	17	0	53	85	28	1	114	121	73%	45	1	<b>167</b>	7	3	6	16	128	48	7	<b>183</b>
RY1998	39	15	0	54	74	21	0	95	113	76%	36	0	<b>149</b>	7	13	5	25	120	49	5	<b>174</b>
RY1999	44	16	0	60	83	27	0	110	127	75%	43	0	<b>170</b>	12	7	4	23	139	50	4	<b>193</b>
<i>10-year mean</i>	<i>35.2</i>	<i>17.7</i>	<i>0.2</i>	<i>53.1</i>	<i>75.9</i>	<i>30.5</i>	<i>0.5</i>	<i>106.9</i>	<i>111.1</i>	<i>70%</i>	<i>48.2</i>	<i>0.7</i>	<i>160.0</i>	<i>6.2</i>	<i>7.2</i>	<i>4.8</i>	<i>18.2</i>	<i>117.3</i>	<i>55.4</i>	<i>5.5</i>	<i>178.2</i>

Table 3. continued.

Regulatory Year	Fall harvest				Spring harvest				Total sport harvest					Reported nonsport				Total reported bear kill <sup>a</sup>			
	M <sup>b</sup>	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
RY2000	34	15	0	49	87	34	0	121	121	71%	49	0	<b>170</b>	5	2	5	12	126	51	5	<b>182</b>
RY2001	47	13	0	60	99	25	0	124	146	79%	38	0	<b>184</b>	3	5	10	18	149	43	10	<b>202</b>
RY2002	33	16	0	49	70	23	0	93	103	73%	39	0	<b>142</b>	5	4	11	20	108	43	11	<b>162</b>
RY2003	39	15	0	54	85	26	0	111	124	75%	41	0	<b>165</b>	9	5	13	27	133	46	13	<b>192</b>
RY2004	44	13	0	57	94	18	0	112	138	82%	31	0	<b>169</b>	7	8	15	30	145	39	15	<b>199</b>
RY2005	40	22	0	62	118	28	0	146	158	76%	50	0	<b>208</b>	11	7	5	23	169	57	5	<b>231</b>
RY2006	49	23	0	72	103	27	0	130	152	75%	50	0	<b>202</b>	14	14	10	38	166	64	10	<b>240</b>
RY2007	53	23	0	76	79	29	0	108	132	73%	50	0	<b>184</b>	5	7	13	25	131	57	13	<b>201</b>
RY2008	72	37	0	109	100	41	0	141	172	69%	78	0	<b>250</b>	10	13	13	36	182	91	13	<b>286</b>
RY2009	63	21	0	84	86	31	0	117	149	74%	52	0	<b>201</b>	9	8	14	31	158	60	14	<b>232</b>
<i>10-year mean</i>	<i>42.4</i>	<i>17.5</i>	<i>0.0</i>	<i>59.9</i>	<i>91.9</i>	<i>26.3</i>	<i>0.0</i>	<i>118.1</i>	<i>134.3</i>	<i>76%</i>	<i>43.5</i>	<i>0.0</i>	<i>178.0</i>	<i>7.4</i>	<i>6.5</i>	<i>10.3</i>	<i>24.1</i>	<i>140.9</i>	<i>50.0</i>	<i>10.3</i>	<i>201.1</i>
RY2010	55	43	0	98	96	28	0	124	151	68%	71	0	<b>222</b>	8	8	22	38	159	79	22	<b>260</b>
RY2011	55	31	1	87	84	29	0	113	139	70%	60	1	<b>200</b>	7	6	11	24	146	66	12	<b>224</b>

<sup>a</sup> Reported kill data derived from sealing records (1960–61 to 1989–90) and annual harvest reports (1990–91 to present).

<sup>b</sup> Males.

<sup>c</sup> Females.

<sup>d</sup> Unknown or unreported gender.

<sup>e</sup> Total.

<sup>f</sup> Percent males in harvest (males/total).

Table 4. Total skull size, age, and gender of brown bears killed by sport hunters in Unit 8, regulatory years 2002 through 2011.

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>
2002–03	25.8	100	9.4	103	22.0	37	7.3	39
2003–04	24.9	120	7.8	124	21.8	40	7.8	40
2004–05	25.2	134	7.6	137	21.7	29	6.3	31
2005–06	24.7	156	6.4	154	22.1	50	7	48
2006–07	25	146	7.4	146	22.2	49	7.1	49
2007–08	25.6	130	7.8	127	21.8	52	7.2	51
2008–09	25.4	172	8.6	171	22.2	77	7.1	78
2009–10	24.9	147	8.7	148	22.3	52	8.5	52
2010–11	25.4	147	8.7	146	22.3	69	9.7	70
2011–12	25.6	139	9.4	136	22.1	59	9.2	58

Table 5. Unit 8 brown bear harvest data for drawing permit hunts DB 101–163 and 201–293, regulatory years 2002 through 2011.

	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total <sup>a</sup> harvest
Fall	2002–03	113	112	4	44	32	68	15	32	0	47
Drawing	2003–04	121	120	6	41	33	72	13	28	0	46
Hunts	2004–05	113	112	3	48	39	76	12	24	0	51
(DB101-163)	2005–06	107	107	0	52	35	63	21	38	0	56
(DB201-293)	2006–07	110	110	0	55	40	67	20	33	0	60
	2007–08 <sup>b</sup>	139	137	0	49	44	68	21	32	0	65
	2008–09	129	127	0	66	56	67	28	33	0	84
	2009–10	138	137	1	49	51	76	16	24	0	67
	2010–11	128	128	0	50	40	61	26	34	0	66
	2011–12	133	133	0	35	32	73	12	27	0	44
Spring	2002–03	213	210	3	44	68	76	22	24	0	90
Drawing	2003–04	194	194	2	54	80	78	23	22	0	103
Hunts	2004–05	205	201	0	52	88	83	18	17	0	106
(DB131-193)	2005–06	214	214	1	66	113	81	26	19	0	139
(DB231-293)	2006–07	197	197	0	62	98	80	24	20	0	122
	2007–08 <sup>b</sup>	210	207	0	48	73	73	27	27	0	100
	2008–09	204	201	0	66	92	69	41	31	0	133
	2009–10	219	219	2	53	85	75	29	25	0	114
	2010–11	191	184	4	64	96	81	23	19	0	119
	2011–12	196	195	1	55	81	76	26	24	0	107

Table 5. continued.

	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total <sup>a</sup> harvest
Combined	2002–03	326	322	3	43	100	73	37	27	0	137
Fall & Spring	2003–04	315	314	4	49	113	76	36	24	0	149
Drawing	2004–05	318	313	3	51	127	81	30	19	0	157
Hunts	2005–06	321	321	1	61	148	76	47	24	0	195
(DB101-193)	2006–07	307	307	0	59	138	76	44	24	0	182
(DB201-293)	2007–08 <sup>b</sup>	349	344	0	48	117	71	48	29	0	165
	2008–09	333	328	0	66	148	68	69	32	0	217
	2009–10	357	356	2	51	136	75	45	25	0	181
	2010–11	327	318	3	62	139	70	60	30	0	199
	2011–12	324	324	0	53	121	70	52	30	0	173

<sup>a</sup> Harvest figures may differ from those in other tables because of differences in classification of illegal kills and unresolved discrepancies in hunter reports

<sup>b</sup> Starting in RY07, the northern islands of Afognak, Shuyak and Raspberry were split from 1 hunt area into 3 areas.

Table 6. Unit 8 brown bear harvest data for registration permit<sup>a</sup> hunt numbers RB 230 and RB 260, regulatory years 2002 through 2011.

	Regulatory year	Permits issued <sup>a</sup>	Permits returned	Hunters afield	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total harvest
Fall	2002–03	85	77	54	30	4	1	50	1	50	0	2
Registration	2003–04	118	118	81	31	10	5	63	3	38	0	8
Hunt	2004–05	144	143	96	33	6	5	83	1	17	0	6
(RB230)	2005–06	143	139	94	32	6	5	83	1	17	0	6
	2006–07	154	154	102	34	12	9	75	3	25	0	12
	2007–08	157	156	110	29	10	7	64	4	36	0	11
	2008–09	208	198	140	29	18	14	56	11	44	0	25
	2009–10	174	172	114	34	15	12	71	5	29	0	17
	2010–11	172	169	98	42	18	12	67	6	33	0	18
	2011–12	180	179	110	39	19	16	76	5	24	0	21
Spring	2002–03	75	67	46	31	7	2	67	1	33	0	3
Registration	2003–04	117	108	76	30	11	5	63	3	37	0	8
Hunt	2004–05	100	95	74	26	9	5	83	1	17	0	6
(RB260)	2005–06	122	122	85	30	8	6	86	1	14	0	7
	2006–07	99	97	66	32	12	4	50	4	50	0	8
	2007–08	75	71	51	28	16	6	75	2	25	0	8
	2008–09	89	84	61	27	13	8	100	0	0	0	8
	2009–10	62	61	41	33	7	1	33	2	67	0	3
	2010–11	92	91	63	31	8	1	20	4	80	0	5
	2011–12	70	69	48	30	13	4	67	2	33	0	6

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	2002–03	160	144	100	31	5	3	60	2	40	0	5
Fall & Spring	2003–04	235	226	157	31	10	10	63	6	37	0	16
Registration	2004–05	244	238	166	30	7	10	83	2	17	0	12
Hunts	2005–06	265	261	179	31	7	11	85	2	15	0	13
(RB230	2006–07	253	251	168	33	12	13	65	7	35	0	20
& RB260)	2007–08	232	227	161	29	12	13	68	6	32	0	19
	2008–09	297	282	201	29	16	22	67	11	33	0	33
	2009–10	236	233	155	33	13	13	65	7	35	0	20
	2010–11	264	260	161	38	14	13	57	10	43	0	23
	2011–12	250	248	158	36	17	20	74	7	26	0	27

<sup>a</sup> No limit on the number of permits issued.

Table 7. Residency of successful brown bear hunters<sup>a</sup> in Unit 8, regulatory years 2002 through 2011.

Regulatory year	Local residents <sup>b</sup>	(%)	Nonlocal residents	(%)	Nonresidents <sup>c</sup>	(%)	Total successful hunters
2002–03	6	4	51	36	85	60	142
2003–04	19	12	62	38	84	50	165
2004–05	17	10	52	31	100	59	169
2005–06	23	11	78	38	107	51	208
2006–07	16	8	81	40	105	52	202
2007–08	10	6	65	35	109	59	184
2008–09	34	14	85	34	131	52	250
2009–10	18	9	78	39	105	52	201
2010–11	24	11	82	37	116	52	222
2011–12	18	9	84	42	98	49	200

<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 nonresidents guided by next-of-kin: 2002–03=4; 2003–04=1; 2004–05=2; 2005–06=3; 2006–07=3; 2007–08=3; 2008–09=2; 2009–10=2; 2010–11=2; 2011–12=1.

Table 8. Chronology of the brown bear harvest by season and period in Unit 8, 2002-03 through 2011-12.

Regulatory year	Fall Season							Spring Season							Regulatory year total <sup>a</sup>
	25 Oct– 6 Nov		7 Nov– 18 Nov		19 Nov– 25 Nov		Fall total	1 Apr– 15 Apr		16 Apr– 30 Apr		1 May– 15 May		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>	
2002–03	39	80	6	12	4	8	49	2	2	40	43	51	55	93	142
2003–04	45	83	9	17	0	0	54	4	4	40	36	67	60	111	165
2004–05	40	70	12	21	5	9	57	7	6	46	41	59	53	112	169
2005–06	50	81	9	14	3	5	62	13	9	75	51	58	40	146	208
2006–07	53	74	16	22	3	4	72	4	3	44	34	82	63	130	202
2007–08	51	67	21	28	4	5	76	8	7	54	50	46	43	108	184
2008–09	92	84	15	14	2	2	109	4	3	42	30	95	67	141	250
2009–10	64	76	14	17	6	7	84	5	4	41	35	71	61	117	201
2010–11	85	87	13	13	0	0	98	5	4	45	36	74	60	124	222
2011–12	69	79	15	17	3	3	87	4	4	40	35	69	61	113	200

<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 percent by transport method, 2002-03 through 2011-12.

Regulatory Year	Percent of Harvest								<i>n</i>
	Airplane	Horse	Boat	3- or 4-wheeler	Snow machine	ORV	Highway vehicle	Unknown	
2002-03	73	0	23	2	0	0	1	1	142
2003-04	66	0	25	2	0	0	7	<1	165
2004-05	59	0	34	2	0	1	3	1	169
2005-06	55	1	36	3	0	1	2	2	208
2006-07	58	0	32	2	1	1	5	1	202
2007-08	51	0	38	2	0	0	7	2	184
2008-09	55	0	32	4	0	<1	8	<1	250
2009-10	67	0	21	4	0	<1	7	0	201
2010-11	72	0	17	<1	0	4	6	<1	222
2011-12	62	<1	25	0	0	3	9	1	200

Table 10. Unit 8 brown bears reported killed in defense of life or property (DLP), 2002–2011.

Calendar year	Gender of bear				Location		Cause <sup>a</sup>	
	Males	Females	Unknown	Total	Kodiak road system	Remote	Hunting Related	Other
2002	2	1	0	3	1	2	1	2
2003	1	1	0	2	1	1	2	0
2004	3	7	1	11	3	8	8	3
2005	2	5	0	7	0	7	4	3
2006	14	7	1	22	3	19	5	17
2007	4	7	1	12	5	7	8	4
2008	8	6	1	15	3	12	6	9
2009	5	8	0	13	4	9	2	11
2010	5	7	1	13	3	10	5	8
2011	1	4	0	5	0	5	2	3

<sup>a</sup> Data included in previous columns

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
907-465-4190 PO BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012

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

**GEOGRAPHIC DESCRIPTION:** Alaska Peninsula

**BACKGROUND**

The Alaska Peninsula supports high densities of large brown bears, and the Board of Game and the Alaska Department of Fish and Game (ADF&G, department) have placed a high priority on maintaining a quality hunting experience for brown bear hunters. Because of reasonably easy aircraft access and the high quality of bear trophies in the unit, an active guiding industry developed during the 1960s and harvest began to increase significantly.

High harvest rates and illegal hunting activities in the 1960s and early 1970s were suspected to have caused a unitwide decline in the brown bear population by the mid-1970s. Poor salmon escapements in most drainages during regulatory years (RY) 1972 and RY73 coincided with the high harvests and exacerbated the situation (a regulatory year runs from 1 July through 30 June; e.g., RY72 = 1 July 1972–30 June 1973). Harvest statistics and the high percentage of marked bears killed in the Black Lake area supported the conclusion that a harvest reduction was needed. Emergency hunting 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. Law enforcement presence was also increased to curtail illegal activities. At the spring 1975 Board of Game (BOG) 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.

The more conservative management system reduced harvests substantially from RY76 to RY81 and allowed the bear population to recover. As a result the BOG abandoned the harvest quota in 1984 but retained alternating seasons. The department and BOG established more flexible objectives to manage the increasing population of brown bears (Sellers and McNay 1984): 1) maintain maximum opportunity to hunt bears by avoiding a drawing permit system, 2) continue both spring and fall hunts, manage them to 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.

The Alaska Peninsula is a premier destination for brown bear viewing and hunting, attracting visitors from around the world. However public sentiment with regard to the bear population is diverse and management goals are frequently challenged. While some people advocate for more

protection of the bear population, others want to reduce the bear population to enhance ungulate populations and reduce bear-human conflicts.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVES**

- Maintain a high bear density with a sex and age structure that will sustain a harvest composed of 60% males, with 50 males 8 years or older taken during the combined fall and spring seasons.

## **METHODS**

Unit 9 brown bear management relies heavily on interpretation of harvest statistics (i.e., total harvest, sex ratio, age composition, skull size measurements, etc.) to monitor bear populations. Aerial surveys are also used periodically to obtain supplemental information about the brown bear population. Stream surveys are used to detect major changes in population composition of bears concentrated along salmon streams and assess the effects of harvest rates on the bear population. Erickson and Siniff (1963) identified limitations of these surveys, recommending procedures to standardize the technique. ADF&G incorporated these recommendations into stream surveys conducted near Black Lake and in the Katmai National Preserve, and the U.S. Fish and Wildlife Service (USFWS) conducted similar surveys in the Izembek and Unimak areas. Line-transect surveys (Quang and Becker, 1997) have also been used to estimate brown and black bear densities in Subunits 9A, 9B, 9C, and 9D.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

The brown bear population is probably stable and at high density throughout most of Unit 9. Density of bears frequently varies with seasonal distribution of food resources across their range. Under the current management strategy any variation in the brown bear population is expected to be caused by changes in density-dependent limitations to population growth. Human harvests and development are not exerting a strong influence on the brown bear population at this time.

#### *Population Size*

Brown bear densities vary within Unit 9; densities are lower in western Subunit 9B and the Bristol Bay coastal plain. The most recent density estimates from line transect surveys flown between 1999 and 2005 in Subunits 9A, northern 9B, 9C, and 9D suggest that the overall bear density in Unit 9 is approximately 1 bear/3.5 mi<sup>2</sup> (110 bears/1,000 km<sup>2</sup>) with an extrapolated population size of 6,000–6,800 bears occupying lands open to bear hunting. However, the estimate is biased low by a lack of current information for 9E and the southern portion of 9B (1991 densities were assumed). The McNeil River State Game Sanctuary and national parks within Unit 9 are thought to contain 2,000–2,500 additional brown bears.

#### *Population Composition*

Limited surveys were conducted during this reporting period. However, taken as a whole, the composition of bears observed during surveys in the Black Lake area 1990–2002 and Katmai National Preserve 2006–2011 (Tables 1 and 2) suggest a productive population exposed to low

to moderate harvest rates. Detailed analysis of these survey data is available in earlier management reports (Riley and Butler 2011).

## **MORTALITY**

### *Harvest*

Season and Bag Limit. During RY10 the general season and Cold Bay area hunts RB362 and 372, were closed. The Naknek registration hunts, RB361 and 371, and the subsistence hunt RB500, were open. The respective seasons for RB361 and 371 were 1 September–31 October and 1 May–30 June with a bag limit of 1 bear every 4 regulatory years by permit only. The season for RB500 in the Subunit 9B area was 1 September–31 May; in the Subunit 9E area the season was 1 November –31 December. The bag limit for this residents only hunt was 1 bear.

During RY11 the general season bear hunt was open. The fall hunt in Subunits 9A, C, D, and E was RB368, with a season of 1–21 October. The spring hunt (RB370) season in these subunits was 10–25 May. In subunit 9B, the fall hunt RB369 season was 20 September–21 October and the spring RB370 season was 10–25 May. The bag limit for each of these hunts was 1 bear every 4 regulatory years. The subsistence hunt, now called RB502, was open 1 September–31 May in the 9B area and 1 November –31 December in the 9E area. The bag limit was 1 bear.

The RB525 near-village hunt was first open in RY11 with no closed season and a bag limit of 1 bear every regulatory year, by permit only.

Board of Game Action and Emergency Orders. In RY11 the BOG converted Unit 9 general season hunts to registration permit hunts, established a new near-village resident registration hunt (RB525) within a specific distance of communities on the Alaska Peninsula, and eliminated the tag and tag fee requirements in these hunts.

Hunter Harvest. During RY10, with the general season and Cold Bay hunts closed, hunters took 9 brown bears; all 9 were harvested in the fall (33% male and 67% female, Table 3). During RY11 the general season hunt was open, and the reported harvest was 617 bears (73% male and 27% female, Table 3).

RB525, the new near-village registration also opened in RY11. There were 204 total permits issued for this hunt with 20 bears harvested in Unit 9, 65% males and 35% females. There was a discrepancy between bear sealing data and permit harvest information, probably because of delays in processing bear sealing certificates. Improved reporting by hunters was the most important reason that the BOG and department established registration hunts in Unit 9. During RY10 and RY11, 34 bears were killed by people who were not hunting. Because illegal and nonhunting kills, including defense of life or property (DLP) kills, are rarely reported, nonhunting mortality is estimated at more than 50 bears.

The mean annual hunter harvest of mature males (i.e.,  $\geq 8$  years old) RY75–RY81, a period of population recovery, was 51 (range = 41–58). This number increased to 121 bears (range = 71–135) RY83–RY91 and to 149 bears RY93–RY01 (range = 113–180). The average harvest of mature males dropped slightly to 139 bears (range = 65–165) RY03–RY11. The proportion of mature males in the harvest also increased from 14% RY75–81, to 20% RY83–91, and to 25% RY93–01; it dropped slightly to 22% RY03–11.

Permit Hunts. The near-village registration brown bear hunt, RB525, was implemented in RY11 to provide increased opportunity for local residents of communities in GMUs 9 and 10 to manage bears within 3–5 miles of their communities, without the requirement to cede the hide and skull to the state. It replaced the Naknek drainage hunts, RB361 and RB371, and the Cold Bay registration hunts, RB362 and RB372. There were 204 total permits issued in the first year of the hunt, RY11, with 20 bears harvested in Unit 9, 65% males and 35% females.

Subsistence hunts (RB500 in RY10 and RB502 in RY11) include both Subunit 9B and the Subunit 9E Chignik Brown Bear Management Area. These hunts provide opportunity for traditional subsistence hunting. The hunts overlap a federal subsistence permit hunt, which complicates issuing permits and collecting results. Since RY96, participation in and compliance with the state permit hunts have been minimal. During this reporting period in the 9B area there were 7 permits issued with 2 harvests reported. There were no permits issued in the 9E area.

Hunter Residency. During the RY10 season, nonresidents took 22% and residents harvested 78% (Table 4), whereas in RY11 nonresidents took 80% and residents harvested 20%. This harvest pattern reflects the Unit 9 odd-regulatory year state general hunt schedule.

Harvest Chronology. The predominant time period for bear harvest occurs during the first week of each hunting season. This pattern of harvest has been consistent through time despite regulatory changes that adjusted season opening dates.

Transportation Methods. During RY10 and RY11, 72.3% of the successful hunters in the general hunts used aircraft, and boats were 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. The total unreported kill is estimated 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. Another continuing issue involves perceived conflicts between bear viewing and hunting. This issue may become more important as the bear viewing industry grows.

### **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. Lacking the resources to employ a more rigorous method on a regular basis, stream surveys on the Alaska Peninsula should be continued. The Black Lake surveys indicated the composition of the brown bear population to be relatively stable. More than 6,000 bears are estimated to inhabit those portions of Unit 9 open to bear hunting, based on results of line transect surveys conducted 1999–2005. With the increase in harvest recorded since RY99 and an estimated unreported

illegal/DLP kill of more than 50 bears per year, the annual rate of human-caused mortality is currently estimated at 7%.

The Board of Game has been asked frequently to increase the brown bear harvest, especially in Subunits 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 (NAP). Caribou calf mortality studies on the NAP identified brown bears as one of the major predators of calves during their first 2 weeks of life; however, a more significant portion of the annual mortality of calves occurred when the calves were older and should have been less vulnerable to bear predation. Caribou calf mortality studies on the Southern Alaska Peninsula caribou herd in Subunit 9D found that brown bear predation played a minor role in the herd's overall calf survival. Thus, an indiscriminant reduction of the brown bear population would realize little reduction in caribou mortality. Throughout Unit 9, brown bear predation on moose calves is likely high. However, the brown bear population would have to be significantly reduced to achieve higher rates of moose calf survival. This level of reduction is not possible with simple liberalizations of seasons and bag limits, and the required actions would not be supported by much of the public. Similarly, targeting brown bears in any portion of Unit 9 for reduction to benefit caribou or moose populations is not practical due to the large number of bears that would need to be removed from this high density area.

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Table 1. Black Lake aerial stream counts of brown bears, GMU 9E, calendar years 1990 through 2002.

Calendar Year	Number of Surveys attempted	<u>Independent bears</u>		<u>Maternal bears</u>		<u>Offspring &gt; 1year old</u>		<u>Cubs of the year</u>		Total
		Number	%	Number	%	Number	%	Number	%	
1990	5	332	36	194	21	232	25	170	18	928
1991	4	357	49	128	17	143	20	106	14	734
1992	3	219	36	126	20	134	22	138	22	617
1994	4	296	36	167	21	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	26	175	16	1103
2000	4	350	35	205	21	223	23	203	21	981
2001	4	351	38	177	19	224	24	176	19	928
2002	4	356	32	234	21	317	29	193	18	1100

Table 2. Katmai National Preserve aerial stream counts of brown bears, GMU 9C, calendar years 2006 through 2007.

Calendar Year	Number of Surveys attempted	<u>Independent bears</u>		<u>Maternal bears</u>		<u>Offspring &gt; 1year old</u>		<u>Cubs of the year</u>		Total
		Number	%	Number	%	Number	%	Number	%	
2006	3	181	38	99	21	113	24	85	17	478
2007	3	352	42	162	19	253	30	72	9	839

Table 3 Unit 9 brown bear harvest, regulatory years 2007–2011.

Regulatory Year	Hunter kill						Non-hunting kill <sup>a</sup>			Total reported kill						
	M	(%)	F	(%)	Unk	Total	M	F	Unk.	M	(%)	F	(%)	Unk.	Total	
2007																
Fall 07	217	63	129	37	0	346	5	2	0	222	63	131	37	0	353	
Spring 08	218	83	46	17	0	264	2	3	0	220	82	49	18	0	269	
Total	435	71	175	29	0	610	7	5	0	442	71	180	29	0	622	
2008																
Fall 08	9	90	1	10	0	10	5	3	2	14	78	4	22	2	20	
Spring 09	3	100	0	0	0	3	2	0	1	5	100	0	0	1	6	
Total	12	92	1	8	0	13	7	3	3	19	83	4	17	3	26	
2009																
Fall 09	223	62	138	38	0	361	12	6	4	235	62	144	38	4	383	
Spring 10	190	82	42	18	1	233	0	1	0	190	82	43	18	1	234	
Total <sup>b</sup>	413	70	180	30	1	594	12	7	4	425	69	187	31	5	617	
2010																
Fall 10	3	33	6	67	0	9	6	6	1	9	43	12	57	1	22	
Spring 11	0	0	0	0	0	0	0	1	1	0	0	1	100	1	2	
Total <sup>b</sup>	3	33	6	67	0	9	6	7	2	9	41	13	59	2	24	
2011																
Fall 11	250	68	116	32	10	376	6	5	7	256	68	121	32	17	394	
Spring 12	192	80	47	19	2	241	1	0	0	193	80	47	20	2	242	
Total <sup>b</sup>	442	73	163	27	12	617	7	5	7	449	73	168	27	19	636	

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

<sup>b</sup>Total includes bears that could not be assigned to a season due to lack of reported information.

Table 4 Unit 9 brown bear successful hunter residency, regulatory years 2002–2011; excludes defense of life or property, research and agency harvests.

Regulatory year	Local <sup>a</sup>		Nonlocal		Nonresident	Nonresident (%)	Unknown	Successful hunters <sup>b</sup>
	resident	(%)	resident	(%)				
2002	7	53.8	3	23.1	3	23.1	2	15
2003	19	3.0	126	20.1	481	76.8	0	626
2004	5	31.3	1	6.3	10	62.5	0	16
2005	12	1.9	106	16.5	523	81.6	0	641
2006	3	25.0	1	8.3	8	66.7	0	12
2007	19	3.0	86	13.8	519	83.2	0	624
2008	4	30.8	4	30.8	5	38.5	0	13
2009	18	3.0	89	14.9	490	82.1	0	597
2010	6	66.7	1	11.1	2	22.2	0	9
2011	28	4.5	95	15.4	493	80.0	0	616

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

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

Table 5 Unit 9 brown bear harvest chronology percent by harvest period, regulatory years 2002–2011; includes defense of life or property, research and agency harvests.

Regulatory Year	Harvest periods								<i>n</i>
	July 1 - Aug 31	September 1- 30	October 1-7	October 8-31	November 1 - April 30	May 1-17	May 18-31	June 1-30	
2002	0	53	0	0	0	7	7	33	15
2003	0	7	26	17	0	30	20	0	622
2004	0	44	0	0	0	6	25	25	16
2005	0	5	30	14	0	32	19	0	640
2006	0	46	0	31	0	8	8	8	13
2007	1	7	29	18	0	24	21	0	634
2008	20	24	0	16	16	4	4	16	25
2009	1	7	34	19	0	18	20	0	610
2010	10	23	14	29	14	0	0	10	21
2011	1	8	33	19	0.5	14	24	0.5	624

Table 6 Unit 9 reported brown bear harvest percent by transport method, regulatory years 2002–2011; excludes defense of life or property, research and agency harvests.

Regulatory Year	Airplane	Horse or dog team	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway Vehicle	Foot	Unk.	<i>n</i>
2002	7	7	33	20	0	0	33	7	0	15
2003	80	1	16	2	0	0	1	1	0	623
2004	0	13	56	25	6	0	0	13	0	16
2005	83	0	12	2	0	0	1	0	0	640
2006	17	0	58	8	0	0	8	8	0	12
2007	83	0	11	2	0	0	1	2	0	624
2008	8	0	38	31	0	0	0	15	8	13
2009	68	0	14	5	0	0	2	5	7	620
2010	11	0	56	22	0	0	0	11	0	9
2011	75	0	16	3	0	0	1	4	0	605

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
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JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010

To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** 10 (1,536 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Unimak Island

**BACKGROUND**

Unimak Island is the only area in Unit 10 occupied by brown bears. About 93% of the island is congressionally designated wilderness. Brown bear hunting on Unimak Island has been administered by the Alaska Department of Fish and Game (ADF&G) since 1979; prior to this, 1949–1979, it was administered by the U.S. Fish and Wildlife Service. Fifteen drawing permits are issued each year, 7 for the spring hunt and 8 for the fall. In recent years the department has issued one additional permit annually using the commissioner's authority to issue governor's tags.

**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**

Interpretation of harvest data to reflect population status is not possible with the very low number of bears killed annually. In spring 2002 a line-transect-double-count technique was used to estimate the number, and sex and age composition, of bears on Unimak Island (Quang and Becker, 1997).

**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*

There have been no population estimation surveys since 2002. That year, a line transect survey estimated a population of 293 brown bears on Unimak Island (90% confidence interval = 218–384). This equates to a density estimate of 1 bear/3.8 mi<sup>2</sup>. During these surveys, 315 bears were classified to assess population composition. Of those bears observed, 21% were adult males and 42% were single bears. Average litter size was 1.9 cubs.

### **MORTALITY**

#### *Harvest*

Season and Bag Limit. The DB375 and DB376 seasons for both residents and nonresidents in RY10–11 were 1 October–31 December and 10–25 May. The bag limit was 1 brown bear every 4 regulatory years by drawing or special governor's permit only; 12–13 permits were issued annually. There was no closed season for the new RB525 near village hunt in RY11. The bag limit was 1 bear every regulatory year; there were 3 RB525 permits issued in Unit 10.

Board of Game Action and Emergency Orders. In RY11, the Board of Game established a new resident registration hunt, RB525, with a 1 bear per year bag limit within specific distances of villages in Units 9 and 10, and eliminated the tag and tag fee requirement in this hunt.

Hunter Harvest. During regulatory years (RY) 1982 (RY82 = 1 July 1982 through 30 June 1983) through RY91, annual harvests from Unimak Island averaged 5 bears (range = 1–8). Between RY92 and RY01, the average annual harvest was 10 bears (range = 5–13), and from RY02 to RY11 annual harvest averaged 10 bears (range = 7–13). This increase was due to greater hunt participation by permittees and an increased success rate. Special governor's permits were auctioned off in some years by Safari Club International, Foundation for North American Wild Sheep, and Boone and Crockett Club. Hunters harvested a total of 18 bears (83% male) during RY10 and RY11 (Table 1).

The near-village registration brown bear hunt, RB525, was implemented in RY11 to provide increased opportunity for local residents of communities in GMUs 9 and 10 to manage bears within 2.5 to 5 miles of their communities, without the requirement to cede the hide and skull to the state. There were 3 permits issued in Unit 10 in the first year of the hunt, RY11. Two male bears were harvested in the community of False Pass, one by a local resident and the other by a nonlocal resident.

Hunter Residency and Success. From RY01 through RY11 nonresidents held 45% of the permits and accounted for 52% of the brown bear harvest. Additionally during RY01 through RY11, 100% of permittees hunted, with a success rate of 76%.

Harvest Chronology. Most of the bears harvested on Unimak are taken in May and October. Since RY01, 61% of the spring harvest has occurred during the first week of hunting, and 50% of the fall harvest has occurred during the first week of hunting.

Transport Methods. Since RY95 the vast majority of successful hunters have 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, no changes are recommended in the permit hunt at this time.

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Peterson, C. 2013. Unit 10 brown bear management report. Pages 121–124 [*In*] P. Harper and Laura A. McCarthy, editors. Brown bear management report of survey and inventory activities 1 July 2010–30 June 2012, Alaska Department of Fish and Game, Species Management Report, ADF&G/DWC/SMR-2013-4, Juneau.

Table 1. Unit 10 brown bear harvest data by permit hunt, regulatory years 2007 through 2011.

Hunt Number	Regulatory year	Permits issued	Hunter reports <sup>c</sup>	Percent did not hunt <sup>d</sup>	Percent successful hunters	Harvest				
						Male	(%)	Female	(%)	Total
DB375 (Fall)	2007	8	8	0	100	5	(63)	3	(37)	8
	2008	8	8	25	83	5	(100)	0	(0)	5
	2009	8	8	13	71	4	(80)	1	(20)	5
	2010 <sup>a</sup>	5	5	0	60	3	(100)	0	(0)	3
	2011 <sup>ab</sup>	7	7	0	86	6	(100)	0	(0)	6
DB376 (Spring)	2007 <sup>b</sup>	8	8	25	83	5	(100)	0	(0)	5
	2008 <sup>b</sup>	8	7	17	100	5	(83)	1	(17)	6
	2009 <sup>b</sup>	8	8	0	75	6	(100)	0	(0)	6
	2010 <sup>ab</sup>	7	7	0	71	4	(80)	1	(20)	5
	2011 <sup>a</sup>	3	3	0	67	0	(0)	2	(100)	2
RB525	2011 <sup>a</sup>	3	3	0	67	2	(100)	0	(0)	2
Combined Hunts	2007 <sup>b</sup>	16	16	13	93	10	(77)	3	(23)	13
	2008 <sup>b</sup>	16	15	20	92	10	(91)	1	(9)	11
	2009 <sup>b</sup>	16	16	6	73	10	(91)	1	(9)	11
	2010 <sup>ab</sup>	12	12	0	67	7	(88)	1	(12)	8
	2011 <sup>ab</sup>	13	13	0	77	8	(80)	2	(20)	10

<sup>a</sup> Alaska Department of Fish and Game. 2013. Brown Bear Harvest Information. winfonet.alaska.gov (Accessed June 21, 2013).

<sup>b</sup> Includes one governor's permit.

<sup>c</sup> Includes hunters that sealed a bear, but did not turn in a permit report.

<sup>d</sup> Includes hunters that did not turn in a permit report and did not seal a bear.

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 PO BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010

To: 30 June 2012

**GAME MANAGEMENT UNIT:** 11 (12,785 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Wrangell Mountains

**BACKGROUND**

Unit 11 is a large remote unit east of the Copper River with limited access. While no formal population estimates have been conducted in Unit 11, brown bears are considered common. During the period from 1948 to 1953, federal poisoning programs directed at controlling wolves incidentally reduced bear numbers. Following cessation of poisoning, bear numbers increased, and by the mid-1970s bears again were considered abundant.

Brown bear harvests averaged 16 (range = 8–27) per year throughout the 1960s and 1970s, but declined substantially after regulatory year (RY) 1978 (RY78 = 1 July 1978 through 30 June 1979), when much of Unit 11 was included in the Wrangell–Saint Elias National Park and Preserve. For the next 20 years, hunting pressure was low and harvests averaged only 6 bears (range = 2–12) per year. In 1999, the Federal Subsistence Board established a federal subsistence brown bear hunting season, and the harvest began to increase. State hunting regulations were liberalized somewhat in 2003 to allow additional hunting opportunity. Although Unit 11 brown bear harvests are slowly increasing, they remain very low compared to adjacent areas with similar habitat.

**MANAGEMENT DIRECTION**

**MANAGEMENT OBJECTIVES**

Provide maximum opportunity to hunt brown bears in Unit 11.

**METHODS**

The harvest of brown bears in Unit 11 was monitored through mandatory sealing. Skulls of sealed bears were measured, sex was recorded, and a premolar tooth was extracted for aging. Information on date and location of harvest, days afield, and mode of transportation were collected from successful hunters.

**RESULTS AND DISCUSSION**

**POPULATION STATUS AND TREND**

No brown bear surveys or censuses have been conducted in Unit 11. Frequent observations of bears by ADF&G staff and the public suggest a relatively abundant and well-distributed population of brown bears in Unit 11. No population trends were evident over this reporting period.

*Distribution and Movements*

Based on incidental observations and harvest locations, brown bears inhabit most of Unit 11 except high-elevation glaciers. There have been no bear movement studies conducted in Unit 11, but we suspect the

movement patterns are similar to those in adjacent Unit 13. After den emergence, most bears except females with cubs of the year move into riparian areas to feed on newly emergent vegetation and overwintered berries. They also scavenge carcasses of ungulates that died during winter. Brown bears have been documented taking a large proportion of neonatal *Mentasta* caribou calves in the north Wrangell Mountains during the first several weeks of summer (Jenkins and Barten 2005). They likely prey on neonatal moose calves unitwide as well.

Throughout the summer, brown bears in Unit 11 feed in various habitats. In late summer, bears generally move into subalpine habitats to feed on ripening blueberries. Bears feed on salmon in many streams throughout Unit 11, but especially in the lower Chitina River Valley during late summer and fall.

## **MORTALITY**

### *Harvest*

Seasons and Bag Limits. The bear season in Unit 11 was 10 August–15 June. The bag limit was 1 bear every regulatory year; no resident tag fee required.

Board of Game Actions and Emergency Orders. No regulatory changes have been made since 2003.

Hunter Harvest. Eighteen brown bears were reported harvested during RY10 and 15 during RY11 (Table 1). Males composed 56% of the harvest in RY10 and 73% in RY11. In the past 5 years (RY 07–RY11) the harvest by hunters averaged 18 bears, similar to the 16-bear average of the previous 5-year period (RY02–RY06). During this 10-year period, an average of 17 brown bears were harvested each year, a considerable increase from the 5-bear average of the previous decade (RY92–RY01). While age data is not yet available for RY11, the mean age for males was 6.9 years in RY10. Mean ages of bears taken in Unit 11 are highly variable due to the small sample size. Since RY02, annual mean ages of harvested males have ranged from 6.1 to 12 years.

Hunter Residency and Success. Hunter residency is listed in Table 2. Prior to the establishment of Wrangell–Saint Elias National Park in 1979, nonresident hunters took an average of 11 bears per year (range = 2–18, RY61–RY78). Over the next two decades, very few nonresidents harvested brown bears each year (average = 2; range 0–5). The nonresident harvest slowly increased after RY03 and following the liberalization in regulations. Over the last 5 years (RY07–RY11), nonresidents have harvested an average of 10 bears annually. Take by residents was also relatively low following the creation of the National Park, averaging 5 bears per year (range = 0–8; RY79–RY02). Similar to nonresidents, the resident take has also slightly increased since regulations were changed. Between RY07 and RY11, residents harvested an average of 8 bears per year (range = 5–15). Successful bear hunters averaged 3.2 days to take a bear during RY11 and 3.8 days during RY10. Annual hunter effort is highly variable in Unit 11.

Harvest Chronology. Of the brown bears harvested in RY10, 78% were harvested during the fall (Table 3). During RY11, 74% of the harvest occurred during the fall. Since sealing was initiated in RY61, fall harvests have continued to dominate the brown bear take in Unit 11. Presumably, fall harvests are higher because more bears are taken by hunters on combination hunts for other big game. In the past 10 years (RY02–RY11) the spring harvest averaged 4 bears, up from the previous 10-year average (RY92–RY01) of 1 bear. The increased harvest may represent an increased interest in spring brown bear hunting by both residents and nonresidents.

Transport Methods. Aircraft has been the most effective method of transportation for successful brown bear hunters in Unit 11 (Table 4). Access by boat has been the second most effective method of transportation, with those hunters taking 22% of the bears harvested in RY10, and 13% in RY11. Use of ground transportation in Unit 11 is very restricted; the only access points are along the Nabesna and

McCarthy roads. In addition, some of the most popular trails have been closed to off road vehicles by the National Park Service (NPS) due to negative environmental impacts.

#### **OTHER MORTALITY**

No bears were reported taken in defense of life or property (DLP) during this reporting period. Although much of the unit is remote, most problem bears are killed near homesites and cabins along the Nabesna and McCarthy roads. More bears are likely killed each year than are reported because of the work involved with salvaging and preserving the hides and skulls of bears taken DLP and the remote nature of Unit 11 communities. By liberalizing hunting regulations, such as allowing residents to take bears without big game tags as well as the opportunity to take 1 bear per year versus 1 bear every 4 years, problem bears are more likely to be taken under general hunting regulations.

#### **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

There are few cabins or homesites in this remote unit away from the road system. Future settlement will be limited because much of the land is included in Wrangell–Saint Elias National Park or has been conveyed to the local Native corporation, Ahtna Inc. Minimal private inholdings and NPS facilities are the only sources of development, and are concentrated along the Nabesna and McCarthy roads. The number of people living in and visiting McCarthy has increased appreciably in recent years, and as a result, bear problems have become more frequent. This increase in human-bear conflicts could result in more DLP-killed bears. However, the NPS has acknowledged the increased potential for conflict and has developed a program to minimize incidents. Overall, Unit 11 is considered good brown bear habitat because of the variety of vegetation types, large tracts of undeveloped land, the presence of ungulates and numerous salmon streams throughout the unit.

### **CONCLUSIONS AND RECOMMENDATIONS**

The Unit 11 annual brown bear harvest averaged 17 bears over the last 2 years, down from 22 bears during the last reporting period. The harvest density continues to be very low in Unit 11, with only 1 bear per 1,000 km<sup>2</sup> of available habitat (area < 4,000 ft) taken during RY11, compared to 3 bears per 1,000 km<sup>2</sup> in Unit 13. This corresponds to a single bear taken in Unit 11 per 386 square miles of available habitat. Harvested bears continue to be mostly male (64% during this reporting period), and large old bears are commonly taken in this unit. Much of the unit remains un-hunted.

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, suggest the Copper River Basin has good productivity rates for interior brown bear populations. The coastal influence in southern Unit 11 also provides additional resources to bears in this area. Given the low yearly harvests and the large amount of habitat that serves as refugia due to NPS regulations, hunting likely has no influence on brown bear numbers, composition, or productivity trends in the unit.

Given the minimal impact current harvests have on this brown bear population, there is no reason not to offer hunters maximum opportunity to take bears in this unit. Unless land management and access changes dramatically in Unit 11, a management objective of providing the maximum opportunity to hunt brown bears reflects a realistic and biologically sound objective for this unit. The current population is considered healthy, and bears are common across the entire unit. No changes in bag limits or season dates are necessary this time.

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Table 1. Unit 11 brown bear harvest, regulatory years 2007 through 2011.

Regulatory Year	Hunter kill						Nonhunting kill <sup>a</sup>			Total Kill			
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.	M	F	Unk.	Total
2007													
Fall 07	10	(91)	1	(9)	0	11	1	0	0	11	1	0	12
Spring 08	3	(75)	1	(25)	0	4	0	0	0	3	1	0	4
Total	13	(87)	2	(13)	0	15	1	0	0	14	2	0	16
2008													
Fall 08	11	(79)	3	(21)	0	14	0	0	0	11	3	0	14
Spring 09	1	(33)	2	(67)	0	3	0	0	0	1	2	0	3
Total	12	(71)	5	(29)	0	17	0	0	0	12	5	0	17
2009													
Fall 09	16	(70)	7	(30)	0	23	0	0	0	16	7	0	23
Spring 10	3	(100)	0	(0)	0	3	0	0	0	3	0	0	3
Total	19	(73)	7	(27)	0	26	0	0	0	19	7	0	26
2010													
Fall 10	9	(64)	5	(36)	0	14	0	0	0	9	5	0	14
Spring 11	1	(25)	3	(75)	0	4	0	0	0	1	3	0	4
Total	10	(56)	8	(44)	0	18	0	0	0	10	8	0	18
2011													
Fall 11	9	(82)	2	(18)	0	11	0	0	0	9	2	0	11
Spring 12	2	(50)	2	(50)	0	4	0	0	0	2	2	0	4
Total	11	(73)	4	(27)	0	15	0	0	0	11	4	0	15

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

Table 2. Unit 11 brown bear successful hunter residency, regulatory years 2007 through 2011.

Regulatory year	Local <sup>a</sup>		Nonlocal		Nonresident		Successful hunters
	resident	(%)	resident	(%)		(%)	
2007	4	(27)	3	(20)	8	(53)	15
2008	4	(24)	4	(24)	9	(53)	17
2009	6	(23)	9	(35)	11	(42)	26
2010	2	(11)	4	(22)	12	(67)	18
2011	4	(27)	1	(7)	10	(67)	15

<sup>a</sup> Local means residents of Unit 11 and Unit 13.

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Table 3. Unit 11 brown bear harvest chronology percent by time period, regulatory years 2007 through 2011.

Regulatory year	Harvest percent							<i>n</i>
	August	September	October	November	April	May	June	
2007	27	40	--	7	--	13	13	15
2008	18	59	6	--	--	12	6	17
2009	12	65	12	--	--	8	4	26
2010	22	39	17	--	--	6	17	18
2011	20	47	7	--	--	7	20	15

Table 4. Unit 11 brown bear harvest percent by transport method, regulatory years 2007 through 2011.

Regulatory year	Percent of harvest									
	Airplane	Horse	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walking	Unk.	<i>n</i>
2007	27	7	40	0	0	0	13	13	0	15
2008	47	6	6	12	0	6	18	6	0	17
2009	38	12	23	8	0	0	4	15	0	26
2010	50	0	22	6	0	6	11	6	0	18
2011	47	20	13	7	0	0	13	0	0	15

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**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012<sup>1</sup>

**LOCATION**

**GAME MANAGEMENT UNIT:** 12 (10,107 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**

Brown (grizzly) bears are distributed throughout most of Unit 12. Approximately 2,500 mi<sup>2</sup> are not commonly used by bears and are dominated by high mountains (>7,000 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 (1959) through the early 1980s as guiding activity increased. During the 1970s the Unit 12 moose population declined substantially. Although no studies were conducted in Unit 12 in the 1970s, grizzly bears were found to be an important predator on moose calves in adjacent Unit 13 (Ballard et al. 1981). Unit 12 grizzly bear hunting regulations were liberalized in 1981 to reduce the bear population and elevate moose calf survival. Harvest was not expected to significantly reduce the grizzly bear population, but some population reduction was expected, along with increased moose calf survival because the sustainable harvest of grizzly bears was thought to be low (5–8%) (Reynolds and Boudreau 1992).

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 longer hunting seasons and more liberal bag limits. Concurrently, survival of moose calves to 5 months of age improved in western Unit 12 where bear harvest was highest, and the moose population throughout Unit 12 slowly increased. However, moose calf survival also improved in portions of Unit 12 where little bear harvest was reported (Gardner 1994).

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<sup>1</sup> At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

During the 1990s through 2010, the grizzly bear population likely remained stable. In fall 2000 the population was estimated at 350–425 bears (46.6–56.7 bears of all ages/1,000 mi<sup>2</sup> of useable habitat; 18.0–21.9 bears of all ages/1,000 km<sup>2</sup>; Gardner 2003). Management objectives in the early 1990s called for elevated grizzly bear harvest until moose numbers approached stated objectives or until grizzly bear harvest was too high to ensure the viability of the population. However, grizzly bear reductions through harvest were ineffective at increasing moose calf survival (Miller and Ballard 1992). In 1994 the Unit 12 grizzly bear management goal to reduce the grizzly bear population to increase moose calf survival was revised to provide for maximum opportunity to hunt grizzly bears in Unit 12. The management goal has remained the same since 1994.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT GOALS**

- Maintain the brown/grizzly bear population and its habitat in concert with other components of the ecosystem.
- Provide the greatest sustained opportunity to hunt brown/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**

The Unit 12 population estimate is 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 harvested bears. The population trend estimate is based on 1) harvest statistics (total harvest, sex ratio, average skull size, and age of harvested bears) and 2) informal public surveys (Gardner 2003). In 2006 the Alaska Department of Fish and Game (ADF&G; C. Gardner, ADF&G, unpublished data, Fairbanks, 2007) conducted a DNA-based mark-recapture population estimate for grizzly bears in the adjacent upper Yukon-Tanana grizzly bear control area of Unit 20E. Based on the Unit 12 estimated grizzly bear population size and research in Unit 20A (Reynolds and Boudreau 1992), the sustainable harvest in Unit 12 was estimated to be 28 bears, of which no more than 6 could be adult females >5-years old.

All grizzly bears taken in Unit 12 must be sealed within 30 days of the kill. During the sealing process we take skull measurements, determine the sex of each bear, extract a vestigial premolar tooth, and collect information on harvest date, specific harvest location, transport methods and time the hunter spent afield. Premolar teeth were sent to Matson's Laboratory (Milltown, Montana) to determine age. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY10 = 1 July 2010–30 June 2011).

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

During RY10–RY11, the Unit 12 grizzly bear population likely remained unchanged from the fall 2000 estimated population of 350–425 bears (46.6–56.7 bears of all ages/1,000 mi<sup>2</sup> of useable habitat; 18.0–21.9 bears of all ages/1,000 km<sup>2</sup>; Gardner 2003). Preliminary data from Gardner’s DNA-based mark-recapture study in adjacent Unit 20E support the 2000 grizzly bear density estimate (53.9 bears/1,000 mi<sup>2</sup>; 20.8 bears/1,000 km<sup>2</sup>; C. Gardner, ADF&G unpublished data).

Few data were available on population composition in Unit 12. Sex ratios in the harvest may not accurately represent the population because females with cubs are protected by regulation. During RY10–RY11 productivity of the grizzly bear population in Unit 12 appeared adequate based on the animals harvested. No other methods are currently used in Unit 12 to estimate grizzly bear population composition or density.

### MORTALITY

#### *Harvest*

Season and Bag Limit. During RY10–RY11, the grizzly bear hunting season in Unit 12 for both resident and nonresident hunters was 10 August–30 June. Cubs  $\leq$ 2-years old and females with cubs were protected from harvest. The bag limit of 1 bear every year did not count against the bag limit of 1 bear every 4 years in other units.

Alaska Board of Game Actions and Emergency Orders. In spring 2010 the Alaska Board of Game (board) eliminated the requirement for a resident \$25 grizzly bear tag fee in all of Interior Alaska game management units, including Unit 12. In spring 2012 the board approved harvest of grizzly bears at black bear bait stations during open black bear baiting seasons at permitted black bear baiting stations in Units 12, 20C, 20E, and 21D. The board required hunters who take grizzly bears over bait in these areas to salvage the edible meat in addition to the hide and skull.

Harvest by Hunters. During RY10 and RY11, 15 and 29 grizzly bears, respectively, were harvested in Unit 12, which is within the estimated sustainable yield of 5–8% of the population (Reynolds and Boudreau 1992). An average of 8.5 adult females (range = 7–10) were taken and males represented an average of 61% (range = 53–66%) of the harvest (Table 1). Locally, high harvest levels generally occur in the upper Tok River drainage, within a few miles of Bear Lake at the head of the Tetlin River drainage and between the Nabesna River and the Alaska-Yukon border within the Wrangell Mountains. In RY10 and RY11, 100% and 76%, respectively, of the harvest occurred in those areas. In the remainder of the unit, harvest was light and likely had no effect on population trend.

Hunter Residency and Success. Nonresident hunters took 40% of grizzlies harvested in RY10 and 35% in RY11 (Table 2). Based on discussions with local and nonlocal resident hunters, their interest in hunting grizzly bears in Unit 12 was relatively low because 1) they had already harvested a grizzly bear in the past and had no interest in harvesting another bear, or 2) they were not interested in taking a bear while hunting moose or Dall sheep.

In RY10 and RY11 all successful nonresident hunters hunted with a guide. These nonresidents primarily harvested bears either within a few miles of Bear Lake at the head of the Tetlin River drainage or between the Nabesna River and the Alaska-Yukon border within the Wrangell Mountains. During those years successful resident hunters primarily harvested bears within the upper Tok and upper Nabesna River drainages while hunting for moose or Dall sheep.

Harvest Chronology. During RY10 and RY11, 87% and 76%, respectively, of the harvested grizzly bears were taken during August–September (Table 3). Historically, most bears were harvested when resident and guided nonresident hunters were afield hunting caribou and moose. During RY94–RY03, 28% of the annual harvest of grizzly bears in Unit 12 was taken in the spring (May–June). However, during RY04–RY07, only 11% of the average annual harvest occurred during spring. The decrease in spring harvest continued in RY08–RY09 through RY10–RY11 with 15% and of the harvest taken in the spring. This decline was likely caused by fewer guided nonresident hunters during spring in the Nabesna and Chisana River drainages.

Transport Methods. During RY10–RY11, most successful grizzly bear hunters used airplanes, all-terrain vehicles (ATV), or horses to access hunting areas (Table 4). Most nonresidents used airplanes to get to their hunting area and then hunted using horses. Use of ATVs began to increase in the late 1990s, primarily by residents who hunted moose. In RY10–RY11 the majority of successful resident hunters used ATVs. Most ATV use occurred west of the Tok Cutoff road in the Alaska Range, where access is easier.

#### *Other Mortality*

Intraspecific mortality inflicted by adult male bears is likely the greatest source of nonhunting bear mortality in Unit 12 (Miller et al. 2003). No grizzly bears were recorded as being taken in defense of life or property incidents during RY10 and RY11 (Table 1).

## **HABITAT**

### *Assessment*

Unit 12 offers moderate quality grizzly bear habitat with the exception of approximately 2,500 mi<sup>2</sup> of unvegetated mountaintops and ice fields. The LANDFIRE™ (2009) satellite imagery vegetation classification system (based on 2001 Landsat™ imagery) estimates 6,572 mi<sup>2</sup> (17,021 km<sup>2</sup>) of potential grizzly bear habitat (all vegetated habitat types in Unit 12; ADF&G, unpublished data, Fairbanks). I continued to use the more general 7,500 mi<sup>2</sup> of available habitat in this report because the LANDFIRE (2009) classification system has not yet been validated and may not include some high elevation grizzly bear habitat. Bear habitat is relatively undisturbed, except near a few small communities, the Alaska Highway, and the Tok Cutoff. Like many other areas in Interior Alaska, streams in Unit 12 do not contain reliable seasonal salmon runs accessible to bears.

### *Enhancement*

Maintaining a near-natural fire regime through provisions of the *Alaska Interagency Fire Management Plan: Fortymile Area* (Alaska Wildland Fire Coordinating Group 1998) was the primary action taken in Unit 12 to restore habitat diversity and productivity for all species. Wildfires in Unit 12 burned approximately 28 mi<sup>2</sup> (73 km<sup>2</sup>) in the Eagle Trail fire in May and June 2010. Data suggest grizzly bears avoid burned areas for several years following large scale

fires (C. Gardner, ADF&G unpublished data). Long term, bears and their prey species are expected to benefit from fire due to higher productivity of earlier successional stage boreal forest (Haggstrom and Kelleyhouse 1996).

#### **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

No nonregulatory issues were identified for grizzly bears in Unit 12 during RY10 and RY11.

### **CONCLUSIONS AND RECOMMENDATIONS**

Grizzly bears continue to be distributed throughout Unit 12. The 2010 population was likely near Gardner's estimate of 350–425 bears in 2000 (46.6–57.7 bears of all ages/1,000 mi<sup>2</sup>; 18.0–21.9 bears of all ages/1,000 km<sup>2</sup>; Gardner 2003). Harvest regulations were liberal and allowed for maximum hunting opportunity while sustaining the grizzly bear population in concert with other components of the ecosystem.

During RY10 and RY11, harvest of grizzly bears in Unit 12 likely had no effect on population trend because harvest did not exceed 6% of the total estimated population and was distributed throughout the unit. Research in Unit 13 indicates that brown/grizzly bear populations with access to salmon may be able to sustain a higher harvest rate than the 6% previously predicted (Tobey 2005) Fifteen years of harvest rates in excess of 10% resulted in little reduction in bear numbers in Unit 13, although these harvest rates were likely supported by immigration of numerous subadult males into the area (Tobey and Kelleyhouse 2007). Higher harvest levels may also be sustainable in Unit 12; however, Unit 12 lacks large lightly hunted populations of grizzly bears in adjacent areas and immigration of subadult males is expected to be low. Unit 12 has lower food availability for grizzly bears than Unit 13, with a shorter growing season, less rainfall and lack of both salmon and ground squirrels. This suggests that harvest levels of 10% or more of the population would result in a population decline in Unit 12.

All management objectives were achieved during RY10 and RY11. The 3-year (RY09–RY11) mean harvest rate ( $\bar{x} = 19.7$ ) was  $\leq 6\%$ , did not exceed 28 bears and included more than 55% males in the harvest ( $\bar{x} = 61\%$ ). Harvest has remained relatively stable within these areas and no regulatory changes are recommended at this time.

The Board of Game approved the take of grizzly bears at black bear bait stations in Unit 12 starting in spring 2013. Considerable interest in hunting grizzly bears over bait has been expressed by hunters who bait black bears in Unit 12. This method has the potential to substantially increase harvest. However, in the Upper Yukon Tanana Predation Control Area in adjacent Unit 20E, hunter success at taking grizzly bears over bait was low. During the next report period, we will carefully monitor changes in harvest associated with the take of grizzly bears at black bear bait sites.

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Table 1. Unit 12 brown/grizzly bear mortality, regulatory years<sup>a</sup> 2005–2011.

Regulatory year	Reported										Total estimated kill					
	Hunter kill				Nonhunting kill <sup>b</sup>						M	(%)	F	(%)	Unk	Total
	M	F	Unk	Total	M	(DLP)	F	(DLP)	Unk	(DLP)						
<i>2005</i>																
Autumn 2005	9	11	0	20	0	(0)	0	(0)	0	(0)	9	(45)	11	(55)	0	20
Spring 2006	2	0	0	2	0	(0)	0	(0)	0	(0)	2	(100)	0	(0)	0	2
Total	11	11	0	22	0	(0)	0	(0)	0	(0)	11	(50)	11	(50)	0	22
<i>2006</i>																
Autumn 2006	12	4	0	16	0	(0)	0	(0)	0	(0)	12	(75)	4	(25)	0	16
Spring 2007	0	1	0	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	0	1
Total	12	5	0	17	0	(0)	0	(0)	0	(0)	12	(71)	5	(29)	0	17
<i>2007</i>																
Autumn 2007	6	3	0	9	0	(0)	0	(0)	0	(0)	6	(67)	3	(33)	0	9
Spring 2008	1	1	0	2	0	(0)	0	(0)	0	(0)	1	(50)	1	(50)	0	2
Total	7	4	0	11	0	(0)	0	(0)	0	(0)	7	(64)	4	(36)	0	11
<i>2008</i>																
Autumn 2008	15	6	0	21	0	(0)	0	(0)	0	(0)	15	(71)	6	(29)	0	21
Spring 2009	1	0	0	1	0	(0)	0	(0)	0	(0)	1	(100)	0	(0)	0	1
Total	16	6	0	22	0	(0)	0	(0)	0	(0)	16	(73)	6	(27)	0	22
<i>2009</i>																
Autumn 2009	5	5	0	10	0	(0)	0	(0)	0	(0)	5	(50)	5	(50)	0	10
Spring 2010	4	0	0	4	0	(0)	1	(1)	0	(0)	4	(80)	1	(20)	0	5
Total	9	5	0	14	0	(0)	1	(1)	0	(0)	9	(60)	6	(40)	0	15
<i>2010</i>																
Autumn 2010	7	7	0	14	0	(0)	0	(0)	0	(0)	7	(50)	7	(50)	0	14
Spring 2011	1	0	0	1	0	(0)	0	(0)	0	(0)	1	(100)	0	(0)	0	1
Total	8	7	0	15	0	(0)	0	(0)	0	(0)	8	(53)	7	(47)	0	15
<i>2011</i>																
Autumn 2011	13	10	0	23	0	(0)	0	(0)	0	(0)	13	(57)	10	(43)	0	23
Spring 2012	6	0	0	6	0	(0)	0	(0)	0	(0)	6	(100)	0	(0)	0	6
Total	19	10	0	29	0	(0)	0	(0)	0	(0)	19	(66)	10	(34)	0	29

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2005 = 1 July 2005–30 June 2006).

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

Table 2. Unit 12 brown/grizzly bear success by hunter residency, regulatory years<sup>a</sup> 1991–2011<sup>b</sup>.

Regulatory year	Success by hunter residency			Total successful hunters
	Unit resident (%)	Other residents (%)	Nonresident (%)	
1991	2 (17)	4 (33)	6 (50)	12
1992	7 (29)	6 (25)	11 (46)	24
1993	1 (6)	7 (39)	10 (56)	18
1994	2 (14)	1 (7)	11 (79)	14
1995	0 (0)	2 (22)	7 (78)	9
1996	5 (24)	4 (19)	12 (57)	21
1997	2 (18)	1 (9)	8 (73)	11
1998	1 (6)	5 (31)	10 (63)	16
1999	3 (18)	5 (29)	9 (53)	17
2000	4 (12)	10 (30)	19 (58)	33
2001	4 (27)	1 (7)	10 (67)	15
2002	4 (33)	1 (8)	7 (58)	12
2003	1 (13)	2 (25)	5 (63)	8
2004	3 (13)	5 (21)	16 (67)	24
2005	2 (9)	3 (14)	17 (77)	22
2006	1 (6)	4 (23)	12 (71)	17
2007	4 (36)	2 (18)	5 (45)	11
2008	2 (9)	10 (45)	10 (45)	22
2009	4 (29)	3 (21)	7 (50)	14
2010	2 (13)	7 (47)	6 (40)	15
2011	5 (17)	14 (48)	10 (35)	29

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1991 = 1 July 1991–30 June 1992).

<sup>b</sup> Does not include defense of life or property kills or illegal kills.

Table 3. Unit 12 brown/grizzly bear harvest chronology by month, regulatory years<sup>a</sup> 1991–2011<sup>b</sup>.

Regulatory year	Harvest chronology by month									
	Aug (%)	Sep (%)	Oct (%)	Nov (%)	Apr (%)	May (%)	Jun (%)	Total		
1991	1 (8)	9 (75)	0 (0)	0 (0)	1 (8)	1 (8)	0 (0)	12		
1992	0 (0)	14 (58)	2 (8)	2 (8)	0 (0)	6 (25)	0 (0)	24		
1993	0 (0)	15 (83)	1 (6)	0 (0)	1 (6)	1 (6)	0 (0)	18		
1994	0 (0)	11 (79)	0 (0)	0 (0)	1 (7)	2 (14)	0 (0)	14		
1995	0 (0)	6 (67)	0 (0)	0 (0)	0 (0)	3 (33)	0 (0)	9		
1996	1 (5)	16 (76)	0 (0)	0 (0)	0 (0)	4 (19)	0 (0)	21		
1997	0 (0)	8 (73)	0 (0)	0 (0)	0 (0)	3 (27)	0 (0)	11		
1998	0 (0)	9 (56)	1 (6)	0 (0)	0 (0)	6 (38)	0 (0)	16		
1999	0 (0)	11 (65)	1 (6)	0 (0)	0 (0)	5 (29)	0 (0)	17		
2000	0 (0)	23 (70)	1 (3)	0 (0)	0 (0)	9 (27)	0 (0)	33		
2001	0 (0)	12 (80)	0 (0)	0 (0)	0 (0)	3 (20)	0 (0)	15		
2002	0 (0)	6 (50)	2 (17)	0 (0)	0 (0)	4 (33)	0 (0)	12		
2003	0 (0)	5 (63)	0 (0)	0 (0)	0 (0)	3 (37)	0 (0)	8		
2004	6 (25)	13 (54)	2 (8)	0 (0)	0 (0)	2 (8)	1 (4)	24		
2005	11 (50)	9 (41)	0 (0)	0 (0)	0 (0)	2 (9)	0 (0)	22		
2006	6 (35)	10 (59)	0 (0)	0 (0)	0 (0)	1 (6)	0 (0)	17		
2007	2 (18)	6 (54)	1 (9)	0 (0)	0 (0)	0 (0)	2 (18)	11		
2008	5 (23)	16 (73)	0 (0)	0 (0)	0 (0)	1 (4)	0 (0)	22		
2009	5 (36)	4 (29)	0 (0)	1 (7)	0 (0)	3 (21)	1 (7)	14		
2010	4 (27)	9 (60)	1 (7)	0 (0)	0 (0)	1 (7)	0 (0)	15		
2011	7 (24)	15 (52)	1 (3)	0 (0)	0 (0)	2 (7)	4 (14)	29		

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1991 = 1 July 1991–30 June 1992).

<sup>b</sup> Does not include defense of life or property kills or illegal kills.

Table 4. Unit 12 brown/grizzly bear harvest by transport method, regulatory years<sup>a</sup> 1991–2011<sup>b</sup>.

Regulatory year	Harvest by transport method (%)									
	Airplane	Horse	Boat	ATV	Snowmachine	ORV	Highway vehicle	Walking	Unk	<i>n</i>
1991	6 (50)	2 (17)	0 (0)	0 (0)	1 (8)	0 (0)	1 (8)	1 (8)	1 (8)	12
1992	10 (42)	7 (29)	0 (0)	1 (4)	2 (8)	0 (0)	2 (8)	0 (0)	2 (8)	24
1993	6 (33)	4 (22)	0 (0)	2 (11)	0 (0)	0 (0)	2 (11)	3 (17)	1 (6)	18
1994	4 (29)	7 (50)	0 (0)	1 (7)	0 (0)	0 (0)	2 (14)	0 (0)	0 (0)	14
1995	1 (11)	7 (78)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (11)	0 (0)	9
1996	4 (19)	10 (48)	1 (5)	4 (19)	0 (0)	1 (5)	1 (5)	0 (0)	0 (0)	21
1997	2 (18)	8 (73)	1 (9)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	11
1998	8 (50)	3 (19)	0 (0)	1 (6)	0 (0)	2 (13)	2 (13)	0 (0)	0 (0)	16
1999	12 (71)	2 (12)	0 (0)	3 (18)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17
2000	10 (30)	12 (36)	1 (3)	5 (15)	0 (0)	0 (0)	5 (15)	0 (0)	0 (0)	33
2001	3 (20)	6 (40)	0 (0)	5 (33)	0 (0)	0 (0)	0 (0)	1 (7)	0 (0)	15
2002	3 (25)	4 (33)	0 (0)	2 (17)	0 (0)	1 (8)	1 (8)	1 (8)	0 (0)	12
2003	4 (50)	1 (13)	0 (0)	2 (25)	0 (0)	0 (0)	1 (13)	0 (0)	0 (0)	8
2004	10 (42)	6 (25)	1 (4)	4 (17)	0 (0)	0 (0)	1 (4)	2 (8)	0 (0)	24
2005	12 (55)	6 (27)	0 (0)	2 (9)	0 (0)	0 (0)	0 (0)	2 (9)	0 (0)	22
2006	7 (41)	6 (35)	1 (6)	2 (12)	0 (0)	0 (0)	1 (6)	0 (0)	0 (0)	17
2007	5 (45)	2 (18)	0 (0)	2 (18)	0 (0)	0 (0)	1 (9)	1 (9)	0 (0)	11
2008	4 (18)	5 (23)	1 (5)	8 (36)	0 (0)	0 (0)	1 (5)	3 (14)	0 (0)	22
2009	4 (29)	5 (36)	0 (0)	3 (21)	0 (0)	0 (0)	1 (7)	1 (7)	0 (0)	14
2010	8 (53)	3 (20)	0 (0)	3 (20)	0 (0)	0 (0)	0 (0)	1 (7)	0 (0)	15
2011	7 (24)	5 (17)	2 (7)	6 (21)	0 (0)	0 (0)	4 (14)	3 (10)	2 (7)	29

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1991 = 1 July 1991–30 June 1992).

<sup>b</sup> Does not include defense of life or property kills or illegal kills.

**SPECIES**  
**MANAGEMENT REPORT**

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

From: 1 July 2010  
To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** 13 (23,367 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Nelchina Basin

**BACKGROUND**

The brown bear harvest in Unit 13 has increased substantially since the early 1960s when the average annual take was only 39 bears. The average annual harvests steadily increased through the mid-1990s as interest in bear hunting increased and seasons and bag limits were slowly liberalized. While the long-term trend has been increasing, the annual harvest has stabilized since the mid-1990s, ranging from 117 to 166. 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. In 2003, with the exception of Denali State Park, the Unit 13 brown bear hunting season was extended to year-round. Brown bear harvests have been the highest in those years when the bag limit has been one bear per year and the resident tag fee waived.

**MANAGEMENT DIRECTION**

**MANAGEMENT OBJECTIVES**

To maintain a minimum unitwide population of 350 brown bears.

**METHODS**

Department representatives sealed skulls and hides of harvested bears. Skulls were measured, sex was determined, a premolar tooth was extracted for aging, and hair/hide samples were collected by staff for genetic studies. Sealing agents collected information on date and location of harvest and time spent afield by successful hunters. A study to evaluate brown bear population trends and indices in the expanded Nelchina Study Area in western 13A was initiated in 2006; 137 bears were captured and data are currently being reviewed. In 2011, a capture mark recapture (CMR) survey was completed to estimate the size of the bear population in the western half of Subunit 13A.

**RESULTS AND DISCUSSION**

**POPULATION STATUS AND TREND**

Estimated brown bear densities in Subunits 13A and 13E are among the highest estimates for brown bears in interior and northern Alaska (Testa et al. 1998).

### *Population Size*

The brown bear management strategy adopted by the Board of Game since the mid-1990s has included liberalized seasons and bag limits for the purpose of reducing the brown bear population, and in turn, increasing moose calf survival. This management approach has been attempted in other areas of the state, with the eventual goal of increasing the harvestable surplus of moose. In an attempt to measure regulation effectiveness, biologists have actively evaluated brown bear population demographic data, as well as initiated new research to evaluate any changes in the brown bear population and in the predator-prey dynamic.

While several population estimates have been calculated for brown bears in Unit 13 in the past 30 years, each has relied heavily on anecdotal information and/or extrapolation. During the late 1970s an estimate of 1,500 brown bears was calculated based solely on field observations, hunter reports, and harvests. Past CMR brown bear density estimates are available for two study areas in Subunit 13E and a study area in western 13A. Line transect surveys were also used in the past to derive density estimates for all of 13E, and both 13A and 13B together. Estimates are described in terms of all bears, or independent bears (bears  $\geq 2$  years of age).

On the upper Susitna River (13E), the 1987 CMR estimate of 6.46 independent bears/1,000 km<sup>2</sup> was down from the 1979 removal-based estimate of 10.5 independent bears/1,000 km<sup>2</sup> (Ballard et al. 1982; Miller 1987, 1988, 1995). Although the 1987 point estimate was lower, Miller (1995) concluded that because of differences in survey techniques, it could not be statistically demonstrated that a decline in bear numbers occurred. For the original Susitna Hydroelectric (Su-Hydro) Study Area which is on the border between 13A and 13E, CMR density estimates in 1985 and 1995 were 18.8 and 23.3 independent bears/1,000 km<sup>2</sup> (27.1 and 40.8 all bears) respectively. Unfortunately, while similar census techniques were used, the latter survey was stopped prematurely after only 5 days to conserve funds. While the results at the time were not significantly different from the 1985 survey, it was reported that confidence intervals were becoming smaller each day, and given an additional 2 days, the difference could have been significant (Miller 1995). Extrapolations from density estimates in the Upper Susitna River and Su-Hydro areas from 1979, 1985, and 1987 yielded a recalculated Unit 13 population estimate of 1,228 bears (Miller 1990). Following the 1995 Su-Hydro CMR survey, the unitwide estimate was again revised to 1,456 bears (Miller 1997).

In 1998, Testa et al. reported a CMR density estimate for the Nelchina study area in western 13A of 21.3 independent bears/1,000 km<sup>2</sup> (27.5 all bears/1,000 km<sup>2</sup>). This area continues to be highly accessible to hunters and of interest to managers.

In the spring of 2001, 2002, and 2003, line-transect surveys were conducted in Subunit 13E, resulting in a preliminary estimate of 32.3 independent bears/1,000 km<sup>2</sup>. The same line-transect methodology was used in subunits 13A and 13B in 2003 and 2004, with 16.3 independent bears/1,000 km<sup>2</sup> being estimated initially. In May 2011, a CMR survey was conducted in western 13A. Initial survey results indicated a density of 16.3 independent bears /1,000 km<sup>2</sup>. An estimate for all bears has not yet been calculated. Data are still being analyzed for significance.

### *Population Composition*

Miller (1993) reported that between 1980 and 1988, on average, reproductive brown bear females from the Su-Hydro study area were accompanied by 2.1 cubs of the year, 1.9 yearlings, or 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). In 1998 Testa et al. reported average litter sizes in the Nelchina Study Area in western 13A of 2.3 cubs of the year and 1.8 yearlings. Preliminary composition data from the same area

between 2006 and 2011 indicate average litter sizes of 2.2 cubs of the year ( $n = 55$ ), 2.1 yearlings ( $n = 41$ ), and 2.0 two-year-olds ( $n = 39$ ). Data are still being analyzed for significance.

Miller (1997) reported the sex ratios of brown bears in the Su-Hydro Study Area during two different periods 10 years apart for bears  $\geq 2$  years of age. He found 82.4 males:100 females in 1985 ( $n = 31$ ), compared to only 27.8 males:100 females in 1995 ( $n = 23$ ). Miller concluded that heavy hunting pressure was responsible for the decline in the male ratio, even though this area is difficult for hunters to access.

Testa et al. (1998) reported 48.4 males:100 females in the Nelchina Study Area in western 13A ( $n = 46$ ) during the 1998 CMR. This study area is just south of the Su-Hydro area and it is highly accessible to hunters.

Capture data from the same Nelchina Study Area between 2006 and 2008 indicated only 31.6 males:100 females ( $n = 75$ ), initially suggesting a decline from 1998. However, capture data collected between 2009 and 2011 indicated 114 males:100 females ( $n = 62$ ). Of the bears captured between 2009 and 2011, 32 were 2 years of age, and of those, 66% were male. When all capture data from 2006 to 2011 was combined, the ratio was 59 males:100 females ( $n = 137$ ).

Low male ratios are often thought to be caused by high harvest pressure, and the protection reproductive females have under general brown bear hunting regulations. While this is a logical assumption, recent observations suggest there may be tremendous variability in this parameter between years. Considering harvest pressure remains very high in this area, we may want to consider the possibility that brown bear populations have an inherent ability to respond if the male ratio drops too low. In this case, the population could be compensating by producing more males than females.

## **MORTALITY**

### *Harvest*

There has been no closed season in Unit 13 since 2002, except for that portion of 13E within Denali State Park, where the season remains 10 August–15 June. The resident \$25 tag fee requirement has been waived annually since 1995 by the Board of Game in Unit 13, except for that portion of 13E within Denali State Park. The bag limit is one bear every year in the entire unit.

Board of Game Actions and Emergency Orders. The Board of Game designated Unit 13 an intensive management area as directed under Senate Bill 77 during the 1995 meeting. Board 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 numbers should be reduced to increase moose calf survival. While brown bears are not covered by intensive management regulations in Unit 13, the board addresses brown bear regulations annually. In February 2013, a proposal to allow for the harvest of brown bears over black bear baits in Subunit 13D was carried by the Board of Game, as was a regional proposal to waive resident tag fees for hunting in Denali State Park. Both changes will take effect in RY14.

Hunter Harvest. The reported RY10 take of brown bears was 138, with 120 harvested during RY11 (Table 1). Since regulations were liberalized in 1995, a total of 2,314 bears have been taken in Unit 13. Take since 1995 has averaged 136 bears a year with no trend evident. Annual fluctuations are mostly attributable to weather related hunter access.

During this reporting period, the documented average annual brown bear harvest by subunit was 27 in 13A, 18 in 13B, 4 in 13C, 24 in 13D, and 56 in 13E. More bears have been reported harvested from 13E over the years than any other subunit.

During RY10, 87 male (63%) and 51 female (37%; Table 1) brown bears were harvested in Unit 13. The RY11 brown bear harvest was composed of 72 males (61%) and 47 females (39%). In RY10, the mean skull size was 20.4 inches for males, and 19.6 inches for females. During RY11, the mean skull size was 21 inches for males, and 19.7 inches for females. Since 1995 when harvests increased, males have composed 57% of the harvest. The mean ages for RY10 were 5.1 for males and 6.9 for females. The mean ages for bears taken in RY11 are not yet available. No significant trends are evident in the sex, skull size, or age data.

Interpretation of skull size, age, and sex ratios in harvest data is difficult (Miller 1993). Kontio et al. (1998) suggest that even assuming a 50:50 sex ratio at birth, immigration from lighter or unhunted areas could effectively keep subadult harvest biased towards males through age 5.

In most years, the mean age of males taken in the fall was lower than males taken in the spring. Considering 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. Males killed in the fall incidentally by hunters pursuing other big game species tend to be younger. In comparison, females taken during the fall tend to be older, larger bears compared to females taken in the spring. While most 2-year-old brown bear cubs in this area are still accompanied by the female during the spring season, most are on their own by the fall season. While brown bears are legal to harvest as 2-year-olds, hunters tend to avoid female-with-cub groups.

The high reported harvests since 1995 exceed predicted 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 years of age. These rates would give a maximum unitwide sustainable harvest of only 83 given a population of 1,450 bears. The current average yearly take (for all bears) during this reporting period represents an estimated harvest rate of 10%. This harvest rate exceeds all modeled sustainable rates for Alaska grizzlies or brown bears, yet Unit 13 harvests have been relatively stable for the past 17 years.

Hunter Residency and Success. Successful hunter residency data are presented in Table 2. Nonresident hunters took 31 bears in RY11, or 26% of the total harvest. The number of bears taken by nonresidents has averaged 35 (range = 21 – 48) over the last 30 years and no trend is evident. The lack of growth in the nonresident harvest largely reflects the high cost of guided hunts which limits participation by most nonresidents. Local residents took 16 bears, or 13% of the total harvest in RY11 and nonlocal Alaska residents took 73 (61%). There is considerable variation in the number of bears taken by local residents, and that variation appears to be independent of hunting regulation changes. The nonlocal Alaska resident harvest did increase appreciably in those years when hunting regulations were liberalized. Alaska residents are mostly opportunistic bear hunters outside of coastal trophy brown bear areas. Liberal seasons and waived tag requirements are necessary for these hunters to take bears incidentally.

Successful Unit 13 brown bear hunters averaged 4.6 days hunted per bear harvested in RY11. Since 2007, hunters in Unit 13 have averaged 4.4 days hunted per bear. Successful nonresidents tend to spend about two additional days in the field versus successful residents.

Harvest Chronology. For this report period, most of the harvest occurred during fall (71%, Table 3). The fall season continues to be the most important for bear hunters in Unit 13. Spring harvests have fluctuated between years but no trend is evident; harvest is mostly related to snow conditions and hunter access in relation to den emergence. Deep persistent snow cover can result in an increase in April harvests, while a particularly late breakup could interfere with off-road vehicle (ORV) access and limit harvests until later in May.

Since 1980, when the spring season was implemented, males have averaged 67% of the spring harvest (range = 49–83%) and 57% (range = 43–75%) of the total annual harvest.

Transport Methods. The most important method of transportation for brown bear hunters in Unit 13 continues to be 4-wheelers (Table 4). Unit 13 has many far-reaching trail systems that are ideally suited to 4-wheeler transportation during the fall hunting season. The importance of 4-wheelers as a transportation method for all hunting in Unit 13 has steadily increased. Aircraft and highway vehicles are still consistently reported, while snowmachine use is highly variable and dependent on snow conditions during the spring season.

### *Other Mortality*

During the period of this report no bears were killed in defense of life or property (DLP) in Unit 13. Since the year-round season was adopted in 2003, most problem bears have been harvested under general hunting regulations and the hunter has been able to keep the bear. Between 2003 and 2008, no more than one brown bear per year was taken DLP. The reported DLP harvest has always been considered a minimum estimate because some bears are shot and not reported, especially at remote cabins, homesites and mining claims. The state requirement to salvage and surrender the hides of DLP bears often deters individuals from reporting kills.

### **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

Intolerance of brown bears in proximity to people and dwellings has become more of a problem in Unit 13 as development has increased. Because of the increase in the human population in the unit, bear-human encounters have increased. A year-round season provides the public opportunity to harvest problem bears during previously closed summer months. Even with increased hunting opportunity in recent years, the Glennallen office continues to receive complaints of problem bears and requests to tranquilize and relocate bears. In dealing with bear-human conflicts at remote sites, we continue to recommend the department maintain its policy of not relocating problem bears and rely on education to prevent habituation of bears to human food as a preventive measure.

## **CONCLUSIONS AND RECOMMENDATIONS**

Because of their relatively low density and secretive behavior, observing and counting brown bears is both difficult and expensive. Brown bears in Unit 13 do not generally congregate on salmon streams and are wary of motorized vehicles. Because of this, population data are available for only limited portions of Unit 13. All the unitwide bear estimates are based on extrapolations of estimated densities. The problems with this are obvious, particularly given the differences in study areas and survey techniques.

The most recent brown bear research in Unit 13 has been focused on monitoring the population composition and trend in the Nelchina Study Area in western Subunit 13A; the project began in May 2006. The CMR survey conducted in May 2011 and capture data through 2011 suggest brown bears are still abundant, and that the population may be more resilient than previously thought.

Thus far, no long-term discernable decline in bear numbers has been detected in Unit 13, yet the brown bear harvest regulations in this area have been quite liberal for many years. Hunters can take any brown bear 2 years of age and up year-round, and the bag limit is one bear per year.

Research since 2005 has documented continued high neonatal moose calf mortality from bears in the Nelchina Study Area in western Subunit 13A. During the years of 2003, 2005, and 2008, annual moose calf mortality in Subunit 13A ranged 65–70%, and exceeded 80% in 2004 and 2006 (Bender, ADF&G, personal communication). However, despite high documented moose calf mortality, the options are limited for further increasing the take of brown bears in this area. One potential option would be to

change the guide requirement to allow nonresidents to hunt brown bears in Unit 13 without a guide. Although the majority of Unit 13 brown bears are similar to interior grizzlies in size, they are classified as brown bears by Boone & Crocket. An attempt to reclassify these bears in Boone & Crocket as grizzlies was unsuccessful. Allowing nonresidents to hunt without a guide would create a new pool of hunters who, by taking advantage of a less expensive opportunity to legally take a brown bear, might increase the harvest.

While moose numbers were low in Unit 13 during the late 1990s, and focus was on increasing calf survival, the population has since improved. From 2001 to 2009 the number of moose observed during annual trend counts in Unit 13 increased by 46% (Tobey and Schwanke 2010). The number of moose counted increased an average of 6% each year. While bear harvests were high during this period, fall calf ratios remained stable, averaging 20 calves per 100 cows across the unit. If the changes in bear harvest regulations were having an effect, we would expect the calf ratios to be significantly higher. The rise in the number of moose observed was attributed to good productivity, mild winters, and lower wolf predation due to predator management.

Whether continued harvests at the current level can reduce bear numbers, and if such a reduction would be substantial enough to appreciably reduce predation on moose calves is unknown. Estimates of changes in productivity, cub survival, and immigration following high harvests are being researched in the Subunit 13A study. Current regulations that protect the reproductive portion of the population (females with cubs of the year or yearlings) may protect enough females to maintain recruitment, and prevent, or at least delay, a population reduction.

We recommend maintaining the current season, bag limit, and resident tag fee waiver. The most we can conclude to date is that while providing substantial hunting opportunity and an increased harvest, the population within the Subunit 13A West study area has yet to decline dramatically as originally predicted. A slow decline in the population may be occurring, though due to the difficulty in enumerating bears, any change detected may be insignificant. .

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Table 1. Unit 13 brown bear harvest, regulatory years 2007–2011.

Regulatory Year	Hunter kill						Nonhunting kill <sup>a</sup>			Total Kill			
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.	M	F	Unk.	Total
2007													
Fall 07	52	(59)	36	(41)	1	89	1	0	0	53	36	1	90
Spring 08	38	(63)	22	(37)	0	60	1	0	0	39	22	0	61
Total	90	(61)	58	(39)	1	149	2	0	0	92	58	1	151
2008													
Fall 08	47	(42)	65	(58)	0	112	0	3	0	47	68	0	115
Spring 09	32	(74)	11	(26)	0	43	0	0	0	32	11	0	43
Total	79	(51)	76	(49)	0	155	0	3	0	79	79	0	158
2009													
Fall 09	62	(60)	42	(40)	0	104	3	3	0	65	45	0	110
Spring 10	17	(59)	12	(41)	1	30	1	1	0	18	13	1	32
Total	79	(59)	54	(41)	1	134	4	4	0	83	58	1	142
2010													
Fall 10	66	(63)	38	(37)	0	104	0	0	0	66	38	0	104
Spring 11	21	(62)	13	(38)	0	34	0	0	0	21	13	0	34
Total	87	(63)	51	(37)	0	138	0	0	0	87	51	0	138
2011													
Fall 11	43	(55)	35	(45)	1	79	0	0	0	43	35	1	79
Spring 12	29	(71)	12	(29)	0	41	0	0	0	29	12	0	41
Total	72	(61)	47	(39)	1	120	0	0	0	72	47	1	120

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

Table 2. Unit 13 brown bear successful hunter residency, 2007–2011.

Regulatory year	Local <sup>a</sup> resident		Nonlocal Resident		Nonresident		Successful hunters <sup>b</sup>
	(%)	(n)	(%)	(n)	(%)	(n)	
2007	6	(4)	98	(66)	45	(30)	149
2008	12	(8)	95	(61)	48	(31)	155
2009	19	(14)	81	(61)	34	(25)	134
2010	8	(6)	84	(61)	46	(33)	138
2011	16	(13)	73	(61)	31	(26)	120

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

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

Table 3. Unit 13 brown bear harvest chronology percent by time period, regulatory years 2007–2011.

Regulatory year	Harvest periods																		n
	July		August		September		October		November		March		April		May		June		
	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	
2007	9	(13)	21	(31)	27	(40)	3	(5)	0	(0)	0	(0)	7	(10)	15	(22)	17	(25)	146
2008	10	(15)	19	(30)	36	(56)	7	(11)	0	(0)	0	(0)	7	(11)	10	(16)	10	(16)	155
2009	10	(13)	16	(21)	46	(61)	7	(9)	0	(0)	0	(0)	4	(5)	13	(18)	5	(7)	134
2010	7	(10)	27	(37)	35	(48)	7	(9)	0	(0)	0	(0)	6	(8)	12	(16)	7	(10)	138
2011	8	(10)	21	(25)	31	(37)	6	(7)	0	(0)	0	(0)	10	(12)	12	(14)	13	(15)	120

Table 4. Unit 13 brown bear harvest percent by transport method, regulatory years 2007–2011.

Regulatory year	Airplane	Horse	Boat	4-wheeler	Snowmachine	ORV	Highway vehicle	Walking	n <sup>a</sup>
2007	20	0	17	30	7	5	13	9	147
2008	22	0	14	29	5	5	14	10	154
2009	21	0	12	34	7	2	17	8	134
2010	19	1	17	32	7	5	10	8	138
2011	20	1	14	29	13	4	11	8	120

<sup>a</sup> Includes only reported method of transportation.

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 P.O. BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** 14A and 14B (4,713 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Upper Cook Inlet

**BACKGROUND**

Since colonization of the Matanuska Valley began in the 1930s the area has been changed radically by agricultural settlement, increased development, and urbanization (Peltier 2011). The influx of people has had an impact on brown bear numbers and their available habitat. Del Frate (2003) and Kavalok (2007) noted an increase in the number of reports of bears in urban areas, bears causing property damage, and human–bear encounters in Subunits 14A and 14B compared to the number reported 10–15 years earlier. This increase has been partially attributed to the growing human population that has been expanding into formerly undeveloped areas in these subunits.

The differences in pace of development between Units 14A and 14B have resulted in differences in the number of brown bears in each subunit and, subsequently, differences in hunting opportunities and management strategies between the 2 subunits. In Subunit 14A management emphasis has been placed on reducing bear–human conflicts. Subunit 14B is less developed and human settlements are found only along the western edge of 14B. In 14B brown bear management has been focused on reducing the number of bear ‘break-ins’ of seasonally occupied cabins, providing hunting opportunity, and possibly reducing the overall bear population in order to improve moose calf recruitment.

**MANAGEMENT DIRECTION**

**MANAGEMENT OBJECTIVES**

- Maintain a brown bear population that can sustain an annual harvest of 25 bears composed of at least 50% male.
- Maintain the brown bear population at a level that minimizes bear–human conflicts.

**METHODS**

Brown bear harvests are monitored through the mandatory sealing of all bears harvested in Subunits 14A and 14B. Department staff or authorized sealers interviewed successful hunters to collect information on the date and location of kill, methods used, and the number of days they

hunted prior to taking the bear. Sealers also collect biological information from each bear harvested (measuring skull size, determining the sex, and collecting a premolar tooth for aging). All data collected were entered into the statewide database for analysis. Harvest data were compared to previous years to evaluate trends.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

There are no practical methods to census brown bears in the forested environments that exist in most of Unit 14. Previously, biologists have attempted to estimate the Unit 14 brown bear population based on anecdotal information. Grauvogel's 1990 estimate of 169–262 brown bears for all of Unit 14 was later refined by Harkness (1993) to 185–239 brown bears. Those estimates included Subunit 14C. By combining our knowledge of brown bear observations and extrapolating bear densities from neighboring units, we arrived at a rough extrapolated estimate of 30 to 60 brown bears in Subunit 14A and 90 to 130 in Subunit 14B. Anecdotal information from residents of 14B indicates that the brown bear population in that unit may be slowly increasing.

### MORTALITY

#### *Harvest*

Season and Bag Limit. In Subunit 14A the season was 1 September–31 May, and the bag limit for brown bears was 1 bear every 4 regulatory years. In Subunit 14B, the season was 10 August–31 May, and the bag limit was 1 bear every regulatory year. Harvesting cubs and females accompanied by cubs was prohibited.

Board of Game Actions. The Board of Game made no changes to brown bear hunting regulations in Unit 14 during the reporting period.

Hunter Harvest. During the past 5 years hunters harvested an average of 26.2 bears (Table 1) per year. This shows a continuing trend toward increasing harvest noted by Peltier (2011). The female component of the brown bear harvest for the past 5 years averaged 48.2%. The percent of females in the harvest was higher for Subunit 14A (50.4%) than 14B (44.8%), however Subunit 14B had a greater proportion of the overall harvest for the unit (65%).

Hunter Residency. Nonresidents were responsible for 26% of the harvest from regulatory year (RY) 2002 to 2011 (Table 2). A regulatory year begins 1 July and goes to 30 June of the following year (i.e., RY11 = 1 July 2011–30 June 2012). Nonlocal resident take of bears in Subunits 14A and 14B is small and typically less than 5%. The majority of the bears taken in the 2 subunits are taken by local residents.

Harvest Chronology. Peak harvests occur in September and May (Table 3). During the past 10 years 54% of the harvest has occurred during September. This pattern of harvest has remained consistent over time and suggests that many of the brown bears harvested are taken opportunistically by moose hunters during the September moose season.

Transport Methods. During the past 10 regulatory years 30.1% of the successful bear hunters used ATVs or ORVs (Table 4). Aircraft were the second most common means of transportation

used by successful bear hunters (16.4%), but highway vehicles (15.2%) and boats (14.5%) are also popular methods for accessing the area.

#### *Other Mortality*

Defense of life or property (DLP) is the primary cause of nonhunting mortality; however, vehicle collisions were responsible for 2 of the 9 bears killed during the reporting period (Table 1). There were no known illegal kills during this reporting period.

### **CONCLUSIONS AND RECOMMENDATIONS**

Historically, brown bears in Unit 14 were managed conservatively under the assumption that bears are a slow producing species that cannot withstand high harvest levels. Since the early 1980s the total harvest has increased, but there have been no observable declining trends in the harvest that would indicate excessive harvest pressure. While the percentage of females in the harvest has been slowly increasing over the past 20 years, this trend is very weak. Nonetheless, the percentage of females in the harvest should continue to be monitored in concert with other management concerns to prevent excessive overharvest of the reproductive segment of the population in the future.

Brown bears are regularly seen during the summer in Subunits 14A and 14B, and these sightings result in a tremendous number of calls to the department from concerned citizens. Staff should continue informing the public on ways to avoid negative interactions with bears to reduce property damage, including garbage and food storage techniques, proper use of bird feeders, and the use of electric fences. Proper storage of garbage continues to be a problem in both subunits, especially in the more rural portions of the valley. Educational efforts that emphasize the relationship between problem bears and garbage need to continue in order to slowly increase compliance. Information should also be distributed on how people should respond to bears during encounters to prevent or minimize the severity of attacks. Videos and DVD's titled "Staying Safe in Bear Country" and "Living in Bear Country" produced in 2002 and 2005 are made available to the public. These and similar efforts to educate the public should be continued in Subunits 14A and 14B.

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Table 1. Subunits 14A and 14B brown bear harvest, regulatory years 2006 through 2011.

Regulatory Year	Reported						Estimate of Unreported kill			Total estimated kill						
	Hunter kill			Nonhunting kill <sup>a</sup>			M	F	Unk.	M	F	Unk.	Total			
M	(%)	F	(%)	Unk.	Total	(%)								(%)	(%)	(%)
<i>2006</i>																
Fall 2006	4	(50)	4	(50)	0	8	1	1	0	1	5	(50)	5	(50)	1	11
Spring 2007	8	(89)	1	(11)	0	9	0	1	0	1	8	(80)	2	(20)	1	11
Total	12	(71)	5	(29)	0	17	1	2	0	2	13	(65)	7	(35)	2	22
<i>2007</i>																
Fall 2007	8	(40)	12	(60)	0	20	1	0	0	1	9	(43)	12	(57)	1	22
Spring 2008	6	(86)	1	(14)	0	7	0	0	0	1	6	(86)	1	(14)	1	8
Total	14	(52)	13	(48)	0	27	1	0	0	2	15	(54)	13	(46)	2	30
<i>2008</i>																
Fall 2008	10	(45)	12	(55)	0	22	2	1	0	1	12	(48)	13	(52)	1	26
Spring 2009	7	(87)	1	(13)	0	8	0	1	0	1	7	(78)	2	(22)	1	10
Total	17	(57)	13	(43)	0	30	2	2	0	2	19	(56)	15	(44)	2	36
<i>2009</i>																
Fall 2009	5	(36)	9	(64)	0	14	1	0	0	1	6	(40)	9	(60)	1	16
Spring 2010	5	(71)	2	(29)	0	7	0	1	0	1	5	(63)	3	(47)	1	9
Total	10	(48)	11	(52)	0	21	1	1	0	2	11	(48)	12	(52)	2	25
<i>2010</i>																
Fall 2010	16	(53)	14	(47)	0	30	1	2	0	1	17	(52)	16	(48)	1	34
Spring 2011	0	(0)	1	(10)	0	1	1	0	0	1	1	(50)	1	(50)	1	3
Total	16	(52)	15	(48)	0	31	2	2	0	2	18	(51)	17	(49)	2	37
<i>2011</i>																
Fall 2011	6	(55)	5	(45)	0	11	0	2	0	1	6	(46)	7	(54)	1	14
Spring 2012	5	(45)	6	(55)	0	11	1	1	1	1	6	(46)	7	(54)	2	15
Total	11	(50)	11	(50)	0	22	1	3	1	2	12	(46)	14	(54)	3	29

<sup>a</sup>Includes DLPs, illegal kills, and other human-caused mortality unrelated to hunting.

Table 2. Subunits 14A and 14B brown bear successful hunter residency, regulatory years 2002 through 2011.

Regulatory year	Local <sup>a</sup> resident		Nonlocal resident		Nonresident		Total successful hunters
		(%)		(%)		(%)	
2002	15	(88)	1	(6)	1	(6)	17
2003	18	(82)	1	(5)	3	(13)	22
2004	5	(56)	0	(0)	4	(44)	9
2005	14	(64)	1	(4)	7	(32)	22
2006	9	(53)	0	(0)	8	(47)	17
2007	16	(59)	1	(4)	10	(37)	27
2008	24	(80)	0	(0)	6	(20)	30
2009	17	(81)	0	(0)	4	(19)	21
2010	19	(61)	4	(13)	8	(26)	31
2011	14	(64)	2	(9)	6	(27)	22

<sup>a</sup>Unit 14 residents

Table 3. Subunits 14A and 14B brown bear harvest chronology percent by month, regulatory years 2002 through 2011.

Regulatory year	Harvest periods									
	August	September	October	November	March	April	May	June	July	<i>n</i>
2002	0	76	6	6	0	0	12	0	0	17
2003	0	38	10	0	0	5	48	0	0	21
2004	0	45	0	0	0	33	22	0	0	9
2005	4	82	0	0	0	9	5	0	0	22
2006	0	41	6	0	0	41	12	0	0	17
2007	0	73	3	0	0	12	12	0	0	26
2008	0	57	17	0	3	3	20	0	0	30
2009	10	35	15	5	0	10	25	0	0	20
2010	26	61	7	0	0	0	3	0	3	31
2011	18	32	0	0	0	18	32	0	0	22

Table 4. Subunits 14A and 14B brown bear harvest percent by transport method, regulatory years 2002 through 2011.

Regulatory year	Percent of harvest								<i>n</i>
	Airplane	Horse	Boat	ATV/ORV	Snowmachine	Highway vehicle	Foot	Unknown	
2002	12	0	12	53	0	17	6	0	17
2003	14	0	18	36	4	14	14	0	22
2004	10	0	10	20	30	10	20	0	10
2005	18	0	27	18	5	23	9	0	22
2006	23	0	6	23	24	12	12	0	17
2007	26	0	11	22	11	26	4	0	27
2008	20	0	17	47	3	3	10	0	30
2009	16	0	16	37	5	10	16	0	19
2010	19	0	23	13	0	19	16	10	31
2011	9	0	5	32	18	18	14	5	22

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
907-465-4190 PO BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012

**GAME MANAGEMENT UNIT:** 14C (1,912 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Municipality of Anchorage

**BACKGROUND**

Unit 14C, comprising the Municipality of Anchorage, is a mosaic of large tracts of natural wildlife habitat and areas of human development. Forty percent of the state's human population (290,000 people) and numerous brown bears live in Unit 14C. As a result, the Unit 14C brown bear population has been influenced by habitat fragmentation and alteration, urbanization, and other human activities. Cumulatively, these factors have caused an increased number of brown bear-human conflicts and interactions.

As the number of outdoor recreationists and residential neighborhoods in prime bear habitat increase, so do brown bear-human encounters. Since 1990, 14 people have been injured and 2 killed by brown bears in Unit 14C. There are no documented maulings before the late 1980s, but the number of people injured in the last decade (2002–2012;  $n=10$ ) is higher than the number of people injured or killed in the previous decade (1991–2001;  $n=6$ ). During the last decade (2002–2012), 32 brown bears have been reported killed in Unit 14C in defense of life or property or by authorities because they constituted an immediate threat to public safety.

The Alaska Department of Fish and Game (ADF&G) has coordinated with other local, state, and federal agencies, as well as nonprofit organizations, to address urban bear issues. ADF&G has conducted two detailed public opinion surveys (Responsive Management 2010), engaged other agencies and the public in an urban bear management plan, and created the Anchorage Bear Committee to facilitate coordination and cooperation on bear-related issues in the municipality. In 2008, ADF&G organized the Anchorage Bear Education Committee to help maximize the public benefits of bears while minimizing human-bear conflicts. Along with ADF&G, the education committee has developed web pages, brochures, classroom presentations, bear-safety presentations, bear-awareness seminars, bear-resistant trash container demonstrations, coloring books, bear-safety videos, and other informational and educational activities and products to promote safe activities, minimize food-conditioning of bears, and encourage land-management practices compatible with bear conservation and public safety.

**MANAGEMENT DIRECTION**

**MANAGEMENT GOALS**

Maintain a healthy brown bear population while minimizing negative bear-human encounters and provide an opportunity to hunt brown bears under aesthetically pleasing conditions.

## **MANAGEMENT OBJECTIVES:**

- (1) Provide an opportunity to view and photograph brown bears,
- (2) Work with local residents to reduce bear attractants and defense of life or property kills (DLP), and
- (3) Support a stable brown bear population by maintaining a mean annual human-caused mortality of up to 9 bears, with no more than 3 females > 2 years of age.

## **METHODS**

Department staff 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 database and made available to staff for analysis. Harvest data were compared to previous years.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

There is currently no cost-effective way to census brown bears in a forested environment, as is found throughout the majority of Unit 14C. Farley et al. (2008) identified a minimum number of 36 brown bears using salmon streams within Elmendorf AFB, Fort Richardson (now known as Joint Base Elmendorf Richardson or JBER), the Eagle River drainage, and portions of the Anchorage Bowl. A rough population estimate for brown bears in Unit 14C (65–75 brown bears) has been based on comparison of density estimates from other areas in Alaska. Unfortunately, this estimate is outdated; however, we do not believe the population to be more than 100 bears. Recent public reports and human–bear encounters indicate a viable brown bear population throughout Unit 14C, and, in general, the population appears stable.

### **MORTALITY**

#### *Harvest*

Seasons and Bag Limits. The Remainder of 14C was open to general harvest for brown bears 1 September–31 May, with a bag limit of 1 bear every 4 regulatory years (a regulatory year [RY] runs 1 July through 30 June; e.g., RY10 = 1 July 2010–30 June 2011). Beginning in 2008, the Chugach State Park Management Area was opened to a drawing permit hunt 1 January–31 May, with a bag limit of 1 bear every regulatory year. In 2009, this drawing permit hunt was extended to include a fall season (day after Labor Day–31 May), and included the upper Eagle River Valley. In addition, beginning in 2009, an archery-only brown bear drawing hunt was opened within Chugach State Park in the Eklutna Management Area, from the day after Labor Day through 31 May, with a bag limit of 1 bear every regulatory year. Harvesting cubs and sows accompanied by cubs was prohibited throughout Subunit 14C. Residents were required to purchase a \$25 tag for brown bear hunting. Nonresidents paid \$500 for a brown bear tag and had to be accompanied by a guide or a resident relative within second degree of kindred.

There was no open season for brown bear hunting in the JBER, Anchorage, and Birchwood Management Areas.

Board of Game Actions. There were no Board of Game actions that impacted brown bears during this reporting period.

Hunter Harvest. During this reporting period, hunters harvested an average of 4 bears each year (range 2–6; Table 1). This 2-year average is greater than the average of 1.5 bears for RY08 and RY09. There were 3 female brown bears harvested during the reporting period.

Hunter Residency. Nonresidents harvested 3 bears during this reporting period (Table 2). All remaining bears were harvested by residents with 2 bears harvested by residents of Unit 14C and 3 by nonlocal residents.

Harvest Chronology. During the reporting period, 75% of bears were harvested in the fall and 25% were harvested in the spring (Table 3). Most bears were harvested in September ( $n = 4$ ), followed by 2 in October and 1 each in April and May.

Transport Methods. Most brown bear hunters used foot transport or a highway vehicle during the reporting period (Table 4). The propensity for foot transport is most likely a direct reflection of motor vehicle restrictions in Chugach State Park and on Chugach National Forest lands. In reality, most of these hunters probably accessed trailheads by automobile and reported transport improperly. During this same period, 2 hunters used an airplane and 1 used an ATV to access hunting areas.

#### *Other Mortality*

Defense of life or property (DLP) is the primary cause of nonhunting mortality; however, in some years, roadkills account for a large proportion of nonhunting mortality. There were no reported nonhunting mortalities in 2010 and 7 in 2011. We estimate an additional 2 bears per year killed and not reported (Table 1). In Unit 14C, most brown bears shot in defense of life or property were killed in either June or August.

#### **HUMAN INJURIES CAUSED BY BROWN BEARS**

During the reporting period, 4 people were injured by brown bears in Unit 14C (Table 5). The severity of the injuries ranged from superficial scratches to severe lacerations and broken bones. All of the attacks happened in Chugach State Park and resulted from surprising brown bears at close range.

### **CONCLUSIONS AND RECOMMENDATIONS**

Management goals for brown bears in Unit 14C were met for the regulatory years covered in this reporting period. However, human use objectives were exceeded in RY11. Both hunter harvest and DLP kills were at a record high in 2011. The high proportion of subadults killed in defense of life or property may explain the ability to maintain a high mortality rate without observing a decline in brown bear numbers, as the removal of subadults has less of an impact on long-term population dynamics than removal of adult breeding age bears.

The average number of female bears >2 years of age known to be killed in the reporting period was 1.5 per year (including DLP and other nonhunting mortality).

Brown bears in and around Anchorage are seen and reported often during the summer months, resulting in phone calls to the department from concerned citizens. However, with hundreds of encounters and sightings every year, relatively few people are injured annually by brown bears. All of the attacks on humans by brown bears have resulted from surprising bears at close range. Bear safety education and informed planning of trails and development projects will help mitigate future bear attacks.

There have been extensive efforts to educate Anchorage residents on how to live and recreate safely in bear country over the past 10 years. The Anchorage Bear Committee and the Anchorage Bear Education Committee have produced educational materials, safety videos, and public service announcements aimed at reducing bear-human conflicts in the Anchorage area. Recently, productions titled “Staying Safe in Bear Country” and “Living in Bear Country” have been produced with input from staff bear biologists, and made available to the public at ADF&G area offices and at the regional headquarters office. In addition, ADF&G staff have given instructional presentations on installation of electric fences for livestock, as urban chicken rearing has become one of the top three bear conflict issues in Unit 14C.

A recent public opinion survey conducted by Responsive Management for ADF&G indicates that Anchorage residents would like to maintain the current population size of brown bears in Unit 14C (Responsive Management 2010). In addition, Anchorage residents support current management practices of removing individual bears that are a heightened public safety concern (Responsive Management 2010).

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Table 1. Game Management Unit 14C brown bear harvest, 2007–2012.

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.						
2007														
Fall 2007	0	0	(0)	0	0	1	0	2	1	1 (100)	0 (0)	3	4	
Spring 2008	0	0	(0)	0	0	2	0	1	1	2 (100)	0 (0)	2	4	
Total	0	0	(0)	0	0	3	0	3	2	3 (100)	0 (0)	5	8	
2008														
Fall 2008	1	0	(0)	0	1	1	2	3	1	2 (50)	2 (50)	4	8	
Spring 2009	0	0	(0)	0	0	0	0	0	1	0 (0)	0 (0)	1	1	
Total	1	0	(0)	0	1	1	2	3	2	2 (50)	2 (50)	5	9	
2009														
Fall 2009	0	0	(0)	0	0	0	0	0	1	0 (0)	0 (0)	1	1	
Spring 2010	2	0	(0)	0	2	0	1	2	1	2 (67)	1 (33)	3	6	
Total	2	0	(0)	0	2	0	1	2	2	2 (67)	1 (33)	4	7	
2010														
Fall 2010	0	1	(100)	0	1	0	0	0	1	0 (0)	1 (100)	1	2	
Spring 2011	1	0	(0)	0	1	0	0	0	1	1 (100)	0 (0)	1	2	
Total	1	1	(50)	0	2	0	0	0	2	1 (50)	1 (50)	2	4	
2011														
Fall 2011	3	2	(40)	0	5	3	0	0	1	6 (75)	2 (25)	1	9	
Spring 2012	1	0	(0)	0	1	1	2	1	1	2 (50)	2 (50)	2	6	
Total	4	2	(33)	0	6	4	2	1	2	8 (67)	4 (33)	3	15	

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

Table 2. Subunit 14C brown bear successful hunter residency, 2007–2012.

Regulatory year	Local resident*		Nonlocal resident		Nonresident		Total successful hunters
		(%)		(%)		(%)	
2007	0	(0)	0	(0)	0	(0)	0
2008	1	(100)	0	(0)	0	(0)	1
2009	1	(50)	1	(50)	0	(0)	2
2010	1	(50)	0	(0)	1	(50)	2
2011	1	(17)	3	(50)	2	(33)	6

\*Unit 14C residents only.

Table 3. Subunit 14C brown bear harvest chronology percent by month, 2007–2012.

Regulatory year	Harvest periods							<i>n</i>
	August	September	October	November	March	April	May	
2007	0	0	0	0	0	0	0	0
2008	0	100	0	0	0	0	0	1
2009	0	0	0	0	0	50	50	2
2010	0	50	0	0	0	0	50	2
2011	0	50	33	0	0	17	0	6

Table 4. Subunit 14C brown bear harvest percent by transport method, 2007–2012.

Regulatory year	Percent of harvest							<i>n</i>
	Airplane	Horse	Boat	ATV/ORV	Snowmachine	Highway vehicle	Foot	
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	100	1
2009	0	0	50	0	0	0	50	2
2010	50	0	0	0	0	50	0	2
2011	17	0	0	17	0	33	33	6

Table 5. Brown bear attacks in Subunit 14C, 2007–2012.

Date	Location	Activity of Victim	Injuries Suffered
October 25, 2007	Chugach State Park (Crow Pass Trail)	runner	single bite wound
June 30, 2008	Bicentennial Park (Rovers Run Trail)	biker	severe injuries
August 4, 2008	Chugach State Park (Meadow Creek)	hiker	bite wounds and scratches
August 8, 2008	Bicentennial Park (Rovers Run Trail)	runner with dog	severe lacerations
June 15, 2010	Bicentennial Park (Rovers Run Trail)	biker	bite wounds and scratches
August 21, 2011	Chugach State Park (Prospect Heights Trail)	dog walker	scratches
May 12, 2012	Private Property adjacent to Chugach State Park	hiker	severe lacerations
June 10, 2012	Chugach State Park (Penguin Creek)	hiker	single bite wound
June 11, 2012	Chugach State Park (Eagle River Campground Trail)	hiker	bite wounds and broken foot

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 P.O. BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012

**LOCATION**

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

**GEOGRAPHIC DESCRIPTION:** West side of Cook Inlet

**BACKGROUND**

The brown bear population in Unit 16 was estimated in the 1990s by Griese (1993) at 586–1,156. Line transect surveys conducted in the northeastern portion of Unit 16 in 2003 and 2004, and a survey conducted in 2007 arrived at similar conclusions (Peltier 2011). Densities vary from low in the northern and eastern portion of the unit and to greater in the coastal and foothill areas of Redoubt and Trading Bay. There are no brown bears on Kalgin Island. Due to infrequent surveys the department has used harvest data to estimate population trends and has also relied on reports by long-time residents to refine estimated trends (Griese 1998). The bear population estimate was also refined by applying information from surveys conducted in Lake Clark National Park and in Subunit 13A to areas of similar habitat in Unit 16B.

Brown bear management has changed over time to reflect the change in our understanding of harvest sustainability. Brown bears were managed conservatively in Unit 16 from the 1960s into the 1980s with a 1 bear every 4 years bag limit and a fall only season. Harvests ranged from 17 to 46 bears annually between regulatory year (RY) 1961 (RY61 = 1 July 1961 through 30 June 1961) and RY83. In RY84 harvests increased to 66 bears when the hunting season was lengthened to allow hunting during den emergence in March and April. The bag limit in Subunit 16B was liberalized from 1 bear every 4 years to 1 bear every year in RY01 and increased again to 2 bears every year in RY05. The bag limit in Subunit 16A was also liberalized from 1 bear every 4 years to 1 bear per year in RY05, but the change did not apply to hunting in Denali State Park (DSP). By RY07, the bag limit in DSP had also been increased to 1 bear per year. In addition to season and bag limit changes, the resident brown bear tag fee was dropped in Unit 16B in RY03 and in Unit 16A in RY07. These changes resulted in more interest in brown bear hunting in Unit 16 and a record reported harvest of 162 in RY10. During the last 5 years, the annual harvest averaged 122 bears.

An annual sustainable harvest of 55 bears was first estimated by Griese (1993). This included no more than 18 females older than 2 years. Harvests exceeded this level during RY84–RY92. Brown bear numbers, at least females and young, appeared to increase during the 1990s. Also, Griese (1999) reported long-time residents seeing more bears than during the previous 10–20

years. During 1994, the Board of Game directed the department to allow the brown bear population in Unit 16 to decline. The board determined 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. It was modified again in 1998, producing management goals and objectives intended to reduce the bear population. Because harvest levels were not reaching objectives and the ratio of bears to moose was greater than desired, the Board of Game adopted a 10 August opening date in RY99 in Unit 16B. The board lengthened the season in Unit 16A by moving the opening date from 1 September to 10 August, beginning in RY09.

### **MANAGEMENT DIRECTION**

- Reduce the impact of brown bear predation on moose calves in the unit while maintaining a sustainable brown bear population that will allow for consumptive and nonconsumptive uses.

### **POPULATION OBJECTIVES**

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

### **METHODS**

Brown bear harvests were monitored by collecting data gathered during the sealing of skulls and hides of harvested animals. Department personnel or designated sealers measured skulls, determined sex of bears, extracted a premolar tooth for age determination, and recorded date and location of kill, hunter effort, and transportation method. The staff at the Palmer office also collected hair and tissue samples for further analysis. All harvest information was entered into the statewide harvest database, as were age data when they were provided from the lab later in the year. Similar data were collected from bears sealed as taken in defense of life or property (DLP), an illegal kill, or other nonhunting mortality.

### **RESULTS AND DISCUSSION**

#### **POPULATION STATUS AND TREND**

Increased emphasis on hunting brown bears in Unit 16 has not resulted in a decrease in the population. Reports by staff and the public as well as the results of calf mortality studies in southern 16B indicate a robust bear population. Results of line transect surveys conducted in Unit 13 in 1999 and Subunit 16B in 2007 suggested that the density of brown bears in northern Subunit 16B was in the range of 26.7 bears per 1,000 km<sup>2</sup> (Peltier 2011). Earl Becker provided an update to his earlier model and developed a point estimate of brown bear density of 26.3 bears per 1,000 km<sup>2</sup> for both Subunit 16A and the northern and middle portions of Subunit 16B, and an estimate of 100 bears per 1,000 km<sup>2</sup>. These densities result in point estimates of 120 brown bears for Subunit 16A and 798 bears for Subunit 16B. Further refinements of these estimates are anticipated in the future.

#### *Population Size*

The population is currently estimated at between 625 and 1,250 brown bears in Subunit 16B and 100 to 150 brown bears in Subunit 16A.

## **MORTALITY**

### *Harvest*

Season and Bag Limit. The season in Subunit 16B in RY10 was 10 August–31 May with a bag limit of 2 bears every regulatory year, and no resident tag fee was required. The exception to this was the season within 1 mile of Wolverine Creek, where the season was 15 September–31 May. In Subunit 16A the hunting season was 10 August–31 May in RY10, and the bag limit was 1 brown bear per year. Residents were not required to have a brown bear tag except in Denali State Park. Cubs and females accompanied by cubs were not legal to take. In RY11 there were no closed seasons in Unit 16 with the exception of within one mile of Wolverine Creek. This regulation change was expedited effectively preventing the closure of the spring RY10 season.

Board of Game Actions and Emergency Orders. In 2011 the Board of Game approved several changes to increase the take of brown bears in Unit 16. First, seasons in Subunits 16A and 16B were extended to no closed season with the exception of within one mile of the mouth of Wolverine Creek, where the season remained 15 September–31 May. Second, a brown bear control program was initiated in a small portion of southern Subunit 16B. The area available for this program is between the Beluga and the McArthur rivers and is approximately 960 square miles. Under this program permittees may take any brown bear except cubs of the year and females accompanied by cubs of the year. They may set up bait stations and use snares, and they may also take a bear at the bait station the same day they have flown providing they are at least 300 feet from the airplane. These regulations were expedited by the Alaska Department of Law, and went into effect during the RY10 spring season.

Hunter Harvest. The hunter harvest has been highly variable over the past 10 years (Table 1 and 2). The 10-year annual average for both subunits combined was 113.6 bears and the range varied from 69 to 159. Increases in harvest typically occur after changes in the regulations and then return to a lower level. This was seen in RY04 after the Board of Game increased the limit from 1 bear per year to 2 bears per year. It was seen again in RY10 when brown bear control was implemented in 16B. Twenty-nine bears were taken in the spring of RY10 under predator control permits, followed by 3 bears in the fall of RY11 and 5 in the spring of RY11. Over the past 20 years the total number of females harvested has increased; however, the percent of females in the harvest has stayed relatively constant at 35%.

Hunter Residency and Success. Nonresident harvest decreased from the previous reporting period. Nonresidents claimed 37% and 43% of the harvest in RY10 and RY11 respectively (Table 3). The percentage of bears taken by local residents remained small. Local residents were responsible for 2% of the take in RY10 and 0% of the take in RY11.

Harvest Chronology. Brown bear seasons were expanded in the spring of RY10 to no closed season with the exception of within a mile of the mouth of Wolverine Creek in 16B. These changes led to slight shifts in the chronology of the harvest; however the majority of the bears taken during the reporting period were taken in the fall (Table 4). The proportion of bears taken in the spring varies with the spring snowpack. A spring season characterized by a long lasting snow that holds up to travel well will result in a greater number of bears taken in April and May. this effect can also be seen in the relative percentage of successful hunters using snowmachines (Table 5).

Transport Methods. Well over 50% of successful brown bear hunters reported using airplanes for transportation (Table 5). There is often a slight increase in snowmachine use that coincides with years with good snow conditions in the spring.

#### *Other Mortality*

During the report period there were 7 reports of nonhunting mortality (Tables 1 and 2). We estimated unreported take of brown bears in Unit 16 may account for an additional 9% of the total take annually.

#### **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

The potential for resource exploration in Subunit 16B has resulted in an increase in the number of work crews in remote areas and thus the potential for conflict with brown bears in the area. A geologist working in the Rainy Pass area was attacked 21 June 2010 by a female bear with a cub. The injuries were serious but not life threatening. He was medevacked to Anchorage for treatment. Personnel from the Rainy Pass Lodge and the geology crew attempted to find and kill the brown bear but were unsuccessful. Other incidents involving human-bear encounters that could have but did not result in injuries have been reported.

There has also been a potential increase for conflict associated with bear viewing activities, which are on the rise, especially in lower Subunit 16B. Also, Griese (1998) noted dangerous interactions between humans and bears resulting from sport fishing at Wolverine Creek and currently that activity continues. ADF&G has worked to educate users, and commercial operators specifically, and to develop a multidivisional management strategy to promote safer conditions for anglers and bear viewers (Griese 1999).

#### **CONCLUSIONS AND RECOMMENDATIONS**

The emphasis on reducing the number of brown bears in the unit in order to increase calf survival does not appear to have had a significant effect on the size of the bear population. The harvest in this decade has been almost twice as high as Griese estimated was sustainable in 1993 with no evidence that harvest strategies have had a significant impact on the brown bear population. Given the high population of brown bears and the low moose calf recruitment further steps may be required to reduce the bear population and thus increase the rate of recovery of the moose population. The department must continue to closely monitor harvest, particularly age and sex of bears, to avoid reducing the population below objectives.

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Table 1. Unit 16A human-caused brown bear mortality, regulatory years 2002 through 2011.

Regulatory Year	Reported						Estimate of Unreported kill			Total estimated kill						
	Hunter kill			Nonhunting kill <sup>a</sup>			M	F	Unk.	M	(%)	F	(%)	Unk.	Total	
M	(%)	F	(%)	Unk.	Total	M										F
<i>2002</i>																
Fall 2002	3	(75)	1	(25)	0	4	0	0	0		3	(75)	1	(25)	0	4
Spring 2003	1	(100)	0	(0)	0	1	1	0	0		2	(100)	0	(0)	0	2
Total	4	(80)	1	(20)	0	5	1	0	0	1	5	(83)	1	(17)	1	7
<i>2003</i>																
Fall 2003	3	(50)	3	(50)	0	6	0	0	0		3	(50)	3	(50)	0	6
Spring 2004	4	(100)	0	(0)	0	4	0	0	0		4	(100)	0	(0)	0	4
Total	7	(70)	3	(30)	0	10	0	0	0	2	7	(70)	3	(30)	2	12
<i>2004</i>																
Fall 2004	3	(75)	1	(25)	0	4	0	0	0		3	(75)	1	(25)	0	4
Spring 2005	6	(86)	1	(14)	0	7	0	0	0		6	(86)	1	(14)	0	7
Total	9	(82)	2	(18)	0	11	0	0	0	2	9	(82)	2	(18)	2	13
<i>2005</i>																
Fall 2005	4	(40)	6	(60)	0	10	0	0	0		4	(40)	6	(60)	0	10
Spring 2006	1	(50)	1	(50)	0	2	0	0	0		1	(50)	1	(50)	0	2
Total	5	(42)	7	(58)	0	12	0	0	0	2	5	(42)	7	(58)	2	14
<i>2006</i>																
Fall 2006	5	(56)	4	(44)	0	9	0	0	0		5	(56)	4	(44)	0	9
Spring 2007	4	(40)	6	(60)	0	10	0	0	0		4	(40)	6	(60)	0	10
Total	9	(47)	10	(53)	0	19	0	0	0	2	9	(47)	1	(53)	2	21
<i>2007</i>																
Fall 2007	5	(71)	2	(29)	0	7	0	0	0		5	(71)	2	(29)	0	7
Spring 2008	4	(67)	2	(33)	0	6	0	0	0		4	(67)	2	(33)	0	6
Total	9	(69)	4	(31)	0	13	0	0	0	2	9	(69)	4	(31)	2	15

Table 1 continued.

Regulatory Year	Reported						Nonhunting kill <sup>a</sup>			Estimate of Unreported kill	Total estimated kill					
	Hunter kill		Nonhunting kill <sup>a</sup>		Unreported kill		M	(%)	F		(%)	Unk.	Total			
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
<i>2008</i>																
Fall 2008	1	(33)	2	(67)	0	3	0	0	0		1	(33)	2	(67)	0	3
Spring 2009	13	(76)	4	(24)	0	17	0	0	0		13	(76)	4	(24)	0	17
Total	14	(70)	6	(30)	0	20	0	0	0	2	14	(70)	6	(30)	2	22
<i>2009</i>																
Fall 2009	3	(43)	4	(57)	0	7	1	0	0		4	(50)	4	(50)	0	8
Spring 2010	8	(80)	2	(20)	0	10	0	0	0		8	(80)	2	(20)	0	10
Total	11	(65)	6	(35)	0	17	1	0	0	2	12	(67)	6	(33)	3	21
<i>2010</i>																
Fall 2010	4	(29)	10	(71)	0	14	0	0	1		4	(29)	10	(71)	1	15
Spring 2011	0	(0)	2	(10)	0	2	0	0	0		0	(0)	2	(20)	0	2
Total	4	(25)	12	(75)	0	16	0	0	1	2	4	(25)	12	(75)	3	19
<i>2011</i>																
Fall 2011	4	(44)	5	(56)	0	9	0	0	0		4	(44)	5	(56)	0	9
Spring 2012	8	(80)	2	(20)	0	10	0	0	0		8	(80)	2	(20)	0	10
Total	12	(63)	7	(37)	0	19	0	0	0	2	12	(63)	7	(37)	2	21

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

Table 2. Unit 16B human-caused brown bear mortality, regulatory years 2002 through 2011.

Regulatory Year	Reported						Estimate of Unreported kill			Total estimated kill						
	Hunter kill		Nonhunting kill <sup>a</sup>				M	F	Unk.	M	(%)	F	(%)	Unk.	Total	
M	(%)	F	(%)	Unk.	Total	M										F
<i>2002</i>																
Fall 2002	21	(52)	19	(48)	0	40	0	0	0		21	(52)	1	(48)	0	40
Spring 2003	21	(87)	3	(13)	0	24	0	0	0		21	(87)	3	(13)	0	24
Total	42	(66)	22	(34)	0	64	0	0	0	5	42	(66)	2	(34)	5	69
<i>2003</i>																
Fall 2003	22	(56)	17	(44)	0	39	0	0	0		22	(56)	1	(44)	0	39
Spring 2004	38	(90)	4	(10)	0	42	0	0	0		38	(90)	4	(10)	0	42
Total	60	(74)	21	(26)	0	81	0	0	0	6	60	(74)	2	(26)	6	87
<i>2004</i>																
Fall 2004	32	(73)	12	(27)	0	44	1	1	0		33	(72)	1	(28)	0	46
Spring 2005	56	(81)	13	(19)	1	70	0	1	0		56	(80)	1	(20)	1	71
Total	88	(78)	25	(22)	1	114	1	2	0	9	89	(77)	2	(23)	10	126
<i>2005</i>																
Fall 2005	37	(60)	25	(40)	1	63	0	0	0		37	(60)	2	(40)	1	63
Spring 2006	37	(74)	13	(26)	1	51	0	0	0		37	(74)	1	(26)	1	51
Total	74	(66)	38	(34)	2	114	0	0	0	9	74	(66)	3	(34)	11	123
<i>2006</i>																
Fall 2006	35	(62)	21	(38)	0	56	0	0	0		35	(62)	2	(38)	0	56
Spring 2007	36	(88)	5	(12)	0	41	0	0	0		36	(88)	5	(12)	0	41
Total	71	(73)	26	(27)	0	97	0	0	0	9	71	(73)	2	(27)	9	106
<i>2007</i>																
Fall 2007	38	(59)	26	(41)	0	64	0	0	0		38	(59)	2	(41)	0	64
Spring 2008	29	(81)	7	(19)	0	36	0	0	0		29	(81)	7	(19)	0	36
Total	67	(67)	33	(33)	0	100	0	0	0	9	67	(67)	3	(33)	9	109

Table 2 continued.

Regulatory Year	Reported						Nonhunting kill <sup>b</sup>			Estimate of Unreported kill	Total estimated kill					
	Hunter kill <sup>a</sup>			Unk.			M	F	Unk.		M	(%)	F	(%)	Unk.	Total
<i>2008</i>																
Fall 2008	39	(47)	44	(53)	0	83	1	0	0		40	(48)	44	(52)	0	84
Spring 2009	27	(90)	3	(10)	0	30	2	1	0		29	(88)	4	(12)	0	33
Total	66	(58)	47	(42)	0	113	1	1	0	9	67	(59)	48	(41)	9	124
<i>2009</i>																
Fall 2009	17	(53)	15	(47)	0	32	0	1	1		17	(52)	16	(48)	1	34
Spring 2010	25	(74)	9	(26)	0	34	0	1	0		25	(71)	10	(29)	0	35
Total	42	(64)	24	(36)	0	66	0	2	1	6	42	(62)	26	(38)	7	75
<i>2010</i>																
Fall 2010	59	(63)	34	(37)	0	93	1	1	0		60	(63)	35	(37)	0	95
Spring 2011	36	(68)	17	(32)	0	53	0	0	0		36	(68)	17	(32)	0	53
Total	95	(65)	51	(35)	0	146	1	1	0	13	96	(65)	52	(35)	13	161
<i>2011</i>																
Fall 2011	33	(51)	32	(49)	0	65	1	0	0		34	(52)	32	(48)	0	66
Spring 2012	25	(68)	12	(32)	0	37	3	0	0		28	(70)	12	(30)	0	40
Total	58	(57)	44	(43)	0	102	4	0	0	9	62	(58)	44	(42)	9	115

<sup>a</sup> Includes bears taken under the predator control program.

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

Table 3. Unit 16 brown bear successful hunter residency, regulatory years 2002 through 2011.

Regulatory year	Local <sup>a</sup> resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total <sup>b,c</sup> successful hunters
2002	1	(1)	24	(35)	44	(64)	69
2003	6	(7)	43	(47)	42	(46)	91
2004	5	(4)	60	(48)	60	(48)	125
2005	3	(2)	78	(62)	45	(36)	126
2006	2	(2)	67	(58)	47	(40)	116
2007	5	(5)	58	(51)	50	(44)	113
2008	3	(2)	67	(51)	62	(47)	132
2009	3	(4)	43	(52)	37	(44)	83
2010	2	(1)	102	(62)	60	(37)	164
2011	0	(0)	72	(57)	54	(43)	126

<sup>a</sup> Unit 16 residents

<sup>b</sup> Includes unknown residency

<sup>c</sup> Does not include predator control

Table 4. Unit 16 brown bear harvest chronology percent by month, regulatory years 2002 through 2011<sup>a</sup>.

Regulatory Year	Harvest periods									<i>n</i>
	August	September	October	November	March	April	May	June	July	
2002	14	41	9	0	0	29	7	0	0	69
2003	10	32	7	1	0	37	13	0	0	91
2004	12	23	3	1	1	43	17	0	0	125
2005	14	34	10	0	1	19	22	0	0	126
2006	17	33	5	1	0	22	22	0	0	116
2007	24	32	5	3	0	22	14	0	0	113
2008	32	27	7	0	1	15	18	0	0	131
2009	18	22	6	1	0	26	27	0	0	82
2010	27	31	8	0	0	12	6	16	0	164
2011	18	28	6	0	0	27	4	10	8	126

<sup>a</sup> Does not include predator control

Table 5. Unit 16 brown bear harvest percent by transport method, regulatory years 2000 through 2009<sup>a</sup>.

Regulatory Year	Percent of harvest							Other/ Unknown	<i>n</i>
	Airplane	Horse	Boat	ATV/ORV	Snowmachine	Highway vehicle	Foot		
2002	69	1	11	6	4	3	6	0	71
2003	66	2	8	9	12	1	2	0	91
2004	62	3	8	4	15	0	8	0	128
2005	63	5	13	6	5	2	6	0	126
2006	61	3	15	9	6	2	3	1	116
2007	60	7	11	9	10	3	0	0	113
2008	66	4	11	8	6	0	5	0	133
2009	52	5	16	13	9	4	1	0	76
2010	56	4	13	17	3	2	4	0	156
2011	55	6	10	6	17	3	1	2	125

<sup>a</sup> Does not include predator control.

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 P.O. BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** 17A, 17B, and 17C (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 Kulukak drainages, as well as throughout the Wood River/Tikchik Lakes. Bears also are observed occasionally near aggregations of the Mulchatna caribou herd.

Bears in Game Management Unit 17 are neither as abundant nor usually as large as those found along the Alaska Peninsula, so historically there hadn't been as much hunting pressure on this bear population.

Along with increased interest in hunting bears elsewhere in the state, bear hunting in Unit 17 has increased since the mid-1990s. Prior to 1970, few bears were reported as harvested from the unit. When the Board of Game restricted bear hunting opportunity in Unit 9 in regulatory year (RY) 1975 (RY75 = 1 July 1975 through 30 June 1976) by only allowing bears to be hunted during alternating seasons (open during the fall of odd-numbered years and the spring of even-numbered years), the number of bears reported killed in Unit 17 increased. The increase in reported harvest may have been partially due to the displacement of some hunters and guiding activities from Unit 9 to Unit 17, which had more consistent bear hunting opportunity. There was also increased enforcement effort aimed at reducing the illegal harvest of brown bears that may have led to better reporting. Between RY70 and RY97, annual reported harvests rarely exceeded 50 bears per year. Since 1997, annual reported bear harvests have increased substantially. From RY72 to RY80, the harvest was generally balanced between the spring and fall seasons. Between RY82 and RY97 there were higher harvests during fall seasons than during the spring. Beginning with the increased spring hunting season length during the 1998 regulatory year, spring harvests exceeded fall harvests for several years. However, during recent years, fall harvests have increased to where they are almost twice the spring take.

One reason for the increase in the fall harvest through the mid-1990s was increased hunting pressure on the rapidly growing Mulchatna caribou herd (Van Daele 1997; Woolington 2003). Reported moose hunting activity and harvests also increased dramatically during this same

period (Woolington 2002). With more hunters in the field hunting caribou and moose, more bears were killed either incidentally or during “combination” hunts. However, with the decline in the Mulchatna caribou herd, fewer caribou hunters are now coming to Unit 17 (Woolington 2009). Increased spring harvest, however, demonstrated the rising interest in hunting brown bears in Unit 17. Present bear harvest numbers probably reflect the popularity of bear hunting, as well as the ability for guided hunters to participate in multi-species hunts: moose, brown bear, black bear, and wolf.

Reported harvests reflect only a portion of the brown bears killed in the unit. All villages in the area 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. Many local residents have a low tolerance for bears near villages and fish sites, and they occasionally kill bears in these areas. Although reporting rates seem to have improved in recent years, many nonhunting mortalities are reported either indirectly or not at all. Because of unreported kills, any conclusions based solely on harvest data should be viewed with caution.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVES**

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

## **METHODS**

Each brown bear legally harvested or reported 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**

### **POPULATION STATUS AND TREND**

No objective data on the status of the bear population specific to Unit 17 are available. The brown bear population is probably stable to increasing unitwide. 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 hunting pressure.

#### *Population Size*

No population size or density estimates have been made for the Unit 17 brown bear population. 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 throughout the unit.

### **MORTALITY**

#### *Harvest*

#### Season and Bag Limit

Units 17A, B, and C	20 Aug–31 May	2 bears per regulatory year
Units 17A, B, and C	20 Aug–31 May	2 bears per regulatory year
Residents only, by registration permit		

Human-Induced Mortality. During RY10, 137 hunters reported killing brown bears in Unit 17, 77 males (56%) and 60 females (44%; Table 1). During the RY11 hunting seasons, 168 hunters reported killing brown bears in Unit 17, including 104 males (62%) and 63 females (38%) and 1 bear of undetermined sex (Table 1). Compared to the mean annual reported harvest of the previous five years (118 bears), hunter kill from this reporting period shows continued increase.

The average skull size of bears presented for sealing in RY10 was 22.9 inches ( $n = 75$ , range 17.7–28.5 inches) for males and 20.9 inches ( $n = 59$ , range 16.1–24.7 inches) for females. The average skull size of bears presented for sealing in RY11 was 23.3 inches ( $n = 100$ , range 18.8–28.0 inches) for males and 21.5 inches ( $n = 58$ , range 17.0–26.1 inches) for females.

In RY10, 18 bears (12 males, 6 females) were reported killed in Unit 17A; 80 (39 males, 41 females) were reported killed in Unit 17B; and 39 (26 males and 13 females) were reported from Unit 17C. In RY11 26 bears (18 males, 7 females, and 1 bear of unknown sex) were reported killed in Unit 17A, 99 (58 males and 41 females) were reported killed in Unit 17B, and 42 (28 males and 14 females) were reported from Unit 17C. In the past 5 years, 16% of the bears reported killed in the unit have been taken in Unit 17A, 57% in 17B, and 27% in 17C (Table 2).

Hunter Residency and Success. Nonresidents account for most of the brown bear harvest in Unit 17. During RY10 nonresidents took 75% of the bears reported killed in the unit. During RY11 nonresidents took 74% of the bears reported killed in the unit (Table 3).

Harvest Chronology. One hundred and one bears were reported killed during the fall hunting season in RY10, and 36 bears were reported killed during the spring. One hundred and twenty two bears were reported killed during the fall hunting season in RY11, and 46 bears were reported killed during the spring (Tables 1 and 4). Prior to 1998, most bears were consistently reported killed in fall in Unit 17. When the spring season was lengthened, spring harvests increased and for several years exceeded that reported taken in the fall (Table 4). For the past several years, numbers reported taken in the fall exceed the spring harvest, but then the fall harvest is also almost twice that of previous years. It is likely that the ability for nonresident guided hunters to take bears while on combination hunts for moose, and the interest of resident

hunters in taking bears while moose and caribou hunting have contributed to the increased number of bears taken during the fall.

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

#### *Other Mortality*

Five brown bears were reported killed in defense of life or property in Unit 17 during RY10, with reports of 2 bears killed illegally. Five brown bears were reported killed in defense of life or property in Unit 17 during RY11, with reports of 2 known illegal kills. Based on observations from previous years, additional illegal kills likely occurred.

#### **HABITAT**

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 a steady 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. Proposed development of mines in the area have the possibility of affecting bear habitat, but the degree to which the exploration and possible mine development might affect denning and use of the area by bears is currently unknown.

#### **NONREGULATORY PROBLEMS/NEEDS**

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 has worked with city and local village government representatives and 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 and have been very effective.

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 Alaska 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 for more than two decades. The open landfill formerly used was closed and covered in 2003. The new landfill was moved to a different location and uses the “closed cell” concept. Garbage and waste material dropped off by the public at a transfer site is now incinerated before being hauled to a disposal site, which is covered with soil at the end of each day. In addition, the transfer and

disposal sites are enclosed by chain link as well as electric fences. The former dump site attracted large numbers of bears to the surrounding residential areas. The design and operation of the new landfill has significantly reduced the number of bears and bear problems in the immediate Dillingham area.

## CONCLUSIONS

Despite harvests during the reporting period of more than 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 (reported plus unreported) in the unit is unknown.

It is unknown if the unequal distribution of harvest in the unit is due to bear distribution or hunter effort. Efforts to better distribute hunting pressure to other areas of the unit should continue.

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

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Table 1. Unit 17 brown bear harvest, regulatory years 2000 through 2011.

Regulatory year	Hunter Kill				Nonhunting Kill				Total reported kill			
	Male	Female	Unk	Total	Male	Female	Unk	Total	Male	Female	Unk	Total
2000												
Fall 00	33	27	1	61	4	2	2	8	37	29	3	69
Spring 01	36	7	0	43	0	0	0	0	36	7	0	43
Total	69	34	1	104	4	2	2	8	73	36	3	112
2001												
Fall 01	21	25	1	47	0	3	0	3	21	28	1	50
Spring 02	42	4	1	47	0	0	0	0	42	4	1	47
Total	63	29	2	94	0	3	0	3	63	32	2	97
2002												
Fall 02	35	37	0	72	4	0	1	5	39	37	1	77
Spring 03	21	6	0	27	0	0	0	0	21	6	0	27
Total	56	43	0	99	4	0	1	5	60	43	1	104
2003												
Fall 03	26	42	0	68	2	2	0	4	28	44	0	72
Spring 04	27	5	0	32	0	0	0	0	27	5	0	32
Total	53	47	0	100	2	2	0	4	55	49	0	104
2004												
Fall 04	23	27	0	50	0	0	0	0	23	27	0	50
Spring 05	30	5	0	35	1	0	0	1	31	5	0	36
Total	53	32	0	85	1	0	0	1	54	32	0	86
2005												
Fall 05	35	39	0	74	0	0	0	0	35	39	0	74
Spring 06	33	13	0	46	0	0	0	0	33	13	0	46
Total	68	52	0	120	0	0	0	0	68	52	0	120

Table 1 continued.

Regulatory year	Hunter Kill				Nonhunting Kill				Total reported kill			
	Male	Female	Unk	Total	Male	Female	Unk	Total	Male	Female	Unk	Total
2006												
Fall 06	32	40	0	72	2	2	1	5	34	42	1	77
Spring 07	36	7	0	43	0	0	0	0	36	7	0	43
Total	68	47	0	115	2	2	1	5	70	49	1	120
2007												
Fall 07	34	37	0	71	0	1	0	1	34	38	0	72
Spring 08	29	18	0	47	0	0	0	0	29	18	0	47
Total	63	55	0	118	0	1	0	1	63	56	0	119
2008												
Fall 08	40	27	0	67	0	1	0	1	40	28	0	68
Spring 09	29	13	0	42	0	0	1	1	29	13	1	43
Total	69	40	0	109	0	1	1	2	69	41	1	111
2009												
Fall 09	52	40	1	93	2	0	0	2	54	40	1	95
Spring 10	27	7	0	34	1	0	0	1	28	7	0	35
Total	79	47	1	127	3	0	0	3	82	47	1	130
2010												
Fall 10	48	53	0	101	2	2	1	5	50	55	1	106
Spring 11	29	7	0	36	0	2	0	2	31	9	0	40
Total	77	60	0	137	2	4	1	7	81	64	1	146
2011												
Fall 11	73	48	1	122	5	1	0	6	78	49	1	128
Spring 12	31	15	0	46	0	0	0	0	31	15	0	46
Total	104	63	1	168	5	1	0	6	109	64	1	174

Table 2. Unit 17 brown bear harvest by subunit, regulatory years 1991 through 2011.

Regulatory Year	Unit												Unit 17 total <sup>a</sup>			
	17(A)				17(B)				17(C)				M	F	Unk	Total
	M	F	Unk	Total	M	F	Unk	Total	M	F	Unk	Total	M	F	Unk	Total
1991	2	2	0	4	18	12	2	32	6	3	0	9	26	17	2	45
1992	1	3	0	4	21	7	0	28	13	4	0	17	35	14	0	49
1993	1	2	0	3	16	6	0	22	4	4	0	8	21	12	0	33
1994	0	3	0	3	16	14	0	30	7	3	0	10	23	20	0	43
1995	1	3	0	4	19	13	0	32	7	3	0	10	27	19	0	46
1996	3	0	0	3	18	9	1	28	10	6	0	16	31	15	1	47
1997	3	0	0	3	28	18	0	46	11	6	0	17	42	24	0	66
1998	4	0	0	4	36	19	0	55	16	3	0	19	56	22	0	78
1999	7	3	0	10	33	17	0	50	17	5	0	22	57	25	0	82
2000	6	1	0	7	44	26	1	71	19	7	0	26	69	34	1	104
2001	3	2	0	5	31	17	0	48	29	10	2	41	63	29	2	94
2002	3	1	0	4	41	38	0	79	12	4	0	16	56	43	0	99
2003	5	5	0	10	29	31	0	60	19	11	0	30	53	47	0	100
2004	6	1	0	7	23	25	0	48	24	6	0	30	53	32	0	85
2005	12	5	0	17	33	39	0	72	23	8	0	31	68	52	0	120
2006	9	2	0	11	45	39	0	84	14	6	0	20	68	47	0	115
2007	8	13	0	21	34	32	0	66	21	10	0	31	63	55	0	118
2008	11	5	0	16	33	27	0	60	24	8	0	32	69	40	0	109
2009	13	9	0	22	40	31	1	72	26	7	0	33	79	47	1	127
2010	12	6	0	18	39	41	0	80	26	13	0	39	77	60	0	137
2011	18	7	1	26	58	41	0	99	28	14	0	42	104	62	1	168

<sup>a</sup> Total harvest may include bears taken in a Unit 17 that could not be assigned to a subunit.

Table 3. Unit 17 brown bear successful hunter residency, regulatory years 1991 through 2011.

Regulatory Year	Local <sup>a</sup> resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters <sup>b</sup>
1991	5 (11)	2 (4)	38 (85)	45
1992	8 (17)	4 (9)	35 (74)	49
1993	2 (6)	2 (6)	28 (88)	33
1994	4 (9)	2 (5)	37 (86)	43
1995	2 (4)	11 (24)	33 (72)	46
1996	4 (9)	4 (9)	39 (82)	47
1997	1 (1)	9 (14)	56 (85)	66
1998	5 (6)	3 (4)	70 (90)	78
1999	8 (10)	11 (13)	63 (77)	82
2000	1 (1)	14 (13)	89 (86)	104
2001	6 (7)	16 (17)	71 (76)	94
2002	2 (2)	15 (15)	81 (83)	99
2003	7 (7)	17 (17)	76 (76)	100
2004	5 (6)	9 (11)	71 (83)	85
2005	17 (14)	24 (20)	79 (66)	120
2006	3 (3)	20 (17)	92 (80)	115
2007	7 (6)	19 (16)	92 (78)	118
2008	12 (11)	14 (13)	83 (76)	109
2009	11 (9)	27 (21)	89 (70)	127
2010	14 (10)	20 (15)	103 (75)	137
2011	11 (7)	33 (20)	124 (74)	168

<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 years 1991 through 2011.

Regulatory Year	Fall Season				Spring Season				Total
	20-31 Aug	1-15 Sep	16-30 Sep	1-15 Oct	1-15 Apr	16-30 Apr	1-15 May	16-31 May	
1991 <sup>a</sup>	----	7%	53%	11%	----	2%	11%	16%	45
1992 <sup>a</sup>	----	12%	47%	6%	----	----	21%	14%	49
1993 <sup>a, b</sup>	----	9%	49%	24%	----	----	6%	12%	33
1994 <sup>a, b</sup>	----	9%	58%	16%	----	----	5%	12%	43
1995 <sup>a, b</sup>	----	11 %	46%	11%	----	----	15%	17%	46
1996 <sup>a, b</sup>	----	6%	34%	24%	----	----	17%	19%	47
1997 <sup>c</sup>	----	7%	30%	18%	----	23%	14%	7%	66
1998 <sup>c</sup>	----	2%	25%	18%	----	27%	19%	9%	78
1999 <sup>c</sup>	----	4%	29%	12%	5%	21%	24%	5%	82
2000	----	5%	44%	10%	2%	18%	14%	7%	105
2001 <sup>d</sup>	----	6%	35%	9%	9%	28%	11%	3%	94 <sup>e</sup>
2002 <sup>d</sup>	----	8%	52%	13%	1%	9%	12%	5%	99
2003 <sup>f</sup>	----	11%	48%	7%	4%	16%	11%	----	100 <sup>g</sup>
2004	----	13%	39%	7%	16%	18%	6%	1%	85
2005 <sup>h</sup>	----	26%	28%	8%	3%	21%	8%	6%	120
2006	----	25%	33%	4%	7%	13%	15%	3%	115
2007	----	27%	30%	3%	2%	25%	10%	3%	118
2008	----	26%	28%	8%	6%	18%	7%	7%	109
2009	----	40%	27 %	6 %	4%	10%	10%	3%	127
2010	----	48%	23%	3%	3%	12%	7%	4%	137
2011 <sup>i</sup>	16%	38%	17%	1%	2%	15%	2%	8%	168 <sup>j</sup>

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

<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), 1 Sep-31 May

<sup>c</sup> Season dates: Spring - Unit 17 15 Apr-25 May  
 Fall - Units 17(A)&(C) 10 Sep-10 Oct  
 Unit 17(B) 20 Sep-10 Oct  
 Western Alaska Brown Bear Management Area (including Unit 17) 1 Sep-31 May

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

<sup>e</sup> Includes one bear taken 20 Oct 2001, and one bear taken 29 Mar 2002

<sup>f</sup> Season dates: Units 17(A)&(C) 10 Sep-25 May

Unit 17(B) Mulchatna drainage, upstream of and including the Chilikadrotna River  
Unit 17 (B), remainder

10 Sep–25 May  
20 Sep–25 May

<sup>g</sup> Includes one bear taken 16 Nov 2003 and one bear taken 27 Mar 2004

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

<sup>i</sup> Season dates: Unit 17 (A, B, & C) 20 Aug – May 31

<sup>j</sup> Includes one bear taken 12 Nov 2011 and one bear unknown kill date

Table 5. Unit 17 brown bear harvest percent by transport method, regulatory years 1991 through 2011.

Regulatory Year	Percent of harvest									Total
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unknown	
1991	80	---	16	---	---	---	---	---	4	45
1992	84	---	14	---	---	---	---	2	---	49
1993	82	---	15	---	---	---	---	3	---	33
1994	82	---	16	---	---	---	---	2	---	43
1995	91	---	7	---	---	---	2	---	---	46
1996	79	---	17	---	---	---	2	---	2	47
1997	74	---	18	---	6	---	---	2	---	66
1998	73	---	8	1	18	---	---	---	---	78
1999	63	---	15	2	18	---	---	1	---	82
2000	78	---	8	---	10	---	---	4	---	104
2001	61	---	12	1	26	---	---	---	---	94
2002	92	---	7	---	---	---	---	1	---	99
2003	72	---	16	---	9	---	---	3	---	100
2004	58	---	10	---	32	---	---	---	---	85
2005	66	---	12	---	20	---	1	1	---	120
2006	79	---	5	1	12	---	---	3	---	115
2007	69	---	11	---	19	---	1	---	---	118
2008	67	---	11	1	20	---	1	---	---	109
2009	67	---	19	1	12	---	---	---	1	127
2010	56	---	26	---	14	---	---	1	2	137
2011	54	1	22	---	16	---	1	2	4	168

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 P.O. BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** 18 (42,000 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Yukon-Kuskokwim Delta

**BACKGROUND**

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

Traditionally, bears were important as food animals for the Yup'ik people of Unit 18, and some of their customs surrounding bear hunting were inconsistent with the general hunting regulations. A brown bear working group made up of representatives of Unit 18 villages was established in 1994 as a vehicle for local input on brown bear issues. After consultation with this group, the Western Alaska Brown Bear Management Area (WABBMA) was established for subsistence hunting, and regulations were modified to more closely match local cultural needs and to improve harvest reporting. The WABBMA included all of Units 18 and 17, and parts of Units 9 and 19A. In this subsistence hunt area, a registration permit hunt was administered for hunters who pursued bears primarily for their meat.

Future administration of the subsistence brown bear hunt will be on a game management unit basis rather than through the WABBMA, and the working group is no longer active. However, a good working relationship with the local public was established and is an important part of bear management in Unit 18.

**MANAGEMENT DIRECTION**

**MANAGEMENT GOALS**

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

## MANAGEMENT OBJECTIVES

- Monitor harvests through the sealing program, subsistence registration permit reports, and contacts with the public.
- Obtain brown bear population information within the Togiak National Wildlife Refuge (TNWR) portion of Unit 18 by cooperating with TNWR staff in a census effort.
- Provide educational material through the media and informal channels to improve compliance with brown bear hunting regulations and harvest reporting requirements.
- Inform the public of methods to minimize bear–human conflicts by reducing the attractiveness of fish camps, dumps, and other attractants.
- Communicate and cooperate with Association of Village Council Presidents (AVCP), subsistence brown bear hunters, local village councils, Alaska Fish and Game Advisory Committees (AC), Federal Subsistence Regional Advisory Council (RAC), and the U.S. Fish and Wildlife Service (USFWS) to regulate subsistence bear hunting.

## METHODS

Harvest data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY10 = 1 July 2010–30 June 2011). During RY10 and RY11, we sent letters requesting harvest and effort information to registered subsistence hunters and monitored the general hunt harvest through our standard sealing requirements. We also contacted village leaders, local media, village natural resource personnel, hunters, and law enforcement personnel, and relayed reports of illegal activities to the Alaska Department of Public Safety, Division of Alaska Wildlife Troopers (AWT).

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

To date, there have been no unitwide brown bear census efforts or projects completed in Unit 18. In 2002 and 2003, portions of Unit 18 and adjoining units within TNWR were censused by refuge staff, providing a midpoint density of 40.3 bears per 1,000 km<sup>2</sup> as a comparative value for similar habitats found in the remainder of Unit 18 (Walsh et al. 2006). Since one-third of the study area included high quality bear habitat in Unit 18, we extrapolated approximate densities from the TNWR study to all of Unit 18 to estimate the unitwide population at 550 bears. We think the population is stable and includes approximately 350 bears in the Kilbuck Mountains and 200 bears in the Andreafsky Mountains and along the Yukon River. Few bears exist elsewhere in Unit 18.

#### *Population Composition*

There were no activities to determine brown bear population composition in Unit 18, but sex composition of the general hunt harvest is available in Table 1. During this reporting period, 73% of the bears taken were males, compared to 67% of all the bears taken since 1997.

*Distribution and Movements*

Drainages that include salmon streams in Unit 18, such as the Kisaralik and Kwethluk rivers in the Kilbuck Mountains, and the Andreafsky River north of St. Mary’s, support greater brown bear densities than elsewhere in the unit. Lowland habitats along the forested riparian corridors of the Yukon River and tributaries of the Kuskokwim River support moderate densities of brown bears. Other lowland habitats, including the vast treeless lowland of the Yukon–Kuskokwim Delta (Y–K Delta), contain very few bears.

**MORTALITY**

*Harvest*

Season and Bag Limit

*RY10 and RY11*

<u>Unit and Bag Limits</u>	Resident Open Season (Subsistence and <u>General Hunts</u> )	Nonresident <u>Open Season</u>
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*Unit 18–General Hunt*

Resident and Nonresident Hunters: 1 bear every regulatory year	1 Sep–31 May (General hunt only)	1 Sep–31 May (General hunt only)
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*Unit 18–Subsistence Hunt*

Resident Hunters: 1 bear per regulatory year by registration permit	1 Sep–31 May (Subsistence hunt only)	
Nonresident Hunters		No open season (Subsistence hunt only)

Board of Game Actions (BOG) and Emergency Orders (EO). The BOG reauthorized the brown bear tag fee exemption associated with subsistence registration permit hunting in the unit. At its November 2011 meeting, the BOG removed the tag fee for residents during the general season hunts. The general hunt tag fee exemption regulation was implemented in RY12. There were no EO actions by the department during the reporting period.

Human Harvest. During RY10, the Unit 18 reported harvest was 28 bears (0 subsistence and 28 general season), and during RY11 the reported harvest was 44 bears (0 subsistence and 44 general season; Table 1). Nearly all of the total reported harvest occurred in the area south of the Kuskokwim River; in contrast, 11 of 72 bears harvested during this reporting period were taken north of the Yukon River. Harvests during the reporting period were: 1) higher than the 10-year average of 18.3 bears/year, and 2) close to a 6% harvest rate of the estimated population in Unit 18 inferred from census work completed in adjacent areas. This level of harvest is not believed to

be excessive given the low percentage of sows harvested. Additional harvest statistics for the general hunt are shown in Table 1.

Harvests of brown bears have increased in the past decade. Hunter access is primarily by aircraft and limited to a few lakes and landing areas where high hunting pressure occurs. However, there are large areas throughout Unit 18 that provide refuge for bears because they are not accessible by hunters. There has been a slight increase in bears harvested north of the Yukon River as more commercial services have been available to hunters to access the area. Brown bear harvests are within the anticipated increase associated with liberalized seasons and bag limits and are not impacting the population status in the unit.

Defense of life or property (DLP) losses are reported infrequently. By their nature, DLP instances are unplanned; people involved in DLP kills are unprepared for dealing with a dead bear, and they generally have poor knowledge of proper procedures. Along the Yukon River we established an electric fence around a fish camp as a demonstration project to reduce nuisance encounters with bears. Results were encouraging and we anticipate public acceptance of this technique, although expense will be an impediment to wide-scale use. We made progress with DLP reporting, but we probably don't hear about many of the bears killed under DLP circumstances. We did not have any DLP bears during this reporting period. In the past we have had as many as 6 reported in a single regulatory year.

Permit Hunts. Subsistence registration permits are available to hunters who take bears primarily for the meat. Prior to 2005 the subsistence permit included multiple units within the WABBMA area. Now, each unit in the previous management area has a separate subsistence permit as a way to make bear hunting regulations more suitable for local residents who include bear meat as part of their subsistence fare. Under this permit, hunters must salvage the meat for human consumption, the bag limit is 1 bear per regulatory year, resident tag fees are exempted, the hide and skull need not be salvaged, hunters must report their hunting activity after receiving a prompt by mail, and the sealing requirement is eliminated unless the hide or skull is removed from a unit with subsistence hunts. If a bear is presented for sealing under this last provision, the trophy value of the hide is destroyed by removing the skin of the head and the front claws, and these parts are retained by the department. Harvest statistics for the subsistence hunt are shown in Table 2.

In some cases, hunters get a permit so they can shoot a bear causing problems in camp during hunts for other big game. They often don't want to shoot a bear, but if they have to, they also don't care to relinquish it to the state as required by DLP regulations.

Hunter Residency and Success. During RY10 general hunts, 17 of 28 brown bears were harvested by nonresidents. During RY11 general hunts, 28 residents and 16 nonresidents harvested bears. Nonresident harvests are expected to remain relatively stable because nonresident hunters are required to use a guide or be accompanied by a resident relative within second degree kindred. Also, both federal refuges in Unit 18, the Yukon Delta National Wildlife Refuge (YDNWR) and TNWR, limit the number of guides operating on refuge lands. YDNWR has issued permits to 3 bear hunting guides to operate within the refuge and TNWR has issued a permit to 1 guide to operate within the portion of TNWR within Unit 18. Recently, YDNWR allowed both moose and brown bears to be hunted by guided hunters north of the Yukon River,

specifically the Andreadsky River drainage. Each of the federally permitted guides are allowed to take up to 5 bears per calendar year, and there are no plans by either refuge to change that number. Because of this cap on the number of guides, we expect nonresident brown bear harvest to remain low.

General hunt regulations require hunters to report by having their bear sealed. However, this reporting mechanism does not measure the number of unsuccessful hunters, so success rates are unavailable for this group of hunters.

Success rates are available for those hunters using the subsistence registration permits (Table 2). In RY10 and RY11 none of the permit hunters were successful.

Harvest Chronology. Prior to the arrival of caribou in Unit 18 in the mid-1990s, most of the bears taken in Unit 18 were killed in the spring. This pattern was variable and depended on snow conditions that allowed travel by snowmachine, which provided greater access. More recently the fall harvest has exceeded the spring harvest, which was originally attributed to caribou hunters opportunistically taking bears. Even though fewer caribou hunters are hunting in the fall, the seasonality of fall brown bear harvest continues to occur. Additional harvest chronology data are found in Table 1.

Transport Methods. In RY10, 24 successful hunters used airplanes to access their hunting areas, 2 used a snowmachine, and 2 used a boat. In RY11, 23 successful hunters used airplanes, 8 used a boat, 2 used a snowmachine, one used a 4-wheeler and 2 did not report the transportation method.

The hunters who use subsistence permits typically use snowmachines. Since the subsistence season is open 1 September–31 May, and spring hunting is preferred by subsistence hunters, snowmachines are more practical.

#### *Other Mortality*

No other mortality was documented during this reporting period.

### **HABITAT**

#### *Assessment*

Unit 18 contains approximately 14,000 km<sup>2</sup> of fair to excellent brown bear habitat in the Kilbuck and Andreadsky Mountains. Additional lowland riparian habitats surrounded by tundra support moderate densities of brown bears along the Yukon River and tributaries of the Kuskokwim River. Most brown bear habitat in Unit 18 is protected by YDNWR and TNWR, and land status is not expected to change.

#### *Enhancement*

No enhancement is necessary or anticipated.

### **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

The WABBMA Working Group was a useful platform for public involvement in bear issues in Unit 18 but was disbanded due to budget considerations. Public input will still be necessary and will be accomplished through local AC and RAC meetings.

## CONCLUSIONS AND RECOMMENDATIONS

Brown bear harvests ranged 28–44 bears per year during the reporting period and represented a 6% harvest rate on the estimated population in Unit 18. We think most of the harvest is now by residents and nonresidents that are specifically targeting brown bears in Unit 18. We anticipate little change in the number of bears harvested by nonresident hunters due to guide requirements for hunters and restrictions on the number of guides allowed to operate on federal refuge lands, which compose the majority of hunt areas in Unit 18.

Based on harvest rates and a high proportion of males in the harvest (71%), we recommend no changes to seasons and bag limits for general season hunts. Subsistence hunts have low participation and success and should be continued as a registration permit hunt to allow use of a subsistence resource.

Progress was made toward improving DLP reporting, especially along the Yukon River, where we established an electric fence around a fish camp as a demonstration project. This not only provided evidence of the efficacy of this technique, but also offered a focus for education efforts regarding DLP issues. We should continue these efforts.

## LITERATURE CITED

Walsh, P., J. Reynolds, G. Collins, B. Russel, M. Winfree, and J. Denton. 2006. Brown bear population density on the Togiak National Wildlife Refuge and BLM Goodnews Block, southwest Alaska. U.S. Fish and Wildlife Service. Dillingham, Alaska.

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

Perry, P. 2013. Unit 18 brown bear management report. Pages 192–199 [*In*] P. Harper and Laura A. McCarthy, editors. Brown bear management report of survey and inventory activities 1 July 2010–30 June 2012. Alaska Department of Fish and Game, Species Management Report, ADF&G/DWC/SMR-2013-4, Juneau.

Table 1. General season brown bear harvests by sex and river drainage, Unit 18, RY97–RY11.

<u>Regulatory</u> <u>year</u>	Total harvest	South of Kuskokwim River				North of Yukon River			
		Fall harvest		Spring harvest		Fall harvest		Spring harvest	
		Male	Female	Male	Female	Male	Female	Male	Female
RY97	4	2	1	1					
RY98	13	3	2	5	1	1	1		
RY99	5	1	1	3					
RY00	5		1	3	1				
RY01	8	2	3	2	1				
RY02	14	5	5	4					
RY03	15	8	5		1	1			
RY04	39	14	19	2		1		3	
RY05	24	13	7	3				1	
RY06	22	11	7	4					
RY07	33	19	6	3	1			4	
RY08	31	15	8	4	1			3	
RY09	25	14	5	2	1			3	
RY10	28	16	3	2	2	2		3	
RY11	44	17	12	8	1	2		1	3

Table 2. Subsistence brown bear permits and harvest in Western Alaska Brown Bear Management Area (WABBMA)<sup>a</sup> and Unit 18, RY99–RY11.

Regulatory year	Permits issued	Permits returned	Number hunting	Bears harvested in WABBMA <sup>a</sup>	Bears harvested in Unit 18
RY99	85	63	27	8	2
RY00	26	20	9	1	1
RY01	69	56	19	3	1
RY02	63	58	22	5	2
RY03	63	52	17	3	2
RY04	29	27	7	0	0
RY05	27	19	11	- <sup>b</sup>	0
RY06	4	3	2	- <sup>b</sup>	0
RY07	3	3	1	- <sup>b</sup>	0
RY08	0	0	0	- <sup>b</sup>	0
RY09	2	2	0	- <sup>b</sup>	0
RY10	1	1	0	- <sup>b</sup>	0
RY11	2	2	1	- <sup>b</sup>	0

<sup>a</sup> WABBMA includes Units 9, 17, 18 and portions of Units ; data available 1996–2005.

<sup>b</sup> In RY05 the administration of the subsistence permits changed from a management-area basis to a game management unit basis; no data on WABBMA harvest.

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 – PO Box 115526  
Juneau, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012<sup>1</sup>

**LOCATION**

**GAME MANAGEMENT UNITS:** 19, 21A, and 21E (55,278 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Drainages of the Kuskokwim River upstream from the village of Lower Kalskag; Yukon River drainage from Paimiut upstream to, but not including, the Blackburn Creek drainage; the entire Innoko River drainage.

**BACKGROUND**

Although grizzly bears are distributed throughout Units 19, 21A, and 21E, bear densities and hunter interest varies among units. Most harvest occurs in Unit 19B and is generally lower in other portions of the management area.

Estimated population densities are based on extrapolations from research in other areas. During the 1960s when mandatory sealing requirements began, harvest was light, averaging about 15 bears annually. During the 1970s, harvest increased dramatically but seasons were shortened and as a result, harvest declined by the early 1980s. Harvest has been fairly constant in all units except Unit 19B where harvest increased sharply from 13 bears in regulatory year (RY) 1996 (RY = 1 July through 30 June, e.g., RY96 = 1 July 1996–30 June 1997) to a high of 64 (Fig. 1) in RY03. Harvest in Unit 19B has declined since RY03 and during RY07–RY11 averaged 38 bears.

In 2001 the department established the experimental micromanagement area (EMMA) within an approximately 20-mile radius of McGrath (528 mi<sup>2</sup>) including the highest density of moose in Unit 19D. In 2009 the Board of Game reauthorized the Unit 19D East predation control implementation plan and EMMA was renamed the bear control area (Fig. 2). The purpose of this area was to study the effects of predator management, especially for black bears and wolves, around McGrath and to provide more moose for harvest. EMMA was established as a treatment area where predator population manipulations and other management actions could be tested. In addition to harvest by hunters, this included capture and relocation of black and grizzly bears (Keech et al. 2011).

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<sup>1</sup> At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

## MANAGEMENT DIRECTION

### MANAGEMENT GOALS

#### *Unit 19D East and the Bear Control Area*

- Maintain grizzly bears as a viable part of the natural ecosystem in Unit 19D East.
- Reduce grizzly bear populations as low as possible within the bear control area.

#### *Units 19A, 19D remainder, 21A, and 21E*

- Provide the greatest sustained opportunity to hunt grizzly bears.

#### *Units 19B and 19C*

- Provide the opportunity to take large grizzly bears.
- Provide the opportunity to hunt grizzly bears under aesthetically pleasing conditions.

#### *Western portion of Units 19A and 19B (Aniak River drainage)*

- Provide for a subsistence opportunity to take grizzly bears.

### MANAGEMENT OBJECTIVE

- Manage grizzly bear populations to sustain a mean annual harvest of no more than 100 bears with a minimum of 50% males in the harvest.

## METHODS

We used data from grizzly bear sealing certificates to obtain date and location of kill, sex, skull size, hunter residency, transportation method, commercial services used, and kill type (e.g., harvest by hunters, illegal kill, research mortality, defense of life or property, etc.). We coded location of kill according to uniform coding units. During sealing we collected vestigial premolars to determine age. Age determination from tooth cementum annuli was conducted by Matson's Laboratory, Milltown, Montana. These harvest data were summarized by regulatory year. Population size was estimated using known bear densities in similar habitats.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size and Composition*

Population surveys have not been conducted in these units and estimates of bear numbers are based on known bear densities in similar habitats (Miller et al. 1997). The habitat in Unit 19A (9,969 mi<sup>2</sup>) is of moderate quality, which could support a density of 20 bears/1,000 mi<sup>2</sup>, or 200 bears. Unit 19B contains about 7,500 mi<sup>2</sup> of good quality bear habitat, which could support 75 bears/1,000 mi<sup>2</sup> or 560 bears. Unit 19C has about 5,200 mi<sup>2</sup> of good quality habitat (50 bears/1,000 mi<sup>2</sup> = 260 bears) and about 1,500 mi<sup>2</sup> of moderate-quality habitat (20 bears/1,000 mi<sup>2</sup> = 30 bears). Unit 19D (12,405 mi<sup>2</sup>) generally contains poor-quality habitat which could support 15 bears/1,000 mi<sup>2</sup> or 185 bears (Boudreau 2005). Using these figures, Boudreau (2005) hypothesized there may be 1,000–1,250 grizzly bears in all of Unit 19. Pegau and Osborne (1987) estimated a total of 900 bears for the same area.

A similar approach was used for Units 21A and 21E with estimated densities of 25 bears/1,000 mi<sup>2</sup> in moderate quality bear habitat and 15 bears/1,000 mi<sup>2</sup> in poor habitat. In Unit 21A there are about 1,500 mi<sup>2</sup> of moderately good habitat (25 bears/1,000 mi<sup>2</sup> = 40 bears) and about 9,500 mi<sup>2</sup> of poor habitat (15 bears/1,000 mi<sup>2</sup> = 150 bears). Therefore, the total population estimate for Unit 21A is 190 bears. Unit 21E consists of about 1,000 mi<sup>2</sup> of moderately good habitat (25 bears/1,000 mi<sup>2</sup> = 25 bears) and about 7,000 mi<sup>2</sup> of poor habitat (15 bears/1,000 mi<sup>2</sup> = 105 bears). The total population estimate for Unit 21E is 100–200 bears (Boudreau 2005).

## **MORTALITY**

### *Harvest*

#### Season and Bag Limit RY10–RY11.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Units 19A and 19D. 2 bears every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun
Units 19B and 19C. 1 bear every regulatory year.	1 Sep–31 May	1 Sep–31 May
Unit 19A downstream of and including the Aniak River drainage. 2 bears every regulatory year by registration permit RB601.	10 Aug–30 Jun	No open season
Unit 19B downstream of and including the Aniak River drainage. 1 bear every regulatory year by registration permit RB601.	10 Aug–30 Jun	No open season
Units 21A and 21E. 1 bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun

Cubs (<2 yr of age) and females accompanied by cubs were illegal to harvest.

Alaska Board of Game Actions and Emergency Orders. In March 2009 the Board of Game (board) reauthorized the Unit 19D East predation control implementation plan. The plan was approved for 5 years beginning on 1 July 2009 and is up for reauthorization at the March 2014 board meeting. Additional methods permitted under predation control regulations by this reauthorization included take of grizzly bears using bucket snares, take of cubs and females accompanied by cubs, and take of grizzlies the same day airborne, provided the permittee is at least 300 feet from the airplane. In addition, predation control permittees were allowed to sell tanned as well as raw hides and skulls.

In RY09 the board reauthorized the resident tag fee exemptions in Units 19A, 19D, and 21E. In RY10 the board eliminated tag requirements for all of Unit 19 as well as Units 21A and 21E.

Resident tag fee exemptions, which must be reauthorized annually, were reauthorized by the board for RY10 and RY11.

Harvest by Hunters. Grizzly bear harvest was highly variable among units during RY07–RY11 (Tables 1a–1f). In Unit 19A, 5–23 grizzlies were harvested each year (Table 1a). Unit 19B had the highest level of harvest with 26–50 bears reported (Table 1b). Unit 19C had a level of harvest similar to Unit 19A with 10–15 grizzlies taken (Table 1c). Unit 19D had the lowest reported harvest in all of Unit 19 (Table 1d) with 1–11 bears per year. Grizzlies killed in unknown locations within Unit 19 totaled 3 females and 2 males in RY08 and 1 male in RY11. Harvest was low in both Units 21A and 21E with 0–7 bears reported annually in each unit (Tables 1e and 1f). Most harvest occurred during the fall and harvest for the entire area during RY07–RY11 totaled 395 grizzly bears (Tables 1a–1f, plus 6 bears killed in unknown portions of Unit 19).

The 5-year mean annual harvest (RY07–RY11) for the entire area was 79 grizzly bears. This is lower than the 5-year (RY05–RY09) mean annual harvest of 89 reported by Peirce (2009). Male bears made up an average of 59% of the reported harvest during RY07–RY11.

The age class of bears harvested during RY07–RY11 was as follows: bears  $\leq 5$  years old = 49%; 6–10 years old = 24%; 11–15 years old = 15%; 16–20 years old = 8%; and 21–25 years old = 4%. One bear was estimated to be 31 years of age.

Transport Methods. During RY07–RY11 the vast majority (84%) of successful hunters used airplanes as their primary access method (Table 2). The proportion of successful hunters who used aircraft has not changed substantially since sealing began in the 1960s (Boudreau 2005).

Hunter Residency and Success. In RY07–RY11, nonresidents harvested 77% (306 of 395) of bears taken in the area (Table 3). This indicates a relatively high use of the area by grizzly bear guides and their nonresident clients.

Harvest Chronology. Most harvest occurred during the fall, especially in September (Table 4). An average of 65% of all harvest during RY07–RY11 occurred in September.

#### *Nonhunting Mortality*

Three nonhunting mortalities were documented during RY07–RY11. One bear was taken in defense of life or property in Unit 19A, 1 was taken illegally in Unit 19B, and 1 was taken illegally in Unit 21A.

Predator Control Efforts. In 2003 the department captured and moved 9 grizzly bears (including 2 cubs-of-the-year) from the bear control area and surrounding area to distant locations. In 2004, 1 grizzly was removed from the bear control area.

The department began issuing grizzly bear control permits on 1 September 2006. We issued 2 grizzly bear control permits in RY06, 4 in RY07, 7 in RY08, 41 in RY09, 25 in RY10, and 20 in RY11. The large increase in permits in RY09 was due to interest in the new regulations adopted by the board that allowed snaring of grizzly bears. However, even with the large increase in the number of permittees, participation by those permittees was low (10 of 41 participated and 8 of 41 set snares). During RY06–RY11 no grizzlies were taken under the control program and

participation remained low. In spite of regulations that allow sale of grizzly bear hides and skulls from bears taken within the bear control area under predation control regulations, no grizzly bears were taken under these regulations and no grizzly bear hides or skulls have been sold.

## CONCLUSIONS AND RECOMMENDATIONS

Grizzly bear harvest has been fairly stable in all units except Unit 19B where harvest increased from 15 in RY90 to 64 in RY03 (Fig. 1). Unit 19B harvest began to decline in RY04. By RY11 only 26 bears were harvested, the fewest since RY97. Most bear harvest in Unit 19B was in the fall and the substantial increase in harvest in the late 1990s may have been related to high interest in Mulchatna caribou. As opportunities to hunt this herd diminished, bear harvest also declined. If bear harvest in Unit 19B is correlated with the number of caribou hunters, we can expect to see continued low levels of bear harvest in the near future. During RY07–RY11, 61% of grizzlies harvested in Unit 19B were males and the age structure of bears harvested has changed little since RY88 (Peirce 2009). Harvest in Unit 19B increased to approximately 11% of the estimated population by RY03, however harvest appears to be dropping at this time. No changes are recommended to seasons and bag limits.

We met the management objectives of a mean annual harvest of  $\leq 100$  total bears ( $\bar{x} = 63$  bears; RY10 = 75 bears and RY11 = 51 bears). We also met the management objective of at least 50% males in the harvest in RY11 (72%), but not in RY10 (44%).

We continue to have an issue sealing bears in local villages as residents do not have good access to sealing officers. This need is primarily met by the Alaska Wildlife Troopers and McGrath area office staff during village visits.

The resident tag fee exemptions have had no detectable effect on harvest. Also, no grizzlies have been taken under the bear control program. It is unlikely either of these management actions has influenced moose calf survival as intended.

Management objectives in the next reporting period will be refined as follows:

- Maintain a 5-year average harvest of no more than 100 bears.
- Maintain a 5-year average of at least 50% males in the harvest.

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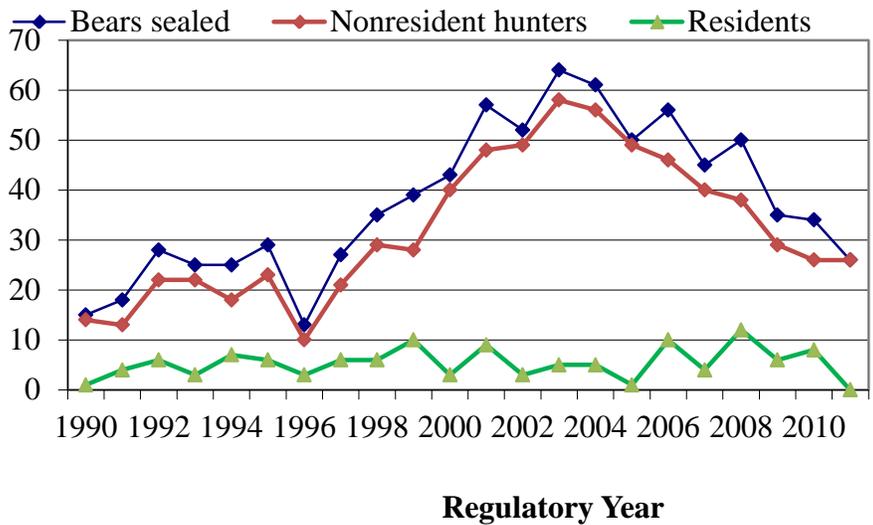


Figure 1. Number of grizzly bears sealed and residency of hunters in Unit 19B by regulatory year.  
 Note: Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1990 = 1 July 1990–30 June 1991).

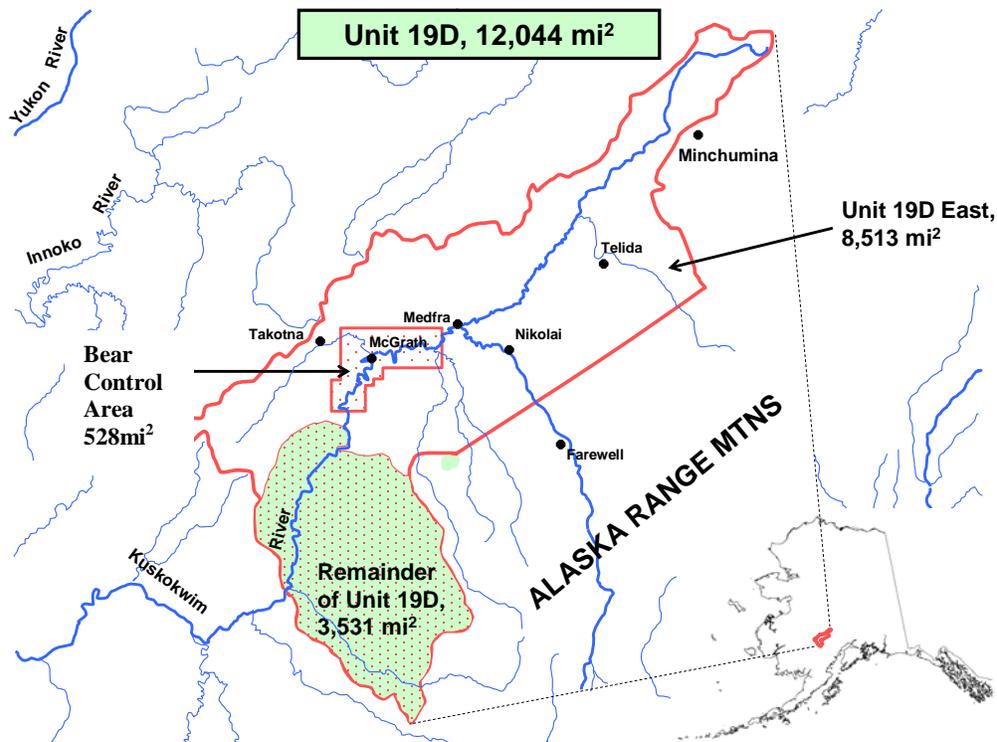


Figure 2. Detailed area map of Unit 19D.

Table 1a. Unit 19A grizzly bear harvest by type of kill, regulatory years<sup>a</sup> 2007–2011.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill			
	M	F	Unk	Total	M	F	Unk	Total	M (%)	F	Unk	Total
<i>2007</i>												
Fall 2007	8	6	0	14	0	0	0	0	8 (57)	6	0	14
Spring 2008	4	5	0	9	0	0	0	0	4 (44)	5	0	9
Total	12	11	0	23	0	0	0	0	12 (52)	11	0	23
<i>2008</i>												
Fall 2008	8	6	0	14	0	0	0	0	8 (57)	6	0	14
Spring 2009	0	0	0	0	0	0	0	0	0 n/a	0	0	0
Total	8	6	0	14	0	0	0	0	8 (57)	6	0	14
<i>2009</i>												
Fall 2009	6	7	0	13	0	0	0	0	6 (46)	7	0	13
Spring 2010	0	0	0	0	0	0	0	0	0 n/a	0	0	0
Total	6	7	0	13	0	0	0	0	6 (46)	7	0	13
<i>2010</i>												
Fall 2010	8	7	0	15	0	0	0	0	8 (53)	7	0	15
Spring 2011	0	2	0	2	0	0	0	0	0 n/a	2	0	2
Total	8	9	0	17	0	0	0	0	8 (47)	9	0	17
<i>2011</i>												
Fall 2011	1	2	0	3	1	0	0	1	2 (25)	2	0	4
Spring 2012	1	0	0	1	0	0	0	0	1 (100)	0	0	1
Total	2	2	0	4	1	0	0	1	3 (40)	2	0	5
Total	36	35	0	71	1	0	0	1	37 (50)	35	0	72
Avg/Yr	7	7	0	14	<1	0	0	<1	7	7	0	14

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2007 = 1 July 2007–30 June 2008).

Table 1b. Unit 19B grizzly bear harvest by type of kill, regulatory years<sup>a</sup> 2007–2011.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill			
	M	F	Unk	Total	M	F	Unk	Total	M (%)	F	Unk	Total
<i>2007</i>												
Fall 2007	17	18	2	37	0	1	0	1	17 (45)	19	2	38
Spring 2008	7	0	0	7	0	0	0	0	7 (100)	0	0	7
Total	24	18	2	44	0	1	0	1	24 (53)	19	2	45
<i>2008</i>												
Fall 2008	30	12	0	42	0	0	0	0	30 (71)	12	0	42
Spring 2009	5	3	0	8	0	0	0	0	5 (63)	3	0	8
Total	35	15	0	50	0	0	0	0	35 (70)	15	0	50
<i>2009</i>												
Fall 2009	18	13	0	31	0	0	0	0	18 (58)	13	0	31
Spring 2010	4	0	0	4	0	0	0	0	4 (100)	0	0	4
Total	22	13	0	35	0	0	0	0	22 (63)	13	0	35
<i>2010</i>												
Fall 2010	15	14	2	31	0	0	0	0	15 (48)	14	2	31
Spring 2011	1	2	0	3	0	0	0	0	1 (33)	2	0	3
Total	16	16	2	34	0	0	0	0	16 (47)	16	2	34
<i>2011</i>												
Fall 2011	18	7	0	25	0	0	0	0	18 (72)	7	0	25
Spring 2012	0	1	0	1	0	0	0	0	0 n/a	1	0	1
Total	18	8	0	26	0	0	0	0	18 (69)	8	0	26
Total	115	70	4	189	0	1	0	1	115 (61)	71	4	190
Avg/Yr	23	14	1	38	0	0	0	0	23	14	1	38

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2007 = 1 July 2007–30 June 2008).

Table 1c. Unit 19C grizzly bear harvest by type of kill, regulatory years<sup>a</sup> 2007–2011.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill			
	M	F	Unk	Total	M	F	Unk	Total	M (%)	F	Unk	Total
<i>2007</i>												
Fall 2007	5	3	0	8	0	0	0	0	5 (63)	3	0	8
Spring 2008	2	0	0	2	0	0	0	0	2 (100)	0	0	2
Total	7	3	0	10	0	0	0	0	7 (70)	3	0	10
<i>2008</i>												
Fall 2008	3	6	0	9	0	0	0	0	3 (33)	6	0	9
Spring 2009	4	0	0	4	0	0	0	0	4 (100)	0	0	4
Total	7	6	0	13	0	0	0	0	7 (54)	6	0	13
<i>2009</i>												
Fall 2009	10	3	0	13	0	0	0	0	10 (77)	3	0	13
Spring 2010	1	1	0	2	0	0	0	0	1 (50)	1	0	2
Total	11	4	0	15	0	0	0	0	11 (73)	4	0	15
<i>2010</i>												
Fall 2010	4	8	0	12	0	0	0	0	4 (33)	8	0	12
Spring 2011	2	0	0	2	0	0	0	0	2 (100)	0	0	2
Total	6	8	0	14	0	0	0	0	6 (43)	8	0	14
<i>2011</i>												
Fall 2011	10	2	0	12	0	0	0	0	10 (83)	2	0	12
Spring 2012	1	0	0	1	0	0	0	0	1 (100)	0	0	1
Total	11	2	0	13	0	0	0	0	11 (85)	2	0	13
Total	42	23	0	65	0	0	0	0	42 (65)	23	0	65
Avg/Yr	8	5	0	13	0	0	0	0	8	5	0	13

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2007 = 1 July 2007–30 June 2008).

Table 1d. Unit 19D grizzly bear harvest by type of kill, regulatory years<sup>a</sup> 2007–2011.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M (%)	F	Unk	Total	
<i>2007</i>													
Fall 2007	8	0	0	8	0	0	0	0	8 (100)	0	0	8	
Spring 2008	1	2	0	3	0	0	0	0	1 (33)	2	0	3	
Total	9	2	0	11	0	0	0	0	9 (82)	2	0	11	
<i>2008</i>													
Fall 2008	2	5	0	7	0	0	0	0	2 (29)	5	0	7	
Spring 2009	0	1	0	1	0	0	0	0	0 n/a	1	0	1	
Total	2	6	0	8	0	0	0	0	2 (25)	6	0	8	
<i>2009</i>													
Fall 2009	8	1	0	9	0	0	0	0	8 (89)	1	0	9	
Spring 2010	0	0	0	0	0	0	0	0	0 n/a	0	0	0	
Total	8	1	0	9	0	0	0	0	8 (89)	1	0	9	
<i>2010</i>													
Fall 2010	3	3	0	6	0	0	0	0	3 (50)	3	0	6	
Spring 2011	0	0	0	0	0	0	0	0	0 n/a	0	0	0	
Total	3	3	0	6	0	0	0	0	3 (50)	3	0	6	
<i>2011</i>													
Fall 2011	1	0	0	1	0	0	0	0	1 (100)	0	0	1	
Spring 2012	0	0	0	0	0	0	0	0	0 n/a	0	0	0	
Total	1	0	0	1	0	0	0	0	1 (100)	0	0	1	
Total	23	12	0	35	0	0	0	0	23 (66)	12	0	35	
Avg/Yr	5	2	0	7	0	0	0	0	5	2	0	7	

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2007 = 1 July 2007–30 June 2008).

Table 1e. Unit 21A grizzly bear harvest by type of kill, regulatory years<sup>a</sup> 2007–2011.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M (%)	F	Unk	Total	
<i>2007</i>													
Fall 2007	0	1	0	1	0	0	0	0	0	(0)	1	0	1
Spring 2008	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Total	0	1	0	1	0	0	0	0	0	(0)	1	0	1
<i>2008</i>													
Fall 2008	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Spring 2009	0	1	0	1	1	0	0	1	1	(50)	1	0	2
Total	0	1	0	1	1	0	0	1	1	(50)	1	0	2
<i>2009</i>													
Fall 2009	1	0	0	1	0	0	0	0	1	(100)	0	0	1
Spring 2010	1	0	0	1	0	0	0	0	1	(100)	0	0	1
Total	2	0	0	2	0	0	0	0	2	(100)	0	0	2
<i>2010</i>													
Fall 2010	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Spring 2011	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Total	0	0	0	0	0	0	0	0	0	n/a	0	0	0
<i>2011</i>													
Fall 2011	0	1	0	1	0	0	0	0	0	n/a	1	0	1
Spring 2012	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Total	0	1	0	1	0	0	0	0	0	n/a	1	0	1
Total	2	3	0	5	1	0	0	1	3	(50)	3	0	6
Avg/Yr	0	1	0	1	0	0	0	0	1		<1	0	1

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2007 = 1 July 2007–30 June 2008).

Table 1f. Unit 21E grizzly bear harvest by type of kill, regulatory years<sup>a</sup> 2007–2011.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M (%)	F	Unk	Total	
<i>2007</i>													
Fall 2007	1	0	0	1	0	0	0	0	1 (100)	0	0	1	
Spring 2008	1	1	0	2	0	0	0	0	1 (50)	1	0	2	
Total	2	1	0	3	0	0	0	0	2 (67)	1	0	3	
<i>2008</i>													
Fall 2008	1	1	0	2	0	0	0	0	1 (50)	1	0	2	
Spring 2009	5	0	0	5	0	0	0	0	5 (100)	0	0	5	
Total	6	1	0	7	0	0	0	0	6 (86)	1	0	7	
<i>2009</i>													
Fall 2009	1	1	0	2	0	0	0	0	1 (50)	1	0	2	
Spring 2010	1	0	0	1	0	0	0	0	1 (100)	0	0	1	
Total	2	1	0	3	0	0	0	0	2 (67)	1	0	3	
<i>2010</i>													
Fall 2010	0	4	0	4	0	0	0	0	0 n/a	4	0	4	
Spring 2011	0	0	0	0	0	0	0	0	0 n/a	0	0	0	
Total	0	4	0	4	0	0	0	0	0 n/a	4	0	4	
<i>2011</i>													
Fall 2011	1	2	0	3	0	0	0	0	1 (33)	2	0	3	
Spring 2012	1	0	0	1	0	0	0	0	1 (100)	0	0	1	
Total	2	2	0	4	0	0	0	0	2 (50)	2	0	4	
Total	12	9	0	21	0	0	0	0	12 (57)	9	0	21	
Avg/Yr	2	2	0	4	0	0	0	0	2		0	4	

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2007 = 1 July 2007–30 June 2008).

Table 2. Units 19, 21A, and 21E percent grizzly bear harvest<sup>a</sup> by transport method, regulatory years<sup>b</sup> 2007–2011.

Regulatory year	Number of bears harvested by transport type									<i>n</i>
	Airplane	Dog team/Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	
2007	81	0	7	0	3	0	0	2	0	93
2008	87	0	5	2	0	0	3	0	2	99
2009	63	0	2	5	0	0	0	0	7	77
2010	63	0	5	1	1	0	0	4	1	75
2011	38	0	8	0	1	0	0	4	0	51
Total	332	0	27	8	5	0	3	10	10	395
Avg/Yr	66	0	5	2	1	0	1	2	2	79
	(84%)	(<1%)	(7%)	(2%)	(1%)	(0%)	(<1%)	(3%)	(3%)	

<sup>a</sup> Includes defense of life or property kills and illegal harvest.

<sup>b</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2007 = 1 July 2007–30 June 2008).

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Table 3. Units 19, 21A, and 21E grizzly bear successful hunter residency, regulatory years<sup>a</sup> 2007–2011<sup>b</sup>.

Regulatory year	Local resident <sup>c</sup>	Nonlocal resident	Nonresident	Total successful
2007	6	12	75	93
2008	5	15	79	99
2009	3	18	56	77
2010	4	15	56	75
2011	5	6	40	51
Total	23	66	306	395
Avg/Yr	5	13	61	79

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2007 = 1 July 2007–30 June 2008).

<sup>b</sup> Includes defense of life or property kills and illegal harvest.

<sup>c</sup> Local resident defined as any hunter from Units 19, 21A, and 21E.

Table 4. Units 19, 21A, and 21E grizzly bear harvest<sup>a</sup> chronology by month, regulatory years<sup>b</sup> 2007–2011.

Regulatory year	Harvest chronology by month						<i>n</i>
	Aug	Sep	Oct	Apr	May	Other	
2007	13	57	0	8	12	3	93
2008	17	57	4	6	13	2	99
2009	18	51	0	4	2	2	77
2010	14	51	2	3	4	1	75
2011	7	39	1	1	2	1	51
Total	69	255	7	22	33	9	395
(%)	(17%)	(65%)	(2%)	(6%)	(8%)	(2%)	
Avg/Yr	14	51	1	4	7	2	79

<sup>a</sup> Includes defense of life or property kills and illegal harvest.

<sup>b</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2007 = 1 July 2007–30 June 2008).

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 – PO Box 115526  
Juneau, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012<sup>1</sup>

**LOCATION**

**GAME MANAGEMENT UNITS:** 20A, 20B, 20C, 20F, and 25C (39,228 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Central and lower Tanana Valley, and middle Yukon River drainages

**BACKGROUND**

Grizzly bears occur throughout this area, with higher densities in the mountainous portions of Units 20A and 20C. Harvests tend to be highest in Unit 20A, particularly in the mountains. State regulations prevent grizzly bear harvest within the Denali National Park portions of Unit 20C, resulting in low harvests in that unit. The eastern half of Unit 20B supports a moderate density of grizzly bears, and harvests are higher than in western Unit 20B. Grizzly bears inhabit Units 20F and 25C at moderate to low densities, which, coupled with poor access, results in low harvests.

During the 1980s, McNay (1990) noted increasing numbers of hunters and increased interest in hunting grizzly bears. He analyzed harvest and population data from this management area to develop specific management and harvest objectives, which he based on a sustainable harvest rate of 8% of the population  $\geq 2$  years of age (Miller 1990). Also, in 1981 the department initiated a long-term grizzly bear research project in 3 phases in Unit 20A to 1) gather baseline data on population status and reproductive biology (1981–1985; Reynolds and Hechtel 1986); 2) study the effects of high exploitation rates on grizzly bear population dynamics (1986–1991; Reynolds and Boudreau 1992, Reynolds 1993); and 3) measure recovery (Reynolds 1999). During the second phase of the project, the grizzly bear population was deliberately subjected to high harvest levels ( $\geq 11\%$  of the population versus  $\leq 6\%$  before 1981). As a result, Reynolds (1999) documented a 36% decline in the bears ( $\geq 2$  yr old) in this area from 1981 to 1992 and recovery to the pre-study level took an estimated 16 years. In addition, equivocal findings in Unit 13, where harvest rates are most studied (Miller 1990, Testa 2004, Tobey and Schwanke 2009), suggest that sustainable harvest rates of grizzly bears are still not well understood.

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

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<sup>1</sup> At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

management area, and subsequently improved evaluation of harvest-based management objectives.

Ballard et al. (1981) and Gasaway et al. (1992) identified grizzly bears as significant predators of moose in Units 13 and 20E, respectively. In the Unit 20A foothills, Valkenburg (1997) identified grizzly bears as important predators of Delta caribou herd neonates. Also, Boertje et al. (2000) estimated that grizzlies killed about 730 of the 4,450 moose that died annually in Unit 20A in the late 1990s. Grizzly bear predation is generally considered additive to other sources of mortality based on experiments that reduced grizzly predation and evaluated the responses in ungulate survival (Ballard and Miller 1990; Gasaway et al. 1992; Boertje et al. 1995; Testa 2004:1448–1449; Keech 2005). However, Gasaway et al. (1983) determined that grizzly bears played little role in the dynamics of moose within the Tanana Flats portion of Unit 20A, and, consistent with that assertion, Keech (1999) reported low mortality rates of moose calves as a result of grizzly bear predation.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT GOALS**

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

- Maintain healthy grizzly populations and the ecosystems upon which they depend.
- Provide people with an opportunity to hunt, view, and photograph grizzly bears.
- Avoid human-grizzly bear interactions that threaten human life and property.

*Additionally in Unit 20A*

- Provide for scientific and educational use of grizzly bears.

*Additionally in Unit 20C*

- Maintain a grizzly bear population within Denali National Park that is largely unaffected by human activity and is not subjected to hunting within the park.

### **MANAGEMENT OBJECTIVES**

*Unit 20A Mountains*

- Manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality  $\leq 8\%$  of the bears  $\geq 2$ -years old.

*Eastern half of Unit 20B*

- Manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality of up to 6 bears  $\geq 2$ -years old.

*Unit 20C within the original boundaries of Denali National Park*

- Maintain a closed season on grizzly bear hunting.

*Unit 20A Tanana Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C*

- Manage human-caused mortality in the combined area to provide stable grizzly bear populations with a 3-year mean annual human-caused mortality of no more than 26 grizzly bears  $\geq 2$ -years old.
- Manage the 3-year mean annual human-caused grizzly bear ( $\geq 2$  yr of age) mortality from individual areas with the following harvest objectives: no more than 3 bears from Unit 20A Tanana Flats, 3 from the western half of Unit 20B, 7 from Unit 20C, 7 from Unit 20F, and 6 from Unit 25C.

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

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

## **METHODS**

### **HARVEST**

We used data from grizzly bear sealing certificates to obtain date and location of kill, sex, skull size, hunter residency, transportation method, commercial services used and kill type (harvest by hunters, illegal kill, research mortality, defense of life or property, etc.). We coded location of kill according to uniform coding units. During sealing we collected vestigial premolars to determine age. ADF&G Wildlife Conservation staff in Fairbanks sealed most of the grizzly bears harvested in this area.

We analyzed grizzly bear harvest data by both regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY10 = 1 July 2010 through 30 June 2011), and calendar year. Many of our harvest objectives are age-specific. Analysis by regulatory year creates difficulties because a cohort passes through 2 age classes within a single regulatory year. Therefore, we analyzed data relevant to age-specific objectives by calendar year to avoid confusion regarding age class. We based all other analyses on regulatory years.

### **POPULATION SIZE AND DENSITY**

In June 1993, Eagan (1995) categorized uniform coding units in Units 20A, 20B, 20C, 20F, and 25C into 4 grizzly bear density strata: low, medium, high, and super. The low-density stratum consisted of areas with significant human development, poorly drained soils (or permafrost), and black spruce. The medium-density stratum included upland forest and tundra habitats at elevations generally between 500 and 1,500 feet. The high-density stratum consisted of upland foothills and mountainous areas similar to areas of known density in Units 20A, 20E, and 13E. The super-density stratum included habitat similar to the high-density areas, but where no harvest was permitted. The total area within each stratum excluded glaciers and land above 6,000 feet. Approximately 500 mi<sup>2</sup> (1,300 km<sup>2</sup>) were excluded from the high-density stratum, and 386 mi<sup>2</sup> (1,000 km<sup>2</sup>) were excluded from the super-density stratum. Population size was estimated using extrapolations from strata densities of low, 3–8 bears/1,000 mi<sup>2</sup> (1–3 bears/1,000 km<sup>2</sup>); medium, 13–26 bears/1,000 mi<sup>2</sup> (5–10 bears/1,000 km<sup>2</sup>); high, 36–44 bears/1,000 mi<sup>2</sup> (14–17 bears/1,000 km<sup>2</sup>); and super, 52–78 bears/1,000 mi<sup>2</sup> (20–30 bears/1,000 km<sup>2</sup>).

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

Unit 20A. Eagan (1995) classified the mountainous portion of Unit 20A as high grizzly bear density based on results from research in the central foothills (Reynolds 1993). High harvest rates intentionally resulted in reduced bear numbers in this portion of Unit 20A during phase 2 (1986–1991) of the research. Phase 3 monitored recovery of the population. We expected the number of female adult bears to meet pre-reduction levels by 1998. However, numbers were still estimated to be slightly low by spring 2000, likely because of high harvest rates that continued into 1992 and 1993. Based on predicted trends and anecdotal information, we suspect the grizzly bear population recovered to pre-reduction levels by 2002.

The Tanana Flats in Unit 20A provide relatively poor grizzly bear habitat, resulting in low densities. Some grizzly bears on the Tanana Flats probably emigrate from higher density areas or make temporary forays onto the flats. Eagan (1995) estimated that the flats provide habitat for 20 grizzly bears, or 6.5 bears/1,000 mi<sup>2</sup> (2.5 bears/1,000 km<sup>2</sup>).

Unit 20B. Eagan (1995) classified most of Unit 20B as low density because of the moderate habitat, high density of people, and good human access. Better habitat in the Sawtooth Mountains in the western portion was classified as low-density stratum because of good access and human activity. The upper Chena and Salcha rivers were rated medium density because the area was better habitat and relatively inaccessible to humans.

Unit 20C. Eagan (1995) classified the mountainous portion of Unit 20C into the super-density stratum (52–78 bears/1,000 mi<sup>2</sup> [20–30 grizzly bears/1,000 km<sup>2</sup>]). Although Dean (1987) estimated 88 bears/1,000 mi<sup>2</sup> (34 bears/1,000 km<sup>2</sup>) for a portion of this area in 1983, he surveyed the area along the Denali Park Road that includes the best habitat. Eagan (1995) assumed lower densities for the remainder of the mountainous portions of Unit 20C, based on densities Reynolds (1993) documented in Unit 20A in 1981.

Eagan (1995) classified a small portion of northwestern Unit 20C as medium-density because of higher habitat quality than in the Unit 20C Tanana Flats, and the area also abuts some higher quality grizzly bear habitat in the upper Kuskokwim drainage. Eagan (1995) felt the remainder of Unit 20C was low-density but indicated potential for slightly higher densities than other low-density areas because the Unit 20C Tanana Flats have streams where salmon are available and hunting pressure is relatively low.

Unit 20F. Although very little information exists, the Tozitna River drainage–Ray Mountains portion of Unit 20F probably contains relatively good grizzly bear habitat and warranted medium-density classification. Eagan (1995) classified the remainder of Unit 20F as low density due to relatively poor grizzly bear habitat.

Unit 25C. Eagan (1995) classified the mountainous portion of Unit 25C as medium density. This is an extension of the medium density area of eastern Unit 20B and also includes the White Mountains. Although good habitat abounds, Eagan (1995) noted that roads and trails through the

area provide good human access. Hunters take grizzly bears incidental to their pursuit of caribou and moose.

All Units. Extrapolating from the stratification above, Eagan (1995) estimated that 446–782 grizzly bears (all ages) inhabit the area. Using the midpoint of the population estimate (614 bears), the combined density for the area is about 16.1 grizzly bears/1,000 mi<sup>2</sup> (6.2 /1,000 km<sup>2</sup>). However, this estimate is likely conservative based on research conducted in 2006 in Unit 20E (C. Gardner, ADF&G, personal communication, 2011) in what Eagan considered to be fairly poor (medium density) habitat.

#### *Population Composition*

Reynolds (1993) summarized composition data for his study area in Unit 20A. In 1992, there were more females than males present in adult age classes and approximately equal numbers of males and females in the subadult age classes. We suspect the 1992 composition data remain applicable because 1) the sex ratio of grizzly bears at birth typically approximates 50:50; 2) hunters generally prefer to shoot the larger, adult males; and 3) females with cubs <2 years of age are legally protected.

#### *Distribution and Movements*

Reynolds (1997) described movement and dispersal trends for the Unit 20A study area. Adult females exhibited high fidelity to home ranges and no emigration was observed. Following weaning all female offspring remained within or adjacent to their maternal home range and all male offspring emigrated.

### **MORTALITY**

#### *Harvest*

Season and Bag Limit. From RY90 through RY93, the hunting season for grizzly bears was 1 September–31 May with a bag limit of 1 bear every 4 regulatory years (1 bear/4 yr). Cubs (<2 yr of age) and females accompanied by cubs were illegal to harvest. Consistent with research objectives, the board shortened the Unit 20A season by 9 days in RY94 to 10 September–31 May. In RY02 the board liberalized the season by 5 days (5 September–31 May) based on evidence that the population had recovered to pre-reduction levels. All other areas covered in this report retained the 1 September–31 May season dates. In RY04 the board liberalized the bag limit from 1 bear/4 years to 1 bear/year in all units. In RY06 the board liberalized the season in Unit 20F to 10 August–30 June. In RY10 the board liberalized the season in Unit 20C to 10 August–30 June and in Unit 20A to 1 September–31 May. In RY12 the season was liberalized to 10 August–30 June in that portion of Unit 20B drained by the middle fork of the Chena River and the Salcha River upstream from and including Goose Creek. Also, in Unit 20C, the board approved the take of grizzly bears over bait at registered black bear bait stations and required that edible meat be salvaged from grizzlies taken over bait. These seasons and bag limits applied to both resident and nonresident hunters. During spring 2013 (RY12) unofficial reports indicated 5 grizzly bears were taken over bait.

Alaska Board of Game Actions and Emergency Orders. No emergency orders have been announced in the area regarding grizzly bears since RY90. Board of Game actions since RY90 are described above.

Harvest by Hunters. Reported harvest by hunters has been on the rise areawide (Units 20A, 20B, 20C, 20F, and 25C; Tables 1a–e). Reported harvest averaged 29 bears annually during RY00–RY03, 39 bears during RY04–RY07, and 52 bears during RY08–RY11 (ADF&G unpublished data [WinfoNet], 2013). In addition, a record number of bears ( $n = 57$ ) was reported taken during RY11. Most of this increase can be attributed to higher harvests in Unit 20A where harvest jumped from an average of 13 bears in RY00–RY05 (Young 2005, 2007) to 25 bears in RY06–RY11.

Harvest by Subareas. Eagan’s (1995) estimated grizzly bear numbers in the management area at the subarea (e.g., Unit 20A mountains, Unit 20A Tanana Flats) scale using a stratified approach based on topography, habitat, and accessibility to humans provided more precise measures of harvest rates across the management area.

*Unit 20A Mountains* — We estimate the 3-year (2009–2011) mean annual human-caused mortality (22.0 bears) was approximately 16–20% of bears  $\geq 2$ -years old (111–136 bears), assuming Eagan’s (1995) population estimates and Reynolds’ (1993) population structure (Table 2). This exceeded our objective to provide a stable population with a 3-year mean annual human-caused mortality  $\leq 8\%$  of the bears  $\geq 2$ -years old.

*Eastern half of Unit 20B* — The 3-year (2009–2011) mean annual human-caused mortality of 9.3 bears  $\geq 2$  years of age exceeded our objective of a mean of  $\leq 6$  bears  $\geq 2$  years of age (Table 2).

*Unit 20A Tanana Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C* — The 3-year (2009–2011) mean annual human-caused mortality of 19.7 brown bears  $\geq 2$  years of age was below our objective of  $\leq 26$  bears  $\geq 2$  years of age for this management area (Table 2). At the subarea scale, we met our objectives to not exceed a 3-year (2009–2011) mean annual human-caused mortality of bears  $\geq 2$  years of age for Unit 20A Tanana Flats with 3.0 bears (objective  $\leq 3$  bears), western Unit 20B with 2.3 bears (objective  $\leq 3$  bears), Unit 20C with 6.0 bears (objective  $\leq 7$  bears), and Unit 20F with 2.0 bears (objective  $\leq 7$  bears), but exceeded the objective for Unit 25C with 6.3 bears (objective  $\leq 6$  bears).

Percent Males in Harvest by Unit. The objective for a 3-year (RY09–RY11) mean proportion of  $\geq 55\%$  males in the harvest was met in all units except Units 20A and 20C (Unit 20A = 50%, Unit 20B = 62%, Unit 20C = 50%, Unit 20F = 75%, and Unit 25C = 74%; Tables 1a–e). However, we met the objective at the areawide scale with a reported harvest of 88 males and 64 females (57% males), RY09–RY11.

Hunter Residency and Success. As in previous years, Alaska residents harvested the majority (68%) of the grizzly bears during RY09–RY11 (Table 3).

Harvest Chronology. Hunters harvested bears primarily during September (Table 4), most likely because moose and caribou hunters take many bears incidentally during that period.

Transport Methods. The methods of transportation used by successful grizzly bear hunters have not changed substantially in recent years (Table 5; Young 2007, 2009, 2011).

Nonhunting Mortality. The reported take of grizzly bears by means other than hunting was extremely low during RY10 and RY11. Two grizzly bears were reported taken in defense of life or property in RY11 (1 male bear in Unit 20B and 1 bear of unknown sex in Unit 20C).

## **CONCLUSIONS AND RECOMMENDATIONS**

We failed to meet our objective of a 3-year mean annual human-caused mortality  $\leq 8\%$  of the bears  $\geq 2$ -years old in 2 of 3 subareas (i.e., Unit 20A mountains and the eastern half of Unit 20B). We met our objective in only one subarea (i.e., Unit 20A Flats, western half of Unit 20B, Unit 20C outside of Denali National Park, Unit 20F, and Unit 25C). Within that management area we exceeded the harvest objective in 1 of the 5 subareas (i.e., Unit 25C). However, in that case, the 3-year mean annual human-caused mortality was exceeded by  $\leq 1$  bear.

We met our objective to manage for a 3-year mean annual human-caused mortality of at least 55% males in all subunits except Units 20A and 20C, but met the objective areawide. We recommend continued harvest monitoring, particularly in areas with high harvest densities or small harvest quotas.

Despite brown bear harvest that exceeded our management objectives in portions of the Fairbanks area, I do not recommend immediate regulatory action for several reasons. First, the proportion of males in the harvest is meeting our objective at the areawide (i.e., Unit) scale and, at the subunit scale, only 2 of 5 subunits are below the objective. Second, in areas where we have exceeded the recommended harvest, the overharvest has been minimal, except in the Unit 20A mountains. Third, studies in Unit 13 (Tobey and Schwanke 2009) suggest that sustainable harvest rates for Interior brown bears may be higher than previously (i.e.,  $\leq 8\%$  of bears  $\geq 2$ -years old) estimated. Finally, the majority of the Fairbanks area (i.e., Units 20A, 20B, and 20C) has been identified by the board for intensive management of moose and caribou (e.g., moose in Units 20A and 20B, the Delta caribou herd in Unit 20A, and the Fortymile caribou herd in portions of Units 20B and 25C). Although there is no formal grizzly bear reduction program in these intensive management areas, moose and caribou populations are managed for elevated yields by legislative mandate. Therefore, harvesting grizzly bear populations at the higher range of sustainable harvest would be consistent with the mandate to increase moose and caribou populations.

In lieu of regulatory changes, we recommend public outreach to reduce the harvest of females. Since guided hunts account for a significant portion of the harvest and their take of females is proportional to that of males, we will attempt to contact guides in Unit 20A to encourage them to select for male grizzly bears and to discuss the ramifications (e.g., shorter seasons) of high harvests of female grizzly bears in the subunit.

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Table 1a. Unit 20A grizzly bear harvest, regulatory years<sup>a</sup> 2006–2011.

Regulatory year	Reported							Total estimated kill <sup>d</sup>				
	Hunter kill <sup>b</sup>				Nonhunting kill <sup>c</sup>			M	F	Unk	Total	% Males
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
<i>2006</i>												
Fall 2006	10	8	0	18	0	1	0	10	9	0	19	
Spring 2007	3	1	0	4	0	0	0	3	1	0	4	
Total	13	9	0	22	0	1	0	13	10	0	23	57
<i>2007</i>												
Fall 2007	11	12	0	23	0	0	0	11	12	0	23	
Spring 2008	2	1	0	3	0	0	0	2	1	0	3	
Total	13	13	0	26	0	0	0	13	13	0	26	50
<i>2008</i>												
Fall 2008	8	9	0	17	0	0	0	8	9	0	17	
Spring 2009	6	0	0	6	0	0	0	6	0	0	6	
Total	14	9	0	23	0	0	0	14	9	0	23	61
<i>2009</i>												
Fall 2009	7	11	0	18	0	0	0	7	11	0	18	
Spring 2010	3	2	0	5	0	0	0	3	2	0	5	
Total	10	13	0	23	0	0	0	10	13	0	23	43
<i>2010</i>												
Fall 2010	10	10	0	20	0	0	0	10	10	0	20	
Spring 2011	2	1	0	3	0	0	0	2	1	0	3	
Total	12	11	0	23	0	0	0	12	11	0	23	52
<i>2011</i>												
Fall 2011	11	11	0	22	0	0	1	11	11	1	23	
Spring 2012	4	2	0	6	0	0	0	4	2	0	6	
Total	15	13	0	28	0	0	1	15	13	1	29	54

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

<sup>b</sup> Includes illegal kills.

<sup>c</sup> Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

<sup>d</sup> Percentage includes only bears of known sex.

Table 1b. Unit 20B grizzly bear harvest, regulatory years<sup>a</sup> 2006–2011.

Regulatory year	Reported							Total estimated kill <sup>d</sup>				
	Hunter kill <sup>b</sup>				Nonhunting kill <sup>c</sup>			M	F	Unk	Total	% Males
	M	F	Unk	Total	M	F	Unk					
<i>2006</i>												
Fall 2006	1	0	0	1	0	0	0	1	0	0	1	
Spring 2007	1	1	0	2	4	2	0	5	3	0	8	
Total	2	1	0	3	4	2	0	6	3	0	9	67
<i>2007</i>												
Fall 2007	2	2	0	4	2	3	0	4	5	0	9	
Spring 2008	2	1	0	3	0	0	0	2	1	0	3	
Total	4	3	0	7	2	3	0	6	6	0	12	50
<i>2008</i>												
Fall 2008	9	8	0	17	0	3	0	9	11	0	20	
Spring 2009	2	1	0	3	0	0	0	2	1	0	3	
Total	11	9	0	20	0	3	0	11	12	0	23	48
<i>2009</i>												
Fall 2009	4	1	0	5	0	0	0	4	1	0	5	
Spring 2010	3	1	0	4	0	0	0	3	1	0	4	
Total	7	2	0	9	0	0	0	7	2	0	9	78
<i>2010</i>												
Fall 2010	4	3	0	7	0	0	0	4	3	0	7	
Spring 2011	1	3	0	4	0	0	0	1	3	0	4	
Total	5	6	0	11	0	0	0	5	6	0	11	45
<i>2011</i>												
Fall 2011	8	4	0	12	0	0	0	8	4	0	12	
Spring 2012	1	1	0	2	0	0	0	1	1	0	2	
Total	9	5	0	14	0	0	0	9	5	0	14	64

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

<sup>b</sup> Includes illegal kills.

<sup>c</sup> Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

<sup>d</sup> Percentage includes only bears of known sex.

Table 1c. Unit 20C grizzly bear harvest, regulatory years<sup>a</sup> 2006–2011.

Regulatory year	Reported								Total estimated kill <sup>d</sup>				
	Hunter kill <sup>b</sup>				Nonhunting kill <sup>c</sup>				M	F	Unk	Total	% Males
	M	F	Unk	Total	M	F	Unk						
<i>2006</i>													
Fall 2006	6	1	0	7	1	0	0	7	1	0	8		
Spring 2007	1	1	0	2	0	0	0	1	1	0	2		
Total	7	2	0	9	1	0	0	8	2	0	10	80	
<i>2007</i>													
Fall 2007	1	0	0	1	0	0	0	1	0	0	1		
Spring 2008	0	0	0	0	0	0	0	0	0	0	0		
Total	1	0	0	1	0	0	0	1	0	0	1	100	
<i>2008</i>													
Fall 2008	3	1	0	4	0	0	0	3	1	0	4		
Spring 2009	1	0	0	1	0	0	0	1	0	0	1		
Total	4	1	0	5	0	0	0	4	1	0	5	80	
<i>2009</i>													
Fall 2009	2	4	0	6	0	0	0	2	4	0	6		
Spring 2010	1	0	0	1	0	0	0	1	0	0	1		
Total	3	4	0	7	0	0	0	3	4	0	7	43	
<i>2010</i>													
Fall 2010	2	3	0	5	0	0	0	2	3	0	5		
Spring 2011	1	2	0	3	0	0	0	1	2	0	3		
Total	3	5	0	8	0	0	0	3	5	0	8	38	
<i>2011</i>													
Fall 2011	3	0	0	3	0	0	0	3	0	0	3		
Spring 2012	0	0	0	0	0	0	1	0	0	1	1		
Total	3	0	0	3	0	0	1	3	0	1	4	100	

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

<sup>b</sup> Includes illegal kills.

<sup>c</sup> Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

<sup>d</sup> Percentage includes only bears of known sex.

Table 1d. Unit 20F grizzly bear harvest, regulatory years<sup>a</sup> 2006–2011.

Regulatory year	Reported											
	Hunter kill <sup>b</sup>				Nonhunting kill <sup>c</sup>			Total estimated kill <sup>d</sup>				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
<i>2006</i>												
Fall 2006	1	2	0	3	0	0	0	1	2	0	3	
Spring 2007	1	0	0	1	0	0	0	1	0	0	1	
Total	2	2	0	4	0	0	0	2	2	0	4	50
<i>2007</i>												
Fall 2007	0	0	0	0	0	0	0	0	0	0	0	
Spring 2008	1	0	0	1	0	0	0	1	0	0	1	
Total	1	0	0	1	0	0	0	1	0	0	1	100
<i>2008</i>												
Fall 2008	0	0	0	0	0	0	0	0	0	0	0	
Spring 2009	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0
<i>2009</i>												
Fall 2009	0	1	0	1	0	0	0	0	1	0	1	
Spring 2010	1	0	0	1	0	0	0	1	0	0	1	
Total	1	1	0	2	0	0	0	1	1	0	2	50
<i>2010</i>												
Fall 2010	0	0	0	0	0	0	0	0	0	0	0	
Spring 2011	1	1	0	2	0	0	0	1	1	0	2	
Total	1	1	0	2	0	0	0	1	1	0	2	50
<i>2011</i>												
Fall 2011	2	0	0	2	0	0	0	2	0	0	2	
Spring 2012	2	0	0	2	0	0	0	2	0	0	2	
Total	4	0	0	4	0	0	0	4	0	0	4	100

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

<sup>b</sup> Includes illegal kills.

<sup>c</sup> Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

<sup>d</sup> Percentage includes only bears of known sex.

Table 1e. Unit 25C grizzly bear harvest, regulatory years<sup>a</sup> 2006–2011.

Regulatory year	Reported							Total estimated kill <sup>d</sup>				
	Hunter kill <sup>b</sup>				Nonhunting kill <sup>c</sup>			M	F	Unk	Total	% Males
	M	F	Unk	Total	M	F	Unk					
<i>2006</i>												
Fall 2006	4	3	0	7	0	0	0	4	3	0	7	
Spring 2007	1	0	0	1	0	0	0	1	0	0	1	
Total	5	3	0	8	0	0	0	5	3	0	8	63
<i>2007</i>												
Fall 2007	3	2	0	5	0	0	0	3	2	0	5	
Spring 2008	0	0	0	0	0	0	0	0	0	0	0	
Total	3	2	0	5	0	0	0	3	2	0	5	60
<i>2008</i>												
Fall 2008	5	0	0	5	0	0	0	5	0	0	5	
Spring 2009	0	1	0	1	0	0	0	0	1	0	1	
Total	5	1	0	6	0	0	0	5	1	0	6	83
<i>2009</i>												
Fall 2009	8	1	0	9	0	0	0	8	1	0	9	
Spring 2010	0	0	0	0	0	0	0	1	0	0	1	
Total	8	1	0	9	0	0	0	9	1	0	10	90
<i>2010</i>												
Fall 2010	2	0	0	2	0	0	0	2	0	0	2	
Spring 2011	0	0	0	0	0	0	0	0	0	0	0	
Total	2	0	0	2	0	0	0	2	0	0	2	100
<i>2011</i>												
Fall 2011	3	3	0	6	0	0	0	3	3	0	6	
Spring 2012	1	1	0	2	0	0	0	1	1	0	2	
Total	4	4	0	8	0	0	0	4	4	0	8	50

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

<sup>b</sup> Includes illegal kills.

<sup>c</sup> Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

<sup>d</sup> Percentage includes only bears of known sex.

Table 2. Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest in 3 zones, 2006–2011.

Harvest subarea	Area (mi <sup>2</sup> )	Calendar year	Bears killed			3-yr Mean harvest		Harvest density <sup>c</sup>
			All ages <sup>a</sup>	≥2 yr <sup>b</sup>	≥2 yr <sup>b</sup>	All ages	≥2 yr <sup>b</sup>	
Unit 20A mountains	3,081 <sup>d</sup>	2006	16	<i>1</i>	14	11.3	10.3	4.5
		2007	24	<i>0</i>	23	16.0	14.7	7.5
		2008	16	<i>0</i>	15	18.7	17.3	4.9
		2009	19	<i>0</i>	19	19.7	19.0	6.2
		2010	23	<i>0</i>	23	19.3	19.0	7.5
		2011	24	<i>0</i>	24	22.0	22.0	7.8
Eastern half of Unit 20B	4,929	2006	7	<i>3</i>	6	9.3	7.7	2.0
		2007	14	<i>9</i>	10	9.7	7.7	2.0
		2008	20	<i>3</i>	19	13.7	11.7	3.9
		2009	6	<i>0</i>	6	13.3	11.7	1.2
		2010	7	<i>0</i>	7	11.0	10.7	1.4
		2011	15	<i>0</i>	15	9.3	9.3	3.0
Unit 20A Flats, western half of Unit 20B, Unit 20C outside Denali National Park, Units 20F and 25C	26,278 <sup>e</sup>	2006	27	<i>2</i>	27	23.0	23.0	5.5
		2007	16	<i>2</i>	16	19.7	19.7	3.2
		2008	10	<i>0</i>	10	17.7	17.7	2.0
		2009	25	<i>0</i>	25	17.0	17.0	5.1
		2010	15	<i>1</i>	15	16.7	16.7	3.0
		2011	19	<i>0</i>	19	19.7	19.7	4.0

<sup>a</sup> Numbers in *italics* indicate how many of these bears were killed by other than harvest by hunters (i.e., defense of life or property, illegal kills, research activities).

<sup>b</sup> Assuming all bears of unknown age were ≥2-years old.

<sup>c</sup> Bears ≥2 years old harvested per 1,000 mi<sup>2</sup>.

<sup>d</sup> Excludes about 500 mi<sup>2</sup> (1,300 km<sup>2</sup>) of nonbear habitat in glaciers and above 6,000 ft (1,850 m).

<sup>e</sup> Excludes 4,450 mi<sup>2</sup> (11,500 km<sup>2</sup>) that is closed to hunting in Denali National Park.

Table 3. Units 20A, 20B, 20C, 20F, and 25C grizzly bear successful hunter residency<sup>a</sup>, regulatory years<sup>b</sup> 2006–2011.

Regulatory year	Resident (%)	Nonresident (%)	Unknown (%)	<i>n</i>
2006 <sup>c</sup>	36 (78)	10 (22)	0 (0)	46
2007 <sup>d</sup>	26 (65)	14 (35)	0 (0)	40
2008 <sup>e</sup>	40 (74)	14 (26)	0 (0)	54
2009 <sup>f</sup>	39 (78)	11 (22)	0 (0)	50
2010	28 (61)	18 (39)	0 (0)	46
2011	37 (65)	20 (35)	0 (0)	57

<sup>a</sup> Excludes defense of life or property, research mortality, or other human-caused accidental or illegal mortality bears.

<sup>b</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

<sup>c</sup> Includes 1 bear reported taken 19 August 2006 in Unit 20F and 1 bear taken 29 August 2006 in Unit 25C.

<sup>d</sup> Includes 1 bear reported taken 14 June 2008 in Unit 20F.

<sup>e</sup> Includes 1 bear reported taken 30 August 2008 in Unit 20B.

<sup>f</sup> Includes 1 bear reported taken 19 August 2009 in Unit 20A and 1 bear taken 25 August 2009 in Unit 20B.

Table 4. Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest chronology percent by month/day, regulatory years<sup>a</sup> 2006–2011.

Regulatory year	Harvest chronology percent by month/day <sup>b</sup>										
	Aug 16–31	Sep 1–15 16–30		Oct–Dec	Total	Apr	May 1–15 16–31		Jun	Total	<i>n</i>
2006 <sup>c</sup>		55	16	7	77	0	11	11		23	44
2007 <sup>d</sup>		44	41	0	85	0	0	15		15	39
2008 <sup>e</sup>		58	21	0	79	2	2	17		21	53
2009 <sup>f</sup>	5	57	16	0	79	0	0	22	0	22	49
2010 <sup>g</sup>	0	53	18	2	73	0	4	18	4	27	45
2011	2	61	16	2	81	0	2	14	4	19	57

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

<sup>b</sup> Excludes defense of life or property, research mortality, or other human-caused accidental or illegal mortality.

<sup>c</sup> Does not include 1 bear reported taken on 19 August 2006 in Unit 20F and another bear on 29 August 2006 in Unit 25C.

<sup>d</sup> Does not include 1 bear reported taken on 14 June 2008 in 20F.

<sup>e</sup> Does not include 1 bear reported taken on 30 August 2008 in Unit 20B.

<sup>f</sup> Does not include 1 bear from Unit 20B with an unknown date of kill.

<sup>g</sup> Does not include 1 bear from Unit 20A with an unknown date of kill.

Table 5. Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest percent by transport method, regulatory years<sup>a</sup> 2006–2011.

Regulatory year	Harvest percent by transport method <sup>b</sup>								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	Other ORV	Highway vehicle	Other/Unk	<i>n</i>
2006 <sup>c</sup>	20	4	15	43	0	2	7	9	46
2007 <sup>d</sup>	43	8	5	23	0	5	15	3	40
2008 <sup>e</sup>	30	7	9	43	0	2	7	2	54
2009 <sup>f</sup>	22	6	10	42	2	2	6	10	50
2010	30	9	13	30	0	2	7	9	46
2011	25	16	7	32	0	5	12	4	57

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

<sup>b</sup> Excludes defense of life or property, research mortality, or other human-caused accidental or illegal mortality.

<sup>c</sup> Includes 1 bear reported taken 19 August 2006 in Unit 20F and 1 bear taken 29 August 2006 in Unit 25C.

<sup>d</sup> Includes 1 bear reported taken 14 June 2008 in Unit 20F.

<sup>e</sup> Includes 1 bear reported taken 30 August 2008 in Unit 20B.

<sup>f</sup> Includes 1 bear reported taken 19 August 2009 in Unit 20A and 1 bear taken 25 August 2009 in Unit 20B.

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 – PO Box 115526  
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**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012<sup>1</sup>

**LOCATION**

**GAME MANAGEMENT UNIT:** 20D (5,637 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Central Tanana Valley near Delta Junction

**BACKGROUND**

Brown bears are distributed throughout Unit 20D; however, the Tanana River separates brown bear habitat into 2 distinct types within the unit. Unit 20D south of the Tanana River is adjacent and similar to habitat described by Reynolds (1990) for the foothills and mountains of the northcentral Alaska Range. Brown bear habitat in Unit 20D north of the Tanana River is adjacent and similar to habitat described in Unit 20E by Gasaway et al. (1990) for the hills north of the Tanana River. Hunter access to southern Unit 20D is excellent, while hunter access is more difficult in northern Unit 20D.

Until regulatory year (RY) 1991 (regulatory year begins 1 July and ends 30 June, e.g., RY91 = 1 July 1991–30 June 1992), Unit 20D brown bear hunting regulations consisted of a bag limit of 1 bear every 4 years, a \$25 resident tag fee, and a hunting season from 1 September to 31 May. During RY92–RY94, the regulations were liberalized in northern Unit 20D to 1 bear per year, and the season was lengthened to 10 August–30 June to provide greater opportunity for hunters in this area of low bear harvest.

In RY95, regulations were further liberalized to meet intensive management objectives, and a Unit 20D harvest objective of 5–15 bears per year was established. The portion of Unit 20D north of the Tanana River and east of the Gerstle River was liberalized to a bag limit of 1 bear per year with no resident tag fee and a hunting season of 10 August–30 June. In RY03, hunting regulations were further liberalized when the portion of Unit 20D west of the Gerstle River was liberalized to a bag limit of 1 bear per year, the resident tag fee was eliminated and the hunting season was expanded to 10 August–30 June, coinciding with the rest of the unit.

**MANAGEMENT DIRECTION**

**MANAGEMENT GOAL**

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

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<sup>1</sup> At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

## MANAGEMENT OBJECTIVES

- Manage for an annual human-caused mortality of 5–15 bears/year.
- Manage for a 3-year mean, annual, human-caused mortality composed of at least 55% males.

## METHODS

Successful hunters were required to have brown bears sealed at Alaska Department of Fish and Game (ADF&G) offices or by other approved sealing officers. Data collected from each brown bear during the sealing process included sex, skull length and width, transportation used by the hunter, number of days hunted, date and location of kill, and hunter name and address. A vestigial premolar tooth was extracted from each bear skull for use in age determination. Bears that died from nonhunting mortality sources, such as those killed in defense of life or property, were also sealed. Data were summarized by regulatory year.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

DuBois (1995) calculated brown bear population estimates for Unit 20D. The Unit 20D estimate was 185–220 total bears, with 140–167 bears  $\geq 2$  years old. For the population estimate, DuBois calculated separate estimates for Unit 20D north and south of the Tanana River as described below. These estimates were used during RY10–RY11 even though harvest rates have increased since 1993 and evidence suggests that brown bears largely vacate recent large burns (C. Gardner, ADF&G, unpublished data, Fairbanks, 2007) such as occurred in 2003–2004. Anecdotal observations and harvest trend data suggest that brown bears remain common to abundant in the unit and we do not have better data on which to base an estimate at this time.

Southern Unit 20D. The population estimate for southern Unit 20D was 51–58 brown bears  $\geq 2$  years old and a total of 76–86 bears. This estimate was based on density estimates of 25.4–29.0 bears  $\geq 2$  years old/1,000 mi<sup>2</sup>, plus an additional 14% for cubs and yearlings, developed by Reynolds (1993) for similar habitat in the Alaska Range in Unit 20A.

Anecdotal information for southern Unit 20D from local residents, hunters, trappers, and pilots indicates that bears are common in most of the area. Residents commonly report bears near the town of Delta Junction, and in the Delta Agricultural Project. Dall sheep, moose, and caribou hunters, and trappers commonly report seeing bears in the foothills of the Alaska Range.

Northern Unit 20D. The population estimate for northern Unit 20D was 92–109 brown bears  $\geq 2$  years old and 109–134 total bears. This estimate was based on Boertje et al.'s (1987) radiotelemetry study of brown bear predation. Boertje subtracted fractions of home ranges outside a 4,000 km<sup>2</sup> study area to calculate minimum and probable maximum brown bear density estimates for Unit 20E in early May. Densities varied from 26 to 32 bears  $\geq 2$  years old/1,000 mi<sup>2</sup> in unburned habitat in May, plus 23% for cubs and yearlings. C. Gardner (unpublished data, 2007) used a contemporary DNA-based hair mark-recapture design to confirm a similar density in unburned areas of Unit 20E, but strikingly lower densities in burned habitat.

### *Population Composition*

Brown bear population composition is unknown for Unit 20D. Because cubs or females accompanied by cubs are illegal to harvest, the sex ratio of the harvest was not used to estimate population composition.

### *Distribution and Movements*

Brown bears are distributed throughout Unit 20D; however, no specific information on patterns of brown bear distribution or movements is available.

## **MORTALITY**

Season and Bag Limit. During RY10–RY11 the Unit 20D brown bear bag limit was 1 bear/year, with no resident tag fee required, and the hunting season was 10 August–30 June. Cubs (<2 yr of age) and females accompanied by cubs were illegal to harvest.

Alaska Board of Game Actions and Emergency Orders. The Board of Game reauthorized brown bear tag fee exemptions for resident hunters in all Interior and eastern North Slope units, including Unit 20D, during each year of this reporting period.

### Harvest by Hunters and Other Mortality.

*RY10* — Hunters killed 10 bears (Table 1), which met the harvest objective. Eight bears were killed in Unit 20D south of the Tanana River and 2 north of the Tanana River (Table 1). The total reported mortality of 10 bears was an estimated 5% of the unitwide brown bear population and 6–7% of bears  $\geq 2$  years old. We estimated that 1 bear was killed each year and not reported. Adding this estimated mortality to known mortality results in total estimated mortality of 11 bears (Table 2) or <10% of the estimated total population for the unit. The 3-year (RY08–RY10) average mortality was 74% males which met the management objective of at least 55%.

*RY11* — Hunters killed 9 bears (Table 1), which met the harvest objective. Hunters killed 5 bears in southern Unit 20D and 4 north of the Tanana River. The total reported mortality of 9 bears was an estimated 4–5% of the unitwide brown bear population and 5–6% of the estimated bears  $\geq 2$  years old. We estimated that 1 bear was killed each year and not reported. Adding this estimated mortality to reported mortality results in estimated total mortality of 10 bears (Table 2). The 3-year (RY09–RY11) average mortality was 73% males which meets the management objective.

Hunter Residency and Success. Most brown bears harvested in Unit 20D continued to be killed by Alaska residents. During RY10–RY11, local residents killed 21% of bears, nonlocal residents killed 74%, and nonresidents killed 5% (Table 3).

Harvest Chronology. During RY10–RY11, the spring and fall harvest were almost equal (Table 4). Prior to RY10, most of the brown bears taken in Unit 20D were killed in the fall.

Transport Methods. During RY10–RY11, most successful hunters used boats, highway vehicles, 3- or 4-wheelers, or walking to access hunting areas (Table 5).

## CONCLUSIONS AND RECOMMENDATIONS

The harvest objective of 5–15 bears per year was met during RY10–RY11. The objective to harvest predominantly male bears was met, with a 3-year (RY09–RY11) mean, annual human-caused mortality of 73% male bears. The Board of Game reauthorized brown bear tag fee exemptions in all Interior and eastern North Slope units as part of an intensive management program to increase numbers of moose and caribou, and continued the liberal season and bag limit in Unit 20D so that regulations were uniform throughout the unit.

Anecdotal observations and harvest trend data suggest bears remain plentiful in Unit 20D and no changes to the hunting season dates and bag limits are planned at this time. Monitoring mortality continues to be the primary methodology for population assessment.

The area west of the Gerstle River will likely continue to experience high levels of bear mortality because of the number of human inhabitants, road access for hunting, and liberal hunting regulations. A substantial portion of the brown bear mortality west of the Gerstle River has resulted from human-bear conflicts and low tolerance by the human population for presence of brown bears rather than targeted harvest. Moose, sheep, and caribou hunters and other people in the field are encouraged by ADF&G to legally harvest bears of concern rather than killing them in defense of life or property. These mortalities are recorded as hunting harvest rather than nonhunting mortality.

I recommend we continue to provide information to the public about bear behavior and safety. Agency educational materials and products will be made available to the public at the Delta area office. Outreach and education can contribute to minimizing human-bear conflicts.

The Unit 20D brown bear population, particularly west of the Gerstle River, should be monitored closely to determine long-term effects of liberal hunting regulations, road-accessibility, and human habitation. A DNA-based hair mark-recapture study should be conducted to estimate the current population.

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Table 1. Unit 20D brown bear mortality<sup>a</sup>, regulatory years<sup>b</sup> 2003–2011.

Regulatory year	Southern Unit 20D										Total Unit 20D		Total bears
	West of Gerstle River		East of Gerstle River		Unk location		Total		Northern Unit 20D		M	F	M+F
	M	F	M	F	M	F	M	F	M	F	M	F	M+F
	1 bear/yr, 10 Aug–30 Jun, no tag fee <sup>c</sup>												
2003	1	1	2	0	0	0	3	1	1	0	4	1	5
2004	5	5	1	0	0	0	6	5	1	3	7	8	15
2005	3	6	2	1	0	0	5	7	1	1	6	8	14
2006	5	1	3	2	0	0	8	3	1	0	9	3	12
2007	1	1	1	1	0	0	2	2	1	1	3	3	6
2008	5	4	4	1	1	1	10	6	1	1	11	7	18
2009	0	0	1	1	0	0	1	1	1	0	2	1	3
2010	4	0	4	0	0	0	8	0	2	0	10	0	10
2011	1	0	1	3	0	0	2	3	2	2	4	5	9
Total kill	25	18	19	9	1	1	45	28	11	8	56	36	92
Kill/Year	Avg 5		Avg 3		Avg <1		Avg 8		Avg 2		Avg 10		
% Male	58		68		50		62		58		61		

<sup>a</sup> Includes nonhunting mortality.

<sup>b</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2003 = 1 July 2003–30 June 2004).

<sup>c</sup> No tag fee for resident hunters, per hunting regulation.

Table 2. Unit 20D brown bear mortality<sup>a</sup>, regulatory years<sup>b</sup> 2003–2011.

Regulatory year	Reported							Estimated kill		Total reported and estimated kill			
	Hunter kill			Total	Nonhunting kill <sup>a</sup>			Unreported	Illegal	M	F	Unk	Total
	M	F	Unk		M	F	Unk						
<i>2003</i>													
Fall 2003	3	0	0	3	0	0	0	1	0	3	0	1	4
Spring 2004	1	1	0	2	0	0	0	0	0	1	1	0	2
Total	4	1	0	5	0	0	0	1	0	4	1	1	6
<i>2004</i>													
Fall 2004	5	7	0	12	0	0	0	1	0	5	7	1	13
Spring 2005	2	1	0	3	0	0	0	0	0	2	1	0	3
Total	7	8	0	15	0	0	0	1	0	7	8	1	16
<i>2005</i>													
Fall 2005	5	4	0	9	0	0	0	1	0	5	4	1	10
Spring 2006	1	4	0	5	0	0	0	0	0	1	4	0	5
Total	6	8	0	14	0	0	0	1	0	6	8	1	15
<i>2006</i>													
Fall 2006	6	2	0	8	1	0	0	1	0	7	2	1	10
Spring 2007	2	1	0	3	0	0	0	0	0	2	1	0	3
Total	8	3	0	11	1	0	0	1	0	9	3	1	13
<i>2007</i>													
Fall 2007	2	2	0	4	0	0	0	1	0	2	2	1	5
Spring 2008	1	1	0	2	0	0	0	0	0	1	1	0	2
Total	3	3	0	6	0	0	0	1	0	3	3	1	7
<i>2008</i>													
Fall 2008	10	3	0	13	0	0	0	1	0	10	3	1	14
Spring 2009	1	4	0	5	0	0	0	0	0	1	4	0	5
Total	11	7	0	18	0	0	0	1	0	11	7	1	19
<i>2009</i>													
Fall 2009	2	1	0	3	0	0	0	1	0	2	1	1	4
Spring 2010	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	1	0	3	0	0	0	1	0	2	1	1	4

Regulatory year	Reported							Estimated kill		Total reported and estimated kill			
	Hunter kill			Total	Nonhunting kill <sup>a</sup>			Unreported	Illegal	M	F	Unk	Total
	M	F	Unk		M	F	Unk						
<i>2010</i>													
Fall 2010	5	0	0	5	0	0	0	1	0	5	0	1	6
Spring 2011	5	0	0	5	0	0	0	0	0	5	0	0	5
Total	10	0	0	10	0	0	0	1	0	10	0	1	11
<i>2011</i>													
Fall 2011	2	3	0	5	0	0	0	1	0	2	3	1	6
Spring 2012	2	2	0	4	0	0	0	0	0	2	2	0	4
Total	4	5	0	9	0	0	0	1	0	4	5	1	10

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

<sup>b</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2003 = 1 July 2003–30 June 2004).

Table 3. Residency of successful Unit 20D brown bear hunters (includes legal and illegal harvest; excludes defense of life or property kills), regulatory years<sup>a</sup> 2000–2011.

Regulatory year	Local <sup>b</sup> resident	Nonlocal resident	Nonresident	Unk	Total successful hunters
2000	6	9	1	1	17
2001	5	3	2	1	11
2002	8	5	0	0	13
2003	1	4	0	0	5
2004	7	7	1	0	15
2005	5	6	2	1	14
2006	9	2	1	0	12
2007	3	3	0	0	6
2008	8	10	0	0	18
2009	1	1	1	0	3
2010	3	7	0	0	10
2011	1	7	1	0	9

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

<sup>b</sup> Residents of Unit 20D.

Table 4. Chronology of Unit 20D brown bear harvest and nonhunting mortality by month, regulatory years<sup>a</sup> 2000–2011.

Regulatory year	Chronology of harvest and nonhunting mortality by month								<i>n</i>
	Aug	Sep	Oct	Nov	Apr	May	Jun	Other	
2000	3	9	2	0	0	2	3	1	20
2001	5	4	1	0	0	0	1	1	12
2002	1	7	0	0	0	5	0	0	13
2003	0	3	0	0	0	1	1	0	5
2004	6	5	1	0	0	2	1	0	15
2005	5	4	0	0	0	4	1	0	14
2006	1	6	2	0	1	1	1	0	12
2007	1	3	0	0	0	0	2	0	6
2008	5	7	1	0	0	3	2	0	18
2009	0	3	0	0	0	0	0	0	3
2010	2	3	0	0	0	3	2	0	10
2011	1	4	0	0	0	1	3	0	9

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

Table 5. Unit 20D percent of brown bear harvest (includes legal and illegal harvest; excludes defense of life or property) by transport method, regulatory years<sup>a</sup> 2000–2011.

Regulatory year	Percent harvest by transport method										<i>n</i>
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Foot	Other	Unk	
2000	12	0	12	29	0	6	12	29	0	0	17
2001	27	0	0	27	0	0	9	36	0	0	11
2002	8	8	0	46	0	0	15	23	0	0	13
2003	20	0	0	60	0	0	0	20	0	0	5
2004	13	0	7	27	0	0	20	33	0	0	15
2005	14	7	7	21	0	0	14	29	0	7	14
2006	17	17	0	25	0	0	33	8	0	0	12
2007	0	17	0	67	0	0	0	17	0	0	6
2008	6	6	17	22	0	0	0	50	0	0	18
2009	33	33	0	0	0	0	0	33	0	0	3
2010	0	0	10	50	0	0	10	30	0	0	10
2011	0	0	45	0	0	0	33	22	0	0	9

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
907-465-4190 – PO Box 115526  
Juneau, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012<sup>1</sup>

**LOCATION**

**GAME MANAGEMENT UNIT:** 20E (10,680 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Fortymile, Charley, and Ladue River drainages, including the Tanana uplands and all drainages into the south bank of the Yukon River upstream from and including the Charley River drainage.

**BACKGROUND**

The brown (grizzly) bear population in Unit 20E declined to low levels during the 1950s as a result of the widespread use of poison during an intensive, year-round federal wolf control program. After the program ended, bears were lightly exploited throughout the 1960s and 1970s.

During the early 1980s, predation by brown bears was identified as a major factor in maintaining the moose population in Unit 20E at low densities (0.2 moose/mi<sup>2</sup>, 0.5 moose/km<sup>2</sup>; Gasaway et al. 1992). Hunting regulations were liberalized in an attempt to reduce the brown bear population to decrease predation pressure on moose calves. Regulation changes included lengthening the brown bear season; increasing the bag limit from 1 bear/4 years to 1 bear/year; and waiving the \$25 resident brown bear tag fee during regulatory years (RY) 1984–1989 (regulatory year begins 1 July and ends 30 June, e.g., RY89 = 1 July 1989–30 June 1990) and during RY02 to the present. Annual brown bear harvest increased from a mean of 3 during RY66–RY81 to a mean of 19 during RY82–RY88 and declined slightly during RY89–RY09 to a mean of 15. In 2004 the Alaska Board of Game (board) further increased the annual bag limit to 2 bears and approved the Upper Yukon–Tanana Predation Control Program in which Alaska residents were issued predation control permits to take an unlimited number of brown bears, to bait brown bears, and sell untanned brown bear hides. The program also allowed take of brown bears at bait stations the same day permittees were airborne, provided they were at least 300 feet from the airplane at the time of taking. However, the control program was suspended in March 2009 because hunter harvest and kill by predation control permittees remained low (Bentzen 2011).

During the mid-1980s, Boertje et al. (1987) estimated the annual May population in a 4,000 mi<sup>2</sup> portion of Unit 20E at 41 brown bears of all ages/1,000 mi<sup>2</sup> (16 bears/1,000 km<sup>2</sup>) and the November population at 31 bears of all ages/1,000 mi<sup>2</sup> (12/1,000 km<sup>2</sup>). Even with liberal hunting

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<sup>1</sup> At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

regulations beginning in the early 1980s and the predation control program beginning in 2004, brown bear harvest has remained low. The Unit 20E population in May 2008 was estimated to be 30–37 bears/1,000 mi<sup>2</sup> (12–14 bears/1,000 km<sup>2</sup>) or 320–394 bears of all ages and appears to have been stable since 1985–1986.

## **MANAGEMENT DIRECTION**

When developing brown bear management goals and objectives for Unit 20E, we also considered the management goals and objectives for moose and caribou populations in the area. Coordinating predator and ungulate population and harvest objectives in Unit 20E is necessary because the board designated the moose population in most of Unit 20E and the Fortymile caribou herd as important for high levels of human consumptive use. Under the intensive management law (Alaska Statute 16.05.255[e]–[g]), the board must consider intensive management if an ungulate population is depleted or has reduced productivity and regulatory action to significantly reduce harvest becomes necessary. Brown bears are the primary predator on newborn moose calves in Unit 20E, and the moose population has been kept at low densities by predation (Gasaway et al. 1992). Brown bears are also an important predator on newborn caribou calves (Boertje and Gardner 1999).

### **MANAGEMENT GOAL**

- Provide maximum opportunity to hunt brown bears in Unit 20E.

### **MANAGEMENT OBJECTIVES**

- Manage for temporary reductions in the brown bear population or for reduction in bear predation where it may be limiting moose population growth (e.g., moose populations are below food-limiting densities, with autumn calf:cow ratios <25:100).
- After moose populations increase to desired levels, reduce bear harvests to allow for bear population stabilization or recovery.

## **METHODS**

Brown bears harvested in Unit 20E must be sealed within 30 days of the kill. During the sealing process, we determined the sex of the bear, measured the length and width of the skull, extracted a premolar tooth, and collected information on date and location of harvest, and time the hunter spent in the field. Premolar teeth were sent to Matson's Laboratory (Milltown, Montana) for age determination. Harvest data were summarized by regulatory year.

The 2005 population estimate (Gross 2007) within Unit 20E was based on extrapolations of density estimates obtained during telemetry studies of predation in central Unit 20E during 1985–1986 (Boertje et al. 1987); Unit 20A, 100 miles west of Unit 20E, during 1981–1998 (Reynolds and Boudreau 1992); and Unit 20E harvest statistics collected since 1977 (Gardner 2001).

The 2008 population estimate is based on a combination of the 2005 estimate and 2006 genetic mark-recapture survey data. In 2006, Gardner (ADF&G, unpublished data, Fairbanks) conducted a brown bear population survey within a 2,002 mi<sup>2</sup> (5,185.2 km<sup>2</sup>) portion of southern Unit 20E using genetic mark-recapture of bear hair during May–July. A density estimate based on the

DNA of individual bears' hair was developed for the 686.5 mi<sup>2</sup> (1,778 km<sup>2</sup>) core of the 2,002 mi<sup>2</sup> survey area. A population estimate was achieved within the 4,074 mi<sup>2</sup> (10,552 km<sup>2</sup>) Unit 20E bear control area by extrapolating the density estimate from the 2,002 mi<sup>2</sup> portion of southern Unit 20E to the 4,074 mi<sup>2</sup> bear control area.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

The Unit 20E population in May 2008 was estimated to be 30–37 bears/1,000 mi<sup>2</sup> (12–14 bears/1,000 km<sup>2</sup>) or 320–394 bears of all ages. This is comparable to estimates from previous years. The 2006 population estimate of 28–35 bears/1,000 mi<sup>2</sup> (10.7–13.4 bears/1,000 km<sup>2</sup>; 320–394 bears of all ages) is similar to the estimate by Boertje et al. (1987) for 1985–1986 of 31–41 bears of all ages/1,000 mi<sup>2</sup>. Gardner estimated the midsummer 2006 brown bear population within the 4,074 mi<sup>2</sup> (10,552 km<sup>2</sup>) bear control area to be 114–141 bears of all ages (C. Gardner, unpublished data), fewer than the 2005 estimate of 170 brown bears within this area (Gross 2007).

The habitat within the bear control area is representative of most of the 7,310 mi<sup>2</sup> (18,933 km<sup>2</sup>) of southern and eastern Unit 20E, where similar harvest, fire patterns, and habitat quality exist. The bear density in southern and eastern Unit 20E was likely 28–35 brown bears/1,000 mi<sup>2</sup> (11–14/1,000 km<sup>2</sup>) following the wildfires of 2004–2005, similar to bear density in the control area. The 3,370 mi<sup>2</sup> (8,728 km<sup>2</sup>) northwestern portion of Unit 20E did not experience extensive fires during 2004–2005 and the population likely remained relatively stable at 34–41 brown bears/1,000 mi<sup>2</sup> (13–16/1,000 km<sup>2</sup>; C. Gardner, ADF&G, personal communication, 2007). By extrapolating these densities, I estimated the Unit 20E bear population during midsummer 2008 to be 30–37 bears/1,000 mi<sup>2</sup> (12–14/1,000 km<sup>2</sup>) or 320–394 bears of all ages.

Gardner (2003) estimated a 2% annual decline in the grizzly bear population in portions of Unit 20E during 1982–1988 and 1992–1996 because localized harvest levels were >6% of the brown bear population in those areas, the maximum harvest level thought to be sustainable at that time (Reynolds and Boudreau 1992). However, Gardner (2003) reported that harvest was within sustainable levels in Unit 20E as a whole. For example, during RY82–RY05, brown bear harvest in Unit 20E was well below the 11% harvest which resulted in an unsustainable 32% decline in the Unit 20A brown bear population (Reynolds and Boudreau 1992).

Research in Unit 13 indicated that sustainable harvest of brown bears may be higher than the 6% which researchers had predicted in the past (Tobey and Kelleyhouse 2007). Fifteen years of harvest rates in excess of 10% resulted in little reduction in bear numbers in Unit 13, although these harvest rates were likely supported by immigration of numerous subadult males into the area (Tobey and Kelleyhouse 2007). Unit 20E lacks large lightly hunted populations of brown bears in adjacent areas and immigration of subadult males is expected to be low. Compared to Unit 13, food availability for brown bears is lower in Unit 20E, which has a shorter growing season, less rainfall and lacks both salmon and ground squirrels. This suggests that harvest levels of 10% or more of the population would result in a population decline in Unit 20E. During RY10–RY11, harvest of brown bears in Unit 20E likely had no effect on population trend because harvest did not exceed 5% of the total estimated population and was distributed throughout the unit.

## MORTALITY

### *Harvest*

#### Season and Bag Limit in Unit 20E during RY10–RY11.

	Resident Open Season (Subsistence and <u>General Hunts</u> )	Nonresident <u>Open Season</u>
<i>Unit 20E</i>		
<u>Bag Limit</u>		
2 bears every regulatory year.	10 August–30 June (General hunt only)	10 August–30 June

Cubs <2-years old and females accompanied by cubs were not legal animals. A bear taken in Unit 20E did not count against the bag limit of 1 bear every 4 years in other units.

Alaska Board of Game Actions and Emergency Orders. In spring 2010 the board eliminated the requirement for a resident \$25 brown bear tag fee in all of Interior Alaska. This included the lands with Yukon–Charley National Preserve, the only area in Unit 20E in which the resident tag fee was required.

In spring 2012 the board approved the take of grizzly bears at black bear bait stations during open black bear baiting seasons with a bear baiting permit in Units 12, 20C, 20E, and 21D. The board required hunters who take brown bears over bait in these areas to salvage the edible meat in addition to the hide and skull.

Harvest by Hunters. Hunters reported killing 17 brown bears in both RY10 and RY11 (Table 1). The 5-year (RY07–RY11) average harvest was 15 bears. The mean percentage of males harvested during RY07–RY11 was 63%. Males represented 59% and 65% of the harvest in RY10 and RY11, respectively.

Hunter Residency and Success. Resident hunters took 88% and 94% of the brown bears harvested in RY10 and RY11 (Table 2). Historically, little guided hunting for brown bears occurred in Unit 20E. Nonresidents accompanied by second-degree of kindred residents occasionally take a bear while hunting moose or caribou. Since 1995, guided nonresident hunters in remote portions of Unit 20E harvested 1–3 bears/year.

Harvest Chronology. During RY10–RY11, 82–88% of brown bears harvested in Unit 20E were taken during August and September when moose and caribou hunters were afield. Twelve to 18% of the total annual harvest was taken in the spring (Table 3).

Transport Methods. During RY10, 3- or 4-wheelers (35%) and airplanes (35%) were the modes of transportation used by most successful bear hunters (Table 4). During RY11, highway vehicles (35%) were used by most successful bear hunters, while fewer successful hunters used 3- or 4-wheelers (29%) or airplanes (12%).

### *Other Mortality*

Intraspecific mortality inflicted by adult male bears is likely the greatest source of nonhunting bear mortality in Unit 12 (Miller et al. 2003). No grizzly bears were recorded as being taken in defense of life or property incidents during RY10–RY11.

## **HABITAT**

### *Assessment*

All of Unit 20E is suitable brown bear habitat. Few human developments exist, except the Taylor Highway and the small communities of Eagle, Boundary, and Chicken. The region offers a variety of forbs and berries consumed by brown bears. However, there are no arctic ground squirrels and salmon are virtually absent. Both are important food sources elsewhere in Alaska. Habitat quality and diversity is improving following implementation of the *Alaska Interagency Fire Management Plan* (Alaska Wildland Fire Coordinating Group 1998) which allowed wildfires and prescribed burns to occur on hundreds of thousands of acres.

### *Enhancement*

In 2004 and 2005, approximately 1,875 mi<sup>2</sup> of habitat burned within, or adjacent to, Unit 20E. Revegetation of burned areas has provided an abundance of high quality forage for moose and provided brown bears with forage species which are limited or unavailable in mature spruce forests.

Ongoing research (C. Gardner, unpublished data) indicates that brown bears avoided the large recently burned areas in Unit 20E. However, the bears probably redistributed themselves rather than died in the fires. Capture data indicated that the large burns may act as barriers to bear movement. Few males and fewer, if any, females crossed the burn and there was no evidence that any bear's home range was centered within the burn. Effects of fire on brown bear survival adjacent to burns are poorly understood. There were no major fires in Unit 20E during RY10–RY11.

## **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

Research in Unit 20E and other parts of Alaska demonstrated that brown bear and wolf predation can be the primary factor limiting moose and caribou population growth (Gasaway et al. 1992). Altering wolf and bear predation simultaneously was recommended by Gasaway et al. (1992) to achieve maximum potential to increase moose numbers. However, liberal brown bear hunting regulations since 1984 and bear control programs during RY04–RY08 were ineffective at reducing brown bear numbers enough to reduce their predation on moose calves.

Additional methods for reducing brown bear numbers continue to be explored. To substantially increase moose numbers in Unit 20E, other brown bear control measures may be necessary. Although further research is needed, one measure may include extensive fire to encourage outmigration of bears. The brown bear population appears to have temporarily redistributed out of portions of the bear control area that were burned during 2004–2005, which likely resulted in reduced predation on moose calves for several years following wildfires in those areas (C. Gardner, unpublished data). Additional research should evaluate moose calf survival within the bear control area.

## CONCLUSIONS AND RECOMMENDATIONS

In July 2008, an estimated 320–394 bears of all ages resided in Unit 20E. Harvest data indicate the population has fluctuated little since 1981, despite the most liberal hunting regulations in Alaska. Low harvest rates are likely due to 1) the relative inaccessibility of most of Unit 20E 2) dense forest cover or downed timber which hinders hunters' ability to access or harvest bears and discourages hunters from coming to Unit 20E specifically to hunt brown bears, and 3) an unwillingness of moose and caribou hunters to opportunistically harvest bears due to the inconvenience and expense of caring for harvested bear hides. Since 1994, brown bear harvest has been dispersed across the unit, and localized impacts to brown bear numbers are unlikely.

Brown bear management in Unit 20E provides maximum bear hunting opportunity, which meets our management goal to provide maximum opportunity to hunt brown bears. Incidental harvest by high numbers of moose and caribou hunters, liberal seasons and bag limits, and an active brown bear control program have been unsuccessful at reducing the bear population. During RY10–RY11, total hunter harvest and bear control kills likely had no effect on the Unit 20E population trend, because they represented <6% of the total estimated population during both years. We did not meet our management objective to temporarily reduce the brown bear population or to reduce brown bear predation where it may be limiting moose population growth. Likely due to a combination of favorable weather conditions, the 2004 and 2005 wildfires, and the Upper Yukon–Tanana Wolf Control Program, moose calf:cow ratios have increased above the management objective of 25:100 in the most heavily hunted portion of Unit 20E west of the Taylor Highway (2008–2012,  $\bar{x}$  = 27 calves:100 cows, range = 17–37 calves:100 cows). However, calf:cow ratios remain low east of the Taylor Highway (2007–2012,  $\bar{x}$  = 15 calves:100 cows, range = 5–25 calves:100 cows).

Total moose populations throughout Unit 20E have not yet increased to desired levels and grizzly bear harvest remains low. Incentives or methods and means other than those allowed under current hunting regulations or the brown bear control program (RY04–RY08) will be necessary if the brown bear population is to be substantially reduced to accomplish our management objectives. Several ideas to increase the number of brown bears killed include allowing nonresidents to hunt brown bears in Unit 20E without a guide under general hunting regulations, allowing sale of tanned hides, snaring as a means of take, and a bag limit of any bear under the bear control program.

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Table 1. Unit 20E brown bear mortality, regulatory years<sup>a</sup> 2005–2011.

Regulatory year	Reported							Estimated kill		Total estimated kill			Total
	Hunter kill				Nonhunting kill <sup>b</sup>			Unreported	Illegal	M (%)	F (%)	Unk	
	M	F	Unk	Total	M	F	Unk						
<i>2005</i>													
Autumn 2005	5	3	0	8	1	0	0	0	0	6 (67)	3 (33)	0	9
Spring 2006	3	1	0	4	2	0	0	0	0	5 (83)	1 (17)	0	6
Total	8	4	0	12	3 <sup>c</sup>	0	0	0	0	11 (73)	4 (27)	0	15
<i>2006</i>													
Autumn 2006 <sup>c</sup>	3	3	0	6	1 <sup>c</sup>	0	0	0	0	4 (57)	3 (43)	0	7
Spring 2007	0	0	0	0	0	0	0	0	0	0 (0)	0 (0)	0	0
Total	3	3	0	6	1 <sup>c</sup>	0	0	0	0	4 (57)	3 (43)	0	7
<i>2007</i>													
Autumn 2007	7	2	0	9	1 <sup>c</sup>	0	0	0	0	8 (80)	2 (20)	0	10
Spring 2008	2	2	0	4	4 <sup>c</sup>	1 <sup>c</sup>	0	0	0	6 (67)	3 (33)	0	9
Total	9	4	0	13	5 <sup>c</sup>	1 <sup>c</sup>	0	0	0	14 (74)	5 (26)	0	19
<i>2008</i>													
Autumn 2008	6	4	0	10	0	0	0	0	0	6 (60)	4 (40)	0	10
Spring 2009	4	1	0	5	1 <sup>c</sup>	1 <sup>c</sup>	0	0	0	5 (71)	2 (29)	0	7
Total	10	5	0	15	1 <sup>c</sup>	1 <sup>c</sup>	0	0	0	11 (65)	6 (35)	0	17
<i>2009</i>													
Autumn 2009	6	5	0	11	0	0	0	0	0	6 (55)	5 (45)	0	11
Spring 2010	1	1	0	2	0	0	0	0	0	1 (50)	1 (50)	0	2
Total	7	6	0	13	0	0	0	0	0	7 (54)	6 (46)	0	13
<i>2010</i>													
Autumn 2010	8	6	0	14	0	0	0	0	0	8 (57)	6 (43)	0	14
Spring 2011	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3
Total	10	7	0	17	0	0	0	0	0	10 (59)	7 (41)	0	17
<i>2011</i>													
Autumn 2011	10	5	0	15	0	0	0	0	0	10 (67)	5 (33)	0	15
Spring 2012	1	1	0	2	0	0	0	0	0	1 (50)	1 (50)	0	2
Total	11	6	0	17	0	0	0	0	0	11 (65)	6 (35)	0	17

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2005 = 1 July 2005–30 June 2006).

<sup>b</sup> Includes bears killed by predator control permittees, defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

<sup>c</sup> All bears were killed by predator control permittees.

Table 2. Unit 20E residency of successful brown bear hunters, regulatory years<sup>a</sup> 1992–2011<sup>b</sup>.

Regulatory year	Resident	(%)	Nonresident	(%)	Unknown	(%)	Total successful hunters
1992	12	(86)	2	(14)	0	(0)	14
1993	20	(95)	1	(5)	0	(0)	21
1994	9	(82)	2	(18)	0	(0)	11
1995	9	(43)	9	(43)	3	(14)	21
1996	22	(92)	2	(8)	0	(0)	24
1997	9	(82)	2	(18)	0	(0)	11
1998	8	(73)	3	(27)	0	(0)	11
1999	3	(60)	2	(40)	0	(0)	5
2000	14	(78)	4	(22)	0	(0)	18
2001	11	(100)	0	(0)	0	(0)	11
2002	13	(93)	1	(7)	0	(0)	14
2003	17	(85)	3	(15)	0	(0)	20
2004	14	(88)	2	(12)	0	(0)	16
2005	11	(92)	1	(8)	0	(0)	12
2006	3	(50)	3	(50)	0	(0)	6
2007	12	(92)	1	(8)	0	(0)	13
2008	14	(93)	1	(7)	0	(0)	15
2009	12	(92)	1	(8)	0	(0)	13
2010	15	(88)	2	(12)	0	(0)	17
2011	16	(94)	1	(6)	0	(0)	17

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1992 = 1 July 1992–30 June 1993).

<sup>b</sup> Does not include bears killed by predator control permittees, defense of life or property kills or illegal kills.

Table 3. Unit 20E chronology of brown bear harvest by month, regulatory years<sup>a</sup> 1992–2011<sup>b</sup>.

Regulatory year	Harvest by month												<i>n</i>
	Aug (%)	Sep (%)	Oct (%)	Nov (%)	Apr (%)	May (%)	Jun (%)	Jul (%)	Aug (%)	Sep (%)	Oct (%)	Nov (%)	
1992	4 (29)	5 (36)	2 (14)	0 (0)	0 (0)	1 (7)	2 (14)						14
1993	6 (29)	12 (57)	1 (5)	0 (0)	1 (5)	1 (5)	0 (0)						21
1994	2 (18)	8 (73)	0 (0)	0 (0)	0 (0)	0 (0)	1 (9)						11
1995	3 (14)	10 (48)	0 (0)	0 (0)	1 (5)	6 (29)	1 (5)						21
1996	7 (29)	13 (54)	0 (0)	0 (0)	0 (0)	2 (8)	2 (8)						24
1997	2 (18)	9 (82)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)						11
1998	5 (45)	6 (55)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)						11
1999	0 (0)	2 (40)	0 (0)	0 (0)	0 (0)	3 (60)	0 (0)						5
2000	3 (17)	15 (83)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)						18
2001	2 (18)	7 (64)	0 (0)	0 (0)	1 (9)	0 (0)	1 (9)						11
2002	3 (22)	9 (64)	0 (0)	0 (0)	1 (7)	1 (7)	0 (0)						14
2003	7 (35)	8 (40)	1 (5)	0 (0)	1 (5)	2 (10)	1 (5)						20
2004	4 (25)	9 (56)	0 (0)	0 (0)	0 (0)	2 (13)	1 (6)						16
2005	2 (17)	4 (33)	2 (17)	0 (0)	0 (0)	3 (25)	1 (8)						12
2006	2 (33)	4 (67)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)						6
2007	4 (31)	5 (38)	0 (0)	0 (0)	1 (8)	3 (23)	0 (0)						13
2008	4 (27)	6 (40)	0 (0)	0 (0)	0 (0)	2 (13)	3 (20)						15
2009	5 (39)	6 (46)	0 (0)	0 (0)	0 (0)	2 (15)	0 (0)						13
2010	4 (23)	10 (59)	0 (0)	0 (0)	0 (0)	2 (12)	1 (6)						17
2011	1 (6)	14 (82)	0 (0)	0 (0)	0 (0)	1 (6)	1 (6)						17

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1992 = 1 July 1992–30 June 1993).

<sup>b</sup> Does not include bears killed by predator control permittees, defense of life or property kills or illegal kills.

Table 4. Unit 20E brown bear percent harvest by transport method, regulatory years<sup>a</sup> 1992–2011<sup>b</sup>.

Regulatory year	Percent harvest by transport method									
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	<i>n</i>
1992	43	0	0	21	0	7	29	0	0	14
1993	24	0	10	14	0	19	5	29	0	21
1994	27	0	9	18	0	9	18	18	0	11
1995	62	0	10	10	0	5	5	10	0	21
1996	42	4	0	8	0	8	21	17	0	24
1997	45	0	0	45	0	0	0	9	0	11
1998	73	0	0	0	0	18	0	9	0	11
1999	60	0	0	0	0	0	40	0	0	5
2000	44	0	11	33	0	0	11	0	0	18
2001	55	0	9	36	0	0	0	0	0	11
2002	21	0	7	29	7	14	7	14	0	14
2003	40	0	0	30	10	0	10	10	0	20
2004	44	0	13	31	0	0	6	6	0	16
2005	42	0	0	0	8	0	33	17	0	12
2006	67	0	0	0	0	0	33	0	0	6
2007	46	0	15	8	8	8	15	0	0	13
2008	27	0	13	46	0	7	0	7	0	15
2009	38	8	15	15	0	8	8	8	0	13
2010	35	0	0	35	0	6	18	6	0	17
2011	12	0	0	29	0	18	35	6	0	17

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1992 = 1 July 1992–30 June 1993).

<sup>b</sup> Does not include bears killed by predator control permittees, defense of life or property kills or illegal kills.

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
907-465-4190 – PO Box 115526  
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**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012<sup>1</sup>

**LOCATION**

**GAME MANAGEMENT UNITS:** 21B, 21C, 21D, and 24 (51,135 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Middle Yukon River, Koyukuk River, Nowitna River, and Melozitna River drainages

**BACKGROUND**

Grizzly bear density is thought to be low (10 bears/1,000 mi<sup>2</sup>) to moderate (25 bears/1,000 mi<sup>2</sup>) throughout Units 21B, 21C, and 21D, with highest densities in the mountainous areas. Grizzly bears are found in moderate numbers throughout Unit 24, with the highest densities (33 bears/1,000 mi<sup>2</sup>) in mountainous areas of the Brooks Range in northern Unit 24. Previous reports indicated bear populations were stable or slowly increasing (Woolington 1997a), based on local oral history. Information from studies conducted on the northern slopes of the Brooks Range in Unit 26 (Crook 1973, Reynolds 1976, Reynolds and Hechtel 1984) and in the southwestern Brooks Range in Unit 23 (Ballard et al. 1988) has been used to describe bear populations in Unit 24.

Since 1963, annual reported harvest in Units 21B, 21C, and 21D was <10 bears per year, except for a harvest of 13 bears in 1982, and 12 bears in 2000. Annually, an estimated additional unreported human-caused mortality of 10 bears per year was probably a result of bear-human conflicts. In Unit 24 the reported harvest since 1961 rarely exceeded 15–20 grizzly bears per year. Unreported kills most likely occurred along the Yukon and Koyukuk rivers during the summer and early fall when fish camps were in operation and bears were attracted to those sites.

Historically, grizzly bears were an important source of food and hides, but hunting effort by unit residents, with the exception of Anaktuvuk Pass residents, declined considerably during the 1900s. The Northwest Alaska brown bear management area was created in 1992 and allowed a bag limit of 1 bear every regulatory year under a subsistence registration permit. This permit required salvage of meat for human consumption, but the hide and skull did not need to be sealed unless they were removed from the management area. If the hide was removed from the management area, the Alaska Department of Fish and Game (ADF&G) took the skin of the head and the front claws. The registration regulations and fee exemption for the Northwest Alaska brown bear management area, which now includes all of Units 21D and 24, did not improve

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<sup>1</sup> At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

harvest reporting among local residents. Local hunters (residents of the units) took very few bears. Although the opening of the Dalton Highway corridor to the public in the 1980s and early 1990s increased the number of potential nonlocal hunters, no increased harvest in Unit 24 was observed.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT GOAL**

- Protect, maintain, and enhance the grizzly bear population and its habitat in concert with other components of the ecosystem.

### **MANAGEMENT OBJECTIVES**

#### *Units 21B, 21C, 21D*

- Manage a grizzly population that will sustain a 3-year mean annual harvest of at least 25 bears, with at least 50% males in the reported harvest.

#### *Unit 24*

- Manage a grizzly population that will sustain a 3-year mean annual reported harvest of at least 20 bears in the northern portion of the unit (north of Allakaket) and at least 15 bears in the southern (remaining) portion of the unit, with at least 50% males in the reported harvest.

## **METHODS**

Harvest was monitored through sealing requirements of general hunts and reporting requirements of the Northwest Alaska brown bear management area subsistence hunts. Data collected during sealing included population information (sex, location of harvest, skull measurements, and age if teeth were submitted for aging) and information specific to harvest (transportation methods, date of harvest, and commercial services used). Age determination from tooth cementum annuli was conducted by Matson's Laboratory (Milltown, Montana). Data collected from bears harvested under subsistence regulations were limited to sex, location of kill, and date of harvest. Bear-human conflicts were addressed through education, legal harvest of problem bears (e.g., bears perceived as potential threats to human safety or property), and changes in regulations. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY11 = 1 July 2011–30 June 2012).

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

Field observations, problem bear reports, and hunter sightings indicated the population was stable or slowly increasing since at least 1999. We did not conduct surveys in the area; however, we made population estimates based on known bear densities in similar habitats in other Interior Alaska game management units (Reynolds and Hechtel 1984, Reynolds 1989). We estimated 350–400 grizzly bears inhabit Units 21B, 21C, and 21D (21B $\approx$ 50, 21C $\approx$ 100, 21D $\approx$ 200), assuming 25 bears/1,000 mi<sup>2</sup> in the highest density bear habitat and 10 bears/1,000 mi<sup>2</sup> in the remainder of the reporting area (Woolington 1997b). In Unit 21D the best bear habitat is in the Nulato Hills. Unit 21C in its entirety contained the next best grizzly bear habitat. However, for

both areas, density was likely underestimated because the best habitat in this reporting area included salmon spawning streams that the referenced habitats were lacking (Miller 1993).

In Unit 24, Reynolds (1989) estimated densities of 33 bears/1,000 mi<sup>2</sup> within Gates of the Arctic National Park (7,000 mi<sup>2</sup>), 33/1,000 mi<sup>2</sup> in the Brooks Range outside the park (6,500 mi<sup>2</sup>), and 22–33 bears/1,000 mi<sup>2</sup> in the remainder of Unit 24 to the south (14,500 mi<sup>2</sup>). Therefore, he estimated 450 bears in northern Unit 24 (north of Allakaket) and 320–480 in the remainder of the unit (south of Allakaket). Earlier work in similar habitats in Interior and Arctic Alaska provided the basis for these estimates (Reynolds 1976, Reynolds and Hechtel 1984).

## MORTALITY

### *Harvest*

#### Seasons and Bag Limits in RY10–RY11.

<u>Units and Bag Limits</u>	<u>Resident Open Season (Subsistence and General Hunts)</u>	<u>Nonresident Open Season</u>
<i>Units 21B and 21C</i>		
One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun
<i>Unit 21D and Unit 24</i>		
One bear every regulatory year by registration permit, or	10 Aug–30 Jun (Subsistence hunt only)	No open season
One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun

*Note:* Cubs (<2 yr of age) and females accompanied by cubs were illegal to harvest.

Alaska Board of Game Actions and Emergency Orders. Details of Alaska Board of Game (board) actions and emergency orders during 1996–2008 can be found in Stout (2011). No board actions or emergency orders have been issued since 2008.

Harvest by Hunters. Reported grizzly bear harvest in Units 21B, 21C, and 21D was low ( $\bar{x} = 6.0$  bears/year), and no harvest patterns were clear during RY09–RY11 (Table 1). The number of bears taken and not reported was likely approximately 10 bears per year (more than half of the annual harvest) based on local resident interviews and previously reported values. Most unreported harvest was likely bears taken at fish camps. This would make the combined mean annual harvest during RY09–RY11 approximately 16.0 bears/year in Units 21B, 21C, and 21D. The estimated sustainable harvest rate is at least 5–6% of the population, based on data from other areas of Interior Alaska (DuBois 1989). Based on this harvest rate, a minimum annual harvest of 18–24 bears can be sustained in Units 21B, 21C, and 21D.

The age and sex composition of the reported harvest in Units 21B, 21C, and 21D shows no indication of overexploitation. From RY06 through fall 2012, males made up 74% of the reported harvest, which was adequate to maintain recruitment. The percent of males in the harvest was higher than the 65% reported for RY04 through fall 2010 (Stout 2011). During RY10–RY11 the average age of bears harvested in Units 21B, 21C, 21D, and 24 was 9.2 years of age.

Since 1963, among Units 21B, 21C, and 21D, most reported grizzly bear harvest occurred in Unit 21D (Table 2), where most of the moose hunting also occurred (Stout 2011). Unit 21C has sustained the second greatest harvest, which was supported by the relatively high density of bears in that area and more favorable open habitat for hunting.

In Unit 24 the average annual grizzly bear harvest reported by hunters during RY09–RY11 was 13.7 bears (Table 3). The reported average harvests during RY09–RY11 in northern (north of Allakaket) and southern (remaining) Unit 24 were 10.7 and 1.7 bears, respectively. The number of bears taken by fishermen or trappers and not reported is unknown, but was likely <6 bears annually. The RY09–RY11 mean annual reported and estimated unreported harvest in the entire unit was 18.7 bears. Of the reported harvest for that same period, 68% of bears taken were males and 32% were females, a percentage of males similar to the RY04–RY09 harvest of 71% males and 29% females. The estimated sustainable harvest rate is at least 5–6% based on data from other areas of Interior Alaska (DuBois 1989). Based on this harvest rate, a minimum annual harvest of 39–56 bears can be sustained in Unit 24.

Hunter Residency and Success. In Units 21B, 21C, and 21D, nonresident hunters harvested more grizzly bears than local or nonlocal resident hunters (Table 4). Mean annual harvest during RY09–RY11 in those units was 1.3 bears for local hunters, 1.0 for nonlocal residents, and 3.7 for nonresidents. From RY02 through fall 2012 the mean annual number of successful hunters was 6.7, similar to the average of 7.0 during RY00–fall 2010 (Stout 2011).

Mean annual harvest during RY09–RY11 in Unit 24 was 1.0 bears for local hunters, 8.7 for nonlocal residents, and 4.0 for nonresidents (Table 5). Most of this harvest was incidental to fall moose hunting. Reported harvest in Unit 24 was in the range of 10–16 bears annually until RY00, when hunters reported harvesting 25 bears, the highest harvest since 1973. Harvest during RY00–RY03 averaged 20.5 bears, an increase from the average harvest of 12.7 bears during RY94–RY99. Harvest during RY09–RY11 was more consistent with historical levels and averaged 13.7 bears. There is no clear explanation for the brief period of increased harvest during RY00–RY03.

Harvest Chronology and Transport Methods. Because harvest was low in Units 21B, 21C, and 21D, a statistically significant pattern demonstrating a difference in harvest during the spring versus fall was not apparent. Spring bear hunters typically used snowmachines for transportation. Fall bear harvest was often incidental to moose hunting, and hunters typically used boats for transportation.

In Unit 24 during RY09–RY11 most kills occurred during the fall (76%), incidental to hunting other game species. Transportation to the hunt area was via highway vehicle (22.4%), airplane (28.6%), boat (22.4%), horseback–dog team (4.1%), or by foot and other methods (22.5%), and was somewhat consistent with previously reported values.

## **CONCLUSIONS AND RECOMMENDATIONS**

For Units 21B, 21C, and 21D we achieved the management objective to manage for a grizzly population that will sustain a 3-year mean annual harvest of at least 25 bears, with at least 50% males in the reported harvest. The 3-year (RY09–RY11) mean annual reported and unreported harvest of 16.0 bears was below the harvest objective of 25 bears, and the population was

probably increasing. With the current conservative population estimate of 350–400 bears, a sustainable annual harvest of at least 18–24 grizzly bears can be supported (5–6% of the population). Because males continued to be harvested at more than twice the rate of females and the average age of harvested bears was relatively high, the population was most likely maintaining a high level of reproductive potential with a gradually maturing age-class structure. Unless regulations or hunting habits change dramatically, the harvest will have a negligible effect on grizzly populations in these units. A more accurate assessment of the unreported harvest and a better estimate of the population size should continue to be a management priority.

In Unit 24 we achieved the management objective of maintaining a population that could sustain a 3-year mean annual reported harvest of at least 20 bears (RY09–RY11;  $\bar{x} = 18.7$ ). During RY10–RY11, harvest throughout the unit was very low and was not a factor influencing the population. Although most harvest took place in northern Unit 24, the population was capable of sustaining that level of harvest. Southern Unit 24 was underutilized at an average harvest of less than 2 bears per year. The objective of maintaining at least 50% male harvest was achieved, with 68% of the harvest being males. With the current conservative population estimate of 770–930 bears, a sustainable annual harvest of 39–56 grizzly bears can probably be supported (5–6% of the population).

Although some localized overhunting could occur in Unit 24, the grizzly bear population as a whole is not likely to be overharvested because hunting is restricted within Gates of the Arctic National Park, which has a relatively high density of grizzly bears based on habitat. Much of the remainder of the unit is more heavily forested and difficult to hunt.

Education, improved reporting compliance, and federal agency cooperative management activities (e.g., regulatory harvest strategies, harvest reporting, population surveys) will continue to be given high priority during the next reporting period. Age and sex ratios of harvested animals are the standard for monitoring large predator populations in the absence of intensive population investigations, and that information will continue to be collected.

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Table 1. Units 21B, 21C, and 21D brown–grizzly bear mortality, regulatory years<sup>a</sup> 2006–2012.

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill <sup>b</sup>				Unreported	Illegal	M	F	Unk	Total
	M	F	Unk	Total	M	F	Unk	Total						
<i>2006</i>														
Fall 2006	4	1	0	5	0	0	0	0	5	0	4	1	5	10
Spring 2007	1	1	0	2	0	0	0	0	5	0	1	1	5	7
Total	5	2	0	7	0	0	0	0	10	0	5	2	10	17
<i>2007</i>														
Fall 2006	1	1	0	2	0	0	0	0	5	0	1	1	5	7
Spring 2007	5	2	0	7	0	0	0	0	5	0	5	2	5	12
Total	6	3	0	9	0	0	0	0	10	0	6	3	10	19
<i>2008</i>														
Fall 2008	1	2	0	3	0	0	0	0	5	0	1	2	5	8
Spring 2009	2	0	0	2	0	0	0	0	5	0	2	0	5	7
Total	3	2	0	5	0	0	0	0	10	0	3	2	10	15
<i>2009</i>														
Fall 2009	2	1	0	3	0	0	0	0	5	0	2	1	5	8
Spring 2010	2	0	0	2	0	0	0	0	5	0	2	0	5	7
Total	4	1	0	5	0	0	0	0	10	0	4	1	10	15
<i>2010</i>														
Fall 2010	1	1	0	2	0	0	0	0	5	0	1	1	5	7
Spring 2011	5	0	0	5	0	0	0	0	5	0	5	0	5	10
Total	6	1	0	7	0	0	0	0	10	0	6	1	10	17
<i>2011</i>														
Fall 2011	4	0	0	4	0	0	0	0	5	0	4	0	5	9
Spring 2012	2	0	0	2	0	0	0	0	5	0	2	0	5	7
Total	6	0	0	6	0	0	0	0	10	0	6	0	10	16
<i>2012</i>														
Fall 2012	5	3	0	8	0	0	0	0	5	0	5	3	5	13

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

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

Table 2. Units 21B, 21C, and 21D reported brown–grizzly bear harvest by subunit, regulatory years<sup>a</sup> 2000–2012<sup>b</sup>.

Regulatory year	Unit			Total
	21B	21C	21D	
2000	2	4	6	12
2001	0	1	8	9
2002	0	0	4	4
2003	0	2	3	5
2004	1	1	7	9
2005	0	1	8	9
2006	1	3	3	7
2007	0	0	9	9
2008	1	1	3	5
2009	0	0	5	5
2010	0	0	7	7
2011	1	0	5	6
Fall 2012	2	1	5	8

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

<sup>b</sup> Nonhunting kill not included.

Table 3. Unit 24 brown–grizzly bear mortality, regulatory years<sup>a</sup> 2006–2012.

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill <sup>b</sup>				Unreported	Illegal	M	F	Unk	Total
	M	F	Unk	Total	M	F	Unk	Total						
<i>2006</i>														
Fall 2006	8	2	0	10	0	0	0	0	3	2	8	2	5	15
Spring 2007	3	0	0	3	0	0	0	0	0	0	3	0	0	3
Total	11	2	0	13	0	0	0	0	3	2	11	2	5	18
<i>2007</i>														
Fall 2007	3	3	0	6	0	0	0	0	3	2	3	3	5	11
Spring 2008	4	0	0	4	0	0	0	0	0	0	4	0	0	4
Total	7	3	0	10	0	0	0	0	3	2	7	3	5	15
<i>2008</i>														
Fall 2008	7	5	0	12	0	0	0	0	3	2	7	5	5	17
Spring 2009	6	0	0	6	0	0	0	0	0	0	6	0	0	6
Total	13	5	0	18	0	0	0	0	3	2	13	5	5	23
<i>2009</i>														
Fall 2009	6	3	0	9	0	0	0	0	3	2	6	3	5	14
Spring 2010	1	0	0	1	0	0	0	0	0	0	1	0	0	1
Total	7	3	0	10	0	0	0	0	3	2	7	3	5	15
<i>2010</i>														
Fall 2010	5	4	0	9	0	0	0	0	3	2	5	4	5	14
Spring 2011	4	1	0	5	0	0	0	0	0	0	4	1	0	5
Total	9	5	0	14	0	0	0	0	3	2	9	5	5	19
<i>2011</i>														
Fall 2011	9	4	0	13	0	0	0	0	3	2	9	4	5	18
Spring 2012	3	1	0	4	0	0	0	0	0	0	3	1	0	4
Total	12	5	0	17	0	0	0	0	3	2	12	5	5	22
<i>2012</i>														
Fall 2012	9	9	0	18	0	0	0	0	3	2	9	9	5	23

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

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

Table 4. Units 21B, 21C, and 21D brown–grizzly bear successful hunter residency, regulatory years<sup>a</sup> 2000–2012.

Regulatory year	Local <sup>b</sup> resident	Nonlocal resident	Nonresident	Total successful hunters
2000	1	2	9	12
2001	3	0	6	9
2002	2	0	2	4
2003	0	2	3	5
2004	1	0	8	9
2005	3	2	4	9
2006	1	2	4	7
2007	3	1	5	9
2008	0	2	3	5
2009	0	2	3	5
2010	2	0	5	7
2011	2	1	3	6
Fall 2012 <sup>c</sup>	2	4	2	8

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

<sup>b</sup> Units 21B, 21C, and 21D residents.

<sup>c</sup> Preliminary data.

Table 5. Unit 24 brown–grizzly bear successful hunter residency, regulatory years<sup>a</sup> 2000–2012.

Regulatory year	Local <sup>b</sup> resident	Nonlocal resident	Nonresident	Total successful hunters
2000	2	16	7	25
2001	1	12	6	19
2002	1	10	7	18
2003	0	12	8	20
2004	2	7	1	11 <sup>c</sup>
2005	1	6	7	14
2006	1	8	4	13
2007	0	8	2	10
2008	2	8	8	18
2009	1	5	4	10
2010	2	9	3	14
2011	0	12	5	17
Fall 2012 <sup>d</sup>	0	8	10	18

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

<sup>b</sup> Unit 24 Residents.

<sup>c</sup> One unknown residency.

<sup>d</sup> Preliminary data.

**SPECIES**  
**MANAGEMENT REPORT**

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

From: 1 July 2010  
To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** 22 (25,200 mi<sup>2</sup>)

**GEOGRAPHICAL DESCRIPTION:** Seward Peninsula and that portion of the Nulato Hills draining west into Norton Sound

**BACKGROUND**

It is believed brown bear numbers in Unit 22 declined during the early 1900s after the introduction of gold mining and reindeer herding industries (Georgette 2001). The population did not begin to recover until these activities diminished substantially during the 1940s, and federal predator control efforts ended at statehood in 1959 (Grauvogel 1986). The growth of the Unit 22 brown bear population has had many effects and consequences. Residents, particularly from the Nome area, have considerable interest in hunting, as do nonresidents, with hunting allowed through general season and drawing permit hunts. Brown bear predation on calf and adult moose is believed to be a significant factor in depressing moose populations in many parts of the unit (Gorn 2010). The public has serious concerns about human-bear encounters in the Nome area, as well as in Unit 22 villages and summer camps. Local residents believe bear densities in Unit 22 are too high and, since 1997, in response to public demand, brown bear hunting regulations have been incrementally liberalized to increase annual harvest to attempt to reduce bear numbers in Unit 22 (Persons 2001).

**MANAGEMENT DIRECTION**

**MANAGEMENT GOALS**

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

**MANAGEMENT OBJECTIVES**

- Assess population trends through field observations and analyses of harvest data.
- Seal bear hides and skulls, determine sex and extract a tooth for aging from sealed brown bears (hunting harvest, non-hunting take, and unknown mortality).
- Monitor the brown bear harvest through field observations, brown bear sealing reports, community-based harvest surveys, subsistence harvest questionnaires, interviews with successful hunters, and analyze data.
- Improve communication with the public to reduce illegal and unreported harvest, and improve understanding of defense of life and property situations.
- Provide opportunity for subsistence hunting of brown bears.

- Assist the public in dealing with nuisance bear problems.
- Educate the public about bear behavior and safety to minimize conflicts between bears and the public.
- Provide information to the Board of Game on brown bear management.

## **METHODS**

Bear hides and skulls are sealed by department staff or authorized sealing agents in several Unit 22 villages. Harvest data is summarized from sealing certificates, nonresident drawing permits, subsistence registration permits, community-based big game harvest surveys, and Defense of Life and Property (DLP) reports. Problems with nuisance bears are addressed through public education, public service announcements, and information to residents on DLP regulations; and by working with Alaska Wildlife Troopers and Village Public Safety Officers on how to deter or destroy problem bears. An electric fence package is made available for seasonal loan to deter bears from homes or summer camps. Staff works with local youth organizations to explain and demonstrate proper bear safety procedures to help minimize human-bear conflict while hiking or camping.

Harvest data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY10 = 1 July 2010–30 June 2011). Harvest during RY10 and RY11 was monitored through sealing and permit reporting.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

#### *Population Size*

There is no current population estimate for brown bears in Unit 22. A census, completed during the early 1990s, estimated the brown bear population in western Unit 22B, Units 22C, 22D, and 22E at 458 bears >2 years old (density: 1 bear per 27 mi<sup>2</sup>). The density estimate varied almost two-fold within the study area with the highest densities (1 bear per 20 mi<sup>2</sup>) in the western portion of Unit 22B, and the lowest densities (1 bear per 39 mi<sup>2</sup>) in the southern portion of Unit 22E (Miller and Nelson 1993). Observations by staff, guides, and long-time residents of Unit 22, suggest bear numbers increased unitwide during the 1990s and early 2000s. Based on an abundance of brown bears in Unit 22, and declining moose populations in Unit 22B remainder, the Board of Game began incrementally liberalizing bear hunting regulations in 1997. However, the department continues to hear from members of the public that they believe the number of bears have increased. Bear sightings at summer camps have increased during the last 4 years, and the unit continues to supports a productive bear population with sows caring for 3 to 4 cubs. We also hear contradictory anecdotal reports that bear numbers are in decline, and opinions that bag limits should be reduced.

#### *Population Composition*

No activities were completed to determine population composition in Unit 22 during the reporting period.

*Distribution and Movements*

No activities were completed to determine distribution and movements in Unit 22 during the reporting period.

**MORTALITY**

*Harvest*

Season and Bag Limit

No changes were made to the Unit 22 brown bear season or bag limit during this reporting period.

<i>Regulatory Year RY10 and RY11 Unit and Bag Limits</i>	<i>Resident Open Season (Subsistence and General Hunts)</i>	<i>Nonresident Open Season</i>
--	---	------------------------------------

*Unit 22(A), that portion  
south of and including the  
Golsovia River drainage*

**RESIDENTS :**

Two bears every regulatory  
year by registration permit  
(RB699)

1 Aug–31 May  
(Subsistence hunt only)

Two bears every regulatory  
year

1 Aug–31 May

**NONRESIDENTS:** One bear  
every regulatory year

1 Aug–31 May

*22(A) remainder*

**RESIDENTS:**

Two bears every regulatory  
year by registration permit  
(RB699)

1 Aug-15 June  
(Subsistence hunt only)

Two bears every regulatory  
year

1 Aug-15 June

**NONRESIDENTS:** One bear  
every regulatory year

1 Aug-15 June

<i>Regulatory Year RY10 and RY11 Unit and Bag Limits</i>	<b>Resident Open Season (Subsistence and General Hunts)</b>	<b>Nonresident Open Season</b>
--	---	------------------------------------

*Unit 22(B)*

**RESIDENTS:**

One bear every regulatory year by registration permit (RB699)

1 Aug–31 May  
(Subsistence hunt only)

One bear every regulatory year

1 Aug–31 May

**NONRESIDENTS:**

One bear every regulatory year by drawing permit only. Up to 27 permits maybe issued in combination with Unit 22C (DB685)

1 Aug–31 May

*Unit 22(C)*

**RESIDENTS:**

One bear every regulatory year by registration permit (RB699)

1 Aug–31 Oct  
10 May–25 May  
(Subsistence hunt only)

One bear every 4 regulatory years

1 Aug–31 Oct  
10 May–25 May

**NONRESIDENTS:**

One bear every 4 regulatory years by drawing permit only. Up to 27 permits maybe issued in combination with Unit 22B (DB685)

1 Aug–31 Oct  
10 May–25 May

*Unit 22(D)*

**RESIDENTS:**

One bear every regulatory year by registration permit (RB699)

1 Aug–31 May  
(Subsistence hunt only)

One bear every regulatory year

1 Aug–31 May

<i>Regulatory Year RY10 and RY11 Unit and Bag Limits</i>	<i>Resident Open Season (Subsistence and General Hunts)</i>	<i>Nonresident Open Season</i>
--	---	------------------------------------

**NONRESIDENTS:**

One bear every regulatory year by drawing permit only. Up to 12 permits maybe issued in combination with Unit 22E (DB690)

1 Aug–31 May

*Unit 22(E)*

**RESIDENTS:**

One bear every regulatory year by registration permit (RB699)

1 Aug–31 May  
(Subsistence hunt only)

One bear every regulatory years

1 Aug–31 May

**NONRESIDENTS:**

One bear every regulatory year by drawing permit only. Up to 12 permits maybe issued in combination with Unit 22D (DB690)

1 Aug–31 May

Board of Game Actions and Emergency Orders. In March 2010 and November 2011, the Board of Game reauthorized the brown bear resident tag fee exemption in Unit 22. In November 2011, the Board of Game adopted regulation to extend the Unit 22C spring brown bear season for residents and nonresidents. The spring season will be 1 May through 31 May beginning in RY12.

Human-Induced Harvest. The department maintained a population in accordance with its management goal to sustain a 3-year mean annual reported harvest of at least 50% males. Annual reported harvest of male bears has exceeded the female harvest, with approximately 66% of the harvest being males since 1961. During this reporting period 64% ( $n = 124$ ) of the bears harvested were males and the remaining 36% ( $n = 71$ ) were females. There was no significant change from the last reporting period where these percentages were 68% and 32%, respectively.

One hundred two (102) bears were taken through hunting and non-hunting kills during RY10, and 96 bears were taken during RY11 (Table 1). The average annual harvest since 1998 has been 94 bears, which is a 74% increase from the 1990–1997 average annual harvest of 54 bears.

From 1998 through 2008 in the most heavily hunted and accessible areas (Units 22B remainder, 22C, and 22D), staff received fewer complaints about problem bears. The harvest approximately doubled with an average of 91 bears harvested annually, with a low of 84 bears in 2002 and a record high of 105 bears harvested during regulatory year 2008 (Fig. 1). However, recently at

public meetings brown bears have been identified as more of a nuisance with camps and people, especially in Unit 22C around the Safety Sound area during the last four years. The new Unit 22C spring harvest regulation effective in RY12 may provide additional harvest opportunity of nuisance bears.

Liberal bear regulations and a high desire by some local residents to reduce bear predation on ungulates have been major contributing factors to the high harvests. Unit 22 brown bear harvest is predominately by local hunters (Table 2), except in Unit 22A where only a few local residents hunt brown bears. In Unit 22A, 11 reported bears were harvested by residents. The age of harvested bears since 1997 has averaged 6.5 years ( $n = 1,100$ ) annually; during this reporting period, bears averaged 6.7 years. Since 1997, the average age of both bears harvested in fall and of bears harvested in spring was 6.5 years of age. Preliminary age data for this reporting period show the annual average age of fall bears was 6 years and spring bears averaged 8 years. Males harvested averaged 6 years while harvested females averaged 7 years.

The average skull size during the reporting period was 20.7 inches ( $n = 200$ ); 12% ( $n = 24$ ) of those bears had a skull size 24 inches or larger, with the average size being 24.9 inches. The number of Boone and Crocket Club record book grizzly bears taken in Unit 22 with a minimum skull size of 24 inches or larger during 1990–2011 ( $n = 233$ ) averaged 11 bears per year.

Two bears were reported as DLP kills during the 2-year reporting period. From RY00 through RY11 there has been an annual average of 5 DLP bears taken from Unit 22. Of reported DLP kills from RY00 through RY11, 48% ( $n = 20$ ) of the bears came from Unit 22A; 23% from both Units 22B & 22C; and 2% from both Units 22D & 22E. However, these reported Unit 22 DLP bears do not represent the actual number of non-hunting kills for the reporting period. Each year, Unit 22 receives unverified reports of bears being shot and left unattended, or not being sealed. The accuracy of these reports and the amount of illegal harvest are unknown.

Permit Hunts. The department administers two nonresident drawing permit hunts (DB685 in Units 22B/22C and DB690 in Units 22D/22E) each year. Twenty-seven (27) DB685 draw permits are available to nonresident hunters and 12 DB690 permits are awarded to nonresidents. A continuous season 1 August–31 May (excluding Unit 22C), allows draw permit holders to hunt in either the spring or fall. Over-the-counter surplus permits are available first-come first-serve when there are undersubscribed drawing permits available from the draw period. The number of available surplus drawing permits since 2000 has varied 0–24 annually. The number of surplus permits available in recent years may likely be due to the constrained economy.

Unit 22 offers a brown bear subsistence registration permit hunt (RB699) that began in 1998, when the Northwest Alaska Brown Bear Management Area was expanded to the Seward Peninsula so bear regulations were consistent with customary and traditional practices of harvesting bears (Georgette 2001). The RB699 registration permit requires all meat be salvaged. In RY10 and RY11, 3 Unit 22 residents registered for the brown bear RB699 subsistence hunt. One hunter reported a successful harvest in Unit 22C in RY11.

Hunter Residency and Success. Hunter effort and success cannot be easily be evaluated for Alaska resident hunters under the present harvest reporting system because unsuccessful hunters are not required to report.

Only nonresident draw permit hunts in Unit 22 (excluding Unit 22A) can be used to estimate hunter success. The RY10 nonresident success rates for hunters who hunted on permit hunts DB685 and DB690 were 64%; and 86%, respectively. The RY11 success rates for DB685 and DB690 were 56% and 33%, respectively. From RY00 through RY11, the average rate of successfully harvesting a bear on permit DB685 was 60%, and it was 65% on permit DB690. It is difficult to evaluate nonresident hunter success in Unit 22A because a draw permit is not required. Records from the reporting period indicate 47 nonresidents were successful in harvesting a brown bear in Unit 22A which is a 13% decrease in harvest from 54 bears harvested in RY08 through RY09 by nonresidents.

Harvest Chronology. Historically, more bears are taken during the spring season because bears are easily observed and tracked; and bears tend to be more accessible to hunters on snowmachines as transportation. In RY10 and RY11, 61% and 54% of the total hunter harvest occurred in the spring, respectively (Table 3).

Transport Methods. The 300-mile road system from Nome in Unit 22 allows bear hunters to use to use roads as access points to utilize snowmachines, off road vehicles, and boats. Methods of transport used by hunters are summarized in Table 4. During this reporting period, 40% ( $n = 34$ ) of successful fall hunters used off-road vehicles, and 33% ( $n = 28$ ) used boats. In the spring season, 68% ( $n = 77$ ) of successful hunters used snowmachines and 15% ( $n = 17$ ) used aircraft. Aircraft use in the unit is generally by registered guides and transporters for nonresident bear hunters entering their base camp. Other transport methods to search for a bear are used from the camps.

Other Observations. In the spring of RY10, an Alaska resident bear hunter was mauled in Unit 22B remainder by a male bear. During the incident the bear was killed and immediately, in accordance with Department protocol (ADF&G 2012). the head was sent into the State of Alaska virology lab to test for rabies Results came back negative.

## **HABITAT**

### *Assessment Enhancement*

No brown bear habitat enhancement activities were completed during the reporting period.

## **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

Moose research in Unit 22B during 1996–1998 indicates brown bear predation on moose calves reduces calf survival in the western portion of Unit 22B (Persons 1998), and research in other parts of Alaska has shown that brown bear predation can be the primary factor in limiting moose population growth. During the 1990s and early 2000s, moose recruitment rates declined to less than 10% in much of Unit 22, while bear numbers are believed to have increased above the density estimated in the 1989–1991 bear census and research study (Miller and Nelson 1993). Except in Unit 22C, the Board of Game has liberalized opportunity to hunt brown bears in an attempt to reduce bear numbers. Unit 22C bear harvest is approximately 15 brown bears annually.

## CONCLUSIONS AND RECOMMENDATIONS

Throughout the 1990s, staff, guides, and Unit 22 residents observed an increase in human-bear encounters and complaints about nuisance bears indicated bear numbers had increased unitwide. Beginning in 1997, the Board of Game began incremental liberalization of bear hunting regulations in 1998, resulting in 72% greater harvest than during 1990–1997.

Heavily hunted and accessible areas (Units 22B remainder, 22C, and 22D), where harvest has nearly doubled compared to pre-1997 trends, generally have produced fewer complaints about problem bears. However, the Unit 22C area around Safety Sound continues to generate nuisance complaints, and the liberalized spring season (1 May–31 May) effective in RY12 is expected to provide hunting opportunity to reduce the number of bears causing nuisance complaints

The management goal to maintain a population that sustains a 3-year mean annual reported harvest of at least 50% males was met. High harvest and reductions in the bear population should continue as long as necessary to rebuild moose populations that appear to be limited by predation. If the 3-year average male harvest declines below the management goal of 50% males, bear harvest rates may be reduced to prevent depleting the bear population to very low levels.

Brown bear harvest will continue to be monitored through field observations, information from sealing certificates, age from tooth extraction, interviews with hunters, and data analysis. It is imperative for department staff to continue bear safety and bear behavior education to the public and hunters throughout the Bering Strait region. Cooperation should continue with Unit 22 Village Public Safety Officers and Native corporations to provide bear safety material to shareholders, and it should emphasize the importance of clean camps to help minimize human-bear conflicts.

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Table 1. Unit 22 brown bear hunting and non-hunting mortality for RY10 and RY11.

Regulatory Year	Reported harvest											
	Hunter kill				Non-hunting kill				Total <sup>a</sup>			
	M	F	Unk.	Total	M	F	Unk.	Total	M	F	Unk.	Total
<u>RY10</u>												
Fall 2010	21	18	0	39	1	0	0	1	22	18	0	40
Spring 2011	44	18	1	62	0	0	0	0	44	18	0	62
Subsistence	0	0	0	0	0	0	0	0	0	0	0	0
Total	65	36	1	101	1	0	0	1	66	36	1	102
<u>RY11</u>												
Fall 2011	22	21	0	43	1	0	0	1	23	21	0	44
Spring 2012	35	16	0	51	0	0	0	0	35	16	0	51
Subsistence	1	0	0	1	0	0	0	0	1	0	0	1
Total	58	37	0	95	1	0	0	1	59	37	0	96

<sup>a</sup> Represents the total known harvest including nonresident permit hunt harvest, DLP and other human-caused accidental mortality.

Table 2. Number and residency of Unit 22 successful brown bear hunters for RY02 through RY11.

Regulatory Year	Successful hunters <sup>a</sup>								
	Local AK Residents <sup>b</sup>		Nonlocal AK Residents		Nonresidents		Unknown		Total
	(n)	%	(n)	%	(n)	%	(n)	%	(n)
RY02	36	43%	13	15%	32	38%	3	4%	84
RY03	39	43%	16	18%	31	34%	4	4%	90
RY04	41	44%	10	11%	38	41%	4	4%	93
RY05	39	45%	9	10%	35	40%	4	5%	87
RY06	34	36%	7	7%	46	49%	7	7%	94
RY07	31	40%	9	12%	36	47%	1	1%	77
RY08	42	42%	11	11%	43	43%	5	5%	101
RY09	40	43%	10	11%	42	45%	2	2%	94
RY10	44	43%	20	20%	38	37%	0	0	102
RY11	51	53%	13	14%	32	33%	0	0	96

<sup>a</sup> Excludes defense of life and property (DLP) or other non-hunting kills.

<sup>b</sup> Hunters residing in Unit 22.

Table 3. Unit 22 brown bear hunter harvest<sup>a</sup> by sex and subunit for RY10 and RY11.

Regulatory Year	Game management unit																	
	22A			22B			22C			22D			22E			Total		
	M	F	U	M	F	U	M	F	U	M	F	U	M	F	U	M	F	U
<u>RY10</u>																		
Fall 2010	9	5	0	3	6	0	6	1	0	3	6	0	0	0	0	21	18	0
Spring 2011	10	5	1	13	8	0	7	4	0	10	0	0	4	1	0	44	18	1
<u>RY11</u>																		
Fall 2011	9	6	0	7	5	0	4	6	0	3	4	0	0	0	0	23	21	0
Spring 2012	9	3	0	10	3	0	5	7	0	9	2	0	2	1	0	35	16	0

<sup>a</sup> Excludes defense of life and property (DLP) or other non-hunting kills.

Table 4. Unit 22 brown bear harvest by transport method for RY97 through RY11.

Regulatory year	Number harvested							Total (n)
	Airplane	Boat	Snowmachine	ORV <sup>a</sup>	Highway vehicle	Walk	Unknown	
RY97	7	6	28	8	10	0	0	59
RY98	4	13	42	13	8	3	0	83
RY99	7	8	35	25	12	2	0	89
RY00	6	10	56	10	10	2	0	94
RY01	1	8	42	21	7	2	0	81
RY02	5	14	34	13	9	6	3	84
RY03	4	20	10	24	18	11	3	90
RY04	0	18	25	27	10	8	5	93
RY05	2	16	30	21	9	3	6	87
RY06	7	29	27	15	5	2	2	87
RY07	10	14	29	20	1	2	0	76
RY08	16	23	26	20	8	3	5	101
RY09	9	12	25	24	13	3	8	94
RY10	11	18	43	18	4	6	2	102
RY11	10	14	34	22	11	4	2	97

<sup>a</sup> ORV is defined as off-road vehicle.

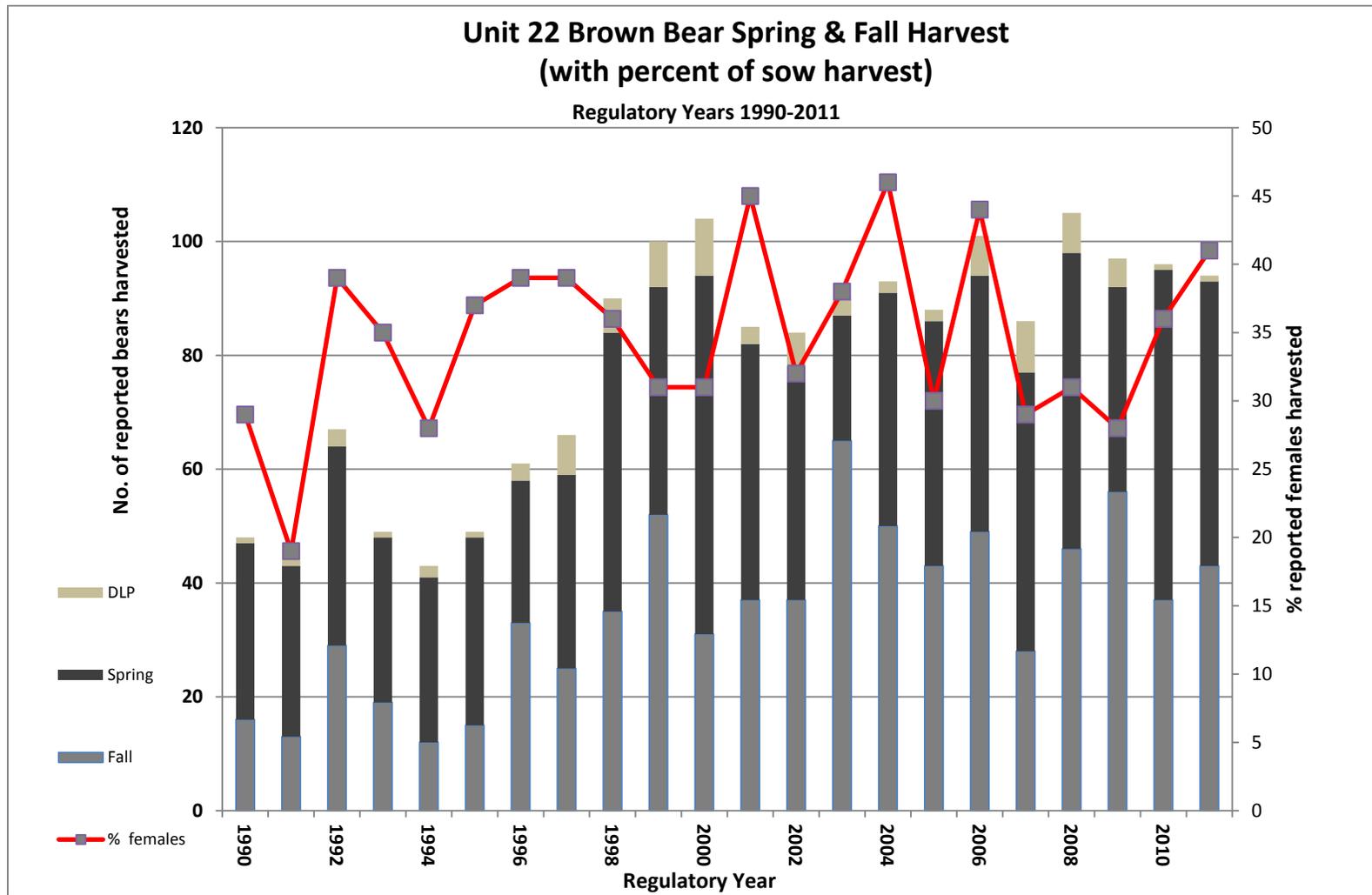


Figure 1. Unit 22 reported brown bear harvest from RY90 through RY11.

**SPECIES**  
**MANAGEMENT REPORT**

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

From: 1 July 2010  
To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** 23 (43,000 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Kotzebue Sound and western Brooks Range

**BACKGROUND**

The department established hunting regulations and sealing requirements for brown bears in Unit 23 in 1961. From that time until the early 1990s, regulations assumed the primary use of brown bears was for trophy hunting. However, Inupiat hunters of inland communities traditionally harvested brown bears for meat, fat, and hides for countless generations (Loon and Georgette 1989). In response to frustration expressed by local residents over hunting regulations for brown bear and other species, department staff began an extensive regulation review in Unit 23 during 1988. This review provided the basis for establishing the Northwest Alaska Brown Bear Management Area (NWABBMA) subsistence registration hunt in 1992, which was later modified into a unit-based subsistence hunt (RB700). Since 1992, 3 types of brown bear hunts have existed in Unit 23, 1) nonresident drawing permit hunts, 2) resident general season hunts, and 3) RB700—a subsistence registration permit hunt for resident hunters. Since the early 1990s, brown bear hunting regulations have been incrementally liberalized in Unit 23 to increase hunting opportunity and reduce predation on moose.

**MANAGEMENT DIRECTION**

**MANAGEMENT GOALS**

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

**MANAGEMENT OBJECTIVES**

- Conduct a brown bear population estimate for some portion of Unit 23 in cooperation with Department of Interior (DOI) staff at least once every reporting period.
- Continue community-based assessments to collect brown bear harvest information from residents of Unit 23.
- Seal bear skins and skulls, determine sex, and extract a tooth for aging.
- Monitor harvest data (age, sex, and skull size) for changes related to selective harvest pressure.

- Improve communication between the public and the department to improve harvest reporting and prevent defense of life and property situations from occurring.

## METHODS

We obtained harvest information from sealing documents, community harvest assessments, and harvest reports. Compliance with brown bear sealing requirements has historically been low for residents of Unit 23; therefore, these data should be viewed as minimal estimates of harvest. We believe community-based harvest assessments and harvest reports from the registration subsistence hunt are more accurate than sealing data. In contrast, most nonlocal hunters seal their bears, so these data are reasonably accurate. Many brown bears taken under defense of life or property (DLP) regulations are not reported. As a result, harvest data in future reports will likely differ from that reported here as information about DLP take is added to the harvest database. Additionally, data in this report are slightly different from years prior due to ongoing efforts to clean up historical records.

The 1987 capture-mark-recapture (CMR) brown bear census in the area of the then “proposed” Red Dog Mine provided a benchmark for bear abundance in the northwest portion of Unit 23 and has been cited in every report since that time (Dau 2007). Since then, our understanding of brown bear population status has been based on qualitative information from local residents and some long-term commercial operators, and opportunistic observations of agency staff. The National Park Service (NPS) conducted brown bear studies using paired sampling techniques in the upper Noatak River (June 2005) drainage and in the southwest portion of Unit 23 (June 2006) while attempting to develop a population estimate technique that would replace CMR methods. In 2008 the National Park Service (NPS) conducted a paired sample study technique in the lower Noatak River, which included the Red Dog mine area examined in 1987. ADF&G provided three planes and three pilot/observer teams and contributed financially to the study. The technique used a stratified random sample with classifications for lowland, hills, mountains, and the traditional Red Dog area. Units were approximately 40 mi<sup>2</sup> blocks. All of the traditional Red Dog units were sampled. Additionally, some units were double sampled to generate estimates of sightability. Final results from this study are not yet available (Brad Shults, NPS, Fairbanks, personal communication).

To examine whether harvests have affected the sex and age structure of bear populations, the proportion of males in the total Unit 23 harvest was plotted through time. The mean skull size and age of bears taken in Unit 23 was examined to look for indicators of selective pressures on the sex or age structure of the population. A decrease in the proportion of males, average skull size, or age of animals taken could indicate that harvests are changing population structure. The term “nonlocal hunter” in this report refers to resident Alaskans who live outside of Unit 23 as well as nonresident and alien hunters. “Local hunter” refers to anyone residing in Unit 23.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

The only brown bear population estimate that has been completed and for which we have final results in Unit 23 occurred in the vicinity of the Red Dog Mine during 1987. The density estimate based on this survey was one adult bear (3+ years) per 25.7 mi<sup>2</sup> (Ballard et al. 1991).

Preliminary results from the 2008 Lower Noatak Population Estimate (Fig. 1) can be used to generate a minimum count of the same area and show a density of 1.9–2.2 adult bears (2+ years) (or 1.5–1.6 “independent bears”) per 25.7 mi<sup>2</sup> with no corrections for sightability. Because the same area used in the 1987 estimate was completely surveyed, the density is simply generated from the total number of bears observed. Additionally, the 2– to 3-year-old age class may not be represented in the estimate for the 1987 study. However, since 1987 there has been significant discourse about the ability to accurately age bears over 2-years-old from aerial survey. Until the results of the 2008 study are finalized, the appropriate sightability correction factor to apply is unknown. However, the density estimate will only increase because, undoubtedly, bears were missed. Sightability correction factors can be highly variable and are very survey specific. Factors affecting sightability include but are not limited to weather, snow conditions, topography, and perhaps, most importantly, pilot/observer abilities. A minimum density estimate for the entire study area based on the stratified random sampling of units was lower, with 1.15 adult bears per 25.7 mi<sup>2</sup>. Therefore, it is important to note that bear densities are habitat specific and cannot be applied broadly.

According to residents of Unit 23, brown bear numbers have increased substantially since at least the 1940s or 1950s. Several developments over the last 60 years have probably contributed to this trend. Moose, caribou, and muskox numbers in this region grew from the 1950s until recent years. This has provided a stable prey base for large predators. In addition, the presence of these ungulates has substantially reduced the need for the subsistence harvest of brown bears (Raymond Stoney, Kiana, personal communication). In recent years the decline of the commercial salmon fishery in Kotzebue Sound, related to market conditions, has allowed more salmon to reach spawning areas far inland, also increasing food for bears. State hunting regulations, such as the protection of sows with cubs, have probably contributed to the increase of brown bears in Unit 23 as well. Traditionally, the practice of “denning” bears and killing all occupants, including sows with cubs, commonly occurred when bears provided the only reliable source of terrestrial hides, meat, and fat to local users (Raymond Stoney, Kiana, personal communication). Finally, the strong selection by recreational hunters for large male bears that occasionally kill cubs and smaller bears may have increased survival of cubs.

## **MORTALITY**

### *Harvest*

Harvest data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY10 = 1 July 2010–30 June 2011). Harvest during RY10 and RY11 was monitored through sealing and permit reporting.

### Season and Bag Limit.

The following regulations were in effect during this period:

<i>RY10 and RY11</i> Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
<i>Unit 23</i> Residents: One bear per regulatory year; no tag required	1 Aug–31 May (General hunt)	
Nonresidents: One bear every regulatory year by drawing permit DB761-767 (40 permits fall); DB771- 777 (28 permits spring)		1 Sep–31 Oct 15 Apr– 31 May
Residents: One bear per regulatory year by registration permit	1 Aug-31 May (Subsistence hunt)	

Hunters taking a brown bear under the general season hunt must seal the hide and skull; however, salvage of meat is optional under this type of hunt. To participate in the subsistence registration hunt, salvage of meat is required and use of airplanes for accessing hunting areas is not allowed except between state maintained airports. Under the registration hunt, salvage of the hide is optional; however, if the hide is removed from Unit 23, it must be sealed and the trophy value destroyed by removing the skin of the head and front claws, which are retained by the department.

Game Board Actions and Emergency Orders. There were no emergency orders issued for brown bears during the reporting period. In November 2009, the Board of Game changed the fall nonresident brown bear season by lengthening it to September 1–October 31 unitwide. Because the nonresident brown bear harvest is limited by permit availability and not season dates, this change will not increase harvest beyond acceptable levels. This change went into effect during this reporting period. In each regulatory year of the reporting period the resident brown bear tag fee exemption was reauthorized for general season and subsistence hunts.

Hunter Harvest. Harvests in RY10 and RY11 were 59 and 71 respectively (Table 1, Fig. 2), notably higher than the 20-year average of 48 bears (SD 14). Data from the last 20 years indicates a steady increase in harvests ( $R^2 = 0.1577$ ) with substantial annual variability that is seen throughout the entire sealing dataset. During this reporting period, 6 bears were taken under the subsistence registration permit hunt (Table 1). This is likely because general hunting seasons and bag limits are now as liberal as subsistence regulations (although methods and means for hunting, and salvage requirements differ between these hunts). Residents of Unit 23 still harvest brown bears for food; however, it is almost as easy to do so under the general hunt. Community harvest assessments suggest that the number of brown bears taken for food is now low (Table 2). This is likely due to the abundance of other food and evolving taste preferences.

Annual variation in harvest levels is probably mainly affected by weather and snow conditions, especially during spring, which strongly affect timing of emergence from dens, hunter access, and success rates. Although establishment of the brown bear subsistence hunt in 1992 may have improved our harvest data to some degree, it likely had little effect on the long-term trend of increasing harvests because historically few bears have been taken under this hunt. We feel the subsistence hunt had no effect on actual harvest levels in Unit 23 because brown bears were taken for subsistence prior to 1992 but were rarely sealed.

Although the use of RB700 has likely increased the proportion of harvest that is reported, some harvest is undoubtedly unaccounted for. Combining all community harvest assessment data for all communities in Unit 23, excluding Kotzebue, indicates approximately 17 brown bears (0.004 brown bears per capita) are taken annually (Table 2). This is roughly half the previously reported total because a data outlier observed in the Buckland 2009 survey has since been removed. It is likely inappropriate to apply the same harvest rate to the Kotzebue population. The 20-year average for annual harvest of brown bears by Kotzebue hunters is 8 bears. Combining Kotzebue harvest with village per capita harvest estimates suggests that residents of Unit 23 have taken approximately 20–30 brown bears annually in recent years. Compare to reported harvest, this is approximately twice as high as the number of bears reported through the registration permit and sealing systems (20-year average of 13 bears/yr, RY92–RY11).

Some human-caused mortality of bears continues to be unreported in Unit 23. This includes bears taken under DLP regulations but not reported. Many residents of Unit 23 feel DLP reporting requirements are onerous or fear they have broken the law and will be cited for shooting a bear out of season or without a hunting license. As a result, many DLP bears are not reported to the department. Therefore, our harvest data provide a conservative index of total human-induced brown bear mortality.

As in previous years, more brown bears were reported taken in the Noatak drainage during this reporting period than in any other drainage (Fig. 2, Table 3). This is partly because guides and residents of Kotzebue have historically focused their efforts in the Noatak River drainage, where brown bears are easier to hunt, rather than in the more densely forested Kobuk River and Selawik River drainages. However, in RY98 brown bear harvests began to increase in the Kobuk River drainage and harvests there have remained relatively high since that time.

The proportion of males in the total Unit 23 harvest shows a stable or very slightly decreasing ( $R^2 = 0.024$ ) trend of approximately 70% males in the harvest over the last 20 years (Fig. 3). Likewise, there was a stable trend in mean skull size for all bears over the last 20 years when analyzed by sex (Table 4). Four out of five of the largest bears on record in Unit 23 were harvested in RY10 and RY11. The possibility of increased skull size at age should be explored when final tooth data becomes available. There was a stable or slightly increasing trend in the mean age of bears taken throughout the unit, when considered by sex for the last 20 years. These data, however, are volatile from year to year (Table 4).

Brown bear hunting regulations in Unit 23 have been modified many times since 1962, when bear sealing requirements were instituted. Prior to 1980, reported harvests by nonresidents were high and increasing rapidly. Sealing compliance was low initially and data may be skewed towards very large bears as hunters wanted them recognized. In regulatory year 1980 the

department first established a unitwide drawing permit to administer nonresident hunts in Unit 23. This provided regulatory control over the number of nonresident hunters participating in the hunt. Since 1992, brown bear regulations have been incrementally liberalized in this unit to provide for traditional subsistence hunting practices and to increase opportunity for other hunters. These regulatory changes also attempted to slowly reduce bear density to reduce bear–human conflicts and predation on moose. There is little data available to monitor total hunter effort and success rates for bear hunters (under general hunt regulations, only successful hunters are required to provide harvest data). Perhaps a significant factor influencing hunter effort is the economy. It is likely that weather has a greater effect on success rates than do regulation changes. However, increasing the number of nonresident brown bear permits, lengthening all hunting seasons, adopting a 1 bear/year bag limit and not counting it against more restrictive bag limits in other game management units, eliminating the resident tag requirement, and establishing the subsistence registration hunt collectively increased the number of bear hunters in the unit. Increasing levels of commercial hunting-related activities, such as guiding and transporting, undoubtedly complemented the effects of regulatory changes on bear hunter numbers as well.

With these changes, brown bear harvests have shown a slowly increasing trend through time (Fig. 2). However, harvest data provides no indication that brown bears are being overharvested, and the vast majority of reports from the public indicate that bears are plentiful. Opportunistic observations of brown bears by ADF&G staff while flying throughout the unit in recent years suggest brown bear numbers are stable or increasing.

Permit Hunts. Participation in the Unit 23 subsistence registration hunt (RB700) has declined, probably as a result of increasingly liberal general hunting regulations. Although six bears were reported taken under the subsistence registration permit hunt during this reporting period (Table 1), this hunt should remain in place for two reasons: First, the presence of a subsistence hunt allows for an easy reduction of trophy hunting without impacting subsistence activities should brown bear numbers decline in the future. Second, the NPS requires federally-qualified subsistence hunters to register before hunting brown bears on National Park or Monument lands because this is the only mechanism available for collecting harvest information from these areas, short of requiring sealing.

Nonresident brown bear hunts were administered through 7 fall drawing permit hunts, DB761–767 and 7 spring drawing hunts, DB771–777 (Table 5). Hunters took 10 bears in the RY10 fall hunt, and 4 bears in the RY10 spring hunt. Hunters took 9 bears in the RY11 fall hunt; and 3 bears in the RY11 spring hunt. Although the number of permits available was increased by the Board of Game in 2007, it has not resulted in increased participation or harvest. This is likely due to the weak economy and the relative expense of a nonresident bear hunt.

Hunter Residency and Success. Prior to RY81 nonresident hunters consistently took more bears than either local or nonlocal resident hunters. Since then the number and proportion of bears taken by local residents, nonlocal residents, and nonresidents have varied substantially among years. However, nonlocal resident hunters have tended to take more bears than either other group since RY92. This may be related to increasing numbers of nonlocal resident hunters who incidentally take bears while hunting moose and caribou during August and September. Nonlocal resident and nonresident hunters collectively took 75% and 80% of the total reported Unit 23

harvest during RY10 and RY11, respectively (Fig. 4, Table 6; these percentages do not include community harvest assessment data). Numbers of nonresident bear hunters are limited by the number of drawing permits available. However, there is no limit on numbers of resident hunters and the number of bears taken by both local and nonlocal residents has increased since the 1960s; this increase in harvest has been greatest for nonlocal residents. For example, in 8 of the last 10 regulatory years, nonlocal residents have taken more brown bears (in some years, 2 to 3 times more) than either residents of Unit 23 or nonresident hunters (Table 6).

Harvest Chronology. Since 1970, the majority of the brown bear harvest has been taken in the fall (Fig. 5). In recent years the department has provided more nonresident drawing permits in the fall hunt than the spring. During fall many nonlocal hunters come to Unit 23 to hunt moose, caribou and sheep, and some of them take a bear incidentally while hunting other species. Some are also simply interested in a fall bear hunt. In contrast, brown bears are the only big game animal to hunt in Unit 23 during spring. As in the past, substantially more bears were taken during September than in any other month during this reporting period (Table 7). August, April, and May are other popular months.

Transport Methods. As in previous years, aircraft was the predominant means of accessing brown bear hunting areas. Boats (fall) and snowmachines (spring) were the next most commonly used means of transportation (Table 8). Some guides now combine use of airplanes and snowmachines to hunt bears during spring. Use of all-terrain vehicles (ATVs) in the fall is increasing for hunting all big game in Unit 23 as guides and outfitters base them at remote camps.

#### *Other Mortality*

There were no estimates of other mortality for brown bears in Unit 23 during the reporting period.

### **HABITAT**

#### *Assessment*

There were no habitat assessment activities in Unit 23 during the reporting period.

#### *Enhancement*

There were no habitat enhancement activities in Unit 23 during the reporting period.

### **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

During this reporting period, brown bears continued to be viewed as a nuisance or threat to many residents of Unit 23, who encounter them during subsistence activities (e.g., drying fish or picking berries).

## **CONCLUSIONS AND RECOMMENDATIONS**

Brown bear regulations in Unit 23 have been incrementally liberalized since the early 1990s. During this time, brown bear harvest levels have increased; this trend began well before recent regulatory changes. Increases in bear harvests have probably been caused more by increasing numbers of commercial operators and nonlocal hunters throughout Unit 23 than through increased hunting opportunity. Although brown bear harvests have clearly increased in Unit 23

over the last 40 years, harvest data do not suggest this has affected the sex or age structure of the population or the size of bears available to hunters. Heavily hunted portions of the unit may be acting as “population sinks” where bears, especially boars, are continually replaced by bears from lightly hunted areas (e.g., the upper Noatak drainage and Brooks Range). Harvest data alone may be insensitive to changes in brown bear populations (Harris and Metzgar, 1987). Without bear census data, human harvests could skew population sex and age structures without being reflected in harvest data. Therefore, I recommend the following activities:

- Survey a large portion of Unit 23 in 2013 or 2014 to determine bear density.
- Continue community-based assessments to monitor harvests of brown bears by residents of Unit 23.

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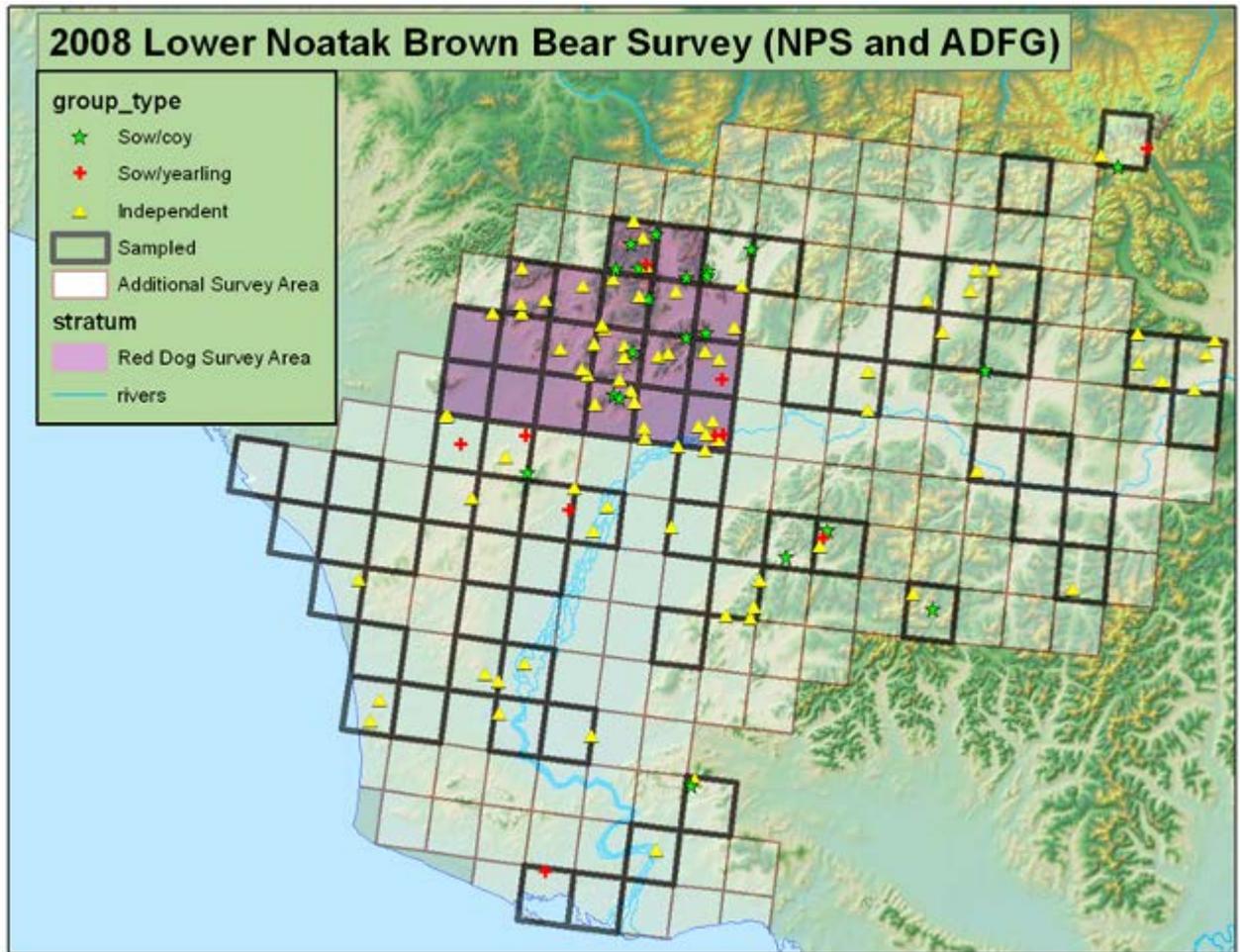


Figure 1. Observations from the 2008 Lower Noatak Brown Bear Survey conducted by the National Park Service and ADF&G (excluding data from the second survey in a paired count).

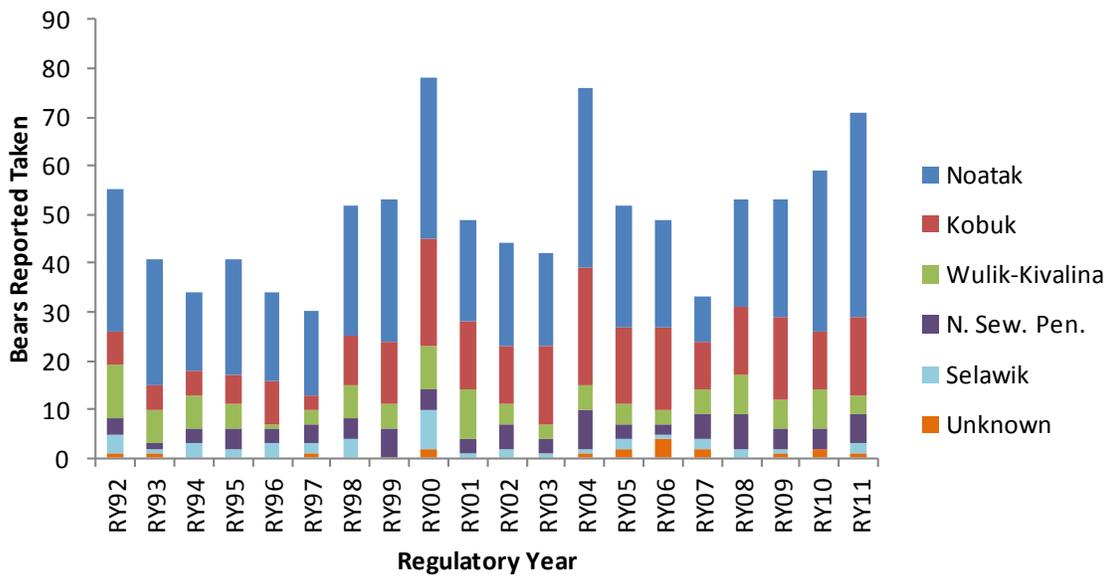


Figure 2. Unit 23 brown bear harvest by drainage, RY92 through RY11 (sealing and registration permit data). N. Sew. Pen. = Northern Seward Peninsula.

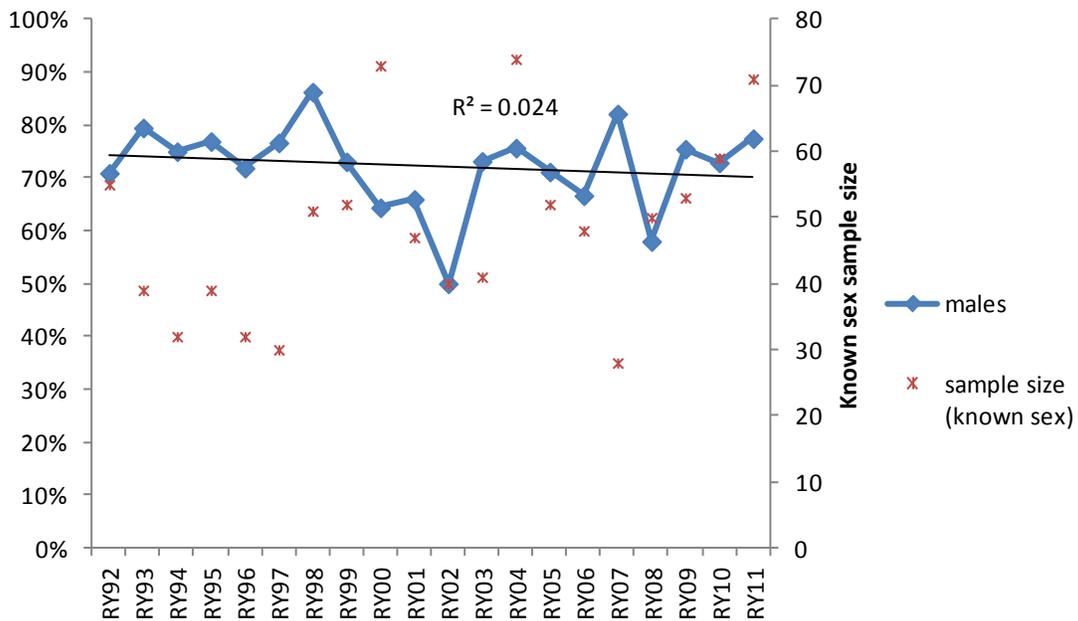


Figure 3. Percent males in Unit 23 brown bear harvest, RY92 through RY11 (sealing and registration permit data).

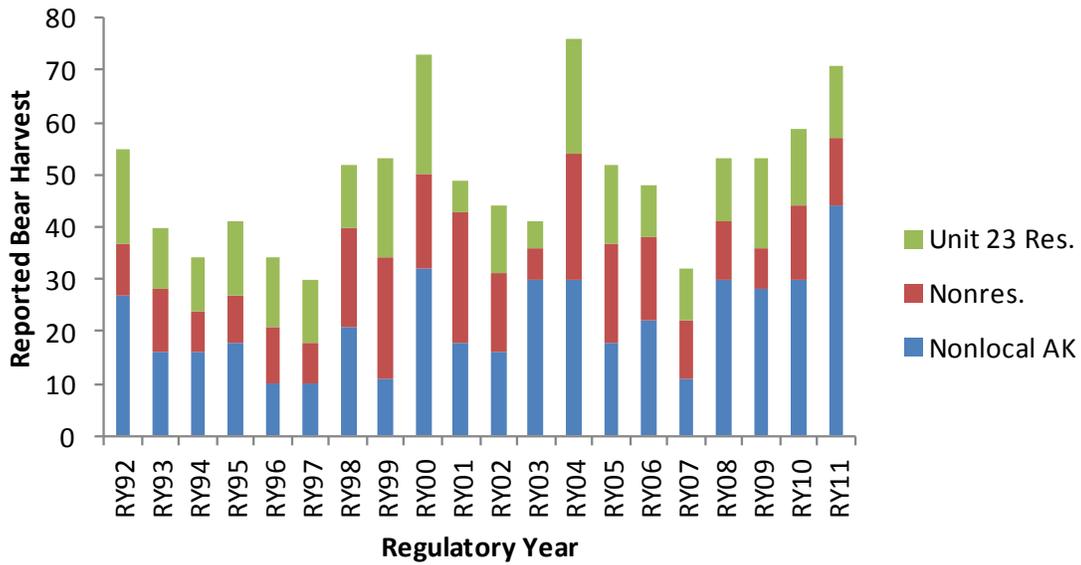


Figure 4. Unit 23 brown bear harvest by hunter residency, RY92 through RY11 (sealing and registration permit data).



Figure 5. Unit 23 brown bear harvest by season (Fall = Aug–Dec; Spring = Jan–May), RY92 through RY11 (does not include records where season was unknown).

Table 1. Reported harvest of brown bears in Unit 23, RY02 through RY11, by hunt type (sealing and registration permit data).

Regulatory Year	General Hunt	Fall Drawing	Spring Drawing	RB700	Unk. & DLP	Total
RY02	27	9	4	4	0	44
RY03	34	5	1	0	2	42
RY04	47	12	10	5	2	76
RY05	33	12	7	0	0	52
RY06	27	9	8	5	0	49
RY07	19	8	2	0	4	33
RY08	40	9	1	3	0	53
RY09	38	8	0	7	0	53
RY10	42	10	4	2	1	59
RY11	54	9	3	4	1	71

Table 2. Brown bear harvests in Unit 23 based on community harvest assessments (CSIS information from Subsistence Division, 2012).

Community	Year	Human Population <sup>a</sup>	Brown Bears Harvested (Estimate) <sup>b</sup>	Brown Bears Taken per Capita (Estimate) <sup>b</sup>
Ambler	2003, 2009	294, 258	1,4	0.009
Buckland	2003, 2009	395, 418	2	0.004
Deering	2011	124	0	0.000
Kiana	2006, 2009	385, 356	0, 0	0.000
Kivalina	2010	124	0	0.000
Kobuk	2004, 2009	125, 151	4, 6	0.036
Noatak	2001, 2007, 2010,2011	438, 489, 514,547	1, 2, 5, 3	0.005
Noorvik	2002, 2008	674, 631	5, 2	0.005
Selawik	2006,2010	842, 829	1, 0	0.001
Shungnak	1998, 2008	249, 272	1, 2	0.006
Total		3,922	17	0.004

<sup>a</sup> Human population estimates for many villages were adjusted retrospectively with updated 2010 census information.

<sup>b</sup> Reported estimate in communities with two or more data points is based on the average.

Table 3. Reported Unit 23 brown bear harvest by drainage, RY92 through RY11 (sealing and registration permit data).

Regulatory Year	Noatak	Kobuk	Selawik	N. Seward Peninsula	Wulik/Kivalina	Total <sup>a</sup>
RY92	29	7	4	3	11	55
RY93	26	5	1	1	7	41
RY94	16	5	3	3	7	34
RY95	24	6	2	4	5	41
RY96	18	9	3	3	1	34
RY97	17	3	2	4	3	30
RY98	27	10	4	4	7	52
RY99	29	13	0	6	5	53
RY00	33	22	8	4	9	78
RY01	21	14	1	3	10	49
RY02	21	12	2	5	4	44
RY03	19	16	1	3	3	42
RY04	37	24	1	8	5	76
RY05	25	16	2	3	4	52
RY06	22	17	1	2	3	49
RY07	9	10	2	5	5	33
RY08	22	14	2	7	8	53
RY09	24	17	1	4	6	53
RY10	33	12		4	8	59
RY11	42	16	2	6	4	71

<sup>a</sup>Total may include uncoded harvest.

Table 4. Total skull size, age and gender of brown bears sealed in Unit 23, RY92 through RY11.

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>
RY92	21.3	29	7.8	29	19.7	10	8.2	11
RY93	21.3	28	7.0	26	18.9	7	3.4	7
RY94	21.1	21	5.6	21	18.0	7	5.4	7
RY95	21.2	22	5.6	26	19.7	9	7.4	9
RY96	21.3	18	7.7	19	19.5	7	7.6	7
RY97	21.8	20	9.6	17	19.8	7	8.2	6
RY98	21.3	37	5.7	33	18.7	7	5.0	7
RY99	21.5	33	7.2	34	20.2	12	8.5	12
RY00	22.2	40	7.7	39	19.2	20	7.9	20
RY01	22.1	29	7.0	28	19.3	16	6.4	16
RY02	21.5	19	7.1	19	19.9	20	8.8	16
RY03	21.8	29	7.9	28	20.2	11	10.2	11
RY04	22.6	51	9.5	51	19.3	18	6.8	17
RY05	22.5	36	9.6	36	20.6	13	8.1	13
RY06	21.3	25	7.6	25	19.9	16	7.7	15
RY07	22.1	20	8.2	19	18.5	5	6.4	5
RY08	21.3	25	7.3	22	19.5	21	6.9	17
RY09	21.4	34	7.4	30	18.7	12	6.0	12
RY10	21.4	39	6.9	37	20.1	13	7.9	14
RY11	21.6	51	7.1	49	20.3	16	9.1	12

Table 5. Brown bear nonresident drawing permit data, RY10 and RY11.

Hunt number	Available	RY10 permits			RY11 permits		
		Issued	Hunted	Killed	Issued	Hunted	Killed
<u>Fall Drawing</u>							
DB761	8	7	7	5	8	3	2
DB762	8	8	6	3	8	7	4
DB763	4	0	0	0	2	2	0
DB764	4	1	0	0	3	1	0
DB765	4	4	0	0	4	1	0
DB766	8	8	3	2	8	5	3
DB767	4	0	0	0	0	0	0
Total	40	28	16	10	33	19	9
Avg RY00–RY09	34–40	27.8	18.1	9.8			
SD RY00–RY09		6.5	6.5	3.5			
<u>Spring Drawing</u>							
DB771	6	2	0	0	1	1	0
DB772	6	4	4	2	0	0	0
DB773	2	0	0	0	0	0	0
DB774	3	3	3	2	2	2	0
DB775	3	0	0	0	1	1	1
DB776	6	0	0	0	0	0	0
DB777	2	0	0	0	2	2	2
Total	28	9	7	4	6	6	3
Avg RY00–RY09	24–28	14.8	9.5	7.1			
SD RY00–RY09		8.7	6.7	4.3			

Table 6. Unit 23 brown bear harvest by hunter residency, RY92 through RY11 (sealing and registration permit data; does not include community harvest assessment data).

Regulatory Year	Unit 23 resident	Nonlocal resident	Nonresident	Unk.	Total
RY92	18	27	10		55
RY93	12	16	12	1	41
RY94	10	16	8		34
RY95	14	18	9		41
RY96	13	10	11		34
RY97	12	10	8		30
RY98	12	21	19		52
RY99	19	11	23		53
RY00	23	32	18	5	78
RY01	6	18	25		49
RY02	13	16	15		44
RY03	5	30	6	1	42
RY04	22	30	24		76
RY05	15	18	19		52
RY06	10	22	16		49
RY07	10	11	11		33
RY08	12	30	11		53
RY09	17	28	8		53
RY10	15	30	14		59
RY11	14	44	13		71

Table 7. Percent harvest of brown bears by month in Unit 23, RY92 through RY11 (sealing and registration permit data).

Regulatory year	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Unk
RY92	0	7	64	5	0	0	0	0	0	18	0	0	5
RY93	2	0	51	0	0	0	5	0	0	29	7	0	5
RY94	3	0	68	3	0	0	0	0	0	18	9	0	0
RY95	0	0	63	5	0	2	0	0	0	20	10	0	0
RY96	3	0	65	3	0	0	0	0	0	21	6	3	0
RY97	3	0	57	3	0	0	0	0	0	30	7	0	0
RY98	0	0	62	2	0	0	0	0	4	10	21	0	2
RY99	2	6	47	0	0	0	0	0	0	32	11	2	0
RY00	0	1	46	1	0	0	0	0	0	28	14	1	8
RY01	0	0	65	0	2	0	0	0	0	12	20	0	0
RY02	0	0	61	5	0	0	0	0	2	14	9	0	9
RY03	0	21	69	2	0	0	0	0	0	5	0	0	2
RY04	0	5	54	3	1	0	0	0	1	25	8	1	1
RY05	0	2	58	0	0	0	0	0	0	25	12	0	4
RY06	0	6	57	2	0	0	0	0	0	18	12	0	4
RY07	0	3	55	6	0	0	0	0	0	15	6	3	12
RY08	0	8	75	0	0	0	0	0	0	11	4	2	0
RY09	0	8	79	2	0	0	0	0	0	4	6	0	2
RY10	0	8	64	2	0	0	0	0	2	20	3	0	0
RY11	0	8	69	3	0	0	0	0	0	18	1	0	0

Table 8. Percent harvest of brown bears by transport method, RY92 through RY11 (sealing and registration permit data).

Regulatory Year	Airplane	Boat	Off road vehicle	Snow-machine	Other	Unknown
RY92	58	5	13	2	7	16
RY93	59	0	2	24	5	10
RY94	50	24	0	21	6	0
RY95	49	12	5	17	7	10
RY96	53	9	0	12	12	15
RY97	50	23	3	13	3	7
RY98	48	19	2	13	6	12
RY99	47	6	0	26	15	6
RY00	53	4	1	18	12	13
RY01	53	20	4	18	0	4
RY02	52	20	0	16	2	9
RY03	67	26	2	2	2	0
RY04	45	18	5	28	3	1
RY05	56	10	0	35	0	0
RY06	57	16	2	22	2	0
RY07	52	9	9	21	0	9
RY08	58	25	2	13	0	2
RY09	62	23	8	6	2	0
RY10	53	24	3	17	2	2
RY11	56	20	1	20	1	1

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 – PO Box 115526  
Juneau, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2012<sup>1</sup>

**LOCATION**

**GAME MANAGEMENT UNITS:** 25A, 25B, 25D, 26B, and 26C (73,755 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Upper Yukon River drainage and eastern North Slope of the Brooks Range

**BACKGROUND**

Brown bears are widely distributed in northeastern Alaska. A decline in numbers occurred during the 1960s, resulting primarily from aircraft-supported guided hunters and defense of life and property (DLP) kills and other harvest associated with early oil and gas exploration (Shideler and Hechtel 2000). As a result, in regulatory year (RY) 1971 (RY = 1 July through 30 June, e.g., RY71 = 1 July 1971–30 June 1972), Units 26B and 26C were closed to brown bear hunting. In subsequent years a variety of regulations were used to limit harvest and allow for an increase in brown bear numbers. Regulations have been gradually liberalized as populations recovered.

Beginning in RY77, all brown bear hunters in Units 25A, 26B, and 26C were required to obtain drawing permits. As bear populations recovered, regulatory changes included applying the permit requirement only to nonresidents and increasing the number of permits issued in some areas. Only nonresidents were required to obtain drawing permits in Units 25A and 26C beginning in RY84, and in Unit 26B in RY87. The Alaska Board of Game (board) reevaluated and eliminated the requirement that nonresident hunters obtain drawing permits in Units 25A and 26C beginning in RY94, with the understanding that harvests would be closely monitored and that the average annual harvest in each unit during a 2-year period should not exceed the estimated sustainable harvest (Table 1).

The permit system for nonresident hunters in Unit 26B was similarly reevaluated and eliminated by the board in RY96. The board also established an earlier season opening date of 20 August in Units 26B and 26C in response to closure of the September moose hunting season in most of Unit 26 the same year. A decline in brown bear harvest was expected to accompany the decline in moose hunting activity during September. These regulations worked as intended in Units 25A and 26C, but resulted in an elevated harvest in Unit 26B. Following the harvest of 25 bears in Unit 26B during RY96 and 25 during fall 1997, the Alaska Department of Fish and Game (ADF&G) closed the remainder of the RY97 season by emergency order. For RY98 the board

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<sup>1</sup> At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

restored a drawing permit hunt for nonresident hunters in Unit 26B and opened the season on 1 September rather than 20 August. However, in view of the high harvests during RY96 and RY97, no permits were issued in RY98. Up to 3 drawing permits were issued for nonresident hunters in RY99 and RY00, with a 1 September–31 October open season. Regulations remained conservative during RY01–RY09, although season lengths and permit availability were somewhat less restrictive (Lenart 2011).

In Unit 25D, more liberal brown bear hunting regulations were implemented beginning in RY98. The board eliminated the tag fee for resident hunters and established a bag limit of 1 bear per year. These regulations were changed because Unit 25D harvests were extremely low and less restrictive regulations could provide for additional hunting opportunity. The estimated sustainable annual harvest in Unit 25D was 19 bears, whereas the reported annual harvest was <5 bears.

### **MANAGEMENT DIRECTION**

Goals and objectives established for brown bear in the eastern Brooks Range (Units 25A, 26B, and 26C) considered a maximum sustainable yield approach to managing brown bears beginning in RY11. Previously, a more conservative approach was applied (Lenart 2011).

Goals and objectives established for brown bear in Unit 25D considered management goals and objectives for moose populations in accordance with the *Yukon Flats Cooperative Moose Management Plan* (ADF&G 2002) and Alaska's intensive management law for moose in Unit 25D.

#### **MANAGEMENT GOALS**

- Protect, maintain, and enhance brown bear populations and habitat in concert with other components of the ecosystem.
- Provide the opportunity to hunt brown bears under aesthetically pleasing conditions in the eastern Brooks Range.
- Provide the greatest sustained opportunity to participate in hunting brown bears in the upper Yukon and Porcupine drainages.
- Provide maximum opportunity to participate in hunting grizzly bears in Unit 25D.

#### **MANAGEMENT OBJECTIVES**

Management objectives recommended at the end of the previous Units 25A, 25B, 25D, 26B, and 26C brown bear management report (Lenart 2011) were listed incorrectly. Management objectives were changed during the middle of the 1 July 2010–30 June 2012 report period. The following were the objectives used to manage brown bears during the report period (1 July 2010–30 June 2012).

##### *Units 25A, 25B, and 26C in RY10 and RY11*

- Units 25A, 25B, and 26C, manage for a 3-year mean annual human-caused brown bear mortality of  $\leq 5\%$  of the current estimated brown bear population in each subunit.

- In Units 25A, 25B, and 26C, manage for a 3-year mean annual human-caused mortality of at least 60% males.

*Units 25A, 25B, and 26C in RY12*

- In Units 25A, 25B, and 26C, manage for a 3-year mean annual human-caused brown bear mortality of  $\leq 8\%$  of the bears  $\geq 2$  years old of which no more than 40% in each subunit can be females.

*Unit 25D in RY10, RY11, and RY12*

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

*Unit 26B in RY10 and RY11*

- Reduce brown bear predation on muskoxen in RY10 and RY11.
- Temporarily allow the 3-year mean annual human-caused brown bear mortality to exceed 8% of the bears  $\geq 2$  years old, but remain  $\leq 15\%$  (40 bears).

Activity:

- Liberalize brown bear hunting seasons.
- In RY11 (spring 2012), lethally remove brown bears identified as threatening or killing muskoxen via a Department-conducted predator control program.

*Unit 26B in RY12*

- Reduce brown bear predation on muskoxen in RY12.
- Maintain an estimated population of 200–320 bears (midpoint = 265).
- Manage for a 3-year mean annual human-caused brown bear mortality of  $\leq 8\%$  of the bears  $\geq 2$  years old (21 bears) of which no more than 40% can be females (8 bears).

Activity:

- In RY12 (spring 2013), lethally remove brown bears identified as threatening or killing muskoxen via a department-conducted predator control program.

## **METHODS**

### **POPULATION SIZE**

Prior to 1993 brown bear population density estimates for Units 25A, 25B, 25D, 26B, and 26C were based on extrapolations from studies done in portions of the eastern Brooks Range in Units 26B and 25A; (3,600 mi<sup>2</sup>; Reynolds 1976), Unit 26C (Reynolds and Garner 1987) or in similar habitat in the western Brooks Range in Unit 26A (Reynolds and Hechtel 1984, Reynolds 1992). In 1993, population estimates were adjusted slightly from the original extrapolated

estimates based on better technology to calculate the area of bear habitat and increased knowledge of bear densities in certain types of bear habitat.

An aerial technique termed “double-count line transect method” (Becker and Quang 2009) was applied in portions of Unit 26B during 1999–2003 to obtain a density estimate for the foothills and mountains <4,000 feet in elevation in Unit 26B (3,935 mi<sup>2</sup>; Reynolds et al., ADF&G unpublished report, Fairbanks, <http://irmafiles.nps.gov/reference/holding/485525> [Accessed 2 February 2015]). A density estimate for the coastal plain (9,848 mi<sup>2</sup>) and for areas >4,000 feet (1,733 mi<sup>2</sup>) in Unit 26B was extrapolated from data collected from the radiocollared bears in ADF&G’s North Slope oil field grizzly bear project (R. Shideler, ADF&G, personal communication, 2013) and a subsample from the technique described above.

### *Harvest*

Harvest data were obtained from mandatory sealing documents when harvested bears were sealed by ADF&G or an appointed sealer. Total harvest and nonhunting kill, sex, age, skull size, hunter residency and success, chronology, and transportation were summarized by regulatory year.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

#### *Population Size*

No brown bear population surveys were conducted during RY10 and RY11. Population estimates are listed below for the eastern Brooks Range and upper Yukon River drainage in Units 25A, 25B, 25D, 26B, and 26C.

*Units 25A, 25B, and 25D* — The current estimate of brown bears in Units 25A, 25B, and 25D is based on the 1993 estimate of approximately 1,200 brown bears (2.4 bears/100 mi<sup>2</sup>; Table 1). Availability of habitat for brown bears in this area has not changed substantially since 1993, harvest was below 5%, and in most years the harvest included ≥60% males. Thus, it is likely that bear densities remained unaffected by reported harvest. There is a possibility the population increased in Unit 25D or expanded to new habitat, because local residents on the Yukon River observed more brown bears along the river corridor recently compared to years prior to 2000.

*Units 26B and 26C* — The current estimate of 265 brown bears (1.7 bears/100 mi<sup>2</sup>) in Unit 26B is based on the double-count line transect population estimate in the foothills (186.5 bears ± 34 [95% CI]), the pilot study on the coastal plain (66 bears), and for areas >4,000 feet (12 bears).

The current population estimate for Unit 26C is based on the 1993 estimate of approximately 390 brown bears. Availability of habitat for brown bears in this area has not changed substantially since 1993. Harvest has been below 5% since 1993, and in most years the harvest included ≥60% males. Thus, it is likely that bears were unaffected by reported harvest.

#### *Reproductive Parameters*

In Unit 26B, some reproductive parameters were measured in conjunction with research investigating use of the North Slope oil fields by brown bears (Shideler and Hechtel 2000). Data from 116 marked bears during 1992–2004 (R. Shideler, ADF&G, unpublished data, Fairbanks)

indicated that females that had access to human food (“food-conditioned”) were younger at age of first year of reproduction (5.4 yr,  $n = 5$ ) compared with those that fed on natural food only (7.4 yr,  $n = 16$ ). Litter size was similar at about 2 cubs per litter. Additionally, the mean reproductive interval was lower for food conditioned bears (3.3 yr) compared with natural-food bears (4.8 yr). Reproductive parameters observed in the natural-food bears were similar to those of other brown bears in the Arctic that fed on natural foods (Reynolds 1981; Nagy et al. 1983; McLoughlin et al. 2003). However, only 4 natural-food adult females contributed to approximately 67% of the cubs weaned ( $n = 23$ , R. Shideler, ADF&G, unpublished data). This indicated that productive females were not equally distributed throughout the region.

*Distribution and Movements*

Brown bears are distributed throughout the area. Densities were generally highest in the foothills, moderate in the mountains of the Brooks Range, and lowest on the coastal plain of the North Slope. Riparian habitats were extensively used in Units 26B and 26C. Brown bears are also known to concentrate near salmon spawning areas on the lower Sheenjek River in Unit 25A.

**MORTALITY**

*Harvest*

Seasons and bag limits, RY10.

Units and Bag Limits	Resident Open Season	Nonresident Open Season
Unit 25A RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun
Unit 25B RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun
Unit 25D RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	1 Jul–30 Nov 1 Mar–30 Jun	1 Sep–30 Nov 1 Mar–15 Jun
Unit 26B RESIDENT HUNTERS: One bear every regulatory year by registration permit only. NONRESIDENT HUNTERS: One bear every regulatory year by drawing permit only; up to 20 permits will be issued.	10 Aug–31 Dec	10 Aug–31 Dec

Units and Bag Limits	Resident Open Season	Nonresident Open Season
<p>Unit 26B, that portion of Unit 26B including the Kadleroshilik River drainage south and east of the Prudhoe Bay closed area, and including that portion of the Echooka, Ivishak Lupine, and Ribdon River drainages and the Accomplishment Creek drainage north of a line beginning at N69°08.97', W146°50.36' on the divide between the Echooka and Shaviovik River drainages and ending at N68°35.71', W148°29.64', excluding the Accomplishment Creek drainage southwest of a line following the west bank of Accomplishment Creek from N68°35.71', W148°29.64' to the confluence of Accomplishment Creek and the Sagavanirktok River at N68°42.19', W148°54.47', and including that portion of the Sagavanirktok River drainage south of the Prudhoe Bay closed area and N68°42.19' (crossing the Dalton Highway near milepost 300), and including that portion of the Kuparuk and Toolik River drainages south of the Prudhoe Bay closed area and north of a line at N68°42.19', excluding tributary drainages flowing into the Kuparuk River north of the confluence of the Kuparuk and Toolik rivers and west of the west bank of the Kuparuk River</p> <p>RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year by registration permit only.</p>	4 Mar–30 Jun	4 Mar–30 Jun
<p>Remainder of Unit 26B</p> <p>RESIDENT HUNTERS: One bear every regulatory year.</p> <p>NONRESIDENT HUNTERS: One bear every regulatory year by drawing permit only; up to 20 permits will be issued.</p>	1 Jan–31 May	1 Jan–31 May
<p>Unit 26C</p> <p>RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.</p>	10 Aug–30 Jun	10 Aug–30 Jun

Seasons and bag limits, RY11. The seasons and bag limits for Units 25A, 25B, 25D and 26C were the same as RY10. Unit 26B seasons for RY11 are listed below.

Units and Bag Limits	Resident Open Season	Nonresident Open Season
Unit 26B, that portion of Unit 26B including the Kadleroshilik River drainage south and east of the Prudhoe Bay closed area, and including that portion of the Echooka, Ivishak Lupine, and Ribdon River drainages and the Accomplishment Creek drainage north of a line beginning at N69°08.97', W146°50.36' on the divide between the Echooka and Shaviovik River drainages and ending at N68°35.71', W148°29.64', excluding the Accomplishment Creek drainage southwest of a line following the west bank of Accomplishment Creek from N68°35.71', W148°29.64' to the confluence of Accomplishment Creek and the Sagavanirktok River at N68°42.19', W148°54.47', and including that portion of the Sagavanirktok River drainage south of the Prudhoe Bay closed area and N68°42.19' (crossing the Dalton Highway near milepost 300), and including that portion of the Kuparuk and Toolik River drainages south of the Prudhoe Bay closed area and north of a line at N68°42.19', excluding tributary drainages flowing into the Kuparuk River north of the confluence of the Kuparuk and Toolik rivers and west of the west bank of the Kuparuk River.		
RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year by registration permit only.	1 Jul–30 Jun	1 Jul–30 Jun
Remainder of Unit 26B		
RESIDENT HUNTERS: One bear every regulatory year.	1 Sep–31 May	
NONRESIDENT HUNTERS: One bear every regulatory year by drawing permit only; up to 20 permits will be issued.		1 Sep–31 May

Cubs and females with cubs were protected from harvest. Additional state regulations that affected brown bear hunting include special restrictions along the Dalton Highway. The Dalton Highway corridor management area (DHCMA) extends 5 miles from each side of the Dalton

Highway from the Yukon River to the Prudhoe Bay closed area, which encompasses most of the Prudhoe Bay oil field. DHCMA is closed to hunting with firearms. Big game, small game, and fur animals can be taken by bow and arrow only, but hunters must possess a valid Alaska Bowhunter Education Program card or a recognized equivalent certification. In addition, no motorized vehicles except aircraft, boats, and licensed highway vehicles may be used to transport game or hunters within DHCMA.

#### Alaska Board of Game Actions and Emergency Orders.

2010 — No regulatory changes were implemented during the March 2010 board meeting. Actions taken during the August and October 2010 meetings were substantially different compared to previous years.

During an emergency meeting in August 2010 the board opened the Unit 26B brown bear season for residents and nonresidents on 10 August versus 25 August in an effort to help reduce predation by brown bears on muskoxen. In addition, the resident drawing permit DB990 (within DHCMA) was eliminated beginning in fall 2010 and the resident season within DHCMA reverted to a general season hunt. We issued an additional 8 nonresident draw permits (DB987) for a total of 20 permits.

In October 2010 the board further modified brown bear hunting regulations for a large portion of central Unit 26B in an effort to help reduce predation by brown bears on muskoxen. Beginning 4 February 2011, a registration permit for resident and nonresident hunters in central Unit 26B (described above under Seasons and bag limits, RY10) became available for 1 brown bear every regulatory year, with season dates of 4 March–30 June for regulatory year 2010 and 1 July–30 June for future years. The board intended this registration permit hunt to focus brown bear hunters in areas where muskoxen groups were known to occur. For the remainder of Unit 26B (the area surrounding the registration hunt area), the season was changed to 1 September–31 May, by general season for resident hunters. Drawing permit DB987 for nonresident hunters remained intact for the remainder of Unit 26B.

2012 — In January 2012 the board approved the *Unit 26B Muskox Recovery Plan* (Title 5 of the Alaska Administrative Code, regulation 92.126 [5 AAC 92.126]). This plan included use of department-authorized personnel to lethally remove brown bears identified as threatening or killing muskoxen in Unit 26B (5 AAC 92.126; *Operational Plan for Unit 26B Muskox Recovery 2012–2018*, ADF&G unpublished document, 2012, <http://www.adfg.alaska.gov/index.cfm?adfg=intensivemanagement.unit26b#anchor> [Accessed 3 February 2015]). The board expedited 5 AAC 92.126, which went into effect in spring 2012 (RY11) when lethal brown bear removal was implemented. In addition, hunting regulations were modified beginning RY12 (fall 2012) such that resident hunters were required to obtain a registration permit for all of Unit 26B with season dates 25 August–31 December (RB988) and 1 January–31 May (RB989). Throughout Unit 26B, nonresidents were required to obtain drawing permit DB987 to hunt brown bears during the season of 25 August–31 May.

#### Harvest by Hunters.

*Units 25A, 25B, and 25D* — In Unit 25A, 23 and 30 brown bears were reported harvested in RY10 and RY11, respectively (Table 2). Males made up 70% and 65% of the harvest,

respectively. Most harvest occurred in the Chandalar River drainage between the North Fork Chandalar and Wind Rivers ( $\geq 70\%$ ). The remaining harvest took place in the Sheenjek or Coleen River drainages. The 3-year mean annual human-caused mortality (RY09–RY11) in Unit 25A was 28 bears (64% males). During the past 10 years (RY02–RY11), 265 brown bears were sealed, 61% were males, and most bears were harvested in the fall (Table 2). In RY02 and RY03, harvest increased by approximately 10 bears compared to the previous 5 years (RY97–RY01; range = 7–14), mostly due to an increase in guided nonresident hunters. No trends were detected in mean age during this period. The mean age of brown bears sealed was 7.3 ( $n = 21$ ) and 6.2 years ( $n = 22$ ) in RY10–RY11 compared to a 10-year mean age of 7.9 years (RY02–RY11;  $n = 206$ ). The 10-year mean age was 8.3 years ( $n = 93$ ) for females and 7.8 years ( $n = 137$ ) for males. Reported nonhunting kills were low (Table 2), and included DLP, illegal take, research mortalities, or other known human-caused accidental mortality.

In Units 25B and 25D, 2 brown bears were reported harvested in RY10 and 3 were reported in RY11 (Table 3). Reported harvest in these units was low in most years (2–6 bears; Table 3). In RY02, 10 brown bears were reported harvested which was likely related to efforts to increase bear harvest as prescribed in the *Yukon Flats Cooperative Moose Management Plan* (ADF&G 2002). We suspect that many bears were not reported because of the difficulty of sealing a bear in this remote area. The Council of Athabaskan Tribal Government (CATG) conducted bear harvest interviews for RY05 with community hunters in the Yukon Flats. Hunters reported killing 37 brown bears and 149 black bears (Thomas and Fleener, 2006 Yukon Flats moose, bear, and wolf harvest data collection final report, CATG unpublished report, Fort Yukon). Some of these bears may have been killed as DLP rather than hunting. Nonetheless, many brown bears were not sealed.

*Units 26B and 26C* — In Unit 26B, 26 and 22 brown bears were reported harvested in RY10 and RY11 (Table 4), respectively. Males made up 65% of the harvest in RY10 and 68% in RY11. The 3-year mean annual human-caused mortality (RY09–RY11) in Unit 26B was 24 bears (69% males; Table 4). During the 10-year period of RY02–RY11, 129 bears were sealed and 64% were males (ADF&G files). No trends were detected in mean age. The mean age of brown bears sealed was 10.8 ( $n = 26$ ) in RY10 and 7.7 years ( $n = 21$ ) in RY11 compared to a 10-year (RY02–RY11) mean age of 8.8 years ( $n = 110$ ). The 10-year mean age was 8.6 ( $n = 42$ ) for female bears and 8.8 ( $n = 68$ ) for males. During RY00–RY11 at least 5 marked bears were killed by humans and not reported.

Harvest distribution in Unit 26B was not uniform. Most harvest was in the Sagavanirktok Ivishak, and Ribdon River drainages because these drainages were accessible via river boats and airboats. Harvest of bears by Alaska residents was frequently opportunistic relative to caribou hunting.

In Unit 26C, 14 and 15 brown bears were reported harvested in RY10 and RY11 (Table 5). Males made up 50% of the harvest in RY10 and 67% in RY11. The 3-year mean annual human-caused mortality (RY09–RY11) in Unit 26C was 17 bears (65% males). During RY02–RY11, a total of 125 bears (54% males). The mean age of brown bears sealed was 7.3 ( $n = 14$ ) in RY10 and 10 years ( $n = 12$ ) in RY11. No trends were detected in mean age during the past 10 years ( $\bar{x} = 8.8$  years,  $n = 112$ ). The 10-year mean age was 9.6 years ( $n = 52$ ) for females and 8.1 years ( $n = 59$ ) for males.

Permit Hunts. The drawing permit hunt (DB987) required for all nonresidents brown bear hunters in Unit 26B for the 25 August–31 December and 1 March–31 May hunting season was modified during August 2010 and October 2010 Board of Game meetings. The bag limit remained 1 bear every regulatory year. The RY10 hunting season in the fall opened earlier on 10 August. The spring season opened earlier (1 January), and the hunt area changed to the remainder of Unit 26B, outside the registration hunt area. In RY10 a total of 20 permits were issued and 6 bears were harvested (Table 6). In RY11 the season for DB987 (remainder of Unit 26B, outside the registration hunt area) was 1 September–31 May, 6 permits were issued and no bears were harvested.

Registration permits for resident (RB988) and nonresident (RB989) brown bear hunters were implemented in central Unit 26B. The bag limit was 1 bear every regulatory year. The nonresident hunt (RB989) was 4 March–30 June 2011 in RY10 and 1 January–30 June 2012 in RY11. In RY10, 38 permits were issued and 1 bear was harvested. In RY11, 39 permits were issued and no bears were harvested. The resident permit hunt (RB988) was implemented in RY11 during 1 July–31 December, 442 permits were issued and 21 bears were harvested (Table 6).

As described above, the resident draw hunt (DB990) was eliminated during an emergency Board of Game meeting in early August 2010 (RY10), prior to the opening of the hunt. Drawing application fees were refunded to permit holders who applied for the hunt.

#### Hunter Residency and Success.

*Units 25A, 25B, and 25D* — In Unit 25A, residents of Alaska took 26% of the reported harvest during RY10 and 47% in RY11. Nonresidents took 74% of the reported harvest in RY10 and 53% in RY11. The proportion of nonresidents who harvested brown bears has been  $\geq 48\%$  since RY00 and was frequently  $\geq 70\%$  (Table 7).

In Units 25B and 25D combined, nonlocal Alaska residents harvested 2 brown bears in RY10 and 3 in RY11 (Table 8). Generally, few local residents reported taking bears. Because local residents report infrequently, these figures probably underrepresent the number taken by local hunters.

*Units 26B and 26C* — In Unit 26B, 77% of the reported harvest was taken by Alaska residents during RY10 and 73% during RY11. Since RY00 most of the reported harvest was taken by residents of Alaska (Table 9) because the permit system was more restrictive on nonresidents.

In Unit 26C, 14% and 47% of the reported harvest was taken by Alaska residents in RY10 and RY11 (Table 10).

Transport Methods. In Unit 25A, most brown bears were harvested during aircraft supported hunts (5-year  $\bar{x} = 78\%$ ,  $n = 139$  successful hunters, RY07–RY11; ADF&G files [WinfoNet, Accessed July 2013]). The remaining bears were harvested by hunters who accessed the area by horse, foot, highway vehicle, boat, or snowmachine (<10% each). In Units 25B and 25D, boats and snowmachines were used for transportation by successful hunters. In Unit 26B during RY07–RY11, successful hunters ( $n = 92$ ) mainly used aircraft ( $\bar{x} = 72\%$ ), boats ( $\bar{x} = 14\%$ ), and

highway vehicles ( $\bar{x} = 5\%$ ). In Unit 26C, hunters used mainly aircraft (5 year  $\bar{x} = 92\%$ ,  $n = 76$  successful hunters, RY07–RY11; ADF&G files [WinfoNet, Accessed July 2013]).

#### Harvest Chronology.

*Units 25A, 25B, and 25D* — In Unit 25A, 48% of the brown bears were harvested in August and 48% in September during RY10 ( $n = 23$ ). In RY11, 57% were harvested in August and 37% in September ( $n = 30$ ). The remaining bears were harvested in June. In Units 25B and 25D, most harvested bears were not reported, but data collected by CATG in 2005 indicated that bears in these units were harvested primarily in June and September (Thomas and Fleener, CATG unpublished report, Fort Yukon).

*Units 26B and 26C* — In Unit 26B the season opened 10 August in RY10 and 1 July in RY11. In RY10, 72% ( $n = 26$ ) were harvested in August and peak harvest was during 25–31 August. The remaining bears were harvested in September (23%) and 1 bear was harvested in the spring. In RY11, 86% ( $n = 22$ ) of the bears were harvested in August and 14% in September. In Unit 26C, 100% ( $n = 15$ ) and 93% ( $n = 15$ ) of the brown bears were harvested in August in RY10 and RY11, respectively. The remaining bear was harvested in September.

#### Other Mortality

The number of brown bears taken and not reported is unknown, but there were occasional reports of bears being killed but not sealed, especially near villages in Unit 25 (Thomas and Fleener, CATG unpublished report, Fort Yukon). Some of this mortality was probably DLP. Continued efforts are necessary to encourage local residents to report harvest and seal bears. As mentioned previously, mortality due to DLP was high in some years in Unit 26B.

Relatively little is known about natural mortality of brown bears in northeastern Alaska. Reynolds and Hechtel (1984) observed natural mortality rates in the western Brooks Range of 47% for cubs (largely infanticide by male bears), 12% for yearlings, and 13% for 2-year-olds. During 1992–2004 in northern Unit 26B, pre-weaning mortality was 60% (R. Shideler, ADF&G, unpublished data, Fairbanks). ADF&G staff observed 2 adult mortalities due to natural causes (6%) out of 34 known adult mortalities (R. Shideler, unpublished data).

*Unit 26B Liberalized Seasons and Muskox Recovery Program Results* — In RY10 a male bear known to have killed muskoxen was harvested by a bow hunter in May 2011. In RY11, another male bear known to have killed muskoxen was harvested by a hunter in August 2011. Predation events by brown bears on muskoxen continued to occur in spring 2012. Therefore, the effect of reducing brown bear predation on muskoxen by liberalizing bear seasons was unknown.

During RY11 (spring 2012), the department lethally removed 3 adult male brown bears that were either threatening or killing muskoxen. Initial preliminary results of reducing predation appeared promising because survival of calves to October 2012 (80%) was higher than the 5-year mean (2007–2011) of 64% (E. Lenart, ADF&G memorandum, 16 November 2012, Fairbanks). In addition, the number of adult muskoxen deaths documented was 3 compared to a 5-year mean (2007–2011) of 9 adult muskoxen  $\geq 1$  year old killed by bears annually (E. Lenart, ADF&G memorandum).

During RY12 (spring 2013), the department lethally removed 3 adult male brown bears that were either threatening or killing muskoxen. Results are pending.

## CONCLUSIONS AND RECOMMENDATIONS

Brown bear populations in the eastern Brooks Range and North Slope appeared to be mostly stable since the late 1980s. A slight population increase along the Yukon River may have occurred, according to observations by residents of the area. Reported harvest remained below maximum sustainable yields and considerable opportunity for brown bear hunting was available across the upper Yukon River drainage and eastern North Slope of the Brooks Range. All management goals were met.

For Units 25A, 25B, and 26C during RY10 and RY11, we met the objectives to manage for a 3-year mean annual human-caused brown bear mortality of  $\leq 5\%$  of the current estimated brown bear population and at least 60% males in the harvest (RY09–RY11), in each subunit. In Unit 25A, the 3-year mean annual human-caused mortality was 28 bears (64% males) and 5% of the estimated population was 30 bears (Tables 1 and 2). In Unit 25B and 25D combined, the 3-year mean annual human-caused mortality was 4 bears (73% male) and 5% of the estimated population was 30 bears (Tables 1 and 3). Because few bears were reported harvested in Unit 25D, it is unlikely we met the Unit 25D objective to temporarily reduce grizzly bear numbers and predation on moose in Unit 25D. Few bears were reported harvested in Unit 25D. In Unit 26C the 3-year mean was 17 bears (65% males) and 5% of the estimated population was 19 bears (Tables 1 and 5).

For Unit 26B in RY10 and RY11, we do not know if we met the objective to reduce brown bear predation on muskoxen because we could not determine what effect liberalizing the bear season and increasing the number of bears harvested had on reducing predation. We did document that 2 bears known to have killed muskoxen were harvested during this period. We met the objective to temporarily allow the 3-year mean annual human-caused brown bear mortality to exceed 8% (21 bears) but remain  $\leq 15\%$  of bears  $>2$ -years old (40 bears). The 3-year mean annual human-caused mortality was 24 adult bears (Table 4).

For the next reporting period, objectives and activities will remain the same for RY12. Objectives and activities are being developed for RY13.

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Table 1. Units 25A, 25B, 25D, 26B, and 26C brown bear population parameters and estimated sustainable harvest, 1993–2012.

Unit	Area (mi <sup>2</sup> )	Estimated <sup>a</sup> density/100 mi <sup>2</sup>	Estimated population size	Allowable harvest @ 8%
25A	21,280	2.8	596	48
25B and 25D	26,660	2.2	587	47
26B	15,515	1.7	265	21
26C	10,272	3.8	391	31
Total	73,727	2.5	1,839	147

<sup>a</sup> Density estimates for Units 25A, 25B, 25D and Unit 26C were based on extrapolations from studies done in portions of the eastern Brooks Range or in similar habitat in the western Brooks Range during the 1980s and early 1990s. Density estimate for Unit 26B was based on an aerial line transect method conducted during 1999–2003.

Table 2. Unit 25A brown bear human-caused mortality, regulatory years<sup>a</sup> 2000–2011.

Regulatory year	Reported									Total known kill					
	Hunter kill					Nonhunting kill <sup>b</sup>									
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total	
<i>2000</i>															
Fall 2000	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7	
Spring 2001	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0	
Total	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7	
<i>2001</i>															
Fall 2001	9	2	(18)	0	11	1	1	0	10	(77)	3	(23)	0	13	
Spring 2002	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1	
Total	10	2	(17)	0	12	1	1	0	11	(79)	3	(21)	0	14	
<i>2002</i>															
Fall 2002	15	7	(32)	0	22	0	0	0	15	(68)	7	(32)	0	22	
Spring 2003	0	1	(100)	0	1	0	0	0	0	(0)	1	(100)	0	1	
Total	15	8	(35)	0	23	0	0	0	15	(65)	8	(35)	0	23	
<i>2003</i>															
Fall 2003	11	13	(54)	1	25	1	0	0	12	(48)	13	(52)	1	26	
Spring 2004	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0	
Total	11	13	(54)	1	25	1	0	0	12	(48)	13	(52)	1	26	
<i>2004</i>															
Fall 2004	12	12	(50)	0	24	0	0	0	12	(50)	12	(50)	0	24	
Spring 2005	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0	
Total	12	12	(50)	0	24	0	0	0	12	(50)	12	(50)	0	24	
<i>2005</i>															
Fall 2005	12	12	(50)	0	24	0	0	0	12	(50)	12	(50)	0	24	
Spring 2006	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0	
Total	12	12	(50)	0	24	0	0	0	12	(50)	12	(50)	0	24	
<i>2006</i>															
Fall 2006	18	8	(31)	0	26	0	2	0	18	(64)	10	(36)	0	28	
Spring 2007	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0	
Total	18	8	(31)	0	26	0	2	0	18	(64)	10	(36)	0	28	

Regulatory year	Reported										Total known kill		Unk	Total
	Hunter kill					Nonhunting kill <sup>b</sup>			M	F (%)				
	M	F	(%)	Unk	Total	M	F	Unk						
<i>2007</i>														
Fall 2007	13	10	(43)	0	23	0	0	0	13	(57)	10	(43)	0	23
Spring 2008	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Total	15	10	(40)	0	25	0	0	0	15	(60)	10	(40)	0	25
<i>2008</i>														
Fall 2008	22	8	(27)	0	30	0	0	0	22	(73)	8	(27)	0	30
Spring 2009	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	23	8	(26)	0	31	0	0	0	23	(74)	8	(26)	0	31
<i>2009</i>														
Fall 2009	16	13	(45)	0	29	0	0	0	16	(55)	13	(45)	0	29
Spring 2010	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Total	18	13	(42)	0	31	0	0	0	18	(58)	13	(42)	0	31
<i>2010</i>														
Fall 2010	14	8	(36)	0	22	0	0	0	14	(64)	8	(36)	0	22
Spring 2011	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	15	8	(35)	0	23	0	0	0	15	(65)	8	(35)	0	23
<i>2011</i>														
Fall 2010	19	9	(32)	0	28	0	0	0	19	(68)	9	(32)	0	28
Spring 2011	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Total	21	9	(30)	0	30	0	0	0	21	(70)	9	(30)	0	30

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

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

Table 3. Units 25B and 25D brown bear human-caused mortality, regulatory years<sup>a</sup> 2000–2011.

Regulatory year	Reported													
	Hunter kill					Nonhunting kill <sup>b</sup>			Total known kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>2000</i>														
Fall 2000	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 2001	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
<i>2001</i>														
Fall 2001	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 2002	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
<i>2002</i>														
Fall 2002	6	4	(40)	0	10	0	0	0	6	(60)	4	(40)	0	10
Spring 2003	0	0	(0)	0	0	1	0	0	1	(100)	0	(0)	0	1
Total	6	4	(40)	0	10	1	0	0	7	(64)	4	(36)	0	11
<i>2003</i>														
Fall 2003	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 2004	0	0	(0)	0	0	1	0	0	1	(100)	0	(0)	0	1
Total	1	0	(0)	0	1	1	0	0	2	(100)	0	(0)	0	2
<i>2004</i>														
Fall 2004	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 2005	1	0	(0)	0	1	1	0	0	2	(100)	0	(0)	0	2
Total	2	0	(0)	0	2	1	0	0	3	(100)	0	(0)	0	3
<i>2005</i>														
Fall 2005	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 2006	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
<i>2006</i>														
Fall 2006	3	0	(0)	1	4	0	0	0	3	(100)	0	(0)	1	4
Spring 2007	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	3	0	(0)	1	4	0	0	0	3	(100)	0	(0)	1	4

Regulatory year	Reported												
	Hunter kill					Nonhunting kill <sup>b</sup>			Total known kill				
	M	F (%)	Unk	Total	M	F	Unk	M (%)	F (%)	Unk	Total		
<i>2007</i>													
Fall 2007	4	1 (20)	0	5	0	0	0	4 (80)	1 (20)	0	5		
Spring 2008	1	0 (0)	0	1	0	0	0	1 (100)	0 (0)	0	1		
Total	5	1 (17)	0	6	0	0	0	5 (83)	1 (17)	0	6		
<i>2008</i>													
Fall 2008	3	1 (25)	0	4	0	0	0	3 (75)	1 (25)	0	4		
Spring 2009	1	1 (50)	0	2	0	0	0	1 (50)	1 (50)	0	2		
Total	4	2 (33)	0	6	0	0	0	4 (67)	2 (33)	0	6		
<i>2009</i>													
Fall 2009	2	1 (33)	0	3	0	0	0	2 (67)	1 (33)	0	3		
Spring 2010	2	1 (33)	0	3	0	0	0	2 (67)	1 (33)	0	3		
Total	4	2 (33)	0	6	0	0	0	4 (67)	2 (33)	0	6		
<i>2010</i>													
Fall 2010	1	0 (0)	0	1	0	0	0	1 (100)	0 (0)	0	1		
Spring 2011	1	0 (0)	0	1	0	0	0	1 (100)	0 (0)	0	1		
Total	2	0 (0)	0	2	0	0	0	2 (100)	0 (0)	0	2		
<i>2011</i>													
Fall 2010	0	1 (100)	0	1	0	0	0	0 (0)	1 (0)	0	1		
Spring 2011	2	0 (0)	0	2	0	0	0	2 (100)	0 (0)	0	2		
Total	2	1 (33)	0	3	0	0	0	2 (67)	1 (33)	0	3		

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

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

Table 4. Unit 26B brown bear human-caused mortality, regulatory years<sup>a</sup> 2000–2011.

Regulatory year	Reported												
	Hunter kill <sup>b</sup>					Nonhunting kill <sup>c</sup>			Total known kill				
	M	F (%)	Unk	Total	M	F	Unk	M (%)	F (%)	Unk	Total		
<i>2000</i>													
Fall 2000	6	4 (40)	0	10	1	1	0	7 (58)	5 (42)	0	12		
Spring 2001	1	0 (0)	0	1	0	0	0	1 (100)	0 (0)	0	1		
Total	7	4 (36)	0	11	1	1	0	8 (62)	5 (38)	0	13		
<i>2001<sup>d</sup></i>													
Fall 2001	10	3 (23)	0	13	2	4	1	12 (63)	7 (37)	1	20		
Spring 2002	1	0 (0)	0	1	0	0	0	1 (100)	0 (0)	0	1		
Total	11	3 (21)	0	14	2	4	1	13 (65)	7 (35)	1	21		
<i>2002</i>													
Fall 2002	4	2 (33)	0	6	1	1	0	5 (63)	3 (37)	0	8		
Spring 2003	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0		
Total	4	2 (33)	0	6	1	1	0	5 (63)	3 (37)	0	8		
<i>2003</i>													
Fall 2003	4	2 (33)	0	6	3	0	0	7 (78)	2 (22)	0	9		
Spring 2004	0	1 (100)	0	1	0	0	0	0 (0)	1 (100)	0	1		
Total	4	3 (43)	0	7	3	0	0	7 (70)	3 (30)	0	10		
<i>2004</i>													
Fall 2004	2	3 (60)	0	5	0	0	0	2 (40)	3 (60)	0	5		
Spring 2005	1	0 (0)	0	1	0	0	0	1 (100)	0 (0)	0	1		
Total	3	3 (50)	0	6	0	0	0	3 (50)	3 (50)	0	6		
<i>2005</i>													
Fall 2005	0	2 (100)	0	2	0	1	0	0 (0)	3 (100)	0	3		
Spring 2006	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0		
Total	0	2 (100)	0	2	0	1	0	0 (0)	3 (100)	0	3		
<i>2006</i>													
Fall 2006	4	2 (33)	0	6	0	1	0	4 (57)	3 (43)	0	7		
Spring 2007	1	1 (50)	0	2	0	0	0	1 (50)	1 (50)	0	2		
Total	5	3 (38)	0	8	0	1	0	5 (56)	4 (44)	0	9		

Regulatory year	Reported												
	Hunter kill <sup>b</sup>					Nonhunting kill <sup>c</sup>			Total known kill				
	M	F (%)	Unk	Total	M	F	Unk	M (%)	F (%)	Unk	Total		
<i>2007</i>													
Fall 2007	2	3 (60)	0	5	0	0	0	2 (40)	3 (60)	0	5		
Spring 2008	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0		
Total	2	3 (60)	0	5	0	0	0	2 (40)	3 (60)	0	5		
<i>2008</i>													
Fall 2008	15	8 (35)	0	23	0	0	0	15 (65)	8 (35)	0	23		
Spring 2009	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0		
Total	15	8 (35)	0	23	0	0	0	15 (65)	8 (35)	0	23		
<i>2009<sup>e</sup></i>													
Fall 2009	14	3 (18)	0	17	0	0	0	14 (82)	3 (18)	0	17		
Spring 2010	0	0 (0)	0	0	0	1	0	0 (0)	1 (1)	0	1		
Total	14	3 (18)	0	17	0	1	0	14 (78)	4 (22)	0	18		
<i>2010</i>													
Fall 2010	16	9 (36)	0	25	1	1	0	17 (63)	10 (37)	0	27		
Spring 2011	1	0 (0)	0	1	0	0	0	1 (100)	0 (0)	0	1		
Total	17	9 (36)	0	26	1	1	0	18 (64)	10 (36)	0	28		
<i>2011</i>													
Fall 2011	15	7 (32)	0	22	0	1	0	15 (65)	8 (35)	0	23		
Spring 2012	0	0 (0)	0	0	3 <sup>f</sup>	0	0	3 (100)	0 (0)	0	3		
Total	15	7 (32)	0	22	3 <sup>f</sup>	1	0	18 (69)	8 (31)	0	26		

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

<sup>b</sup> Includes drawing permit harvest.

<sup>c</sup> Includes defense of life or property kills, illegal take, research mortalities, marked bears known to be harvested and not reported, and other known human-caused mortality.

<sup>d</sup> Several bears were taken in defense of life or property in the Prudhoe Bay oil field complex because they were food-conditioned bears and garbage was not properly managed.

<sup>e</sup> Includes 2 bears whose sealing forms were lost; but the information was recorded on the DB987 permit.

<sup>f</sup> Includes bears taken by ADF&G staff during predator control for the Unit 26B Muskox Recovery Program.

Table 5. Unit 26C brown bear human-caused mortality, regulatory years<sup>a</sup> 2000–2011.

Regulatory year	Reported													
	Hunter kill					Nonhunting kill <sup>b</sup>			Total known kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>2000</i>														
Fall 2000	8	4	(33)	0	12	1	0	1	9	(69)	4	(31)	1	14
Spring 2001	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	8	4	(33)	0	12	1	0	1	9	(69)	4	(31)	1	14
<i>2001</i>														
Fall 2001	5	3	(38)	0	8	1	0	0	6	(67)	3	(33)	0	9
Spring 2002	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	5	3	(38)	0	8	1	0	0	6	(67)	3	(33)	0	9
<i>2002</i>														
Fall 2002	4	4	(50)	0	8	0	0	0	4	(50)	4	(50)	0	8
Spring 2003	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	4	4	(50)	0	8	0	0	0	4	(50)	4	(50)	0	8
<i>2003</i>														
Fall 2003	2	4	(67)	0	6	0	0	0	2	(33)	4	(67)	0	6
Spring 2004	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	2	4	(67)	0	6	0	0	0	2	(33)	4	(67)	0	6
<i>2004</i>														
Fall 2004	4	6	(60)	0	10	1	1	0	5	(42)	7	(58)	0	12
Spring 2005	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	4	6	(60)	0	10	1	1	0	5	(42)	7	(58)	0	12
<i>2005</i>														
Fall 2005	5	8	(62)	1	14	1	0	0	6	(43)	8	(57)	1	15
Spring 2006	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	5	8	(62)	1	14	1	0	0	6	(43)	8	(57)	1	15
<i>2006</i>														
Fall 2006	6	3	(33)	0	9	0	0	0	6	(67)	3	(33)	0	9
Spring 2007	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	6	3	(33)	0	9	0	0	0	6	(67)	3	(33)	0	9

Regulatory year	Reported											
	Hunter kill					Nonhunting kill <sup>b</sup>			Total known kill			
	M	F (%)	Unk	Total	M	F	Unk	M (%)	F (%)	Unk	Total	
<i>2007</i>												
Fall 2007	4	7 (64)	0	11	0	0	0	4 (36)	7 (64)	0	11	
Spring 2008	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0	
Total	4	7 (64)	0	11	0	0	0	4 (36)	7 (64)	0	11	
<i>2008</i>												
Fall 2008	7	6 (46)	0	13	0	0	0	7 (54)	6 (46)	0	13	
Spring 2009	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0	
Total	7	6 (46)	0	13	0	0	0	7 (54)	6 (46)	0	13	
<i>2009</i>												
Fall 2009	16	6 (27)	0	22	0	0	0	16 (73)	6 (27)	0	22	
Spring 2010	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0	
Total	16	6 (27)	0	22	0	0	0	16 (73)	6 (27)	0	22	
<i>2010</i>												
Fall 2010	8	7 (47)	0	15	0	0	0	8 (53)	7 (47)	0	15	
Spring 2011	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0	
Total	8	7 (47)	0	15	0	0	0	8 (53)	7 (47)	0	15	
<i>2011</i>												
Fall 2011	10	5 (33)	0	15	0	0	0	10 (67)	5 (33)	0	15	
Spring 2012	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0	
Total	10	5 (33)	0	15	0	0	0	10 (67)	5 (33)	0	15	

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

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

Table 6. Unit 26B brown bear harvest data by permit hunt, regulatory years<sup>a</sup> 2004–2011.

Hunt <sup>b</sup>	Regulatory year	Permits available	Permits issued	Number reported	Did not hunt (%)	Unsuccessful (%)	Successful (%)	Males	Females	Unk	Total harvest
DB987	2008	12	8	8	2 (25)	3 (50)	3 (50)	2	1	0	3
	2009	12	11	11	1 (9)	5 (50)	5 (50)	3	2	0	5
	2010	20	20	20	2 (10)	12 (67)	6 (33)	4	2	0	6
	2011	6	6	6	4 (67)	2 (100)	0 (0)	0	0	0	0
RB988	2011	unlimited	442	439	217 (49)	201 (91)	21 (9)	14	7	0	21
RB989	2010	unlimited	38	34	24 (63)	9 (90)	1 (10)	1	0	0	1
	2011	unlimited	39	39	30 (77)	9 (100)	0 (0)	0	0	0	0
DB990	2004	15	15	12	7 (58)	4 (80)	1 (20)	0	1	0	1
	2005	15	15	15	5 (33)	9 (90)	1 (10)	0	1	0	1
	2006	20	20	19	12 (63)	6 (86)	1 (14)	0	1	0	1
	2007	20	19	19	11 (58)	8 (100)	0 (0)	0	0	0	0
	2008	20	20	20	10 (50)	9 (90)	1 (10)	1	0	0	1
	2009	20	20	20	12 (60)	7 (88)	1 (13)	1	0	0	1

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2004 = 1 July 2004–30 June 2005).

<sup>b</sup> DB987 was a nonresident drawing hunt for all of Unit 26B in regulatory years 2008 through 2010. In regulatory year 2011, DB987 was for that portion of Unit 26B outside the registration permit hunt areas of RB988 and RB989. RB988 and RB989 were resident and nonresident registration hunts for the central portion of Unit 26B with RB989 for the fall season and RB988 for the spring season. RB988 was implemented in the spring of regulatory year 2010. DB990 was a resident drawing hunt within the Dalton Highway corridor management area during regulatory years 2004–2009.

Table 7. Unit 25A residency of successful brown bear hunters, regulatory years<sup>a</sup> 2000–2011.

Regulatory year	Local resident <sup>b</sup> (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
2000	0 (0)	1 (14)	6 (86)	7
2001	0 (0)	6 (50)	6 (50)	12
2002	1 (4)	11 (48)	11 (48)	23
2003	1 (4)	5 (20)	19 (76)	25
2004	0 (0)	12 (50)	12 (50)	24
2005	0 (0)	7 (29)	17 (71)	24
2006	0 (0)	9 (35)	17 (65)	26
2007	0 (0)	12 (48)	13 (52)	25
2008	0 (0)	12 (39)	19 (61)	31
2009	2 (6)	14 (45)	15 (48)	31
2010	0 (0)	6 (26)	17 (74)	23
2011	1 (3)	13 (43)	16 (53)	30

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

<sup>b</sup> Includes only residents of Unit 25A.

Table 8. Units 25B and 25D residency of successful brown bear hunters, regulatory years<sup>a</sup> 2000–2011.

Regulatory year	Local resident <sup>b</sup> (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
2000	1 (100)	0 (0)	0 (0)	1
2001	0 (0)	1 (100)	0 (0)	1
2002	7 (70)	3 (30)	0 (0)	10
2003	1 (100)	0 (0)	0 (0)	1
2004	2 (100)	0 (0)	0 (0)	2
2005	0 (0)	1 (100)	0 (0)	1
2006	1 (25)	3 (75)	0 (0)	4
2007	2 (33)	4 (67)	0 (0)	6
2008	1 (17)	5 (83)	0 (0)	6
2009	0 (0)	6 (100)	0 (0)	6
2010	0 (0)	2 (100)	0 (0)	2
2011	0 (0)	3 (100)	0 (0)	3

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

<sup>b</sup> Includes only residents of Units 25B and 25D.

Table 9. Unit 26B residency of successful brown bear hunters<sup>a</sup>, regulatory years<sup>b</sup> 2000–2011.

Regulatory year	Local resident <sup>c</sup> (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
2000	0 (0)	9 (82)	2 (18)	11
2001	0 (0)	13 (93)	1 (7)	14
2002	0 (0)	6 (100)	0 (0)	6
2003	0 (0)	7 (100)	0 (0)	7
2004	0 (0)	5 (83)	1 (17)	6
2005	0 (0)	2 (100)	0 (0)	2
2006	0 (0)	7 (88)	1 (12)	8
2007	0 (0)	2 (40)	3 (60)	5
2008	0 (0)	20 (87)	3 (13)	23
2009	0 (0)	12 (71)	5 (29)	17
2010	0 (0)	20 (77)	6 (23)	26
2011	0 (0)	16 (73)	6 (27)	22

<sup>a</sup> Includes permit harvest.

<sup>b</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

<sup>c</sup> Includes only residents of Unit 26B.

Table 10. Unit 26C residency of successful brown bear hunters<sup>a</sup>, regulatory years<sup>b</sup> 2000–2011.

Regulatory year	Local <sup>c</sup> resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
2000	0 (0)	5 (38)	8 (62)	13
2001	0 (0)	2 (25)	6 (75)	8
2002	0 (0)	3 (38)	5 (62)	8
2003	0 (0)	3 (50)	3 (50)	6
2004	0 (0)	2 (20)	8 (80)	10
2005	0 (0)	7 (50)	7 (50)	14
2006	0 (0)	4 (44)	5 (56)	9
2007	0 (0)	5 (45)	6 (55)	11
2008	0 (0)	8 (62)	5 (38)	13
2009	3 (14)	10 (45)	9 (41)	22
2010	0 (0)	3 (20)	12 (80)	15
2011	1 (7)	6 (40)	8 (53)	15

<sup>a</sup> Includes permit harvest.

<sup>b</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2000 = 1 July 2000–30 June 2001).

<sup>c</sup> Includes only residents of Unit 26C.

**SPECIES**  
**MANAGEMENT REPORT**

**Alaska Department of Fish and Game**  
**Division of Wildlife Conservation**  
(907) 465-4190 P.O. BOX 115526  
JUNEAU, AK 99811-5526

**BROWN BEAR MANAGEMENT REPORT**

From: 1 July 2010

To: 30 June 2012

**LOCATION**

**GAME MANAGEMENT UNIT:** 26A (56,000 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Western North Slope

**BACKGROUND**

Densities of brown/grizzly bears vary widely in Unit 26A, with densities highest in the foothills of the Brooks Range and lowest in the northern portion of the unit. Bear populations were reduced during the 1960s by hunting, but are currently stable or slowly increasing. Hunters, particularly those from outside the state, have continued to show an interest in hunting bears in Unit 26A. Subsistence hunting regulations allow residents to hunt brown bears primarily for food in Unit 26A.

Population abundance, density, and composition were studied by department staff during the 1980s through 2000s. A population estimate of 900–1,120 brown bears was reported by Reynolds (1989), with 400 bears in Unit 26A West and 500–720 bears in Unit 26A East. In 1992, the western foothills region of the Utukok and Kokolik drainages contained an estimated density of 29.5 bears/1,000 km<sup>2</sup> with a 95% confidence interval of 28.1–31.5 bears/1,000 km<sup>2</sup> (Reynolds unpublished). Based on surveys flown during 2000, 2001, and 2003 in a 20,000 km<sup>2</sup> (8,000 mi<sup>2</sup>) area of eastern Unit 26A, Unit 26B, and western Unit 26C, a density of 18.3 grizzly bears/1,000 km<sup>2</sup> was calculated for areas within 1,500–4,000 feet elevation (Reynolds unpublished; Becker and Quang (2009).

**MANAGEMENT DIRECTION**

**MANAGEMENT GOALS**

- Maintain the existing brown bear population.

**MANAGEMENT OBJECTIVES**

- Maintain a grizzly bear population of approximately 800 bears or greater.
- Monitor the harvest rate of grizzly bears.
- Minimize adverse interactions between grizzly bears and the public.

## METHODS

We used brown bear sealing certificates and reported harvest from the Unit 26A subsistence registration brown bear hunt to determine seasonal harvests. For sealed bears we summarized the date and location of taking, skull sizes, and sex/age composition of harvested animals. We summarized hunting activity by residency of hunters and their methods of transportation. For reporting population estimates and harvest summaries, we divided Unit 26A at 159° W longitude into Unit 26A East and Unit 26A West.

The sealing certificate system has not proven to be an effective method to determine local harvest, so over a decade ago we reviewed several community-based harvest assessment studies to get an insight into local harvest. The department uses those studies, and updates when available, to estimate unreported kill by local residents. (See harvest section below.)

Harvest data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g. RY10 = 1 July 2010–30 June 2011). Harvest during the RY10 and RY11 was monitored through sealing and permit reporting process.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

No population estimate studies were attempted during the reporting period. Based on historical information, bear populations in the Brooks Range declined during the 1960s due to guided hunting (H. Reynolds, ADF&G [retired], personal communication) but have recovered, partially due to permit hunt management initiated in 1977–78 regulatory year (Trent 1989). The drawing permit hunt has since been eliminated, and bear densities appear to be at high levels relative to carrying capacity of the habitat.

#### *Population Composition*

No population composition studies were completed during the reporting period. Previously, Reynolds (1984) reported sex ratios of 40% males and 60% females for bears older than 1 year, and a 50:50 ratio for cubs and yearlings for the population within the western portion of the unit in the Utukok and Kokolik River drainages. Age composition was determined to be: cubs of the year–13%; yearlings–10%; 2-year-olds–14%; 3 and 4-year-olds–11%; and bears over 5 years–52%. Mean age at first reproduction was 8.0 years, mean litter size was 2.0 cubs, mean reproductive interval was 4.0 years, and mean productivity was 0.5 cubs/year. We believe the current sex ratios, composition, and productivity are similar to what Reynolds found.

#### *Distribution and Movements*

No distribution and movement studies were completed during the reporting period. Previously, Carroll (1995) reported densities for habitat zones in Unit 26A at 0.5–2 bears/1,000 km<sup>2</sup> on the coastal plain, 10–30 bears/1,000 km<sup>2</sup> in the foothills, and 10–20 bears/1,000 km<sup>2</sup> in the mountains. The mid-range of these densities was used to yield an estimated total of 1,007 bears, with 81 in the coastal plain, 666 in the foothills, and 260 in the mountains. Judging by hunter and

pilot reports in the mountains and foothills and the increased number of bear encounters on the coastal plain, bear numbers have probably increased in all these areas.

Bear movements vary from a limited home range for some bears to extensive movements for others. One radiocollared male brown bear was videotaped during 2007 killing muskox calves near Prudhoe Bay in May and then was shot near Atqasuk in September, a movement of over 200 miles.

**MORTALITY**

*Harvest*

Season and Bag Limit

RY10 and RY11

Unit and Bag Limits

*Unit 26A General Hunt*

Resident and Nonresident

Hunters:

1 bear every regulatory year.

Resident  
Open Season  
(Subsistence and  
General Hunts)

Nonresident  
Open Season

No closed season

No closed season

*Unit 26A Subsistence Hunt*

Resident Hunters:

1 bear per regulatory year  
by registration permit

No closed season  
(Subsistence hunt only)

Board of Game (BOG) Actions and Emergency Orders. During the fall 2009 meeting, the Board of Game lengthened the seasons for the general brown bear hunt from 1 August–31 May to 1 July –30 June and the season for the subsistence registration brown bear hunt from to 1 July–31 May to 1 July–30 June. During the fall 2011 meeting, the Board passed a brown bear tag fee exemption for Unit 26A. This exemption will take effect during RY12.

Based on previous population data and hunt histories, harvest quotas have been established at 31 bears per year in Unit 26A East and 20 bears in Unit 26A West. If quotas are exceeded during 1 year, the following year quota will be reduced by the amount of overharvest in the first year. If average harvest is exceeded after 2 years, more restrictive regulatory action through emergency orders will be implemented. Since quotas were not reached during the reporting period, no emergency orders were issued. The system depends on open lines of communication among the Department, guides, and hunters.

In each regulatory year of the reporting period the resident brown bear tag fee exemption was reauthorized for subsistence hunts.

Human-Induced Harvest. Eleven bears were reported harvested during RY10. Ten were sealed and 1 was reported harvested under the Unit 26A subsistence registration brown bear hunt. No

bears were reported killed in DLP situations. Two bears were killed in Unit 26A West and 9 were killed in Unit 26A East. Ten bears were taken in fall 2010 and 1 during spring 2011 (Table 1). Nine bears were males, 1 was a female, and 1 was unknown (Table 2).

Twenty two bears were reported harvested during RY11. Seventeen were sealed and 5 were reported harvested under the Unit 26A subsistence registration brown bear hunt. No bears were reported killed in DLP situations. All 22 bears were killed in Unit 26A East. All 22 bears were taken fall 2011 (Table 1). Nineteen bears were males and 3 were females (Table 2).

The reported harvest for RY10 (11 bears) was less than the previous 2 years (20 and 19, respectively), but the harvest for RY11 (22 bears) was greater than any year since 1998. The range of harvest from 1998–2010 was 9–20 bears. However, both years were below the average number of 27.6 harvested from 1988 to 1997 (Carroll 2007), and well below the 5% harvest rate of 45-56 bears (Table 1).

Skull Size and Age. For bears harvested during RY10, the mean skull size for males was 22.0 inches and 19.6 inches for females; the mean age was 9.6 years for males and no ages were recorded for females. During RY11 the mean skull size for males was 20.6 inches and 17.1 for females; the mean age for males was 8.6 years and 6.0 years for females (Table 3).

Permit Hunts. Drawing permit hunts were discontinued by board action as of the RY96. One bear was taken under the subsistence permit hunt in RY10 and 5 were taken in RY11.

Hunter Residency and Success. The reported harvest of bears in Unit 26A during RY10 was 5 taken by nonresidents, 4 by nonlocal Alaska residents, and 2 by local North Slope residents. During RY11, 9 bears were reported harvested by nonresidents, 7 by nonlocal Alaska residents, and 6 by local residents (Table 4).

Harvest Chronology. During RY10, 7 bears were harvested during August, 3 in September, and 1 in June. During RY11, 14 bears were reported harvested in August, 5 in September, and 3 in October (Table 5).

Transport Methods. Most bear hunters continued to use aircraft as transportation in Unit 26A. During RY10, 7 hunters used aircraft, 3 used boats, and 1 walked. During RY11, 15 hunters used aircraft, 1 used a boat, 2 used snow machines, 3 used ORVs, and 1 was unknown (Table 6).

The sealing certificate system has not proven to be an effective method to determine actual local harvest. For example, Fuller and George (1997) reported that in 1992 local residents harvested at least 9–10 bears whereas sealing certificates indicated a reported local harvest of 3 bears. We reviewed the results of North Slope Borough (NSB), ADF&G, and other community-based harvest assessment studies to get an indication of local harvest. We determined that the number of unreported bears harvested per year was approximately 6–12 bears (Braund et al. 1991, 1993; Brower and Opie 1996, 1997; Fuller and George 1997; Hepa et al. 1997; Pedersen 1989, 1995, 2001). These numbers are reflected in the unreported estimated kill column on Table 2.

### *Other Mortality*

No recent estimate of natural mortality for grizzly bears in Unit 26A is available. However, Reynolds and Hechtel (1983) reported mortality rates among offspring accompanied by marked adult females in the western Brooks Range to be 44% for cubs, 9% for yearlings, and 14% for 2-year-olds from 1977 to 1981.

## **HABITAT**

### *Assessment*

Most of the brown bear habitat in Unit 26A remains undisturbed and supports a fairly large population of bears. It would be difficult to evaluate many of the food sources for brown bears in Unit 26A, such as herbivorous forage and ground squirrels. Caribou represent a large food resource available to bears for at least part of the year. Changing moose numbers on the Colville River drainage may affect bear numbers.

Potential hazards to brown bear habitat include oil, gas, and mineral exploration and development. Exploration is currently underway in Unit 26A, including areas within the foothills on the north side of the Brooks Range.

Some areas in Unit 26A, particularly some east/west-oriented ridges, are used much more heavily than the surrounding area by brown bears for at least part of the year (H. Reynolds, ADF&G [retired], personal communication). These areas should be given special consideration in resource development planning efforts.

### *Enhancement*

No habitat enhancement activities were completed in Unit 26A during the reporting period.

## **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

We have been engaged in several programs designed to minimize negative interactions between people and brown/grizzly bears. We participated in radio talk shows, produced written public notices, and spoke at public meetings to provide educational materials to local people. We have helped write and commented on Environmental Impact Statements, Integrated Activity Plans, and other documents to minimize impacts on brown bears during exploration and development projects on the North Slope. We have worked with exploration and development companies on how to minimize their impact on bears and on how to deal with bears in their work camps.

Brown bears breaking into cabins of local residents has become a serious issue and we have worked with people to develop a system of electrified bear fencing that could be used to protect remote cabins. We provided fencing for a cabin, where bears had broken in for 3 consecutive years. The cabin owner reported that no bears have broken into his cabin for the last 2 spring/summer seasons, since we applied the fencing, even though there was evidence that bears had approached his cabin.

## **CONCLUSIONS AND RECOMMENDATIONS**

During the last 4 years hunters have reported 20, 19, 11, and 22 bears harvested. Three of these years have been slightly greater than any year since 1998. The range 1998–2008 was 9–18 bears.

However, all 4 years were below the average number of 27.6 harvested from 1988 to 1997 (Carroll 2007) and well below the 5% harvest rate of 45–56 bears. Even if unreported harvest is as high as 100% of the reported harvest, the total estimated yearly harvest would still be well within safe harvest limits.

Historically, unreported harvest and noncompliance with bear hunting regulations has been related to bears causing damage at remote cabins or other human/bear conflicts. With hunting seasons increased to 12 months per year, tag fee waivers, and subsistence regulations coinciding with local hunting practices, we anticipate improved harvest reporting and compliance. Increased use of electric fencing to protect remote camps and cabins from nuisance bears should continue to be promoted as a way to reduce nonhunting kills and unreported harvest.

Since 1996, the Board of Game has liberalized bear regulations in Unit 26A several times by lengthening seasons, increasing bag limits, and removing drawing permit requirements. It has been surprising that since 1996 the bear harvest continues to be less than before the regulations were liberalized. This can be partially explained by a reduction in the number of guided moose hunters who would have secondarily harvested bears. Because the harvest remains well below the allowable sustained yield of approximately 51 bears, we recommended that the tag fee be eliminated for the general season hunt to provide more opportunity for hunters and so that Unit 26A regulations are aligned with surrounding game management units. The BOG passed the proposal at its fall 2011 meeting. We recommend no further regulation changes at this time.

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Table 1. Estimated population size and reported harvest of brown/grizzly bears in Unit 26A by unit and season, RY00–RY11<sup>a</sup>.

Population and harvest	Number of brown bears per area			Hunter harvest	
	26A West <sup>b</sup>	26A East	Total	Fall	Spring
Estimated population	400	500-720	900-1120		
5% Harvest Rate	20	25-36	45-56		
<u>Regulatory year harvest</u>					
RY00	6	12	18	16	2
RY01	0	13	13	13	0
RY02	4	10	14	12	2
RY03	4	12	16	14	2
RY04	0	15	15	15	0
RY05	0	2	2	2	0
RY06	3	10	13	11	2
RY07	3	6	9	8	1
RY08	3	17	20	17	3
RY09	3	16	19	15	4
RY10	2	9	11	10	1
RY11	0	22	22	22	0

<sup>a</sup> Figures for 1988–1999 available in Carroll (2007).

<sup>b</sup> West of 159° West longitude.

Table 2. Unit 26A brown bear harvest by sex, RY00–RY11<sup>a</sup>.

Regulatory year	Hunter harvest					Non- hunting kill <sup>b</sup>	Total	Un- reported est. kill	Total est. kill	
	M	(%)	F	(%)	Unk.					Total
2000-2001	14	(78)	4	(22)		18	0	18	6–12	24–30
2001–2002	10	(77)	3	(23)		13	0	13	6–12	19–25
2002–2003	10	(71)	4	(29)		14	0	14	6–12	20–26
2003–2004	12	(75)	4	(25)		16	0	16	6–12	22–28
2004–2005	11	(73)	4	(27)		15	0	15	6–12	21–27
2005–2006	2	(100)	0	(0)		2	0	2	6–12	8–14
2006–2007	9	(69)	4	(31)		13	0	13	6–12	18–25
2007–2008	6	(67)	3	(33)		9	0	9	6–12	15–21
2008-2009	14	(70)	6	(30)		20	0	20	6–12	26-32
2009-2010	13	(68)	6	(32)		19	0	19	6-12	24-31
2010-2011	9	(90)	1	(10)	1	11	0	11	6-12	17-23
2011-2012	19	(82)	3	(18)		22	0	22	6-12	28-34

<sup>a</sup> Figures for 1985–1999 available in Carroll (2007)

Table 3. Unit 26A brown bear skull size and age, RY00–RY11<sup>a</sup>.

Regulatory year	Mean skull size, inches				Mean age, years			
	Male	<i>N</i>	Female	<i>N</i>	Male	<i>N</i>	Female	<i>N</i>
RY00	21.9	14	20.8	4	11.0	14	9.0	4
RY01	21.0	10	18.7	3	9.4	10	5.3	3
RY02	20.8	10	18.5	4	6.8	10	10	4
RY03	21.6	12	19.3	4	10.4	12	7.8	4
RY04	21.1	10	19.2	4	9.9	10	7.5	4
RY05	23.5	2	-	0	19	2	-	0
RY06	20.3	9	20.4	4	8.7	9	8	4
RY07	22.1	6	19.5	3	13.3	5	9.7	3
RY08	22.7	12	20.1	6	13.5	12	11.2	6
RY09	20.3	10	19.5	5	6.7	10	6.4	5
RY10	22.0	8	19.6	1	9.6	8		0
RY11	20.6	14	17.1	3	8.6	14	6.0	3

<sup>a</sup> Figures for 1985–1999 available in Carroll (2007)

Table 4. Unit 26A brown bear successful hunter residency, RY00–RY11<sup>a</sup>.

Regulatory year	Local resident <sup>b</sup>	Nonlocal resident	Nonresident	Unknown	Total hunters
RY00	3	3	12	0	18
RY01	0	4	9	0	13
RY02	0	6	8	0	14
RY03	1	6	9	0	16
RY04	0	6	9	0	15
RY05	0	1	1	0	2
RY06	0	3	10	0	13
RY07	1	5	3	0	9
RY08	6	6	8	0	20
RY09	4	8	7	0	19
RY10	2	4	5	0	11
RY11	6	7	9	0	22

<sup>a</sup> Figures for 1985–1999 available in Carroll (2007).

<sup>b</sup> Local means North Slope residents.

Table 5. Unit 26A brown bear harvest chronology by time period, RY00–RY11<sup>a</sup>.

Regulatory year	July	Aug	Sep	Oct	Nov	Apr	May	June	<i>N</i>
RY00		10	6	0	0	0	2	0	18
RY01		7	6	0	0	0	0	0	13
RY02		6	6	0	0	1	1	0	14
RY03		7	6	0	0	0	3	0	16
RY04		8	7	0	0	0	0	0	15
RY05		1	1	0	0	0	0	0	2
RY06		8	3	0	0	0	2	0	13
RY07		5	3	0	0	0	1	0	9
RY08		8	8	1	0	2	1	0	20
RY09	2	11	3	0	0	1	2	0	19
RY10		7	3	0	0	0	0	1	11
RY11		14	5	3	0	0	0	0	22

<sup>a</sup> Data for 1985–1999 available in Carroll (2007).

Table 6. Unit 26A brown bear harvest percent by transport method, RY00–RY11<sup>a</sup>.

Regulatory year	Transport method for brown bear harvest												Total <i>n</i>		
	<u>Airplane</u>		<u>Horse</u>		<u>Boat</u>		<u>Snowmachine</u>		<u>ORV</u>		<u>Walk</u>			<u>Unknown</u>	
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)		<i>n</i>	(%)
RY00	15	(83)			1	(6)	1	(6)			1	(5)			18
RY01	13	(100)													13
RY02	12	(86)					1	(7)			1	(7)			14
RY03	12	(75)							1	(6)	2	(13)	1	(6)	16
RY04	12	(80)			3	(20)									15
RY05	2	(100)													2
RY06	13	(100)													13
RY07	6	(67)							2	(22)	1	(11)			9
RY08	14	(70)			5	(25)	1	(5)							20
RY09	14	(74)			3	(16)	1	(5)			1	(5)			19
RY10	7	(64)			3	(27)					1	(9)			11
RY11	15	(68)			1	(4.5)	2	(9)	3	(14)			1	(4.5)	22

<sup>a</sup> Data for 1985–1999 available in Carroll (2007).

