

Brown Bear Management Report

**of survey-inventory activities
1 July 2008–30 June 2010**

**Patricia Harper, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation**



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**Funded through
Federal Aid in Wildlife Restoration
Grants W-33-7 and W-33-8, Project 4.0
2011 Set**

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Cover Photo: A northeast Chichagof Island brown bear feeds on grass and equisetum. To address brown bear user conflicts in the area, the Board of Game set up a special management team in 1998 of 15 members representing consumptive and nonconsumptive user groups. The team recommended a strategy that has helped guide brown bear management on the island, which is in Game Management Unit 4. ©2012 ADF&G, *photo by Neil Barten.*

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If this report is used in its entirety, please reference as: Alaska Department of Fish and Game. 2011. Brown bear management report of survey-inventory activities 1 July 2008–30 June 2010. P. Harper, editor. Juneau, Alaska.

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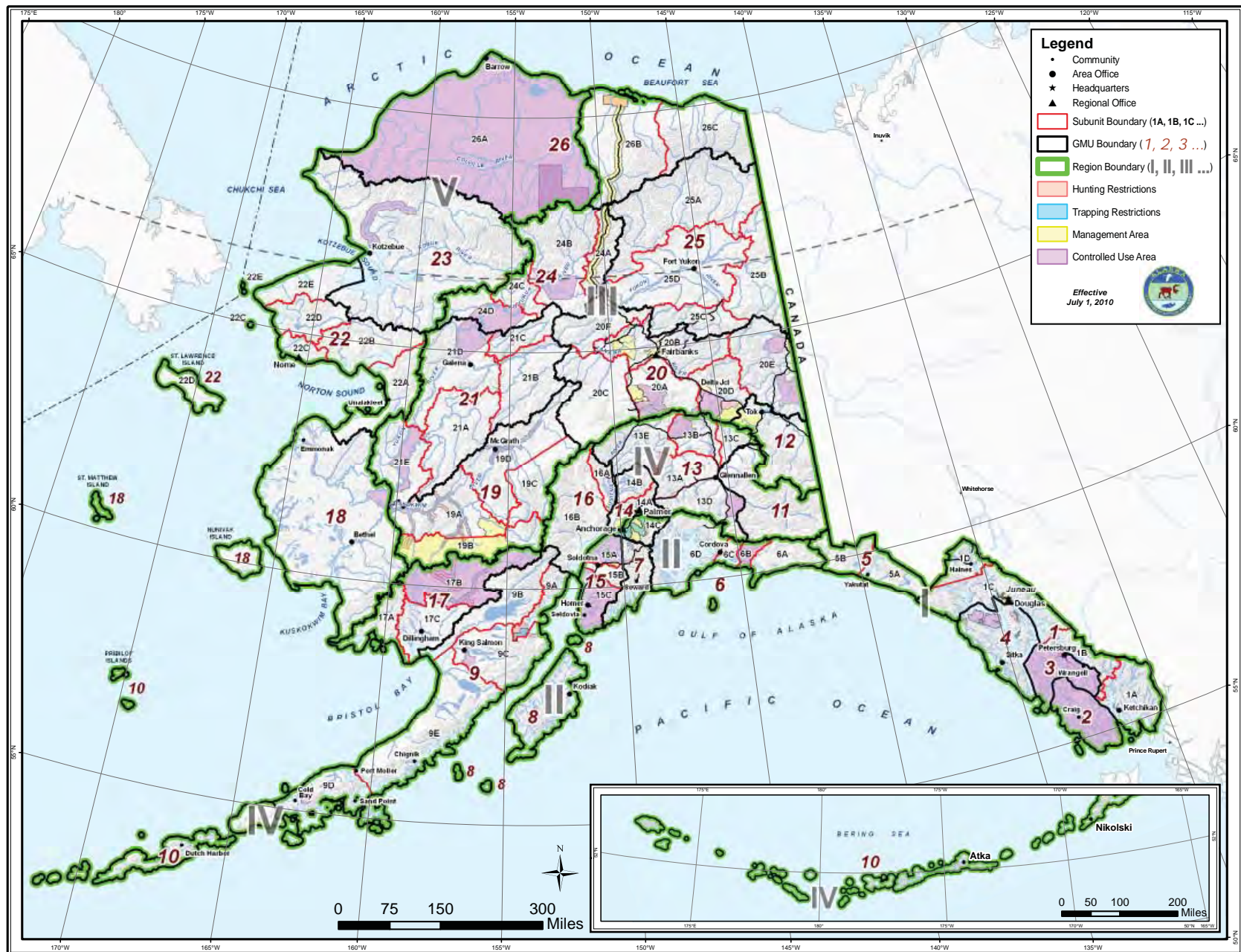
BROWN BEAR MANAGEMENT REPORT

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To: 30 June 2010

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**WILDLIFE
MANAGEMENT REPORT**

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

From: 1 July 2008
To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 1 (18,500 mi²)

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 45% 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 28% in Unit 1A (Ketchikan area), 12% in Unit 1B (Petersburg area), and 15% 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 four 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 Fiords National Monument within the Tongass on the southern 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 unsuccessful hunt and/or kill locations. We also collect brown bear harvest data through a mandatory sealing program. During sealing we record the sex of harvested bears, along with the hunt date and kill location. We also measure bear skulls and extract a premolar tooth. At the end of each season, we send all extracted premolars to Matson's Laboratory (Bozeman, Montana, USA) for 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. RY08 = 1 July 2008–30 June 2009.

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 have estimated the Bradfield Canal brown bear population at approximately 48 bears (95% CI 45–58). Given a sampled area of 1,094 km², the density of Bradfield Canal brown bears in the late summer would be about 44 bears/1000 km² with a 95% CI 41–53 bears/1000 km² (Flynn et al. 2006). The Unuk River brown bear population is estimated to be approximately 45 bears (95% CI 30–60; in 2007). Given a sampled area of 877 km², the density of Unuk River brown bears in the late summer would be about 51 bears/1000 km² with a 95% CI 34–68 bears/1000 km² (Flynn unpublished data). In Berners Bay the population is estimated to be approximately 60 bears (95% CI 46.5–96.4) (Flynn et al. 2007). These estimates are preliminary and will be refined after further analysis. 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 in the area south of the Taku River on down to Endicott Arm. With continuing mainland research we hope to more accurately estimate populations throughout the region.

MORTALITY

Harvest

Season and Bag Limit

1 bear every 4 regulatory years
by registration permit only

Resident and Nonresident Hunters

15 Sep–31 Dec
15 Mar–31 May

Board of Game Actions and Emergency Orders. No regulatory changes were made 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 46% and 43% of the take during RY08 and RY09 respectively. During RY08 the proportion of bears killed by subunit (1A, 1B, 1C, and 1D) was 24%, 11%, 19%, and 46%. During RY09 it was 32%, 14%, 11%, and 43% respectively. The Unit 1 12-year mean harvest percentage by subunit (1A–1D) is 25%, 19%, 16%, and 44%, respectively (Table 1).

The Unit 1A harvests during RY08–RY09 were 9 and 12 bears, respectively, which is similar to the 12-year mean annual harvest of 8 bears for this subunit.

The Unit 1B harvests during RY08–RY09 were 4 and 5 bears respectively, which is similar to the long-term 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 1994 and 2009. 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 RY08–RY09 were 7 and 4 bears respectively, which is similar to the 12-year 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 RY08–RY09 was 17 and 16 bears, respectively. Again, this is similar to the 12-year 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. The total of 33 bears for

this reporting period in this unit is the highest since RY98 when 33 bears were also harvested and is the only period in the last 12 years where the GHL was met or exceeded in both regulatory years. Unit 1D managers will continue to monitor the harvest level in Unit 1D to ensure future sustainability. Specifically, the harvest sex ratio and age structure will be monitored closely.

During this reporting period the spring harvest accounted for 62% of the bears taken; 38% of bears were harvested in the fall (Table 2). Over the past 12 years, the spring season has produced more bears (59%) than the fall season (41%) (Table 7). During this same period, females represented 39% of fall-harvested bears, but only 20% of the spring-harvested bears. This is likely due to the fact that in spring, a portion of the female bears are accompanied by cubs and therefore not legal for harvest. Some of these same bears will be separating from their cubs during the summer months, and therefore will be alone by the fall season and available for harvest.

The mean male skull size of harvested bears across Unit 1 during RY08 (\bar{x} = 22.3, n = 30) was identical to the long-term mean of 22.3 inches; the RY09 skull size (\bar{x} = 22.7, n = 26) is also similar to the long term average. Skull sizes in both years of this reporting period are substantially lower than that of the year previous to this reporting period (RY2007) where we noted a skull size of 23.5 inches which is 1.2 inches greater than the long term average, and quite an anomaly. The average female skull sizes during RY08 (\bar{x} = 19.2, n = 10) and RY09 (\bar{x} = 19.5, n = 12) are both well below the long term average of 20.2 inches and are some of the lowest skull sizes in recent years. This could represent a change in the female portion of the bear population. Unit 1 managers will continue to actively monitor this parameter (Table 3).

Mean ages of harvested male bears in RY08 (5.7 years, n = 30), and RY09 (8.6 years, n = 24) bracket the long-term average of 7.5 years. The RY08 average is the lowest in the last 12 years and the RY09 average is the highest since 2001. Our management objective of at least 6.5 years of age was not met in RY08. However, when combined with the high of 2009 the average age is 7.0. Mean female age was 6.9 years (n = 12) in RY08, and 8.2 years (n = 10) in RY09. Female ages for RY08 were near the 12-year mean (7.2). The RY09 mean age of 8.2 years was much higher than the 12-year mean, which is interesting considering that the skull sizes for females were slightly below average for this reporting period. Managers would have expected skull sizes for 2009 to be closer to the long term average (Table 3). 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 this however.

Permit Hunts. Registration permits have been required for Unit 1 brown bear hunters since fall 1989. During the 2008 and 2009 regulatory years, 426 and 432 registration permits were issued respectively, with 44% of the permittees actually going hunting (Tables 4 & 5). 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 nonreporting a misdemeanor offense. In addition, nonreporting hunters lose their opportunity to participate in any permit (registration, drawing, tier II) hunt for all species, statewide, during the following regulatory year. The combination of a possible citation and losing permit hunt privileges appears to be providing the impetus to hunters to report

their hunting information in a timely and accurate manner. Hunters failing to report after receiving the initial reminder letter are subject to failure to report (FTR) penalties and may be issued a citation by Alaska Wildlife Troopers. During this reporting period only 4 and 3 hunters respectively failed to report after receiving a reminder letter and were placed on the failure to report list (FTR). As there are often late reports, information presented in tables 4 and 5 is subject to revision as additional information is received.

Hunter Success and Residency. Of the 194 permittees who hunted during RY08 only 16% were successful in harvesting a bear, while in RY09 a total of 186 hunters went afield with 13% success (Tables 4 and 5). 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 RY08 (426) and RY09 (432) were much higher than the previous 10-year average of 330 permits (Tables 4 & 5). 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 RY08 and RY09, nonresidents harvested 20 and 19 bears, respectively. The nonresident hunter harvest was slightly higher than the 10-year average (1998–2007) of 18 bears. Success rates were 54% and 51%, during RY08 and RY09 respectively. Local residents of Unit 1 enjoyed success rates of 43% during both years of this reporting period; high relative to non-local residents' success rates of just 3% and 5% respectively (Table 6).

Successful hunters spent 5.4 days to harvest a bear during RY08 and 3.9 days in RY09, compared to the previous 10-year average of 4.4 days (range 1–15 days). Combining all successful hunters across the unit, a total of 196 days was spent hunting during the RY08 season and a total of 146 days during the RY09 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 indicates that spring hunters are more successful than those hunting in fall (59% and 41%, respectively). During RY08 and RY09, 59% and 65% 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 10–27), with September/October the second highest harvest period (\bar{x} = 12, range 4–20). September has historically seen slightly higher harvests than October (7 vs. 4.5), however, during this reporting period October had a slightly higher harvest. Together these 3 months account for almost all of the Unit 1 brown bear harvest. During this reporting period, May accounted for 43 of 74 bears harvested and September/October accounted for 22 bears for percentages of 58 and 30 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 78% of the reported transport

methods for successful brown bear hunters. Highway vehicles (11%), off-road vehicles (8%), and airplanes (3%) 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, 9 bears were reported as non-hunter kills, including 4 males and 5 female bears. Four bears were killed under DLP regulations, 2 were poached illegally and 3 were research mortalities. Non-hunting brown bear mortalities are incorporated into the overall management of the Unit 1 brown bear population and can impact 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 44 bears in RY08 and 39 bears in RY09.

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 non-hunting 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. In addition to an increase in bear viewing, Connelly Lake in the Chilkoot River drainage is being investigated for hydroelectric potential. Another hydroelectric project near Hyder in the Portland Canal is underway with construction beginning summer of 2010. 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 cause concern.

In 2004, department research staff initiated a mainland brown bear research project at Bradfield Canal near Petersburg, AK. The project goals included documenting basic demographics, seasonal movements, habitat selection, and trans-boundary movement of bears (Flynn et al. 2006). In spring 2006 a similar project was initiated in response to the possible construction of the Juneau Access Road (Flynn et al. 2007). Researchers collared bears with global positioning system (GPS) collars. These collars provide spatial and temporal movement data for brown bears in these areas. Home range information for individual bears is determined through analysis of collar locations. Researchers also took DNA samples from captured bears as well as from hair follicles collected in hair traps strategically placed in close proximity to salmon spawning streams. Bear movement distances were calculated via capture, hair-snare and telemetry data. GPS location data will be used to calculate bear densities in the study area. Preliminary data

indicate extensive trans-boundary (between Alaska and Canada) movement along the Unuk River corridor; and extensive use of proposed road corridor areas in Berners Bay.

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 is 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. 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 selecting males over females. However, we did not meet our objective of reducing the number of bears killed because of human food conditioning.

During the current report period 9 bears were killed under either DLP regulations, as research mortalities, or killed illegally. 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 Pt. Couverdon on the west side of Lynn Canal. Subsequent management reports will include refined population data for Bradfield Canal and 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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Please cite any information taken from this section, and reference as:

Bethune, S. 2011. Unit 1 brown bear management report. Pages 1-18 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Unit 1 brown bear harvest, by subunit, 1998–2009^a.

Regulatory	Unit 1A		Unit 1B		Unit 1C		Unit 1D		Total
Year	harvest	% of total	harvest	% of total	harvest	% of total	harvest	% of total	harvest
1998	6	(17)	7	(20)	4	(11)	18	(52)	35
1999	13	(33)	6	(15)	6	(15)	15	(37)	40
2000	4	(12)	9	(26)	5	(15)	16	(47)	34
2001	5	(18)	9	(32)	2	(7)	12	(43)	28
2002	3	(13)	7	(30)	2	(9)	11	(48)	23
2003	12	(33)	6	(17)	6	(17)	12	(33)	36
2004	6	(26)	4	(17)	6	(26)	7	(31)	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
\bar{x}	8	(23)	6	(19)	5	(15)	14	(43)	32

^a Does not include DLP kills, research mortalities, illegal harvests, or other human-caused accidental mortalities.

Table 2. Unit 1 brown bear mortality, by season, 1998–2009.

Regulatory Year	Reported										
	Hunter Kill				Nonhunting Kill ^a			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	(86)	(14)	0	22	2	0	0	(92)	(8)	0	24
Total	(63)	(37)	0	35	3	2	0	(65)	(35)	0	40
Fall 1999	(80)	(20)	0	20	2	2	0	(75)	(25)	0	24
Spring 2000	(35)	(65)	0	20	2	0	0	(41)	(59)	0	22
Total	(58)	(42)	0	40	4	2	0	(58)	(42)	0	46
Fall 2000	(42)	(58)	0	19	3	2	0	(46)	(54)	0	24
Spring 2001	(71)	(29)	0	17	1	0	0	(72)	(28)	0	18
Total	(57)	(43)	0	36	4	2	0	(57)	(43)	0	42
Fall 2001	(41)	(59)	0	17	0	1	0	(39)	(61)	0	18
Spring 2002	(82)	(18)	0	11	0	0	0	(82)	(18)	0	11
Total	(61)	(39)	0	28	0	1	0	(60)	(40)	0	29
Fall 2002	(60)	(40)	0	10	0	0	0	(60)	(40)	0	10
Spring 2003	(69)	(31)	0	13	4	1	0	(76)	(24)	0	18
Total	(65)	(35)	0	23	4	1	0	(70)	(30)	0	28
Fall 2003	(64)	(36)	0	11	1	1	0	(62)	(38)	0	13
Spring 2004	(80)	(20)	0	25	0	0	0	(80)	(20)	0	25
Total	(75)	(25)	0	36	1	1	0	(74)	(26)	0	38
Fall 2004	(75)	(25)	0	4	2	0	1	(83)	(14)	1	7
Spring 2005	(89)	(11)	0	19	1	0	0	(90)	(10)	0	20
Total	(87)	(13)	0	23	3	0	1	(88)	(12)	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 ^a			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	1	0	(78)	(22)	0	28
Total	(74)	(26)	0	35	1	3	0	(69)	(31)	0	39
Fall 2007	(75)	(25)	0	8	2	0	0	(80)	(20)	0	10
Spring 2008	(88)	(12)	0	17	0	1	0	(85)	(15)	0	18
Total	(84)	(16)	0	25	2	1	0	(83)	(17)	0	28
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

^a Includes DLP and illegal harvests, research mortalities, natural mortalities, and other known human-caused accidental mortalities.

Table 3. Unit 1 age and skull size of harvested brown bears, 1998–2009.

Regulatory Year	Mean skull size ^a				Mean age ^b			
	Male	Nr	Female	Nr	Male	Nr	Female	Nr
1998	22.8	24	19.7	13	7.9	24	5.4	10
1999	21.7	26	19.4	16	8.2	17	6.4	14
2000	21.7	21	20.8	16	6.1	20	6.2	9
2001	22.6	15	20.1	13	9.8	10	9.4	10
2002	22.1	15	20.9	7	7.3	10	3.1	3
2003	21.3	26	20.7	9	7.0	20	7.1	9
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	22.3	30	19.2	10	5.7	30	6.9	12
2009	22.7	26	19.5	12	8.6	24	8.2	10
\bar{x}	22.3	23	20.2	10	7.5	20	7.2	8

^a Skull size equals length plus zygomatic width.

^b Determined through successful analyses of extracted premolar teeth. Some samples are not viable for aging.

Table 4. Unit 1A, 1B, 1C brown bear registration permit hunt data, 1998-2009 ^a.

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	95	27	68	(30)	4	4	0	8
RB062	2004	105	38	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	(15)	2	3	0	5
RB062	2009	134	41	93	(5)	1	1	0	2
(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	116	63	50	(22)	13	1	0	14
RB072	2004	129	78	49	(17)	12	1	0	13
RB072	2005	111	56	55	(18)	9	1	0	10
RB072	2006	134	72	60	(26)	15	4	0	19
RB072	2007	143	73	69	(19)	12	2	0	14
RB072	2008	187	94	70	(11)	8	2	0	10
RB072	2009	190	89	99	(8)	5	2	0	7

^a Includes Unit 1D for regulatory years 1998–2002.

Table 5. Unit 1D fall and spring registration and drawing hunt^a permits by regulatory year, 2003–2009.

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
DB052	2004	11	5	6	(20)	1	0	0	1
RB050	2003	54	33	21	(9)	2	1	0	3
RB050	2004	57	26	28	(0)	0	0	0	0
RB050	2005	49	24	25	(25)	3	3	0	6
RB050	2006	58	37	21	(16)	4	2	0	6
RB050	2007	63	41	22	(15)	4	2	0	6
RB050	2008	62	37	23	(24)	6	3	0	9
RB050	2009	67	29	36	(28)	6	2	0	8
(Spring)									
DB053	2003	13	10	3	(80)	5	3	0	8
DB053	2004	8	7	1	(71)	4	0	1	5
RB051	2003	34	21	13	(5)	1	0	0	1
RB051	2004	28	17	10	(0)	0	0	0	0
RB051	2005	41	27	14	(37)	7	3	0	10
RB051	2006	39	25	13	(32)	7	1	0	8
RB051	2007	35	18	17	(17)	3	0	0	3
RB051	2008	44	29	15	(28)	8	0	0	8
RB051	2009	41	27	14	(30)	6	2	0	8

^a Drawing permit hunt during 2003–2004 only.

Table 6. Unit 1 successful brown bear hunters, by residency, 1998–2009.

Regulatory Year	Local Resident ^a (%)	Nonlocal Resident (%)	Nonresident (%)	Unknown (%)	Total Successful Hunters
1998	(37)	(23)	(40)	(0)	35
1999	(25)	(12)	(63)	(0)	40
2000	(34)	(9)	(57)	(0)	34
2001	(7)	(4)	(69)	(21)	28
2002	(9)	(14)	(77)	(0)	23
2003	(37)	(3)	(60)	(0)	36
2004	(39)	(0)	(61)	(0)	23
2005	(40)	(7)	(53)	(0)	30
2006	(49)	(8)	(43)	(0)	35
2007	(36)	(8)	(56)	(0)	25
2008	(43)	(3)	(54)	(0)	37
2009	(43)	(5)	(51)	(0)	37

^a Local residents are those hunters who reside in Unit 1.

Table 7. Unit 1 brown bear harvest, by season, 1998–2009.

Regulatory Year	Fall		Spring	
	Harvest	Percent of Total	Harvest	Percent of Total
1998	13	(37)	22	(63)
1999	20	(50)	20	(50)
2000	19	(53)	17	(47)
2001	17	(61)	11	(39)
2002	13	(57)	10	(43)
2003	11	(31)	24	(69)
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)
\bar{x}	13	(39)	19	(61)

Table 8. Unit 1 brown bear harvest, by month, 1998–2009.

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	0	20	0	40
2000	17	3	0	0	2	13	0	35
2001	7	9	1	0	1	10	0	28
2002	8	2	0	0	0	13	0	23
2003	8	3	2	0	0	23	0	36
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 ^a
2009	4	7	2	0	0	24	0	37

^a Includes 1 bear harvested in December

Table 9. Unit 1 successful brown bear hunter transport methods, 1998-2009.

Regulatory Year	Percent of Hunters						Nr Successful <u>Hunter</u>
	Airplane	Boat	Walk	ORV	Highway Vehicle	Other/ Unknown	
1998	(0)	(83)	(3)	(0)	(14)	(0)	35
1999	(8)	(72)	(0)	(0)	(20)	(0)	40
2000	(3)	(77)	(0)	(0)	(17)	(3)	35
2001	(15)	(68)	(0)	(3)	(11)	(3)	28
2002	(0)	(77)	(0)	(0)	(23)	(0)	23
2003	(0)	(86)	(0)	(0)	(14)	(0)	36
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

WILDLIFE
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 2008

To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 3 (3,000 mi²)

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. While 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 Unit's 1A, 1B, 3, and British Columbia, Canada.

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 Mar–31 May

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

Hunter Harvest. Registration permits are required for Unit 3 brown bear hunters. During RY08 25 registration permits were issued. Nine (36%) of those permittees reported going afield to hunt brown bear and none were successful. During RY09 25 registration permits were issued. Eleven (44%) of those permittees reported going afield to hunt brown bear and none were successful. (Tables 1, 2, and 3).

Hunter Success and Residency. The Unit 3 brown bear hunt is closed to nonresidents. For the 2008 spring hunt, 7 of the 9 hunters who actually took to the field were local residents of Unit 3. In 2009, 7 of the 11 hunters that took to the field were local residents of Unit 3. None of those who took to the field in 2008 and 2009 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 9 hunters who took to the field in RY08, 6 reported using boats to access hunting areas, and 3 reported using a highway vehicle. Of the 11 hunters who took to the field in RY09, 8 reported using boats to access hunting areas, 2 reported using a highway vehicle, and 1 failed to indicate the method of transportation.

Other Mortality

Since 1978 there have been 5 reported instances of Unit 3 brown bears having been killed in defense of life and property. In the most recent instance, a female was killed by a Forest Service Law Enforcement Officer in April 2003 after the nonfatal mauling of a boy staying at a Wilderness Youth Camp on Deer Island. Anecdotal reports suggest that other 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.

ADF&G recently completed a brown bear research project on the Unit 1A (Unuk River) and 1B (Bradfield Canal) mainland designed to investigate the abundance, spatial relationships, and transboundary movements of brown bears along a portion of the mainland coast in Southeast Alaska. Prior to this study no research had been directed at brown bears inhabiting the Southeast Alaska mainland. The specific objectives of the study were as follows:

- 1) To estimate the number of brown bears in a portion of the mainland coast during late summer;
- 2) To determine seasonal movements and spatial relationships of brown bears along a portion of the mainland coast;
- 3) To determine seasonal habitat selection of brown bears in a portion of the mainland coast and compare the results to other populations in Southeast Alaska; and
- 4) To determine transboundary movement of brown bears.

We used a single-catch hair snares (Beier et al. 2005) to collect bear hair along salmon streams to estimate bear populations within the drainages of Bradfield Canal and the Unuk River. Our objective was to estimate brown bear population size in 2 areas of the southern mainland coast of Southeast Alaska.

We estimated bear abundance in the Bradfield Canal area during 2005 and 2006 using a DNA-based, capture-mark-recapture (CMR) approach. We identified individual brown bears during capture sessions based on microsatellite genotyping. We focused on stream segments with evidence of spawning salmon and with suitable conditions for bears to capture fish. We set snares in late July or early August and checked them 3 times during August. Genetic analysis of the samples identified 21 unique brown bears in 2005 and 37 unique bears during 2006 in the Bradfield Canal, for a total of 49 unique bears. In 2005 we estimated the population size for the Bradfield Canal area to be 30 brown bears (95% CI = 27 – 38; 8 males, 95% CI = 8 – 15; 21 females, 95% CI = 19 – 28). In 2006 we estimated the population to be 48 brown bears (95% CI = 45 – 58; 14 males, 95% CI = 13 – 21; 34 females, 95% CI = 31 – 43). Given a sampled area of 1,094 km², the density of brown bears in the late summer would be about 27 bears/1000 km² with a 95% CI = 25 – 35 bears/1000 km² in 2005 and 44 bears/1000 km² with a 95% CI = 41 – 53 bears/1000 km² in 2006 (Flynn et al. 2010).

From 2004 to 2008 the department captured and radiocollared a total of 13 brown bears (5 males, 8 females) within the Bradfield Canal drainage. We deployed GPS-equipped radio collars (3rd generation, store-on-board; Telonics Models TGW-3600 and TGW-3700 - GPS/SOB/D, Telonics, Mesa, AZ) on all captured bears except cubs, and obtained adequate location data (i.e., > 1,000 locations each animal) for 11 adult brown bears (5 males, 6 females).

We found that brown bears on the southern mainland coast had substantially greater movements, spent more time at lower elevations and had substantially larger home range size than brown bears on Admiralty, Baranof and Chichagof islands. One large male bear travelled from the Bradfield Canal area to the Stikine River and back. This bear also swam across Eastern Passage to Wrangell Island. These larger movements make the bears more vulnerable to exploitation and disturbance.

Most of the brown bears in the study used estuary and beach fringe habitats during the spring and fall hunting seasons. Although home range areas are large, the bears still seek out the estuaries and beach areas during the late spring and fall. Also, the research found substantial transboundary movement by bears.

CONCLUSIONS AND RECOMMENDATIONS

Most brown bear hunting in Unit 3 probably is incidental to other outdoor activities. Some hunters who obtain a brown bear registration permit probably do so only on the slim 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 bears have been taken on the island. 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.

Because most of the brown bears in the recent Unit 1 research project used 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 are similar in their habitat use to Unit 1 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 and increased human-bear interactions 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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Please cite any information taken from this section, and reference as:

Lowell, R. 2011. Unit 3 brown bear management report. Pages 19–27 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Unit 3 brown bear harvest, 2004-2009^a.

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

^a Includes all reported human-caused mortalities

Table 2. Unit 3 age and skull size of harvested brown bears, 2004–2009.

Regulatory year	Mean skull size ^a				Mean age ^b			
	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

^a Skull size equals length plus zygomatic width

^b Determined through analyses of extracted premolar teeth

Table 3. Unit 3 brown bear registration permit hunt data, 2004–2009.

Season/ hunt nr (Spring)	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bear harvest			
						Males (%)	Females (%)	Unknown	Total
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

Table 4. Unit 3 successful brown bear hunters, by residency, 2004–2009.

Regulatory year	Local Resident ^a (%)	Nonlocal resident (%)	Nonresident (%)	Unknown	Total successful hunters
2004	N/A	N/A	N/A	N/A	N/A
2005	(100)	(0)	N/A	0	1
2006	(100)	(0)	N/A	0	1
2007	(50)	(50)	N/A	0	2
2008	(0)	(0)	N/A	(0)	(0)
2009	(0)	(0)	N/A	(0)	(0)

^a Local residents are those hunters who reside in Unit 3

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: Unit 4 (5,820 mi²)
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 more than 5,429 bears from the unit in all categories of human-caused mortality (hunting, defense of life and property, public safety, vehicle collisions, and research). However, 93% (5,041 bears) of these records reflect hunter harvest. (ADF&G 2010)

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 used to publish a report, *Southeast Alaska Unit 4 Brown Bear Management Strategy* (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).

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. 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 sent 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. Preliminary data has indicated the bear moved in and out of the closed area during seasonal periods. We plan to deploy several more GPS collars over 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 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/mi² 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 clear cut 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 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 2008–2010, almost no carcasses were available due to very low winter kill. Also salmon runs in streams on northeast Chichagof Island during the summers of 2008 and 2010 were minimal and many bears dispersed to other areas of the island in search of food. 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 small, and it is likely 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 2008–2009 harvest by hunters was 75% males ($n = 124$) and 25% females ($n = 42$). The 2009–2010 harvest was 85% males ($n = 136$) and 15% females ($n = 24$). Wounding loss reported by hunters is accounted for in these regulatory years from direct reporting. Unknown sex of bears in wounding loss defaults to the more sensitive female harvest category. Table 1 displays sex, wounding loss, and non hunting 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. Additional data will be retrieved this year.

Collar data from both 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 cubs had to be euthanized. The second sow was killed illegally 26 days after being captured. Her 3 cubs were placed at the Fortress of the Bear facility in Sitka.

A female bear with 2 cubs was fitted with a GPS radio collar at Port Armstrong, southern Baranof Island during the fall of 2010 as part of the research conducted with electronic control devices. We will retrieve the collar data in the fall of 2011.

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	Sep 15–Dec 31 Mar 15–May 31
1 bear every 4 regulatory years by registration permit only	
Unit 4, that portion within the Northeast Chichagof Controlled Use Area	Sep 15–Dec 31 Mar 15–May 20
1 bear every 4 regulatory years by registration permit only	

Remainder of Unit 4:

Sep 15–Dec 31

Mar 15–May 20

One bear every 4 regulatory years by registration permit only

Board of Game Actions and Emergency 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. No emergency orders were issued as part of management actions.

Hunter Harvest and Other Mortality: *Regulatory Year (RY) (A regulatory year begins 1 July and ends 30 June; e.g. RY 2008 = 1 July 2008–30 June 2009):*

RY 2008: Hunters harvested 35 brown bears in fall 2008 and another 130 in spring 2009. The total for the year was 166 bears, including 11 bears from reported wounding loss. An additional 8 bears are known to have died from nonhunting situations, bringing the year's total to 174 bears. This resulted in a three-year mean of 152 bears. More than 90% of the spring harvest occurred in the last 20 days of May.

RY 2009: Hunters took 32 bears in fall 2009 and 128 in spring 2010. Hunter harvest accounted for 160 bears including 6 bears from reported wounding loss, an additional 18 bears are known to have died from nonhunting situations, bringing the year's total combined mortality to 178 bears. The 3-year mean annual human-caused mortality rose to 172, well above 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 all factors have not been analyzed for the influence to that change. Ages and skull sizes for Baranof and Chichagof islands are comparable to Admiralty Island data.

Hunter Residency and Success: 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.

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 2008–2009 nonlocal Alaska hunters and nonresidents harvested 88% of the bears. In 2009–2010 nonlocal Alaskans and nonresidents took 89% of the bears. For this reporting period, the largest percentage increase (7%) has been in nonlocal resident harvest and a 2% increase in local resident harvest. Nonresident harvest has declined 4% over the last 2 years. Part of the decline has been attributed to the world-wide economic downturn affecting many businesses and disposable income.

Spring and fall hunting effort is presented in Table 4. In fall 2008, 73 Alaska residents hunted a total of 235 days, and 55 nonresidents spent 216 days afield. In fall 2009, 57 residents hunted 184 days and 50 nonresidents hunted 216 days.

Spring seasons produced a larger harvest (Table 1) and greater hunting pressure (Table 4). In spring 2009, 155 residents hunted 421 days and 163 nonresidents hunted 677 days. In spring 2010, 119 residents hunted 444 days and 156 nonresidents hunted 658 days. Over the last 5 years, fall seasons produced an average of one bear for every 3.5 hunt days, and spring seasons produced one bear for every 10.4 days. This rose to a combined total of 16 hunt days per fall bear in 2008 and 2009. Spring effort in 2009 dropped to 8 days per bear and then slightly increased to 9 days per bear in spring 2010.

Harvest Chronology: 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 harvest is characteristically composed of a high percentage (~40%) of female bears (Table 1). During this report period, we experienced a female harvest of around 30%, a decline likely due to very poor weather conditions. High female harvest in the fall remains a management concern and may require changes in the fall season to maintain the guideline harvest.

A much higher number and percentage of male bears (~88%) 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 tend to have longer hair than in the fall making for a better trophy hide. The greatest number of bears are available to hunters late in the spring season because nearly all bears have left their dens to seek food. 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.

Transport Methods: Unit 4 bear hunters overwhelmingly used boats as the most common form of transportation (Table 6). In 2008–2009, 94% of successful hunters used boats. In 2009–2010, successful hunters used boats 93% of the time. Aircraft are the second most important means of hunter transport but were used by only 4% of successful hunters in 2008–2009 and by 6% of successful hunters in the 2009–2010 season.

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 previously habituated to humans. 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 remains without trash receptacles that are, at a minimum, bear resistant, primarily because of the cost to replace 3,500 cans. This resulted in a loss of 12 bears around the community during the reporting period. Included in this total are those bears killed as DLPs, illegally shot, euthanized, and cubs transferred to zoos and other facilities. The other major increase in DLP incidents can be attributed to the unsecured landfills of Angoon on Admiralty Island and Hoonah on Chichagof Island.

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. Regional staff assisted in educational programs directed at school children using college student volunteers to present programs. In the summer of 2007, 3 brown bear cubs were orphaned and captured on Killisnoo Island. The 2 surviving cubs entered a permitted facility in Sitka (Fortress of the Bear) where area school children have been able to witness a number of educational programs involving bear behavior and safety through demonstrations with the cubs. 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, along with others, help to provide a sense of ownership in the bear’s welfare around communities where food conditioning puts them at risk.

Three additional cubs, orphaned when the sow was killed by hazing efforts in Sitka during 2009, were placed in the Bronx Zoo in New York. Last year another 3 cubs, orphaned when the sow was killed illegally in Sitka, were placed in the Fortress of the Bear facility in Sitka.

In 2008–2009, 8 nonhunting mortalities were formally reported (Table 1) and 18 occurred in 2009–2010. 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 2006, 1,166 visitors (both guided and unguided) were recorded at PCCMA. In summer 2007 the number of visitors declined to 1,101, dropping further to 1,043 visitors in 2008. The downward trend continued in 2009 with 805 visitors and fell again in 2010 to 711 visitors (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), but the PCCMA area remains the premier spot for 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 (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 was 3:1.5 in 2008–2009 and 3:0.96 in 2009–2010, meeting the management objective of no more than 3:2. The 3-year (RY's 2006–2008) mean annual human-caused mortality was 152 bears and did not exceed the guideline of 166 bears. However, the 3-year (RY's 2007–2009) mean annual human-caused mortality was 172 bears and did 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 - mortality levels (Table 2) near or at the conservative 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 RY 2009 and was close to exceeding it RY 2007 (Table 2). While it is easy to target these categories as the primary cause, the overall upward trend in mortality has been consistent across all categories. Continuing increases in hunter harvest, DLPs, illegal kills, and wounding loss may make it 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 to reverse the trend of increasing bear kills 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 only have had 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 for reductions through attrition. 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

DWC staff contributed significantly to the Unit 4 brown bear management program. The following deserve specific mention: Doug Larsen, Rod Flynn, Neil Barten, LaVern Beier, Steve Lewis, Tom Paul, Kristen Romanof, Chad Rice, and Kim Titus. Holley Dennison, at the Sitka Area office, contributed to editing and data compilation of this report. Additional management support came from the Department of Public Safety, Alaska Wildlife Troopers, especially from Lt. Todd Sharp, Lt. Steven Hall, Troopers Tim Hall, Kyle Carson, and Andy Savland. The Sitka Police Department and Village Public Safety Officer Charles Hartzell in Angoon also provided support.

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

Mooney, P.W. 2011. Unit 4 brown bear management report. Pages 28–47 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Unit 4 brown bear harvest and nonhunting mortality, regulatory years 2005–2009.

Regulatory year	<u>Hunter kill</u>					<u>Nonhunting mortality^a</u>				Total Reported
	M	F	(%F)	Unk	Total	M	F	Unk	Total	
<u>2005</u>										
Fall 2005	21	19	(48)	0	40	3	2	1	6	46
Spring 06	68	9	(12)	0	77	0	3	0	3	80
Total	89	28	(24)	0	117	3	5	1	9	126
<u>2006</u>										
Fall 2006	19	16	(46)	0	35	6	3	1	10	45
Spring 07	69	5	(7)	0	74	0	0	0	0	74
Total	88	21	(19)	0	109	6	3	1	10	119
<u>2007</u>										
Fall 2007	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 2008	24	10	(29)	1	35	4	1	0	5	40
Spring09	100	21	(16)	10	131	3	0	0	3	134
Total	124	31	(19)	11	166	7	1	0	8	174
<u>2009</u>										
Fall 2009	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

^a Includes DLP kills, illegal kills, wounding loss, research mortalities, and other known human-caused accidental mortality.

Info from sealing certificates – Winfo 04/14/11. Natural mortality NOT included, since this is not a human-related mortality.

Table 2. Unit 4 brown bear hunting pressure ^a and hunter harvest ^b by major geographic areas, regulatory years 2005–2009.

Hunt area	Regulatory Year	# hunters	M	(%) ^c	F	(%) ^c	Unknown	(%) ^d	Total harvest	Percent estimated population ^e
<u>Northeast Chichagof Island ^f</u>										<u>354*</u>
	2005–06	31	7	(88)	1	(13)	0		8	(2.3)
	2006-07	26	4	(50)	4	(50)	0		8	(2.3)
	2007-08	38	11	(79)	3	(21)	0		14	(4.0)
	2008-09	32	9	(69)	4	(31)	0		13	(3.7)
	2009-10	27	7	(70)	3	(30)	0		10	(2.8)
<u>Remainder of Chichagof Island</u>										<u>1,196*</u>
	2005–06	157	32	(76)	10	(24)	0		42	(3.5)
	2006-07	159	25	(83)	5	(17)	0		30	(2.5)
	2007-08	161	43	(84)	8	(16)	0		51	(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)
<u>Baranof and Kruzof Islands</u>										<u>1,045*</u>
	2005–06	110	22	(79)	6	(21)	0		28	(2.7)
	2006-07	132	24	(77)	7	(23)	0		31	(3.0)
	2007-08	101	26	(90)	3	(10)	0		29	(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)
<u>Admiralty Island</u>										<u>1,560*</u>
	2005–06	145	28	(72)	11	(28)	0		39	(2.5)
	2006-07	142	35	(88)	5	(13)	0		40	(2.6)
	2007-08	132	47	(82)	10	(18)	0		57	(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)

Table 2 continues next page

Table 2. continued.

Hunt area	Regulatory year	# hunters	M	(%) ^c	F	(%) ^c	Unknown	(%) ^d	Total harvest	Percent estimated population ^e
<u>Unit 4 Totals</u>										<u>4,155*</u>
	2005–06 ^g	463	89	(76)	28	(24)	0		117	(2.8)
	2006-07 ^h	467	88	(81)	21	(19)	0		109	(2.6)
	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)

^a Registration permit data.^b Bear sealing data.^c Percentage based on known sex bears.^d Percentage based on total bears.^e Estimated populations: NE Chichagof Island, 354 bears; remainder of Chichagof Island, 1,196; Baranof and Kruzof Islands, 1045 bears; Admiralty Island, 1,560 bears; all Unit 4, 4,155 bears.^f X35 only.

*guideline population estimate

^g Total includes 20 hunters who didn't report location of hunt^h Total includes 8 hunters who didn't report location of hunt

Table 3. Unit 4 brown bear successful hunter residency, regulatory years 2005–2009.

Regulatory year	Local resident ^a	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
2005–06	15	(13)	14	(12)	88	(75)	117
2006-07	12	(11)	21	(19)	76	(70)	109
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

^a Resident of Unit 4.

Hunt kill ONLY. Other kill types NOT included.

From bear sealing certs – Winfo 04/14/11

Table 4. Unit 4 hunting effort by island, by residency, regulatory years 2005–2009.

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 2005	Fall 2005	22	14	36	68	70	138	12	12
	Spring 2006	61	48	109	205	256	461	27	17
RY 2006	Fall 2006	21	39	60	99	269	368	10	37
	Spring 2007	36	46	82	117	281	398	30	13
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
<u>Baranof</u>									
RY 2005	Fall 2005	32	16	48	72	66	138	13	11
	Spring 2006	36	26	62	106	95	201	15	13
RY 2006	Fall 2006	41	23	64	118	83	201	12	17
	Spring 2007	27	41	68	59	132	191	19	10
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

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 2005	Fall 2005	29	31	60	102	103	205	15	14
	Spring 2006	47	81	128	130	371	501	35	14
RY 2006	Fall 2006	24	36	60	78	123	201	13	15
	Spring 2007	50	75	125	153	325	478	25	19
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
<u>Unit 4 Totals</u>									
RY 2005 ^a	Fall 2005	83	61	144	242	239	481	40	12
	Spring 2006	144	155	299	441	722	1163	77	15
RY 2006 ^b	Fall 2006	86	98	184	295	475	770	35	22
	Spring 2007	113	162	275	329	738	1067	74	14
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

^a 20 hunt reports missing information, not included in totals.^b 8 hunt reports missing information, not included in totals.

Table 5. Unit 4 brown bear harvest chronology, regulatory years 2005–2009^a.

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	
2005–06	14	15	7	0	2	0	1	0	1	0	0	40
2006-07	14	9	7	0	3	1	1	0	0	0	0	35
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

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	
2005–06	0	0	1	17	43	16	77	117
2006-07	1	0	4	9	48	12	74	109
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

^a Includes all hunts.

Table 6. Unit 4 brown bear harvest by transport method, 2005–2006 through 2009–2010.

Regulatory year	Airplane	Boat	Walked	Off- road vehicle	Highway vehicle	Unknown
2005-06	2	114	0	0	1	0
2006-07	12	93	3	0	0	1
2007-08	12	138	0	1	0	0
2008-09	7	156	3	0	0	0
2009-10	10	149	0	1	0	0

Hunt kill ONLY, other kill types NOT included. From sealing certs – Winfo 04/14/11.

WILDLIFE
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 2008

To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 5 (5,800 mi²)

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. The subunits also vary. 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, non-hunter 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 84 bears. Approximately 82% of the hunter harvested bears were from Unit 5A, and 18% from Unit 5B. Although hunters from around Alaska hunt bears in Unit 5, the majority of the harvest is by guided nonresident hunters, who have harvested 78% of brown bears over the last 10 years. Between 2001 and 2009, an average of 34 nonresidents hunted brown bears annually.

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 unit 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.² and .2 bears/mi.² for units 5A and 5B respectively (Miller 1993). These density estimates were derived by managers after considering brown bear densities in areas with density estimates (Admiralty & Chichagof Islands), and then comparing the available habitat, and the quality of the area available to brown bears in Unit 5.

Data gathered from sealing certificates, incidental observations, and hunter interviews indicate no notable changes in the population. 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, but during the previous report period (RY06–RY07) the total brown bear mortality returned to pre-2003 levels, with 37 and 27 bears killed. (A regulatory year runs from 1 July through 30 June; e.g. RY 2004 ran from 1 July 2004–30 June 2005). During this report period 41 bears were killed in RY08 and 28 bears in RY09. The high mortality level in 2008 included 3 DLP kills.

MORTALITY

Harvest

Season and Bag Limit

1 bear every 4
regulatory years

Resident and Nonresident Hunters

1 Sep–31 May

Board of Game Actions and Emergency Orders. No Board of Game actions or emergency orders associated with Unit 5 brown bears occurred during this report period.

Hunter Harvest. The Unit 5 brown bear harvest has stabilized at 30–35 bears per year since the early 1990s, when for 2 consecutive years 40 or more bears were taken. Bear harvests from 1961 until the early 1990s consistently increased. Since 1990, the annual average harvest has been about 33 bears (range 22–41), with a mean annual harvest during the current report period of 30 bears. The mean male age increased from the 1970s (5.8 years) to the 1980s (7.0 years), but dropped to a mean of 6.3 years for 1990 through 1999. Since then the mean age of males has ranged between 6.1–9.3 years of age.

During RY08, 24 males and 14 females were reported taken (Table 1). Males composed 63% of the harvest, which achieves our management objective of 60%. The mean male skull size of 23.7 inches is nearly the same as the previous 8-year (RY00–RY07) average of 23.6 inches. The average male age (8.9 years) is older than the mean age of bears in the previous report period (7.7 years) and the previous 8-year mean age of 7.0 years. The number of days required to take a brown bear in RY08 was equal to the previous 8-year average of 4.5 days/bear.

In RY09, Unit 5 hunters killed 19 male and 8 female brown bears (Table 1). Males composed 70% of the harvest, which again achieves our management objective of 60%. Mean male skull size was 23.7 inches, and the mean age was 10.2 years. The average male skull size is similar to the long-term mean (23.6); and the mean male age is significantly higher than previous report periods. In RY09, hunters took 4.1 days to harvest a bear, just slightly below RY08.

Harvest Chronology. Since 2000, the majority of Unit 5 brown bears have been taken during the fall (58%). During the report period 44 bears (68%) were harvested during the fall season, and 21 bears (32%) were taken in spring (Table 2). The months of September and May produce the highest harvest for their respective seasons; between 2000 and 2009, 115 bears were taken in September and 97 were taken in May.

Hunter Residency and Success. Nonresident hunters took 66% and 56% of the brown bears in RY08 and RY09, 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 29% of the brown bears during the report period; the same group took only 15% of the bears in the previous report period. Unit 5 residents have taken 2–6 bears annually over the last 10 years, and took 4 and 2 brown bears, respectively, during RY08 and RY09.

Transport Methods. Transportation types used in successful brown bear hunts during this report period included airplanes (46%), boats (25%), off road vehicles (22%), and highway vehicles (8%) (Table 4).

Other Mortality

This category includes DLP kills, illegal kills, road kills, and nuisance bear kills. During RY08 3 bears were killed under DLP regulations (Table 5). Two of the DLP bears were killed in urban settings, were habituated and food conditioned; 1 bear was killed in the field. In RY09 only 1 bear was killed under DLP regulations. The bear was killed in town by a Yakutat police officer.

The Yakutat landfill has been the focus of concern for non-hunting 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 non-hunting situations.

Douglas Area ADF&G staff continue 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. A long planned electric fence around the dump will be in place in the near future, and the department will discuss addressing bears that continue to use the landfill and urban areas near the landfill, with the community, and public safety agencies. Additional insight into the behavior of bears displaced from the landfill will be gathered through a radiocollaring project initiated in RY09 at the Yakutat landfill. In late summer and early fall 2009, 4 bears were collared to gather information on habitat selection and movement patterns (ADFG, unpublished data). Information from collars programmed to release after a short interval (2 weeks) suggests bears are not dependent on the landfill and move extensively on the Yakutat forelands in search of food.

HABITAT

Assessment and Enhancement

We did not conduct any habitat assessment studies or enhancement projects during this report period. The department has begun 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 both management objectives, male to female harvest ratio of at least 3:2 and average age of 6.5 yrs. for harvested male bears, during RY 09, and were only slightly below the male to female harvest objective in RY08. Male bears comprised 63% of the harvest in RY08 and 70% of the harvest in RY09. The average age for hunter-harvested male bears was 7.8 yrs. in RY08, and 10.2 yrs. in RY09. The high percentage of male bears in the hunter harvest, the consistent number of days required to harvest a bear, and a stable long term harvest age structure 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 RY09 and managers will monitor the age data very closely to look for patterns or trends that might shed 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. Non-hunter harvest remains a concern, specifically 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. 2010). Data from GPS equipped radio-collars will provide habitat selection and movement pattern data. While a DNA based brown bear population estimate is not planned, GPS equipped radio-collar 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. However, without additional population information managers are unable to support any increase in harvest. Miller (1993) estimated brown bear density at .5 bears/mi² in Unit 5A, and at .2 bears/mi² in Unit 5B and managers believed the population was stable or decreasing at the time. The Unit 5A density estimate is the highest in mainland Southeast Alaska. The current population is unknown but appears to be able to support the current level of mortality.

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

Scott, R. 2011. Unit 5 brown bear management report. Pages 48–55 in P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Unit 5 brown bear harvest, age, skull sizes, and effort, RY 2000 through RY 2009.

Regulatory year	<u>Harvest</u>				<u>Mean age</u>		<u>Mean skull size</u>		<u>Avg days/kill</u>	
	M	F	Unk	Total	M	F	M	F	M	F
2000	25	8	0	33	7.0	6.3	23.9	20.4	4.5	6.1
2001	18	11	0	29	6.4	8.8	23.0	20.5	3.5	3.5
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
Mean 2008-2009	21.5	11.0	0	32.5	8.9	7.0	23.7	20.5	4.3	4.7
2000-2007	21.8	7.6	0	29.4	7.5	7.0	23.6	21.0	4.5	4.5

Table 2. Unit 5 brown bear harvest chronology, RY 2000 through RY 2009.

Regulatory Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
2000	0	0	17	3	0	0	0	0	0	3	10	0	33
2001	0	0	14	1	1	0	0	0	0	3	10	0	29
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

Table 3. Unit 5 successful brown bear hunter residency, RY 2000 through RY 2009.

Regulatory year	Unit resident	(%)	Other AK. resident	(%)	Nonresident	(%)
2000						
Fall 2000	3	(15)	3	(15)	14	(70)
Spring 2001	0	(0)	0	(0)	13	(100)
Total	3	(9)	3	(9)	27	(82)
2001						
Fall 2001	2	(13)	5	(31)	9	(56)
Spring 2002	4	(31)	0	(0)	9	(69)
Total	6	(21)	5	(17)	18	(62)
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)

Table 4. Unit 5 transport modes used by successful brown bear hunters, RY 2000 through 2009.

Regulatory year	Plane	(%)	Boat	(%)	ORV/4- wheeler	(%)	Highway vehicle	(%)	Foot	(%)	Other	(%)
2000	5	(15)	18	(55)	7	(21)	3	(9)	0	(0)	0	(0)
2001	15	(52)	9	(31)	1	(3)	4	(14)	0	(0)	0	(0)
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)

Table 5. Unit 5 brown bear mortality by type, RY 2000 through 2009.

Regulatory Year	DLP	Unknown/ Natural	Vehicle Collision	Illegal kill	Other	Hunter Kill	Total Mortality
2000	1	0	0	0	0	33	34
2001	2	0	0	2	0	29	33
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
Mean							
2008- 2009	2.0	0	0	0	0	32.5	34.5
Mean							
2000- 2007	3.9	.4	.3	.4	0	29.4	34.3

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008

To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 6 (10,140 mi²)

GEOGRAPHIC DESCRIPTION: Prince William Sound and North Gulf Coast

BACKGROUND

Brown bears inhabit most of Unit 6, with the exception of the 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 1992–1993. Average annual kill during regulatory years 1961–1962 through 1986–1987 was 32 bears (range = 14–63). During 1987–1988 through 1991–1992, the average yearly harvest was 50 bears (range = 40–60). Most of the increased harvest was in Unit 6D, 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 1992–1993 through 2002–2003. The average annual harvest from 2003 – 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 VanDaele 1989). The Exxon Valdez Oil Spill

(EVOS) Trustee Council acquired or protected most lands scheduled for timber harvest in Unit 6D, thus removing the threat of continued, large-scale habitat loss in Prince William Sound (PWS).

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Maintain a brown bear population capable of sustaining a minimum annual harvest of 35 bears, to include a minimum of 60% males 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 nonglaciaded 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. 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 estimated illegal kill. 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 km²) that included Kodiak Island, much of the Alaska Peninsula, and parts of Southeast Alaska. Montague Island had a medium density (40–175 bears/1000 km²) consistent with contiguous coastal habitat to the southeast and with the northern Alaska Peninsula.

MORTALITY

Harvest

Season and Bag Limit. The 2008 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–30 November to residents only 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. The Board extended the brown bear season, beginning in 2009, to June 10 for Units 6A – 6C, and to a split season of October 15 – December 31 and April 1 – May 25 for Montague Island.

Hunter Harvest. Reported harvests during 2008–2009 and 2009–2010 for Unit 6 were 65 and 69, respectively (Table 2). In each year, most bears were harvested in units 6A (15 and 26 bears), or 6D (25 and 24 bears). The reported harvests for Montague Island were 4 and 6 during the 2 years of the reporting period.

During the reporting period females made up 32% and 30% of the reported kill in each of the years, respectively (Table 2). Mean skull size among males was 24 inches, similar to mean skull size during the past 5 years. (Table 3). Female skull size remained unchanged at 21 inches. Average age of males and females was relatively stable during the reporting period (Table 3).

Hunter Residency. Nonresidents harvested the majority of brown bears in Unit 6 during 2008–2009 (51%) and 2009–2010 (61%) (Table 4). Nonresident harvest was most prevalent in Unit 6A. Local residents had the lowest harvest. These were typical harvest rates for brown bears.

Harvest Chronology. Peak brown bear harvests typically occurred during September and May during the reporting period (Table 5).

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 3 bears killed in defense of life or property during 2008–2009 and 7 during 2009–2010 (Table 2). This was unusually high and occurred when a sow with 2 cubs were killed each year, 1 set in Cordova (Unit 6C) and one near a cabin in Jack Bay (6D). Estimated illegal kill totaled 10 bears per year.

CONCLUSIONS AND RECOMMENDATIONS

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

Brown bear numbers were 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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Please cite any information taken from this section, and reference as:

Crowley, D.W. 2011. Unit 6. Pages 56–68 in P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

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 index		Estimated population	Harvest quota		Reported	
		tracks	dens	bear		$[(t/2)+d+b]/mi$	Obs/hr		Tota bear	Female age >2	Tota bear	Females age >2
Hinchinbroo 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
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

^aMidpoint of range estimate (+/- 30%)

Table 2. Unit 6 brown bear harvest, 2005–2009.

	Regulatory year	Reported								Estimated						
		Hunter kill					Nonhunting kill			illegal kill	Total estimated kill					
		M	F	(%)	Unk	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6A	6A/Fall 05	10	1	(9)	0	11	1	1	0	1	11	(85)	2	(15)	1	14
	Spring 06	3	0	(0)	0	3	0	0	0	1	3	(100)	0	(0)	1	4
	6A/Total	13	1	(7)	0	14	1	1	0	2	14	(88)	2	(13)	2	18
	6A/Fall 06	11	3	(21)	0	14	0	1	0	2	11	(73)	4	(27)	2	17
	Spring 07	7	0	(0)	0	7	0	0	0	1	7	(100)	0	(0)	1	8
	6A/Total	18	3	(14)	0	21	0	1	0	3	18	(82)	4	(18)	3	25
	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
	6A/Total	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
	6A/Total	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
	6A/Total	18	8	(31)	0	26	0	0	1	3	18	(69)	8	(31)	4	30
6B	6B/Fall 05	4	1	(20)	0	5	0	0	0	1	4	(80)	1	(20)	1	6
	Spring 06	2	1	(33)	0	3	0	0	0	0	2	(67)	1	(33)	0	3
	6B/Total	6	2	(25)	0	8	0	0	0	1	6	(75)	2	(25)	1	9
	6B/Fall 06	2	1	(33)	0	3	0	0	0	2	2	(67)	1	(33)	2	5
	Spring 07	6	1	(14)	0	7	0	0	0	1	6	(86)	1	(14)	1	8
	6B/Total	8	2	(20)	0	10	0	0	0	3	8	(80)	2	(20)	3	13
	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
	6B/Total	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
	6B/Total	10	5	(33)	0	15	0	0	0	2	10	(67)	5	(33)	2	17

Table 2. continued.

Unit	Regulatory year	Reported								Estimated						
		Hunter kill					Nonhunting kill			illegal kill	Total estimated kill					
		M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6B	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
	6B/Total	4	5	(56)	0	9	0	0	0	2	4	(44)	5	(56)	2	11
6C	6C/Fall 05	2	2	(50)	0	4	0	0	0	1	2	(50)	2	(50)	1	5
	Spring 06	2	0	(0)	0	2	0	0	0	0	2	(100)	0	(0)	0	2
	6C/Total	4	2	(33)	0	6	0	0	0	1	4	(67)	2	(33)	1	7
	6C/Fall 06	1	3	(75)	0	4	0	0	0	1	1	(25)	3	(75)	1	5
	Spring 07	2	0	(0)	0	2	0	0	0	0	2	(100)	0	(0)	0	2
	6C/Total	3	3	(50)	0	6	0	0	0	1	3	(50)	3	(50)	1	7
	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
	6C/Total	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
	6C/Total	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
	6C/Total	7	3	(30)	0	10	0	0	0	1	7	(70)	3	(30)	1	11
6D	6D/Fall 05	2	0	(0)	0	2	0	0	0	4	2	(100)	0	(0)	4	6
	Spring 06	11	6	(35)	0	17	0	1	0	1	11	(61)	7	(39)	1	19
	6D/Total	13	6	(32)	0	19	0	1	0	5	13	(65)	7	(35)	5	25
	6D/Fall 06	7	0	(0)	0	7	0	2	0	2	7	(78)	2	(22)	2	11
	Spring 07	13	3	(19)	0	16	0	0	0	1	13	(81)	3	(19)	1	17
	6D/Total	20	3	(13)	0	23	0	2	0	3	20	(80)	5	(20)	3	28
	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
	6D/Total	14	4	(22)	0	18	0	1	0	4	14	(74)	5	(26)	4	23

Table 2. Continued.

Unit	Regulatory year	Reported					Estimated									
		Hunter kill					Nonhunting kill			illegal kill	Total estimated kill					
		M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6D	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
	6D/Total	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
	6D/Total	19	5	(21)	0	24	3	3	0	4	22	(73)	8	(27)	4	34
TOTALS																
	Fall 05	18	4	(18)	0	22	1	1	0	7	19	(79)	5	(21)	7	31
	Spring 06	18	7	(28)	0	25	0	1	0	2	18	(69)	8	(31)	2	28
	Total	36	11	(23)	0	47	1	2	0	9	37	(74)	13	(26)	9	59
	Fall 06	22	7	(24)	0	29	0	3	0	7	22	(69)	10	(31)	7	39
	Spring 07	28	4	(13)	0	32	0	0	0	3	28	(88)	4	(13)	3	35
	Total	50	11	(18)	0	61	0	3	0	10	50	(78)	14	(22)	10	74
	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
	Total	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
	Total	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
	Total	48	21	(30)	0	69	3	3	1	10	51	(68)	24	(32)	11	86

Table 3. Unit 6 brown bear mean skull size and age, 2005–2009.

Unit	Year	Males				Females			
		Skull size	<i>n</i>	Age	<i>n</i>	Skull size	<i>n</i>	Age	<i>n</i>
6A	2005–2006	24	11	6	13	20	1	2	1
	2006–2007	25	17	7	18	19	3	6	3
	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
6B	2005–2006	23	6	6	6	22	2	6	2
	2006–2007	25	7	7	8	24	2	22	2
	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
6C	2005–2006	24	4	8	4	23	2	7	2
	2006–2007	22	3	6	3	20	3	4	3
	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
6D	2005–2006	24	13	7	13	21	6	6	6
	2006–2007	23	19	6	20	22	3	12	3
	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
Unit 6 Average	2005–2006	24	34	6	36	21	11	6	11
	2006–2007	24	46	6	49	21	11	10	11
	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

Table 4. Unit 6 brown bear successful hunter residency, 2005–2009.

Unit	Regulatory year	Local ^a resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Residency unknown	(%)	Total Successful hunters
6A	2005–2006	1	(7)	2	(14)	11	(79)	0	(0)	14
	2006–2007	1	(5)	4	(19)	16	(76)	0	(0)	21
	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
6B	2005–2006	1	(7)	2	(14)	11	(79)	0	(0)	14
	2006–2007	1	(5)	4	(19)	16	(76)	0	(0)	21
	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
6C	2005–2006	1	(17)	1	(17)	4	(67)	0	(0)	6
	2006–2007	1	(17)	4	(67)	1	(17)	0	(0)	6
	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
6D	2005–2006	4	(21)	4	(21)	11	(58)	0	(0)	19
	2006–2007	2	(9)	14	(61)	7	(30)	0	(0)	23
	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
Unit 6	2005–2006	7	(13)	9	(17)	37	(70)	0	(0)	53
Total	2006–2007	5	(7)	26	(37)	40	(56)	0	(0)	71
	2007–2008	7	(8)	13	(14)	73	(78)	0	(0)	93
	2008–2009	13	(20)	19	(29)	33	(51)	0	(0)	65
	2009–2010	11	(16)	16	(23)	42	(61)	0	(0)	69

Table 5. Unit 6 brown bear harvest chronology by percent, 2005–2009.

Unit 6: Unit 6 brown bear harvest chronology, by percent, 2005–2009												
		Harvest periods										
Unit	Regulatory year	September		October		November		April		May		n
		1–15	16–30	1–15	16–31	1–15	16–30	1–15	16–30	1–15	16–31	
6A	2005–2006	(7)	(29)	(43)	(0)	(0)	(0)	(0)	(0)	(14)	(7)	14
	2006–2007	(15)	(30)	(10)	(10)	(0)	(0)	(0)	(0)	(15)	(20)	20
	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) ^a	26
6B	2005–2006	(0)	(14)	(43)	(0)	(0)	(0)	(0)	(0)	(14)	(29)	7
	2006–2007	(15)	(8)	(15)	(8)	(0)	(0)	(0)	(0)	(31)	(23)	13
	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
6C	2005–2006	(57)	(0)	(14)	(0)	(0)	(0)	(0)	(0)	(0)	(29)	7
	2006–2007	(80)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(20)	5
	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) ^a	10
6D	2005–2006	(0)	(0)	(0)	(5)	(5)	(0)	(0)	(11)	(37)	(42)	19
	2006–2007	(0)	(0)	(0)	(23)	(5)	(0)	(0)	(0)	(14)	(59)	22
	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
Unit 6 Total	2005–2006	(11)	(11)	(21)	(2)	(2)	(0)	(0)	(4)	(21)	(28)	47
	2006–2007	(15)	(12)	(7)	(13)	(2)	(0)	(0)	(0)	(17)	(35)	60
	2007–2008	(23)	(24)	(13)	(10)	(1)	(0)	(0)	(1)	(10)	(17)	70
	2008–2009	(28)	(5)	(9)	(17)	(0)	(0)	(2)	(3)	(17)	(20)	65
	2009–2010	(16)	(16)	(9)	(1)	(0)	(0)	(1)	(6)	(19)	(32)	69

^a One bear was legally killed in early June under the newly extended season.

Table 6. Unit 6 brown bear harvest percent by transport method, 2005–2009.

Unit	Regulatory year	Percent of harvest								<i>n</i>
		Airplane	Boat	Airboat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
6A	2005–2006	57	29	0	7	0	7	0	0	14
	2006–2007	76	19	0	0	0	0	0	5	21
	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
6B	2005–2006	25	25	0	0	0	0	50	0	8
	2006–2007	70	0	0	0	0	0	30	0	10
	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
6C	2005–2006	17	33	0	17	0	0	33	0	6
	2006–2007	17	50	0	0	0	0	33	0	6
	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
6D	2005–2006	11	79	0	5	0	0	5	0	19
	2006–2007	30	70	0	0	0	0	0	0	23
	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
Total	2005–2006	28	49	0	6	0	2	15	0	47
	2006–2007	52	38	0	0	0	0	8	2	60
	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

WILDLIFE
MANAGEMENT REPORT

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

From: 1 July 2008
To: 30 June 2010

LOCATION

GAME MANAGEMENT UNITS: 7 (3,520 mi²) and 15 (4,876 mi²)

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 mi²) and the National Park Service (NPS; Kenai Fjords National Park, 885 mi²) are the principal landowners in Unit 7. In Unit 15 the U.S. Fish and Wildlife Service (FWS; Kenai National Wildlife Refuge) is the primary landowner responsible for management of 3,062 mi². Ownership of the remaining 29% of the Kenai varies 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–20 June, with a bag limit of 2 bears for coastal areas in Southcentral and all of Southeast 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. Cubs and sows with cubs were protected in the early 1970s. The season dates have ranged from 20 to 45 days. In 1978 a 10-day spring season was opened for Unit 15 and extended to a 15-day season in 1980.

More restrictive regulations were needed beginning in 1989 with a reduction of the fall season by 14 days. This change was to reduce the incidental take of brown bears by moose hunters. During the spring 1994 Board of Game meeting, the board shortened and moved the fall season to 1–25 October in response to continued high harvests.

The board again addressed the bear season in 1997 and authorized the Department of Fish and Game (ADF&G) to operate the hunts as registration permit hunts. The season dates were changed to 15–31 October. The fall seasons from 1995 to 1998, and the spring of 1999, were closed by emergency order because additional harvests would have exceeded management

objectives. Because of these closures, we determined only 1 season would be allowable on the Kenai to stay within management objectives, and the Board of Game authorized a fall-only registration hunt with a bag limit of 1 bear every 4 years and season dates of 15–31 October.

The fall registration hunt remained in place until 2007, when the Board of game adopted a drawing permit for brown bear harvest. The change was recommended by the Department because the large number of permits issued under the registration system (254 in 2004) only allowed for a very short season (2 days in 2004), and did not promote a quality hunting experience. By switching to a drawing hunt, successful applicants would have longer seasons, there was greater potential for a more widely distributed harvest, and hunters would be allowed to be more selective. The season dates for the new drawing hunt in 2007–08 were 1 October–30 November and 1 April–15 June. A total of 18 permits were issued in 5 different hunt areas. Season dates and the number of permits issued were the same during 2008–09, but season dates were liberalized (as authorized by the Board of game action at the March 2009 meeting) to 15 September–30 November and 1 April–15 June during 2009–10. Also, during 2009–10, the number of permits issued was increased to 30.

In 1984 representatives of the Alaska Department of Fish and Game (ADF&G), FWS, 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 has coordinated many projects that have increased our understanding of brown bear ecology. The IBBST coordinated a baseline inventory (Bevins et al. 1984, Risdahl et al. 1986) of salmon streams and known high-use brown bear areas and performed detailed ground and habitat surveys (Schloeder et al. 1987, Jacobs et al. 1988). More recently the IBBST has focused research on the dietary requirements of Kenai Peninsula brown bears (Jacoby et al. 1999, Hilderbrand et al. 1999a), the importance of marine nitrogen in the ecosystem (Hilderbrand et al. 1999b), and the physiological effects of diet on reproduction (Hilderbrand et al. 2000). 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 et al. 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 (Jan 1–Dec 31).

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.

There has never been a formal census conducted to produce a statistically valid estimate for the Kenai brown bear population. The exercise outlined above was conducted in 1993 and likely does not accurately reflect current brown bear numbers.

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 km² (7.0 bears per 100 mi²) he reported for his middle Susitna Study Area (Miller et al. 1987). Using the available information, Del Frate estimated the bear density on the Kenai to be 20 bears per 1,000 km² (5.2 bears per 100 mi²), and calculated the suitable habitat to be 13,848 km² (5,347 mi²). 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 and 1 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 one bear every four 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 modified the fall season dates at the March 2009 meeting from 1 October–20 November to 15 September–30 November

while maintaining the spring season at 1 April–15 June. The Board also allowed nonresidents (up to 10% of the total permits issued) to apply for Kenai brown bear hunts.

Hunter Harvest. In the first year of the drawing hunt (2007–08), 18 permits were issued within 5 separate hunt areas. The fall portion of the 2007 season was closed by emergency order, but 1 subadult male bear was harvested (Table 1) by a nonlocal resident hunter (Table 2) during the spring season (Table 3) in 2008.

The number of permits issued remained 18 in 2008–09, but increased to 30 in 2009–10. Both the fall and spring portions of the hunts remained open during these 2 seasons. During the 2008–09 hunters harvested 6 brown bears and during 2009–10 hunters harvested 5 brown bears (Table 1).

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

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

In 1998, Kenai Peninsula brown bears were listed as a Population of Special Concern under Alaska’s list of Species of Special Concern. The listing was based on the potential for decline in the future because of human encroachment into brown bear habitat.

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 2007, there were 27 reported, nonhunting, human-caused brown bear mortalities, consisting of 11 males, 16 females. Eighteen of these animals were subadults. Twenty one were killed in defense of life or property, 4 were killed by automobiles, 1 was killed illegally, and 1 was killed while conducting research activities.

During calendar year 2008, there were 39 reported, nonhunting, human-caused brown bear mortalities, consisting of 18 males, 18 females and 3 of unknown gender. Twenty seven of these animals were subadults. Thirty-three were killed in defense of life or property, 1 was killed by an automobile, and 5 were illegal kills. In addition to the 39 bears mentioned above, the collar from a research bear was located in the Kenai River. Due to the location of the collar (even though it was not recovered) we believe that someone killed this bear, did not report it, removed the collar and threw the collar into the river. This was confirmed during the spring of 2011 when someone found the collar in the river and returned it to the ADF&G office in Soldotna.

During calendar year 2009, there were 21 reported, nonhunting, human-caused brown bear mortalities, consisting of 5 males, 14 females, and 2 cubs of the year of unknown gender. Twelve of these animals were subadults. Seventeen were killed in defense of life or property and 4 were illegal kills.

During calendar year 2010, there were 22 reported, nonhunting, human-caused brown bear mortalities, consisting of 9 male, 11 females, and 2 cubs of the year of unknown gender. Fourteen of these animals were subadults. Fifteen were killed in defense of life or property, 3

were illegal kills, 2 were killed by automobiles, 1 was incidentally killed in a wolf snare, and 1 was killed by a train.

Reducing the nonhunting 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 to support salvaging timber killed by spruce bark beetles may make some bears more vulnerable (McLellan and Shackleton 1988). 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 because 71% of the land on the Kenai is under federal management and has restrictions in place relating to potential 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 dumpster issues, and other human generated attractants. Solving many of these management concerns will require innovative approaches. Nonhunting, human-caused, brown bear mortalities peaked in 2008 but appear to be stabilizing at a lower level in the years since. It is essential that we continue our effort to minimize nonhunting, 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 codes are needed. However, without a commitment by local and state enforcement agencies, new regulations stand little chance for success.

During 2006 the City of Kenai was the first municipality to be recognized as a Wildlife Conservation Community. 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. Nonprofit organizations (for the city of Kenai it was the 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. The 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.

We will continue to develop strategies to address brown bear issues on the Kenai Peninsula, and it is possible we will develop and implement new management objective before the next report period.

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

Selinger, J. 2011. Units 7 & 15 brown bear management report. Pages 69–78 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Units 7 and 15 brown bear harvest, 2005–2009.

Regulatory year	Hunting			Nonhunting ^a				All human caused mortality			
	Male	Female	Total	Male	Female	Unknown	Total	Male	Female	Unknown	Total
2005–06	<i>No hunt</i>		0	10	7	2	19	10	7	2	19
2006–07	<i>No hunt</i>		0	12	15	4	31	12	15	4	31
2007–08	1	0	1	11	16	0	27	12	16	0	28
2008–09 ^b	1	5	6	13	18	3	34	14	23	3	40
2009–10	5	0	5	5	18	2	25	10	18	2	30

^a Includes defense of life or property, road-kill, illegal, and research related mortalities

^b Hunting includes one bear taken under a federal subsistence permit

Table 2. Units 7 and 15 brown bear hunter residency, 2005–2009.

Regulatory year	Successful					Unsuccessful				Total hunters
	Local ^a resident	Nonlocal resident	Non- resident	Total	Percent success	Local ^a resident	Nonlocal resident	Non- resident	Total	
2005–06	<i>No hunt</i>									
2006–07	<i>No hunt</i>									
2007–08	0	1	0	1	7	5	9	0	14	15
2008–09	6	0	0	6	29	11	4	0	15	21
2009–10	5	0	0	5	23	11	6	0	17	22

^a Local resident resides in Units 7 or 15

Table 3. Units 7 and 15 brown bear seasonal hunter-harvest chronology, 2005–2009.

Regulatory year	Spring	Fall	Total Harvest
2005–06	<i>No hunt</i>		0
2006–07	<i>No hunt</i>		0
2007–08	1		1
2008–09	5	1	6
2009–10	3	2	5

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Table 4. Units 7 and 15 successful brown bear hunter-harvest transportation methods 2005–2009.

Regulatory year	Airplane	Horse	Boat	3/4 wheel- ATV-ORV	Highway vehicle	Snow- machine	Other- Unknown	Harvest
2005–06	<i>No hunt</i>							0
2006–07	<i>No hunt</i>							0
2007–08					1			1
2008–09				3	3			6
2009–10			1	1	2	1		5

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 8 (5,097 mi²)

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 considered 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.

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.

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 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; 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.

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 invasion of inland bear habitat on Kodiak Island. To address the opposition encountered from the public and agencies, a mitigation settlement was negotiated in 1981 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 radiotelemetry 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 20th 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. Afognak and part of northeastern Kodiak Island were changed from an unlimited permit hunt to a limited permit hunt in 1987–88. State hunting regulations allowed for a subsistence bear hunt in 1986–87, with hunters required to salvage all bear meat for human consumption. The state subsistence bear hunt was rescinded the next year, and in spring 1997 a federal hunting regulation reinstated a subsistence season. Under federal regulation up to 10 permits were available to residents of Kodiak Island villages. Permits were valid only on federal lands, and seasons were 1–15 December and 1 April–15 May. All meat from bears harvested under this regulation was to be salvaged for human consumption.

Although hunting continued to be the most popular human use of bears on Kodiak in the early 1990s, the area 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 unit-wide 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 and the Alaska Wildlife Troopers to conduct 20 intensive aerial brown bear surveys from 1987 to 2010 (Table 1). These surveys were in 9 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 2007). 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 km² (0.8 bears/mi²), and for the northern islands it was 189 bears/1,000 km² (0.5 bears/mi²). 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 1995–2005 (Van Daele 2007) .

An intensive aerial survey of the brown bear population on the Aliulik Peninsula was conducted from 20–26 May 2009. Survey data indicate that the bear density in this area had increased since the last survey was conducted in 2002. The density of independent bears (not including cubs) on the Aliulik Peninsula was estimated at 282/1,000 km² in 2009 (SE = 27.15). This estimate is significantly higher ($P < 0.05$) than those derived from surveys conducted in 2002 (173/1,000 km²; SE = 18.32) and in 1993 (209/1,000 km²; SE = 16.95), and it suggests the population is healthy and productive.

We also successfully completed an intensive aerial survey of the brown bear population in the Karluk Lake drainage from 22–25 May 2010. Survey data indicate that the bear density of that area has decreased since the last survey, which was conducted in 2003 (483 independent bears/1,000 km² in 2003 versus 252 independent bears/1,000 km² in 2010). This decrease is statistically significant ($P = 0.0004$). The methods used and conditions encountered during this year's intensive aerial survey were comparable to those in 2003, however, we do not think there has been an actual decline in the bear population in the Karluk vicinity. Supplemental information from guides, hunters, and hunt records corroborate the conclusion that the bear population in the Karluk Lake drainage is healthy and productive and probably has not declined significantly in the past 7 years. Long-time hunting guides throughout the Archipelago commented on the exceptionally late emergence of bears and lack of normal movement patterns during the Spring 2010 hunting season. When we returned to the survey area on 2 June 2010 to initiate our capture and collaring program, we noted a noticeable increase in the number of bears seen and dens opened. We plan to replicate the survey in 2011.

Aerial surveys along salmon streams in southwestern Kodiak Island by Kodiak NWR staff indicated considerable interannual variation in composition of the brown bears observed, which was often correlated with berry and salmon abundance and timing (Table 2). 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 from 1985–1989, 16.8% from 1990–1994, 19.6% from 1995–1999, and 18.2% from 2000–2004. No surveys were conducted in 2005 or 2006, however data collected from 2005, 2008, and 2009 indicated an average maternal female proportion of 11.3% of the bears surveyed.

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). 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 radio-telemetry collars on bears in those areas.

MORTALITY

Harvest

Since statehood, the reported sport harvests of bears in Unit 8 have ranged from a low of 77 (1968–69) to a high of 250 (2008–09) per regulatory year (Table 3). In recent years regulations have been more consistent and designed to better distribute the hunting pressure. From 1980–81 to 1989–90 the average annual harvest was 165.4 bears (range = 124–202), from 1990–91 to 1999–2000 the average was 160.0 bears (range = 149–177), and from 2000–01 to 2009–2010 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, Table 3), the estimated sport harvest 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 Sallery 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).

An additional season for subsistence hunters is open on Kodiak NWR lands from 1 April – 15 May, and from 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. During its spring 2007 meeting, the Alaska Board of Game increased the number of drawing permits for hunt areas on eastern Kodiak, and rescinded the regulation that penalized guides in southwestern Kodiak whose clients took small female bears. The number of bear permits was also increased on Afognak, Shuyak and Raspberry islands and those northern islands were divided into 3 hunt areas to better distribute the hunting pressure. A hunt area border change affected the bear registration hunt along the road system in northeastern Kodiak. That boundary, which was a straight line from Crag Point to Sallery Creek,

was changed to follow ridge tops in the same area. The overall size of the hunt area was not changed, but it will be easier for hunters to find the boundary in the field.

The Board also established a regulation, starting in the fall 2007 hunting season that hunters who wound a brown bear in Unit 8 will not be able to hunt for another bear during the remainder of that regulatory year. In recent years there had been some confusion about the status of hunters who wound an animal and cannot retrieve it. The Board failed to pass a similar proposal in 2005. This regulation was proposed by the Kodiak Fish and Game Advisory Committee to maintain high ethical standards in Kodiak bear hunts and to minimize the wounding of bears.

No changes in Unit 8 bear hunting regulations were made during the 2009 Board of Game meetings and no emergency orders were issued during this reporting period.

Hunter Harvest. Hunters harvested 250 bears in 2008–09 and 201 bears in 2009–10, a rate higher than the previous 5-year mean of 185.6 bears (Table 3). The 2008–09 harvest was the highest ever recorded. There were 109 bears killed in fall 2008 and 84 killed in fall 2009. The mean annual fall harvest for the previous 5 years was 64.2 bears. During the spring of 2008, 141 bears were killed, and in the spring of 2009, 117 bears were killed. The mean annual harvest for the previous 5-year period was 121.4 bears. These totals do not include bears killed under federal subsistence regulations: 2 bears (1 male, 1 female) in 2008–09 and 1 bear (male) in 2009–10.

Males predominated in the harvest, composing 69% of the sport harvest in 2008–09 and 74% in 2009–10, a rate below the previous 5-year average of 76.0%. Although the current management objective of 60% males was met both years, Miller (1990a) cautioned that using gender and age ratios to set allowable harvest objectives is more likely to result in overexploitation than using total adult females for setting guideline harvests. Sport hunters harvested 78 females in 2008–09 and 52 females in 2009–10, higher than the annual mean of 44.4 females harvested during the preceding 5 years. Including all known deaths of females, 91 females were killed in 2008–09 and 60 females were killed in 2009–10, higher than the previous 5-year mean of 52.6 females.

Mean total skull sizes of male bears harvested was 25.4” (64.5 cm) in 2008–09, and 24.9” (63.2 cm) in 2009–10, comparable to the mean skull size of 25.1” (63.8 cm) for the previous 5 years. Skull measurements from harvested females averaged 22.2” (56.4 cm) in 2008–09 and 22.3” (56.6 cm) in 2009–10. The average female skull size during the previous 5 years was 21.9” (55.6 cm; Table 4). The mean age of males harvested in 2008–09 was 8.6 years; and the mean age in 2009–10 was 8.7 years. The average age of male bears harvested during the previous 5 years was 7.4 years. Female ages averaged 7.1 years in 2008–09 and 8.5 years in 2009–10. The average age of female bears harvested during the previous 5 years was 7.1 years (Table 4).

Permit Hunts. Starting in 2007–08, 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 496. Drawing permits available to Alaska residents each year increased from 319 (107 in fall, 212 in spring) to 327 (114 in fall, 213 in spring). Nonresident drawing permits increased from 153 (53 in fall, 100 in spring) to 169 (63 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 2008–09, 333 (67.1%) successful applicants claimed their permits; in 2009–10, 357 (71.9%) permits were claimed

(Table 5). Annual harvest in the drawing permit areas was 217 in 2008–09 and 181 in 2009–10. The average annual harvest during the previous 5 years was 169.6.

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 2008–09 we issued 297 registration permits, and in 2009–10 we issued 236 (Table 6). This was an increase over the mean number of registration permits issued in the previous 5 years (245.8). The number of hunters afield in the registration hunt was 201 in 2008–09 and 155 in 2009–10, as compared to the mean of 166.2 for the previous 5 years. Annual harvest in the registration permit area was 33 in 2008–09 and 20 in 2009–10. The average annual registration hunt harvest during the previous 5 years was 16.

Hunter Residency and Success. Hunter success in the drawing permit hunts was 66% in 2008–09 and 51% in 2009–10 (Table 5). The mean for the previous 5 years was 53.6%. In the registration hunts, hunter success was 16% in 2008–09 and 13% in 2009–10, higher than the mean for the previous 5 years (9.6%; 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 2008–09, residents harvested 119 bears and nonresidents took 131 (Table 7). In 2009–10, residents harvested 96 bears and nonresidents took 105 bears. The mean harvest for the previous 5 years was 84.6 for residents and 101 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 2008–09, 84% of the harvest occurred during the first third of the fall season, and in 2009–10, 76% 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 75%. In 2008–09, 67% of the harvest occurred during the last third of the spring season, and in 2009–10, 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 57.8%.

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 36 bears in 2008–09 and 31 in 2009–10 (Table 3) that were recovered and sealed. This was higher than the mean annual nonsport mortality of 28.6 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.

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 productivity and survival 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 (FWS). The final plan included more than 270 recommendations (all by consensus), and we are continuing to incorporate several into our management program.

Public education projects associated with the Kodiak Archipelago Bear Conservation and Management Plan (ADF&G 2002) continued during this reporting period with a bear safety DVD ("A guide to brown bear country"), featuring information developed by KUBS and ADF&G, which was produced and distributed by a private videographic company (Camera Q) in 2006. The Kodiak NWR has also addressed many bear-related issues in its recently completed

Comprehensive Conservation Plan (FWS 2006). Since 2007, KUBS members were active participants in an effort by Kodiak Island Borough to revamp garbage collection and disposal methods on the Kodiak road system. These changes could have significant impacts to bear/human encounters in the future. The group also successfully planned and conducted a 3-day seminar (1 credit) on responsible bear viewing at Kodiak College that has been conducted annually 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 at Larsen Bay continues to be a success and is well maintained by local villagers. In 2008 Port Lions completed fencing of their landfill, including electric fence that was retrofitted to an 8' chain-link fence (2009). Port Lions also installed bear resistant dumpsters outside of the fence and lighted the area. The village of Old Harbor continued to have bear problems during this reporting period, but in 2010 the community 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 radio-telemetry 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.

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 2009, there were sporadic reports of property damage, no human injuries, 1 DLP, and 1 bear 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 found occasionally. 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 from 25 June–30 September since 1995, and the bear viewing program that is anticipated to commence in 2011 will be the first since 1994. Refuge staff, with cooperation from ADF&G and KUBS, will oversee the implementation of the program and work closely with Koniag to assess its impacts on bears and make appropriate modifications to minimize those impacts. 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 years.

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. During 21–25 May 2009, we used a Hughes 500D helicopter and rifle-fired darts to capture 11 brown bears (7 females and 4 males) on Kodiak and Sitkalidak Islands. We deployed GPS/VHF transmitters on 7 adult female and 1 adult male bears. Distribution of the bear collars was satisfactory as we continued to research bears on Sitkalidak Island, the vicinity of Old Harbor and the Karluk Lake drainage. The collars were deployed at Barling Bay (1 bear), on Sitkalidak Island (4 bears), and 3 collars on adult females in the Karluk Lake basin.

During 3–7 June 2010, we again used a Hughes 500D helicopter and rifle-fired darts to capture 28 brown bears (25 females and 3 males) in the Karluk Basin of Kodiak. We deployed GPS/VHF transmitters on 22 adult female bears and VHF collars on 1 adult female and 2 adult male bears. This project was primarily funded by the Kodiak NWR and it is designed to gain a more comprehensive understanding of bear movements and habitat use of the Karluk Lake area.

Another on-going research project was a cooperative project with Washington State University to investigate the nutritional ecology of bears across the archipelago by analyzing hair samples. In 2007 we began collecting hair samples from all bears harvested in the Unit. A graduate student is conducting stable isotope and mercury analyses on those samples, as well as samples from a variety of commonly used bear foods. These data, coupled with information they are collecting from feeding trials on captive grizzly bears in their facility, are expected to provide information on the proportion of bears' diets that are composed of terrestrial meat and vegetation, marine meat and vegetation, and salmon in various parts of the archipelago.

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 1996–97 to 2009–10, the percent males in the harvest exceeded 69%. The management objective of males composing at least 60% of the harvest has been achieved for the past 23 consecutive years and in 42 of 48 years since statehood.

Miller (1990b) suggested that survival rates of productive adult females were the most critical factor driving brown bear populations in Alaska. The model developed with Kodiak data (Van Daele 2007) came to the same conclusion, with female survival and productivity the most sensitive parameters driving population trend. However, the 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 from 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 with these 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 2007 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 the recommendations and assisting with 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 and 2010 a similar address was given at conferences in Canada, Russia, and Japan. The area biologist was also invited to Orsa, Sweden to work with local representatives on brown bear management issues in 2006, 2008, and 2010. 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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Please cite any information taken from this section, and reference as:

Van Daele, L.J., and J. R. Crye. 2011. Unit 8. Pages 79–108 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Estimated density and observation rates of independent bears^a in intensive aerial survey areas, Unit 8, 1987–2010.

Survey Area	Year	Replicate surveys	Survey rate (min/km ²)	Observed independent bears/hr	Observed independent bears/1000 km ²	Sightability	Est. density ind. bears / 1000 km ²	Standard error	Size of survey area (km ²)
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
Karluk Lake	2010	4	2.1	3.3	113	0.45	252	22.25	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
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

^a Does not include cubs still with mother

Table 2. Unit 8 aerial stream counts of brown bears^a, 2000–2009.

Regulatory year	Complete surveys	Single bears		Maternal bears		Yearlings & cubs		Cubs of the year		Bears per survey	Total
		Number	%	Number	%	Number	%	Number	%		
2000	5	182	57	50	16	78	24	13	4	64.6	323
2001	8	168	43	67	17	67	17	88	23	48.8	390
2002	4	129	30	101	23	162	37	44	10	109.0	436
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 ^b	--	--	--	--	--	--	--	--	--	--	--
2007 ^b	--	--	--	--	--	--	--	--	--	--	--
2008	10	428	71	63	10	76	13	37	6	60.4	604
2009	15	573	69	91	11	88	11	77	9	57.7	866

^a From Kodiak National Wildlife Refuge files; standardized low-level surveys along selected streams on southwestern Kodiak Island^b No surveys conducted

Table 3. Reported brown bear kill data for the Kodiak archipelago by regulatory year and season, 1960–61 through 2009–10.

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

Table 3. continued.

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

Table 3. continued.

Regulatory Year	Fall harvest				Spring harvest				Total sport harvest					Reported nonsport				Total reported bear kill ^a			
	M ^b	F ^c	UNK ^d	Total ^e	M	F	UNK	Total	M	%M ^f	F	UNK	Total	M	F	UNK	Total	M	F	UNK	Total
2000–01	34	15	0	49	87	34	0	121	121	71%	49	0	170	5	2	5	12	126	51	5	182
2001–02	47	13	0	60	99	25	0	124	146	79%	38	0	184	3	5	10	18	149	43	10	202
2002–03	33	16	0	49	70	23	0	93	103	73%	39	0	142	5	4	11	20	108	43	11	162
2003–04	39	15	0	54	85	26	0	111	124	75%	41	0	165	9	5	13	27	133	46	13	192
2004–05	44	13	0	57	94	18	0	112	138	82%	31	0	169	7	8	15	30	145	39	15	199
2005–06	40	22	0	62	118	28	0	146	158	76%	50	0	208	11	7	5	23	169	57	5	231
2006–07	49	23	0	72	103	27	0	130	152	76%	50	0	202	14	14	10	38	166	64	10	240
2007–08	53	23	0	76	79	29	0	108	132	71%	50	0	184	5	7	13	25	131	57	13	201
2008–09	72	37	0	109	100	41	0	141	172	69%	78	0	250	10	13	13	36	182	91	13	286
2009–10	63	21	0	84	86	31	0	117	149	74%	52	0	201	9	8	14	31	158	60	14	232
<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>75.4%</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>

^a reported kill data derived from sealing records (1960–61 to 1989–90) and annual harvest reports (1990–91 to present).

^b males

^c females

^d unknown or unreported gender

^e total

^f percent males in harvest (males/total)

Table 4. Total skull size, age, and gender of brown bears killed by sport hunters in Unit 8, 2000-01 through 2009-10.

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>
2000-01	25.2	117	8.1	120	21.1	49	5.2	49
2001-02	24.7	141	7.2	145	21.9	37	7.0	38
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

Table 5. Unit 8 brown bear harvest data for drawing permit hunts DB 101–163 and 201–293, 2000-01 through 2009-10.

	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total ^a harvest
Fall	2000–01	114	113	1	41	32	70	14	30	0	46
Drawing	2001–02	113	113	0	46	39	76	12	24	0	51
Hunts	2002–03	113	112	4	44	32	68	15	32	0	47
(DB101-163)	2003–04	121	120	6	41	33	72	13	28	0	46
(DB201-293)	2004-05	113	112	3	48	39	76	12	24	0	51
	2005-06	107	107	0	52	35	63	21	38	0	56
	2006-07	110	110	0	55	40	67	20	33	0	60
	2007-08 ^b	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
	2000–01	225	218	2	54	87	75	29	25	0	116
	2001–02	221	220	1	54	94	80	23	20	0	117
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 ^b	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		85	75	29	25	0	114

Table 5. continued.

	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total ^a harvest
Combined	2000–01	339	331	3	50	119	73	43	27	0	162
Fall & Spring	2001–02	334	333	1	51	133	79	35	21	0	168
Drawing	2002–03	326	322	3	43	100	73	37	27	0	137
Hunts	2003–04	315	314	4	49	113	76	36	24	0	149
(DB101-193)	2004–05	318	313	3	51	127	81	30	19	0	157
(DB201-293)	2005–06	321	321	1	61	148	76	47	24	0	195
	2006-07	307	307	0	59	138	76	44	24	0	182
	2007-08 ^b	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

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

^b Starting in 2007-08, 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^a hunt numbers RB 230 and RB 260, 2000-01 through 2009-10.

	Regulatory year	Permits issued ^a	Permits returned	Hunters afield	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total harvest
Fall Registration Hunt (RB230)	2000-01	162	146	99	32	3	2	67	1	33	0	3
	2001-02	126	124	92	26	10	8	89	1	11	0	9
	2002-03	85	77	54	30	4	1	50	1	50	0	2
	2003-04	118	118	81	31	10	5	63	3	38	0	8
	2004-05	144	143	96	33	6	5	83	1	17	0	6
	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
Spring Registration Hunt (RB260)	2000-01	104	92	70	24	7	0	---	5	100	0	5
	2001-02	106	94	70	26	10	5	71	2	29	0	7
	2002-03	75	67	46	31	7	2	67	1	33	0	3
	2003-04	117	108	76	30	11	5	63	3	37	0	8
	2004-05	100	95	74	26	9	5	83	1	17	0	6
	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

Table 6. continued.

	Regulatory year	Permits issued ^a	Permits returned	Hunters afield	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total harvest
Combined	2000–01	226	238	169	29	5	2	25	6	75	0	8
Fall & Spring Registration	2001–02	232	218	162	26	10	13	81	3	19	0	16
Hunts	2002–03	160	144	100	31	5	3	60	2	40	0	5
(RB230	2003–04	235	226	157	31	10	10	63	6	37	0	16
& RB260)	2004–05	244	238	166	30	7	10	83	2	17	0	12
	2005–06	265	261	179	31	7	11	85	2	15	0	13
	2006–07	253	251	168	33	12	13	65	7	35	0	20
	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

^a No limit on the number of permits issued

Table 7. Residency of successful brown bear hunters^a in Unit 8, 2000-01 through 2009-10.

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

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

^b Includes residents of Game Management Unit 8

^c Includes the following successful nonresidents guided by next-of-kin: 2000-01=2; 2001-02=6; 2002-03=4; 2003-04=1; 2004-05=2; 2005-06=3; 2006-07=3; 2007-08=3; 2008-09=2; 2009-10=2

Table 8. Chronology of the brown bear harvest by season and period in Unit 8, 2000-01 through 2009-10.

Regulatory year	Fall Season							Spring Season							Regulatory year total ^a
	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>	%		
2000–01	35	71	12	24	2	4	49	4	3	55	45	62	51	121	170
2001–02	47	78	10	17	3	5	60	4	3	44	35	76	61	124	184
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

^a 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, 2000-01 through 2009-10.

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

Table 10. Unit 8 brown bears reported killed in defense of life or property (DLP), 2000–2009.

Calendar year	Gender of bear				Location		Cause ^a	
	Males	Females	Unknown	Total	Kodiak road system	Remote	Hunting Related	Other
2000	6	3	1	10	0	10	1	9
2001	1	3	0	4	0	4	0	4
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

^a Data included in previous columns

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008

To: 30 June 2010

GAME MANAGEMENT UNIT: 9 (33,638 mi²)

GEOGRAPHIC DESCRIPTION: Alaska Peninsula

BACKGROUND

The Alaska Peninsula is a premier area for large brown bears, and the Board of Game has placed a high priority on maintaining a quality hunting experience for them. Because of reasonably easy aircraft access and the high quality of bear trophies in the unit, an active guiding industry developed during the 1960s.

High harvest rates and illegal hunting activities in the 1960s and early-1970s are believed to have caused a Unit-wide decline in the brown bear population by the mid-1970s. Poor salmon escapements in most drainages during regulatory years (RY) 1972 (RY72 = 1 July 1972 through 30 June 1973) and RY73 coincided with the high harvests and exacerbated the situation. 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 the illegal activities. At the spring 1975 Board of Game meeting, the present system of alternating seasons (open in the fall of odd-numbered years and the spring of even-numbered years) was adopted to keep harvests within the quota of 150 bears per year for the area south of the Naknek River. This system reduced harvests substantially from RY76 to RY81 and allowed the bear population to recover.

In 1984 the board abandoned the harvest quota (150 bears) for the area south of the Naknek River and endorsed more flexible objectives (Sellers and McNay 1984): 1) maintain maximum opportunity to hunt bears by avoiding a drawing permit system; 2) continue both spring and fall hunts, managing 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.

Currently the brown bear population is believed to be stable at high densities for this area, and harvests are within sustainable limits. 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 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 has incorporated these recommendations into stream surveys conducted near Black Lake and in the Katmai National Preserve, and U.S. Fish and Wildlife Service (USFWS) has 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 believed to be stable at high densities throughout most of the Unit. While there is undoubtedly localized variation, most of the changes in brown bear numbers observed in any given area are often associated with changes in the distribution of brown bears in response to the distribution of the seasonal resources they require. Where changes in bear numbers have been observed and investigated, the changes in bear numbers were associated with changes in resource availability in the immediate area, changes in resource availability in surrounding areas, and changes in human use at specific locations.

Under the current management strategy any variation in the brown bear population is expected to be caused by changes in density-dependant 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 mi² (110 bears/1,000 km²) 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 assumed). The McNeil River State Game Sanctuary and national parks within Unit 9 are thought to contain an additional 2,000–2,500 brown bears.

Population Composition

No surveys were conducted during this reporting period. However, taken as a whole, the composition of bears observed during surveys conducted between 1999 and 2007 (Tables 1 and 2) suggested a productive population exposed to low to moderate harvest rates. Detailed analysis of these survey data is available in earlier management reports.

Evidence from the Black Lake study and analysis of harvest data show a change in the population composition since the early 1970s believed to be correlated to differences in harvest rates. The Black Lake capture samples during the early 1970s showed an adult (i.e., ≥ 5 years old) sex ratio of 21 adult males:100 adult females. The 1988–1989 capture sample showed a significantly higher ratio of 39 males:100 females ($t = 1.62$, $df = 194$, $P = 0.052$).

Classification of bears during replicate stream surveys at Black Lake also showed changes in population composition believed to reflect significant changes in harvest rates beginning in the mid 1960s. This analysis was based on the percentage of “single” bears (i.e., not in family groups) in the population. Hunting regulations protected family groups of cubs and yearlings, so hunting tended to reduce the proportion of single bears in the population (Sellers and McNay 1984). During 1958–61, when harvests were extremely low, a mean of 46% (range = 37–55%) of 1,365 brown bears classified during summer surveys were single bears. This was higher ($t = 6.81$, $P = 0.002$) than the mean of 21% single bears (range = 17–26%) of 2,078 bears classified from 1967 to 1976 when the population was affected by excessive harvests. Restrictive regulations, beginning in 1974, led to reduced harvests, and the population began recovering during the late 1970s and early 1980s. During 1982–2002, a mean of 37% of 14,123 bears classified during stream surveys were single, significantly higher than during 1967–76 ($P < 0.001$).

While conducting line-transect surveys of Unit 9D in 2002, 633 bears were observed, of which, 52% were single bears. Similar surveys were conducted in Unit 9C during 2004 and 2005. Based on the composition of 674 bears, 53% were single bears. Replicate stream surveys in Katmai National Preserve in 2006 and 2007 found that single bears accounted for an average of 40% of the bears observed. Taken as a whole, the composition of bears observed during surveys conducted between 1999 and 2007 suggest a productive population exposed to low to moderate harvest rates.

MORTALITY

Harvest

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

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

Board of Game Action and Emergency Orders. No actions were taken during this reporting period.

Hunter Harvest. During RY08, only the Naknek registration hunt and the 2 subsistence brown bear registration hunt areas were open; the general season hunt was closed. Hunters took 12 bears in the fall and 3 in the spring under the registration permit hunts. During RY09 the general season hunt was also open, and the reported harvest was 595 bears (70% male and 30% female, Table 3). During RY08 and RY09, 36 bears were killed by people who were not hunting, but 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 harvest of trophy-sized males, ≥ 8 years old, was 51 (range = 41–58) RY75–RY82, during a period of population recovery. The average number of trophy-sized bears harvested increased to 73 (range = 61–80) between RY83 and RY88 and increased again to 123 bears between RY89 and RY98. Since RY01, an average of 161 males ≥ 8 years old have been taken during regulatory years that are open to unitwide hunting. Not only has the number of mature males in the harvest increased, but the proportion of the harvest composed of mature males has also increased for these 3 time periods. Mature bears were 14.3% of the harvest during RY75–RY82; 16.9% during RY83–RY88; and 23.1% during RY89–RY98. Since RY99, 25% of the total harvest has been males ≥ 8 years old.

Permit Hunts. The registration permit hunt in the Naknek drainage (RB361 and RB371) was designed to minimize bear-human conflicts in the most heavily settled portion of Unit 9. Participation in fall hunts was higher than in spring hunts because some moose and caribou hunters obtained a permit “just in case” they encountered a bear. Harvests averaged 11 bears per regulatory year between RY95 and RY99 and 12 bears between RY00 and RY09. Hunters harvested 11 bears in RY08 and 4 bears in RY09 using the registration permit. About half the bears taken in this permit hunt since RY87 were either confirmed or suspected of having been in conflict with humans.

The registration permit hunt in the Cold Bay area was also designed to minimize bear-human conflicts. In 1983, the Izembek National Wildlife Refuge staff expressed concern that the number of local brown bears was too low; they believed problem bears were not common. Consequently, the Board of Game authorized this hunt only for when it was determined that problem bears were present. The hunt was not conducted from RY84 through RY88. During this period, the bear population appeared to have increased, and USFWS and the department agreed it was impractical to have a season by emergency announcement in response to nuisance bear complaints. The registration permit hunt was changed to coincide with the normal unitwide season, but was still closed when the seasonal quota had been reached. A review of population data in 2005 suggested that the bear population had increased sufficiently to allow more liberal harvests. During the fall season in RY05, 2 bears were harvested on 1 October and the season was closed by emergency order. During the spring hunt in RY05, the season remained open for the duration of the season and 5 bears (3 males and 2 females) were harvested. Because the harvest from the unrestricted hunt was within acceptable limits, we have allowed this hunt to remain open for the duration of the season each hunting cycle to see if the hunt can eventually be merged with the general season. The bear harvest in RY09 was 9 bears (8 males and 1 females).

If harvests continue at this level, there will be no demonstrated need for the hunt to be managed under a special registration permit with a quota that is unique to the hunt area.

The Chignik Brown Bear Management Area was established in 1994 and was modeled after the Western Alaska Brown Bear Management Area to provide an opportunity for traditional subsistence hunting. Past village household surveys resulted in customary and traditional findings by the Board of Game for the villages of Chignik Lake, Perryville, and Ivanof Bay. This hunt overlaps a federal subsistence permit hunt, which complicates issuing permits and collecting results. Since RY96, participation in and compliance with the state permit hunt have been virtually nonexistent. ADF&G's Subsistence Division estimated a harvest of 6 bears from these villages in RY96, yet the only permittee was unsuccessful. Two permits were issued in RY08, both permittees reported hunting, and 1 bear was harvested.

Unit 9B was included in the Western Alaska Brown Bear Management Area in RY97. Very few bears have been reported harvested under this hunt. In RY08, 9 permits were issued, 7 permittees hunted, and 1 bear was harvested. In RY09, 4 permits were issued, 3 permittees reported hunting, and no bears were harvested.

Hunter Residency. During the RY08 and RY09 seasons, nonresidents took 81% of the harvest (Table 4).

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. Since RY00 59% of the fall harvest and 56% of the spring harvest has occurred during the first week of each bear hunting season.

Transportation Methods. During RY08 and RY09, 69% 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. The other 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 from 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 (NAPCH). Caribou calf mortality studies on the NAPCH 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 subunits 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 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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Please cite any information taken from this section, and reference as:

Riley, M.D and L. Butler. 2011. Unit 9 brown bear management report. Pages 109–117 in P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

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 > 1 year 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 > 1 year 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 2005 through 2009.

Regulatory Year	Hunter kill						Non-hunting kill ^a			Total reported kill					
	M	(%)	F	(%)	Unk	Total	M	F	Unk.	M	(%)	F	(%)	Unk.	Total
2005															
Fall 05	188	(60)	124	(40)	1	313	6	2	0	194	(61)	126	(39)	1	321
Spring 06	260	(80)	64	(20)	3	327	1	1	0	261	(80)	65	(20)	3	329
Total	448	(70)	188	(30)	5	641	6	3	0	454	(70)	191	(30)	5	650
2006															
Fall 06	3	(43)	4	(57)	1	8	3	0	1	6	(60)	4	(40)	2	12
Spring 07	4	(67)	2	(33)	0	6	0	1	0	4	(57)	3	(43)	0	7
Total	7	(54)	6	(46)	1	14	3	1	1	10	(59)	7	(41)	2	19
2007															
Fall 07	212	(63)	126	(37)	0	338	6	2	0	218	(63)	128	(37)	0	346
Spring 08	234	(82)	52	(18)	0	286	2	4	0	236	(81)	56	(19)	0	292
Total	446	(71)	178	(29)	0	624	8	6	0	454	(71)	184	(29)	0	638
2008															
Fall 08	10	(83)	2	(17)	0	12	5	3	2	15	(75)	5	(25)	2	22
Spring 09	3	(100)	0	(0)	0	3	2	0	1	5	(100)	0	(0)	1	6
Total	13	(87)	2	(13)	0	15	7	3	3	20	(80)	5	(20)	3	28
2009															
Fall 09	224	(62)	138	(38)	0	362	11	6	0	235	(62)	144	(38)	1	379
Spring 10	192	(82)	42	(18)	1	233	0	1	0	192	(82)	43	(18)	1	234
Total ^b	416	(70)	180	(30)	1	597	11	7	0	427	(70)	187	(30)	1	615

^aIncludes DLP kills, research mortalities, and other known human-caused, accidental mortality.^bTotal 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 2005 through 2009.

Regulatory Year	Local residents ^a	(%)	Nonlocal residents	(%)	Nonresidents	(%)	Successful hunters ^b
2005	12	2	106	16	523	82	641
2006	3	25	1	8	8	67	12
2007	19	3	86	14	519	83	624
2008	4	31	4	31	5	38	13
2009	18	3	89	15	490	82	597

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

Table 5. Unit 9 brown bear harvest chronology percent by harvest periods, regulatory years 2005 through 2009.

Regulatory Year	July 1 - August 31	September 1 - 30	October 1 - 7	October 8 - 31	November 1 - April 30	May 1 - 17	May 18 - 31	June 1 - 30	<i>n</i>
2005	0	5	30	14	0	32	19	0	640
2006	8	51	8	0	0	8	25	0	12
2007	0	7	29	18	0	25	21	0	621
2008	0	46	0	31	0	8	8	7	13
2009	0	7	34	20	0	18	21	0	594

Table 6. Unit 9 brown bear harvest percent by transport method, regulatory years 2005 through 2009.

Regulatory Year	Airplane	Dog team/ Horse	Boat	3- or 4- Wheeler	Snowmachine	ORV	Highway vehicle	Foot	Unk.	<i>n</i>
2005	83	0	12	2	0	0	1	2	0	641
2006	18	0	58	8	0	0	8	8	0	12
2007	83	0	11	2	0	0	1	3	0	624
2008	8	0	42	33	0	0	0	17	0	12
2009	74	0	15	5	0	0	2	4	0	568

**WILDLIFE
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 2008

To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 10 (1,536 mi²)

GEOGRAPHIC DESCRIPTION: Unimak Island

BACKGROUND

Unimak Island is the only area in Unit 10 occupied by brown bears. The island is classified as a wilderness area and is managed by the Izembek National Wildlife Refuge (INWR). Brown bear hunting on Unimak Island was administered by the U.S. Fish and Wildlife Service (USFWS) from 1949 to 1979 and by the Alaska Department of Fish and Game (ADF&G) after 1979. Fifteen drawing permits are issued each year: 7 for the spring hunt and 8 for the fall. The department has also issued one additional permit annually in recent years 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). In addition, USFWS periodically conducts aerial bear surveys on Unimak Island in late summer.

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 mi². 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 seasons for both residents and nonresidents were 1 October–31 December and 10–25 May. The bag limit was 1 brown bear every 4 regulatory years by drawing or special governor's permit only; 15–17 permits were issued annually.

Board of Game Action and Emergency Orders. There were no Board of Game actions or emergency orders associated with Unit 10 brown bears during this reporting period.

Hunter Harvest. During regulatory years (RY) 1981 (RY81 = 1 July 1981 through 30 June 1982) through RY96, annual harvests from Unimak Island averaged 6 bears (range = 3–9). Between RY00–RY09, the average annual harvest was 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 22 bears (91% male) during the RY08 and RY09 regulatory years (Table 1).

Hunter Residency and Success. Nonresidents accounted for 8% of the harvest during RY81–RY96 and 52% during RY97–RY01. From RY01–RY09 nonresidents accounted for 49% of the permit holders and 58% of the brown bear harvest. Approximately 62% of the permittees hunted on Unimak Island between RY81 and RY96, and of those who actually hunted, 63% were successful. Since RY01, 82% of permittees hunted, and their success rate increased to 78%.

Harvest Chronology. The majority of bears harvested on Unimak are taken in May and October. Since RY00, 50% of the 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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SELLERS, R.A. AND S.D. MILLER. 1991. Dynamics of a hunted brown bear population at Black Lake, Alaska. Third annual progress report, 1990. Alaska Department of Fish & Game. Juneau 23pp.

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

RILEY, M. D. 2011. Unit 10 brown bear management report. Pages 118–121 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

TABLE 1 Unit 10 brown bear harvest data by permit hunt, regulatory years 2005 through 2009.

Hunt Number	Regulatory year	Permits issued	Hunter reports ^b	Percent did not hunt ^c	Percent successful hunters	Harvest				
						Male	(%)	Female	(%)	Total
DB375 (Fall)	2005 ^a	9	9	11	50	4	(100)	0	(0)	4
	2006	8	8	50	100	3	(75)	1	(25)	4
	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
DB376 (Spring)	2005 ^a	8	8	50	75	3	(100)	0	(0)	3
	2006	7	7	57	100	3	(100)	0	(0)	3
	2007 ^a	8	8	25	83	5	(100)	0	(0)	5
	2008 ^a	8	7	17	100	5	(83)	1	(17)	6
	2009 ^a	8	8	0	75	6	(100)	0	(0)	6
DB375 & DB376 (Combined)	2005	17	17	29	58	7	(100)	0	(0)	7
	2006	15	15	53	100	6	(86)	1	(14)	7
	2007	16	16	13	93	10	(77)	3	(23)	13
	2008	16	15	20	92	10	(91)	1	(9)	11
	2009	16	16	6	73	10	(91)	1	(9)	11

^a Includes one governor's permit^b Includes hunters that sealed a bear, but did not turn in a permit report^c Includes hunters that did not turn in a permit report and did not seal a bear

**WILDLIFE
MANAGEMENT REPORT**

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

From: 1 July 2008

To: 30 June 2010

GAME MANAGEMENT UNIT: 11 (12,895 mi²)

GEOGRAPHIC DESCRIPTION: Wrangell Mountains

BACKGROUND

Unit 11 is a large remote unit east of the Copper River where access is limited. No formal population estimates have been conducted in Unit 11, although brown bears are common. The population was reduced 1948–1953, when 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–St. 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

Brown bear harvests were monitored by sealing skulls and hides. Skulls of sealed bears were measured and the sex was recorded. A premolar tooth was extracted for aging, and information on date and location of the 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 Alaska Department of Fish and Game (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. The National Park Service (NPS) and the Federal Subsistence Board established a federal subsistence season for brown bears in 1999. The Board of Game adopted the current season dates during the March 2001 meeting. During the March 2003 meeting, the board further liberalized brown bear hunting by changing the bag limit from 1 bear every 4 years to a bear every year and dropping the \$25 resident tag fee requirement.

Hunter Harvest. Seventeen brown bears were reported killed during RY08 and 26 during RY09. The RY09 harvest was the highest ever recorded in Unit 11. Males composed 71% of the harvest in RY08 harvest and 73% in RY09 (Table 1). Since RY99, the average harvest has been 15 bears, up considerably from the average of 6 bears a year between RY79 and RY98. The mean age for males was 9.8 years in RY08. Mean ages of bears taken in Unit 11 are highly variable due to the small sample size, but do indicate large, older bears are common, and hunters can select for large trophies.

Hunter Residency and Success. Hunter residency is listed in Table 2. Prior to the national park land designation in 1979, nonresident hunters took an average of 11 bears per year (range = 2–18, RY61–RY78). Over the next 2 decades, very few nonresidents harvested brown bears each

year (average = 2, range 0–5). The harvest has slowly increased since RY03 following the regulation changes, although the recent average of 8 bears per year is still relatively low (range = 5–11, RY03–RY09). 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 increased since regulations were changed. Between RY03 and RY09, residents harvested an average of 10 bears per year (range = 6–16). Successful bear hunters averaged 5.7 days to take a bear during the RY09 season, up from 3.4 days in RY08. Annual hunter effort is highly variable in Unit 11.

Harvest Chronology. During RY09 88% of the brown bear harvest occurred during the fall (Table 3). 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. Sheep season opens 10 August, moose season opens 20 August, and goat season opens 1 September. Spring harvests have increased since RY03, averaging 4 bears each spring (range = 3–5), up from the 1-bear average (range = 0–2) between RY92 and RY02. The increased harvest likely represents an increased interest in spring hunting by both residents and nonresidents.

Transport Methods. For successful brown bear hunters in Unit 11, aircraft has generally been the most important method of transportation (Table 4). In RY07, boat hunters were the most successful, reporting taking 40% of the bears. Since RY05, an average of 20% of successful bear hunters used a boat. 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 by the National Park Service 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 the 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 prior to RY03, many problem bears are likely now taken legally.

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-St. Elias National Park or has been conveyed to 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 and visiting McCarthy has increased appreciably in recent years, and as a result, bear problems have become more frequent and could result in more DLP-killed bears. However, the NPS has identified this as a problem area and has developed a program to minimize bear problems. Overall, Unit 11 is considered good brown bear habitat because of the variety of vegetation types, large tracts of undeveloped land, the presence of ungulates and numerous salmon streams throughout the unit.

CONCLUSIONS AND RECOMMENDATIONS

Brown bear harvests in Unit 11 for the past 2 years averaged 22 bears a year, up from the 14 taken per year during the last reporting period. Although the take increased, the harvest density continues to be very low in Unit 11 with only 0.8 bears per 1,000 km² taken in RY09 as compared to 2.5 bears per 1,000 km² in Unit 13. This relates to a single bear being harvested in Unit 11 per 492 square miles. Harvested bears continue to be mostly male (72% during this reporting period), and large old bears are commonly taken in this unit. Much of the unit remains unhunted.

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 on access, 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 to continue with a harvest objective based on percent males in the harvest. 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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Please cite any information taken from this section, and reference as:

Schwanke, R.A. 2011. Unit 11 brown bear management report. Pages 122–128 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Unit 11 brown bear harvest, regulatory years 2005 through 2010

Regulatory Year	Hunter kill						Nonhunting kill ^a			Total Kill			
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.	M	F	Unk.	Total
2005													
Fall 05	10	(71)	4	(29)	0	14	0	0	0	10	4	0	14
Spring 06	1	(33)	2	(67)	0	3	1	0	0	2	2	0	4
Total	11	(65)	6	(35)	0	17	1	0	0	12	6	0	18
2006													
Fall 06	5	(63)	3	(38)	0	8	0	0	0	5	3	0	8
Spring 07	3	(60)	2	(40)	0	5	0	0	0	3	2	0	5
Total	8	(62)	5	(38)	0	13	0	0	0	8	5	0	13
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

^a Includes DLP kills, research mortalities, and other known human-caused accidental mortality.

Table 2 Unit 11 brown bear successful hunter residency, regulatory years 2005 through 2010

Regulatory year	Local ^a resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Successful hunters
2005	1	(6)	6	(35)	10	(59)	17
2006	4	(31)	2	(15)	7	(54)	13
2007	4	(27)	3	(20)	8	(53)	15
2008	4	(24)	4	(24)	9	(53)	17
2009	5	(22)	9	(39)	9	(39)	23

^a Local means residents of Unit 11 and Unit 13.

Table 3 Unit 11 brown bear harvest chronology percent by time period, regulatory years 2005 through 2010

Regulatory year	Harvest percent							n
	August	September	October	November	April	May	June	
2005	29	41	12	--	--	6	12	17
2006	0	54	8	--	--	23	15	13
2007	27	40	--	7	--	13	13	15
2008	18	59	6	--	--	12	6	17
2009	12	65	12	--	--	8	4	26

Table 4 Unit 11 brown bear harvest percent by transport method, regulatory years 2005 through 2010

Regulatory year	Percent of harvest									n
	Airplane	Horse	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walking	Unk.	
2005	65	0	6	6	0	0	6	18	0	17
2006	38	0	23	15	0	0	15	8	0	13
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

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008

To: 30 June 2010¹

LOCATION

GAME MANAGEMENT UNIT: 12 (10,107 mi²)

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

BACKGROUND

Grizzly (brown) bears are distributed throughout most of Unit 12. Approximately 2500 mi² are not commonly used by bears and are dominated by high mountains (>7000 ft) devoid of vegetation or covered by large ice fields. Little is known about historical population trends; harvest data indicate that most of the unit probably supported densities of grizzly bears that were not limited by harvest. In portions of the unit that were mined extensively or had human settlements, the bear population was regulated at lower levels.

Since 1900, grizzly bears have been sought by hunters and periodically by miners in southeastern Unit 12. Bear hunting regulations became more restrictive from statehood (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).

¹ 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/1000 mi² of useable habitat; 18.0–21.9 bears of all ages/1000 km²; 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 GOAL

- 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, 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, USA) to determine age. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 July 2008 through 30 June 2009).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

During RY08–RY09, 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/1000 mi² of useable

habitat; 18.0–21.9 bears of all ages/1000 km²; 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/1000 mi²; 20.8 bears/1000 km²; C. Gardner, ADF&G, unpublished data, Fairbanks, 2007).

During RY08 and RY09, 22 and 15 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). 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 RY08 and RY09, 59% and 64%, 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.

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 RY08–RY09 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 RY08–RY09, the grizzly bear hunting season in Unit 12 for both resident and nonresident hunters was 10 August–30 June. Cubs ≤ 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. During RY08–RY09 a \$25 resident tag fee was required to hunt grizzly bears in Unit 12.

Alaska Board of Game Actions and Emergency Orders. In spring 2010 the Alaska Board of Game eliminated the requirement for a resident \$25 grizzly bear tag fee in all of Interior Alaska game management units, including Unit 12.

Harvest by Hunters. During RY08–RY09 average annual harvest was 18 bears/year (range = 14–22), with an average of ≤ 7 adult females (range = 6–7) and an average of 63% males (range = 53–73%) (Table 1).

Hunter Residency and Success. During RY08 and RY09 nonresident hunters took 46% and 50% of grizzlies harvested (Table 2). Based on discussions with local and nonlocal residents, their interest in hunting for 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 sheep.

In RY08 and RY09 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 sheep.

Harvest Chronology. During RY08 and RY09, 96% and 65%, 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–Jun). However, during RY04–RY07, only 11% of the average annual harvest occurred during spring. The decrease in spring harvest continued in RY08–RY09 with 16% 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 RY08–RY09, most successful grizzly bear hunters used airplanes or horses to access hunting areas (Table 4). Most nonresidents used airplanes to get to their hunting area and then hunted using horses. All hunters who used horses in RY08–RY09 were guided nonresident hunters within the Nabesna, Chisana, Tetlin, and White river drainages. Use of all-terrain vehicles (ATVs) began to increase in the late 1990s, primarily by residents who hunted moose. In RY08–RY09 the majority of successful resident hunters used ATVs. Most ATV use occurred west of the Tok Cutoff 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). One grizzly bear was recorded as being taken in a defense of life or property incident during RY08–RY09 (Table 1).

HABITAT

Assessment

Unit 12 offers moderate quality grizzly bear habitat with the exception of approximately 2500 mi² of unvegetated mountaintops and ice fields. The Landfire™ (2009) satellite imagery created vegetation classifications based on 2001 Landsat™ imagery. This classification system estimates 6,572 mi² (17,021 km²) 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 mi² 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 most 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. Other habitat enhancement methods are being considered for areas managed for full fire suppression. A cooperative ADF&G–Alaska Department of Natural Resources timber harvest project has been developed for the Tok River valley. Clearcuts measuring 20–80 acres will be treated to encourage hardwood regeneration with the objective of simulating natural succession. Beginning in 2008 about 1000 acres are planned to be logged and treated during the next 5–10 years. Mechanical treatment projects began in spring 2010. Wildfires in Unit 12 burned approximately 28 mi² (73 km²) 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, Fairbanks, 2007). Long-term, bears and their prey species are expected to benefit from both natural fires and habitat enhancement efforts due to higher productivity of earlier successional stage boreal forest (Haggstrom and Kelleyhouse 1996).

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

There were no nonregulatory issues identified for grizzly bears in Unit 12 during RY08–RY09.

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/1000 mi²; 18.0–21.9 bears of all ages/1000 km²; 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.

Although research in Unit 13 indicates that brown/grizzly bear populations with access to salmon may be able to sustain a higher harvest rate than previously predicted (Tobey 2005), the current harvest in Unit 12 does not exceed 5% of the population. Higher harvest levels may also be sustainable in Unit 12, but information from Unit 13 suggests that harvest of 10% or more of the population would result in a population decline in Unit 12. Future research on Interior Alaska grizzly bear populations will help define sustainable harvest levels.

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 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). Unit 12 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 12, 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 12. During RY08–RY09, harvest of brown bears in Unit 12 likely had no effect on population trend because harvest did not exceed 5% of the total estimated population during this period and was distributed throughout the unit.

All management objectives were achieved during this report period. The 3-year mean harvest did not exceed 28 bears and included more than 55% males in the harvest. The mean harvest during RY08–RY09 was 18 bears, with 63% males. Most of the Unit 12 grizzly bear harvest was concentrated within the Tok, Nabesna, Chisana, and White river drainages. Harvest has remained relatively stable within these areas and no regulatory changes are recommended at this time.

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

BENTZEN, T. W. 2011. Unit 12 brown bear. Pages 129–140 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

TABLE 1 Unit 12 brown/grizzly bear mortality, regulatory years 1996–1997 through 2010–2011.

Regulatory year	Reported										Total estimated kill					
	Hunter kill				Nonhunting kill ^a											
	M	F	Unk	Total	M	(DLP)	F	(DLP)	Unk	(DLP)	M	(%)	F	(%)	Unk	Total
<i>1996–1997</i>																
Autumn 1996	9	8	0	17	0	(0)	0	(0)	0	(0)	9	(53)	8	(47)	0	17
Spring 1997	3	1	0	4	0	(0)	0	(0)	0	(0)	3	(75)	1	(25)	0	4
Total	12	9	0	21	0	(0)	0	(0)	0	(0)	12	(57)	9	(43)	0	21
<i>1997–1998</i>																
Autumn 1997	7	1	0	8	1	(1)	0	(0)	0	(0)	8	(89)	1	(11)	0	9
Spring 1998	3	0	0	3	0	(0)	1	(1)	0	(0)	3	(75)	1	(25)	0	4
Total	10	1	0	11	1	(1)	1	(1)	0	(0)	11	(85)	2	(15)	0	13
<i>1998–1999</i>																
Autumn 1998	6	4	0	10	0	(0)	1	(1)	0	(0)	6	(55)	5	(45)	0	11
Spring 1999	2	4	0	6	0	(0)	0	(0)	0	(0)	2	(33)	4	(67)	0	6
Total	8	8	0	16	0	(0)	1	(1)	0	(0)	8	(47)	9	(53)	0	17
<i>1999–2000</i>																
Autumn 1999	4	8	0	12	0	(0)	0	(0)	0	(0)	4	(33)	8	(67)	0	12
Spring 2000	4	1	0	5	0	(0)	0	(0)	0	(0)	4	(80)	1	(20)	0	5
Total	8	9	0	17	0	(0)	0	(0)	0	(0)	8	(47)	9	(53)	0	17
<i>2000–2001</i>																
Autumn 2000	15	9	0	24	2	(2)	1	(1)	0	(0)	17	(63)	10	(37)	0	27
Spring 2001	6	3	0	9	0	(0)	0	(0)	0	(0)	6	(67)	3	(33)	0	9
Total	21	12	0	33	2	(2)	1	(1)	0	(0)	23	(64)	13	(36)	0	36
<i>2001–2002</i>																
Autumn 2001	6	6	0	12	3	(3)	0	(0)	0	(0)	9	(60)	6	(40)	0	15
Spring 2002	2	1	0	3	0	(0)	0	(0)	0	(0)	2	(67)	1	(33)	0	3
Total	8	7	0	15	3	(3)	0	(0)	0	(0)	11	(61)	7	(39)	0	18
<i>2002–2003</i>																
Autumn 2002	1	7	0	8	0	(0)	0	(0)	0	(0)	1	(12)	7	(88)	0	8
Spring 2003	4	0	0	4	0	(0)	0	(0)	0	(0)	4	(100)	0	(0)	0	4
Total	5	7	0	12	0	(0)	0	(0)	0	(0)	5	(42)	7	(58)	0	12
<i>2003–2004</i>																
Autumn 2003	3	2	0	5	0	(0)	0	(0)	0	(0)	3	(60)	2	(40)	0	5
Spring 2004	2	1	0	3	0	(0)	0	(0)	0	(0)	2	(67)	1	(33)	0	3
Total	5	3	0	8	0	(0)	0	(0)	0	(0)	5	(63)	3	(37)	0	8

Regulatory year	Reported										Total estimated kill					
	Hunter kill				Nonhunting kill ^a											
	M	F	Unk	Total	M	(DLP)	F	(DLP)	Unk	(DLP)	M	(%)	F	(%)	Unk	Total
<i>2004–2005</i>																
Autumn 2004	11	10	0	21	0	(0)	0	(0)	0	(0)	11	(52)	10	(48)	0	21
Spring 2005	3	0	0	3	0	(0)	0	(0)	0	(0)	3	(100)	0	(0)	0	3
Total	14	10	0	24	0	(0)	0	(0)	0	(0)	14	(58)	10	(42)	0	24
<i>2005–2006</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>2006–2007</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>2007–2008</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>2008–2009</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>2009–2010</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>2010–2011</i>																
Autumn 2010	5	4	0	9	0	(0)	0	(0)	0	(0)	5	(56)	4	(44)	0	9

^a Includes defense of life or property (DLP) kills, research mortalities, and other known human-caused accidental mortality.

TABLE 2 Unit 12 brown/grizzly bear successful hunter residency, regulatory years 1989–1990 through 2010–2011^a.

Regulatory year	Unit resident (%)	Other residents (%)	Nonresident (%)	Total successful hunters
1989–1990	6 (46)	3 (23)	4 (31)	13
1990–1991	2 (12)	8 (47)	7 (41)	17
1991–1992	2 (17)	4 (33)	6 (50)	12
1992–1993	7 (29)	6 (25)	11 (46)	24
1993–1994	1 (6)	7 (39)	10 (56)	18
1994–1995	2 (14)	1 (7)	11 (79)	14
1995–1996	0 (0)	2 (22)	7 (78)	9
1996–1997	5 (24)	4 (19)	12 (57)	21
1997–1998	2 (18)	1 (9)	8 (73)	11
1998–1999	1 (6)	5 (31)	10 (63)	16
1999–2000	3 (18)	5 (29)	9 (53)	17
2000–2001	4 (12)	10 (30)	19 (58)	33
2001–2002	4 (27)	1 (7)	10 (67)	15
2002–2003	4 (33)	1 (8)	7 (58)	12
2003–2004	1 (13)	2 (25)	5 (63)	8
2004–2005	3 (13)	5 (21)	16 (67)	24
2005–2006	2 (9)	3 (14)	17 (77)	22
2006–2007	1 (6)	4 (23)	12 (71)	17
2007–2008	4 (36)	2 (18)	5 (45)	11
2008–2009	2 (9)	10 (45)	10 (45)	22
2009–2010	4 (29)	3 (21)	7 (50)	14
2010–2011 ^b	2 (22)	5 (56)	2 (22)	9

^a Does not include defense of life or property kills or illegal kills.

^b Preliminary data, autumn only.

TABLE 3 Unit 12 brown/grizzly bear harvest chronology by month, regulatory years 1989–1990 through 2010–2011^a.

Regulatory year	Harvest chronology by month							Total
	Aug (%)	Sep (%)	Oct (%)	Nov (%)	Apr (%)	May (%)	Jun (%)	
1989–1990	0 (0)	10 (83)	0 (0)	0 (0)	0 (0)	2 (17)	0 (0)	13 ^b
1990–1991	0 (0)	11 (65)	0 (0)	0 (0)	1 (6)	5 (29)	0 (0)	17
1991–1992	1 (8)	9 (75)	0 (0)	0 (0)	1 (8)	1 (8)	0 (0)	12
1992–1993	0 (0)	14 (58)	2 (8)	2 (8)	0 (0)	6 (25)	0 (0)	24
1993–1994	0 (0)	15 (83)	1 (6)	0 (0)	1 (6)	1 (6)	0 (0)	18
1994–1995	0 (0)	11 (79)	0 (0)	0 (0)	1 (7)	2 (14)	0 (0)	14
1995–1996	0 (0)	6 (67)	0 (0)	0 (0)	0 (0)	3 (33)	0 (0)	9
1996–1997	1 (5)	16 (76)	0 (0)	0 (0)	0 (0)	4 (19)	0 (0)	21
1997–1998	0 (0)	8 (73)	0 (0)	0 (0)	0 (0)	3 (27)	0 (0)	11
1998–1999	0 (0)	9 (56)	1 (6)	0 (0)	0 (0)	6 (38)	0 (0)	16
1999–2000	0 (0)	11 (65)	1 (6)	0 (0)	0 (0)	5 (29)	0 (0)	17
2000–2001	0 (0)	23 (70)	1 (3)	0 (0)	0 (0)	9 (27)	0 (0)	33
2001–2002	0 (0)	12 (80)	0 (0)	0 (0)	0 (0)	3 (20)	0 (0)	15
2002–2003	0 (0)	6 (50)	2 (17)	0 (0)	0 (0)	4 (33)	0 (0)	12
2003–2004	0 (0)	5 (63)	0 (0)	0 (0)	0 (0)	3 (37)	0 (0)	8
2004–2005	6 (25)	13 (54)	2 (8)	0 (0)	0 (0)	2 (8)	1 (4)	24
2005–2006	11 (50)	9 (41)	0 (0)	0 (0)	0 (0)	2 (9)	0 (0)	22
2006–2007	6 (35)	10 (59)	0 (0)	0 (0)	0 (0)	1 (6)	0 (0)	17
2007–2008	2 (18)	6 (54)	1 (9)	0 (0)	0 (0)	0 (0)	2 (18)	11
2008–2009	5 (23)	16 (73)	0 (0)	0 (0)	0 (0)	1 (4)	0 (0)	22
2009–2010	5 (36)	4 (29)	0 (0)	1 (7)	0 (0)	3 (21)	1 (7)	14
2010–2011 ^c	2 (22)	6 (67)	1 (11)	0 (0)				9

^a Does not include defense of life or property kills or illegal kills.^b Includes 1 bear killed in December.^c Preliminary data, autumn only.

TABLE 4 Unit 12 brown/grizzly bear harvest by transport method, regulatory years 1989–1990 through 2010–2011^a.

Regulatory year	Harvest by transport method (%)									<i>n</i>
	Airplane	Horse	Boat	ATV	Snowmachine	ORV	Highway vehicle	Walking	Unk	
1989–1990	4 (31)	2 (15)	1 (8)	0 (0)	1 (8)	4 (31)	0 (0)	0 (0)	1 (8)	13
1990–1991	6 (35)	4 (24)	0 (0)	0 (0)	0 (0)	2 (12)	3 (18)	1 (6)	1 (6)	17
1991–1992	6 (50)	2 (17)	0 (0)	0 (0)	1 (8)	0 (0)	1 (8)	1 (8)	1 (8)	12
1992–1993	10 (42)	7 (29)	0 (0)	1 (4)	2 (8)	0 (0)	2 (8)	0 (0)	2 (8)	24
1993–1994	6 (33)	4 (22)	0 (0)	2 (11)	0 (0)	0 (0)	2 (11)	3 (17)	1 (6)	18
1994–1995	4 (29)	7 (50)	0 (0)	1 (7)	0 (0)	0 (0)	2 (14)	0 (0)	0 (0)	14
1995–1996	1 (11)	7 (78)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (11)	0 (0)	9
1996–1997	4 (19)	10 (48)	1 (5)	4 (19)	0 (0)	1 (5)	1 (5)	0 (0)	0 (0)	21
1997–1998	2 (18)	8 (73)	1 (9)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	11
1998–1999	8 (50)	3 (19)	0 (0)	1 (6)	0 (0)	2 (13)	2 (13)	0 (0)	0 (0)	16
1999–2000	12 (71)	2 (12)	0 (0)	3 (18)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17
2000–2001	10 (30)	12 (36)	1 (3)	5 (15)	0 (0)	0 (0)	5 (15)	0 (0)	0 (0)	33
2001–2002	3 (20)	6 (40)	0 (0)	5 (33)	0 (0)	0 (0)	0 (0)	1 (7)	0 (0)	15
2002–2003	3 (25)	4 (33)	0 (0)	2 (17)	0 (0)	1 (8)	1 (8)	1 (8)	0 (0)	12
2003–2004	4 (50)	1 (13)	0 (0)	2 (25)	0 (0)	0 (0)	1 (13)	0 (0)	0 (0)	8
2004–2005	10 (42)	6 (25)	1 (4)	4 (17)	0 (0)	0 (0)	1 (4)	2 (8)	0 (0)	24
2005–2006	12 (55)	6 (27)	0 (0)	2 (9)	0 (0)	0 (0)	0 (0)	2 (9)	0 (0)	22
2006–2007	7 (41)	6 (35)	1 (6)	2 (12)	0 (0)	0 (0)	1 (6)	0 (0)	0 (0)	17
2007–2008	5 (45)	2 (18)	0 (0)	2 (18)	0 (0)	0 (0)	1 (9)	1 (9)	0 (0)	11
2008–2009	4 (18)	5 (23)	1 (5)	8 (36)	0 (0)	0 (0)	1 (5)	3 (14)	0 (0)	22
2009–2010	4 (29)	5 (36)	0 (0)	3 (21)	0 (0)	0 (0)	1 (7)	1 (7)	0 (0)	14
2010–2011 ^b	5 (55)	0 (0)	0 (0)	3 (33)	0 (0)	0 (0)	0 (0)	0 (0)	1 (11)	9

^a Does not include defense of life or property kills or illegal kills.^b Preliminary data, autumn only.

**WILDLIFE
MANAGEMENT REPORT**

Alaska Department of Fish and Game
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008

To: 30 June 2010

GAME MANAGEMENT UNIT: 13 (23,367 mi²)

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 increased steadily 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 positive, 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 1 bear a year between 1983 and 1988, and again starting in 1995. Brown bear harvests have been the highest in those years with the bag limit at 1 bear per year and the resident tag 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 subunit 13A was initiated in 2006; 133 bears have been captured to date. Monitoring of movements, productivity, and survival is ongoing.

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). Past capture-mark-recapture (CMR) brown bear density estimates are available for 2 study areas in subunit 13E and a study area in western subunit 13A. More recently, line transect surveys were used to derive density estimates for all of subunit 13E and for subunits 13A and 13B combined, although these estimates are currently being revised.

On the upper Susitna River (13E), the 1987 CMR estimate of 6.46 independent bears/1,000 km² (Ballard et al. 1982; Miller 1988, 1995) was down from the 1979 removal-based estimate of 10.5 independent bears/1,000 km². 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 Susitna Hydroelectric (Su-Hydro) Study Area, which is on the border between 13A and 13E, CMR density estimates in 1985 and 1995 were 18.75 and 23.31 independent bears/1,000 km² (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 statistical 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).

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 km² (27.5 all bears/1,000 km²). Another CMR density estimation survey is scheduled for this area in May 2011.

POPULATION SIZE

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. Extrapolations from density estimates in the Upper Susitna River and Su-Hydro areas from 1979, 1985, and 1987 (Ballard et al. 1982; Miller 1987, 1988) yielded a recalculated 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).

POPULATION COMPOSITION

Miller (1993) reported that between 1980 and 1988, on average, reproductive brown bear sows 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 2009 indicate average litter sizes of 2.2 cubs of the year (n=37), 2.1 yearlings (n=27), and 2.0 two-year-olds (n=26).

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

Testa et al. (1998) reported 48.4 boars:100 sows 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 much more accessible to hunters.

Capture data from the same Nelchina Study Area between 2006 and 2008 indicated only 31.6 boars:100 sows (n=75), initially suggesting a decline from 1998. However, capture data from 2009 and 2010 indicated 108 boars:100 sows (n=52). Of the bears captured in 2009 and 2010, 27 were 2 years of age, and of those, 66% were male. When all capture data from 2006 to 2010 was combined, the ratio was 54.9 boars:100 sows (n=127).

MORTALITY

Harvest

Season and Bag Limit. Since regulatory year (RY) 2002 (RY02 = 1 July 2002 through 30 June 2003), there has been no closed season in Unit 13, except for that portion of subunit 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 subunit 13E within Denali State Park. The bag limit is 1 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 brown bear numbers should be reduced to increase moose calf survival.

Hunter Harvest. The total reported take of brown bears was 144 (Table 1) in RY09. Since regulations were liberalized in RY95, a total of 2,100 bears have been taken in Unit 13. Take since RY95 has averaged 140 bears a year with no trend evident. Annual fluctuations are mostly attributable to weather related hunter access.

Of the brown bear taken in RY09, 28 were from subunit 13A, 26 were from subunit 13B, 14 were from subunit 13C, 25 were from subunit 13D, and 51 were from subunit 13E. The reported bear harvest from subunit 13E over time has been greater than any other subunit.

Hunters harvested 80 males (59%) and 55 females (41%; Table 1) during RY09. The mean skull size was 20.8 inches for males and 20.0 inches for females. Since RY95, when harvests increased, males have composed 57% of the harvest. The mean ages for bears taken in RY09 are not yet available. Mean ages from RY08 were 5.1 for males and 7.5 for females. 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) suggested that even with a 50:50 sex ratio at birth, immigration from lighter or unhunted areas could effectively keep subadult harvest biased towards boars through age 5.

In most years, the mean age of males taken in the fall was lower than males taken in the spring. Because older males are the first to emerge from dens, they are more prevalent in the spring harvests, 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. Alternately, females taken during the fall tend to be older, larger bears compared to females taken in the spring. This

is likely attributable to the protection of sows with cubs. The majority of 2-year-old brown bears are still with the sow during the spring season, but leave the sow before the fall season. While brown bears are legal to harvest as 2-year-olds, hunters tend to avoid shooting bears that are in family groups.

The high reported harvests since RY95 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 more than 2.0 years old. 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) represents an estimated harvest rate of just over 10%. This harvest rate exceeds all modeled sustainable rates for Alaska grizzlies or brown bears, yet Unit 13 harvests have been stable for the past 15 years.

Hunter Residency and Success. Successful hunter residency data are presented in Table 2. Nonresident hunters took 33 (24%) bears in RY09. The number of bears taken by nonresidents has averaged 34 (range = 21–48) over the last 30 years and no trend is evident. The lack of increase in nonresident harvests is likely due to the high cost of guided hunts which limits participation by most nonresidents (nonresident hunters are required to hunt brown bear with a guide or next of kin). Local residents took 20 (15%) bears in RY09 and nonlocal Alaska residents took 82 (61%). There is considerable variation in the number of bears taken by local residents, and it 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. Over the past 5 years, an average of 7% (range = 4–10%) of successful resident brown bear hunters in Unit 13 had purchased a locking tag.

Successful Unit 13 brown bear hunters averaged 4.1 days per bear harvested in RY09. Since RY05, hunters in Unit 13 have averaged 4.0 days per bear. Successful nonresidents tend to spend 2 additional days in the field versus successful residents.

Harvest Chronology. For the RY09 regulatory year, 77% of the harvest was during the fall and 23% in the spring (Table 3). The fall season continues to be the most important for bear harvests in Unit 13. Spring harvests have fluctuated between years but no trend is evident. Annual variation is mostly related to snow conditions and hunter access in relation to den emergence. Snow cover was minimal late in the 2009–10 winter, and snow conditions deteriorated early, leading to a lower than average April harvest. Deep persistent snow cover can result in an increase in April harvests, while a particularly late breakup can interfere with off-road vehicle (ORV) access and limit harvests later in May.

Since RY80, when the spring season was implemented, males have averaged 68% of the spring harvest (range = 49–83%) and 58% (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 over the last 20 years. Aircraft and highway vehicles are still consistently reported, while snowmachine use is highly variable and dependent on snow conditions during the spring season. Snowmachine use has been important since the late 1980s, when design changes improved mobility and reliability, permitting hunters to travel into areas formerly considered too rough or remote.

OTHER MORTALITY

In RY09 six brown bears were reported killed in defense of life or property (DLP). This is up dramatically from previous years, and the highest annual DLP take since RY91. Of the DLP bears reported, 4 were in the same location taken by the same person. Since the year-round season was adopted in RY03, most problem bears have been harvested under general hunting regulations and the hunter has been able to keep the bear. Between RY03 and RY08, no more than 1 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, home sites, and mining claims. The state requirement to salvage and surrender the hides of DLP bears often deters individuals from reporting kills. Bears may also not be reported because individuals fear they may be cited if the Alaska Wildlife Troopers deem their DLP claim invalid. There were no trends evident in accidental or illegal 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 become more numerous. 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. Publications, including news articles about bear problems and maulings, encourage and maintain the public's fear of 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

A major problem pertaining to brown bear management is the difficulty in obtaining population data. Because of their relatively low density and secretive behavior, observing and counting 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 census techniques.

There are many published studies warning managers of the sensitivity of brown bear populations to overharvest, but none thus far have been able to show continued, long-term declines in brown bear numbers due to hunting.

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 13A, a project that began in May

2006. A CMR survey will be done in May 2011 using a technique comparable to the survey used to produce the 1998 population estimate.

Capture data through 2010 suggests brown bears are still abundant and that the population is more resilient than previously thought. So far we have not been able to detect a decline in brown bear numbers in Unit 13, despite the liberal brown bear harvest regulations that have been in effect for many years. Hunters can legally harvest any brown bear that is 2 years of age or older, year-round, and the bag limit is 1 bear per year.

Research since 2005 has documented continued high neonatal moose calf mortality from bears in subunit 13A (Bruce Dale, ADF&G biologist, personal communication), however there are very limited options for further increasing the take of brown bears in this area. One potential option to further increase hunting effort in Unit 13 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 coastal brown bears by Boone & Crocket. An attempt to reclassify these bears in Boone & Crocket as grizzlies was unsuccessful. Opening Unit 13 to nonresidents, with no guide requirement, would be the only way to create a new pool of hunters looking for an inexpensive opportunity to take a legal brown bear, and subsequently increase the harvest.

Whether continued harvests at the current level can reduce bear numbers is unknown, let alone a reduction substantial enough to appreciably reduce predation on moose calves. 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 (sows with cubs of the year or yearlings) may protect enough sows to maintain recruitment, and eliminate the possibility of or at least delay a population reduction.

I recommend maintaining the current season, bag limit, and resident tag fee waiver. The current high harvest pressure should be maintained to determine the impacts on this interior-type brown bear population. To date we can only conclude that the brown bear population in the study area did not decline dramatically when harvests were increased as was originally predicted by other studies. A slow decline in the population may be occurring, but the change may be difficult to detect due to the difficulty of enumerating bears. It would be premature to substantially alter the regulations at this point, before fully determining the effects of current harvest levels. Regardless of anticipated results, we recommend continuing the 13A research and completion of another CMR census for comparison to past estimates.

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

Schwanke, R.A. 2011. Unit 13 brown bear management report. Pages 141–150 in P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Unit 13 brown bear harvest, regulatory years 2005 through 2009.

Regulatory Year	Hunter kill						Nonhunting kill ^a			Total Kill			
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.	M	F	Unk.	Total
2005													
Fall 05	49	(53)	44	(47)	0	93	0	0	0	49	44	0	93
Spring 06	27	(64)	15	(36)	0	42	0	0	0	27	15	0	42
Total	76	(56)	59	(44)	0	135	0	0	0	76	59	0	135
2006													
Fall 06	44	(58)	32	(42)	0	76	0	1	0	44	33	0	77
Spring 07	27	(53)	24	(47)	0	51	0	0	0	27	24	0	51
Total	71	(56)	56	(44)	0	127	0	1	0	71	57	0	128
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	(73)	12	(27)	0	44	0	0	0	32	12	0	44
Total	79	(51)	77	(49)	0	156	0	3	0	79	80	0	159
2009													
Fall 09	63	(60)	42	(40)	0	105	3	3	0	66	45	0	111
Spring 10	17	(57)	13	(43)	1	31	1	1	0	18	14	1	33
Total	80	(59)	55	(41)	1	136	4	4	0	84	59	1	144

^a Includes DLP kills, research mortalities, and other known human-caused accidental mortality.

Table 2. Unit 13 brown bear successful hunter residency, regulatory years 2005 through 2009.

Regulatory Year	Local ^a Resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Successful hunters ^b
2005	17	(12)	86	(64)	32	(24)	135
2006	11	(9)	92	(72)	24	(19)	127
2007	6	(4)	98	(66)	44	(30)	149
2008	12	(7)	95	(62)	47	(31)	156
2009	20	(15)	82	(61)	33	(24)	136

^a Local resident means resident of GMU 13.

^b Includes unknown residency.

Table 3. Unit 13 brown bear harvest chronology percent by time period, regulatory years 2005 through 2009.

Regulatory Year	Harvest periods																		n
	July		August		September		October		November		March		April		May		June		
	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	
149 2005	5	(7)	22	(30)	36	(48)	6	(8)	0	(0)	0	(0)	13	(18)	10	(14)	8	(10)	135
2006	10	(13)	12	(15)	34	(43)	2	(3)	2	(2)	1	(1)	13	(17)	14	(18)	12	(15)	127
2007	9	(13)	21	(31)	28	(40)	3	(5)	0	(0)	0	(0)	7	(10)	15	(22)	17	(25)	146
2008	10	(15)	20	(30)	36	(56)	7	(11)	0	(0)	0	(0)	7	(11)	10	(16)	10	(16)	155
2009	10	(13)	15	(21)	45	(61)	7	(9)	0	(0)	0	(0)	4	(5)	13	(18)	6	(8)	135

Table 4. Unit 13 brown bear harvest percent by transport method, regulatory years 2005 through 2009.

Regulatory Year	Airplane	Horse	Boat	4-wheeler	Snowmachine	ORV	Highway vehicle	Walking	<u>n</u> ^a
2005	19%	1%	9%	37%	10%	0%	16%	7%	134
2006	13%	0%	18%	27%	15%	5%	12%	10%	123
2007	20%	0%	17%	30%	7%	4%	13%	9%	147
2008	22%	0%	13%	30%	5%	5%	15%	10%	153
2009	20%	0%	10%	35%	7%	2%	18%	8%	134

^a Includes only reported method of transportation.

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 14A and 14B (4,713 mi²)

GEOGRAPHIC DESCRIPTION: Upper Cook Inlet

BACKGROUND

The brown bear populations in Unit 14 have been influenced by agricultural settlement, increased development, urbanization, and other human activities. Grauvogal's 1990 estimate of 169–262 brown bears for all of Unit 14 was later refined by Harkness (1993) to 185–239 brown bears. 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, however the number of bears reported to have been killed in defense of life and property has been decreasing over the past 20 years.

The management direction for subunits of Unit 14 has diverged over time. The management of brown bears in subunit 14C has focused on preventing bear-human conflicts. While preventing bear-human conflicts in subunits 14A and 14B is important, more emphasis has been placed on providing a harvest opportunity for hunters in both subunits and decreasing bear predation on a recovering moose population in subunit 14B.

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 the majority of Unit 14. Previously, biologists have attempted to estimate the Unit 14 brown bear population based on anecdotal information (see Background section). 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.

MORTALITY

Harvest

Season and Bag Limit. In subunits 14A and 14B the season was 1 September–31 May, and the bag limit for brown bears was 1 bear every 4 years during regulatory year (RY) 2008 (RY08 = 1 July 2008 through 30 June 2009). In RY09 brown bear hunting was liberalized in subunit 14B. The bag limit was increased to 1 bear every year and the season was lengthened to 10 August–31 May. The season and bag limit did not change in Subunit 14A. Harvesting cubs and sows accompanied by cubs was prohibited.

Board of Game Actions. During spring 2009 the Board of Game liberalized the season and bag limit in subunit 14B to reduce the brown bear population in the subunit and reduce brown bear predation on moose calves.

Hunter Harvest. During the past 5 years hunters harvested an average of 23.4 bears (range 17–30) (Table 1). This 5-year average is greater than the 19.6 average for the previous 5-year period (range 9–27). The female component of the brown bear harvest for the past 5 years ranged 43–57%, averaging 48.2%. The average yearly total of female bears >2 years of age killed in the 5-year period RY05–RY09 was 11.4 (including DLP—defense of life or property—and other nonhunting mortality).

Hunter Residency. Nonresidents harvested an average of 7.0 bears from RY05–RY09 (Table 2). All remaining bears were harvested by residents of Unit 14 during this period, except for 2 bears taken by Alaska residents that do not reside in Unit 14 (nonlocal) in RY05 and RY07 (1 bear taken during each regulatory year).

Harvest Chronology. Peak harvests occur in September and May (Table 3). During RY05–RY09 on average 57.6% of the harvest occurred in 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 (Table 3).

Transport Methods. During RY05–RY09 29.4% 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 (20.6%), which reflects the difficulty of accessing much of the area with ground transportation.

Other Mortality

Defense of life or property (DLP) is the primary cause of nonhunting mortality. There were 4 reported nonhunting mortalities in RY08 and 2 in RY09 (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. The percentage of females in the harvest has stayed relatively consistent at about 35%. The current harvest appears to be sustainable.

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. Information should also be distributed on how people should to 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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Please cite any information taken from this section, and reference as:

Peltier, T. C. 2011. Unit 14 brown bear management report. Pages 151–157 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Subunits 14A and 14B brown bear harvest, regulatory years 2004 through 2009.

Regulatory Year	Reported						Estimate of Unreported kill			Total estimated kill						
	Hunter kill				Nonhunting kill ^a											
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
2004																
Fall 2004	3	(75)	1	(25)	0	4	1	0	0	1	4	(80)	1	(20)	1	6
Spring 2005	5	(100)	0	(0)	0	5	1	0	0	1	6	(100)	0	(0)	1	7
Total	8	(89)	1	(11)	0	9	2	0	0	2	10	(91)	1	(9)	2	13
2005																
Fall 2005	10	(53)	9	(47)	0	19	0	0	0	1	10	(53)	9	(47)	1	20
Spring 2006	2	(67)	1	(33)	0	3	0	0	0	1	2	(67)	1	(33)	1	4
Total	12	(55)	10	(45)	0	22	0	0	0	2	12	(55)	10	(45)	2	24
2006																
Fall 2006	4	(40)	4	(50)	0	8	1	1	0	1	5	(50)	5	(50)	1	11
Spring 2007	8	(87)	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
2007																
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
2008																
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
2009																
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

^aIncludes DLPs, illegal kills, and other human-caused mortality unrelated to hunting.

Table 2. Subunits 14A and 14B brown bear successful hunter residency, regulatory years 2000 through 2009.

Regulatory year	Local ^a resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
2000	9	(69)	0	(0)	4	(31)	13
2001	13	(72)	0	(0)	5	(28)	18
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

^aUnit 14 residents

Table 3. Subunits 14A and 14B brown bear harvest chronology percent by month, regulatory years 2000 through 2009.

Regulatory year	Harvest periods							<i>n</i>
	August	September	October	November	March	April	May	
2000	0	38	54	0	0	0	8	13
2001	0	56	11	0	0	22	11	18
2002	0	76	6	6	0	0	12	17
2003	0	38	10	0	0	5	48	21
2004	0	45	0	0	0	33	22	9
2005	4	82	0	0	0	9	5	22
2006	0	41	6	0	0	41	12	17
2007	0	73	3	0	0	12	12	26
2008	0	57	17	0	3	3	20	30
2009	10	35	15	5	0	10	25	20

Table 4. Subunits 14A and 14B brown bear harvest percent by transport method, regulatory years 2000 through 2009.

REGULATORY year	Percent of harvest							<i>n</i>
	Airplane	Horse	Boat	ATV/ORV	Snowmachine	Highway vehicle	Foot	
2000	29	0	14	22	7	7	21	14
2001	16	0	11	26	21	16	10	19
2002	12	0	12	53	0	17	6	17
2003	14	0	18	36	4	14	14	22
2004	10	0	10	20	30	10	20	10
2005	18	0	27	18	5	23	9	22
2006	23	0	6	23	24	12	12	17
2007	26	0	11	22	11	26	4	27
2008	20	0	17	47	3	3	10	30
2009	16	0	16	37	5	10	16	19

WILDLIFE
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 2008

To: 30 June 2010

GAME MANAGEMENT UNIT: 14C (1,912 mi²)

GEOGRAPHIC DESCRIPTION: Municipality of Anchorage

BACKGROUND

Prior to 2010, the brown bear management report for Game Management Unit (GMU) 14 included population and harvest trends for Subunits 14A, 14B, and 14C, as well as how these trends related to Unit 14 as a whole. In 2010, Unit 14 was split between Region II and the newly created Region IV. Subunits 14A and 14B were included in Region IV, while subunit 14C remained in Region II. The following report will focus on subunit 14C, referred to hereafter in this report as Unit 14C.

Brown bears in Unit 14 have been influenced by agricultural settlement, increased development, urbanization, and other human activities. Grauvogel's 1990 estimate of 169–262 brown bears was later refined by Harkness (1993) to 185–239 brown bears. Del Frate (2003) and Kavalok (2007) noted that reports of bears in residential areas, and human–brown bear encounters were more common than they had been 10–15 years earlier. Farley et al. (2008) estimated a minimum of 36 brown bears using salmon streams in the Anchorage and Eagle River areas.

Approximately 40 percent of the state's population lives in the Municipality of Anchorage, Unit 14C, which contains large natural areas adjacent to areas of human development. Due to the increasing number of outdoor recreationists and residential neighborhoods in prime bear habitat, as well as a healthy population of brown bears, human–bear encounters and conflicts are high and have increased in recent years. In the past 2 decades, 10 people have been injured and 2 killed by brown bears in Unit 14C. There are no documented maulings before the late 1980s, and the number of people injured in the last decade (2000–2010; n=7) is similar to the number of people injured or killed in the previous decade (1989–1998; n=6). During the last decade (2000–2009), 25 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. The ADF&G has conducted two detailed public opinions 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

Game Management Unit 14C goals have been to provide an opportunity to view, photograph, and enjoy brown bears, and secondarily, to provide an opportunity to hunt brown bears under aesthetically pleasing conditions.

MANAGEMENT OBJECTIVES

- To maintain a brown bear population that is largely unaffected by human harvest.
- To allow optimum opportunity to hunt brown bears with an annual allowable harvest (AAH) of 5-6 bears, including no more than 2 females greater than 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. Recent public reports and human–bear encounters indicate a viable brown bear population throughout Unit 14C. Farley et al. (2008) estimated a minimum number of 36 brown bears using salmon streams within Elmendorf Air Force Base (AFB), Fort Richardson, Eagle River drainage, and portions of the Anchorage Bowl. A rough population estimate for brown bears in GMU 14C (65–75 brown bears) has been based on comparison of density estimates from other areas in Alaska. While this may be a conservative estimate, we do not believe the population to be as high as 100 bears. Regardless, the population appears stable.

MORTALITY

Harvest

Seasons and Bag Limits. The Remainder of 14C was open to a general harvest for brown bears from 1 September–31 May, with a bag limit of 1 bear every 4 regulatory years. Beginning in 2008, the Chugach State Park Management Area was opened to a drawing permit hunt from 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 through 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 Unit 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 relative within second degree of kindred.

There was no open season for brown bear hunting in the Fort Richardson, Anchorage, and Birchwood management areas, as well as on Elmendorf AFB.

Board of Game Actions. In 2009 the Board of Game extended the hunting season for DB470 in Chugach State Park Management Area to the day after Labor Day through 31 May. In addition, the upper Eagle River Area was also included into this hunt. The Board also approved the creation of an archery-only drawing permit hunt for brown bears in the Chugach State Park portion of the Eklutna Management Area (DB468). The archery-only season was the day after Labor Day through 31 May, with a bag limit of 1 bear every regulatory year.

Hunter Harvest. During this reporting period, hunters harvested an average of 1.5 bears each year (range 1–2; Table 1). This 2-year average is less than the average of 2 bears for 2006–07 and 2007–08. There were no female brown bears harvested for the reporting period.

Hunter Residency. Nonresidents did not harvest any bears during this reporting period (Table 2). All remaining bears were harvested by residents of Unit 14C during this period, except 1 taken by a nonlocal resident in 2009.

Harvest Chronology. Harvest chronology in Unit 14C peaked during September and secondarily in May (Table 3). In 2008, 100% of the bears were harvested during the fall, whereas in 2009, 100% of the brown bears were taken in the spring. During the period of 2005 to 2009, 60% of the harvest occurred in September. Forty percent of brown bears were opportunistically taken by residents, while the rest were actively hunted.

Transport Methods. Most (80%) of brown bear hunters preferred using foot transport over any other method during the regulatory years 2008 and 2009 (Table 4; a regulatory year [RY] runs from 1 July through 30 June; e.g., RY 2008 = 1 July 2008 through 30 June 2009). However, the propensity for foot transport is most likely a direct reflection of motor vehicle restrictions in Chugach State Park and Chugach National Forest lands. In reality, most of these hunters accessed trailheads by automobile. During this same period, 1 other hunter (20%) used a boat to access hunting areas.

Other Mortality

Defense of life or property (DLP) is the primary cause of nonhunting mortality. There were 9 reported nonhunting mortalities in 2008 and 8 in 2009. We estimate an additional 2 bears per year killed and not reported (Table 1). In Unit 14C, most brown bears were shot as DLPs in either June or August. In 2008, 2 cubs were captured after a sow was shot by ADF&G biologists, and they were sent to a zoo outside of Alaska. Three brown bears were killed by vehicles and 1 cub of the year was killed by a train in the summer of 2008 in Unit 14C. The average yearly total of female bears >2 years of age known killed in the reporting period 2008–2010 was 2.5

(including DLP - defense of life or property- and other nonhunting mortality). While the overall brown bear mortality rate was high considering the estimated population level, the majority of nonhunting mortalities were subadult bears. The removal of nonbreeding subadult bears has less of an effect on overall population status compared to the removal of adult bears.

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 both regulatory years, 2008 and 2009. While hunter harvest remains low in the Anchorage area, DLP kills are high and increasing. The high proportion of subadults killed in defense of life and 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. Regardless, a reduction in the number of DLP kills is advisable to maintain the population at the current level.

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. 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. In 2002 and 2005, productions titled “Staying Safe in Bear Country” and “Living in Bear Country,” respectively, were produced with input from staff bear biologists, and made available to the public at ADF&G area offices and at the regional headquarters office. Despite conflicts with brown bears, 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 present a heightened public safety concern (Responsive Management 2010).

In Unit 14C we recommend the following changes to the management Goals and Objectives:

Management Goals:

- 1) Maintain a healthy brown bear population while minimizing negative bear human encounters, and
- 2) Provide an opportunity to hunt brown bear under aesthetically pleasing conditions.

Management Objectives:

- 1) Provide an opportunity to view and photograph,
- 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 8 bears > 2 years of age.

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

Coltrane, J. 2011. Unit 14C brown bear management report. Pages 158–165 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska

TABLE 1 Game Management Unit 14C brown bear harvest, 2005–2010

Regulatory year	Reported									Estimated unreported kill	Total estimated kill					
	Hunter kill					Nonhunting kill*										
	M	F	(%)	Unk.	Total	M	F	Unk.	M		(%)	F	(%)	Unk.	Total	
2005																
Fall 2005	0	0	(0)	0	0	0	2	2	1	0	(0)	2	(100)	3	5	
Spring 2006	0	0	(0)	0	0	0	0	0	1	0	(0)	0	(0)	1	1	
Total	0	0	(0)	0	0	0	2	2	2	0	(0)	2	(100)	4	6	
2006																
Fall 2006	0	2	(100)	0	2	1	0	0	1	1	(33)	2	(67)	1	4	
Spring 2007	0	0	(0)	0	0	0	0	1	1	0	(0)	0	(0)	2	2	
Total	0	2	(100)	0	2	1	0	0	2	1	(33)	2	(67)	3	6	
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	0	1	2	(100)	0	(0)	1	3	
Total	0	0	(0)	0	0	3	0	2	2	3	(100)	0	(0)	4	7	
2008																
Fall 2008	1	0	(0)	0	1	2	2	3	1	3	(60)	2	(40)	4	9	
Spring 2009	0	0	(0)	0	0	1	0	1	1	1	(100)	0	(0)	2	3	
Total	1	0	(0)	0	1	3	2	4	2	4	(67)	2	(33)	6	12	
2009																
Fall 2009	0	0	(0)	0	0	1	2	2	1	1	(33)	2	(67)	3	6	
Spring 2010	2	0	(0)	0	2	0	1	2	1	2	(67)	1	(33)	3	6	
Total	2	0	(0)	0	2	1	3	4	2	3	(50)	3	(50)	6	12	

*Includes DLP kills, illegal kills, other known human-caused accidental mortality

TABLE 2 Subunit 14C brown bear successful hunter residency, 2005–2009

Regulatory year	Local resident*	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
2005	0	(0)	0	(0)	0	(0)	0
2006	1	(50)	1	(50)	0	(0)	2
2007	0	(0)	0	(0)	0	(0)	0
2008	1	(100)	0	(0)	0	(0)	1
2009	1	(50)	1	(50)	0	(0)	2

*Unit 14C residents only

TABLE 3 Subunit 14C brown bear harvest chronology percent by month, 2005–2009

Regulatory year	Harvest periods							<i>n</i>
	August	September	October	November	March	April	May	
2005	0	0	0	0	0	0	0	0
2006	0	100	0	0	0	0	0	2
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

TABLE 4 Subunit 14C brown bear harvest percent by transport method, 2005–2009

Percent of harvest								
Regulatory year	Airplane	Horse	Boat	ATV/ORV	Snowmachine	Highway vehicle	Foot	<i>n</i>
2005	0	0	0	0	0	0		0
2006	0	0	0	0	0	100	0	2
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

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 16 (12,255 mi²)

GEOGRAPHIC DESCRIPTION: West side of Cook Inlet

BACKGROUND

The brown bear population in Unit 16 was estimated in the 1990's by Griese (1993) at 586–1156. 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. The density of brown bears in Unit 16 is estimated to be approximately 26.7 bears per 1,000 km²; however, densities are not uniform in the unit. Densities vary from low in the northern and eastern portion of the units and become 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 harvests in Unit 16 have increased substantially over time with periodic liberalizations of the hunting regulations. 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 reported record harvest of 133 in RY08. During the last 5 years, the annual harvest averaged 114 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 sows 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. 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

Staff observations during the past 20 years and reports from the public indicate that a robust brown bear population remains in the unit. 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 km².

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 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 1 September–31 May in RY08, and 10 August–31 May in RY09, 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.

Board of Game Actions and Emergency Orders. In 2009 the Board of Game changed the start of the season in Unit 16A from 1 September to 10 August.

Hunter Harvest. The average annual brown bear harvest in Unit 16 was 114 bears from RY05–RY09. This included an average annual harvest of 40 females older than 2 years. Annual harvests decreased during this reporting period from an average of 115 bears per year during the RY06–RY07 reporting period to an average of 108 bears per year during the RY08–RY09 reporting period. Nonhunting mortality and estimates of unreported kills from wounding loss and poaching accounted for an average of 11.4 bears annually between RY05 and RY09 (Tables 1 and 2). The average age of female bears for this report period was 6.48 years ($n = 86$). This was higher than the 5.78 years reported for RY05–RY07 ($n=87$).

Hunter Residency and Success. Nonresident harvest increased from the previous reporting period, but was low compared to historic values. Nonresidents claimed 47% and 44% of the harvest in RY08 and RY09 respectively (Table 3). The percentage of bears taken by local residents remained small at an average of 3%.

Harvest Chronology. On average 57% of bears taken in Unit 16 during the reporting period were taken in the fall. Over the last 10 years more bears have been taken during fall than spring (Table 4). During the last 10 years there have been 2 time periods, RY01–RY02, and RY06–RY08, when there was no general resident moose hunting season. It has long been believed that some of the fall brown bear harvest is taken opportunistically by moose hunters in the unit. If this relationship were true then the fall brown bear harvest should be lower in those years where there is no moose hunting in 16B. This does not appear to be the case (see Table 2).

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

Other Mortality

During the report period there were 6 reports of nonhunting mortality (Tables 1 and 2). We estimated that approximately 10 bear kills annually might not be reported.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

A geologist working in the Rainy Pass area was attacked June 21, 2010, by a sow with a cub. The injuries were serious but not life threatening. He was medivaced 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.

Bear viewing along the lower portion of subunit 16B has been increasing in popularity. Griese (1998) noted dangerous interactions between humans and bears caused by 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). The department also assisted in the formation of a public advisory group, the Wolverine Creek Management Committee, which was charged with establishing voluntary guidelines for users. This has been in effect since the summer of 2003 with success in addressing some of the issues.

CONCLUSIONS AND RECOMMENDATIONS

The brown bear population in Unit 16 appears healthy. 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. Brown bears continue to be a significant cause of mortality for moose calves and have been contributing to the lack of recovery of the moose population in Unit 16. Liberalizations of seasons and bag limits have not resulted in a reduced population of brown bears. Given the high population of brown bears and the low 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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Peltier, T. 2011. Unit 16 brown bear management report. Pages 166–176 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Unit 16A human-caused brown bear mortality, regulatory years 2000 through 2009.

Regulatory Year	Reported									Estimate of Unreported kill	Total estimated kill					
	Hunter kill						Nonhunting kill ^a									
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
<i>2000</i>																
Fall 2000	6	(67)	3	(33)	0	9	0	0	0		6	(67)	3	(33)	0	9
Spring 2001	4	(100)	0	(0)	0	4	0	0	0		4	(100)	0	(0)	0	4
Total	10	(77)	3	(23)	0	13	0	0	0	2	10	(77)	3	(23)	2	15
<i>2001</i>																
Fall 2001	5	(71)	2	(29)	0	7	0	0	0		5	(71)	2	(29)	0	7
Spring 2002	1	(0)	0	(0)	0	1	0	0	0		1	(100)	0	(0)	0	1
Total	6	(75)	2	(25)	0	8	0	0	0	2	6	(75)	2	(25)	2	10
<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

Table 1 continued.

Regulatory Year	Reported						Nonhunting kill ^a			Estimate of Unreported kill	Total estimated kill					
	Hunter kill						M	F	Unk.		M	(%)	F	(%)	Unk.	Total
<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
<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)	2	20

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

Table 2. Unit 16B human-caused brown bear mortality, regulatory years 2000 through 2009.

Regulatory Year	Reported						Nonhunting kill ^a			Estimate of Unreported kill	Total estimated kill					
	Hunter kill			Total							M	(%)	F	(%)	Unk.	Total
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
2000																
Fall 2000	17	(44)	22	(56)	0	39	1	5	0		18	(40)	2	(60)	0	45
Spring 2001	25	(89)	3	(11)	0	28	0	0	0		25	(89)	3	(11)	0	28
Total	42	(63)	25	(37)	0	67	1	5	0	6	43	(59)	3	(41)	6	79
2001																
Fall 2001	22	(48)	24	(52)	0	46	0	0	0		22	(48)	2	(52)	0	46
Spring 2002	32	(94)	2	(6)	0	34	0	0	0		32	(94)	2	(6)	0	34
Total	54	(67)	26	(33)	0	80	0	0	0	6	54	(67)	2	(33)	6	86
2002																
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
2003																
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
2004																
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
2005																
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

Table 2 continued.

Regulatory Year	Reported									Estimate of Unreported kill	Total estimated kill					
	Hunter kill						Nonhunting kill ^a									
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
<i>2006</i>																
Fall 2006	35	(62)	21	(38)	0	56	0	0	0		35	(62)	21	(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)	26	(27)	9	106
<i>2007</i>																
Fall 2007	38	(59)	26	(41)	0	64	0	0	0		38	(59)	26	(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)	33	(33)	9	109
<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	0	1	0		27	(87)	4	(13)	0	31
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

^a Includes DLP kills, illegal kills, other known human-caused accidental mortality.^b Includes one bear killed where subunit could not be determined.

Table 3. Unit 16 brown bear successful hunter residency, regulatory years 2000 through 2009.

Regulatory year	Local ^a resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total ^b successful hunters
2000	3	(4)	27	(34)	50	(62)	80
2001	4	(5)	38	(43)	46	(52)	88
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

^a Unit 16 residents

^b Includes unknown residency

Table 4. Unit 16 brown bear harvest chronology percent by month, regulatory years 2000 through 2009.

Regulatory year	Harvest periods							<i>n</i>
	August	September	October	November	March	April	May	
2000	20	39	1	0	1	33	6	80
2001	23	28	8	1	0	33	7	88
2002	14	41	9	0	0	29	7	69
2003	10	32	7	1	0	37	13	91
2004	12	23	3	1	1	43	17	125
2005	14	34	10	0	1	19	22	126
2006	17	33	5	1	0	22	22	116
2007	24	32	5	3	0	22	14	113
2008	32	27	7	0	1	15	18	131
2009	18	22	6	1	0	26	27	82

Table 5. Unit 16 brown bear harvest percent by transport method, regulatory years 2000 through 2009.

Regulatory year	Percent of harvest							Other/ Unknown	<i>n</i>
	Airplane	Horse	Boat	ATV/ORV	Snowmachine	Highway vehicle	Foot		
2000	72	3	5	5	6	1	2	6	86
2001	66	0	9	7	10	2	6	0	88
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

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 17A, 17B, and 17C (18,800 mi²)

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 efforts aimed at reducing the illegal harvest of brown bears that may have lead to better reporting. The increase 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 1982 and 1997 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 almost twice the numbers previously taken.

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, demonstrates 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.

Reported harvests are 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 is 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 brown bear population in Unit 17. Densities are probably lower than those observed along the Alaska Peninsula, but greater than that of interior areas to the north.

Distribution and Movements

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

MORTALITY

Harvest

Season and Bag Limit

Units 17A, B, and C	1 Sep–25 May	1 bear per regulatory year
Units 17A, B, and C	1 Sep–31 May	1 bear per regulatory year
Residents only, by registration permit		

Board of Game Actions and Emergency Orders. During the spring 2009 Board of Game meeting for Region 2, the opening date for brown bear hunting season was changed to 1 September. No emergency orders were issued during this reporting period.

Human-Induced Mortality. During RY08, 109 hunters reported killing brown bears in Unit 17, 69 males (63%) and 40 females (37%; Table 1). During the RY09 hunting seasons, 127 hunters reported killing brown bears in Unit 17, including 79 males (63%) and 47 females (37%) and 1 bear of undetermined sex (0.8%; Table 1). These harvests from this reporting period are comparable to the mean annual reported harvest of the previous five years (108 bears).

The average skull size of bears presented for sealing in RY08 was 23.0 inches ($n = 68$, range 18.5–27.7 inches) for males and 20.6 inches ($n = 38$, range 17.3–23.5 inches) for females. The average skull size of bears presented for sealing in RY09 was 23.4 inches ($n = 79$, range 16.7–28.2 inches) for males and 21.2 inches ($n = 43$, range 18.7–23.9 inches) for females. In RY08 16 bears (11 males, 5 females) were reported killed in Unit 17A; 60 (33 males, 27 females) were reported killed in Unit 17B; and 32 (24 males and 8 females) were reported from Unit 17C. In RY09 22 bears (13 males, 9 females) were reported killed in Unit 17A, 72 (40 males and 31 females, and 1 bear of unknown sex) were reported killed in Unit 17B, and 33 (26 males and 7 females) were reported from Unit 17C. In the past 5 years, 15% of the bears reported killed in the unit have been taken in Unit 17A, 60% in 17B, and 25% in 17C (Table 2).

Hunter Residency and Success. Nonresidents account for most of the brown bear harvest in Unit 17. During RY08 nonresidents took 76% of the bears reported killed in the unit. During RY09 nonresidents took 70% of the bears reported killed in the unit (Table 3).

Harvest Chronology. Sixty-seven bears were reported killed during the fall hunting season in RY08, and 42 bears were reported killed during the spring. Ninety-three bears were reported killed during the fall hunting season in RY09, and 34 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 method of access (Table 5).

Other Mortality

One brown bear was reported killed in defense of life or property in Unit 17 during RY08, with one report of a bear killed illegally. Three brown bear were reported killed in defense of life or property in Unit 17 during RY09, with no known illegal kills; however, based on observations in previous years, 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 the Pebble copper and gold mine in the Mulchatna drainage has the possibility of affecting bear habitat, but the degree to which the exploration and possible 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 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 almost twice the historical average, we are meeting our population objective of maintaining a brown bear population that will support a harvest of 50 bears per year. Subjective evidence indicates the population is large enough to support such a harvest. The population objective of at least 50% males in the reported harvest has been met in most years, though the sex ratio for all bears killed (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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Please cite any information taken from this section, and reference as:

Woolington, J.D. 2011. Unit 17 brown bear management report. Pages 177–188 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Unit 17 brown bear harvest, regulatory years 1998 through 2009.

Regulatory year	Hunter Kill				Nonhunting Kill				Total reported kill			
	Male	Female	Unk	Total	Male	Female	Unk	Total	Male	Female	Unk	Total
1998												
Fall 98	19	16	0	35	1	2	0	3	20	18	0	38
Spring 99	37	6	0	43	2	0	0	2	39	6	0	45
Total	56	22	0	78	3	2	0	5	59	24	0	83
1999												
Fall 99	22	15	0	37	0	1	0	1	22	16	0	38
Spring 00	35	10	0	45	0	0	0	0	35	10	0	45
Total	57	25	0	82	0	1	0	1	57	26	0	83
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

Table 1. continued

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

Table 2. Unit 17 brown bear harvest by subunit, regulatory years 1991 through 2009.

Regulatory Year	Unit												Unit 17 total ^a			
	17(A)				17(B)				17(C)							
	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

^a 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 2009.

Regulatory Year	Local ^a resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters ^b
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

^a Residents of Game Management Unit 17.^b Total may be higher than the sum of the columns because of hunters of unknown residency.

Table 4. Unit 17 brown bear harvest chronology percent by season, regulatory years 1991 through 2009.

Regulatory Year	Fall Season			Spring Season				Total
	1–15 Sep	16–30 Sep	1–15 Oct	1–15 Apr	16–30 Apr	1–15 May	16–30 May	
1991 ^a	7%	53%	11%	----	2%	11%	16%	45
1992 ^a	12%	47%	6%	----	----	21%	14%	49
1993 ^{a, b}	9%	49%	24%	----	----	6%	12%	33
1994 ^{a, b}	9%	58%	16%	----	----	5%	12%	43
1995 ^{a, b}	11 %	46%	11%	----	----	15%	17%	46
1996 ^{a, b}	6%	34%	24%	----	----	17%	19%	47
1997 ^c	7%	30%	18%	----	23%	14%	7%	66
1998 ^c	2%	25%	18%	----	27%	19%	9%	78
1999 ^c	4%	29%	12%	5%	21%	24%	5%	82
2000	5%	44%	10%	2%	18%	14%	7%	105
2001 ^d	6%	35%	9%	9%	28%	11%	3%	94 ^e
2002 ^d	8%	52%	13%	1%	9%	12%	5%	99
2003 ^f	11%	48%	7%	4%	16%	11%	----	100
2004	13%	39%	7%	16%	18%	6%	1%	85
2005	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

^a 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

^b Season dates for 1993–94 through 1996–97 are the same as 1990–91 through 1992–93 with the following addition:
 Western Alaska Brown Bear Management Area(including 17A and that portion of 17B that drains into Nuyakuk and Tikchik Lakes), 1 Sep–31 May

^c 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

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

^e Includes one bear taken 20 Oct 2001, and one bear taken 29 Mar 2002

^f Season dates: Units 17(A)&(C) 10 Sep–25 May ^g Includes one bear taken 16 Nov 2003 and one bear taken 27 Mar 2004
 Unit 17(B) Mulchatna drainage, upstream of and including the Chilikadrotna River 10 Sep–25 May
 Unit 17 (B), remainder 20 Sep–25 May

Table 5. Unit 17 brown bear harvest percent by transport method, regulatory years 1991 through 2009.

Regulatory Year	Percent of harvest									Total ^a
	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	123

^a Total only includes bear harvest for which the method of transportation was reported.

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008

To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 18 (42,000 mi²)

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 Yupik people of Unit 18, and some of their customs surrounding bear hunting were inconsistent with general hunting regulations that were established following Alaska statehood. 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 9B, 17, 18, and 19B, and a portion of 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 (FWS) to regulate subsistence bear hunting.

METHODS

During the 2008–2009 and the 2009–2010 regulatory years, 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, Bureau of Wildlife Enforcement (ABWE).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

To date, there have been no unit-wide 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 km² 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 unit-wide 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. Marys, support greater brown bear densities than elsewhere in the unit. Lowland habitats along the forested riparian corridors of the Yukon River and tributaries of the Kuskokwim River support moderate densities of brown bears. Other lowland habitats, including the vast treeless lowland of the Yukon–Kuskokwim Delta (Y–K Delta), contain very few bears.

MORTALITY

Harvest

Season and Bag Limit

2008–2009 and 2009–2010

<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)
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Nonresident Hunters	No open season (Subsistence hunt only)
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Board of Game Actions and Emergency Orders. In each year of this reporting period, the Board of Game reauthorized the brown bear tag fee exemption associated with subsistence registration permit hunting in the unit. This action took place at the spring board meetings in March 2009 and March 2010. In the winter of 2004 the Board of Game had authorized ADF&G to manage subsistence harvest on a unit-by-unit basis within the area previously defined as the WABBMA.

Human Harvest. During the 2008–2009 regulatory year, the Unit 18 reported harvest was 31 bears (0 subsistence and 31 general season), and during 2009–2010 the reported harvest was 25 bears (0 subsistence and 25 general season). Nearly all of the total reported harvest occurs in the area south of the Kuskokwim River; only 18 of 238 bears harvested since 1997 have been 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 projected population in Unit

18. 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. 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. We made some 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 year.

Permit Hunts. Subsistence registration permits are available to hunters who take bears primarily for the meat. Prior to 2005–2006, 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. Provided the meat is salvaged, the subsistence registration permit offers them a way to do that without paying the \$25 tag fee required under the general hunt regulations.

Hunter Residency and Success. During the 2008–2009 regulatory year, 14 of 31 brown bears harvested under general hunting regulations were taken by nonresidents. During the general hunt in 2009–2010, 13 residents and 12 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. The YDNWR has issued permits to 2 bear hunting guides to operate within the refuge and the TNWR has issued a permit to 1 guide to operate within the portion of the TNWR within Unit 18. Only 2 of these 3 guides are active in Unit 18, but each is permitted to take up to 5 bears per calendar year, and there are no plans by either refuge to

change that number. Because of this cap on the number of guides, we expect nonresident brown bear harvest to remain low.

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 2008–2009 and 2009–2010 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 is attributed to caribou hunters opportunistically taking bears. Additional harvest chronology data are found in Table 1.

Transport Methods. In 2008–2009, 24 successful hunters used airplanes to access their hunting areas, 3 used a snowmachine, and 1 person each used the methods of 4-wheeler, highway vehicle, foot, and unknown method. In 2009–2010, 17 successful hunters used airplanes, 3 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 from 1 September through 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 km² 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. Most brown bear habitat in Unit 18 is protected by the YDNWR and the 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 the Fish and Game Advisory Committees (AC) and Federal Subsistence Regional Advisory Council (RAC).

CONCLUSIONS AND RECOMMENDATIONS

Brown bear harvests ranged from 25 to 31 bears per year during the reporting period and represent a 6% harvest rate on the projected population in Unit 18. We think most of the harvest is now by residents and nonresidents that are specifically targeting brown bears in GMU 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 (73%), we recommend no changes to seasons and bag limits for general season hunts. Subsistence hunts have low participation and success and should be continued using registration permits to allow use of the 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.

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

Perry, P. 2011. Unit 18 brown bear management report. Pages 189–196 in P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. General Season brown bear Harvests in GMU divided by sex and river drainage, 1997–2010.

	Total Harvest	Kuskokwim				Yukon			
		Fall Harvest		Spring Harvest		Fall harvest		Spring Harvest	
		Male	Female	Male	Female	Male	Female	Male	Female
1997–1998	4	2	1	1					
1998–1999	13	3	2	5	1	1	1		
1999–2000	5	1	1	3					
2000–2001	5		1	3	1				
2001–2002	8	2	3	2	1				
2002–2003	14	5	5	4					
2003–2004	15	8	5		1	1			
2004–2005	39	14	19	2		1		3	
2005–2006	24	13	7	3				1	
2006–2007	22	11	7	4					
2007–2008	33	19	6	3	1			4	
2008–2009	31	15	8	4	1			3	
2009–2010	25	14	5	2	1			3	

Table 2. Subsistence brown bear permits and harvest in Western Alaska Brown Bear Management Area (WABBMA) and Unit 18, 1996–2010.

Regulatory year	Permits issued	Permits returned	Number hunted	Bears harvested in WABBMA ^a	Bears harvested in Unit 18
1999–2000	85	63	27	8	2
2000–2001	26	20	9	1	1
2001–2002	69	56	19	3	1
2002–2003	63	58	22	5	2
2003–2004	63	52	17	3	2
2004–2005	29	27	7	0	0
2005–2006	27	19	11	- ^b	0
2006–2007	4	3	2	- ^b	0
2007–2008	3	3	1	- ^b	0
2008–2009	0	0	0		0
2009–2010	2	2	0		0

^a WABBMA includes Units 9B, 17, 18, and 19B, and a portion of 19A; data available 1996–2005.

^b In 2005–2006 the administration of the subsistence permits changed from a management-area basis to a unit-by-unit basis; no data on WABBMA harvest.

**WILDLIFE
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 2008
To: 30 June 2010¹

LOCATION

GAME MANAGEMENT UNITS: 19, 21A, and 21E (55,278 mi²)

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 in this area. Most of the 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 to a high of 64 (Fig. 1) in RY03 (RY = 1 July through 30 June, e.g., RY03 = 1 July 2003–30 June 2004). Harvest in Unit 19B has declined since RY03 and harvest during RY05–RY09 averaged 47 bears.

In 2001 the department established the Experimental Micro Management Area (EMMA) within an approximately 20-mile radius of McGrath (528 mi²; Fig. 2) in Unit 19D. The purpose of the EMMA was to study the effects of predator management around McGrath and to provide more moose for human harvest. This area encompasses the highest density of moose in Unit 19D and 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 removal of grizzly bears, and killing grizzly bears under predation control regulations (Keech 2005). In 2009 the Board of Game reauthorized the Unit 19D East Predation Control Implementation Plan and the EMMA was renamed the Bear Control Area.

¹ 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

Data from sealing certificates provided hunter residency, methods, transportation, timing and location of harvest. Harvest data were summarized by regulatory year. Population size was estimated using known bear densities in similar habitats and through knowledge gained during bear removal research in the Bear Control Area.

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 mi²) is of moderate quality, which could support a density of 20 bears/1,000 mi², or 200 bears. Unit 19B contains about 7,500 mi² of good quality bear habitat, which could support 75 bears/1,000 mi² or 560 bears. Unit 19C has about 5,200 mi² of good quality habitat (50 bears/1,000 mi² = 260 bears) and about 1,500 mi² of moderate-quality habitat (20 bears/1,000 mi² = 30 bears). Unit 19D (12,405 mi²) generally contains poor quality habitat (15 bears/1,000 mi² = 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 (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 mi² in moderate quality bear habitat and 15 bears/1,000 mi² in poor habitat. In Unit 21A there are about 1,500 mi² of moderately good habitat (25 bears/1,000 mi² = 40 bears)

and about 9500 mi² of poor habitat (15 bears/1,000 mi² = 150 bears). The total population estimate for Unit 21A, therefore, is 190 bears. Unit 21E consists of about 1,000 mi² of moderately good habitat (25 bears/1,000 mi² = 25 bears) and about 7,000 mi² of poor habitat (15 bears/1,000 mi² = 105 bears). The total population estimate for Unit 21E is 100–200 bears (Boudreau 2005).

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
<i><u>RY08 and RY09</u></i>		
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

Alaska Board of Game Actions and Emergency Orders. In March 2009 the Board of Game (board) reauthorized the 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 sows with 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.

The board also reauthorized the resident tag fee exemptions in Unit 19A, 19D, and 21E in RY08 and RY09. Resident tag fee exemptions must be reauthorized each year by the board.

Harvest by Hunters. Grizzly bear harvest was highly variable among units during RY05–RY09 (Tables 1a–1f). In Unit 19A, 6–23 grizzlies were harvested each year (Table 1a). Unit 19B had by far the highest harvest with 35–56 bears reported (Table 1b). Unit 19C had a level of harvest similar to Unit 19A with 7–17 grizzlies taken (Table 1c). Unit 19D had the lowest reported harvest in all of Unit 19 (Table 1d) with 4–11 bears per year. Grizzlies killed in unknown locations within Unit 19 totaled 2 females in RY05 and 3 females and 2 males in RY08. Harvest was low in both Units 21A and 21E with 0–9 bears reported annually in each unit (Tables 1e and 1f). Most harvest occurred during the fall season in each of the 5 units, and harvest for the entire area during RY05–RY09 totaled 443 grizzly bears (Tables 1a–1f, plus 7 bears killed in unknown portions of Unit 19).

The 5-year mean annual harvest (RY05–RY09) for the entire area was 89 grizzly bears. This is similar to the (RY03–RY07) 5-year mean annual harvest of 86 reported by Peirce (2009). Male bears made up an average of 62% of the reported harvest during RY05–RY09.

The age class of bears harvested has changed little when comparing data from RY88–RY97 and RY98–RY07. Bears <6 years old made up 58% of the total harvest during both 10-year periods. Bears >11 years of age made up 19% and 20%, bears >16 years of age made up 13% and 12% and bears >21 years of age made up 5% and 7% respectively for the two 10-year periods.

Transport Methods. During RY05–RY09 the vast majority (86%) 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 RY05–RY09, nonresidents harvested 351 of the 443 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 hunting season, especially in September (Table 4). An average of 63% of all harvest during RY05–RY09 occurred in September.

Non-hunting Mortality

Three non-hunting mortalities were documented during RY05–RY09. 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, we removed 1 grizzly 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, and 41 in RY09. 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). No grizzlies have been taken under the control program. 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, to our knowledge 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 10 in RY88 to 64 in RY03 (Fig. 1). Unit 19B harvest began to decline in RY04, and by RY09 only 35 bears were harvested. RY98 was the last time harvest was that low. 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 RY05–RY09 62% of grizzlies harvested in Unit 19B were males and the age structure of bears harvested has changed little since RY88. 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 at this time, but we will continue to monitor harvest in Unit 19B to ensure overharvest does not occur.

We met the management objectives of at least 50% males in the harvest, and fewer than 100 total bears taken annually in RY08 and RY09. Males comprised 62% and 66% of the harvest and total harvest was 99 and 77 bears respectively.

Harvest reporting by local residents still appears to be low. Although educational efforts may help increase awareness of sealing requirements, people in local communities often do not have access to someone who can seal their bears. The recent 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.

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

Peirce, J. M. 2011. Units 19, 21A, and 21E brown bear. Pages 197–212 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

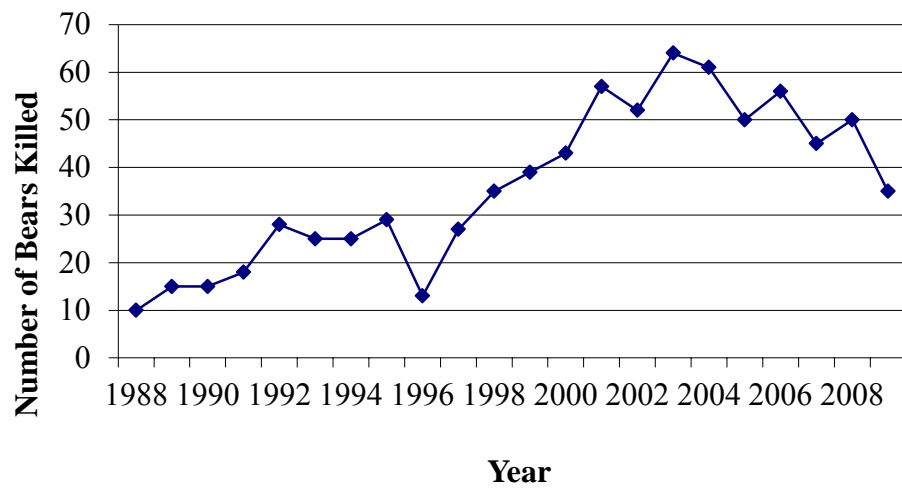


Figure 1. Number of grizzly bears killed in Unit 19B by regulatory year.

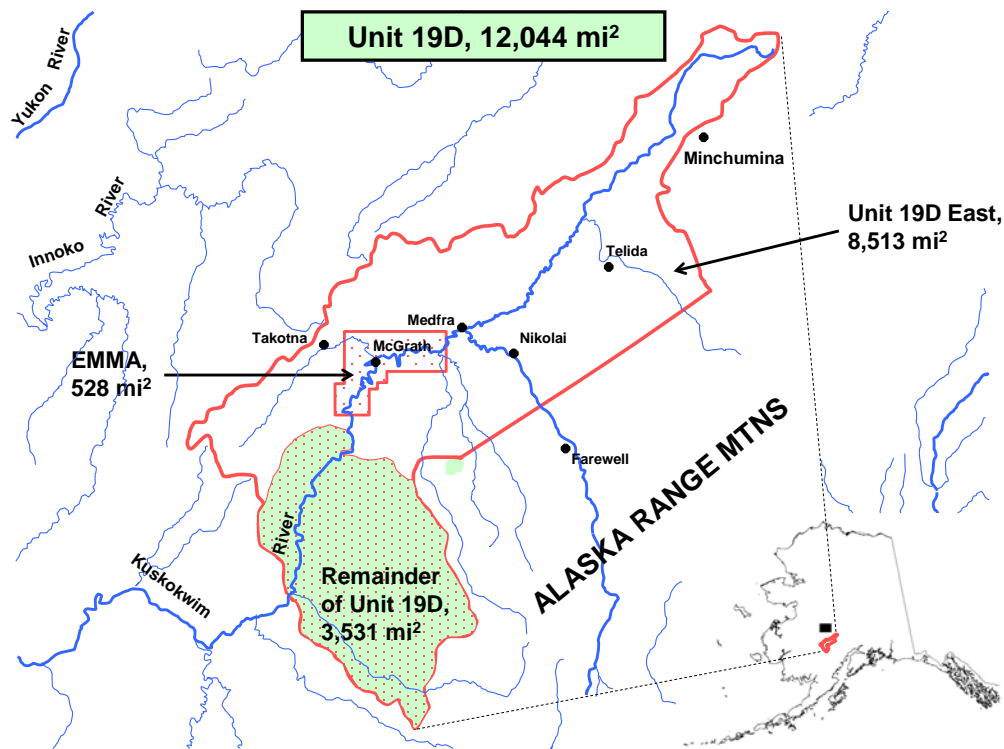


Figure 2. Detail area map of Unit 19D (EMMA = Experimental Micro Management Area, renamed the Bear Control Area).

Table 1a. Unit 19A grizzly bear harvest by type of kill, regulatory years 2005–2006 through 2009–2010.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F	Unk	Total
<i>2005–2006</i>													
Fall 2005	2	3	0	5	0	0	0	0	2	(40)	3	0	5
Spring 2006	1	0	0	1	0	0	0	0	1	(100)	0	0	1
Total	3	3	0	6	0	0	0	0	3	(50)	3	0	6
<i>2006–2007</i>													
Fall 2006	6	2	0	8	0	0	0	0	6	(75)	2	0	8
Spring 2007	1	0	0	1	1	0	0	1	2	(100)	0	0	2
Total	7	2	0	9	1	0	0	1	8	(80)	2	0	10
<i>2007–2008</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>2008–2009</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>2009–2010</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
Total	36	29	0	65	1	0	0	1	37	(56)	29	0	66
Avg/Yr	7	6	0	13	0	0	0	0	7		6	0	13

Table 1b. Unit 19B grizzly bear harvest by type of kill, regulatory years 2005–2006 through 2009–2010.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				Unk	Total
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F			
2005–2006														
Fall 2005	27	15	0	42	0	0	0	0	27	(64)	15	0	42	
Spring 2006	4	4	0	8	0	0	0	0	4	(50)	4	0	8	
Total	31	19	0	50	0	0	0	0	31	(62)	19	0	50	
2006–2007														
Fall 2006	24	21	0	45	0	0	0	0	24	(53)	21	0	45	
Spring 2007	6	5	0	11	0	0	0	0	6	(55)	5	0	11	
Total	30	26	0	56	0	0	0	0	30	(54)	26	0	56	
2007–2008														
Fall 2007	17	18	2	37	0	1	0	1	17	(47)	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	(56)	19	2	45	
2008–2009														
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	
2009–2010														
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	
Total	142	91	2	235	0	1	0	1	142	(61)	92	2	236	
Avg/Yr	28	18	0	47	0	0	0	0	28		18	0	47	

Table 1c. Unit 19C grizzly bear harvest by type of kill, regulatory years 2005–2006 through 2009–2010.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F	Unk	Total
<i>2005–2006</i>													
Fall 2005	5	4	0	9	0	0	0	0	5	(56)	4	0	9
Spring 2006	4	4	0	8	0	0	0	0	4	(50)	4	0	8
Total	9	8	0	17	0	0	0	0	9	(53)	8	0	17
<i>2006–2007</i>													
Fall 2006	4	2	0	6	0	0	0	0	4	(67)	2	0	6
Spring 2007	0	1	0	1	0	0	0	0	0	(0)	1	0	1
Total	4	3	0	7	0	0	0	0	4	(57)	3	0	7
<i>2007–2008</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>2008–2009</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>2009–2010</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
Total	38	24	0	62	0	0	0	0	38	(61)	24	0	62
Avg/Yr	8	5	0	12	0	0	0	0	8		5	0	12

Table 1d. Unit 19D grizzly bear harvest by type of kill, regulatory years 2005–2006 through 2009–2010.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill			Unk	Total
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F		
2005–2006													
Fall 2005	3	0	0	3	0	0	0	0	3	(100)	0	0	3
Spring 2006	1	0	0	1	0	0	0	0	1	(100)	0	0	1
Total	4	0	0	4	0	0	0	0	4	(100)	0	0	4
2006–2007													
Fall 2006	2	2	0	4	0	0	0	0	2	(50)	2	0	4
Spring 2007	3	1	0	4	0	0	0	0	3	(75)	1	0	4
Total	5	3	0	8	0	0	0	0	5	(63)	3	0	8
2007–2008													
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
2008–2009													
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	(0)	1	0	1
Total	2	6	0	8	0	0	0	0	2	(25)	6	0	8
2009–2010													
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
Total	28	12	0	40	0	0	0	0	28	(70)	12	0	40
Avg/Yr	6	2	0	8	0	0	0	0	6		2	0	8

Table 1e. Unit 21A grizzly bear harvest by type of kill, regulatory years 2005–2006 through 2009–2010.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				Unk	Total
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F			
2005–2006														
Fall 2005	1	0	0	1	0	0	0	0	1	(100)	0	0	1	
Spring 2006	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	
2006–2007														
Fall 2006	0	0	0	0	0	0	0	0	0	n/a	0	0	0	
Spring 2007	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	
2007–2008														
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	
2008–2009														
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	
2009–2010														
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	
Total	3	2	0	5	1	0	0	1	4	(67)	2	0	6	
Avg/Yr	1	0	0	1	0	0	0	0	1		0	0	1	

Table 1f. Unit 21E grizzly bear harvest by type of kill, regulatory years 2005–2006 through 2009–2010.

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill			Unk	Total
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F		
2005–2006													
Fall 2005	2	1	0	3	0	0	0	0	2	(67)	1	0	3
Spring 2006	5	1	0	6	0	0	0	0	5	(83)	1	0	6
Total	7	2	0	9	0	0	0	0	7	(78)	2	0	9
2006–2007													
Fall 2006	1	1	0	2	0	0	0	0	1	(50)	1	0	2
Spring 2007	2	0	0	2	0	0	0	0	2	(100)	0	0	2
Total	3	1	0	4	0	0	0	0	3	(75)	1	0	4
2007–2008													
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
2008–2009													
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
2009–2010													
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
Total	20	6	0	26	0	0	0	0	20	(77)	6	0	26
Avg/Yr	4	1	0	5	0	0	0	0	4		1	0	5

Table 2. Units 19, 21A, and 21E percent grizzly bear harvest^a by transport method, regulatory years 2005–2006 through 2009–2010.

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	
2005–2006	77	1	4	1	3	0	0	3	0	89
2006–2007	75	0	4	0	1	0	0	4	1	85
2007–2008	81	0	7	0	3	0	0	2	0	93
2008–2009	87	0	5	2	0	0	3	0	2	99
2009–2010	63	0	2	5	0	0	0	0	7	77
Total	383	1	22	8	7	0	3	9	10	443
Avg/Yr	77	0	4	2	1	0	1	2	2	89
	(86%)	(<1%)	(5%)	(2%)	(2%)	(0%)	((<1%)	(2%)	(2%)	

^a Includes defense of life or property kills and illegal harvest.

Table 3. Units 19, 21A, and 21E grizzly bear successful hunter residency, regulatory years 2005–2006 through 2009–2010^a.

Regulatory year	Local resident ^b	Nonlocal resident	Nonresident	Total successful
2005–2006	3	10	76	89
2006–2007	6	14	65	85
2007–2008	6	12	75	93
2008–2009	5	15	79	99
2009–2010	3	18	56	77
Total	23	69	351	443
Avg/Yr	5	14	70	89

^a Includes defense of life or property kills and illegal harvest.

^b Local resident defined as any hunter from Units 19, 21A, and 21E.

Table 4. Units 19, 21A, and 21E grizzly bear harvest^a chronology by month, regulatory years 2005–2006 through 2009–2010.

Regulatory year	Harvest chronology by month						<i>n</i>
	Aug	Sep	Oct	Apr	May	Other	
2005–2006	1	62	2	17	7	0	89
2006–2007	9	53	3	8	8	4	85
2007–2008	13	57	0	8	12	3	93
2008–2009	17	57	4	6	13	2	99
2009–2010	18	51	0	4	2	2	77
Total	58	280	9	43	42	11	443
	(13%)	(63%)	(2%)		(9%)	(2%)	
Avg/Yr	12	56	2	9	8	2	89

^a Includes defense of life or property kills and illegal harvest.

**WILDLIFE
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 2008

To: 30 June 2010¹

LOCATION

GAME MANAGEMENT UNITS: 20A, 20B, 20C, 20F, and 25C (39,228 mi²)

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 ≥ 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 (≥ 2 yr old) in this area from 1981 to 1992. 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

¹ 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 4450 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 ≥ 2 years old.

Eastern half of Unit 20B

- Manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality of up to 6 bears ≥ 2 years old.

Unit 20C within the original boundaries of Denali National Park

- Maintain a closed season on grizzly bear hunting.

Unit 20A Tanana Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C

- Manage human-caused mortality in the combined area to provide stable grizzly bear populations with a 3-year mean annual human-caused mortality of no more than 26 grizzly bears ≥ 2 years old.
- Manage the 3-year mean annual human-caused grizzly bear (≥ 2 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 (DLP), 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., RY08 = 1 July 2008 through 30 June 2009), 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, Reynolds and Egan (Egan 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 1500 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 6000 feet. Approximately 500 mi² (1300 km²) were excluded from the high-density stratum, and 386 mi² (1000 km²) were excluded from the super-density stratum. Population size was estimated using extrapolations from strata densities of low, 3–8 bears/1000 mi² (1–3 bears/1000 km²); medium, 13–26 bears/1000 mi² (5–10 bears/1000 km²); high, 36–44 bears/1000 mi² (14–17 bears/1000 km²); and super, 52–78 bears/1000 mi² (20–30 bears/1000 km²).

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 immigrate from higher density areas or make temporary forays onto the flats. Eagan (1995) estimated that the flats provide habitat for 20 grizzly bears, or 6.5 bears/1000 mi² (2.5 bears/1000 km²).

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/1000 mi² [20–30 grizzly bears/1000 km²]). Although Dean (1987) estimated 88 bears/1000 mi² (34 bears/1000 km²) 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/1000 mi² (6.2 /1000 km²). 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. These seasons and bag limits applied to both resident and nonresident hunters.

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. Total harvest by hunters in Units 20A, 20B, 20C, 20F, and 25C was higher in RY07–RY09 (\bar{x} = 47.7) than during RY04–RY06 (\bar{x} = 40.7) (Tables 1a–e). However, other human-caused mortality (DLP kills, illegal kills, etc.) was lower in RY07–RY09 (\bar{x} = 2.7) than during the previous 3-year period (\bar{x} = 4.3).

Harvest Zones.

Unit 20A Mountains — We estimate the 3-year (2007–2009) mean annual human-caused mortality (17.7 bears) was approximately 13–16% of bears ≥ 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 ≥ 2 years old.

Eastern half of Unit 20B — The 3-year (2007–2009) mean annual human-caused mortality of 11.0 bears ≥ 2 years of age exceeded our objective of a mean of ≤ 6 bears ≥ 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 (2007–2009) mean annual human-caused mortality of 14.0 brown bears ≥ 2 years of age was below our objective of ≤ 26 bears ≥ 2 years of age for this management area (Table 2). At the subarea scale, we met our objectives to not exceed a 3-year (2007–2009) mean annual human-caused mortality of bears ≥ 2 years of age for western Unit 20B with 2.3 bears (objective ≤ 3 bears), Unit 20C with 4.7 bears (objective ≤ 7 bears), and Unit 20F with 1.0 bear (objective ≤ 7 bears), but exceeded the objective for Unit 20A Tanana Flats with 3.3 bears (objective ≤ 3 bears) and Unit 25C with 7.0 bears (objective ≤ 6 bears).

Percent Males in Harvest by Unit. The objective for a 3-year (RY07–RY09) mean proportion of $\geq 55\%$ males in the harvest was met in all units except Unit 20A (Unit 20A = 51%, Unit 20B = 55%, Unit 20C = 58%, Unit 20F = 67%, and Unit 25C = 80%; Tables 1a–e).

Hunter Residency and Success. As in previous years, Alaska residents harvested the majority (73%) of the grizzly bears during RY07–RY09 (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 (Young 2007). However, use of ATVs by successful hunters increased from a mean of 27% during RY01–RY03 (Young 2007) to 43% during RY04–RY06, but after dropping back to 23% in RY07 again averaged 43% (RY08–RY09) (Table 5). Thus it appears the increase since RY04 may be indicative of a long-term change in trend.

Nonhunting Mortality. During summer 2007 (i.e., RY06 and RY07) in Unit 20B, 11 grizzly bears were taken in DLP and one additional bear was killed illegally. The average number taken in DLP during the previous 4 summers (2003–2006) was 2.25 bears, the number taken in 2008 was 3 bears (an adult female with 2 yearlings) and none were taken in 2009. We speculate that the unusually high number of bears taken in DLP in Unit 20B during 2007 was partly related to large scale wildfires in 2004 that likely displaced some adult bears from traditional home ranges and altered dispersal patterns of subadult bears. In 2004, 548,322 acres burned in Unit 20B (9.4% of the subunit) compared with a total of 214,632 acres that burned in Unit 20B (3.7%) during 1993–2003. Recent studies in Unit 20E indicated that grizzly bears, especially females, tended to avoid recent large-scale burns (C. Gardner, personal communication, 2010).

CONCLUSIONS AND RECOMMENDATIONS

We failed to meet our objective to provide a stable population with a 3-year mean annual human-caused mortality $\leq 8\%$ of the bears ≥ 2 years old in 2 of 3 management areas (i.e., Unit 20A mountains and the eastern half of Unit 20B). We met our objective in only one management area (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 2 of the 5 subareas (i.e., Unit 20A Tanana Flats and Unit 25C). However, in those cases, the 3-year mean annual human-caused mortality was exceeded by ≤ 1 bear.

We met our objective to manage for a 3-year mean annual human-caused mortality of at least 55% males in all units except Unit 20A. 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 in 4 of 5 subunits. Second, in areas where we have exceeded the recommended harvest, the overharvest has been minimal, except in Unit 20A mountains and the eastern half of Unit 20B. Third, we have yet to detect any declines in mean skull size that would suggest current harvest levels are not sustainable. Fourth, studies in Unit 13 (Tobey and Schwanke 2009) suggest that sustainable harvest rates for Interior brown bears may be higher than previously estimated (i.e., $\leq 8\%$ of bears ≥ 2 years old). 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 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.

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

YOUNG, D. D., JR. 2011. Units 20A, 20B, 20C, 20F, and 25C brown bear. Pages 213–229 in P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

TABLE 1A Unit 20A grizzly bear harvest, regulatory years 2004–2005 through 2009–2010.

Regulatory year	Reported							Total estimated kill ^c					% Males
	Hunter kill ^a				Nonhunting kill ^b								
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total		
<i>2004–2005</i>													
Fall 2004	5	8	0	13	0	0	0	5	8	0	13		
Spring 2005	1	2	0	3	0	0	0	1	2	0	3		
Total	6	10	0	16	0	0	0	6	10	0	16	38	
<i>2005–2006</i>													
Fall 2005	7	3	0	10	0	1	0	7	4	0	11		
Spring 2006	3	1	0	4	0	0	0	3	1	0	4		
Total	10	4	0	14	0	1	0	10	5	0	15	67	
<i>2006–2007</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>2007–2008</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>2008–2009</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>2009–2010</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	

^a Includes illegal kills.^b Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.^c Percentage includes only bears of known sex.

TABLE 1B Unit 20B grizzly bear harvest, regulatory years 2004–2005 through 2009–2010.

Regulatory year	Reported							Total estimated kill ^c				
	Hunter kill ^a				Nonhunting kill ^b							
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
<i>2004–2005</i>												
Fall 2004	12	4	0	16	0	0	0	12	4	0	16	
Spring 2005	0	0	0	0	1	0	0	1	0	0	1	
Total	12	4	0	16	1	0	0	13	4	0	17	76
<i>2005–2006</i>												
Fall 2005	5	3	0	8	1	1	0	6	4	0	10	
Spring 2006	0	0	0	0	0	0	0	0	0	0	0	
Total	5	3	0	8	1	1	0	6	4	0	10	60
<i>2006–2007</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>2007–2008</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>2008–2009</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>2009–2010</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

^a Includes illegal kills.^b Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.^c Percentage includes only bears of known sex.

TABLE 1C Unit 20C grizzly bear harvest, regulatory years 2004–2005 through 2009–2010.

Regulatory year	Reported							Total estimated kill ^c					
	Hunter kill ^a				Nonhunting kill ^b								
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males	
<i>2004–2005</i>													
Fall 2004	5	1	0	6	0	0	0	5	1	0	6		
Spring 2005	1	1	0	2	0	0	0	1	1	0	2		
Total	6	2	0	8	0	0	0	6	2	0	8	75	
<i>2005–2006</i>													
Fall 2005	1	0	0	1	0	0	0	1	0	0	1		
Spring 2006	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>2006–2007</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>2007–2008</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>2008–2009</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>2009–2010</i>													
Fall 2009	2	4	0	6	0	0	0	2	4	0	6		
Spring 2010	0	0	0	0	0	0	0	0	0	0	0		
Total	2	4	0	6	0	0	0	2	4	0	6	33	

^a Includes illegal kills.^b Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.^c Percentage includes only bears of known sex.

TABLE 1D Unit 20F grizzly bear harvest, regulatory years 2004–2005 through 2009–2010.

Regulatory year	Reported							Total estimated kill ^c					% Males
	Hunter kill ^a				Nonhunting kill ^b								
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total		
2004–2005													
Fall 2004	1	0	0	1	0	0	0	1	0	0	1		
Spring 2005	0	0	0	0	1	0	0	1	0	0	1		
Total	1	0	0	1	1	0	0	2	0	0	2	100	
2005–2006													
Fall 2005	1	0	0	1	0	0	0	1	0	0	1		
Spring 2006	0	0	0	0	0	0	0	0	0	0	0		
Total	1	0	0	1	0	0	0	1	0	0	1	100	
2006–2007													
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	
2007–2008													
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	
2008–2009													
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	
2009–2010													
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	

^a Includes illegal kills.^b Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.^c Percentage includes only bears of known sex.

TABLE 1E Unit 25C grizzly bear harvest, regulatory years 2004–2005 through 2009–2010.

Regulatory year	Reported							Total estimated kill ^c				
	Hunter kill ^a				Nonhunting kill ^b							
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
<i>2004–2005</i>												
Fall 2004	4	0	0	4	0	0	0	4	0	0	4	
Spring 2005	1	0	0	1	0	0	0	1	0	0	1	
Total	5	0	0	5	0	0	0	5	0	0	5	100
<i>2005–2006</i>												
Fall 2005	4	1	1	6	0	0	0	4	1	1	6	
Spring 2006	0	0	0	0	0	0	0	0	0	0	0	
Total	4	1	1	6	0	0	0	4	1	1	6	80
<i>2006–2007</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>2007–2008</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>2008–2009</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>2009–2010</i>												
Fall 2009	8	1	0	9	0	0	0	8	1	0	9	
Spring 2010	0	0	0	0	0	0	0	0	0	0	0	
Total	8	1	0	9	0	0	0	8	1	0	9	89

^a Includes illegal kills.^b Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.^c Percentage includes only bears of known sex.

TABLE 2 Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest in 3 zones, calendar years 2004 through 2009.

Harvest zone	Area (mi ²)	Calendar year	Bears killed		3-yr Mean harvest		Harvest density ^c
			All ages ^a	≥2 yr ^b	All ages	≥2 yr ^b	
Unit 20A mountains	3,081 ^d	2004	10 (0)	10	9.7	9.0	3.2
		2005	8 (0)	7	9.0	8.3	2.3
		2006	16 (1)	14	11.3	10.3	4.5
		2007	24 (0)	23	16.0	14.7	7.5
		2008	16 (0)	15	18.7	17.3	4.9
		2009	15 (0)	15	18.3	17.7	4.9
Eastern half of Unit 20B	4,929	2004	13 (2)	11	8.0	7.3	2.2
		2005	8 (2)	7	8.0	7.0	1.4
		2006	7 (3)	6	9.3	7.7	2.0
		2007	14 (9)	10	9.7	7.7	2.0
		2008	20 (3)	19	13.7	11.7	3.9
		2009	4 (0)	4	12.7	11.0	0.8
Unit 20A Flats, western half of Unit 20B, Unit 20C outside Denali National Park, Units 20F and 25C	26,278 ^e	2004	24 (0)	24	17.3	17.0	4.9
		2005	18 (3)	18	17.0	17.0	3.7
		2006	27 (2)	27	23.0	23.0	5.5
		2007	16 (2)	16	19.7	19.7	3.2
		2008	10 (0)	10	17.7	17.7	2.0
		2009	16 (0)	16	14.0	14.0	3.2

^a Numbers in parentheses 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).

^b Assuming all bears of unknown age were ≥2 years old.

^c Bears ≥2 years old harvested per 1000 mi².

^d Excludes about 500 mi² (1300 km²) of nonbear habitat in glaciers and above 6000 ft (1850 m).

^e Excludes 4450 mi² (11,500 km²) that is closed to hunting in Denali National Park.

TABLE 3 Units 20A, 20B, 20C, 20F, and 25C grizzly bear successful hunter residency^a, regulatory years 2004–2005 through 2009–2010.

Regulatory year	Resident (%)	Nonresident (%)	Unknown (%)	<i>n</i>
2004–2005	32 (73)	12 (27)	0 (0)	44
2005–2006	20 (80)	5 (20)	0 (0)	25
2006–2007 ^b	36 (78)	10 (22)	0 (0)	46
2007–2008 ^c	26 (65)	14 (35)	0 (0)	40
2008–2009 ^d	40 (74)	14 (26)	0 (0)	54
2009–2010 ^e	39 (78)	11 (22)	0 (0)	50

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

^b Includes 1 bear reported taken 19 August 2006 in Unit 20F and 1 bear taken 29 August 2006 in Unit 25C.

^c Includes 1 bear reported taken 14 June 2008 in Unit 20F.

^d Includes 1 bear reported taken 30 August 2008 in Unit 20B

^e 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 2004–2005 through 2009–2010.

Regulatory year	Harvest chronology percent by month/day ^a								<i>n</i>
	Sep		Oct–Nov	Total	Apr	May		Total	
	1–15	16–30				1–15	16–31		
2004–2005	50	27	14	91	2	2	5	9	44
2005–2006	80	16	4	100	0	0	0	0	25
2006–2007	55	16	7	77	0	11	11	23	44
2007–2008	44	41	0	85	0	0	15	15	39
2008–2009	58	21	0	79	2	2	17	21	53
2009–2010	60	17	0	77	0	0	23	23	47

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

TABLE 5 Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest percent by transport method, regulatory years 2004–2005 through 2009–2010.

Regulatory year	Harvest percent by transport method ^a								<i>n</i>
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	Other ORV	Highway vehicle	Other/Unk	
2004–2005	20	9	11	36	0	0	9	14	44
2005–2006	28	4	12	48	0	0	0	8	25
2006–2007 ^b	20	4	15	43	0	2	7	9	46
2007–2008 ^c	43	8	5	23	0	5	15	3	40
2008–2009 ^d	30	7	9	43	0	2	7	2	54
2009–2010 ^e	22	6	10	42	2	2	6	10	50

^a Does not include defense of life or property, research mortality, or other human-caused accidental or illegal mortality.

^b Includes 1 bear reported taken 19 August 2006 in Unit 20F and 1 bear taken 29 August 2006 in Unit 25C.

^c Includes 1 bear reported taken 14 June 2008 in Unit 20F.

^d Includes 1 bear reported taken 30 August 2008 in Unit 20B.

^e Includes 1 bear reported taken 19 August 2009 in Unit 20A and 1 bear taken 25 August 2009 in Unit 20B.

WILDLIFE
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 2008
To: 30 June 2010¹

LOCATION

GAME MANAGEMENT UNIT: 20D (5,637 mi²)

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 (RY = 1 July through 30 June; e.g., RY91 = 1 July 1991 through 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.

¹ 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 ADF&G offices. 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 (DLP), 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 ≥ 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 RY08–RY09 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, 2007) such as occurred in 2003–2004. Anecdotal observations and recent research indicate 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 ≥ 2 years old and a total of 76–86 bears. This estimate was based on density estimates of 25.4–29.0 bears ≥ 2 years old/1,000 mi², plus an additional 14% for cubs and yearlings, developed by Reynolds (1993) for similar habitat in the Alaska Range in Unit 20A.

Anecdotal information for southern Unit 20D from local residents, hunters, and pilots indicates that bears are common in most of the area. Residents commonly report bears near the town of Delta Junction, near the landfill, and in the Delta Agricultural Project. Dall sheep, moose, and caribou hunters commonly report seeing bears in the foothills of the Alaska Range.

Northern Unit 20D. The population estimate for northern Unit 20D was 92–109 brown bears ≥ 2 years old and 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 km² 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 ≥ 2 years old/1,000 mi² in unburned habitat in May, plus 23% for cubs and yearlings. C. Gardner (ADF&G, unpublished data, 2007) recently 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 RY08–RY09 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.

Alaska Board of Game Actions and Emergency Orders. The Board of Game reauthorized brown bear tag fee exemptions for resident hunters in Unit 20D during each year of this reporting period. At the spring 2010 meeting, the board authorized brown bear tag fee exemptions for resident hunters in all Interior and eastern North Slope units to begin in RY10.

Harvest by Hunters and Other Mortality.

RY08 — Hunters killed 18 bears (Table 1), which exceeded the harvest objective. The 3-year (RY06–RY08) average mortality was 64% males which met the management objective of at least 55%. Sixteen bears were killed in Unit 20D south of the Tanana River and 2 north of the Tanana River (Table 1). Thirteen bears were killed during fall and 5 were killed during spring (Table 2). The total reported mortality of 18 bears was an estimated 8–10% of the unitwide brown bear population and 11–13% of bears ≥ 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 19 bears or $<10\%$ of the estimated total population for the unit (Table 2).

RY09 — Hunters killed 3 bears (Table 1), which was fewer than harvest objective. The 3-year (RY07–RY09) average mortality was 60% males which meets the management objective. Hunters killed 2 bears in southern Unit 20D and 1 north of the Tanana River.

The total reported mortality of 3 bears was an estimated 1–2% of the unitwide brown bear population and 2% of the estimated bears ≥ 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 4 bears (Table 2).

Hunter Residency and Success. Most brown bears continued to be killed in Unit 20D by Alaska residents. During RY08–RY09, local residents killed 43% of bears, nonlocal residents killed 52%, and nonresidents killed 5% (Table 3).

Harvest Chronology. No substantive changes occurred in previous patterns of harvest chronology during RY08–RY09. In Unit 20D most brown bears continued to be harvested during the fall hunting season, with most kills in August–September (Table 4).

Transport Methods. During RY08–RY09 the most commonly used transportation types for hunting brown bears in Unit 20D was walking, followed by 3- or 4-wheelers (Table 5).

CONCLUSIONS AND RECOMMENDATIONS

The harvest objective of 5–15 bears per year was not met on an annual basis during RY08–RY09; however, average annual harvest was 10 bears, within the range of the harvest objective. The objective to harvest predominantly male bears was met, with a 3-year (RY07–RY09) mean, annual human-caused mortality of 59% male bears. The Board of Game reauthorized brown bear tag fee exemptions in Unit 20D 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.

Annual mortality increased in Unit 20D since the \$25 resident tag fee was eliminated in portions of Unit 20D beginning in 1992. Based on population estimates, brown bear mortality may be exceeding sustainable levels in southern Unit 20D. A substantial portion of the brown bear mortality west of the Gerstle River has been due to nonhunting mortality that results from people living near brown bears. However, anecdotal observations indicate that bears remain plentiful in the area. This area will likely continue to experience high levels of bear mortality because of the number of human inhabitants and liberal hunting regulations. However, because this area is relatively small and surrounded by areas that have healthy brown bear populations, and because the board's objective is to reduce predation on ungulates, no reduction in the hunting season dates and bag limits are planned at this time. There is significant demand for human use of moose and caribou in southern Unit 20D, and current population objectives are to increase the size of these ungulate populations. While there is no evidence that increased bear harvest was sufficient to increase ungulate numbers outside urban areas of Alaska, a localized reduction in the brown bear population may benefit survival of moose and caribou calves.

The Unit 20D brown bear population should be monitored closely to determine long-term effects of liberal hunting regulations and to monitor the population west of the Gerstle River where mortality rates are highest. A DNA-based hair mark–recapture study should be conducted to estimate the current population.

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DUBOIS, S. D. and PARKER MCNEILL, D. I. 2011. Unit 20D brown bear. Pages 230–240 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

TABLE 1 Unit 20D brown bear mortality^a with differing hunting regulations, regulatory years 1987–1988 through 2009–2010.

Regulatory year	Southern Unit 20D								Northern Unit 20D		Total Unit 20D		Total bears M+F	
	West of Gerstle River		East of Gerstle River		Unk location		Total							
	M	F	M	F	M	F	M	F	M	F	M	F		
	1 bear/4 yr, 1 Sep–31 May, \$25 tag ^b													
1987–1988	2	0	4	4	1	0	7	4	0	1	7	5	12	
1988–1989	1	1	1	1	0	0	2	2	2	0	4	2	6	
1989–1990	2	0	0	0	0	0	2	0	2	0	4	0	4	
1990–1991	1	2	2	0	0	1	3	3	0	1	3	4	7	
1991–1992	2	3	0	1	0	0	2	4	0	0	2	4	6	
Total kill	8	6	7	6	1	1	16	13	4	2	20	15	35	
Kill/Year	Avg 3		Avg 3		Avg 0		Avg 6		Avg 1		Avg 7			
% Male	57		54		50		55		67		57			
1 bear/4 yr, 1 Sep–31 May, \$25 tag ^b								1 bear/yr, 10 Aug– 30 Jun, no tag fee ^b						
1992–1993	4	1	1	1	0	1	5	3	2	0	7	3	10	
1993–1994	2	0	2	1	0	0	4	1	1	1	5	2	7	
1994–1995	3	2	1	1	0	0	4	3	0	0	4	3	7	
Total kill	9	3	4	3	0	1	13	7	3	1	16	8	24	
Kill/Year	Avg 4		Avg 2		Avg 0		Avg 7		Avg 1		Avg 8			
% Male	75		57		0		65		75		67			
		1 bear/4 yr, 1 Sep– 31 May, \$25 tag ^b		1 bear/yr, 10 Aug– 30 Jun, no tag fee ^b						1 bear/yr, 10 Aug– 30 Jun, no tag fee ^b				
1995–1996	4	1	3	1	0	0	7	2	4	3	11	5	16	
1996–1997	3	4	1	1	0	0	4	5	1	1	5	6	11	
1997–1998	3	3	0	0	0	0	3	3	2	1	5	4	9	
1998–1999	10	3	2	0	0	0	12	3	0	1	12	4	16	
1999–2000	1	2	2	1	0	0	3	3	4	1	7	4	11	
2000–2001	6	3	3	4	0	0	9	7	4	0	13	7	20	
2001–2002	4	1	3	2	0	0	7	3	2	0	9	3	12	
2002–2003	5	3	2	2	0	0	7	5	0	1	7	6	13	
Total kill	36	20	16	11	0	0	52	31	17	8	69	39	108	
Kill/Year	Avg 7		Avg 3		Avg 0		Avg 10		Avg 3		Avg 14			
% Male	64		59		0		63		68		64			
1 bear/yr, 10 Aug–30 Jun, no tag fee ^b														

Regulatory year	Southern Unit 20D								Northern Unit 20D		Total Unit 20D		Total bears
	West of Gerstle River		East of Gerstle River		Unk location		Total		M	F	M	F	M+F
	M	F	M	F	M	F	M	F					
2003–2004	1	1	2	0	0	0	3	1	1	0	4	1	5
2004–2005	5	5	1	0	0	0	6	5	1	3	7	8	15
2005–2006	3	6	2	1	0	0	5	7	1	1	6	8	14
2006–2007	5	1	3	2	0	0	8	3	1	0	9	3	12
2007–2008	1	1	1	1	0	0	2	2	1	1	3	3	6
2008–2009	5	4	4	1	1	1	10	6	1	1	11	7	18
2009–2010	0	0	1	1	0	0	1	1	1	0	2	1	3
Total kill	20	18	14	6	1	1	35	25	7	6	42	31	73
Kill/Year	Avg 5		Avg 3		Avg <1		Avg 9		Avg 2		Avg 10		
% Male	53		70		50		58		54		58		

^a Includes nonhunting mortality.

^b No tag fee for resident hunters, per hunting regulation.

TABLE 2 Unit 20D brown bear mortality^a, regulatory years 2000–2001 through 2009–2010.

Regulatory year	Reported							Estimated kill Unreported Illegal		Total reported and estimated kill			
	Hunter kill			Total	Nonhunting kill ^a					M	F	Unk	Total
	M	F	Unk			M	F	Unk					
2003–2004													
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
2004–2005													
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
2005–2006													
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
2006–2007													
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
2007–2008													
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
2008–2009													
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
2009–2010													
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

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

TABLE 3 Residency of successful Unit 20D brown bear hunters (includes legal and illegal harvest; excludes defense of life or property kills), regulatory years 1989–1990 through 2009–2010.

Regulatory year	Local ^a resident	Nonlocal resident	Nonresident	Unk	Total successful hunters
1989–1990	3	1	0	0	4
1990–1991	4	2	0	1	7
1991–1992	5	0	0	0	5
1992–1993	5	4	0	0	9
1993–1994	3	4	0	0	7
1994–1995	2	4	0	0	6
1995–1996	7	6	1	2	16
1996–1997	5	3	0	0	8
1997–1998	5	2	1	0	8
1998–1999	8	5	0	0	13
1999–2000	9	2	0	0	11
2000–2001	6	9	1	1	17
2001–2002	5	3	2	1	11
2002–2003	8	5	0	0	13
2003–2004	1	4	0	0	5
2004–2005	7	7	1	0	15
2005–2006	5	6	2	1	14
2006–2007	9	2	1	0	12
2007–2008	3	3	0	0	6
2008–2009	8	10	0	0	18
2009–2010	1	1	1	0	3

^a Residents of Unit 20D.

TABLE 4 Chronology of Unit 20D brown bear harvest and nonhunting mortality by month, regulatory years 1989–1990 through 2009–2010.

Regulatory year	Chronology of harvest and nonhunting mortality by month								<i>n</i>
	Aug	Sep	Oct	Nov	Apr	May	Jun	Other	
1989–1990	0	2	0	0	0	2	0	0	4
1990–1991	0	5	0	0	0	2	0	0	7
1991–1992	0	1	0	0	0	4	1	0	6
1992–1993	0	4	2	0	0	3	0	1	10
1993–1994	1	4	0	1	0	1	0	0	7
1994–1995	0	4	0	0	0	2	1	0	7
1995–1996	1	9	1	0	0	2	3	0	16
1996–1997	2	5	1	0	0	1	1	1	11
1997–1998	0	5	1	0	0	2	1	0	9
1998–1999	4	7	0	2	0	3	0	0	16
1999–2000	1	3	2	0	0	2	3	0	11
2000–2001	3	9	2	0	0	2	3	1	20
2001–2002	5	4	1	0	0	0	0	2	12
2002–2003	1	7	0	0	0	5	0	0	13
2003–2004	0	3	0	0	0	1	1	0	5
2004–2005	6	5	1	0	0	2	1	0	15
2005–2006	5	4	0	0	0	4	1	0	14
2006–2007	1	6	2	0	1	1	1	0	12
2007–2008	1	3	0	0	0	0	2	0	6
2008–2009	5	7	1	0	0	3	2	0	18
2009–2010	0	3	0	0	0	0	0	0	3

TABLE 5 Unit 20D percent of brown bear harvest (includes legal and illegal harvest; excludes defense of life or property) by transport method, regulatory years 1989–1990 through 2009–2010.

Regulatory year	Percent harvest by transport method										<i>n</i>
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Foot	Other	Unk	
1989–1990	0	0	25	0	0	25	25	25	0	0	4
1990–1991	0	14	0	0	0	57	14	14	0	0	7
1991–1992	0	0	0	0	20	20	0	0	60	0	5
1992–1993	11	11	11	22	0	0	33	11	0	0	9
1993–1994	14	0	29	0	0	0	43	14	0	0	7
1994–1995	17	17	0	33	0	0	17	17	0	0	6
1995–1996	25	0	13	25	0	0	31	6	0	0	16
1996–1997	0	0	25	13	0	13	38	0	13	0	8
1997–1998	13	0	13	25	0	13	13	0	25	0	8
1998–1999	0	0	0	54	0	0	8	39	0	0	13
1999–2000	9	0	9	0	0	9	27	46	0	0	11
2000–2001	12	0	12	29	0	6	12	29	0	0	17
2001–2002	27	0	0	27	0	0	9	36	0	0	11
2002–2003	8	8	0	46	0	0	15	23	0	0	13
2003–2004	20	0	0	60	0	0	0	20	0	0	5
2004–2005	13	0	7	27	0	0	20	33	0	0	15
2005–2006	14	7	7	21	0	0	14	29	0	7	14
2006–2007	17	17	0	25	0	0	33	8	0	0	12
2007–2008	0	17	0	67	0	0	0	17	0	0	6
2008–2009	6	6	17	22	0	0	0	50	0	0	18
2009–2010	33	33	0	0	0	0	0	33	0	0	3

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008

To: 30 June 2010¹

LOCATION

GAME MANAGEMENT UNIT: 20E (10,680 mi²)

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/mi², 0.5 moose/km²; 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 through RY89 and during RY02–RY10 (RY begins 1 July and ends 30 June; e.g., RY02 = 1 July 2002 through 30 June 2003). 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–RY07 to a mean of 14. In 2004 the Alaska Board of Game further increased the annual bag limit to 2 bears and approved the Upper Yukon Tanana Predation Control Program (control program) in which Alaska residents were issued predator 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 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 did not result in a measurable increase in brown bear harvest in Unit 20E.

During the mid 1980s, Boertje et al. (1987) estimated the annual May population in a 4,000 mi² portion of Unit 20E at 41 brown bears of all ages/1,000 mi² (16 bears/1,000 km²) and the November population at 31 bears of all ages/1,000 mi² (12/1,000 km²). Even with liberal hunting

¹ 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 predator control program beginning in 2004, brown bear harvest has remained relatively low. Gardner (2003) indicated that harvest data and population estimates reported by Boertje et al. (1987) showed that there may have been a population decline in Unit 20E during 1982–1988. However, due to the small sample sizes, fluctuating harvest levels and variable harvest distribution, a population decline was not clearly documented. Although the moose population increased temporarily, multiple causative factors were described unrelated to a possible decline in brown bear numbers (Gasaway et al. 1992).

MANAGEMENT DIRECTION

When developing brown bear and 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 Alaska Board of Game designated the moose population in most of Unit 20E and the Fortymile caribou herd as important for high levels of human consumptive use. Under the intensive management law, the board must consider intensive management if 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, USA) 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 harvest statistics collected since 1977 (Gardner 2001).

In 2006, Gardner (ADF&G unpublished data, Fairbanks) conducted a brown bear population survey within a 2,002 mi² (5,185.2 km²) 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 mi² (1,778 km²) core of the 2,002 mi² survey area. A population estimate was achieved within the 4,074 mi² (10,552 km²) Unit 20E bear control area by extrapolating the density estimate from the 2,002 mi² portion of southern Unit 20E to the 4,074 mi² bear control area. I based the 2008 population estimate on a combination of the 2005 estimate and the 2006 genetic mark–recapture survey data.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

The Unit 20E population at the beginning of this report period (midsummer 2008) was estimated to be 30–37 bears/1,000 mi² (12–14 bears/1,000 km²) 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 mi² (10.7–13.4 bears/1,000 km²; 320–394 bears of all ages) is similar to the 1985–1986 estimates of 31–41 bears of all ages/1,000 mi² (by Boertje et al. (1987)). Based on this information, the autumn 2000 unitwide population estimate of 44.3–51.3 bears of all ages/1,000 mi² (475–550 bears; Gardner 2001) may have been liberal (C. Gardner, ADF&G, personal communication, 2007). Gardner estimated the midsummer 2006 brown bear population within the 4,074 mi² (10,552 km²) bear control area to be 114–141 bears of all ages (C. Gardner, ADF&G unpublished data, Fairbanks), fewer bears than the 2005 estimate of 170 brown bears within this control area (Gross 2007).

The habitat within the bear control area is representative of most of the 7,310 mi² (18,933 km²) of southern and eastern Unit 20E, where similar harvest and fire patterns and habitat quality exist. The bear density in southern and eastern Unit 20E was likely 28–35 brown bears/1,000 mi² (11–14/1,000 km²) following the fires of 2004–2005, similar to the control area. The 3,370 mi² (8,728 km²) 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 mi² (13–16/1,000 km²; 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 mi² (12–14/1,000 km²) or 320–394 bears of all ages. As habitat in southern Unit 20E improves following the 2004–2005 fires the number of brown bears is likely to increase.

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 level that 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 (Toby 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 RY08–RY09, harvest of brown bears in Unit 20E likely had no effect on population trend because harvest did not exceed 4% of the total estimated population during this period and was distributed throughout the unit.

MORTALITY

Harvest

Season and Bag Limit during RY08–RY09

<u>Unit and Bag Limit</u>	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 20E. 2 bears every regulatory year.	10 Aug–30 Jun (General hunt only)	10 Aug–30 Jun

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. During RY04–RY09 the \$25 resident tag fee was waived for hunting brown bears in Unit 20E outside of Yukon–Charley Rivers National Preserve.

Alaska Board of Game Actions and Emergency Orders. In March 2009 The Alaska Board of Game (Board) suspended the brown bear control portion of the Upper Yukon–Tanana Predation Control Program, which allowed baiting of brown bears. Despite liberal methods, means, and bag limits, the goal of the brown bear portion of the predation control program (60% reduction in the brown bear population in the brown bear control area) was not reached between 2004 and 2008 because hunter harvest and kill by predation control permittees remained low. 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, which was the only area in Unit 20E in which the resident tag fee was still required.

Harvest by Hunters. Hunters reported killing 15 brown bears in RY08 and 13 in RY09 (Table 1). The 5-year (RY05–RY09) average harvest was 12 bears. The mean percentage of males harvested during RY05–RY09 was 63%. During RY08 and RY09, males represented 67% and 54% of the harvest, respectively.

Hunter Residency and Success. Resident hunters took 93% and 92% of the brown bears harvested in RY08 and RY09 (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 the unit harvested 1–3 bears/year.

Harvest Chronology. During RY08–RY09, 67–85% of brown bears harvested in Unit 20E were taken during August and September when moose and caribou hunters were afield. Fifteen to 33% of the total annual harvest was taken in the spring (Table 3).

Transport Methods. During RY08, 3- or 4-wheelers (46%) and airplanes (27%) were the modes of transportation used by most successful bear hunters (Table 4). During RY09, airplanes (38%) were used by most successful bear hunters, while fewer hunters used 3- or 4-wheelers (15%) and boats (15%). Use of airplanes by brown bear hunters in Unit 20E has increased as more big game hunters access remote areas.

Other Mortality

During RY08–RY09, there were no brown bears reported killed in defense of life or property in Unit 20E. Most nonhunting-caused brown bear mortality was likely the result of intraspecific strife and cannibalism (Boertje et al. 1987).

During RY08, the 2 bears killed by brown bear control permittees were killed over bait in spring 2009 (Table 1). The bear control program was suspended in RY09. Further details can be found in the 2006, 2007, and 2008 *Upper Yukon–Tanana Predation Control Implementation Plan* and activity reports to the Alaska Board of Game (ADF&G Boards Support files, Juneau).

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 mi² of habitat burned within, or adjacent to, Unit 20E. Revegetation of preferred plant species in burned areas is expected to eventually provide an abundance of high quality forage, which is limited or unavailable in mature spruce forests, for brown bears and their prey.

Ongoing research (C. Gardner, ADF&G unpublished data, Fairbanks) indicates that brown bears avoided the large recent burns in Unit 20E. However, the bears probably redistributed themselves rather than died in the burns. 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. There are currently 8 adult female grizzly bears in central Unit 20E fitted with GPS radio collars in order to study the long-term effects of the 2004 and 2005 burns on grizzly bear movements and habitat use. There were no major fires in Unit 20E during RY08–RY09.

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 the implementation of 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 needed. Although further research is needed, one measure may include extensive fire to encourage outmigration of bears. The brown bear population appears to have redistributed out of portions of the bear control area that were burned during 2004 and 2005, which likely resulted in reduced predation on moose calves in those areas (C. Gardner, ADF&G unpublished data, Fairbanks,). 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, 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 RY08–RY09, 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 20E west of the Taylor Highway (2006–2010 \bar{x} = 33 calves:100 cows, range = 27–37 calves:100 cows). However, calf:cow ratios remain low east of the Taylor Highway (2006–2010 \bar{x} = 22 calves:100 cows, range = 15–25 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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Please cite any information taken from this section, and reference as:

BENTZEN, T. W. 2011. Unit 20E brown bear. Pages 241–253 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

TABLE 1 Unit 20E brown bear mortality, regulatory years 1996–1997 through autumn 2010.

Regulatory year	Reported							Estimated kill		Total estimated kill					Total
	Hunter kill				Nonhunting kill ^a					M (%)	F (%)	Unk			
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal						
<i>1996–1997</i>															
Autumn 1996	10	10	0	20	1	0	0	0	0	11 (52)	10 (48)	0	21		
Spring 1997	2	2	0	4	0	0	0	0	0	2 (50)	2 (50)	0	4		
Total	12	12	0	24	1	0	0	0	0	13 (52)	12 (48)	0	25		
<i>1997–1998</i>															
Autumn 1997	7	4	0	11	0	0	0	0	1	7 (64)	4 (36)	1	12		
Spring 1998	0	0	0	0	0	0	0	0	0	0 (0)	0 (0)	0	0		
Total	7	4	0	11	0	0	0	0	1	7 (64)	4 (36)	1	12		
<i>1998–1999</i>															
Autumn 1998	6	5	0	11	1	0	0	0	0	7 (58)	5 (42)	0	12		
Spring 1999	0	0	0	0	0	0	0	0	0	0 (0)	0 (0)	0	0		
Total	6	5	0	11	1	0	0	0	0	7 (58)	5 (42)	0	12		
<i>1999–2000</i>															
Autumn 1999	0	2	0	2	0	0	0	0	0	0 (0)	2 (100)	0	2		
Spring 2000	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3		
Total	2	3	0	5	0	0	0	0	0	2 (40)	3 (60)	0	5		
<i>2000–2001</i>															
Autumn 2000	10	8	0	18	0	1	0	0	0	10 (53)	9 (47)	0	19		
Spring 2001	0	0	0	0	0	0	0	0	0	0 (0)	0 (0)	0	0		
Total	10	8	0	18	0	1	0	0	0	10 (53)	9 (47)	0	19		
<i>2001–2002</i>															
Autumn 2001	6	3	0	9	0	0	0	0	0	6 (67)	3 (33)	0	9		
Spring 2002	2	0	0	2	0	0	0	0	0	2 (100)	0 (0)	0	2		
Total	8	3	0	11	0	0	0	0	0	8 (73)	3 (27)	0	11		
<i>2002–2003</i>															
Autumn 2002	6	6	0	12	0	0	0	0	0	6 (50)	6 (50)	0	12		
Spring 2003	2	0	0	2	0	0	0	0	0	2 (100)	0 (0)	0	2		
Total	8	6	0	14	0	0	0	0	0	8 (57)	6 (43)	0	14		
<i>2003–2004</i>															
Autumn 2003	5	11	0	16	0	0	0	0	0	5 (31)	11 (69)	0	16		
Spring 2004	2	2	0	4	0	0	0	0	0	2 (50)	2 (50)	0	4		
Total	7	13	0	20	0	0	0	0	0	7 (35)	13 (65)	0	20		
<i>2004–2005</i>															

Regulatory year	Reported							Estimated kill		Total estimated kill					Total
	Hunter kill				Nonhunting kill ^a					M (%)	F (%)	Unk			
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal						
Autumn 2004	9	4	0	13	0	0	0	0	0	9	(69)	4	(31)	0	13
Spring 2005	2	1	0	3	2	0	0	0	0	4	(80)	1	(20)	0	5
Total	11	5	0	16	2 ^b	0	0	0	0	13	(72)	5	(28)	0	18
2005–2006															
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 ^b	0	0	0	0	11	(73)	4	(27)	0	15
2006–2007															
Autumn 2006 ^c	3	3	0	6	1 ^b	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 ^b	0	0	0	0	4	(57)	3	(43)	0	7
2007–2008															
Autumn 2007	7	2	0	9	1 ^b	0	0	0	0	8	(80)	2	(20)	0	10
Spring 2008	2	2	0	4	4 ^b	1 ^b	0	0	0	6	(67)	3	(33)	0	9
Total	9	4	0	13	5 ^b	1 ^b	0	0	0	14	(74)	5	(26)	0	19
2008–2009															
Autumn 2008	6	4	0	10	0	0	0	0	0	6	(60)	4	(40)	0	10
Spring 2009	4	1	0	5	1 ^b	1 ^b	0	0	0	5	(71)	2	(29)	0	7
Total	10	5	0	15	1 ^b	1 ^b	0	0	0	11	(65)	6	(35)	0	17
2009–2010															
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
2010–2011															
Autumn 2010 ^c	10	5	0	15	0	0	0	0	0	10	(67)	5	(33)	0	15

^a Includes bears killed by predator control permittees, defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

^b All bears were killed by predator control permittees.

^c Preliminary data.

TABLE 2 Unit 20E residency of successful brown bear hunters, regulatory years 1992–1993 through autumn 2010.

Regulatory year	Resident	(%)	Nonresident	(%)	Unknown	(%)	Total successful hunters
1992–1993	12	(86)	2	(14)	0	(0)	14
1993–1994	20	(95)	1	(5)	0	(0)	21
1994–1995	9	(82)	2	(18)	0	(0)	11
1995–1996	9	(43)	9	(43)	3	(14)	21
1996–1997	22	(92)	2	(8)	0	(0)	24
1997–1998	9	(82)	2	(18)	0	(0)	11
1998–1999	8	(73)	3	(27)	0	(0)	11
1999–2000	3	(60)	2	(40)	0	(0)	5
2000–2001	14	(78)	4	(22)	0	(0)	18
2001–2002	11	(100)	0	(0)	0	(0)	11
2002–2003	13	(93)	1	(7)	0	(0)	14
2003–2004	17	(85)	3	(15)	0	(0)	20
2004–2005	14	(88)	2	(12)	0	(0)	16
2005–2006	11	(92)	1	(8)	0	(0)	12
2006–2007	3	(50)	3	(50)	0	(0)	6
2007–2008	12	(92)	1	(8)	0	(0)	13
2008–2009	14	(93)	1	(7)	0	(0)	15
2009–2010	12	(92)	1	(8)	0	(0)	13
Autumn 2010 ^a	13	(87)	2	(13)	0	(0)	15

^a Preliminary harvest data.

TABLE 3 Unit 20E chronology of brown bear harvest by month, regulatory years 1992–1993 through autumn 2010.

Regulatory year	Harvest by month												<i>n</i>
	Aug (%)	Sep (%)	Oct (%)	Nov (%)	Apr (%)	May (%)	Jun (%)						
1992–1993	4 (29)	5 (36)	2 (14)	0 (0)	0 (0)	1 (7)	2 (14)						14
1993–1994	6 (29)	12 (57)	1 (5)	0 (0)	1 (5)	1 (5)	0 (0)						21
1994–1995	2 (18)	8 (73)	0 (0)	0 (0)	0 (0)	0 (0)	1 (9)						11
1995–1996	3 (14)	10 (48)	0 (0)	0 (0)	1 (5)	6 (29)	1 (5)						21
1996–1997	7 (29)	13 (54)	0 (0)	0 (0)	0 (0)	2 (8)	2 (8)						24
1997–1998	2 (18)	9 (82)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)						11
1998–1999	5 (45)	6 (55)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)						11
1999–2000	0 (0)	2 (40)	0 (0)	0 (0)	0 (0)	3 (60)	0 (0)						5
2000–2001	3 (17)	15 (83)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)						18
2001–2002	2 (18)	7 (64)	0 (0)	0 (0)	1 (9)	0 (0)	1 (9)						11
2002–2003	3 (22)	9 (64)	0 (0)	0 (0)	1 (7)	1 (7)	0 (0)						14
2003–2004	7 (35)	8 (40)	1 (5)	0 (0)	1 (5)	2 (10)	1 (5)						20
2004–2005	4 (25)	9 (56)	0 (0)	0 (0)	0 (0)	2 (13)	1 (6)						16
2005–2006	2 (17)	4 (33)	2 (17)	0 (0)	0 (0)	3 (25)	1 (8)						12
2006–2007	2 (33)	4 (67)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)						6
2007–2008	4 (31)	5 (38)	0 (0)	0 (0)	1 (8)	3 (23)	0 (0)						13
2008–2009	4 (27)	6 (40)	0 (0)	0 (0)	0 (0)	2 (13)	3 (20)						15
2009–2010	5 (39)	6 (46)	0 (0)	0 (0)	0 (0)	2 (15)	0 (0)						13
Autumn 2010 ^a	5 (33)	10 (67)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)						15

^a Preliminary data.

TABLE 4 Unit 20E brown bear percent harvest by transport method, regulatory years 1992–1993 through autumn 2010.

Regulatory year	Percent harvest by transport method									<i>n</i>
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	
1992–1993	43	0	0	21	0	7	29	0	0	14
1993–1994	24	0	10	14	0	19	5	29	0	21
1994–1995	27	0	9	18	0	9	18	18	0	11
1995–1996	62	0	10	10	0	5	5	10	0	21
1996–1997	42	4	0	8	0	8	21	17	0	24
1997–1998	45	0	0	45	0	0	0	9	0	11
1998–1999	73	0	0	0	0	18	0	9	0	11
1999–2000	60	0	0	0	0	0	40	0	0	5
2000–2001	44	0	11	33	0	0	11	0	0	18
2001–2002	55	0	9	36	0	0	0	0	0	11
2002–2003	21	0	7	29	7	14	7	14	0	14
2003–2004	40	0	0	30	10	0	10	10	0	20
2004–2005	44	0	13	31	0	0	6	6	0	16
2005–2006	42	0	0	0	8	0	33	17	0	12
2006–2007	67	0	0	0	0	0	33	0	0	6
2007–2008	46	0	15	8	8	8	15	0	0	13
2008–2009	27	0	13	46	0	7	0	7	0	15
2009–2010	38	8	15	15	0	8	8	8	0	13
Autumn 2010 ^a	40	0	0	46	0	7	7	0	0	15

^a Preliminary data.

WILDLIFE
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 2008
To: 30 June 2010¹

LOCATION

GAME MANAGEMENT UNITS: 21B, 21C, 21D, and 24 (51,135 mi²)

GEOGRAPHIC DESCRIPTION: Middle Yukon River, Koyukuk River, Nowitna River, and Melozitna River drainages

BACKGROUND

Grizzly bear density is thought to be low (10 bears/1000 mi²) to moderate (25 bears/1000 mi²) 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/1000 mi²) in mountainous areas of the Brooks Range in the northern portion of the unit. 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 1972; 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 of 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

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

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 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). 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., RY09 = 1 July 2009 through 30 June 2010).

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/1000 mi² in the highest density bear habitat and 10 bears/1000 mi² 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/1000 mi² within Gates of the Arctic National Park (7000 mi²), 33/1000 mi² in the Brooks Range outside the park (6500 mi²), and 22–33 bears/1000 mi² in the remainder of Unit 24 to the south (14,500 mi²). 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 RY08.

<u>Units and Bag Limits</u>	<u>Resident Open Season (Subsistence and General Hunts)</u>	<u>Nonresident Open Season</u>
Units 21B and 21C One bear every 4 regulatory years.	10 Aug–30 Jun	10 Aug–30 Jun
Unit 21D One bear every regulatory year by registration permit, or One bear every regulatory year.	10 Aug–30 Jun (Subsistence hunt only) 10 Aug–30 Jun	No open season 10 Aug–30 Jun
Unit 24 One bear every regulatory year by registration permit, or One bear every regulatory year.	10 Aug–30 Jun (Subsistence hunt only) 10 Aug–30 Jun	No open season 10 Aug–30 Jun

Seasons and Bag Limits in RY09.

<u>Units and Bag Limits</u>	<u>Resident Open Season (Subsistence and General Hunts)</u>	<u>Nonresident Open Season</u>
Units 21B and 21C		
One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun
Units 21D and 24		
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.

Units 21B, 21C and 21D — During the spring 1996 meeting, the Alaska Board of Game (board), included Unit 21D within the Northwest Alaska Brown Bear Management Area. This regulation change allowed a bag limit of 1 bear/year under a subsistence registration permit. This regulation also required salvage of meat for human consumption, but the hide and skull did not need to be sealed unless they were removed from the management area, aircraft could not be used, and there was no resident tag fee. If the hide was removed from the management area, ADF&G took the skin of the head and the front claws. At the spring 2000 meeting, the board extended the season to 15 June for both subsistence and general season hunts in Unit 21D. The bag limit was also liberalized to allow for the harvest of 1 bear/year under the general hunt. During the spring 2002 meeting, the board eliminated the Northwest Alaska Brown Bear Management Area and adopted a registration permit hunt (RB601) in its place in Unit 21D. At the 2004 meeting, the board eliminated the resident tag fee requirement for general hunts in Units 21B, 21C, and 21D and then reversed the tag fee exemption for Units 21B and 21C in 2005. Also at the 2004 meeting the board standardized seasons to 10 August–30 June throughout most of Interior Alaska (including Units 21B, 21C, 21D) and revised bag limits to allow 1 bear every regulatory year in the general hunt. The resident tag fee exemption was adopted for Units 21B, 21C, and 21D at the 2008 board meeting in conjunction with resident tag fee exemptions throughout Interior Alaska and the eastern North Slope.

Unit 24 — In 1990 the board eliminated all grizzly bear drawing permits and made a uniform general season hunt throughout Unit 24, which was aligned with seasons in Units 19, 20, and 21. In 1992 the board established the Northwest Alaska Brown Bear Management Area that included portions of Unit 24 west of the Dalton Highway Corridor Management Area (DHCMA). Under this subsistence registration permit, the season remained the same, but the bag limit changed from 1 bear/4 years to 1 bear/year. Also, all meat had to be salvaged for human consumption, sealing requirements were waived if the hide and skull remained within the management area, there was no resident tag fee, and aircraft could not be used. During the spring 1996 meeting, the board included the portion of Unit 24 within the DHCMA within the Northwest Alaska Brown Bear Management Area. This action allowed Unit 24 residents who resided within the DHCMA

to participate in the subsistence hunt and transport bear hides to their residences without sealing. At the spring 2000 meeting, the season was extended to 15 June for both the subsistence and general season hunts. The bag limit was also liberalized to allow for the harvest of 1 grizzly bear every year under the general harvest regulation. The Northwest Alaska Brown Bear Management Area was eliminated during the spring 2002 board meeting, and a registration permit hunt (RB601) was adopted for Unit 24 in its place. A limited drawing hunt for moose was adopted in 2002, which apparently reduced the number of bears harvested incidental to moose hunting activities. More long-term harvest data will be needed to make that assessment. At the 2004 board meeting, grizzly bear seasons were standardized throughout most of Interior Alaska (including Unit 24) to 10 August–30 June with a bag limit of 1 bear every regulatory year in the general hunt. The resident tag fee exemption was adopted for Unit 24 at the 2008 board meeting in conjunction with resident tag fee exemptions throughout Interior Alaska and the eastern North Slope.

Harvest by Hunters. Grizzly bear harvest in Units 21B, 21C, and 21D was low ($\bar{x} = 7.3$ bears/year), and no harvest patterns were clear during RY04–RY09 (Table 1). More than half the annual harvest was probably unreported. The number of bears taken and not reported was uncertain, but I estimated it was approximately 10 bears per year based on local resident interviews and previously reported values. Most of the bears that were harvested but unreported were likely taken at fish camps. If this estimate was accurate, the combined mean annual harvest during RY04–RY09 was approximately 17.5 bears/year in Units 21B, 21C, and 21D. 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 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 RY04 through fall 2010, males made up 65% of the reported harvest, which was adequate to maintain recruitment. The percent of males in the harvest was lower than the 72% reported for RY02 through fall 2008 (Stout 2009). In RY08–RY09 the average age of bears harvested in Units 21B, 21C, 21D, and 24 was 9.0 years of age.

Since 1963, among Units 21B, 21C, and 21D, most grizzly bear harvest has occurred in Unit 21D (Table 2), where most of the moose hunting has also occurred. 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 by hunters during RY04–RY09 was 12.8 bears (Table 3). The reported average harvests during RY07–RY09 in the northern (north of Allakaket) and southern (remaining) portions of Unit 24 were 10.0 and 2.7 bears, respectively. The number of bears taken by fishermen or trappers and not reported is unknown, but was likely <6 bears annually. The RY04–RY09 mean annual reported and estimated unreported harvest in the entire unit was 18.0 bears. Of the reported harvest for that same period, 71% of bears taken were males and 29% were females, a higher percentage of males than the RY00–RY05 harvest of 64% males and 36% 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 RY07–RY09 in those units was 1.0 bears for local hunters, 1.7 for nonlocal residents, and 3.7 for nonresidents. From RY00 through fall 2010 the mean annual number of successful hunters was 7.0, less than the average of 7.5 during RY98 through fall 2008 (Stout 2009).

Nonlocal resident hunters accounted for 59% of the reported harvest in Unit 24 during RY00–RY09 (Table 5). Most of this harvest was incidental to fall moose hunting. Harvest by local residents did not change noticeably during RY08–RY09. 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 20.3 bears, an increase from the average harvest of 12.7 bears during RY94–RY99. Harvest during RY07–RY09 was more consistent with historical levels and averaged 12.3 bears. There appears to be 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 greater 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 activity, and hunters typically used boats for transportation.

In Unit 24 during RY07–RY09 most kills occurred during the fall (71%), incidental to hunting other game species. Transportation to the hunt area was via highway vehicle (26.3%), airplane (39.5%), boat (18.4%), horseback–dog team (5.3%), or by foot and other methods (10.5%), and was somewhat consistent with previously reported values.

CONCLUSIONS AND RECOMMENDATIONS

For Units 21B, 21C, and 21D the management objective to manage for a grizzly population that will sustain a 3-year mean annual harvest of at least 25 bears, with at least 50% males in the reported harvest, was achieved. The 3-year mean annual reported and unreported harvest of 16.3 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 the management objective of maintaining a population that could sustain the stated level of harvest was achieved. During RY08–RY09, harvest throughout the unit was very low and was not a factor influencing the population. Although most of the 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 rate of less than 3 bears per year. The objective of

maintaining at least 50% male harvest was achieved, with 71% 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. Also, for most hunters the use of firearms is prohibited within 5 miles of the Dalton Highway.

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

STOUT, G. W. 2011. Units 21B, 21C, 21D and 24 brown bear. Pages 254–266 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

TABLE 1 Units 21B, 21C, and 21D brown-grizzly bear mortality, regulatory years 2004–2005 through fall 2010.

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill ^a									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
2004–2005														
Fall 2004	1	0	0	1	0	1	0	1	5	0	1	1	5	7
Spring 2005	6	2	0	8	0	0	0	0	5	0	6	2	5	13
Total	7	2	0	9	0	1	0	1	10	0	7	3	10	20
2005–2006														
Fall 2005	2	2	0	4	0	0	0	0	5	0	2	2	5	9
Spring 2006	3	2	0	5	0	0	0	0	5	0	3	2	5	10
Total	5	4	0	9	0	0	0	0	10	0	5	4	10	19
2006–2007														
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
2007–2008														
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
2008–2009														
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
2009–2010														
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
2010–2011														
Fall 2010	0	1	0	1	0	0	0	0	5	0	0	1	5	6

^a Includes defense of life or property (DLP) 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 1998–1999 through fall 2010^a.

Regulatory year	Unit			Total
	21B	21C	21D	
1998–1999	0	2	4	6
1999–2000	1	0	6	7
2000–2001	1	4	8	13
2001–2002	0	1	8	9
2002–2003	0	0	5	5
2003–2004	0	2	3	5
2004–2005	1	1	7	9
2005–2006	0	1	8	9
2006–2007	1	3	3	7
2007–2008	0	0	9	9
2008–2009	1	1	3	5
2009–2010	0	0	5	5
Fall 2010	0	0	1	1

^a Nonhunting kill not included.

TABLE 3 Unit 24 brown–grizzly bear mortality, regulatory years 2004–2005 through fall 2010.

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill ^a									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
<i>2004–2005</i>														
Fall 2004	6	2	0	8	0	1	0	1	3	2	6	3	5	14
Spring 2005	2	2	0	4	0	0	0	0	0	0	2	2	0	4
Total	8	4	0	12	0	1	0	1	3	2	8	5	5	18
<i>2005–2006</i>														
Fall 2005	8	3	0	11	0	0	0	0	3	2	8	3	5	16
Spring 2006	1	2	0	3	0	0	0	0	0	0	1	2	0	3
Total	9	5	0	14	0	0	0	0	3	2	9	5	5	19
<i>2006–2007</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

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill ^a									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
Total	11	2	0	13	0	0	0	0	3	2	11	2	5	18
2007–2008														
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
2008–2009														
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
2009–2010														
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
2010–2011														
Fall 2010	5	4	0	9	0	0	0	0	3	2	5	4	5	14

^a Includes DLP 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 1998–1999 through fall 2010.

Regulatory year	Local ^a resident	Nonlocal resident	Nonresident	Total successful hunters
1998–1999	2	1	3	6
1999–2000	2	2	3	7
2000–2001	1	3	9	13
2001–2002	3	0	6	9
2002–2003	2	0	3	5
2003–2004	0	2	3	5
2004–2005	1	0	8	9
2005–2006	3	2	4	9
2006–2007	1	2	4	7
2007–2008	3	1	5	9
2008–2009	0	2	3	5
2009–2010	0	2	3	5
Fall 2010 ^b	0	0	1	1

^a Units 21B, 21C, and 21D residents.

^b Preliminary.

TABLE 5 Unit 24 brown–grizzly bear successful hunter residency, regulatory years 1998–1999 through fall 2010.

Regulatory year	Local ^a resident	Nonlocal resident	Nonresident	Total successful hunters
1998–1999	2	10	4	16
1999–2000	0	9	3	12
2000–2001	2	16	7	25
2001–2002	0	12	6	18
2002–2003	1	10	7	18
2003–2004	0	12	8	20
2004–2005	3	7	1	11
2005–2006	1	6	7	14
2006–2007	1	8	4	13
2007–2008	0	8	2	10
2008–2009	1	8	8	17
2009–2010	1	5	4	10
Fall 2010 ^b	0	8	1	9

^a Unit 24 Residents.

^b Preliminary.

WILDLIFE
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 2008
To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 22 (25,200 mi²)

GEOGRAPHICAL DESCRIPTION: Seward Peninsula and that portion of the Nulato Hills draining west into Norton Sound

BACKGROUND

We believe that brown bear numbers in Unit 22 declined during the early 1900s after the introduction of the gold mining and reindeer herding industries. The population did not begin to recover until these activities diminished substantially during the 1940s and federal predator control efforts ended at statehood in 1959 (Grauvogel 1986). Growth of the Unit 22 bear population has had many effects and consequences. Residents, particularly from the Nome area, have considerable interest in hunting, as do nonresidents through general season and drawing permit hunts. Predation by brown bears on moose calves is believed to be depressing moose populations in many parts of the unit. The public has serious concerns about human-bear encounters in the Nome area and in Unit 22 villages and camps, and many local residents believe that bear densities in Unit 22 are too high. Since 1997, in response to public demand, brown bear hunting regulations have been incrementally liberalized to increase annual harvest and to attempt to reduce bear 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 skins and skulls, determine sex and extract a tooth for aging from brown bears presented for sealing.
- Monitor the brown bear harvest through field observations, brown bear sealing reports, village harvest surveys, subsistence harvest questionnaires, interviews with successful hunters, and analyze data.
- Improve communication with the public to reduce illegal and unreported harvest, and improve understanding of defense of life and property situations.

- Provide opportunity for subsistence hunting of brown bears.
- Assist the public in dealing with nuisance bear problems.
- Educate the public about bear behavior and safety to minimize conflicts between bears and the public.
- Provide information to the Board of Game on brown bear management.

METHODS

Bear hides and skulls are sealed by department staff or authorized sealing agents in several Unit 22 villages. We summarize harvest data from sealing certificates, harvest reports, nonresident drawing permits and subsistence registration permits, village-based big game harvest surveys, and Defense of Life and Property (DLP) reports. We address problems with nuisance bears through public education and by working with Alaska Wildlife Troopers and Village Public Safety Officers to deter or destroy problem bears. We inform residents about DLP regulations. We have made an electric fence package 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.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

We do not have a 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 mi²). The density estimate varied almost two-fold within the study area with the highest densities (1 bear per 20 mi²) in the western portion of Unit 22B, and the lowest densities (1 bear per 39 mi²) in the southern portion of Unit 22E (Miller and Nelson 1993). Based on observations by staff, guides and long time residents of Unit 22, we believe bear numbers increased unit-wide during the 1990s and early 2000s. During that period, reports of bear encounters and complaints about nuisance bears were numerous and the take of DLP bears reached a record high of 10 bears during the 2000–2001 regulatory year. Bears were destroying cabins and raiding subsistence food caches in the westernmost parts of the unit where bears were previously seldom seen (Persons 2003). Based on an abundance of brown bears in Unit 22, the Board of Game began incrementally liberalizing bear hunting regulations in 1997, and since 1998 the average annual reported harvest has been 70% greater than the average harvest during 1990–1997. Observations indicate the unit still has a productive bear population, however, in the last 5 years staff and the public have seen fewer bears in the unit. The increased harvest since 1997 may have stabilized or reduced bear numbers.

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. Regulation changes to extend seasons and increase bag limits went into effect during the 2006-2007 reporting period.

<i>2008–2009 and 2009–2010</i>		
<i>Regulatory Year</i>	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit and Bag Limits		
<i>Unit 22(A), that portion south of and including the Golsovia River drainage</i>		
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
<i>22(A) remainder</i>		
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>Unit 22(B)</i>		
RESIDENTS:		
One bear every regulatory year by registration permit (RB699)	1 Aug–31 May (Subsistence hunt only)	

<i>2008–2009 and 2009–2010</i>		
<i>Regulatory Year</i>	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit and Bag Limits		
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		1 Aug–31 May
<i>Unit 22(C)</i>		
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		1 Aug–31 Oct 10 May–25 May
<i>Unit 22(D)</i>		
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 12 permits maybe issued in combination with Unit 22E		1 Aug–31 May

<i>2008–2009 and 2009–2010</i>		
<i>Regulatory Year</i>	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
<i>Unit and Bag Limits</i>		
<i>Unit 22(E)</i>		
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		1 Aug–31 May

Board of Game Actions and Emergency Orders. In March 2008 and 2009 the Board of Game reauthorized the brown bear resident tag fee exemption in Unit 22.

Human-Induced Harvest. The department maintained a population in accordance with its management goal to sustain a reported harvest of at least 50% males. Annual reported harvest of male bears has consistently exceeded the female harvest, with approximately 66% of the harvest being males since 1961. During this reporting period 68% (n=129) of the bears harvested were males and the remaining 32% (n=60) were females.

One hundred five bears were taken through hunting and non-hunting kills during the 2008 regulatory year and 98 bears were taken during the 2009 regulatory year (Table 1). The average annual harvest since 1997 has been 91 bears, which is a 70% increase from the 1990-1997 average annual harvest of 54 bears. Liberal bear regulations and a high desire by local residents to reduce bear predation on ungulates are major contributing factors to the high harvests.

The age of harvested bears since 1997 has averaged 6.5 years (n=1,100) annually, and during this reporting period bears averaged 6.7 years. Since 1997 the average age of fall bears has been 6.4 years, and spring harvest has averaged 6.5 years. Data for this reporting period show the average age of fall bears was 7 years and spring bears averaged 8 years.

Most of the Unit 22 harvest is by local recreational hunters who are not particularly selective and harvest whatever bear first presents itself. The average skull size during July 2008 to June 2010 was 19.5 inches (n=188) and 14% (n=27) of those bears had a skull size 24 inches or larger. The number of Boone & Crocket Club record book grizzly bears taken in Unit 22 with a minimum skull size of 24 inches or larger during 1990-2009 (n=208) has averaged 10.9 bears per year.

Local resident harvest exceeds nonresident harvest in Unit 22, except in Units 22A and 22E where local residents express little interest in hunting brown bears. In Unit 22A, 10 residents, were successful in harvesting a bear, whereas 54 nonresidents were successful in harvesting a bear during the reporting period.

Twelve bears were reported as DLP kills during the 2-year reporting period. From 2000-2009 there has been an annual average of 5 DLP bears taken from the Unit. 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 extent or amount of illegal harvest are unknown.

In 2008–2009, 13 Unit 22 residents registered for the brown bear subsistence hunt RB699 and 5 residents registered for the hunt in 2009–2010. No hunters reported successful harvests in either regulatory year.

Permit Hunts. During each year of the reporting period, 27 drawing permits (DB685) were available to nonresident hunters in Units 22B and 22C in combination, and 12 permits (DB690) were allocated to nonresidents in Units 22D and 22E in combination. A continuous season from 1 August–31 May (excluding Unit 22C), allowed drawing permit holders to hunt during either 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 from 0-14 annually.

Hunter Residency and Success. We cannot easily evaluate hunter effort and success for Alaska resident hunters under the present harvest reporting system because unsuccessful hunters are not required to report.

Only nonresident drawing permit hunts in Unit 22 (excluding Unit 22A) can be used to estimate hunter success. The nonresident success rates for drawing permit hunt DB685 during 2008–2009 was 80%; and 63% for permit hunt DB690. The success rates in 2009–2010 for DB685 was 71% and 64% for DB690. It is difficult to evaluate nonresident hunter success in Unit 22A because drawing permits are not required. Sealing records indicate Unit 22A experienced an 81% increase in annual average brown bear harvest since 2000. This increase is likely due to the 2002 Board of Game regulatory changes to lengthen the season and change the bag limit to one bear every regulatory year; along with a possible increase in outfitters gaining guide use areas. Sealing reports indicate 54 nonresidents were successful in harvesting a brown bear in Unit 22A during the reporting period which is a 34% decrease from the 2006-2007 reporting period of 82 harvested bears.

Harvest Chronology. Historically, more bears are taken during the spring season because they are more easily observed and tracked, and bears tend to be more accessible to hunters using snowmachines as transportation. In 2008–2009, 53% of the harvest occurred in the spring and in 2009–2010 the spring harvest represented 39% of the total harvest (Table 3). The low 2010 spring harvest is likely from low harvest numbers in Unit 22A due to shore fast ice remaining late into the season, and deteriorating snow conditions in other parts of Unit 22 making travel by snowmachine difficult.

Transport Methods. The Nome road system allows bear hunters to use highway vehicles as the primary transportation for hunting, or to use roads as access points for boats, 4-wheelers, and snowmachines. Methods of transport used by hunters are summarized in Table 4. During this reporting period, 38% of successful fall hunters used off road vehicles, and 26% used boats. This is a reverse from the previous reporting period. In the spring season, the majority of successful hunters used off road vehicles (61%), such as snowmachines, followed by aircraft (19%). Aircraft use in the unit is generally by registered guides transporting clients in and out of camps. Other transport methods are used from the camps.

Other Observations. During October 2011, the Nome office responded to a wounded bear on the Nome- Council road in Unit 22B. Staff found the lethargic and skinny bear and determined the right front shoulder was injured. The injury was likely due to an encounter with a muskox; staff received public reports of a brown bear stalking a group of muskox in the same area. Public reports indicated the brown bear stalked a group of muskox and fled the area after it was hooked by an individual muskox. It is also possible the injury was caused by a vehicle collision; the Department of Transportation conducted an extensive road construction project in the Fox River valley and increased road traffic was present throughout the summer.

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 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 department has maximized the opportunity to hunt brown bears in an attempt to reduce bear numbers. Unit 22C harvest is approximately 15 brown bears annually and the Unit 22C moose population is above our management goal (Gorn 2008).

CONCLUSIONS AND RECOMMENDATIONS

Throughout the 1990s, staff, guides, and Unit 22 residents agreed that an increase in bear/human encounters and complaints about nuisance bears indicated bear numbers were increasing unit-wide. Beginning in 1997, the Board began incremental liberalization of bear hunting regulations, resulting in 70% greater harvest than during 1990-1997.

Since 1997, in the most heavily hunted and accessible areas (Units 22B west of the Darby Mountains, 22C, and 22D), staff have received fewer complaints about problem bears, suggesting bear numbers may have stabilized. The harvest has approximately doubled with an average of 91 bears harvested annually, with the low of 84 bears in 2002 and a record high of 105 bears harvested during the 2008-2009 regulatory year (Figure 1).

We have met our management goal to maintain a population that sustains a 3-year mean annual reported harvest of at least 50% males. We should continue to strive for high harvest rates and reductions in the bear population as long as necessary to rebuild moose populations that appear to be limited by predation. If the 3-year average male harvest declines below our management goal of 50% males, bear harvest rates should be reduced to prevent depleting the bear population to very low levels.

We will continue to monitor brown bear harvest through field observations, information from sealing certificates, age from tooth extraction, interviews with hunters, and data analysis. It is important for department staff to continue to educate the public about bear behavior and bear safety. Also, emphasizing to the public the importance of clean camps and not leaving food or garbage unattended, or accessible to bears can help minimize bear& human conflicts.

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Hughes, L. 2011. Unit 22 brown bear management report. Pages 267–279 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Unit 22 brown bear hunting and non-hunting mortality for regulatory years 2008–2009 and 2009–2010.

Regulatory Year	Reported harvest											
	Hunter kill				Non-hunting kill				Total ^a			
	M	F	Unk.	Total	M	F	Unk.	Total	M	F	Unk.	Total
<u>2008–2009</u>												
Fall 2009	21	25	0	46	2	0	1	3	23	25	1	49
Spring 2009	43	8	1	52	3	0	1	4	46	8	2	56
Subsistence	0	0	0	0	0	0	0	0	0	0	0	0
Total	64	33	1	98	5	0	2	7	69	33	3	105
<u>2009–2010</u>												
Fall 2009	37	19	0	56	0	0	3	3	37	19	3	59
Spring 2010	28	8	0	36	2	0	0	2	30	8	0	38
Subsistence	0	0	0	0	0	0	0	0	0	0	0	0
Total	65	27	0	92	2	0	3	5	67	27	3	97

^a 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 regulatory years 2002-2003 through 2009-2010.

Regulatory Year	Successful hunters ^a								Total
	Local Residents ^b		Nonlocal Residents		Nonresidents		Unknown		
	(n)	%	(n)	%	(n)	%	(n)	%	
2002-2003	36	43%	13	15%	32	38%	3	4%	84
2003-2004	39	43%	16	18%	31	34%	4	4%	90
2004-2005	41	44%	10	11%	38	41%	4	4%	93
2005-2006	39	45%	9	10%	35	40%	4	5%	87
2006-2007	34	36%	7	7%	46	49%	7	7%	94
2007-2008	31	40%	9	12%	36	47%	1	1%	77
2008-2009	42	42%	11	11%	43	43%	5	5%	101
2009-2010	40	43%	10	11%	42	45%	2	2%	94

^a Excludes defense of life and property (DLP) or other non-hunting kills^b Hunters residing in Unit 22Table 3. Unit 22 brown bear hunter harvest^a by sex and subunit for regulatory years 2008–2009 and 2009–2010.

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>2008–2009</u>																		
Fall 2008	8	10	0	3	7	0	3	3	0	7	5	0	0	0	0	21	25	0
Spring 2009	22	1	0	5	2	0	10	2	1	5	3	0	1	0	0	43	8	1
<u>2009–2010</u>																		
Fall 2009	9	3	0	10	3	0	11	4	0	7	9	0	0	0	0	37	19	0
Spring 2010	9	1	0	8	4	0	2	0	0	9	3	0	0	0	0	28	8	0

^a Excludes defense of life and property (DLP) or other non-hunting kills

Table 4. Unit 22 brown bear harvest by transport method for regulatory years 1997–2010.

Regulatory year	Number harvested							Total (n)
	Airplane	Boat	Snowmachine	ORV ^a	Highway vehicle	Walk	Unknown	
1997–1998	7	6	28	8	10	0	0	59
1998–1999	4	13	42	13	8	3	0	83
1999–2000	7	8	35	25	12	2	0	89
2000–2001	6	10	56	10	10	2	0	94
2001–2002	1	8	42	21	7	2	0	81
2002–2003	5	14	34	13	9	6	3	84
2003–2004	4	20	10	24	18	11	3	90
2004–2005	0	18	25	27	10	8	5	93
2005–2006	2	16	30	21	9	3	6	87
2006–2007	7	29	27	15	5	2	2	87
2007–2008	10	14	29	20	1	2	0	76
2008–2009	16	23	26	20	8	3	5	101
2009–2010	9	12	25	24	13	3	8	94

^a ORV is defined as off road vehicle

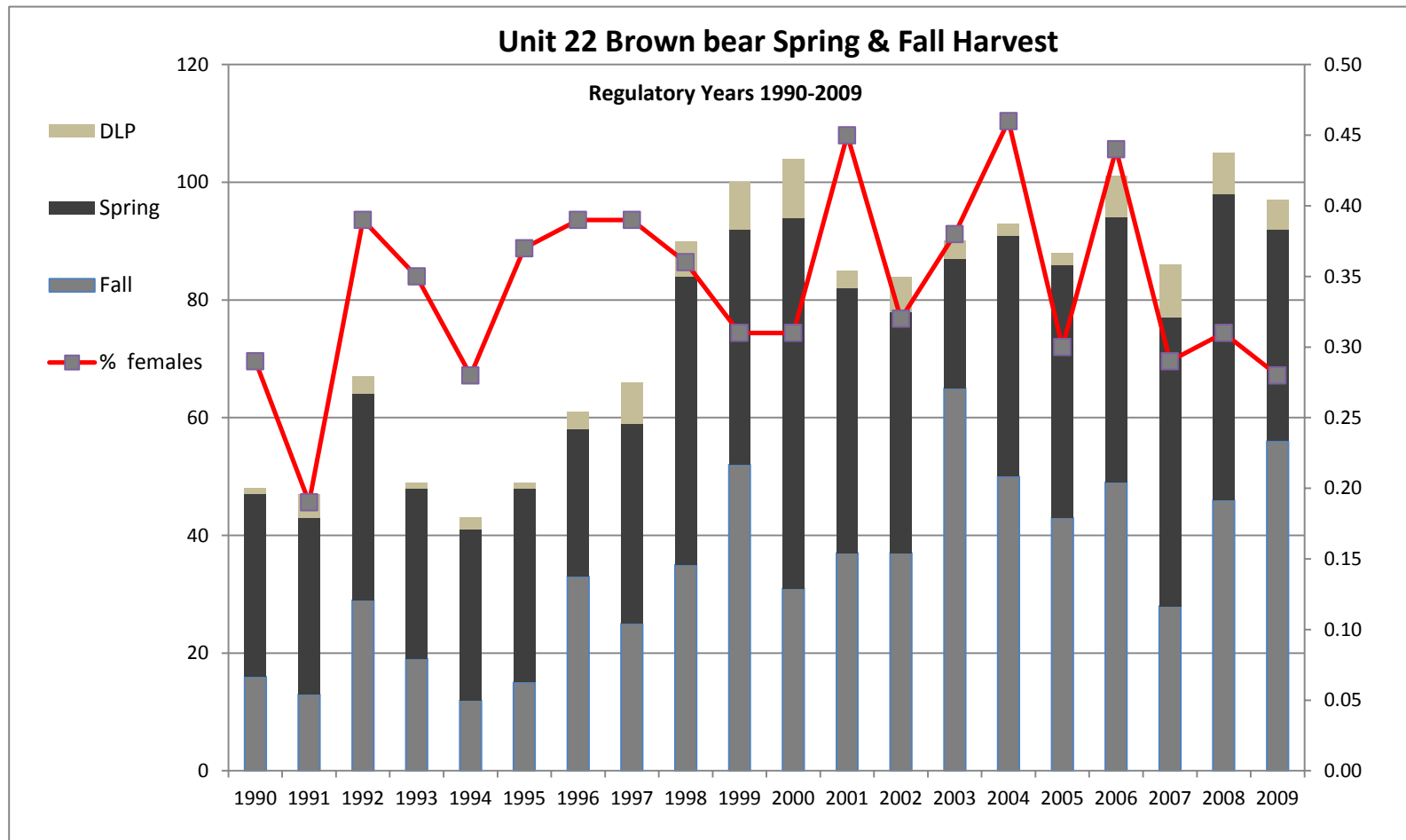


Figure 1. Unit 22 reported brown bear harvest, 1990-2009.

BROWN BEAR MANAGEMENT REPORT

From: July 2008
To: June 2010

LOCATION

GAME MANAGEMENT UNIT: 23 (43,000 mi²)

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) two nonresident drawing permit hunts (DB781 – fall; DB791 – spring); 2) a general season hunt for resident hunters; 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 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. In contrast, most nonlocal hunters seal their bears, so these data are reasonably accurate. We believe community-based harvest assessments and harvest reports from the registration subsistence hunt are more accurate than sealing data. Many brown bears taken under defense of life or property (DLP) regulations are not reported, and many of those that have been reported have not been entered into the statewide harvest files. As a result, harvest data in future reports will likely differ from that reported here. Additionally, numbers reported in this report are slightly different from years prior due to ongoing data cleanup efforts.

The 1987 mark-recapture 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 mark-recapture methods. In 2008 the National Park Service (NPS) conducted their paired sample census 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 mi² 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 determine 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 median 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 mi² (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 mi² 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 2–3 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 ability. 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 mi². Therefore, it is important to note that bear densities are habitat specific and cannot be applied broadly.

Residents of Unit 23 report brown bear numbers have increased since at least the 1940s or 1950s. Several developments over the last 50 years have probably contributed to this trend. Moose, caribou, and muskox numbers in this region have increased substantially since the 1950s. This has provided a stable prey base for large predators. In addition, the presence of these ungulates has substantially reduced the subsistence harvest of brown bears (Raymond Stoney, Kiana, personal communication). In recent years the decline of the commercial salmon fishery in Kotzebue Sound has allowed more salmon to reach spawning areas far inland, again increasing food for bears. State hunting regulations have probably contributed to the increase of brown bears in Unit 23 as well. For example, from statehood until the early 1990s, brown bear hunting regulations mainly provided opportunities for trophy hunting and were not tailored to the needs of subsistence hunters that did not want to deal with sealing requirements and were primarily interested in meat. Additionally, regulations preventing the harvest of cubs and of sows with cubs have historically made it virtually impossible to harvest adult sows. In contrast, “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

Season and Bag Limit.

The following regulations were in effect during this period:

<i>2008–2009 and 2009–2010</i> Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 23		
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–10 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, the 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. 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 2008–2009 and 2009–2010 were 53 bears both years, slightly higher than the 20 year average of 47 bears (SD 13). Data of the last 20 years indicates a gradual increase in harvests ($R^2 = 0.1213$) with substantial annual variability that is seen throughout the entire sealing dataset (Fig. 2). During this reporting period, 9 bears were taken under the subsistence registration permit hunt (Table 1). This is likely because general hunting regulations 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, they may now do so under the general hunt. Community harvest assessments suggest that the number of brown bears taken for food is low (Table 2).

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 32 brown bears (0.0093 brown bears per capita) are taken annually (Table 2). This is twice the previously reported total and is largely due to a data outlier observed in the Buckland 2009 survey. This data point is being further investigated. 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 7. Combining Kotzebue harvest with village per capita harvest estimates suggests that residents of Unit 23 have taken approximately 35–40 brown bears annually in recent years. Compare to reported harvest, this is nearly three times as high as the number of bears reported through the registration permit and sealing systems (median = 12 bears/yr during 1990–1991 through 2009–2010).

Some human-caused mortality of bears continues to be unreported in Unit 23. This includes bears taken under defense of life and property 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 than in the more densely forested Kobuk River and Selawik River drainages. However, in 1998–1999 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 steady or slightly decreasing trend of approximately 70% males in the harvest over the last 20 years (Fig. 3). Likewise, there was a steady trend in mean skull size for all bears over the last 20 years when analyzed by sex (Table 4). There was a steady or slightly increasing trend in median age of bears taken throughout the unit, with the median age of male bears slightly decreasing and median age of female bears slightly increasing (Table 4).

Historically, most trophy hunting for brown bears in Unit 23 has occurred in that portion of the Noatak drainage below the Anisak River and in the Wulik and Kivalina drainages. Telemetry

results indicate bears commonly move among these drainages (Ballard et al. 1991). If hunting has affected the sex or age structure of bears anywhere in Unit 23, it should be most apparent in harvests within this area by nonlocal hunters, who most strongly select for large bears. This subset of harvest data showed the same trend as the entire dataset in the proportion of male bears in the total harvest, in the median skull size of male bears harvested, and in the age of bears taken.

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. In 1980–1981 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 red flags that brown bears are being overharvested, and the vast majority of reports from the public indicate that bears are numerous. Opportunistic observations of brown bears by ADF&G staff while flying throughout the unit in recent years suggest brown bear numbers are stable.

Permit Hunts. Participation in the Unit 23 subsistence registration hunt (RB700) has declined, probably as a result of increasingly liberal general hunting regulations. Nine 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, though. 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.

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 9 bears in the 2008–2009 fall hunt (4 males, 3 females, 2 unknown), and 1 male in the 2008–2009 spring hunt. Hunters took 1 male bear in the 2009–2010 fall hunt; and no bears in the 2009–2010 spring hunt. Although the number of permits available was increased 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 1981–1982 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 1992–1993. 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 57% and 53% of the total reported Unit 23 harvest during 2008–2009 and 2009–2010, 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. There is no limit on numbers of resident hunters, though, and the number of bears taken by both local and nonlocal residents has increased since the 1960s; however, this increase in harvest has been greatest for nonlocal residents. For example, in 3 of the last 5 regulatory years, nonlocal residents have taken more brown bears than either residents of Unit 23 or nonresident hunters (Fig. 4).

Harvest Chronology. Since 1970 the majority of the brown bear harvest has been taken during fall (Fig. 5). In recent years the department has provided more nonresident drawing permits during fall than during spring. This may be in response to interest in the fall hunt, but, also, brown bears are the only big game animal to hunt in Unit 23 during spring. In contrast, 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. 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 (during fall) and snowmachines (during spring) were the next most commonly used means of transportation (Table 8). Many guides now combine use of airplanes and snowmachines to hunt bears during spring. Use of all-terrain vehicles (ATVs) during 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; however, this trend began well before recent regulatory changes. Increases in bear harvests have probably been caused more by increasing numbers of commercial operators and nonlocal hunters throughout Unit 23 than through increased hunting opportunity. 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 that being reflected in harvest data. Therefore, I recommend the following activities:

- Survey a large portion of Unit 23 in 2011 or 2012 to determine bear density.
- Continue community-based assessments to monitor harvests of brown bears by residents of Unit 23.

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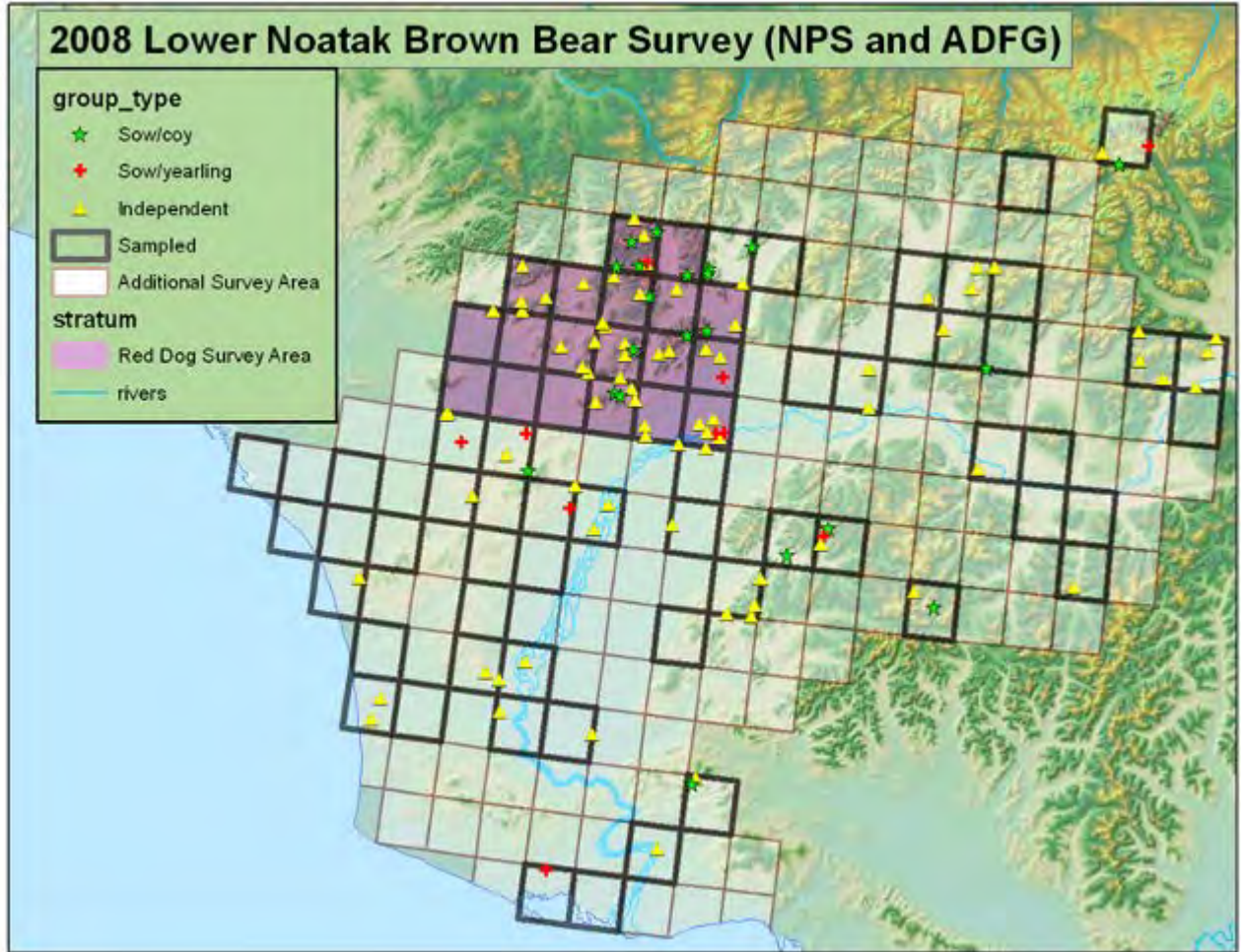


FIGURE 1 Bear observations from the 2008 Lower Noatak Brown Bear Survey conducted by the National Park Service and ADFG (excluding data from the second survey in a paired count).

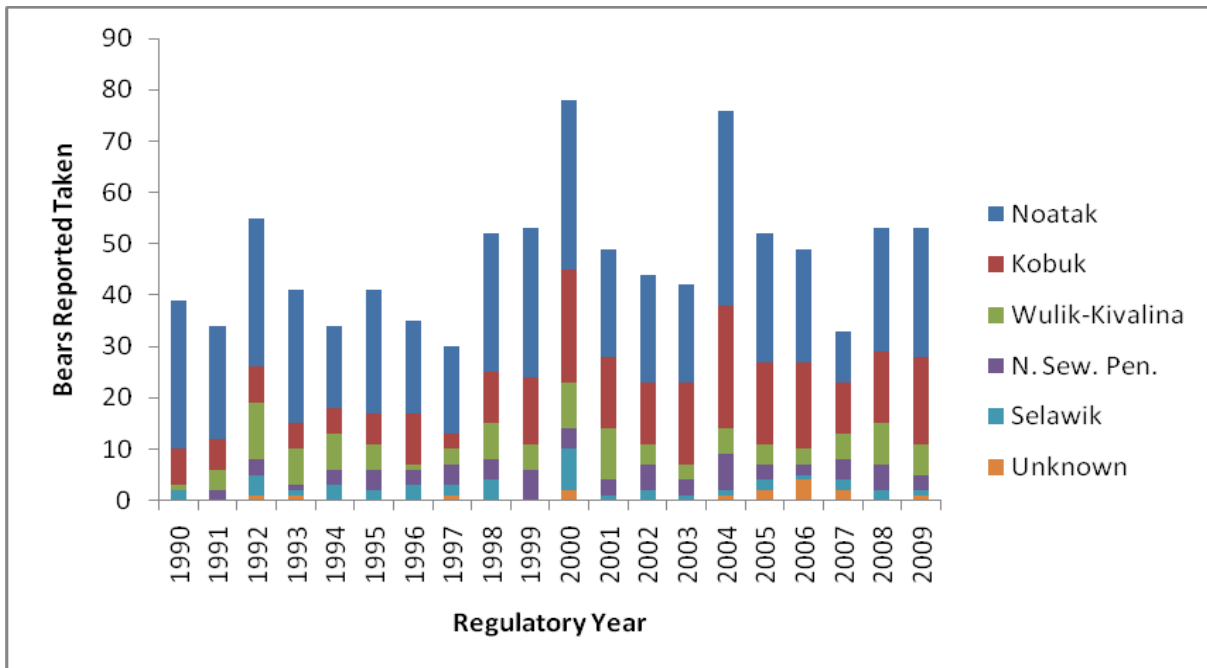


FIGURE 2 Unit 23 brown bear harvest by drainage, 1990-1991 through 2009-2010 (sealing and registration permit data). NSP = Northern Seward Peninsula; W-K = Wulik/Kivalina.

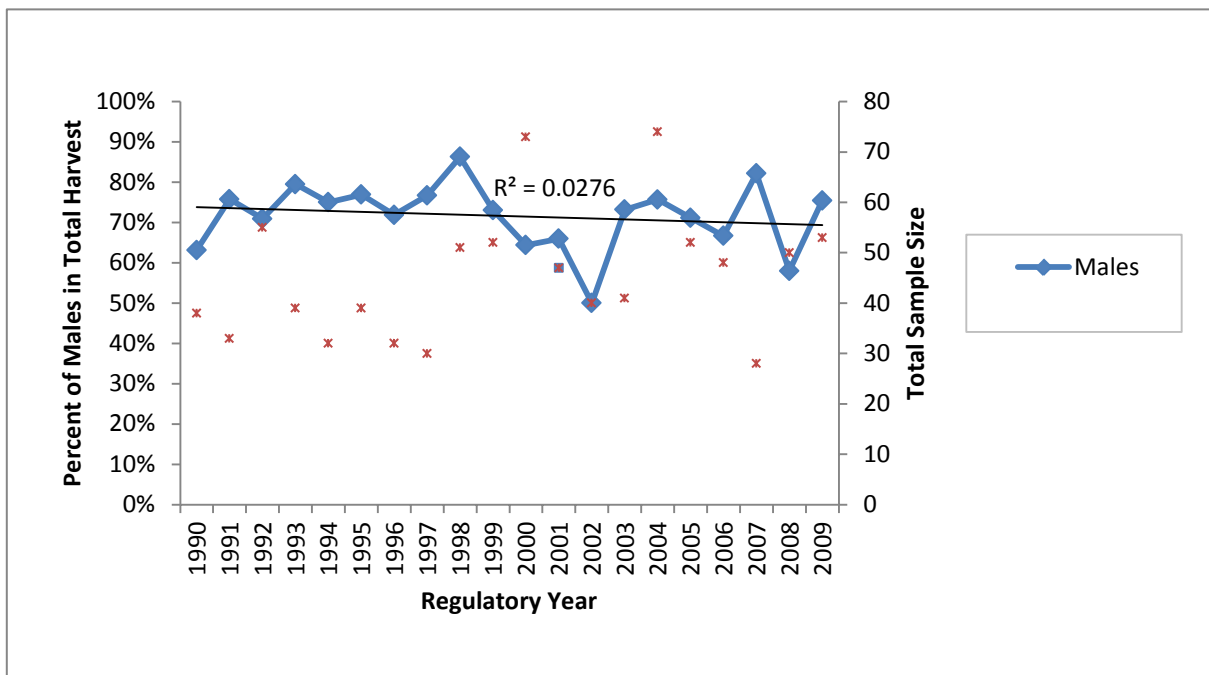


FIGURE 3 Percentage of males in Unit 23 brown bear harvest, 1990-1991 through 2009-2010 (sealing and registration permit data)

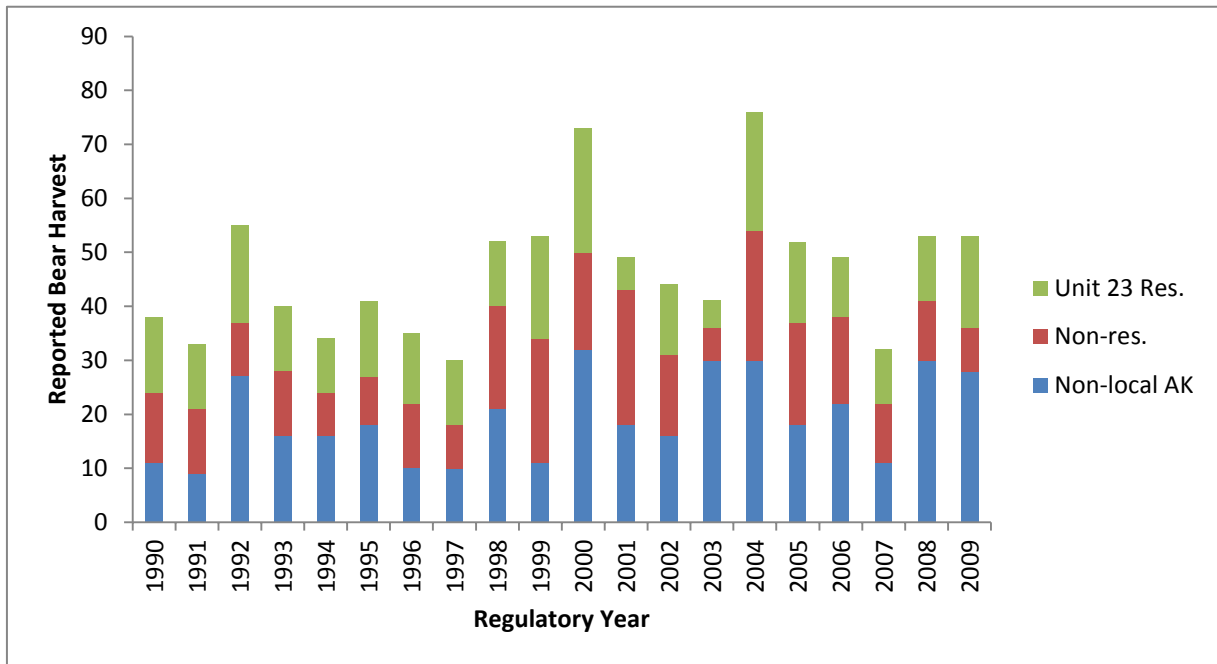


FIGURE 4 Unit 23 brown bear harvest by hunter residency, 1990–1991 through 2009–2010 (sealing and registration permit data)

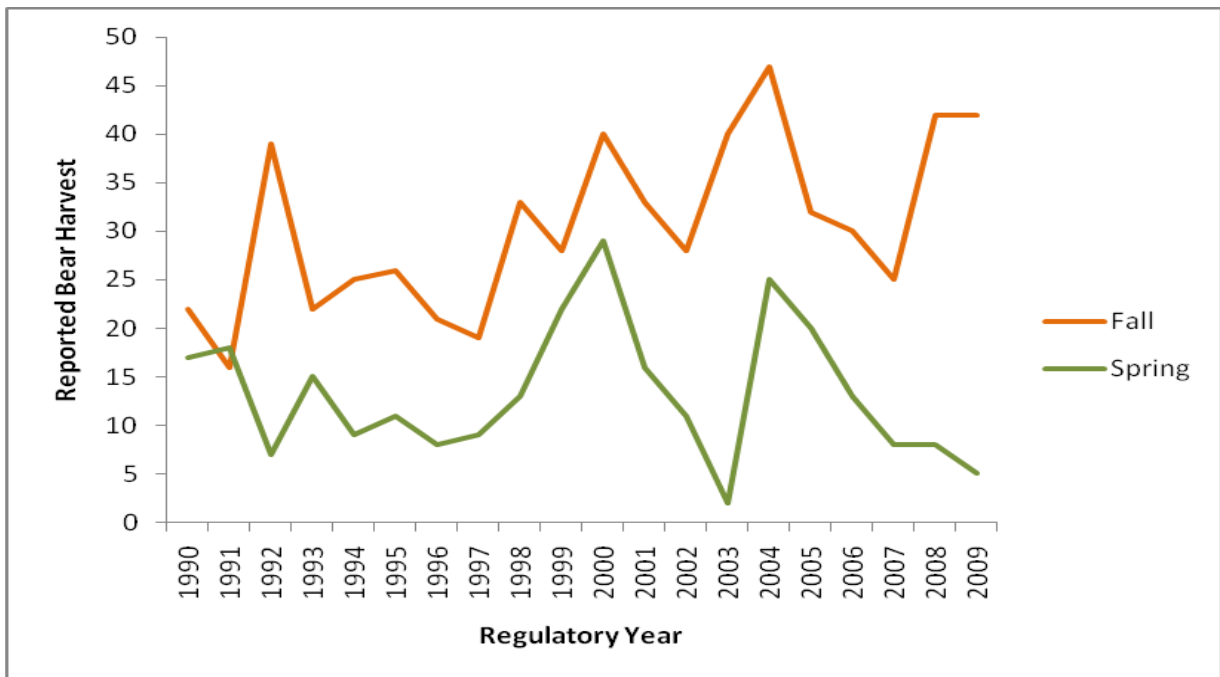


FIGURE 5 Unit 23 brown bear harvest by season (fall = Aug-Dec; spring = Jan-Apr), 1990–1991 through 2009–2010 (does not include records where season was unknown.)

TABLE 1 Reported harvest of brown bears in Unit 23, 2000-2001 through 2009-2010, by hunt type (sealing and registration permit data)

Regulatory Year	General Hunt	Fall Drawing	Spring Drawing	RB700	Unk. & DLP	Total
2000–2001	43	6	11	10	8	78
2001–2002	23	12	12	0	2	49
2002–2003	27	9	4	4	0	44
2003–2004	34	5	1	0	2	42
2004–2005	47	12	10	5	2	76
2005–2006	33	12	7	0	0	52
2006–2007	27	9	8	5	0	49
2007–2008	19	8	2	0	4	33
2008–2009	41	9	1	2	0	53
2009–2010	39	7	0	7	0	53

TABLE 2 Brown bear harvests in Unit 23 based on community harvest assessments (CSIS information from Subsistence Division, 2009)

Community	Year	Human Population ^a	Brown Bears Harvested (Estimate)	Brown Bears Taken per Capita (Estimate) ^b
Ambler	2003, 2009	291, 261	1,2	0.0054
Buckland	2009	432	16 ^c	0.0370
Kiana	2006, 2009	399, 374	2, 0	0.0025
Kobuk	2003-2004	125	4	0.0325
Noatak	2001, 2007	438, 489	1, 2	0.0030
Noorvik	2002	676	5	0.0074
Selawik	1999, 2006	767, 842	1, 1	0.0013
Shungnak	2002, 2008	249, 272	1,2	0.0058
Total		3424	32	0.0093

^a Human population estimates for many villages were adjusted retrospectively with updated 2010 census information.

^b Reported estimate in communities with two data points is based on the average of the two per capita estimates.

^c Data point represents an extreme outlier and is being further investigated.

TABLE 3 Reported Unit 23 brown bear harvest by drainage, 1990–1991 through 2009–2010 (sealing and registration permit data)

Regulatory year	Noatak	Kobuk	Selawik	N. Seward Peninsula	Wulik/ Kivalina	Total ^a
1990–1991	29	7	2	0	1	39
1991–1992	22	6	0	2	4	34
1992–1993	29	7	4	3	11	55
1993–1994	26	5	1	1	7	41
1994–1995	16	5	3	3	7	34
1995–1996	24	6	2	4	5	41
1996–1997	18	10	3	3	1	35
1997–1998	17	3	2	4	3	30
1998–1999	27	10	4	4	7	54
1999–2000	29	13	0	6	5	53
2000–2001	33	22	8	4	9	78
2001–2002	21	14	1	3	10	49
2002–2003	21	12	2	5	4	44
2003–2004	19	16	1	3	3	42
2004–2005	38	24	1	7	5	76
2005–2006	25	16	2	3	4	53
2006–2007	22	17	1	2	3	49
2007–2008	10	10	2	4	5	33
2008–2009	24	14	2	5	8	53
2009–2010	25	17	1	3	6	53

^aTotal may include uncoded harvest.

TABLE 4 Total skull size, age and gender of brown bears sealed in Unit 23, 1990-1991 through 2009-2010.

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>
1990	22.0	24	9.9	23	19.8	14	6.9	14
1991	21.8	25	9.1	22	18.9	8	4.1	7
1992	21.3	39	7.8	29	19.7	16	8.2	11
1993	21.3	31	7.0	26	18.9	8	3.4	7
1994	21.1	24	5.6	21	18.0	8	5.4	7
1995	21.2	29	5.6	26	19.7	9	7.4	9
1996	21.3	23	7.7	19	19.5	9	7.6	7
1997	21.8	23	9.6	17	19.8	7	8.2	6
1998	21.3	44	5.7	33	18.7	7	5.0	7
1999	21.5	38	6.8	36	20.2	14	7.8	13
2000	22.2	47	7.7	39	19.2	26	7.9	20
2001	22.1	31	7.0	28	19.3	16	6.4	16
2002	21.5	20	7.1	19	19.9	20	8.8	16
2003	21.8	30	7.9	28	20.2	11	10.2	11
2004	22.6	55	9.5	51	19.3	18	6.8	17
2005	22.5	36	9.6	36	20.6	15	8.1	13
2006	21.3	32	7.6	25	19.9	16	7.7	15
2007	22.1	23	7.9	18	18.5	5	6.4	5
2008	21.3	28	7.3	22	19.5	21	6.9	17
2009	21.4	39	7.4	30	18.7	12	6.5	11

TABLE 5 Brown bear nonresident drawing permit data 1998-1999 through 2009-2010

Hunt number	Available	2008 permits			2009 permits		
		Issued	Hunted	Killed	Issued	Hunted	Killed
<u>Fall Drawing</u>							
DB761	8	6	4	3	5	3	1
DB762	8	8	5	2	8	6	2
DB763	4	0	0	0	0	0	0
DB764	4	4	3	0	1	0	0
DB765	4	4	2	0	2	1	1
DB766	8	8	6	4	7	5	3
DB767	4	0	0	0	0	0	0
Total	40	30	20	9	23	15	7
Avg. 1998–2007	34-40	26.9	18.2	9.8			
SD 1998–2007		6.6	4.1	2.8			
<u>Spring Drawing</u>							
DB771	6	3	0	0	0	0	0
DB772	6	4	0	0	0	0	0
DB773	2	0	0	0	0	0	0
DB774	3	1	0	0	0	0	0
DB775	3	0	0	0	0	0	0
DB776	6	4	1	1	1	1	0
DB777	2	2	1	0	0	0	0
Total	28	14	2	1	1	1	0
Avg. 1998–2007	24-28	14.8	9.4	7.1			
SD 1998–2007		7.0	5.7	3.8			

TABLE 6 Unit 23 brown bear harvest by hunter residency, 1990–1991 through 2009–2010 (sealing and registration permit data; does not include community harvest assessment data)

Regulatory year	Unit 23 resident	Nonlocal resident	Nonresident	Unk.	Total
1990–1991	14	11	13	1	39
1991–1992	12	9	12	1	34
1992–1993	18	27	10	0	55
1993–1994	12	16	12	1	41
1994–1995	10	16	8	0	34
1995–1996	14	18	9	0	41
1996–1997	13	10	12	0	35
1997–1998	12	10	8	0	30
1998–1999	12	21	19	0	52
1999–2000	19	11	23	0	53
2000–2001	23	32	18	5	78
2001–2002	6	18	25	0	49
2002–2003	13	16	15	0	44
2003–2004	5	30	6	1	42
2004–2005	22	30	24	0	76
2005–2006	15	18	19	0	52
2006–2007	11	22	16	0	49
2007–2008	10	11	11	1	33
2008–2009	12	30	11	0	53
2009–2010	17	28	8	0	53

TABLE 7 Monthly harvest of brown bears in Unit 23, 1990–1991 through 2009–2010 (sealing and registration permit data)

Regulatory year	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Unk	Total
1990–1991	0	0	21	1	0	0	0	0	0	14	3	0	0	39
1991–1992	0	0	15	1	0	0	0	0	0	12	6	0	0	34
1992–1993	0	4	35	3	0	0	0	0	0	10	0	0	3	55
1993–1994	1	0	21	0	0	0	2	0	0	12	3	0	2	41
1994–1995	1	0	23	1	0	0	0	0	0	6	3	0	0	34
1995–1996	0	0	26	2	0	1	0	0	0	8	4	0	0	41
1996–1997	1	0	22	1	0	0	0	0	0	7	2	1	1	35
1997–1998	1	0	17	1	0	0	0	0	0	9	2	0	0	30
1998–1999	0	0	32	1	0	0	0	0	2	5	11	0	1	52
1999–2000	1	3	25	0	0	0	0	0	0	17	6	1	0	53
2000–2001	0	1	36	1	0	0	0	0	0	22	11	1	6	78
2001–2002	0	0	32	0	1	0	0	0	0	6	10	0	0	49
2002–2003	0	0	27	2	0	0	0	0	1	6	4	0	4	44
2003–2004	0	9	29	1	0	0	0	0	0	2	0	0	1	42
2004–2005	0	4	41	2	1	0	0	0	1	19	6	1	1	76
2005–2006	0	1	30	0	0	0	0	0	0	13	6	0	2	52
2006–2007	0	3	28	1	0	0	0	0	0	9	6	0	2	49
2007–2008	0	1	18	2	0	0	0	0	0	5	2	1	4	33
2008–2009	0	4	40	0	0	0	0	0	0	6	2	1	0	53
2009–2010	0	4	42	1	0	0	0	0	0	2	3	0	1	53

TABLE 8 Reported Unit 23 brown bear harvest by transport method, 1990–1991 through 2009–2010 (sealing and registration permit data)

Regulatory Year	Airplane	Boat	Off road vehicle	Snow-machine	Other	Unknown	Total
1990–1991	24	6	0	8	1	0	39
1991–1992	20	2	0	11	1	0	34
1992–1993	32	3	6	1	4	9	55
1993–1994	24	0	1	10	2	4	41
1994–1995	17	8	0	7	2	0	34
1995–1996	20	5	2	7	3	4	41
1996–1997	18	3	0	4	4	6	35
1997–1998	15	7	1	4	1	2	30
1998–1999	25	10	1	7	3	6	52
1999–2000	25	3	0	14	8	3	53
2000–2001	41	3	1	14	9	10	78
2001–2002	26	10	2	9	0	2	49
2002–2003	23	9	0	7	1	4	44
2003–2004	28	11	1	1	1	0	42
2004–2005	34	14	4	21	2	1	76
2005–2006	29	5	0	18	0	0	52
2006–2007	28	8	1	11	1	0	49
2007–2008	17	3	3	7	0	3	33
2008–2009	31	13	1	7	0	1	53
2009–2010	33	12	4	3	1	0	53

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2010¹

LOCATION

GAME MANAGEMENT UNITS: 25A, 25B, 25D, 26B, and 26C (73,755 mi²)

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 through 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 need for the nonresident permit system in Units 25A, 26B, and 26C was reevaluated in 1993. The improved status of bear populations, a low level of harvest relative to a conservative estimate of sustainable harvest, and the cumbersome nature of the permit system prompted the department to propose eliminating the drawing permit system for nonresident hunters in Units 25A and 26C. The Alaska Board of Game adopted this proposal in March 1994, with the understanding that harvests would be closely monitored and that the average annual harvest in each unit during a 2-year period should not exceed the estimated sustainable harvest (Table 1).

The permit system for nonresident hunters in Unit 26B was similarly reevaluated and eliminated by the Board of Game beginning in RY96. The board also established an earlier season opening date of 20 August in Units 26B and 26C 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

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

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 department closed the remainder of the RY97 season by emergency order. In March 1998 the board passed a department proposal to restore a drawing permit hunt for nonresident hunters and open the season on 1 September rather than 20 August. However, in view of the high harvests during the previous 2 years, no permits were issued to nonresidents in RY98. Up to 3 drawing permits were issued for nonresident hunters in RY99 and RY00, with a 1 September–31 October open season.

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 conservative approach to managing brown bears to provide the opportunity to hunt brown bears under aesthetically pleasing conditions.

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* (Alaska Department of Fish and Game 2002) and Alaska's intensive management law for moose in 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

- Units 25A, 25B, 26B, 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, 26B, and 26C, manage for a 3-year mean annual human-caused mortality of at least 60% males.

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

METHODS

Population Size

Brown bear population density estimates for Units 25A, 25B, 25D, 26B, and 26C were based on extrapolations from studies done in portions of eastern Brooks Range in Unit 26B and 25A; (3,600 mi²; 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 portion in Unit 26B (H. Reynolds, ADF&G [retired], “Application of a double-count line transect method to estimate density of brown bears in arctic Alaska”; unpublished data, Fairbanks).

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 RY08–RY09. Population estimates are listed below for the eastern Brooks Range and upper Yukon River drainage in Units 25A, 25B, 25D, and 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 mi²; Table 1). Availability of habitat for brown bears in this area has not changed substantially since 1993, harvest was below a sustainable yield of 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 (1.8 bears/100 mi²) in Unit 26B was based on a double-count line transect population estimate conducted in a portion of Unit 26B during 1999–2003 (H. Reynolds, ADF&G [retired], unpublished data, Fairbanks). The study area (3,935 mi²) consisted of the foothills and mountains < 4,000 feet and resulted in an estimate

of $186.5 \pm 34\%$ (95%CI) bears. Data was extrapolated from a pilot study on the coastal plain to estimate the number of bears north of the study area ($9,848 \text{ mi}^2$) which resulted in 66 bears, and for areas $> 4,000$ feet (1.733 mi^2) which resulted in 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 a sustainable yield of 5% since 1993, and in most years the harvest included $\geq 60\%$ 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 a research project investigating use of the North Slope oilfields by brown bears (Shideler and Hechtel 2000). Data collected on 116 marked bears during 1992–2004 (R. Shideler, ADF&G, unpublished data, Fairbanks) indicated that females that had access to human food were younger at age of first year of reproduction (5.4 yr, $n = 5$) compared with those that were not food conditioned (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 non-food conditioned bears (4.8 yr). Reproductive parameters observed in the non-food conditioned bears were similar to those of other non-food conditioned brown bears in the Arctic (Reynolds 1981; Nagy et al. 1983; McLoughlin et al. 2003). However, only 4 non-food conditioned 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, RY08 and RY09.

<u>Units and Bag Limits</u>	<u>Resident Open Season</u>	<u>Nonresident Open Season</u>
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:		

<u>Units and Bag Limits</u>	<u>Resident Open Season</u>	<u>Nonresident Open Season</u>
One bear every regulatory year.	1 Jul–30 Nov 1 Mar–30 Jun	1 Sep–30 Nov 1 Mar–15 Jun

Unit 26B, that portion within the Dalton Highway Management Corridor

RESIDENT HUNTERS: One bear every regulatory year by drawing permit only; up to 20 permits may be issued, or One bear every regulatory year.	25 Aug–31 Dec 1 Mar–31 May
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NONRESIDENT HUNTERS: One bear every regulatory year by drawing permit only; up to 20 permits will be issued.	25 Aug–31 Dec 1 Mar–31 May
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Remainder of Unit 26B

RESIDENT HUNTERS: One bear every regulatory year.	25 Aug–31 May
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NONRESIDENT HUNTERS: One bear every regulatory year by drawing permit only; up to 20 permits will be issued.	25 Aug–31 Dec 1 Mar–31 May
--	-------------------------------

Unit 26C

RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun
--	---------------	---------------

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. The 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 the DHCMA.

Alaska Board of Game Actions and Emergency Orders.

2002 — During the March 2002 Board of Game (board) meeting, brown bear hunting seasons in Unit 25D were extended and a drawing permit hunt (DB990) for brown bears in the Dalton Highway Corridor Management Area was implemented in Units 26B. Lenart (2009) includes further details regarding these actions.

2004 — In March 2004 the board extended the hunting season in Units 25A, 25B, and 26C to 10 August–30 June, while maintaining existing seasons in Units 25D and 26B. The bag limit in

all areas was increased to 1 bear every year. Furthermore, several modifications to the brown bear permit hunts in Unit 26B were made: Hunt DB990 (archery only within the DHMCA) was changed from a resident and nonresident hunt to a resident-only hunt because of modifications made to the nonresident drawing hunts DB987 and DB997. Thus, a general brown bear hunting season of 1 March–31 May was established for resident hunters. For nonresident drawing hunts DB987 and DB997, the board increased the number of permits that could be issued from 10 to 20 and limited the hunting season to 1 September–31 December. The hunt boundary was also changed from “Unit 26B, outside the Dalton Highway Corridor Management Area” to “Unit 26B,” although hunters were still required to hunt by archery only within the DHCMA. We issued up to 10 permits for nonresident hunts DB897 and DB997 combined. However, because of modifications to all 3 hunts, there was a discrepancy in codified regulation as to the number of permits that could be issued to nonresident hunters.

2006 — No regulatory changes were implemented during the March 2006 Board of Game meeting.

2008 — In March 2008 the board opened the resident and nonresident brown bear season in Unit 26B on 25 August instead of 1 September. In addition, the board passed a housekeeping proposal to clarify the number of drawing permits that could be issued in Unit 26B for nonresident hunts DB987 and DB997. The board increased the number of permits that could be issued from 10 to 20, and agreed upon one drawing hunt (DB987) with both a fall and spring season.

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 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 the DHCMA) was eliminated and the resident season within the 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 passed 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 became available for 1 brown bear every regulatory year, with season dates of 1 July–30 June in 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. This registration permit hunt was put into effect 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 Sept–31 May, by general season for resident hunters. Drawing permit DB987 for nonresident hunters remained intact for the remainder of Unit 26B.

Harvest by Hunters.

Units 25A, 25B, and 25D — In Unit 25A, 31 brown bears were reported harvested each year during RY08 and RY09, respectively (Table 2). Harvest increased slightly during RY08 and RY09 (\bar{x} = 31) compared to the previous 5 years (RY02–RY07; \bar{x} = 25; Table 7). The proportion of males in the harvest was 74% and 58%, respectively. Most harvest occurred in the Chandalar drainage between the North Fork Chandalar and Wind River ($\geq 62\%$). The remaining harvest took place in the Sheenjek or Coleen River drainages. 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. The 3-year mean annual human-caused mortality (RY07–RY09) in Unit 25A was 29 bears with 64% males. During the past 10 years (RY00–RY09), 233 brown bears were sealed, 60% were males (n = 232), and most bears were harvested in the fall (Table 2). No trends were detected in mean age and mean skull size during this period. The mean age of brown bears sealed was 8.4 (n = 30) and 8.2 years (n = 24) in RY08 and RY09 compared to a 10-year mean age of 8.3 years (RY00–RY09; n = 206). The 10-year mean age for females was 8.2 years (n = 82) and for males, it was 8.3 years (n = 123). The mean skull size was 20.2 (n = 30) and 19.4 (n = 28) inches in RY08 and RY09 compared to a 10-year mean skull size of 19.9 inches (n = 219). Reported nonhunting kills were low (Table 2), and included defense of life or property (DLP), illegal take, research mortalities, or other known human-caused accidental mortality.

In Units 25B and 25D, 6 brown bears were reported harvested each year in RY08 and RY09 (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*. 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 data). 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, 23 and 17 brown bears were reported harvested in RY08 and RY09 (Table 4), respectively. The proportion of males in the harvest was 65% and 82%, respectively. Preliminary data for RY10 indicated 28 bears were reported harvested (including 2 illegal bears taken by nonresidents who did not have drawing permits). The 3-year mean annual human-caused mortality (RY07–RY09) in Unit 26B was 15 bears with 69% males (Table 4). During the 10-year period of RY00–RY09, 116 bears were sealed and 63% were males (n = 114; Table 4). No trends were detected in mean age and mean skull size. The mean age of brown bears sealed was 8.6 (n = 21) and 10.3 years (n = 13) in RY08 and RY09 compared to a 10-year

mean age of 7.7 years ($n = 89$). The 10-year mean age was 8.4 ($n = 32$) for female bears and 7.4 ($n = 57$) for males. The mean skull size was 20.1 ($n = 23$) and 20.4 ($n = 15$) inches in RY08 and RY09 compared to a 10-year mean skull size of 19.9 inches ($n = 103$). Since 2000 at least 5 marked bears were killed by humans and not reported.

In Unit 26C, 13 and 22 brown bears were reported harvested in RY08 and RY09 (Table 5). Males made up 54% of the harvest in RY08 and 73% in RY09. The 3-year mean annual human-caused mortality (RY07–RY09) in Unit 26B was 15 bears with 59% males. During RY00–RY09, a total of 120 bears were sealed and the proportion of males in the harvest over this 10-year period was 55% ($n = 118$). No trends were detected in mean age and mean skull size during the past 10 years (\bar{x} age = 8.4 years, $n = 105$; \bar{x} skull size = 19.8 inches; $n = 110$). The 10-year mean age was 9.9 years ($n = 47$) for females and 7.9 years ($n = 57$) for males.

Permit Hunts. During RY08–RY09, nonresident hunters in Unit 26B were required to obtain a drawing permit (DB987) for the 25 August–31 December and 1 March–31 May hunting season. The bag limit was 1 bear every regulatory year. In RY08, 12 permits were available, 8 permits were issued, and 3 bears were harvested. In RY09, 12 permits were available, 11 permits were issued, and 5 bears were harvested (Table 6).

A drawing permit DB990 was required for Alaska residents to hunt within the DHCMA in Unit 26B during the 25 August–31 December season. The bag limit was 1 bear every regulatory year. Twenty permits were available in RY08 and RY09 and all available permits were issued in both years. Only 1 bear was harvested each year (Table 6).

Hunter Residency and Success.

Units 25A, 25B, and 25D — In Unit 25A, residents of Alaska took 39% ($n = 12$) and 52% ($n = 16$) of the reported harvest during RY08 and RY09, and nonresidents took 61% ($n = 19$) and 48% ($n = 15$) of the reported harvest. The proportion of nonresidents who harvested brown bears has been $\geq 48\%$ since 1998 and was frequently $\geq 70\%$ (Table 7).

In Units 25B and 25D combined, 1 brown bear was reported harvested by a local resident in RY08. Nonlocal Alaska residents harvested 5 in RY08 and 6 in RY09 (Table 8). Generally, few local residents reported taking bears. Because local residents report infrequently, these figures probably under-represent the number taken by local hunters.

Units 26B and 26C — In Unit 26B, 87% ($n = 20$) and 71% ($n = 12$) of the reported harvest was taken by Alaska residents during RY08 and RY09. Since 1998 most of the reported harvest was taken by residents of Alaska (Table 9) because the permit system was more restricted for nonresidents and some guides were not present in the area.

In Unit 26C, 62% ($n = 8$) and 59% ($n = 13$) of the reported harvest was taken by Alaska residents in RY08 and RY09. Prior to 2008, a greater proportion of the harvest was taken by nonresidents ($\geq 50\%$); although the total number of bears taken in Unit 26C was small (range = 6–22; Table 10).

Transport Methods. In Unit 25A, most brown bears were harvested during aircraft supported hunts (10-year $\bar{x} = 82\%$, $n = 231$ successful hunters). The remaining bears were harvested by

hunters who accessed the area by horse, foot or 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 RY00–RY09, successful hunters ($n = 97$) mainly used aircraft ($\bar{x} = 52\%$), highway vehicles ($\bar{x} = 18\%$), and boats $\bar{x} = 17\%$). In Unit 26C, hunters used aircraft (10 year $\bar{x} = 92\%$, $n = 114$ successful hunters).

Chronology of Harvest.

Units 25A, 25B, and 25D — In Unit 25A, 45% of the brown bears were harvested in August and 52% in September in RY08 ($n = 31$). In RY09, 32% were harvested in August and 58% in September ($n = 31$). The remaining bears were harvested in October, April, May, or 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, 2006 Yukon Flats moose, bear, and wolf harvest data collection final report, CATG unpublished data).

Units 26B and 26C — In Unit 26B, 48% ($n = 23$) and 69% ($n = 16$) of the bears were harvested in August during RY08 and RY09, respectively. The remaining bears were harvested in September. In Unit 26C, 100% ($n = 13$) and 82% ($n = 22$) of the brown bears were harvested in August in RY08 and RY09 compared with a 10-year mean of 84% (RY00–RY09; $n = 114$). The remaining bears were 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, 2006 Yukon Flats moose, bear, and wolf harvest data collection final report, CATG unpublished data). 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; ADF&G, unpublished data, Fairbanks).

CONCLUSIONS AND RECOMMENDATIONS

Brown bear populations in the eastern Brooks Range and North Slope appear to be mostly stable since the late 1980s; although there may be a slight increase in the number of brown bears along the Yukon River 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 entire region. All management goals were met.

We met our first objective to maintain a brown bear population capable of sustaining 3-year mean annual human-caused brown bear mortality (RY07–RY09) of $\leq 5\%$ of the current estimated brown bear population in 25A, 25B, 25D and 26C. In Unit 25A, the 3-year mean annual human-

caused mortality was 29 bears and 5% of the estimated population was 30 bears (Table 1). In Unit 25B and 25D combined, the 3-year mean annual human-caused mortality was 6 bears and 5% of the estimated population was 29 bears. In Unit 26C, the 3-year mean was 15 bears and 5% of the estimated population was 19 bears. We likely did not meet the objective in Unit 26B where the 3-year mean was 15 bears and 5% of the estimated population was 13 bears.

We met our second objective to maintain a brown bear population capable of sustaining a 3-year mean annual human-caused brown bear mortality (RY07–RY09) of at least 60% males in each subunit. In Unit 25A, the 3-year mean annual human-caused mortality was 64% males. In Units 25B and 25D, the 3-year mean annual human-caused mortality was 72% males. In Unit 26B, the 3-year mean was 69% males. In Unit 26C, the proportion of males killed by humans over a 3-year period was slightly less than our objective at 59%.

It is unlikely we met our third management objective to manage for a temporary reduction in grizzly bear numbers and predation on moose in Unit 25D. This objective is difficult to measure; but allows flexibility to liberalize brown bear regulations to aid in reducing brown bear predation on moose. Few bears were reported harvested in 25D.

Recommendations and objective revisions:

Objectives will be changed to increase the allowable harvest rate from 5% to 8% for Units 25A, 25B, 25D, 26B, and 26C. New objectives for Unit 26B are part of an effort to reduce the effects of brown bear predation on muskoxen in that unit.

For the next report period, objectives are as follows:

Units 25A, 25B, 26B, and 26C,

- Units 25A, 25B, 26B, and 26C, manage for a 3-year mean annual human-caused brown bear mortality of $\leq 8\%$ of the bears ≥ 2 years old of which no more than 40% can be females.

Unit 26B,

- Reduce brown bear predation on muskoxen in RY11 and RY12.

Activity:

- In RY11 (spring 2012) and RY12 (spring 2013), via a Department-conducted predator control program, lethally remove brown bears identified as threatening or killing muskoxen.

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

LENART, E. A. 2011. Units 25A, 25B, 25D, 26B, and 26C brown bear. Pages 299–322 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

TABLE 1 Units 25A, 25B, 25D, 26B, and 26C brown bear population parameters and estimated sustainable harvest, 1993–2010^a

Unit	Area (mi ²)	Estimated ^a density/100 mi ²	Estimated population size	Allowable harvest @ 5%
25A	21,280	2.8	596	30
25B and D	26,660	2.2	587	29
26B	15,515	1.8	265	13
26C	10,272	3.8	391	19
Total	73,727	2.5	1839	92

^a 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 mortality, regulatory years 2000–2001 through 2009–2010

Regulatory year	Reported															
	Hunter kill					Nonhunting kill ^a			Total known kill							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total		
<i>2000–2001</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>2001–2002</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>2002–2003</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>2003–2004</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>2004–2005</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>2005–2006</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>2006–2007</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													
	Hunter kill					Nonhunting kill ^a			Total known kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>2007–2008</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>2008–2009</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>2009–2010</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

^a 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 mortality, regulatory years 2000–2001 through 2009–2010

Regulatory year	Reported										Total known kill					Total
	Hunter kill					Nonhunting kill ^a										
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk			
<i>2000–2001</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		
Total	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1		
<i>2001–2002</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>2002–2003</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>2003–2004</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>2004–2005</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>2005–2006</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>2006–2007</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 ^a			Total known kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>2007–2008</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>2008–2009</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>2009–2010</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

^a Includes defense of life or property kills, illegal take, research mortalities, and other known human-caused mortality.

TABLE 4 Unit 26B brown bear mortality, regulatory years 2000–2001 through 2009–2010

Regulatory year	Reported									Total known kill				
	Hunter kill ^a					Nonhunting kill ^b								
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>2000–2001</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>2001–2002^c</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>2002–2003</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>2003–2004</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>2004–2005</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>2005–2006</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>2006–2007</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 ^a					Nonhunting kill ^b			Total known kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>2007–2008</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>2008–2009</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>2009–2010^d</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	0	1	0	(0)	0	(0)	1	1
Total	14	3	(18)	0	17	0	0	0	14	(82)	3	(18)	1	18

^a Includes drawing permit harvest.

^b 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.

^c Several bears were taken in defense of life or property bears in the Prudhoe Bay oilfield complex because they were food-conditioned bears and garbage was not properly managed.

^d Includes 2 bears whose sealing forms were lost; but the information was recorded on the DB987 permit.

TABLE 5 Unit 26C brown bear mortality^{a,b}, regulatory years 2000–2001 through 2009–2010

Regulatory year	Reported								Total known kill						Total
	Hunter kill					Nonhunting kill ^a									
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk		
<i>2000–2001</i>															
Fall 2000	8	5	(38)	0	13	1	0	1	9	(64)	5	(36)	1	15	
Spring 2001	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0	
Total	8	5	(38)	0	13	1	0	1	9	(64)	5	(36)	1	15	
<i>2001–2002</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>2002–2003</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>2003–2004</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>2004–2005</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>2005–2006</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>2006–2007</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 ^a			Total known kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
2007–2008														
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
2008–2009														
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
2009–2010														
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

^a 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 2000–2001 through 2009–2010

Hunt ^a	Regulatory year	Permits available	Permits issued	Number reported	Did not hunt (%)	Unsuccessful (%)	Successful (%)	Males	Females	Unk	Total harvest
DB987	2000–2001	2	2	2	0 (0)	0 (0)	2 (100)	2	0	0	2
	2001–2002	2	1	1	0 (0)	0 (0)	1 (100)	0	1	0	1
	2002–2003	2	1	1	1 (100)	-	-	-	-	-	0
	2003–2004	2	0	-	-	-	-	-	-	-	0
	2004–2005	2	0	-	-	-	-	-	-	-	0
	2005–2006	2	1	1	1 (100)	0 (0)	0 (0)	0	0	0	0
	2006–2007	8	6	6	1 (17)	4 (80)	1 (20)	0	1	0	1
	2007–2008	8	8	7	2 (29)	4 (80)	1 (20)	0	1	0	1
	2008–2009 ^b	12	8	8	2 (25)	3 (50)	3 (50)	2	1	0	3
	2009–2010 ^b	12	11	11	1 (9)	5 (50)	5 (50)	3	2	0	5
DB997	2000–2001	2	0	-	-	-	-	-	-	-	0
	2001–2002	2	1	1	1 (100)	0 (0)	0 (0)	0	0	0	0
	2002–2003	2	0	-	-	-	-	-	-	-	0
	2003–2004	2	0	-	-	-	-	-	-	-	0
	2004–2005	4	0	-	-	-	-	-	-	-	0
	2005–2006	4	0	-	-	-	-	-	-	-	0
	2006–2007	4	1	1	1 (100)	-	-	-	-	-	0
	2007–2008	4	0	-	-	-	-	-	-	-	0
DB990	2002–2003	6	6	6	1 (17)	5 (100)	0 (0)	0	0	0	0
	2003–2004	6	6	4	2 (50)	0 (0)	2 (100)	1	1	0	2
	2004–2005	15	15	12	7 (58)	4 (80)	1 (20)	0	1	0	1
	2005–2006	15	15	15	5 (33)	9 (90)	1 (10)	0	1	0	1
	2006–2007	20	20	19	12 (63)	6 (86)	1 (14)	0	1	0	1
	2007–2008	20	19 ^c	19	11 (58)	8 (100)	0 (0)	0	0	0	0
	2008–2009	20	20	20	10 (50)	9 (90)	1 (10)	1	0	0	1
	2009–2010	20	20	20	12 (60)	7 (88)	1 (13)	1	0	0	1

^a DB987 was for nonresidents outside of the Dalton Highway Corridor Management Area (DHMCA) in the fall of regulatory years 2000–2001 through 2003–2004. Beginning in regulatory year 2004–2005, the hunt area was all of Unit 26B. DB997 was for nonresidents outside of the DHMCA in the spring during regulatory years 2000–2001 through 2003–2004. Beginning in regulatory year 2004–2005, the hunt area was all of Unit 26B. DB990 was a resident and nonresident drawing hunt within the DHCMA during regulatory years 2002–2003. Beginning in regulatory year 2004–2005, it was a resident-only hunt.

^b Beginning in regulatory year 2008, hunts DB987 and DB997 were combined to a drawing permit hunt (DB987) with a fall and spring season.

^c Twenty permits were available, however one winner was on the Failure to Report list and was not issued the permit.

TABLE 7 Unit 25A residency of successful brown bear hunters, regulatory years 2000–2001 through 2009–2010

Regulatory year	Local resident ^a (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
2000–2001	0 (0)	1 (14)	6 (86)	7
2001–2002	0 (0)	6 (50)	6 (50)	12
2002–2003	1 (4)	11 (48)	11 (48)	23
2003–2004	1 (4)	5 (20)	19 (76)	25
2004–2005	0 (0)	12 (50)	12 (50)	24
2005–2006	0 (0)	7 (29)	17 (71)	24
2006–2007	0 (0)	9 (35)	17 (65)	26
2007–2008	0 (0)	12 (48)	13 (52)	25
2008–2009	0 (0)	12 (39)	19 (61)	31
2009–2010	2 (6)	14 (45)	15 (48)	31

^a Includes only residents of the subunit.

TABLE 8 Unit 25B and 25D residency of successful brown bear hunters, regulatory years 2000–2001 through 2009–2010

Regulatory year	Local resident ^a (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
2000–2001	1 (100)	0 (0)	0 (0)	1
2001–2002	0 (0)	1 (100)	0 (0)	1
2002–2003	7 (70)	3 (30)	0 (0)	10
2003–2004	1 (100)	0 (0)	0 (0)	1
2004–2005	2 (100)	0 (0)	0 (0)	2
2005–2006	0 (0)	1 (100)	0 (0)	1
2006–2007	1 (25)	3 (75)	0 (0)	4
2007–2008	2 (33)	4 (67)	0 (0)	6
2008–2009	1 (17)	5 (83)	0 (0)	6
2009–2010	0 (0)	6 (100)	0 (0)	6

^a Includes only residents of the subunit.

TABLE 9 Unit 26B residency of successful brown bear hunters^a, regulatory years 2000–2001 through 2009–2010

Regulatory year	Local resident ^b (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
2000–2001	0 (0)	9 (82)	2 (18)	11
2001–2002	0 (0)	13 (93)	1 (7)	14
2002–2003	0 (0)	6 (100)	0 (0)	6
2003–2004	0 (0)	7 (100)	0 (0)	7
2004–2005	0 (0)	5 (83)	1 (17)	6
2005–2006	0 (0)	2 (100)	0 (0)	2
2006–2007	0 (0)	7 (88)	1 (12)	8
2007–2008	0 (0)	2 (40)	3 (60)	5
2008–2009	0 (0)	20 (87)	3 (13)	23
2009–2010	0 (0)	12 (71)	5 (29)	17

^a Includes permit harvest.

^b Includes only residents of the subunit

TABLE 10 Unit 26C residency of successful brown bear hunters^a, regulatory years 2000–2001 through 2009–2010

Regulatory year	Local ^b resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
2000–2001	0 (0)	5 (38)	8 (62)	13
2001–2002	0 (0)	2 (25)	6 (75)	8
2002–2003	0 (0)	3 (38)	5 (62)	8
2003–2004	0 (0)	3 (50)	3 (50)	6
2004–2005	0 (0)	2 (20)	8 (80)	10
2005–2006	0 (0)	7 (50)	7 (50)	14
2006–2007	0 (0)	4 (44)	5 (56)	9
2007–2008	0 (0)	5 (45)	6 (55)	11
2008–2009	0 (0)	8 (62)	5 (38)	13
2009–2010	3 (14)	10 (45)	9 (41)	22

^a Includes permit harvest.

^b Includes only residents of the subunit.

WILDLIFE
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 2008
To: 30 June 2010

LOCATION

GAME MANAGEMENT UNIT: 26A (56,000 mi²)

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 km² with a 95% confidence interval of 28.1–31.5 bears/1,000 km² (Reynolds, unpublished). Based on surveys flown during 2000, 2001, and 2003 in a 20,000 km² (8,000 mi²) area of eastern Unit 26A, Unit 26B, and western Unit 26C, a density of 18.3 grizzly bears/1,000 km² 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.)

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 attempted 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 attempted during the reporting period. Previously, Carroll (1995) reported densities for habitat zones in Unit 26A at 0.5–2 bears/1,000 km² on the coastal plain, 10–30 bears/1,000 km² in the foothills, and 10–20 bears/1,000 km² 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 Atkasuk in September, a movement of over 200 miles.

MORTALITY

Harvest

Season and Bag Limit

<u>Unit and Bag Limits</u>	Resident Open Season (Subsistence and <u>General Hunts</u>)	Nonresident <u>Open Season</u>
<i>Unit 26A General Hunt</i>		
Resident and Nonresident Hunters:	1 Aug–31 May	1 Aug–31 May
1 bear every regulatory year.		

Unit 26A Subsistence Hunt

Resident Hunters:

1 bear per regulatory year by registration permit	1 July–31 May (Subsistence hunt only)
--	--

Board of Game 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 1–30 June and the season for the subsistence registration brown bear hunt from 1 July–31 May to 1 July 1–30 June. This 12 month season will take effect during 2010–2011.

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 Alaska Department of Fish and Game (ADF&G), 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. Twenty bears were reported harvested during 2008–2009. Eighteen were sealed and 2 were reported harvested under the Unit 26A subsistence registration brown bear hunt. No bears were reported killed in DLP situations. Three bears were killed in Unit 26A West and 17 were killed in Unit 26A East. Seventeen bears were taken in fall 2008 and 3 during spring 2009 (Table 1). Fourteen bears were males and 6 were females (Table 2).

Nineteen bears were reported harvested during 2009–2010. Sixteen were sealed and 3 were reported harvested under the Unit 26A subsistence registration brown bear hunt. No bears were

reported killed in DLP situations. Three bears were killed in Unit 26A West and 16 were killed in Unit 26A East. Fifteen bears were taken fall 2009 and 4 during spring 2010 (Table 1). Thirteen bears were males and 6 were females (Table 2).

The reported harvest for both 2008–2009 (20 bears) and 2009–2010 (19 bears) was greater than any year since 1998. The range from 1998–2008 was 9–18 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 2008–2009, the mean skull size for males was 22.7 inches and 20.1 inches for females; the mean age was 13.5 years for males and 11.2 years for females. During 2009–2010 the mean skull size for males was 20.3 inches and 19.5 for females; the mean age for males was 6.7 years and 6.4 years for females (Table 3).

Permit Hunts. Drawing permit hunts were discontinued by board action as of the 1996–1997 regulatory year. Two bears were taken under the subsistence permit hunt in 2008–2009 and 3 in 2009–2010.

Hunter Residency and Success. The reported harvest of bears in Unit 26A during 2008–2009 was 8 by nonresidents, 6 by nonlocal Alaska residents, and 6 by local North Slope residents. During 2009–2010, 7 bears were reported harvested by nonresidents, 8 by nonlocal Alaska residents, and 4 by local residents (Table 4).

Harvest Chronology. During 2008–2009, 8 bears were harvested during August, 8 in September, 1 in October, 2 in April, and 1 in May. During 2009–2010, 2 bears were reported harvested in July, 11 in August, 3 in September, 1 in April, and 2 in May (Table 5).

Transport Methods. Most bear hunters continued to use aircraft as transportation in Unit 26A. During 2008–2009, 14 hunters used aircraft, 5 used boats, and 1 used a snow machine. During 2009–2010, 13 hunters used aircraft, 3 used boats, 1 used a snow machine, and 1 walked (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), ADFG, 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

Hunters reported 20 and 19 bears harvested during 2008–2009 and 2009–2010, respectively. This was slightly greater than any year since 1998. The range from 1998–2008 was 9–18 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. 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 non-hunting 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 that would have secondarily harvested bears. Because the harvest remains well below the allowable sustained yield of approximately 51 bears, we recommend 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.

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

Carroll, G. 2011. Unit 26A brown bear management report. Pages 323-334 in P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008-30 June 2010. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Estimated population size and reported harvest of brown/grizzly bears in Unit 26A by unit and season, 2000–2010^a.

Population and harvest	Number of brown bears per area			Hunter harvest	
	26A West ^b	26A East	Total	Fall	Spring
Estimated population	400	500-720	900-1120		
5% Harvest Rate	20	25-36	45-56		
<u>Regulatory year harvests</u>					
2000-2001	6	12	18	16	2
2001-2002	0	13	13	13	0
2002-2003	4	10	14	12	2
2003-2004	4	12	16	14	2
2004-2005	0	15	15	15	0
2005-2006	0	2	2	2	0
2006-2007	3	10	13	11	2
2007-2008	3	6	9	8	1
2008-2009	3	17	20	17	3
2009-2010	3	16	19	15	4

^a Figures for 1988–1999 available in Carroll (2007)

^b West of 159° West longitude

Table 2. Unit 26A brown bear harvest by sex, 2000–2010^a.

Regulatory year	Hunter harvest						Non-hunting kill ^b	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	24–30

^a Figures for 1985–1999 available in Carroll (2007)

Table 3. Unit 26A brown bear skull size and age, 2000–2010^a.

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>
2000–2001	21.9	14	20.8	4	11.0	14	9.0	4
2001–2002	21.0	10	18.7	3	9.4	10	5.3	3
2002–2003	20.8	10	18.5	4	6.8	10	10	4
2003–2004	21.6	12	19.3	4	10.4	12	7.8	4
2004–2005	21.1	10	19.2	4	9.9	10	7.5	4
2005–2006	23.5	2	-	0	19	2	-	0
2006–2007	20.3	9	20.4	4	8.7	9	8	4
2007–2008	22.1	6	19.5	3	13.3	5	9.7	3
2008–2009	22.7	12	20.1	6	13.5	12	11.2	6
2009–2010	20.3	10	19.5	5	6.7	10	6.4	5

^a Figures for 1985–1999 available in Carroll (2007)

Table 4. Unit 26A brown bear successful hunter residency, 2000–2010^a.

Regulatory year	Local resident ^b	Nonlocal resident	Nonresident	Unknown	Total hunters
2000–2001	3	3	12	0	18
2001–2002	0	4	9	0	13
2002–2003	0	6	8	0	14
2003–2004	1	6	9	0	16
2004–2005	0	6	9	0	15
2005–2006	0	1	1	0	2
2006–2007	0	3	10	0	13
2007–2008	1	5	3	0	9
2008–2009	6	6	8		20
2009–2010	4	8	7		19

^aFigures for 1985–1999 available in Carroll (2007)

^bLocal means North Slope residents.

Table 5. Unit 26A brown bear harvest chronology by time period, 2000–2010^a.

Regulatory year	July	Aug	Sep	Oct	Nov	Apr	May	June	<i>N</i>
2000–2001		10	6	0	0	0	2	0	18
2001–2002		7	6	0	0	0	0	0	13
2002–2003		6	6	0	0	1	1	0	14
2003–2004		7	6	0	0	0	3	0	16
2004–2005		8	7	0	0	0	0	0	15
2005–2006		1	1	0	0	0	0	0	2
2006–2007		8	3	0	0	0	2	0	13
2007–2008		5	3	0	0	0	1	0	9
2008–2009		8	8	1	0	2	1	0	20
2009–2010	2	11	3	0	0	1	2	0	19

^aData for 1985–1999 available in Carroll (2007)

Table 6. Unit 26A brown bear harvest percent by transport method, 2000–2010^a.

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>	(%)
2000–2001	15	(83)			1	(6)	1	(6)			1	(5)			18
2001–2002	13	(100)													13
2002–2003	12	(86)					1	(7)			1	(7)			14
2003–2004	12	(75)							1	(6)	2	(13)	1	(6)	16
2004–2005	12	(80)			3	(20)									15
2005–2006	2	(100)													2
2006–2007	13	(100)													13
2007–2008	6	(67)							2	(22)	1	(11)			9
2008–2009	14	(70)			5	(25)	1	(5)							20
2009–2010	14	(74)			3	(16)	1	(5)			1	(5)			19

^a Data for 1985–1999 available in Carroll (2007)



The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sales of handguns, sporting rifles, shotguns, ammunition, and archery equipment. The Federal Aid program allots funds back to states through a formula based on each state's geographic area and number of paid hunting license holders. Alaska receives a maximum 5% of revenues collected each year. The Alaska Department of Fish and Game uses federal aid funds to help restore, conserve and manage wild birds and mammals to benefit the public. These funds are also used to educate hunters to develop the skills, knowledge and attitudes for responsible hunting.



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