

Brown Bear Management Report

**of survey-inventory activities
1 July 2006–30 June 2008**

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



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**Funded through
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Grants W-33-5 and W-33-6
2009 Set**

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Cover Photo: A mother brown bear and her cubs feed along the Nakwasina Passage near Sitka. © 2009 ADF&G. Photo by Phil Mooney.

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BROWN BEAR MANAGEMENT REPORT

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To: 30 June 2008

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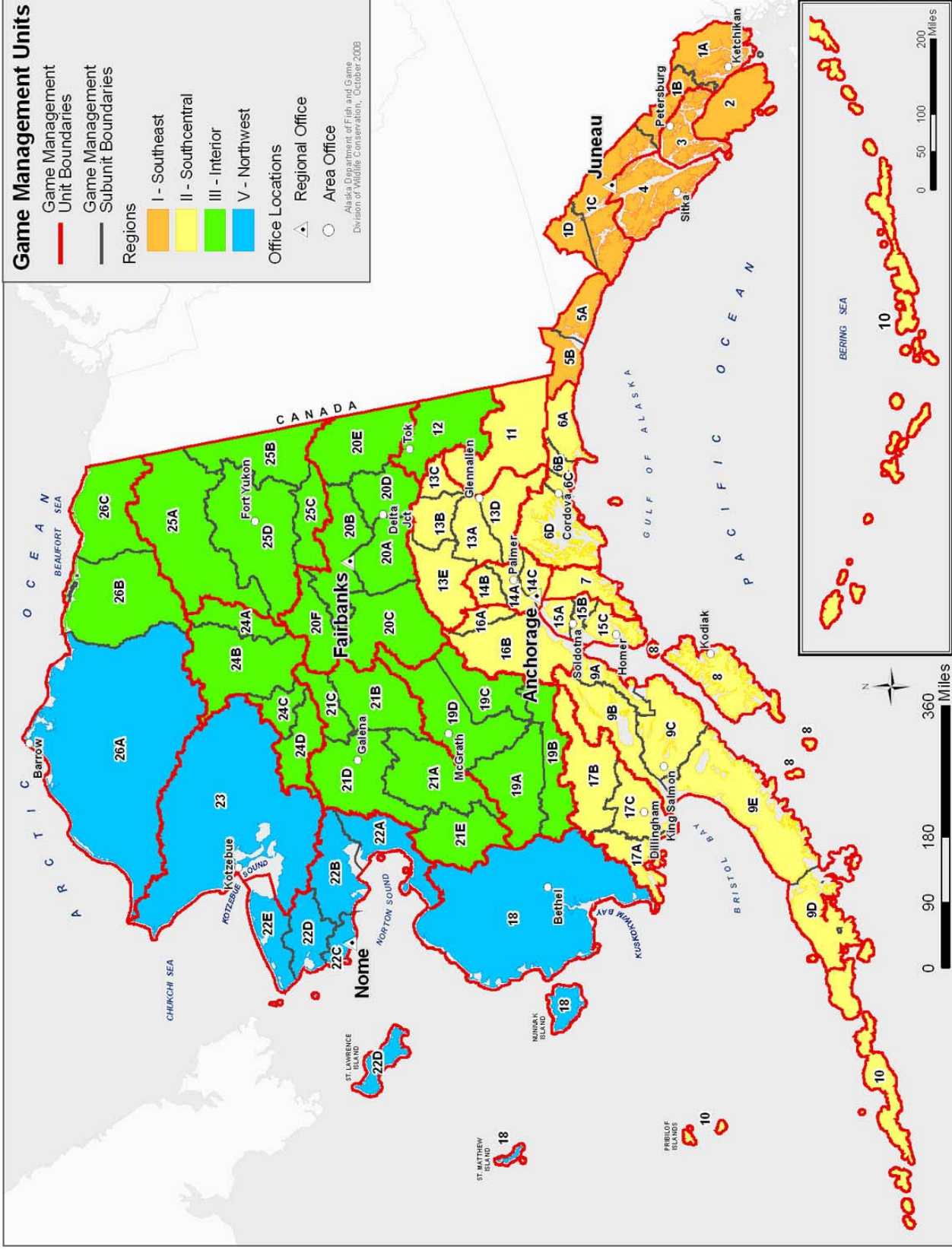
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- I - Southeast
- II - Southcentral
- III - Interior
- V - Northwest

Office Locations

- Regional Office
- Area Office

Alaska Department of Fish and Game
Division of Wildlife Conservation, October 2008



**WILDLIFE
MANAGEMENT REPORT**

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

From: 1 July 2006
To: 30 June 2008

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 42% of the unit's brown bear harvest occurred in Unit 1D (Haines area), located in the northern part of the region. The remainder of the harvest taken in other areas included 23% in Unit 1A (Ketchikan area), 19% in Unit 1B (Petersburg area), and 16% in Unit 1C (Juneau area); harvest percentages were similar to the last reporting period and the long-term averages. Nonresident hunters are required to hunt brown bears with a registered guide or a relative within the second degree of kindred. Because trophy status brown bears are available in the unit and because hunters must wait 4 regulatory years between successful hunts, hunters are very selective and strive for a large bear in prime condition.

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

National Monument within the Tongass on the southern Unit 1 mainland contains large tracts of good 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.

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/Unuk River brown bear population at approximately 50 bears (95%CI 31–115) (Flynn et al. 2006); and the Berners Bay population at 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 additional 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

Hunter Harvest. Subunit 1D continued to account for the highest proportion of the Unit 1 harvest during this report period (2006–2007), 40% and 36%, respectively. During 2006 the proportion of bears killed by subunit (1A, 1B, 1C, and 1D) was 23%, 20%, 17%, and 40% and during 2007 was 24%, 20%, 20%, and 36% respectively. The Unit 1 ten-year mean harvest percentages by subunit (1A–1D) is 23%, 19%, 16%, and 42%, respectively (Table 1).

The Unit 1A harvests during 2006 and 2007 were 8 and 6 bears, respectively, which is similar to the 10-year mean harvest of 7 bears for this subunit.

The Unit 1B harvests during 2006 and 2007 were 7 and 5 bears respectively, and demonstrates a similar harvest pattern as Unit 1A. Although brown bears are believed to occur throughout Unit 1B, population densities vary greatly across the subunit. The overwhelming majority of the brown bear harvest in the 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 on average only 1–3 bears annually between 1994 and 2007. As a result of the USFS moratorium on Unit 1 brown bear guides, there is currently only one active brown bear guide operating in the subunit. This guide is currently authorized to conduct a maximum of 7 brown bear hunts annually in the subunit, and his clients are responsible for the majority of the brown bears harvested each year.

Anecdotal evidence and unconfirmed reports suggest that at least some illegal brown bear harvest is likely 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 2006 and 2007 were 6 and 5 bears respectively, with the annual mean harvest similar to the 10-year average of 5 bears. No bears were taken off of the Juneau road system during this report period, compared to 2004–2005 when 4 bears were taken in this area. The other traditional areas of harvest in Unit 1C include St. James Bay, Berners Bay, and Port Houghton. While 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 2006 and 2007 was 14 and 9 bears, respectively. The 2006 harvest of 14 bears is the same as the 10-year average; and the 2007 harvest of just 9 bears is most likely attributable to bears emerging late in spring because of record snowfall in the unit during the winter of 2006–2007. It is important to note that the Guideline Harvest Level (GHL) for brown bears in Unit 1D is 16 bears annually; since 1996, harvests reached or exceeded the GHL in 5 seasons. 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 73% of the bears taken; 27% of bears were harvested in the fall. Over the past 10 years, the spring season has produced more bears (61%) than the fall season (39%) (Table 2). During this same period, females represented 50% 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.

We continued to meet our management objectives 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.

The mean male skull size of harvested bears across Unit 1 during 2006 (\bar{x} = 22.2, n = 26) was similar to the long-term mean of 22.3 inches; the 2007 (\bar{x} = 23.4, n = 22) skull size represents a substantial increase (~1.1 inches) over the long-term average. Whether this is just an anomaly or some indication of a change in the bear population will be borne out through monitoring in future years. The average female skull size during 2006 (\bar{x} = 20.9, n = 9) and 2007 (\bar{x} = 21.3, n = 4) were both above the long-term average of 20.4 inches (Table 3).

Mean ages of harvested male bears in 2006 (7.4 years, n = 26), and 2007 (7.9 years, n = 19) are similar to the long-term average of 7.7 years and meet our management objective of at least 6.5 years of age. Mean female age was 8.1 years (n = 9) in 2006, and 8.5 years (n = 4) in 2007. Female ages for both years of the reporting period were above the long-term average of 6.5 years of age, and they represent a third straight year of female bears 8+ years of age. Considering the increase in age for female bears in 2007 we would expect that these bears would also be larger in size and this appears to be indicated by the increased female bear skull size for 2007.

Permit Hunts. Registration permits have been required for Unit 1 brown bear hunters since fall 1989. During the 2006 and 2007 regulatory years, 246 and 271 registration permits were issued respectively (Tables 4 & 5). Consistent with the long-term average, about 55% of those permittees who registered actually hunted. Compliance with permit conditions has improved during the reporting period. 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. Since 2003, the percent of permit holders not reporting and requiring a reminder letter has decreased, to only 14% in 2007 (range 14%–25%) (ADF&G unpublished data). 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. 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 168 hunters who went afield in 2006, 21% were successful in getting a bear, while during 2007 a total of 172 hunters went afield with 15%

success (Tables 4 and 5). Variability in harvest is expected and can be associated with multiple factors such as weather, snow depth, and objectives and persistence of hunters. The number of registration permits issued in 2006 (343) and 2007 (369) were slightly higher than the 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 many resident hunters will get a permit and locking tag simply to take advantage of an opportunity to harvest a bear should they bump into one while engaged in other activities. Also, hunters pursuing moose and other big game will often obtain a permit and tag in case they need to kill a bear in defense of their life and/or property.

During 2006 and 2007, nonresidents harvested 15 and 14 bears, respectively. The nonresident hunter harvest was at or below the 10-year average (1996–2005) of 17 bears. Success rates were 39% and 48%, during 2006 and 2007 respectively. Success rates for resident hunters were 16% in 2006 and 6% in 2007. In 2006 and 2007, resident hunters took 20 and 11 bears, respectively.

Successful hunters spent 3.9 days to harvest a bear during 2006 and 3.0 days in 2007, compared to the 10-year average of 4.4 days (range 1–14 days). When combining all successful hunters across the unit, they spent 139 total days hunting during the 2006 season and 78 total days during the 2007 season.

Harvest Chronology. The greatest numbers of bears are taken during the spring portion of the season, with late April to late May being the period of highest harvest. During this period most available food, primarily grasses and sedges, is 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 10-year harvest trend indicates that spring hunters are more successful than those hunting in fall (60% and 40%, respectively). The last three seasons show a significant shift towards a higher spring harvest (Table 7). In 2006, 77% of the harvest was taken in the spring season, and in 2007, a slightly lower harvest percentage of 68%.

The majority of brown bears harvested from the unit have historically been taken during May ($\bar{x} = 18$, range 10–23), with September the second highest harvest period ($\bar{x} = 8$, range 3–17). Together these months account for the majority of Unit 1 brown bears. During the reporting period, May accounted for 44 of 60 bears harvested (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 83% of the reported transport methods for successful brown bear hunters. Highway vehicles (12%), off-road vehicles (2%), and walking (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.

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, 7 bears were reported as nonhunter kills, including 3 male and 4 female bears. Two bears were killed under DLP regulations, 1 bear was found along a roadway but was too decomposed to determine cause of death, and another was

killed illegally. Three additional natural mortalities were discovered in Berners Bay during the report period. Nonhunting 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 other sources of bear mortality were added to the legal Unit 1 hunter harvest, total human-caused mortality was 38 bears in 2006 and 26 bears in 2007.

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 and to reduce nonhunting mortality.

HABITAT

Assessment

As noted above, most areas of Unit 1 have healthy brown bear habitats, which are primarily under USFS jurisdiction. Within Unit 1A there is a highway-accessible area near Hyder, Alaska, (Salmon River Closed Area) that is closed to bear hunting to enhance viewing opportunities. A similar bear viewing situation exists in Haines at Chilkoot State Park. The park area is within the Lutak Road Closed Area, where the harvest of big game is prohibited. 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 and construction will begin 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 be issues of 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 transboundary 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). Bears were collared with global positioning system (GPS) collars. These collars provide researchers with spatial and temporal movement data for brown bears in these areas. DNA samples were taken both as tissue from captured bears, and from hair follicles collected in hair traps strategically placed in close proximity to salmon spawning streams. Home range information for individual bears is determined through analysis of collar locations. In addition, 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 transboundary (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, continues to provide 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 since this allows them access into 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

The trend in nonhunting mortality (DLP and illegal harvest) continued to decline slightly during the current report period; 4 bears were killed under either DLP regulations or were determined to be illegally harvested. Though we met our objective of reducing the number of bears killed because of human food conditioning during the reporting period, we believe the number of bears taken in nonhunting situations can be further reduced. Education is the key to reducing food condition related mortalities as well as DLP and illegal harvests. By providing 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 seems to have an increase in brown bear numbers 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 insight. Another area that seems to be experiencing an increase in brown bears is from St. James Bay on down to Pt. Couverdon, this is again based on reports from hunters. Subsequent 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 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.

LITERATURE CITED

- LARSEN, D.N. 1993. Unit 1 brown bear survey–inventory management report. Pages 1–14 *in* S. M. Abbott, editor. Alaska Department of Fish and Game, Division of Wildlife Conservation. Federal Aid in Wildlife Restoration Project W–23–4 and W–23–5, Study 4.0. Juneau. 283 pp.
- FLYNN, R.W., S. B. LEWIS, L. R. BEIER, AND G. W. PENDLETON. 2006. Abundance, spatial relationships, and transboundary movements of brown bears on the Mainland Coast of Southeast, Alaska. Alaska Department of Fish and Game, Division of Wildlife Conservation. Annual Progress Report. U.S. Fish and Wildlife Service Grant #70181-1-G134, U.S. Forest Service Agreement #43-0114-4-0040 and Federal Aid in Wildlife Restoration Grant No. W-33, Project No. 4.36. 20 pp.
- FLYNN, R.W., S. B. LEWIS, L. R. BEIER, AND G. W. PENDLETON. 2007. Brown Bear Monitoring for the Juneau Access improvements Project. Alaska Department of Fish and Game,

Division of Wildlife Conservation. Annual Progress Report. Alaska Department of Transportation and Public Facilities Reimbursable Service Agreement. 20 pp.

MCCARTHY, T.M. 1991. Unit 1 brown bear survey–inventory management report. Pages 1–11 *in* S. M. Abbott, editor. Alaska Department of Fish and Game, Division of Wildlife Conservation. Federal Aid in Wildlife Restoration Project W–23–3 and W–23–4, Study 4.0. Juneau. 271 pp.

PORTER, B. 2003. Unit 1 brown bear management report. Pages 1–18 *in* C. Healy, editor, Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska. 344 P.

PORTER, B. 2005. Unit 1 brown bear management report. Pages 1–19 *in* C. Brown, editor. Brown Bear management report of survey and inventory activities 1 July 2002–30 Juneau 2004. Alaska Department of Fish and Game. Juneau, Alaska. 331 pp.

SCHOEN, J. W., AND L. R. BEIER. 1989. Brown bear habitat preferences and brown bear logging and mining relationships in Southeast Alaska. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Project Report. Project W–23–1, Study 4.17. Juneau. 32 pp.

SCOTT, R. 2007. Unit 1 brown bear management report. Pages 1–19 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2004–30 June 2006. Alaska Department of Fish and Game. Juneau, Alaska.

TITUS, K., AND L. R. BEIER. 1993. Population and habitat ecology of brown bears on Admiralty and Chichagof Islands. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Research Report. Project W–24–1. Juneau. 40 p.

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TABLE 1 Unit 1 brown bear harvest, by subunit, 1998–2007^a

Regulatory Year	Unit 1A		Unit 1B		Unit 1C		Unit 1D		Total harvest
	harvest	% of total	harvest	% of total	harvest	% of total	harvest	% of total	
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
\bar{x}	7	(23)	6	(19)	5	(16)	13	(42)	31

^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, 1998–2007

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

^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, 1998–2007

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 ^c
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
\bar{x}	22.3	22	20.4	10	7.7	19	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, 1998–2007 ^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
(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

^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, 2003–2007

TABLE 5. Hunt ID, fall and spring registration and drawing hunt permits by regulatory year, 2003-2007									
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
(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

^a Drawing permit hunt during 2003–2004 only.

TABLE 6 Unit 1 successful brown bear hunters, by residency, 1998–2007

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

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

TABLE 7 Unit 1 brown bear harvest, by season, 1998–2007

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)
\bar{x}	12	(39)	19	(61)

Table 8 Unit 1 brown bear harvest, by month, 1997–2007

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

TABLE 9 Unit 1 successful brown bear hunter transport methods, 1998–2007

Regulatory Year	Percent of Hunters						Nr Successful Hunter
	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

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006
To: 30 June 2008

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 on brown bears 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, the Board of Game authorized a limited Unit 3 brown bear season in fall 2004 based on the high likelihood of population interchange between the Unit 3 islands and the adjacent 1B mainland. 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. Restricting the new season to Alaska residents only is intended to maintain hunter harvest at relatively low levels.

Prior to 1985 there existed a 15 September–31 May hunting season 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 for brown bear in Unit 3, a clerical error in the proposal resulted in the inadvertent omission of fall season dates. During recent years there have been 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), until recently no brown bear research had been conducted in Unit 3. Recently completed research on brown bears inhabiting the Bradfield Canal area of Unit 1B has confirmed that population interchange occurs between Unit's 1A, 1B, 3, and British Columbia, Canada. Most of the information we use to assess and manage mainland brown bear populations comes from hunters' anecdotal information, staff observations, defense of life and property (DLP) kill records, 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 Region I since 1989 (McCarthy 1991; Larsen 1993). Prior to this, hunters were required to obtain only a license and metal-locking tag prior to hunting brown bears.

The Tongass National Forest (Tongass) encompasses most Unit 3 brown bear habitat, excluding intertidal and Unit 3 state lands, municipal lands, and Alaska Native corporation lands and is managed by the U.S. Forest Service (USFS).

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.

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. In 2006 a total of 8 hunters went afield and 1 brown bear was harvested. In 2007 a total of 6 hunters went afield and 2 brown bears were harvested (Table 1). The age and skull size of these bears is provided in Table 2.

Permit Hunts. Registration permits are required for Unit 3 brown bear hunters. During the 2006 season a total of 16 registration permits were issued. During the 2007 season a total of 14 registration permits were issued.

Hunter Success and Residency. The Unit 3 brown bear hunt is closed to nonresidents. During 2006, 8 of the 16 hunters (50%) that registered for the spring hunt actually took to the field, and one (13%) was successful in harvesting a bear (Table 3). The successful hunter spent one day to harvest the bear. All permittees in 2006 were local residents of Unit 3 (Table 4). In 2007, 6 of the 14 hunters (43%) that registered for the spring hunt took to the field, and 2 (33%) were successful in harvesting a bear (Table 3). The 2 successful hunters spent an average of 6 days to harvest a bear. Seven of the 14 hunters (50%) were local residents of Unit 3 (Table 4).

Harvest Chronology. All 3 of the bears taken during the report period were taken during the month of May (Table 5), since there is not a fall season. The month of May is the best time to find bears in the spring season because most bears are out of their dens and utilizing the beaches where they can forage on newly emergent sedges. This foraging activity exposes them to hunters.

Transport Methods. Of the 8 hunters who took to the field in 2006, 7 reported using boats to access hunting areas, and one reported using a highway vehicle. The one successful hunter reported using a boat. Of the 6 hunters who took to the field in 2007, 5 reported using boats to access hunting areas, and one reported using a highway vehicle (Table 6). Both successful hunters in 2007 reported using boats to access hunting areas.

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 sow 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) encompasses most Unit 3 brown bear habitat, and is managed under a multiple use concept by the U.S. Forest Service (USFS). Other lands not included under the Tongass ownership include intertidal lands, state lands, municipal lands, and Alaska Native corporation lands. 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 continue to be areas of concern. DLP mortalities are an ever-present possibility where bears are likely to come in 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 there had been no research directed at brown bears inhabiting the Southeast Alaska mainland. The specific objectives of the recently completed 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.

CONCLUSIONS AND RECOMMENDATIONS

Most brown bear hunting in Unit 3 probably occurs incidentally to other outdoor activities. Some hunters who obtain a brown bear registration permit probably do so only on the chance they may encounter a brown bear while engaged in other outdoor activities. The Unit 3 registration permit hunt initiated in 2005 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. While reports of brown bear sightings on Mitkof Island have increased in recent years, no bears have been taken on the island.

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.

The primary threat to brown bear populations in Unit 3 involves habitat loss from 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. The brown bear harvest in Unit 3 was very low during the report period; therefore, we recommend no changes to modify the season or bag limit at this time.

LITERATURE CITED

- LARSEN, D.N. 1993. Unit 1 brown bear survey–inventory management report. Pages 1–14 *in* S. M. Abbott, editor. Alaska Department of Fish and Game, Division of Wildlife Conservation. Federal Aid in Wildlife Restoration Project W–23–4 and W–23–5, Study 4.0. Juneau. 283 pp.
- MCCARTHY, T.M. 1991. Unit 1 brown bear survey–inventory management report. Pages 1–11 *in* S. M. Abbott, editor. Alaska Department of Fish and Game, Division of Wildlife Conservation. Federal Aid in Wildlife Restoration Project W–23–3 and W–23–4, Study 4.0. Juneau. 271 pp.
- SCHOEN, J. W., AND L. R. BEIER. 1989. Brown bear habitat preferences and brown bear logging and mining relationships in Southeast Alaska. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Project Report. Project W–23–1, Study 4.17. Juneau. 32 pp.
- TITUS, K., AND L. R. BEIER. 1993. Population and habitat ecology of brown bears on Admiralty and Chichagof Islands. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Research Report. Project W–24–1. Juneau. 40 pp.

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TABLE 1 Unit 3 brown bear harvest, 2004–2007^a

Regulatory year	Unit 3 harvest
2004	No open season
2005	1
2006	1
2007	2

^a Includes all reported human-caused mortalities

TABLE 2 Unit 3 age and skull size of harvested brown bears, 2004–2007

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

^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, 2004–2007

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

TABLE 4 Unit 1 successful brown bear hunters, by residency, 2004–2007

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

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

TABLE 5 Unit 3 brown bear harvest, by month, 2004–2007

Regulatory year	Harvest periods							Total
	September	October	November	March	April	May	June	
2004	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2005	0	0	0	0	0	1	0	1
2006	0	0	0	0	0	1	0	1
2007	0	0	0	0	0	2	0	2

TABLE 6 Unit 3 successful brown bear hunter transport methods, 2004–2007

Regulatory year	Percent of harvest						Nr.
	Airplane	Boat	Walk	ORV	Highway vehicle	Other/ unknown	
2004	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2005	(0)	(100)	(0)	(0)	(0)	(0)	1
2006	(0)	(100)	(0)	(0)	(0)	(0)	1
2007	(0)	(100)	(0)	(0)	(0)	(0)	2

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006

To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: Unit 4 (5820 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 5025 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% of these records reflect hunter harvest.

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 69% of the region's harvest in recent years (ADF&G 2003). 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. Recent 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 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 which were used to publish a report (ADF&G 2000). A 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.

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.

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. 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. Efforts are underway to establish online access to registration permits to improve 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.

Data recorded on sealing certificates and registration permit reports were entered into a computer database. Delinquent permittees were sent up to two reminder letters, 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 from bears, joining other Alaska cities and towns trying to reduce habituation of bears to human-related food sources.

During summer 2007, a single male bear was fitted with a GPS radio collar at Pack Creek. The intent of this effort 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. Preliminary data on the single bear is inconclusive, but efforts will continue in summer of 2010 with plans on deploying several more GPS collars to continue these efforts.

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). 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 harvest occurs because logging roads allow hunters greater efficiency in accessing salmon streams, bays, and estuaries (Young 1989, 1990; Titus and Beier 1992).

Illegal guiding activity during 1999–2003 contributed to increased harvest above guidelines recommended by the Brown Bear Management Team. 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. Based upon 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 overall 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.

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 4155 bears; Chichagof and adjacent islands, 1550; Baranof and adjacent islands, 1045; and Admiralty Island, 1560. Although it is possible some island numbers will be recalculated in the future using updated information gathered in July 2002–September 2004 from northeast Chichagof Island, changes have not been implemented within this report timeframe. 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 three-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).

Although data analysis is preliminary, it appears that 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 (Rod Flynn, ADF&G wildlife biologist, personal communication). Continued monitoring is necessary as extreme snow depth during the late winter of 2006–2007 reduced the deer population by an estimated 75–85%. This resulted in a number of deer carcasses available to bears during the spring of 2007, but the following spring almost no carcasses were available. In addition, salmon returns to streams on northeast Chichagof Island during the summer of 2008 were minimal and many bears dispersed to other areas in search of food. Increased competition for limited food resources may result in greater mortality of juvenile bears.

Population Composition

Unit-wide population composition data 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 2006–2007 harvest by hunters was 81% males ($n = 88$) and 19% females ($n = 21$). The 2007–2008 harvest was 84% males ($n = 129$) and 16% females ($n = 25$). Table 1 displays sex 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).

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 Orders

At the November 2004 meeting a review of all closed areas to bear hunting within the unit was conducted. Unit 4 has 7 closed areas: Sitka area road system (1960), Seymour Canal Closed Area (1934), Salt Lake Bay Closed Area (1984), Mitchell Bay Closed Area (1991), Port Althorp Closed Area (1984), Bear Cove Closed Area (2003), and the Northeast Chichagof Controlled Use Area (1989). The Board of Game's review concluded that the Seymour Canal and Mitchell Bay

areas would be reopened for discussion during the next Southeast board cycle, fall 2006. Members of the board reiterated their endorsement of the findings of the Unit 4 Brown Bear Management Team (BBMT), supporting the USFS in its attempts to decrease hunter crowding issues and limit the number of guides (thus, nonresident harvest) in Unit 4.

The November 2006 Board of Game meeting in Wrangell was preceded by an opportunity for public testimony at Juneau in October. The bulk of the testimony was related to the closed areas of Mitchell Bay and Seymour Canal and was strongly opposed to any change in the status quo of those areas. Later in Wrangell, the board heard a report on the status of implementing recommendations of the Unit 4 BBMT since the completion of the report in 2000. Following this report, the board heard testimony regarding the closed areas at Seymour Canal and Mitchell Bay and unanimously supported no change to those areas while reiterating their support of the recommendations of the Unit 4 BBMT. In a subsequent unanimous vote the board placed a 10-year moratorium on hearing regulations associated with changes to the Seymour Canal Closed Area.

In May 2006, the Federal Subsistence Board refused the State of Alaska's request to limit sales of bear parts, including claws, skulls, teeth, and bones from bears taken under federal subsistence regulations. Under state law, the purchase of claws, teeth, skulls, and bones is prohibited. The state also argued that the federal regulations authorize sales of extremely valuable bear parts without implementing a tracking system. In August 2006, the state filed a "Request for Reconsideration" which was denied in February 2007.

The Board of Game took no actions concerning brown bear management in the unit at its November 2008 meeting in Juneau.

Hunter Harvest and Other Mortality

Regulatory Year (RY) 2006 (A regulatory year begins 1 July and ends 30 June; e.g. RY 2006 = 1 July 2006–30 June 2007): Hunters harvested 36 brown bears in fall 2006 and another 77 in spring 2007. The total for the year was 113 bears. An additional 20 bears are known to have died from nonhunting situations, bringing the year's total to 133 bears. This resulted in a three-year mean of 141 bears. The decline in hunter harvest can be attributed to an extremely late winter snowpack and resulting green-up. More than 90% of the spring harvest occurred in the last 20 days of May.

RY 2007: Hunters took 37 bears in fall 2007 and 118 in spring 2008. Hunter harvest accounted for 155 bears, while 10 additional bears were reported killed in other situations; the combined mortality for the year was 165 bears. The 3-year mean annual human-caused mortality rose to 143, still well below the guideline harvest of 166, although a 2-year decline has reversed. Data concerning brown bear harvests for the past 5 years are presented in Tables 1 and 2.

Trends in skull measurements and mean ages of harvested bears closely match those found in the long-term data, indicating stable trends. Ages and skull sizes for Baranof and Chichagof islands are comparable to Admiralty Island data, which also indicates a stable trend.

Hunter Residency and Success

Spring Unit 4 permit hunts are administered by two 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 10% over the last 5 years. Most bears were taken by nonresidents or Alaska hunters from outside Southeast. In 2006–2007 nonlocal Alaska hunters and nonresidents harvested 89% of the bears. In 2007–2008 nonlocal Alaskans and nonresidents took 93% of the bears with a slight percentage increase in the nonlocal residents and slight decrease in the nonresident percentage.

Spring and fall hunting effort is presented in Table 4 and the following discussion is in the context of regulatory years. In fall 2006, 86 Alaska residents hunted a total of 293 days, while 98 nonresidents spent 475 days afield. In fall 2007, 93 residents hunted 324 days and 75 nonresidents hunted 236 days.

Spring seasons produced a larger harvest (Table 1) and exhibited greater hunting pressure (Table 4). In spring 2007, 114 residents hunted 329 days and 162 nonresidents hunted 742 days. In spring 2008, 123 residents hunted 402 days and 139 nonresidents hunted 592 days. Over the last 5 years, fall seasons produced an average of one bear for every 14.4 hunt days, and spring seasons produced one bear for every 13 days. This jumped dramatically to 22 hunt days per fall bear in 2006 and fell to 15 days per bear in the fall of 2007. Spring effort in 2007 rose to 15 days per bear and then dropped to only 9 days per bear in spring 2008.

Harvest Chronology

Most fall harvest 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 dispersal 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 of female bears (Table 1). An increasing trend of 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 are taken in the spring than in the fall season. With female bears, the opposite is usually true (Table 1). Fall bear hunting is usually on streams in fairly thick vegetation, so the hunters do not have the luxury of watching a bear for a long time as they do in the spring, and thus they are not as selective. Additionally, 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 when bears are easier to locate than in the fall, and they tend to have longer hair making for a better trophy hide. The greatest numbers 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 where an earlier, warm spring occurs that provides bears with more dispersed feeding opportunities.

Transport Methods

Unit 4 bear hunters overwhelmingly used boats as the most common form of transportation (Table 6). In 2006–2007, 85% of successful hunters used boats. In 2007–2008, successful hunters used boats 92% of the time. Aircraft are the second most important means of hunter transport but were used by only 11% of successful hunters in 2006–2007 and by 8% of successful hunters in the 2007–2008 season. The overlap in percentages is due to hunters reporting using more than one transport method.

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. The majority of increases in DLP incidents this reporting period can be attributed to the landfills of small communities on Admiralty and Chichagof islands, as well as fish hatcheries in remote locations on Baranof 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, three brown bear cubs were orphaned and captured on Killisnoo Island. The two 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.

In 2006–2007, 20 nonhunting mortalities were reported (Table 1) and 10 occurred in 2007–2008. 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.

Bear Viewing

Public interest in viewing bears continues at the Stan Price State Wildlife Sanctuary. The 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 summer 2006, 1166 visitors (both guided and unguided) were recorded at PCCMA. In summer 2007 the number of visitors declined to 1101, dropping further to 1043 visitors in 2008 (the lowest number in the past 10 years). 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. During spring 2004, the Icy Strait-Pt. 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 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 two orphaned cubs were placed that summer. Quantifying growing uses has been difficult and has generated a wide range of general public comments, both for and against.

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 3:1.8 in 2006–2007 and 3:1.4 in 2007–2008, meeting the management objective of no more than 3:2. The three-year (RY's 2005–2007) mean annual human-caused mortality guideline of 166 bears was not exceeded.

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 problems in communities that contribute to such losses.

For harvest purposes, Admiralty Island, Baranof/Kruzof Islands, Northeast Chichagof, and the remainder of Chichagof/Yakobi Islands are managed as 4 subpopulations. These areas are large enough to encompass viable bear populations, and water barriers largely restrict dispersal of subadults between the areas. Hunting pressure on brown bears requires the use of all available population information for management decisions. 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. Project research work 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 appears to have prevented excessive harvest in that area. Chichagof Island has experienced the greatest long-term habitat alteration from logging in Unit 4; thus, bear habitat there is the least secure. Continued research on the island's bear population is necessary to provide managers with population information.

The combined annual mortality from harvest and DLP kills in the unit exceeded the biological guideline of 4% of the estimated population in 2004–2005 and was close to exceeding it 2005–2006 (Table 2). Increases in DLP and illegal kills may make it necessary to recommend regulatory changes to dampen the trend of increasing bear kills, especially where there is an increasing trend in female harvest. Because of the USFS moratorium on licensing additional guides and enforcement action against illegal guiding activities, harvests by nonresidents are expected to stabilize. Reinstatement of the state Big Game Commercial Services Board should provide better oversight of guides and transporters. It is unknown at this time what effect the sale of bear parts will play in human-caused bear mortality in the next few years.

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

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LITERATURE CITED

- ADF&G. 1998. Brown Bears of Unit 4 – Past, Present and Future: A Status Report and Issues Paper. July 1998. ADF&G. Juneau, Alaska. 67 pp.
- ADF&G. 2000. Southeast Alaska. Unit 4 Brown Bear Management Strategy. ADF&G. Juneau, Alaska. 47 pp.
- ADF&G. 2003. Alaska Wildlife Harvest Summary 2002–2003. July 2003. ADF&G, Division of Wildlife Conservation. Juneau, Alaska. 7 pp.

- FARO, J.B. 1997. Unit 4 brown bear survey-inventory report. Pages 2–3 in M.V. Hicks, editor. Annual report of survey-inventory activities. ADF&G, Federal Aid in Wildlife Restoration. Juneau, Alaska.
- FLYNN, R.W., S.B. LEWIS, L. BEIER, G. PENDLETON, AND T.V. SCHUMACHER. 2004. Brown bear use of riparian and beach zones on Northeast Chichagof Island, Southeast Alaska. ADF&G. USDI Fish and Wildlife Service Grant. Wildlife Research Annual Progress Report. Douglas, Alaska. 30 pp.
- HEATON, H.T., S L. TALBOT, and G.F. SHIELDS. 1996. An ice age refugium for large mammals in the Alexander Archipelago, Southeast Alaska. *Quaternary Research* 46:186–192.
- MILLER, S.D. 1993a. Development and improvement of bear management techniques and procedures in Southcentral Alaska. ADF&G, Federal Aid in Wildlife Restoration Research Progress Report, Project W–24–1, Study 4.24. 40pp.
- . 1993b. Brown bears in Alaska: A statewide management overview. ADF&G, Federal Aid in Wildlife Technical Bulletin No. 11. 40pp.
- SCHOEN, J.W. and L.R. BEIER. 1990. Brown bear habitat preferences and brown bear logging and mining relationships in Southeast Alaska. ADF&G. Federal Aid in Wildlife Restoration. Final Report. Project W-22-1 through 6 and W-23-1 through 3. 37pp.
- TALBOT, S.L. and G.F. SHIELDS. 1996. A phylogeny of the bears (Ursidae) inferred from complete sequences of three mitochondrial genes. *Molecular Phylogenetics and Evolution* 5:567–575.
- TITUS, K. and L.R. BEIER. 1992. Population and habitat ecology of brown bears on Admiralty and Chichagof islands. ADF&G. Federal Aid in Wildlife Restoration. Research Progress Report. Project W-23-4. 29pp.
- . 1993. Population and habitat ecology of brown bears on Admiralty and Chichagof islands. ADF&G. Federal Aid in Wildlife Restoration. Research Progress Report. Project W-24-1. 40pp.
- USDA-FOREST SERVICE. 2004. Shoreline Outfitter /Guide. Record of Decision and Final Environmental Impact Statement. R10-MB-519D.
- WHITMAN, J.S. 1999. Unit 4 brown bear survey-inventory report. In M.V. Hicks, editor. Annual report of survey-inventory activities. Part I. Vol. V. ADF&G. Federal Aid in Wildlife Restoration. Juneau, Alaska.
- YOUNG, E.L. 1989. Unit 4 brown bear survey-inventory report. In S.O. Morgan, editor. Annual report of survey-inventory activities. Part I. Vol. V. ADF&G. Federal Aid in Wildlife Restoration. Juneau, Alaska.

———. 1990. Unit 4 brown bear survey-inventory report. In S.O. Morgan, editor. Annual report of survey-inventory activities. ADF&G. Federal Aid in Wildlife Restoration. Juneau, Alaska.

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TABLE 1 Unit 4 brown bear harvest, regulatory years 2003–2007

Regulatory year	<u>Hunter kill</u>					<u>Nonhunting kill^a</u>				Total Reported
	M	F	(%F)	Unk	Total	M	F	Unk	Total	
2003										
Fall 2003	28	16	(36)	0	44	10	3	3	16	60
Spring 04	119	12	(9)	0	131	6	2	1	9	140
Total	147	28	(16)	0	175	16	5	4	25	200
2004										
Fall 2004	25	10	(29)	0	35	3	5	7	15	50
Spring 05	91	14	(13)	0	105	3	0	0	3	108
Total	116	24	(17)	0	140	6	5	7	18	158
2005										
Fall 2005	21	19	(48)	0	40	3	2	2	7	47
Spring 06	71	9	(11)	0	80	0	2	2	4	84
Total	92	28	(23)	0	120	3	4	4	11	131
2006										
Fall 2006	16	19	(56)	1	36	6	4	9	19	55
Spring07	68	8	(12)	1	77	0	0	1	1	78
Total	84	27	(27)	2	113	6	4	10	20	133
2007										
Fall 2007	21	16	(42)	0	37	7	2	0	9	46
Spring 08	107	9	(8)	1	118	1	0	0	1	119
Total	128	25	(17)	1	155	8	2	0	10	165

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

TABLE 2 Unit 4 brown bear hunting pressure^a and mortality^b by major geographic areas, regulatory years 2003–2007

Hunt area	Regulatory Year	# hunters	M	(%) ^c	F	(%) ^c	Unknown	(%) ^d	Total harvest	Percent estimated population ^e
Northeast Chichagof Island ^f										<u>354*</u>
	2003–04	36	11	(85)	2	(15)	0		13	(3.7)
	2004–05	32	6	(75)	2	(25)	0		8	(2.3)
	2005–06	32	6	(67)	3	(33)	0		9	(2.5)
	2006–07	26	3	(43)	4	(57)	0		7	(2)
	2007–08	38	11	(79)	3	(21)	0		14	(4)
Remainder of Chichagof Island										<u>1196*</u>
	2003–04	126	50	(83)	10	(17)	0		60	(5.0)
	2004–05	180	35	(83)	7	(17)	0		42	(3.5)
	2005–06	160	34	(81)	8	(19)	0		42	(3.5)
	2006–07	145	24	(71)	9	(26)	1	(3)	34	(2.8)
	2007–08	162	42	(81)	10	(19)	0		52	(4.3)
Baranof and Kruzof Islands										<u>1045*</u>
	2003–04	76	28	(88)	4	(12)	0		32	(3.0)
	2004–05	142	28	(82)	6	(18)	0		34	(3.3)
	2005–06	112	10	(83)	2	(17)	0		12	(1.1)
	2006–07	132	23	(77)	7	(23)	0		30	(2.9)
	2007–08	99	26	(90)	3	(10)	0		29	(2.8)
Admiralty Island										<u>1560*</u>
	2003–04	163	57	(83)	12	(17)	0		69	(4.4)
	2004–05	165	48	(83)	10	(17)	0		58	(3.7)
	2005–06	150	30	(73)	11	(27)	0		41	(2.6)
	2006–07	143	34	(81)	7	(17)	1	(2)	42	(2.7)
	2007–08	132	49	(84)	9	(16)	0		58	(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
Unit 4 Totals										<u>4155*</u>
	2003-04	401	146	(84)	28	(16)	0		174	(4.2)
	2004-05	519	117	(82)	25	(18)	0		142	(3.4)
	2005-06	454	80	(77)	24	(23)	0		104	(2.5)
	2006-07	446	84	(74)	27	(24)	2		113	(2.7)
	2007-08	431	128	(83)	25	(16)	1		154	(3.7)

^a Registration permit data.^b Bear sealing data.^c Percentage based on known sex bears.^d Percentage based on total bears.^e Estimated populations: NE Chichagof Island, 354 bears; remainder of Chichagof Island, 1196; Baranof and Kruzof Islands, 1045 bears; Admiralty Island, 1560 bears; all Unit 4, 4155 bears.^f X35 only.

*guideline population estimate

TABLE 3 Unit 4 brown bear successful hunter residency, regulatory years 2001–2005

Regulatory year	Local resident ^a	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
2003-04	18	(10)	42	(24)	115	(66)	175
2004-05	13	(09)	24	(17)	103	(74)	140
2005-06	15	(13)	16	(13)	89	(74)	120
2006-07	12	(11)	20	(18)	77	(71)	109
2007-08	11	(07)	37	(24)	107	(69)	155

^a Resident of Unit 4.

TABLE 4 Unit 4 hunting effort by island, by residency, regulatory years 2003–2007

Island	Season	# resident hunters	# nonresident hunters	Total hunters	Days hunted by residents	Days hunted by nonresidents	# days hunted	# bears killed	Effort (Days per bear)
Admiralty									
RY 2003	Fall 2003	34	17	51	151	70	221	14	16
	Spring 2004	62	51	113	283	259	542	55	10
RY 2004	Fall 2004	29	13	42	146	47	193	10	19
	Spring 2005	68	54	122	224	240	464	48	10
RY 2005	Fall 2005	22	14	36	65	73	138	12	12
	Spring 2006	61	48	109	205	267	472	29	16
RY 2006	Fall 2006	21	39	60	97	269	366	10	37
	Spring 2007	37	46	83	117	281	398	32	12
RY 2007	Fall 2007	28	19	47	114	61	175	11	16
	Spring 2008	42	43	85	152	227	379	47	8
Baranof									
RY 2003	Fall 2003	20	8	28	66	43	109	9	12
	Spring 2004	33	19	52	116	94	210	23	9
RY 2004	Fall 2004	22	7	29	79	92	171	12	14
	Spring 2005	46	41	87	146	140	286	22	13
RY 2005	Fall 2005	22	15	37	72	60	132	13	10
	Spring 2006	26	19	45	106	95	201	15	13
RY 2006	Fall 2006	41	23	64	118	83	201	12	17
	Spring 2007	27	41	68	59	136	195	18	11
RY 2007	Fall 2007	35	11	46	74	51	125	9	14
	Spring 2008	30	23	53	87	105	192	20	10

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)
Chichagof									
RY 2003	Fall 2003	42	18	60	218	95	313	21	15
	Spring 2004	62	43	105	263	239	502	53	9
RY 2004	Fall 2004	30	24	54	95	61	156	13	12
	Spring 2005	61	94	155	197	290	487	38	13
RY 2005	Fall 2005	39	32	71	116	111	227	15	15
	Spring 2006	57	88	145	132	360	492	36	14
RY 2006	Fall 2006	24	36	60	78	123	201	14	14
	Spring 2007	50	75	125	153	325	478	27	18
RY 2007	Fall 2007	30	45	75	136	124	260	17	15
	Spring 2008	51	73	124	163	260	423	49	9
Unit 4 Totals									
RY 2003	Fall 2003	96	43	139	442	208	643	44	15
	Spring 2004	157	113	270	662	592	1254	131	10
RY 2004	Fall 2004	81	44	125	320	200	520	35	15
	Spring 2005	175	189	364	567	670	1237	108*	11
RY 2005	Fall 2005	83	61	144	253	244	497	40	12
	Spring 2006	144	155	299	443	722	1165	80	15
RY 2006	Fall 2006**	86	98	184	293	475	768	36	22
	Spring 2007	114	162	276	329	742	1071	77	15
RY 2007	Fall 2007	93	75	168	324	236	560	37	15
	Spring 2008	123	139	262	402	592	994	118	9

*3 bears were later deemed ille

** missing 1 overlay

TABLE 5 Unit 4 brown bear harvest chronology, regulatory years 2003–2007^a

Regulatory year	Fall harvest periods											Total
	9/11– 9/20	9/21– 9/30	10/1– 10/10	10/11– 10/20	10/21– 10/31	11/1– 11/10	11/11– 11/20	11/21– 11/31	12/1– 12/10	12/11– 12/20	12/21– 12/31	
2003–04	24	12	2	2	1	2	1	0	0	0	0	44
2004–05	18	5	5	3	2	1	0	0	1	0	0	35
2005–06	18	11	7	0	2	0	1	0	1	0	0	40
2006–07	14	9	7	1	3	1	1	0	0	0	0	35
2007–08	14	16	5	2	1	0	0	0	0	0	0	38

	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	
2003–04	1	0	10	45	61	14	131	175
2004–05	1	1	24	26	38	15	105	140
2005–06	0	0	2	20	32	26	80	120
2006–07	1	0	4	10	49	13	77*	113
2007–08	0**	0	10	37	55	14	117	155

^a Includes all hunts. *1 unknown bear, ** bear taken previous to period not included in table

TABLE 6 Unit 4 brown bear harvest by transport method, 2003–2004 through 2005–2006^a

Regulatory year	Airplane	Boat	Walked	Off- road vehicle	Highway vehicle	Unknown
2003–04	8	166	1	0	0	0
2004–05	4	138	1	0	0	0
2005–06	2	115	0	0	1	0
2006–07	12	93	3	0	0	1
2007–08	12	142	0	1	0	1*

^aSealing certificate data and registration permit data often differ. Sealing certificate data were used where possible. *1 bear reported taken by airboat.

**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 2006
To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: 5 (5800 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 Alek/Tatshenshini corridor.

Unit 5 is composed of two 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. Finally, there are 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 just a single rental cabin for hunters to use as a base. The subunits also vary in that 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 much of it is designated national park land. Additionally, the subunit has areas owned by Native corporations which are open to hunting only with a permit from a corporation.

Since 1961, when brown bears were first sealed in Alaska, just over 1000 sport-killed bears have been sealed from Unit 5. During this same time period, nonhunter harvest mortality (vehicle collisions, the dispatching of nuisance animals, defense of life and property (DLP) situations, and bears found dead from unknown causes) accounted for 81 bears. Approximately 85% of the hunter harvested bears were from Unit 5A, and 15% 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 ten years. From 1980 through 1988, an average of 22 guided nonresidents per year hunted brown bear in Unit 5. Since then, the number has climbed to an average of 26 per year. This increase is in part due to a 1988 Superior Court

decision that deregulated the big game guide industry, which resulted in an increase in big game guiding activity across Southeast Alaska.

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 Bureau of Wildlife Enforcement staff gathered data about harvested bears during sealing. State game regulations require brown bear hides and skulls to be sealed within 30 days of harvest. Skulls are measured and a 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. Data gathered from sealing certificates, incidental observations, and hunter interviews indicate no notable changes in the population. However, the highest annual mortality on record occurred in 2003 when 45 brown bears were killed, 11 of these in defense of life and property (DLP). There was concern that this high mortality might develop into a pattern, but during this report period the total brown bear mortality returned to pre-2003 levels, with 37 and 27 bears being killed during regulatory years (RY) 2006 and 2007 respectively (A regulatory year runs from 1 July through 30 June; e.g. RY 2004 ran from 1 July 2006–30 June 2007).

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. There were no Board of Game actions or emergency orders associated with Unit 5 brown bears during this report period.

Hunter Harvest. Unit 5 brown bear harvests have 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 had constantly 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 27 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 regulatory year 2006, 20 males and 8 females were reported taken (Table 1). Males composed 71% of the harvest, which is above our management objective of 60%. The mean male skull size of 24.0 inches is roughly one half inch larger than the previous report period mean measurement (23.4 inches), and the 10-year (1996–2005) mean of 23.4 inches. The average male age (7.7 years) is similar to the mean age of bears in the previous report period (7.4 years) and the 10-year mean age of 7.1 years.

In RY 2007, Unit 5 hunters killed 18 male and 8 female brown bears (Table 1). Males composed 69% of the harvest, which again was above our management objective of 60%. Mean male skull size was 22.9 inches, and the mean age was 6.5 years. Both indices are below the long-term means, and that of the previous report period.

Overall, for the report period, both the mean age of 7.7 years, and the mean skull size of 23.7 inches were similar to the long term mean age of 7.1 years and skull size of 23.4 inches.

Hunter Residency and Success. When combining both years of this report period, nonresident hunters accounted for 76% of the brown bear harvest. It is noteworthy that almost all brown bears taken by hunters in 2006 were harvested by nonresident hunters (96%). The report period harvest is slightly lower than the percent of bears taken by nonresident hunters (79%) during the period 1998–2005, and is moderately lower than the 85% of bears taken by nonresident hunters during the previous report period (2004 and 2005).

Harvest Chronology. During the report period the harvest chronology (fall vs. spring) varied between years. In RY 2006, 43% of the bears were taken in spring which is moderately higher than the 27% spring harvest during RY 2007 (Table 2). This compares with a mean spring harvest value of 45% during 1998 through 2005. Fall brown bear harvests represent 56% of the bear harvest for the period 1998–2007.

Transport Methods. Transportation types used in successful brown bear hunts during this report period included boats (33%), off-road vehicles (ORVs) (37%) aircraft (28%), and highway vehicles (2%).

Other Mortality

This category refers to DLP kills, illegal kills, road kills, and nuisance bear kills. During 2006 nine bears were killed under DLP regulations. Most of the DLP bears were killed in urban settings and were habituated and food-conditioned brown bears. Of these nine bears 1 was killed by department personnel, 4 were killed by local public safety officers and 4 were killed by members of the public. In 2007, not a single bear was killed under DLP regulations; one bear of unknown sex was found dead and surrendered to the department for sealing.

The Yakutat landfill has been the main area of concern for these types of mortalities for decades. The landfill attracts dozens of brown bears during the course of a year, and once food conditioned and near the community, many of these animals eventually are killed in nonhunting situations. Douglas Area ADF&G staff continues to work with the community of Yakutat and the Alaska Department of Environmental Conservation (DEC) to remedy landfill problems and curtail brown bear attractants. Over the past year there have been several meetings in Yakutat regarding this issue. Fish waste is no longer being deposited at the landfill, and garbage is being burned immediately after dumping, thereby eliminating many foraging opportunities for bears. We have begun working with the U.S. Forest Service (USFS) to distribute educational materials to Yakutat fish camp permit holders to reduce the illegal killing of bears. One of our goals is to minimize bear attractants at fish camps, thereby easing the concern of fish camp operators and preventing the unnecessary death of bears.

HABITAT

Assessment and Enhancement

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

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 both years of the report period. Male bears composed 71% of the harvest in 2006 and 69% of the harvest in 2007. The average age for hunter-harvested male bears was 7.7 yrs. in 2006, and 6.5 yrs. in 2007. The high percentage of male bears in the hunter harvest, and a stable long-term harvest age structure suggests the productivity of this population is not being compromised by the present level of mortality. No changes to current Unit 5 brown bear hunting seasons or bag limits are recommended at this time.

Current hunter harvest in Unit 5 seems 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 Tongass National Forest. The real concern then is not hunter harvest; but the killing of bears in nonhunting situations. The killing of bears in DLP situations is unpredictable and is substantial some years. Also, bears coming into Yakutat for the landfill as well as trash in residential areas end up being killed year after year. Convincing the general populace in Yakutat that brown bears are a valuable wildlife resource and not just pests has not been an easy thing to do. Efforts are being made by department staff to work with the community of Yakutat to address the access to trash by bears at both the landfill and at people's homes. These efforts, should they be successful, will lead to a much lower take of bears in nonhunt situations. We will continue to emphasize to local residents the importance of properly managing garbage and work with DEC to eliminate this fatal attractant.

Research staff has initiated planning efforts to collect brown bear population data utilizing DNA mark-recapture techniques in Unit 5B. Initial bear capture and hair snare operations are tentatively scheduled for June 2009. In addition, discussion is underway with the U.S. Forest Service to expand brown bear population research to Unit 5A. With additional research we hope

to be able to more accurately estimate the brown bear population in Unit 5 and throughout the Southeast Alaska region.

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

SCOTT, R. 2009. Unit 5 brown bear management report. Pages 49–57 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2006–30 June 2008. Alaska Department of Fish and Game. Juneau, Alaska.

TABLE 1 Unit 5 brown bear harvest, age, skull sizes, and effort, RY 1998 through RY 2007

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
1998	28	7	0	35	6.2	3.8	23.5	21.6	4.4	2.7
1999	23	8	0	31	9.3	6.8	23.5	20.8	5.3	4.0
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
Mean 2006–2007	19.0	8.0	0	27.0	7.1	5.9	23.5	20.9	4.6	4.1
1998–2005	23.4	7.5	0	30.9	7.6	11.9.	23.6	21.3	4.6	4.4

TABLE 2 Unit 5 brown bear harvest chronology, RY 1998 through RY 2007

Regulatory Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1998	0	0	10	10	1	0	0	0	0	4	10	0	35
1999	0	0	10	6	2	0	0	0	0	1	12	0	31
2000	0	0	17	3	0	0	0	0	0	3	10	0	33
2001	0	0	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

TABLE 3 Unit 5 successful brown bear hunter residency, RY 1998 through RY 2007

Regulatory year	Unit resident	(%)	Other AK. resident	(%)	Nonresident	(%)
1998						
Fall 1998	2	(10)	5	(24)	14	(66)
Spring 1999	0	(0)	2	(14)	12	(86)
Total	2	(6)	7	(20)	26	(74)
1999						
Fall 1999	2	(11)	1	(6)	15	(83)
Spring 2000	0	(0)	1	(8)	12	(92)
Total	2	(6)	2	(6)	27	(88)
2000						
Fall 2000	3	(15)	3	(15)	14	(70)
Spring 2001	0	(0)	0	(0)	13	(100)
Total	3	(9)	3	(9)	27	(82)
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)

TABLE 4 Unit 5 transport modes used by successful brown bear hunters, RY 1998 through 2007

Regulatory year	Plane	(%)	Boat	(%)	ORV/4- wheeler	(%)	Highway vehicle	(%)	Foot	(%)	Other	(%)
1998	25	(72)	4	(11)	1	(3)	4	(11)	1	(3)	0	(0)
1999	11	(35)	11	(35)	6	(20)	3	(10)	0	(0)	0	(0)
2000	5	(15)	18	(55)	7	(21)	3	(9)	0	(0)	0	(0)
2001	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)

TABLE 5 Unit 5 brown bear mortality by type, RY 1998 through 2007

Regulatory Year	DLP	Unknown/ Natural	Vehicle Collision	Illegal kill	Other	Hunter Kill	Total Mortality
1998	0	0	1	0	0	35	36
1999	2	0	1	3	0	31	37
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
Mean 2006–2007	4.5	.5	0	0	0	27.0	32.0
Mean 1998–2005	3.0	0.3	.5	.8	0	30.9	35.4

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006

To: 30 June 2008

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 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.

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 nonglaciated land below 3,000 feet elevation, quantified by harvest areas (major drainages or other gross geographical characteristics), and summed for each unit. Griese (1991) estimated bear density and numbers within harvest areas using den and track surveys and local knowledge. Densities were extrapolated to entire harvest areas. In recent years track and den surveys were conducted on Hinchinbrook and Montague islands only. Surveys were timed with the peak emergence of brown bears from dens, which varied annually with snow conditions. An unknown proportion of bears wander the alpine regions of the islands for several days after emergence from dens, leaving easily observable tracks in the snow. Tracks, dens, and bears above 1,000 feet elevation were tallied and linear density estimated as $[(\text{tracks}/2) + \text{dens} + \text{bears}] / \text{miles searched}$. I also calculated observations per hour as an additional index for comparison.

The annual allowable harvest of bears on Hinchinbrook and Montague islands was estimated as 5.7% of the total population. 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, 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. Montague Island bears were managed 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 and 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 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. No actions were taken during the reporting period.

Hunter Harvest. Reported harvests during 2006–2007 and 2007–2008 for Unit 6 were 60 and 70, respectively (Table 2). In each year, most bears were harvested in units 6A (21 and 34 bears), or 6D (23 and 18 bears). The reported harvests for Montague Island were 3 and 1 during the 2 years of the reporting period. The Unit 6 harvest for 2007–2008 was a record high, driven by unusually high fall harvest in 6A and 6B.

During the reporting period females made up 18% and 49% of the reported kill in each of the years, respectively (Table 2). We exceeded our objective for female harvest rate during 2007–2008 because of the unusually high fall harvest when females were more vulnerable to hunters. Mean skull size among males was 24 and 25 inches, respectively, 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 2006–2007 (56%) and 2007–2008 (78%) (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–October 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 five years (Table 6).

Other Mortality

There were 3 bears killed in defense of life or property during 2006–2007 and 1 during 2007–2008 (Table 2). Estimated illegal kill totaled 10 bears per. This was similar to the last reporting period.

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 the exception of 2007–2008) with an average skull size of at least 23 inches.

Brown bear numbers were stable during the reporting period except for Montague Island, where they were probably increasing. Brown bear den and track surveys should continue on Montague and Hinchinbrook islands. A bag limit of 1 bear per year has been in place for Units 6A-C for more than a decade and showing no indications of overharvest. Therefore, I recommend extending the season by 10 days to provide more hunting opportunity during spring when females are least vulnerable to hunting..

LITERATURE CITED

- GRIESE, H.J. 1991. Unit 6 brown bear survey-inventory performance report. Pages 33–47 in S.M. Abbott, editor. Annual performance report of survey-inventory activities. Part V. Brown Bear. Vol. XXII. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Progress Report Project W-23-4. Study 4.0. Juneau. 271 pp.
- HELLER, E. 1910. Mammals of the 1908 Alexander Alaska expedition, with descriptions of the localities visited and notes on the flora of the Prince William Sound region. University of California. Publication 5(11):321–360.
- MCLELLAN, B.N. AND D.M. SHACKLETON. 1988. Grizzly bears and resource extraction industries: effects of roads on behavior, habitat use and demography. *Journal of Applied Ecology* 25:451–460.
- MILLER, S.D. 1988. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Final Report Project W-22-6, Job 4.21. Juneau. 151 pp.
- . 1990. Population management of bears in North America. *International Conference on Bear Research and Management* 8:357–373.
- . 1993. Brown bears in Alaska: a statewide management overview. *Wildlife Technical Bulletin* 11. Alaska Department of Fish and Game, Juneau. 40 pp.
- MILLS, L.S. AND P E. SMOUSE. 1994. Demographic consequences of inbreeding in remnant populations. *American Naturalist* 144:412–431.

- NOWLIN, R.A. 1998. Unit 6 brown bear management report of survey-inventory activities. Pages 32–54 in M.V. Hicks, editor. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. W-24-3 and W-24-4. Study 4.0. Juneau. 270 pp.
- RANDI, E., L. GENTILE, G. BOSCAGLI, D. HUBER, AND H.U. ROTH. 1994. Mitochondrial DNA sequence divergence among some west European brown bear (*Ursus arctos* L) populations. Lessons for conservation. *Heredity* 73:480–489.
- SCHOEN, J.W. 1990. Bear habitat management: a review and future perspective. *International Conference on Bear Research and Management* 8:143–154.
- . AND L.R. BEIER. 1990. Brown bear habitat preferences and brown bear-logging relationships in southeast Alaska. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Final Report. Project W-22-6, Job 4.17. Juneau. 27 pp.
- , ———, J.W. LENTFER, AND L.J. JOHNSON. 1986. Denning ecology of brown bears on Admiralty and Chichagof Islands. *International Conference on Bear Research and Management* 7:293–304.
- SMITH, R.B. AND L.J. VAN DAELE. 1989. Impacts of hydroelectric development on brown bears, Kodiak Island, Alaska. *International Conference on Bear Research and Management* 8:93–103.

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TABLE 1 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 [(t/2)+d+b]/m	Obs/hr	Estimated population ^a	Harvest quota		Reported harvest	
		tracks	Dens	bears					Total bears	Females age >2	Total bears	Females age >2
Hinchinbrook Island	1990–1991	34	8	0	100	0.25	38.1	116	5	2	5	0
	1993–1994	26	9	0	100	0.22	7.9	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	103	6	3	5	0
	2007–2008	95	16	9	148	0.49	25	100	6	3	5	0
Montague Island	1989–1990	10	4	0	165	0.05	8.8	41	2	1	1	1
	2000–2001	58	3	0	210	0.15	18.2	75	4	2	0	0
	2001–2002	80	3	0	210	0.21	22.5	80	4	2	4	0
	2002–2003	134	1	0	210	0.32	26.6	81	5	2	3	0
	2003–2004	74	7	0	163	0.27	31.4	84	5	2	0	0
	2004–2005	154	2	1	210	0.38	37.5	90	5	2	5	1
	2005–2006	166	2	3	210	0.42	38.3	91	5	2	0	0
	2007–2008	221	7	10	210	0.61	25.6	100	6	2	1	1

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

TABLE 2 Unit 6 brown bear harvest, 2003–2007

Unit	Regulatory year	Reported								Estimated						
		Hunter kill					Nonhunting			illegal kill	Total estimated kill					
		M	F	(%)	Unk	Total	M	F	Unk.		M	(%)	F	(%)	Unk	Total
6A	2003–2004															
	Fall 03	7	11	(61)	0	18	0	0	0	2	7	(39)	11	(61)	2	20
	Spring 04	7	1	(13)	0	8	0	0	0	1	7	(88)	1	(13)	1	9
	Total	14	12	(46)	0	26	0	0	0	3	14	(54)	12	(46)	3	29
	2004–2005															
	Fall 04	7	3	(30)	0	10	0	0	0	2	7	(70)	3	(30)	2	12
	Spring 05	6	2	(25)	0	8	0	0	0	1	6	(75)	2	(25)	1	9
	Total	13	5	(28)	0	18	0	0	0	3	13	(72)	5	(28)	3	21
	2005–2006															
	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
	Total	13	1	(7)	0	14	1	1	0	2	14	(88)	2	(13)	2	18
	2006–2007															
	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
	Total	18	3	(14)	0	21	0	1	0	3	18	(82)	4	(18)	3	25
	2007–2008															
	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
	Total	15	19	(56)	0	34	0	0	0	3	15	(44)	19	(56)	3	37

TABLE 2 Continued

Unit	Regulatory year	Reported					Estimated									
		Hunter kill					Nonhunting			illegal kill	Total estimated kill					
		M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6B	2003–2004															
	Fall 03	3	0	(0)	0	3	0	0	0	2	3	(100)	0	(0)	2	5
	Spring 04	4	0	(0)	0	4	0	0	0	1	4	(100)	0	(0)	1	5
	Total	7	0	(0)	0	7	0	0	0	3	7	(100)	0	(0)	3	10
	2004–2005															
	Fall 04	7	1	(13)	0	8	0	0	1	2	7	(88)	1	(13)	3	11
	Spring 05	3	0	(0)	0	3	0	0	0	1	3	(100)	0	(0)	1	4
	Total	10	1	(9)	0	11	0	0	1	3	10	(91)	1	(9)	4	15
	2005–2006															
	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
	Total	6	2	(25)	0	8	0	0	0	1	6	(75)	2	(25)	1	9
	2006–2007															
	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
	Total	8	2	(20)	0	10	0	0	0	3	8	(80)	2	(20)	3	13
	2007–2008															
	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
	Total	4	7	(64)	0	11	0	0	0	2	4	(36)	7	(64)	2	13

TABLE 2 Continued

Unit	Regulatory year	Reported					Estimated									
		Hunter kill			Unk.	Total	Nonhunting			illegal kill	Total estimated kill					
		M	F	(%)			M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6C	2003–2004															
	Fall 03	2	1	(33)	0	3	0	0	0	1	2	(67)	1	(33)	1	4
	Spring 04	2	1	(33)	0	3	0	0	0	0	2	(67)	1	(33)	0	3
	Total	4	2	(33)	0	6	0	0	0	1	4	(67)	2	(33)	1	7
	2004–2005															
	Fall 04	1	0	(0)	0	1	0	0	0	1	1	(100)	0	(0)	1	2
	Spring 05	2	1	(33)	0	3	0	0	0	0	2	(67)	1	(33)	0	3
	Total	3	1	(25)	0	4	0	0	0	1	3	(75)	1	(25)	1	5
	2005–2006															
	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
	Total	4	2	(33)	0	6	0	0	0	1	4	(67)	2	(33)	1	7
	2006–2007															
	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
	Total	3	3	(50)	0	6	0	0	0	1	3	(50)	3	(50)	1	7
	2007–2008															
	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
	Total	3	4	(57)	0	7	0	0	0	1	3	(43)	4	(57)	1	8

TABLE 2 Continued

Unit	Regulatory year	Reported					Estimated									
		Hunter kill			Unk.	Total	Nonhunting			illegal kill	Total estimated kill					
		M	F	(%)			M	F	Unk.		M	(%)	F	(%)	Unk.	Total
6D	2003–2004															
	Fall 03	4	1	(20)	0	5	0	0	0	2	4	(80)	1	(20)	2	7
	Spring 04	9	3	(25)	0	12	0	0	0	1	9	(75)	3	(25)	1	13
	Total	13	4	(24)	0	17	0	0	0	3	13	(76)	4	(24)	3	20
	2004–2005															
	Fall 04	7	5	(42)	0	12	0	1	0	2	7	(54)	6	(46)	2	15
	Spring 05	21	2	(9)	0	23	0	0	0	1	21	(91)	2	(9)	1	24
	Total	28	7	(20)	0	35	0	1	0	3	28	(78)	8	(22)	3	39
	2005–2006															
	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
	Total	13	6	(32)	0	19	0	1	0	5	13	(65)	7	(35)	5	25
	2006–2007															
	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
	Total	20	3	(13)	0	23	0	2	0	3	20	(80)	5	(20)	3	28
	2007–2008															
	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
	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			Unk. Total		Nonhunting			illegal kill	Total estimated kill						
		M	F	(%)			M	F	Unk.		M	(%)	F	(%)	Unk.	Total	
Unit 6	2003–2004																
Total	Fall 03	16	13	(45)	0	29	0	0	0	7	16	(55)	13	(45)	7	36	
	Spring 04	22	5	(19)	0	27	0	0	0	3	22	(81)	5	(19)	3	30	
	Total	38	18	(32)	0	56	0	0	0	10	38	(68)	18	(32)	10	66	
	2004–2005																
	Fall 04	22	9	(29)	0	31	0	1	1	7	22	(69)	10	(31)	8	40	
	Spring 05	32	5	(14)	0	37	0	0	0	3	32	(86)	5	(14)	3	40	
	Total	54	14	(21)	0	68	0	1	1	10	54	(78)	15	(22)	11	80	
	2005–2006																
	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	
	2006–2007																
	Fall 06	21	7	(25)	0	28	0	3	0	7	21	(68)	10	(32)	7	38	
	Spring 07	28	4	(13)	0	32	0	0	0	3	28	(88)	4	(13)	3	35	
	Total	49	11	(18)	0	60	0	3	0	10	49	(78)	14	(22)	10	73	
	2007–2008																
	Fall 07	20	30	(60)	0	50	0	1	0	8	20	(39)	31	(61)	8	59	
	Spring 08	16	4	(20)	0	20	0	0	0	2	16	(80)	4	(20)	2	22	
	Total	36	34	(49)	0	70	0	1	0	10	36	(51)	35	(49)	10	81	

TABLE 3 Unit 6 brown bear mean skull size and age, 2003–2007

Unit	Year	Males				Females			
		Skull size	<i>n</i>	Age	<i>n</i>	Skull size	<i>n</i>	Age	<i>n</i>
6A	2003–2004	26	13	8	13	21	10	7	10
	2004–2005	25	13	8	12	21	5	3	5
	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	22	18	7	19
6B	2003–2004	24	7	6	7		0		0
	2004–2005	24	10	5	9	20	1	5	1
	2005–2006	23	6	6	6	22	2	6	2
	2006–2007	25	7	7	8	24	2	22	2
	2007–2008	24	4	6	4	20	7	6	7
6C	2003–2004	24	4	6	4	21	2	4	2
	2004–2005	25	3	7	3	21	1	3	1
	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	3	21	4	4	4
6D	2003–2004	24	13	7	13	21	4	3	4
	2004–2005	24	28	8	27	22	8	7	6
	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
Unit 6	2003–2004	25	37	7	37	21	16	6	16
Average	2004–2005	24	54	7	51	21	15	5	13
	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

TABLE 4 Unit 6 brown bear successful hunter residency, 2003–2007

TABLE 7. Unit 6 Growth Year Successful Hunter Residency, 2003–2007										
Unit	Regulatory year	Local ^a resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Residency unknown	(%)	Total Successful hunters
6A	2003–2004	3	(12)	5	(19)	18	(69)	0	(0)	26
	2004–2005	1	(6)	0	(0)	17	(94)	0	(0)	18
	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
6B	2003–2004	2	(29)	2	(29)	3	(43)	0	(0)	7
	2004–2005	1	(9)	3	(27)	7	(64)	0	(0)	11
	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
6C	2003–2004	1	(17)	2	(33)	3	(50)	0	(0)	6
	2004–2005	2	(50)	2	(50)	0	(0)	0	(0)	4
	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
6D	2003–2004	1	(6)	8	(47)	8	(47)	0	(0)	17
	2004–2005	1	(3)	14	(40)	20	(57)	0	(0)	35
	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
Unit 6	2003–2004	7	(13)	17	(30)	32	(57)	0	(0)	56
Total	2004–2005	5	(7)	19	(28)	44	(65)	0	(0)	68
	2005–2006	7	(13)	9	(17)	37	(70)	0	(0)	53
	2006–2007	5	(7)	26	(37)	40	(56)	0	(0)	71
	2007–2008	7	(8)	13	(14)	73	(78)	0	(0)	93

TABLE 5 Unit 6 brown bear harvest chronology by percent, 2003–2007

		Harvest periods										
	Regulatory	September		October		November		April		May		
Unit	year	1–15	16–30	1–15	16–31	1–15	16–30	1–15	16–30	1–15	16–31	<i>n</i>
6A	2003–2004	(35)	(8)	(27)	(0)	(0)	(0)	(0)	(0)	(8)	(23)	26
	2004–2005	(6)	(28)	(11)	(11)	(0)	(0)	(0)	(0)	(22)	(22)	18
	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
6B	2003–2004	(29)	(14)	(0)	(0)	(0)	(0)	(0)	(14)	(14)	(29)	7
	2004–2005	(27)	(9)	(27)	(9)	(0)	(0)	(0)	(9)	(9)	(9)	11
	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
6C	2003–2004	(17)	(33)	(0)	(0)	(0)	(0)	(0)	(0)	(33)	(17)	6
	2004–2005	(0)	(0)	(25)	(0)	(0)	(0)	(0)	(25)	(25)	(25)	4
	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
6D	2003–2004	(0)	(0)	(6)	(24)	(0)	(0)	(0)	(6)	(29)	(35)	17
	2004–2005	(0)	(0)	(6)	(26)	(3)	(0)	(0)	(3)	(20)	(43)	35
	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
Unit 6 Total	2003–2004	(21)	(9)	(14)	(7)	(0)	(0)	(0)	(4)	(18)	(27)	56
	2004–2005	(6)	(9)	(12)	(18)	(1)	(0)	(0)	(4)	(19)	(31)	68
	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

TABLE 6 Unit 6 brown bear harvest percent by transport method, 2003–2007

Unit	Regulatory year	Percent of harvest								<i>n</i>
		Airplane	Boat	Airboat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
6A	2003–2004	73	12	0	8	0	0	4	4	26
	2004–2005	100	0	0	0	0	0	0	0	18
	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
6B	2003–2004	43	14	0	0	0	0	29	14	7
	2004–2005	42	25	0	0	0	0	25	8	11
	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
6C	2003–2004	17	17	0	33	0	0	17	17	6
	2004–2005	25	0	0	25	0	0	25	25	4
	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
6D	2003–2004	35	65	0	0	0	0	0	0	17
	2004–2005	40	60	0	0	0	0	0	0	35
	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
Total	2003–2004	52	29	0	7	0	0	7	5	56
	2004–2005	55	35	0	1	0	0	6	3	68
	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

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 2006

To: 30 June 2008

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 southeastern Alaska. The rest of the state did not have a closed season and there was no bag limit. At the time of statehood, the bag limit was 1 brown bear on the Kenai. The bag limit was further reduced in 1967 from 1 bear per year to 1 every 4 years. 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 Alaska 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 one 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. A drawing hunt provided successful applicants a long season, greatly increased the potential to distribute the harvest to different areas, and allowed hunters to be more selective.

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).

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).

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

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a healthy brown bear population.
- Minimize negative brown bear/human interactions.
- Do not exceed 10 human-caused adult female brown bear mortalities annually (1 January–31 December).

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, he attempted to approximate brown bear density on the Kenai.

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 (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.

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

The only documented estimate for the Kenai brown bears population was generated by Del Frate (1993). The estimate was not based on census data from the Kenai Peninsula, is 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 probably 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 one adult female was captured (she was with a boar at the time in that area during spring 2008; another collared bear was sighted there in October 2008).

MORTALITY

Harvest

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

Board of Game Action and Emergency Orders. The Board of Game changed the registration permit hunt to a resident-only drawing permit hunt during the March 2007 meeting. The season was modified again at the March 2009 meeting when the Board retained the drawing permit system, but changed the dates to 15 September–30 November and 1 April–15 June, and allowed nonresidents (up to 10% of the total permits issued) to apply for Kenai brown bear hunts. The fall portion of the brown bear hunting season has been closed by emergency order since 2005.

Hunter Harvest. The registration permit hunt was replaced by a drawing permit hunt starting July 2007. A total of 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 was increased to 25 for the 2008–2009 season. The fall portion of the season was closed by emergency order and the spring portion of the season was in progress when this report was written.

Transport Methods. The successful hunter during the spring 2008 season used a highway vehicle (Table 4) for transportation.

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 and 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, then threw the collar into the river.

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

CONCLUSIONS AND RECOMMENDATIONS

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

The department continues to provide educational material 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 bringing this concept forward. The WCCP is a community-driven program and requires acceptance by the public and support by local law enforcement officials. This program is now active in the communities of Homer, Seward, Cooper Landing, and Hope, and we have received positive feedback that the city of Soldotna will adopt this program in the near future.

LITERATURE CITED

- ALASKA DEPARTMENT OF FISH AND GAME DIVISION OF WILDLIFE CONSERVATION. 2000. Kenai Peninsula brown bear conservation strategy. Alaska Department of Fish and Game. 84 pp.
- BEVINS, J., C. SCHWARTZ, E. BANGS, AND K. NELSON. 1984. Kenai Peninsula brown bear studies: report of the interagency brown bear study team. 103 pp.
- DEL FRATE, G. G. 1993. Units 7 and 15 Brown Bear. Pages 49–57 in S. Abbott editor. Management Report of Survey-Inventory Activities 1 July 1990–30 June 1992. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Project, W-23-4 and W-23-5. Study 4.0.
- HILDERBRAND, G. V., S. G. JENKINS, C. C. SCHWARTZ, T. A. HANLEY, AND C. T. ROBBINS. 1999a. Effect of seasonal differences in dietary meat intake on changes in body mass and composition in wild and captive brown bears. *Canadian Journal of Zoology* 77:1623–1630.
- HILDERBRAND, G. V., T. A. HANLEY, C. T. ROBBINS, AND C. C. SCHWARTZ. 1999b. Role of brown bears (*Ursus arctos*) in the flow of marine nitrogen into a terrestrial ecosystem. *Oecologia* 121:546–550.
- HILDERBRAND, G. V., C. C. SCHWARTZ, C. T. ROBBINS, AND T. A. HANLEY. 2000. Effect of hibernation and reproductive status on body mass and condition of coastal brown bears. *Journal of Wildlife Management* 64(1):178–183.
- INTERAGENCY BROWN BEAR STUDY TEAM. 2001. A conservation assessment of the Kenai Peninsula brown bear. Alaska Department of Fish and Game, Region 2; U.S. Fish and Wildlife Service, Kenai National Wildlife Refuge; National Park Service, Kenai Fjords National Park; and USDA Forest Service, Kenai National Forest. 48 pp.
- JACOBS, M.J., W.R. STAPLES, N.L. WEILAND, E.E. BANGS, AND C.C. SCHWARTZ. 1988. Kenai Peninsula brown bear studies: report of the Interagency Brown Bear Study Team, 1987. Alaska Department of Fish and Game. 17 pp.
- JACOBY, M. E., G. V. HILDERBRAND, C. SERVHEEN, C. C. SCHWARTZ, S. M. ARTHUR, T. A. HANLEY, C. T. ROBBINS, AND R. MICHNER. 1999. Trophic relations of brown and black bears in several western North American ecosystems. *Journal of Wildlife Management* 63(3):921–929.
- MCLELLAN, B. N. AND D. M. SHACKELTON. 1988. Grizzly bears and resource-extraction industries: effects of roads on behavior, habitat use and demography. *Journal of Applied Ecology* 25:451–460.

- MILLER, S. D., E. F. BECKER, AND W. B. BALLARD. 1987. Black and brown bear density estimates using modified capture recapture techniques in Alaska. *International Conference Bear Research and Management*. 7:23–35.
- . 1990. Population management of bears in North America. *International Conference Bear Research and Management*. 8:357–373.
- RISDAHL, G. L., C. A. SCHLOEDER, E. E. BANGS, AND C. C. SCHWARTZ. 1986. Kenai Peninsula brown bear studies: report of the interagency brown bear study team. 92 pp.
- SCHLOEDER, C. A., M. J. JACOBS, N. L. WEILAND, E. E. BANGS, AND C. C. SCHWARTZ. 1987. Kenai Peninsula brown bear studies: report of the interagency brown bear study team, 1986. 52 pp.
- SCHWARTZ, C. C. AND S. M. ARTHUR. 1996. Cumulative effects model verification, sustained yield estimation, and population viability management of the Kenai Peninsula, Alaska brown bear. Federal Aid in Wildlife Restoration Research Project Progress Report 1 July 1994–30 June 1996. Grant W-24-3, W-24-4 Study 4.27. 9 pp.
- , —, AND G. G. DEL FRATE. 1999. Cumulative effects model verification, sustained yield estimation, and population viability management of the Kenai Peninsula, Alaska brown bear. Federal Aid in Wildlife Restoration Research Project Progress Report. Grant W-24-3, W-24-4 Study 4.27.
- SELINGER, J. 2003. Units 7 and 15 brown bear management report. Pages 62–74 in C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.
- SURING, L. H., K. R. BARBER, C. C. SCHWARTZ, T. N. BAILEY, W. C. SHUSTER, M. D. TETREAU. 1998. Analysis of cumulative effects on brown bears on the Kenai Peninsula, Southcentral Alaska. *International Conference Bear Research and Management*. 10: 107–117.

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TABLE 1 Units 7 and 15 brown bear harvest, 2003–2007

Regulatory year	Hunting				Nonhunting ^a				All human caused mortality			
	Male	Female	Unknown	Total	Male	Female	Unknown	Total	Male	Female	Unknown	Total
2003–04	<i>No hunt</i>			0	5	8	3	16	5	8	3	16
2004–05	3	1	0	4	6	6	1	13	9	7	1	17
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	0	1	16	11	0	27	17	11	0	28

^a Includes defence of life or property, roadkill, illegal, and research related mortalities

TABLE 2 Units 7 and 15 brown bear hunter residency, 2003–2007

Regulatory year	Successful					Unsuccessful				Total hunters
	Local ^a resident	Nonlocal resident	Non- resident	Total	Percent success	Local ^a resident	Nonlocal resident	Non- resident	Total	
2003–04	<i>No hunt</i>									
2004–05	2	2	0	4	3	76	39	0	115	119
2005–06	<i>No hunt</i>									
2006–07	<i>No hunt</i>									
2007–08	0	1	0	1	8	4	7	0	11	12

^a Local = residents of Units 7 or 15.

TABLE 3 Units 7 and 15 brown bear seasonal hunter-harvest chronology, 2003–2007

Regulatory year	Spring	Fall	Total Harvest
2003–04	<i>No hunt</i>		0
2004–05		4	4
2005–06	<i>No hunt</i>		0
2006–07	<i>No hunt</i>		0
2007–08	1		1

TABLE 4 Units 7 and 15 successful brown bear hunter-harvest transportation methods 2003–2007

Regulatory year	Airplane	Horse	Boat	3/4 wheel- ATV-ORV	Highway vehicle	Snow- machine	Other- Unknown	Harvest
2003–04	<i>No hunt</i>							0
2004–05	1		3					4
2005–06	<i>No hunt</i>							0
2006–07	<i>No hunt</i>							0
2007–08					1			1

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006
To: 30 June 2008

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 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 have 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 over-harvesting 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 archipelago. 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 of fish (98%) 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 forgo 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 one bear every four years, and for most of the archipelago the winter hunting season was eliminated.

In 1971 the Alaska Native Claims Settlement Act (ANCSA) resolved many long-standing land issues with aboriginal Alaskans statewide. The impacts were 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, Forest Service) 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 six-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 and funding for bear research, resulting in a surge of baseline and applied bear research on Kodiak through the 1980s and 1990s. Extensive use of radio telemetry on bears revealed denning, feeding, movement, mortality rates, and reproductive history patterns (Barnes 1990; Barnes and Smith 1995; Barnes and Van Daele 2006; Smith and Van Daele 1988, 1990; Van Daele et al. 1990; Van Daele 2007). A density estimation technique developed by Miller et al. (1987) was applied in two 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 citizen 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. Despite 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 nine study areas with the “intensive aerial survey technique” detailed in Barnes and Smith (1997). Data from these surveys were extrapolated to develop a unitwide bear density and population estimate. We cooperate with Kodiak NWR staff to conduct aerial brown bear composition surveys along selected streams of southern Kodiak Island to monitor trends in cub production. We input harvest and population data into a population model to objectively estimate appropriate harvest strategies and guidelines (Van Daele 2007).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Recent estimates of the Unit 8 brown bear population are higher than subjective estimates made in the 1950s. The 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 18 intensive aerial brown bear surveys from 1987 to 2007 (Table 1). These surveys were in nine separate areas on Kodiak Island, and seven 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/1000 km² (0.8 bears/mi²), and for the northern islands it was 189 bears/1000 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 tentative. Extrapolation of intensive aerial survey data from all of the survey units on Kodiak Island, coupled with model predictions, indicated a 16.7% increase in the archipelago-wide bear population from 1995 to 2005 (Van Daele 2007) (Table 2).

We completed an intensive aerial survey of the brown bear populations on the Sturgeon River drainage 19–23 May 2007. Survey data indicate the bear density in that area continued to be stable since the last survey was conducted in 1998. The number of independent bears (not including cubs) in the Sturgeon drainage was estimated at 61.0 in 2007 (SE = 6.5). This estimate is not significantly different ($P > 0.15$) from the surveys in 1998 ($\bar{x} = 60.4$; SE = 1.1), 1992/93 ($\bar{x} = 49.3$; SE = 4.8) or 1987 ($\bar{x} = 75.6$; SE = 5.9), but it suggests a continuation of a stable to increasing trend in the area since the decline noted in the early 1990s. No intensive aerial surveys were conducted in 2008.

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 3). Analysis of these data by 5-year periods helps dampen some of the variation and indicates that maternal females composed 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.

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 four 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, which 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).

MORTALITY

Harvest

Since statehood, the reported sport harvests of bears in Unit 8 have ranged from 77 (1968–69) to 208 (2005–06) per regulatory year (Table 4). 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), and from 1990–91 to 1999–2000 the average was 160.0 bears (range = 149–177). If, based on survey data (Table 3) we assume the bear population in the 1980s and 1990s was 2,980 bears (2,085 independent bears), 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; Table 3), then the estimated annual sport harvest during that period was 5.1% of the total bear population (7.5% of the independent bears).

Season and Bag Limit. The season for resident and nonresident hunters on northeast Kodiak, including all drainages into Chiniak, Antone Larsen, and northeast Ugak (east of the Saltery drainage) bays, and including Spruce, Near, Woody, Long, Ugak and adjacent islands, was 15 October–30 November and 1 April–15 May. The bag limit was one bear every four 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 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 three 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 Saltery 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 did not 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 2008 Board of Game meetings and no emergency orders were issued during this reporting period.

Hunter Harvest. Hunters harvested 202 bears in regulatory year 2006–07 and 184 bears in 2007–08, a rate higher than the previous 5-year mean of 173.6 bears (Table 4). There were 72 bears killed in fall 2006 and 76 killed in fall 2007. The mean annual fall harvest for the previous 5 years was 56.4 bears. During the spring of 2007, 130 bears were killed, and in the spring of 2008, 108 bears were killed. The mean annual spring harvest for the previous 5-year period was 117.2 bears. These totals do not include bears killed under federal subsistence regulations: 2 bears (1 male, 1 female) in 2006–07 and 1 bear (male) in 2007–08.

Males predominated in the harvest, composing 76% of the sport harvest in 2006–07 and 71% in 2007–08, a rate below the previous 5-year average of 77.0%. 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 50 females in 2006–07 and 50 females in 2007–08, higher than the annual mean of 39.8 females harvested during the preceding five years. Including all known deaths of females, 64 females were killed in 2006–07 and 57 females were killed in 2007–08, higher than the previous 5-year mean of 45.6 females.

Mean total skull sizes of male bears harvested was 25.0 inches (63.5 cm) in 2006–07, and 25.6 (65.0 cm) in 2007–08, comparable to the mean skull size of 25.1 (63.8 cm) for the previous five years. Skull measurements from harvested females averaged 22.2 inches (56.4 cm) in 2006–07 and 21.8 (55.4 cm) in 2007–08. The average female skull size during the previous five years was 21.9 (55.6 cm; Table 5).

The mean age of males harvested in 2006–07 was 7.4 years; and the mean age in 2007–08 was 7.8 years. The average age of male bears harvested during the previous 5 years was 7.7 years. Female ages averaged 7.1 years in 2006–07 and 7.2 years in 2007–08. The average age of female bears harvested during the previous five years was 7.1 years.

From 1981–82 to 2007–08 there was a noticeable increase in the mean skull sizes for males ($p=0.06$; $r^2=0.14$), but no significant change in the mean ages ($p=0.80$; $r^2=0.003$). There were no significant trends in mean female skull sizes during the same period ($p=0.56$; $r^2=0.01$), but there was a decrease in the mean ages ($p=0.03$; $r^2=0.19$) of females harvested. From 1976 to 2005 we also saw an increase in the number and percentage of the harvest that consisted of trophy-sized males (total skull size ≥ 28.0 inches or 71.1 cm; Van Daele 2007).

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 2006–07, 307 (65.0%) successful applicants claimed their permits; in 2007–08, 349 (70.4%) permits were claimed

(Table 6). Annual harvest in the drawing permit areas was 182 in 2006–07 and 165 in 2007–08. The average annual harvest during the previous five years was 161.2.

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 2006–07 we issued 253 registration permits, and in 2007–08 we issued 232 (Table 7). This was an increase over the mean number of registration permits issued in the previous five years (227.2). The number of hunters afield in the registration hunt was 168 in 2006–07 and 161 in 2007–08, also higher than the mean of the previous five years (152.8). Annual harvest in the registration permit area was 20 in 2006–07 and 19 in 2007–08. The average annual registration hunt harvest during the previous five years was 12.4.

Hunter Residency and Success. Hunter success in the drawing permit hunts was 59% in 2006–07 and 48% in 2007–08 (Table 6). The mean for the previous five years was 51.0. In the registration hunts, hunter success was 12% in both 2006–07 and 2007–08, higher than the mean for the previous five years (7.8%; Table 7).

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 2006–07, residents harvested 97 bears and nonresidents took 105 (Table 8). In 2007–08, residents harvested 75 bears and nonresidents took 109 bears. The mean harvest for the previous five years was 79.0 for residents and 94.6 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 9). In 2006–07, 74% of the harvest occurred during the first third of the fall season, and in 2007–08, 67% of the harvest occurred in the first third. During the previous five years, the mean annual percentage of the harvest in the first third of the fall season was 78.4%. In 2006–07, 63% of the harvest occurred during the last third of the spring season, and in 2007–08, 43% 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 five years was 53.8%.

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 10). 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 38 bears in 2006–07 and 25 in 2007–08 (Table 4) that were recovered and sealed. This was higher than the mean annual nonsport mortality of 23.6 bears/year during the previous five 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 11). 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 30 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 three million acres of brown bear habitat on Kodiak, Afognak, and adjacent islands in Unit 8. Nearly half that acreage is contained within the Kodiak NWR. More than 300,000 acres of the original 1.9 million acres of refuge land, mostly prime coastal and riparian brown bear habitat, was transferred to Native corporations through ANCSA. By 2000, 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 increasing 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 citizens 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 incorporating as many of these as possible into our management program.

Public education projects associated with the bear plan continued during this reporting period with a bear safety DVD ("A guide to brown bear country"), featuring information developed by KUBS and ADF&G that was produced and distributed by a private company (Camera Q) in 2006. The Kodiak NWR has also addressed many bear-related issues in its recently completed Comprehensive Conservation Plan (FWS 2006). In 2007 and 2008, 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 significantly reduce adverse bear-human encounters in the future. The group also successfully planned and conducted a three-day

seminar (1 credit) on responsible bear viewing at Kodiak College in March 2008. The course was 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-foot chain-link fence. Port Lions also installed bear resistant dumpsters outside of the fence and lighted the area. The village of Old Harbor had a plethora of bear problems in 2008, including six bears killed in DLP and up to 19 bears observed near the village. The village has submitted a request for a federal grant for landfill improvements similar to those completed in Larsen Bay and Port Lions.

Our program to reduce adverse bear-human interactions in Kodiak city was tested in 2008 as an unprecedented number of bears remained in and near residential areas. We estimated at least 20 individual bears were in the area from May through October. Bears were readily visible every day along the Buskin River and on the tidal flats in front of Bells Flats, and at least three bears remained within Fort Abercrombie State Park for a six-week period after a humpback whale washed ashore in the park. Numerous bears frequented suburban areas near Monashka Bay and urban areas between Selief Lane and Spruce Cape. We consolidated dumpsters into open areas away from residences and actively hazed bears that persisted in trying to obtain food from them. 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 Kodiak Sanitation to assure effective and consistent responses to bears sighted near the city, and we issued regular media reports. There were several reports of property damage (mostly sheds and cars broken into by bears trying to get food), but there were no human injuries and only three bears had to be killed (one by enforcement agency staff and two DLPs by local residents). The incidence 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 10 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.

One of our primary research projects during this reporting period was a joint effort by ADF&G, Kodiak NWR, Washington State University, and the Kodiak Brown Bear Research and Habitat Maintenance Trust to initiate an investigation of bear movements and habitat use near the village of Old Harbor and near a proposed bear viewing area within the O'Malley River drainage. In May 2008, we used a Hughes 500D helicopter and rifle-fired darts to capture 14 brown bears (11 females and three males) near Old Harbor on Kodiak and Sitkalidak Islands, and three bears (females) in the upper Karluk Lake area. We deployed GPS/VHF transmitters on 13 of the adult female bears. All of the bears recovered from capture, and subsequent flights revealed that all were still alive at the end of this reporting period.

Our other important research project was a cooperative project with Washington State University (WSU) 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 WSU researchers 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 have been 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 2007–08, the percent males in the harvest exceeded 70%. The management objective of males composing at least 60% of the harvest has been achieved for the past 21 consecutive years and in 40 of 46 years since statehood.

Miller (1990b) suggested 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, during this reporting period there was an increasing population 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 then current (2001) estimated bear population level. 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).

The increasing number and percentage of trophy males in the harvest during the past 30 years was encouraging, 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 indicated bear populations on Kodiak Island have remained stable to increasing in most areas during the past 20 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, increasing, bear population in Unit 8 that can support increased 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 Kodiak Archipelago Bear Conservation and Management Plan's recommendations of maintaining a stable bear population across the archipelago without jeopardizing hunting quality.

Development of the plan was a successful endeavor that reiterated the importance of this bear population to a wide variety of people. The group took the best available biological information, along with extensive public testimony, and deliberated to develop mutually acceptable recommendations. The common ground that unified these diverse members of the citizen's advisory committee was their desire to maintain a healthy population of bears on the archipelago, even if it meant alteration of some human behaviors. The group also recognized the importance of tracking and assisting with implementation of the recommendations.

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, and there have been substantial reductions in the number of problems and injuries bears have caused. In August 2002, a delegation of Russian bear biologists spent a week in Southcentral Alaska, including Kodiak, gathering information they could use to improve their bear management and public education programs. In March 2004, Russian and Japanese government representatives invited the Kodiak area wildlife biologist to give the keynote address to a conference in Yakutsk, Russia. In 2005 a similar address was given in Mori, Japan. In 2006, the area biologist was invited to Orsa, Sweden and Sapporo, Japan to work with local representatives on brown bear management issues, and in 2008 he was again invited to Sweden to work with wildlife managers and researchers. 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 the best example of a place where bears and people have learned to coexist and where bear hunting is sustainable.

LITERATURE CITED

- ALASKA DEPARTMENT OF FISH AND GAME. 2002. Kodiak Archipelago Bear Conservation and Management Plan. Alaska Department of Fish and Game, Anchorage, Alaska, USA.
- BARNES, V. G. JR. 1990. The influence of salmon availability on movements and range of brown bears on southwest Kodiak Island. *International Conference on Bear Research and Management* 8:305–313.
- _____. 1993. Brown bear-human interactions associated with deer hunting on Kodiak Island. *International Conference on Bear Research and Management* 9(1):63–73.
- _____. 1994. Brown bear-human interactions associated with deer hunting on Kodiak Island. *International Conference on Bear Research and Management*. 9(1):63–73.

- _____, AND R. B. SMITH. 1995. Brown bear density estimation and population monitoring on southwest Kodiak Island, Alaska. Final report. U.S. National Biological Service and Alaska Department of Fish and Game, Kodiak, Alaska, USA.
- _____ AND _____. 1997. Population ecology of brown bears on Aliulik Peninsula, Kodiak Island, Alaska. Final Report National Fish and Wildlife Foundation, Project 94-237. U.S. National Biological Service and Alaska Department of Fish and Game, Kodiak, Alaska, USA.
- _____, AND _____ 1998. Estimates of brown bear abundance on Kodiak Island, Alaska. *Ursus* 10:1-9.
- _____, _____, AND L. J. VAN DAELE. 1988. Density estimates and estimated population of brown bears on Kodiak and adjacent islands, 1987. U.S. Department of Interior Fish and Wildlife Service and Alaska Department of Fish and Game, Report to Kodiak Brown Bear Research and Habitat Maintenance Trust. Kodiak, Alaska, USA.
- _____, AND L. J. VAN DAELE. 2006. Productivity of female brown bears on Kodiak Island, Alaska. Job completion report for Challenge Cost Share Project. Kodiak National Wildlife Refuge, Kodiak, Alaska, USA.
- EIDE, S. E. 1964. Kodiak bear-cattle relationships. Alaska Department of Fish and Game. Juneau, Alaska, USA.
- MILLER, S. D., E. F. BECKER, AND W. B. BALLARD. 1987. Density estimates using modified capture-recapture techniques for black and brown bear populations in Alaska. *International Conference on Bear Research and Management* 7:23-35.
- MILLER, S. D. 1990a. Population management of bears in North America. *International Conference on Bear Research and Management* 8:357-373.
- _____. 1990b. Impacts of increased hunting pressure on the density, structure and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Project. Report Project W-23-2. Studies 4.18 and 4.21. Juneau, Alaska, USA.
- SARBER, H. R. 1939. Report on the Kodiak bear control projects. Unpublished report. Alaska Game Commission. Juneau, Alaska, USA.
- SMITH, R. B., AND L. J. VAN DAELE. 1988. Terror Lake Hydroelectric Project. Final report on brown bear studies 1982-86. Alaska Department of Fish and Game. Kodiak, Alaska, USA.
- _____, AND _____. 1990. Impacts of hydroelectric development on brown bears, Kodiak Island, Alaska. *International Conference on Bear Research and Management* 8:93-103.

- TALBOT, S. L. J. R. GUST, G. K. SAGE, A. FISCHBACH, K. AMSTRUP, W. LEACOCK, AND L. VAN DAELE. 2006. Genetic characterization of brown bears of the Kodiak Archipelago. Final report to the Kodiak National Wildlife Refuge, Kodiak Alaska, USA.
- TROYER, W. A. AND R. J. HENSEL. 1969. The brown bear of Kodiak Island. U.S. Bureau of Sport Fisheries and Wildlife. Kodiak National Wildlife Refuge, Kodiak, Alaska, USA.
- U.S. FISH AND WILDLIFE SERVICE. 2006., Revised comprehensive conservation plan and environmental impact statement Kodiak National Wildlife Refuge. U.S. Fish and Wildlife Service, Region 7, Anchorage, Alaska, USA.
- VAN DAELE, L. J. 2003. The History of Bears on the Kodiak Archipelago. Alaska Natural History Association. Anchorage, USA.
- _____. 2007. Population dynamics and management of brown bears on Kodiak Island, Alaska. Doctoral dissertation. University of Idaho, Moscow, USA.
- _____, V. G. BARNES JR., AND R. B. SMITH. 1990. Denning characteristics of brown bears on Kodiak Island, Alaska. International Conference on Bear Research and Management 8:257–267.

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TABLE 1 Estimated density and observation rates of independent bears^a in intensive aerial survey areas, Unit 8, 1987–2007

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)	Size of survey area (mi ²)
Terror Lake	1987	3	1.5	3.1	75	0.33	234	29.75	355	137
Terror Lake	1997	4	1.7	3.4	92	0.33	276	31.70	355	137
Southwest Kodiak	1987	4	1.5	3.5	88	0.41	218	-----	632	244
Sturgeon River	1987	4	1.6	4.3	120	0.41	293	22.32	264	102
Sturgeon River	1992–93	4	1.8	2.6	77	0.41	190	18.20	264	102
Sturgeon River	1998	4	1.9	3.0	94	0.41	227	4.43	264	102
Sturgeon River	2007	4	1.5	3.9	95	0.41	231	24.72	264	102
Aliulik Peninsula	1992–93	8	1.6	4.0	108	0.53	216	16.95	350	135
Aliulik Peninsula	2002	5	1.4	4.1	92	0.53	173	18.32	350	135
Olga Lakes	1992–93	5	1.2	1.8	33	0.41	80	-----	262	101
Karluk Lake	1994	4	2.1	5.4	180	0.45	400	25.76	267	103
Karluk Lake	2003	4	2.3	5.8	223	0.45	496	30.53	267	103
Spiridon Lake	1995	4	1.9	1.2	38	0.33	118	24.26	287	111
Spiridon Lake	2000	4	1.8	1.5	44	0.33	134	23.28	287	111
Shearwater Peninsula	1996	3	2.2	2.6	92	0.37	252	28.87	269	104
Shearwater Peninsula	2005	4	1.8	4.8	147	0.37	398	17.41	269	104
Kiliuda Bay	1996	4	2.5	2.4	101	0.37	270	24.52	159	61
Kiliuda Bay	2005	4	2.2	3.6	134	0.37	363	23.51	159	61

^a Does not include cubs still with mother

TABLE 2 Estimates of brown bear numbers and density in each harvest subunit on the Kodiak Archipelago, Alaska, 1995 and 2005

Bear harvest subunit	Area (km ²)	1995 ^a			2005 ^b			Difference	
		Density ^c	Independent bears ^d	Total bears ^e	Density ^c	Independent bears ^d	Total bears ^e	Independent bears ^d	Total bears ^e
Northern Islands	2,281	101	231	330	132	300	430	+69	+100
Northwest Kodiak	2,983	200	596	808	224	668	908	+72	+100
Northeast Kodiak	1,005	63	63	90	70	71	101	+8	+11
East Kodiak	1,738	146	253	471	230	400	744	+147	+273
Southwest Kodiak	3,498	204	712	1,019	219	765	1,094	+53	+75
<u>Aliulik Peninsula</u>	<u>837</u>	<u>219</u>	<u>183</u>	<u>262</u>	<u>208</u>	<u>174</u>	<u>249</u>	<u>-9</u>	<u>-13</u>
TOTAL	12,342	165	2,038	2,980	193	2,378	3,526	+340	+546

^a Estimated bear density in 1995 (based on aerial surveys and extrapolation from 1987 – 1994) (Barnes et al. 1988, Barnes and Smith 1998)

^b Estimated bear density in 2005 (based on aerial surveys and extrapolation from 1987 – 2005)

^c Estimated density of independent bears per 1,000 km²

^d Estimated number of independent bears (excludes dependent cubs)

^e Estimated number of bears in the harvest subunit (includes dependent cubs and independent bears)

TABLE 3 Unit 8 aerial stream counts of brown bears^a, 1985–2005

Regulatory year	Complete surveys	<u>Single bears</u>		<u>Maternal bears</u>		<u>Yearlings & cubs</u>		<u>Cubs of the year</u>		Bears per survey	Total
		Number	%	Number	%	Number	%	Number	%		
1985	10	434	54	110	14	189	24	67	8	80.0	800
1986	10	445	55	115	14	191	24	54	7	80.5	805
1987	8	205	53	58	15	92	24	31	8	48.3	386
1988	4	117	51	39	17	50	22	23	10	57.3	229
1989	9	406	46	148	17	284	32	54	6	99.1	892
1990	8	460	44	177	17	273	26	126	12	129.5	1036
1991	9	529	52	156	15	210	21	129	13	113.8	1024
1992	5	226	44	92	18	103	20	92	18	102.6	513
1993	6	244	47	88	17	119	23	67	13	86.5	518
1994	5	238	47	85	17	110	22	65	13	100.4	498
1995	4	230	46	86	17	136	27	49	10	125.3	501
1996	3	122	39	62	20	86	27	45	14	105	315
1997	7	195	37	112	21	128	24	92	17	75.3	527
1998	19	818	46	317	18	364	21	273	15	93.3	1772
1999	14	477	35	300	22	372	27	214	16	97.4	1363
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

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

TABLE 4 Reported brown bear kill data for the Kodiak archipelago by regulatory year and season, 1960–61 through 2007–08

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 4 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
<i>10-year mean</i>	<i>30.3</i>	<i>24.2</i>	<i>0.5</i>	<i>55.0</i>	<i>76.9</i>	<i>33.6</i>	<i>0.1</i>	<i>110.6</i>	<i>107.0</i>	<i>65%</i>	<i>57.8</i>	<i>0.6</i>	<i>165.4</i>	<i>5.1</i>	<i>8.9</i>	<i>2.5</i>	<i>16.5</i>	<i>112.1</i>	<i>66.7</i>	<i>3.1</i>	<i>181.9</i>
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
<i>10-year mean</i>	<i>35.2</i>	<i>17.7</i>	<i>0.2</i>	<i>53.1</i>	<i>75.9</i>	<i>30.5</i>	<i>0.5</i>	<i>106.9</i>	<i>111.1</i>	<i>69%</i>	<i>48.2</i>	<i>0.7</i>	<i>160.0</i>	<i>6.2</i>	<i>7.2</i>	<i>4.8</i>	<i>18.2</i>	<i>117.3</i>	<i>55.4</i>	<i>5.5</i>	<i>178.2</i>

TABLE 4 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
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
8-year mean	42.4	17.5	0.0	59.9	91.9	26.3	0.0	118.1	134.3	75.4%	43.5	0.0	178.0	7.4	6.5	10.3	24.1	140.9	50.0	10.3	201.1

^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 5 Total skull size, age, and gender of brown bears killed by sport hunters in Unit 8, 1982–83 through 2007–08

Regulatory Year	Mean skull size	Males			Mean skull size	Females		
		<i>n</i>	Mean age	<i>N</i>		<i>n</i>	Mean age	<i>N</i>
1982–83	24.4	89	7.2	98	22.1	55	8.6	59
1983–84	24.6	128	7.4	130	21.6	60	7.9	62
1984–85	24.7	99	7.3	102	22.0	45	7.8	51
1985–86	24.5	116	7.4	120	21.9	57	7.2	64
1986–87	24.8	93	7.6	96	21.9	60	8.5	64
1987–88	24.6	100	6.7	104	21.8	63	6.6	65
1988–89	25.5	98	9.1	103	21.6	53	7.4	61
1989–90	25.4	96	9.0	97	21.6	48	8.7	52
1990–91	25.3	97	8.6	95	21.7	43	8.0	50
1991–92	25.0	91	8.4	96	21.7	52	8.0	56
1992–93	25.1	106	8.2	112	21.9	56	7.8	61
1993–94	24.4	109	6.8	113	21.8	45	7.2	48
1994–95	25.0	103	7.8	107	21.8	46	6.8	48
1995–96	25.2	94	7.5	95	21.8	50	7.4	55
1996–97	24.7	120	7.5	125	21.7	34	7.9	37
1997–98	24.7	117	6.8	120	21.9	44	6.5	44
1998–99	24.9	112	6.9	113	21.8	36	5.6	35
1999–2000	24.7	122	7.7	125	22.4	40	8.8	41
2000–01	25.2	117	8.1	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

TABLE 6 Unit 8 brown bear harvest data for drawing permit hunts DB 101–163 and 201–293, 1998-99 through 2007-08

	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total ^a harvest
Fall	1998–99	128	126	2	39	32	68	15	32	0	47
Drawing	1999–2000	126	126	6	44	37	71	15	29	0	52
Hunts	2000–01	114	113	1	41	32	70	14	30	0	46
(DB101-163)	2001–02	113	113	0	46	39	76	12	24	0	51
(DB201-293)	2002–03	113	112	4	44	32	68	15	32	0	47
	2003–04	121	120	6	41	33	72	13	28	0	46
	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
Spring	1998–99	214	211	3	44	70	77	21	23	0	91
Drawing	1999–2000	216	214	0	48	77	76	24	24	0	101
Hunts	2000–01	225	218	2	54	87	75	29	25	0	116
(DB131-193)	2001–02	221	220	1	54	94	80	23	20	0	117
(DB231-293)	2002–03	213	210	3	44	68	76	22	24	0	90
	2003–04	194	194	2	54	80	78	23	22	0	103
	2004–05	205	201	0	52	88	83	18	17	0	106
	2005–06	214	214	1	66	113	81	26	19	0	139
	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

TABLE 6 continued.

	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total ^a harvest
Combined	1998–99	342	337	5	42	102	74	36	26	0	138
Fall & Spring	1999–2000	342	340	3	46	114	75	39	25	0	153
Drawing	2000–01	339	331	3	50	119	73	43	27	0	162
Hunts	2001–02	334	333	1	51	133	79	35	21	0	168
(DB101-193)	2002–03	326	322	3	43	100	73	37	27	0	137
(DB201-293)	2003–04	315	314	4	49	113	76	36	24	0	149
	2004–05	318	313	3	51	127	81	30	19	0	157
	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

^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 7 Unit 8 brown bear harvest data for registration permit^a hunt numbers RB 230 and RB 260, 1998–99 through 2007–08

	Regulatory year	Permits issued ^a	Permits returned	Hunters afield	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total harvest
Fall	1998–99	157	145	99	32	7	7	100	--	--	0	7
Registration	1999–2000	176	175	110	33	7	7	88	1	12	0	8
Hunt	2000–01	162	146	99	32	3	2	67	1	33	0	3
(RB230)	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
Spring	1998–99	107	92	72	22	6	4	100	0	--	0	4
Registration	1999–2000 ^b	103	96	79	18	11	7	78	2	22	0	9
Hunt	2000–01	104	92	70	24	7	0	---	5	100	0	5
(RB260)	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

TABLE 7 continued

	Regulatory year	Permits issued ^a	Permits returned	Hunters afield	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total harvest
Combined	1998–99	264	237	171	28	6	11	100	0	--	0	11
Fall & Spring	1999–2000 ^b	279	271	189	27	9	14	82	3	18	0	17
Registration	2000–01	226	238	169	29	5	2	25	6	75	0	8
Hunts	2001–02	232	218	162	26	10	13	81	3	19	0	16
(RB230	2002–03	160	144	100	31	5	3	60	2	40	0	5
& RB260)	2003–04	235	226	157	31	10	10	63	6	37	0	16
	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

^a No limit on the number of permits issued

^b Includes 1 female bear illegally killed by a sport hunter

TABLE 8 Residency of successful brown bear hunters^a in Unit 8, 1998–99 through 2007–08

Regulatory year	Local residents ^b	(%)	Nonlocal residents	(%)	Nonresidents ^c	(%)	Total successful hunters
1998–99	11	7	57	38	81	54	149
1999–2000	16	9	62	37	91	54	169
2000–01	15	9	65	38	90	53	170
2001–02	21	11	66	36	97	53	184
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

^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: 1996–97, 1; 1997–98, 3; 1998–99, 1; 1999–2000, 2; 2000–01, 2; 2001–02, 6; 2002–03, 4; 2003–04, 1; 2004–05, 2; 2005–06, 3; 2006–07, 3; 2007–08, 3.

TABLE 9 Chronology of the brown bear harvest by season and period in Unit 8, 1998–99 through 2007–08

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>	%	<i>n</i>	%	<i>n</i>	
1998–99	43	80	9	17	2	3	54	4	4	34	36	57	60	95	149
1999–2000	43	73	10	17	6	10	59	6	5	41	37	63	57	110	169
2000–01	35	71	12	24	2	4	49	4	3	55	45	62	51	121	170
2001–02	47	78	10	17	3	5	60	4	3	44	35	76	61	124	184
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

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

TABLE 10 Unit 8 brown bear harvest percent by transport method, 1998–99 through 2007–08

Regulatory Year	Percent of Harvest								<i>n</i>
	Airplane	Horse	Boat	3- or 4-wheeler	Snow machine	ORV	Highway vehicle	Unknown	
1998–99	73	0	20	3	0	<1	3	0	149
1999–2000	69	0	22	2	0	0	5	2	170
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

TABLE 11 Unit 8 brown bears reported killed in defense of life or property (DLP), 1998–2007

Calendar year	Gender of bear				Location		Cause ^a	
	Males	Females	Unknown	Total	Kodiak road system	Remote	Hunting Related	Other
1998	6	7	0	13	0	13	5	8
1999	10	7	2	19	8	11	3	16
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

^a Data included in previous columns

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006
To: 30 June 2008

LOCATION

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. As hunting pressure increased, several studies on brown bear ecology were initiated. During the late 1960s and early 1970s, Alaska Department of Fish and Game (ADF&G) engaged in research at McNeil River State Game Sanctuary to investigate reproductive biology and survival rates of brown bears (Glenn et al. 1976). A succession of graduate students from Utah State University studied bear behavior at McNeil River during the early 1970s. Sellers and Aumiller (1994) analyzed population data collected at McNeil River.

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

A high harvest rate coincided with poor salmon escapements in most drainages in 1972 and 1973. Harvest statistics and the high percentage of marked bears killed in the Black Lake area also 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. 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 1976 to 1981 and allowed the bear population to recover.

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

In the fall of 1988, the Alaska Supreme Court ruled the existing exclusive guide area system unconstitutional. This allowed the number of registered guides operating in Unit 9 to increase; however, federal land management agencies limited the number of commercial-use licenses available to new guides on federal lands. Therefore, most new guide operations used either state or private lands. With approximately 75% of the Unit 9 harvest coming from guided hunts, stability in the guide industry, with guide and client numbers remaining relatively constant over time, is a key part of the management program.

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 season.

METHODS

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

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

In May 1999 and 2000, an experimental line-transect/double count technique, first tried on Kodiak Island (Quang and Becker, 1997) was used to estimate brown and black bear densities in the northern portion of Unit 9B during a cooperative project with Lake Clark National Park. The project also provided limited information on population composition. This technique was used to estimate brown bear densities for all of Unit 9A, Unit 9C, Unit 9D, and Unimak Island.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

The brown bear population in Unit 9 was depressed during the mid 1970s because of high harvests and low salmon escapements. With reduced harvests during the late 1970s, bear densities increased. From 1985 to 1990, the average number of independent bears observed during surveys at Black Lake was 102 (range = 86–109); from 1991 to 1996 the average number observed was 121 (range = 101–144) (Sellers 1994). Poor weather in 1997 and 1998 hampered completion of adequate repetitions of these surveys, but one completed survey in 1998 included 158 independent bears. Surveys during 1999–2002 averaged 145 independent bears. These data indicate a reasonably stable population during the last 5 years in which surveys were conducted. Table 1 summarizes the composition of bears observed annually during surveys.

Population Size

Brown bear densities vary within Unit 9; densities are lower in western Unit 9B and the Bristol Bay coastal plain. Results from the 1989 CMR (Capture/Mark/Resight) population estimate at Black Lake showed a density of 1 bear/2.08 mi² in a 469 mi² study area. Results were extrapolated by UCUs (uniform coding units) to arrive at estimates of 296; 879; 429; 3,176; and 900 bears for 9A, 9B, 9C, 9E, and 9D, respectively (Sellers and Miller 1991). These estimates do not include national park lands or McNeil River State Game Sanctuary. Thus, in the portion of Unit 9 open to brown bear hunting, the total population was estimated at 5,679 bears in 1991, with an overall density of 1 bear/4.13 mi² (93 bears/1000 km²) (Sellers and Miller 1991). Although these were subjective extrapolations, surveys flown in 1993 within Katmai National Preserve at the same intensity as the CMR flights produced estimated densities similar to the one made for this area in 1991 (Sellers et al. 1999).

More recent density estimates are available from line transect surveys flown between 1999 and 2005 in Units 9A, northern 9B, 9C, and 9D. These surveys suggest that the overall bear density in Unit 9 is now closer to 1 bear/3.5 mi² (110 bears/1000 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

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

Classification of bears during replicate stream surveys at Black Lake also showed changes in population composition believed to reflect significant changes in harvest rates beginning in the mid 1960s. This analysis was based on the percentage of “single” bears (i.e., not in family groups) in the population. Hunting regulations protected family groups of cubs and yearlings, so hunting tended to reduce the proportion of single bears in the population (Sellers and McNay 1984). During 1958–61, when harvests were extremely low, a mean of 46% (range = 37–55%) of 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 ($P = < 0.001$).

The circumstances of excessive harvests in the early 1970s and subsequent population recovery at Black Lake are thought to apply to Unit 9 in general.

Replicate stream surveys were also conducted in Katmai National Preserve in 2006 and 2007 in response to public concern that bear numbers had been reduced in the area by hunting pressure (Table 2). Single bears accounted for an average of 40% of the bears observed, which reflects a low to moderate harvest rate of bears using the area when compared to the studies conducted in Black Lake. Females with offspring accounted for 20% of the bears observed. Average litter size was 2.3 for family groups with cubs, 2.0 for family groups with yearlings, and 1.8 for family groups with cubs 2 years of age or older.

During 1999 and 2000, 272 brown bears in 167 different groups were classified on the line transects in northern 9B. Sixty (22%) were classified as adult males by virtue of their obvious large size. Of all bears seen, 57% were in family groups and 43% were independent bears. Families with cubs made up 10% of all bears seen, and the average litter size was 1.7. Families with yearlings made up 22.4%, and the average litter size was 1.65. Families with young ≥ 2 years old made up 24%, and the average litter size was 2. Litter sizes of both cubs and yearlings were smaller in 1999 (1.5 and 1.4, respectively) than in 2000 (2 and 1.7, respectively). The high percentage of single bears probably reflects both low harvest pressure and the effect of 2 consecutive poor salmon runs in 1997 and 1998 that may have reduced productivity. The cohorts most likely affected by the scarcity of salmon were cubs and yearlings in 1999. The average litter size for cub and yearlings was 1.5 ($n = 10$) and 1.4 ($n = 12$). In contrast, the average litter size of offspring judged to be older than yearlings was 2.56 ($n = 9$).

While conducting line-transect surveys of Unit 9D in 2002, 633 bears were observed, of which, 48% were in family groups and 52% were single bears. Families with cubs made up 10% of all bears seen, and the average litter size was 1.87. Families with yearlings made up 20.2%, and the average litter size was 1.91. Families with young ≥ 2 years old made up 18%, and the average litter size was 1.92.

Similar surveys were conducted in Unit 9C during 2004 and 2005. The composition of 674 bears was recorded (47% family groups and 53% single bears). Of all the bears observed, 8% of the

bears were in family groups with cubs, 21% with yearlings, and 17% with young ≥ 2 years of age. Average litter size was 1.80, 1.82, and 1.85 for each group, respectively.

Taken as a whole, the composition of bears observed during surveys conducted between 1999 and 2007 suggest a productive population exposed to moderate harvest rates.

MORTALITY

Harvest

Season and Bag Limit. The hunting season in Unit 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 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 the 2006 regulatory year (RY; a regulatory year runs from 1 July through 30 June; e.g., RY 2006 = 1 July 2006–30 June 2007), only the Naknek registration hunt was open; hunters took 8 bears in the fall and 6 in the spring. During RY 2007 the reported harvest was 621 bears (72% male and 28% female, Table 3). During RY 2006 and RY 2007, 17 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, I estimate the nonhunting mortality at more than 50 bears.

The mean annual harvest of trophy-sized males, ≥ 8 years old, was 51 (range = 41–58) during the 1975–82 period of population recovery. The mean increased to 73 (range = 61–80) during 1983–88 and jumped to 123 during 1989–98. Since 2001, a mean of 158 males ≥ 8 years old have been taken during regulatory years that are open to 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 1975–82; 16.9% during 1983–88; and 23.1% during 1989–98. Since 1999, 37% of the total harvest has been males ≥ 8 years old.

Permit Hunts. The registration permit hunt in the Naknek drainage was designed to minimize bear-human conflicts in the most heavily settled portion of Unit 9. Participation in fall hunts was higher than in spring hunts because some moose and caribou hunters obtained a permit “just in case” they encountered a bear. Harvests averaged 11 bears per regulatory year between 1995 and 1999 and 13 bears between 2000 and 2005. Hunters harvested 9 bears in 2006 and 13 bears in 2007 using the registration permit. About half the bears taken in this permit hunt since 1987 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 1984 until fall 1989. During this period, the bear population appeared to have increased, and FWS 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 2005 season 2 bears were harvested on 1 October and the season was closed by emergency order. During the spring 2006 hunt, 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 continued to allow this hunt to remain open for the duration of the season to see if the hunt can eventually be merged with the general season. The bear harvest in 2007 was 8 bears (6 males and 2 females). If harvests continue at this level, there will be no demonstrated need for the hunt to be managed under a registration permit.

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

Unit 9B was included in the Western Alaska Brown Bear Management Area in 1997. Only 1 bear was reported during 2001, 2002, and 2003. Two permits were issued in 2005, but both hunters were unsuccessful. Eight permits were issued in 2006, but none of the permittees reported hunting bears that year. Five permits were issued in 2007 and 1 bear was harvested. The 4 remaining hunters did not hunt.

Hunter Residency. During the RY 2006 and RY 2007 general seasons, nonresidents took 83% of the harvest (Table 3).

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 in spite of regulatory changes that adjusted season opening dates. Since 1999 61% of the fall harvest and 64% of the spring harvest has occurred during the first week of each bear hunting season.

Transportation Methods. During RY 2006 and RY 2007, 82% of the successful hunters in the general hunts used aircraft, with boats being the next most common method of transportation (Table 5).

Other Mortality

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

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Bear-human conflicts continue to be the most serious and intractable problem in Unit 9, as in many other parts of the state. Given the pervasive nature of this problem, it will take a concerted effort to make headway. The other continuing issue involves perceived conflicts between bear viewing and hunting, which will likely escalate 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. Stream surveys on the Alaska Peninsula should be continued. The Black Lake surveys indicated a relatively stable and high population. I estimate more than 6,000 bears inhabit the portion of Unit 9 open to bear hunting. With the dramatic increase in harvest recorded since the 1999–2000 regulatory year and an estimated unreported illegal/DLP kill of more than 50 bears per year, the annual rate of human-caused mortality is estimated now at 7%.

In recent years, the Board of Game has been asked to drastically increase the brown bear harvest, especially in Units 9C and 9E, to benefit moose and caribou survival. This is not a new sentiment among local residents, but it has taken on added weight with the decline of the Northern Alaska Peninsula caribou herd (NAPCH). 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 found that bears were not a significant predator in 9D. 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 apparently remains high, but the moose population has remained stable. I do not recommend targeting brown bears in any portion of Unit 9 for reduction to benefit caribou or moose populations.

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

LITERATURE CITED

- ERICKSON, A.W., AND D.B. SINIFF. 1963. A statistical evaluation of factors influencing aerial survey results on brown bears. *North American Wildlife Conference* 28:391–409.
- GLENN, L.P., J.W. LENTFER, J.B. FARO, AND L.H. MILLER. 1976. Reproductive biology of female brown bears (*Ursus arctos*), McNeil River, Alaska. *International Conference on Bear Research and Management* 3:381–390.

- HARRIS, R.B. 1984. Harvest age-structure as an indicator of grizzly bear population status. M.S. thesis, University of Montana, Missoula. 204 p.
- MILLER, S.D. AND S.M. MILLER. 1990. Interpretation of bear harvest data. Final report, Federal Aid in Wildlife Restoration Project W-22-6, Study 4.18. 90 p.
- , G.C. WHITE, R.A. SELLERS, H.V. REYNOLDS, J.W. SCHOEN, K.TITUS, V.G. BARNES, R.B. SMITH, R.R. NELSON, W.B. BALLARD, AND C.C. SCHWARTZ. 1997. Brown and black bear density estimation in Alaska using radiotelemetry and replicate mark-resight techniques. *Wildlife Monographs* 133:1–55.
- QUANG, P.X. AND E.F. BECKER. 1997. Combined line transect and double count sampling techniques for aerial surveys. *Journal of Agricultural, Biological, and Environmental Sciences* 2(2):230-242.
- SELLERS, R.A. 1994. Dynamics of a hunted brown bear population at Black Lake, Alaska. 1993 Annual progress report, December 1994. Alaska Department of Fish & Game. Juneau 61 p.
- , AND M.E. MCNAY. 1984. Population status and management considerations of brown bear, caribou, moose and wolves on the Alaskan Peninsula. Report to the Alaska Board of Game, March 1984. 53 p.
- , 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.
- , AND S.D. MILLER. 1992. Brown bear density on the Alaska Peninsula at Black Lake, Alaska. A final report on completion of the 1989 density estimation objectives and progress report on other objectives of cooperative interagency brown bear studies on the Alaska Peninsula. Alaska Department of Fish & Game. Juneau 42pp.
- , S.D. MILLER, T.S. SMITH, AND R. POTTS. 1999. Population dynamics of a naturally regulated brown bear population on the coast of Katmai National Park and Preserve. 1999 Final Report. Resource Report NPS/AR/NRTR–99/36. 49 p.
- , AND L.A. AUMILLER. 1994. Population characteristics of brown bears at McNeil River, Alaska. *International Conference on Bear Research and Management* 9:283–293.
- TAIT, D.E.N. 1983. An analysis of hunter kill data. Ph.D. thesis, University of British Columbia, Vancouver. 129 p.

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TABLE 1 Black Lake aerial stream counts of brown bears, GMU 9E, 1990–2002

Regulatory year	Number of surveys attempted	<u>Independent bears</u>		<u>Maternal bears</u>		<u>Offspring > 1year old</u>		<u>Cubs of the year</u>		Total
		Number	%	Number	%	Number	%	Number	%	
1990	5	332	36	194	21	232	25	170	18	928
1991	4	357	49	128	17	143	19	106	14	734
1992	3	219	35	126	20	134	22	138	22	617
1994	4	296	36	167	20	206	25	147	18	816
1995	4	370	38	205	21	211	22	182	19	968
1996	4	277	42	131	20	175	26	78	12	661
1997	3	139	40	69	20	48	14	90	26	346
1998	3	172	33	114	22	115	22	121	23	522
1999	4	411	37	236	21	281	25	175	16	1103
2000	4	350	36	205	21	223	23	203	21	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, 2005-2007

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

TABLE 3 Unit 9 brown bear harvest, RY 2003–2007

Regulatory Year	Hunter kill						Non-hunting kill ^a			Total reported kill					
	M	(%)	F	(%)	Unk	Total	M	F	Unk.	M	(%)	F	(%)	Unk.	Total
2003–04															
Fall 03	196	(63)	115	(37)	0	311	1	1	2	197	(63)	116	(37)	2	315
Spring 04	234	(74)	81	(26)	0	315	1	0	0	235	(74)	81	(26)	0	316
Total	430	(69)	196	(31)	0	626	2	1	2	432	(69)	197	(31)	2	631
2004–05															
Fall 04	6	(86)	1	(14)	0	7	2	1	4	8	(80)	2	(20)	4	14
Spring 05	6	(67)	3	(33)	0	9	1	1	2	7	(64)	4	(36)	2	13
Total	12	(75)	4	(25)	0	16	3	2	6	15	(71)	6	(29)	6	27
2005–06															
Fall 05	188	(60)	124	(40)	2	314	5	2	0	193	(61)	126	(39)	2	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
2006–07															
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	0	0	4	(67)	2	(33)	0	6
Total	7	(54)	6	(46)	1	14	3	0	1	10	(62)	6	(38)	2	18
2007–08															
Fall 07	212	(63)	126	(37)	0	338	6	2	0	218	(63)	128	(37)	0	346
Spring 08	233	(82)	50	(18)	0	283	2	3	0	235	(82)	53	(18)	0	288
Total	445	(72)	176	(28)	0	621	8	5	0	453	(71)	181	(29)	0	634

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

TABLE 4 Unit 9 brown bear successful hunter residency, RY 2003–2007

Regulatory Year	Local residents ^a	(%)	Nonlocal residents	(%)	Nonresidents	(%)	Successful hunters ^b
2003–04	19	3	126	20	481	77	626
2004–05	5	31	1	6	10	63	16
2005–06	12	2	106	16	523	82	641
2006–07	3	21	3	21	8	57	14
2007–08	19	3	84	14	518	83	621

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

TABLE 5 Unit 9 brown bear harvest chronology percent by harvest periods, RY 2003–2007

Regulatory Year	July 1– August 30	September 1–30	October 1–7	October 8–31	November 1– April 30	May 1–17	May 17–25	May 26– June 30	<i>n</i>
2003–04	0	7	26	17	0	30	20	0	622
2004–05	0	44	0	0	0	6	25	25	16
2005–06	0	5	30	14	0	32	19	0	640
2006–07	8	46	8	0	0	8	30	0	13
2007–08	0	7	29	18	0	25	21	0	619

TABLE 6 Unit 9 brown bear harvest percent by transport method, RY 2003–2007

Regulatory Year	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway Vehicle	Unk.	<i>n</i>
2003–04	80	0	16	2	0	0	1	1	624
2004–05	0	0	56	25	6	0	0	13	16
2005–06	83	0	12	2	0	0	1	2	641
2006–07	29	0	50	7	0	0	7	7	14

**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 2006

To: 30 June 2008

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 (FWS) 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.

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

FWS periodically conducts aerial bear surveys on Unimak Island in late summer. Interpretation of harvest data to reflect population status is not possible with the very low number of bears killed annually. In spring 2002 we used a new line-transect-double-count technique to estimate the number, and sex and age composition, of bears on Unimak Island.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

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

Population Size and Composition

Based on extrapolation from a capture–mark–resight population estimate done in 1989 at Black Lake, an estimated 250 brown bears were on Unimak Island (Sellers and Miller 1991). Results of

the 2002 line transect survey estimated 293, with 90% confidence intervals of 218–384. This equates to a density estimate of 1 bear/3.8 mi². During these surveys, we classified 315 bears consisting of 21% adult males and 64% single bears. Average litter size for cubs was 1.8.

MORTALITY

Harvest

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

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

Hunter Harvest. During 1981–1996, annual harvests from Unimak Island averaged 5.9 bears (range = 3–9). During the 2000–2007 regulatory years, the average annual harvest was 9.8 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 20 bears (80% male) during the 2006 and 2007 regulatory years (Table 1).

Hunter Residency and Success. Nonresidents accounted for 8% of the harvest during 1981–96 and 52% during 1997–2001. From 2001–2007 nonresidents accounted for 42% of the permit holders and 61% of the brown bear harvest. Approximately 62% of the permittees hunted on Unimak Island between 1981 and 1996, and of those who actually hunted, 63% were successful. Since 1999, 76% of permittees hunted, and their success rate increased to 82%.

Harvest Chronology. The majority of bears harvested on Unimak are taken in May and October and 61% of the harvest occurs during the first week of hunting.

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

CONCLUSIONS AND RECOMMENDATIONS

The brown bear population on Unimak Island appears stable, and the drawing permit hunt meets management objectives. Although harvests have increased, no changes are recommended in the permit hunt at this time.

LITERATURE CITED

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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BUTLER, L. B. 2009. Unit 10 brown bear management report. Pages 125–128 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2006–30 June 2008. Alaska Department of Fish and Game. Juneau, Alaska.

TABLE 1 Unit 10 brown bear harvest data by permit hunt, RY 2003–2007

Hunt Number	Regulatory year	Permits issued	Hunter reports ^b	Percent did not hunt ^c	Percent successful hunters	Harvest				
						Male	(%)	Female	(%)	Total
DB375 (Fall)	2003–04	8	8	13	100	7	(100)	0	(0)	7
	2004–05	8	8	25	100	3	(50)	3	(50)	6
	2005–06 ^a	9	9	11	50	4	(100)	0	(0)	4
	2006–07	8	8	50	100	3	(75)	1	(25)	4
	2007–08	8	8	0	100	5	(63)	3	(37)	8
DB376 (Spring)	2003–04	7	7	0	71	4	(80)	1	(20)	5
	2004–05	7	7	0	57	3	(75)	1	(25)	4
	2005–06 ^a	8	7	50	75	3	(100)	0	(0)	3
	2006–07	7	7	57	100	3	(100)	0	(0)	3
	2007–08 ^a	8	8	25	83	5	(100)	0	(0)	5
DB375 & DB376 (Combined)	2003–04	15	15	7	86	11	(92)	1	(8)	12
	2004–05	15	15	13	77	6	(60)	4	(40)	10
	2005–06	17	15	29	58	7	(100)	0	(0)	7
	2006–07	15	15	53	100	6	(86)	1	(14)	7
	2007–08	16	16	13	93	10	(77)	3	(33)	13

^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

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006

To: 30 June 2008

GAME MANAGEMENT UNIT: 11 (12,784 mi²)

GEOGRAPHIC DESCRIPTION: Wrangell Mountains

BACKGROUND

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

Brown bear harvests averaged 16 (range = 8–27) per year throughout the 1960s and 1970s, but declined substantially after 1978, when much of Unit 11 was included in the Wrangell-Saint Elias National Park and Preserve. For the next 20 years, hunting pressure was low and harvests averaged only 6 bears (range = 2–12) per year. Brown bear harvests have been increasing since 1999, when federal and state hunting regulations were liberalized.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

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

METHODS

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 surveys or censuses have been conducted in Unit 11; therefore, population data are not available. Frequent observations of bears by ADF&G staff and the public suggest a relatively abundant and well-distributed population of brown bears in Unit 11. No population trends were evident over this reporting period.

Distribution and Movements

Based on incidental observations and harvest locations, brown bears inhabit most of Unit 11 except high-elevation glaciers. There has not been a bear movement study 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 sprouting plants and over-wintered berries. They also scavenge carcasses of ungulates that died during winter. When the Mentasta caribou numbered more than 3,000 animals, brown bears moved onto the calving grounds as they were important predators of neonatal caribou as well as moose calves. Throughout the summer, brown bears in Unit 11 feed in various habitats, including the many salmon streams in the unit. In late summer, bears generally move into sub-alpine 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 during this reporting period. 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. Fifteen brown bears were reported killed during the 2007–08 season, and 13 during 2006–07. Males composed 87% of the 2007–08 harvest and 62% of the 2006–07 harvest (Table 1). The average harvest since 2001 has been 15 bears, up considerably from the average of 6 bears a year between 1979 and 2000. The mean age for males was 6.1 years in 2007–08. 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. The annual harvest by nonresidents declined substantially after the federal land designation, from an average of 11 bears per year (range = 2–18; 1961–1978) prior, to an average of 3 (range = 0–10) since. Nonresident hunters took 8 bears during the 2007–08 season, while local residents took 4 and nonlocal residents took 3 (Table 2). Harvests by local residents have fluctuated between 1 and 6 bears a year for the past 5 years with no trend evident. Successful bear hunters averaged 3.7 days to take a bear during the 2007–08 season. There are no trends evident in hunter effort data for successful bear hunters in GMU 11.

Harvest Chronology. In 2007–08, 73% of the brown bear harvest occurred during the fall (Table 3). Since initiating sealing records in 1961, more than 80% of the harvest has occurred during the fall. Spring harvests have increased since 2003, averaging 4 (range = 3–5) bears a spring, up from the 1-bear average (range = 0–2) between 1992 and 2002. The reason for the recent increase in spring hunting reflects more interest in hunting bears by both residents and nonresidents. Presumably, fall harvests are higher because more bears are taken by hunters on a

combination hunt for other big game. Sheep season opens 10 August, moose season opens 20 August, and goat season opens 1 September.

Transport Methods. For successful brown bear hunters in GMU 11, aircraft has been the most important method of transportation; however, in 2007–08 boat hunters reported taking 40% of the bears (Table 4). 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 NPS due to negative environmental impacts.

Other Mortality

The only reported defense of life or property (DLP) killing during the last 2 years was 1 male taken in fall 2007 by a sheep hunter. 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. Compliance with reporting requirements on DLP bears would be higher if individuals were not required to salvage the hide and skull. Because most summer hides are worthless, DLP requirements could be changed so that 16 June–9 August only skulls and claws need to be surrendered. This would increase reporting compliance, but might also increase DLP kills, as the requirement to salvage the hide and skull has long been a deterrent to DLP shootings. The current DLP kill is not a biological issue.

HABITAT

Assessment

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 14 bears a year with a composition of 75% males, well above the minimum harvest composition objective of 50% males. The harvest density is low in Unit 11 with only 0.5 bears per 1,000 km² taken as compared to 3 bears per 1,000 km² in Unit 13. The current bear harvest is considered to have little impact on overall bear numbers, composition, or productivity. Much of the unit remains unhunted and thus a refugium and source of immigration to hunted areas.

Bear harvests declined in 1978 after establishment of the Wrangell-St. Elias National Monument and in 1980 after elevation of the area to park status. Bear harvests averaged 6 bears a year between 1979 and 1999, compared to 18 a year for the 10 years immediately prior to the federal land designation. Federal NPS regulations prohibit sport hunting over approximately 60% of Unit 11 designated as hard park, as well as aircraft access for all subsistence hunting. Hunting within the preserve is also limited through an ATV access permit system. The increase in bear harvests the last 6 years is thought to be a direct result of liberalized federal subsistence and general state seasons and bag limit. The opportunity to hunt caribou, moose, and sheep has decreased dramatically in recent years because these populations have declined substantially. Individuals seeking hunting opportunities with a reasonable chance of success are turning to alternative and relatively abundant species such as bears and wolves, for which seasons are long. Since the bear hunting season was lengthened to overlap with the sheep and moose seasons in Unit 11, there has been an increase in the harvest of bears by hunters on combination hunts. Dropping the tag fee for residents also contributed to the increased take, because problem bears can now be taken incidentally near cabins and homesites and legally kept.

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 these units have good productivity rates for interior grizzly 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 has no influence on brown bear population trends in the unit. No changes in bag limits or season dates are necessary this time.

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TABLE 1 Unit 11 brown bear harvest, 2003–2007

Regulatory Year	Hunter kill						Nonhunting kill ^a			Total Kill			
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.	M	F	Unk.	Total
2003–04													
Fall 03	9	(75)	3	(25)	0	12	0	0	0	9	3	0	12
Spring 04	2	(67)	1	(33)	0	3	0	0	0	2	1	0	3
Total	11	(73)	4	(27)	0	15	0	0	0	11	4	0	15
2004–05													
Fall 04	10	(53)	9	(47)	0	19	0	0	0	10	9	0	19
Spring 05	4	(80)	1	(20)	0	5	0	0	0	4	1	0	5
Total	14	(58)	10	(42)	0	24	0	0	0	14	10	0	24
2005–06													
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
2006–07													
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
2007–08													
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

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

Table 2 Unit 11 brown bear successful hunter residency, 2003–2007

Regulatory year	Local ^a resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Successful hunters
2003–04	6	(40)	4	(27)	5	(33)	15
2004–05	4	(17)	12	(50)	8	(33)	24
2005–06	1	(6)	6	(35)	10	(59)	17
2006–07	4	(31)	2	(15)	7	(54)	13
2007–08	4	(27)	3	(20)	8	(53)	15

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

Table 3 Unit 11 brown bear harvest chronology percent by time period, 2003–2007

Regulatory year	Harvest percent							n
	August	September	October	November	April	May	June	
2003–04	13	47	13	7	--	--	20	15
2004–05	13	63	4	--	4	4	13	24
2005–06	29	41	12	--	--	6	12	17
2006–07	0	54	8	--	--	23	15	13
2007–08	27	40	--	7	--	13	13	15

Table 4 Unit 11 brown bear harvest percent by transport method, 2003–2007

Regulatory year	Percent of harvest									n
	Airplane	Horse	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walking	Unk.	
2003–04	60	0	33	0	0	0	7	0	0	15
2004–05	46	0	25	13	0	0	4	13	0	24
2005–06	65	0	6	6	0	0	6	18	0	17
2006–07	38	0	23	15	0	0	15	8	0	13
2007–08	27	7	40	0	0	0	13	13	0	15

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006
To: 30 June 2008¹

LOCATION

GAME MANAGEMENT UNIT: 12 (9,978 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

Brown bears are distributed throughout most of Unit 12. Approximately 2,500 mi² are not commonly used by bears and are dominated by high mountains (>7,000 ft) devoid of vegetation or covered by large ice fields. Little is known about historical population trends; harvest data indicate that most of the unit probably supported densities of brown 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, brown 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, brown bears were found to be an important predator on moose calves in adjacent Unit 13 (Ballard et al. 1981). Unit 12 brown 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 brown bear population, but because the sustainable harvest of brown bears was thought to be low (5–8%) (Reynolds and Boudreau 1992), some population reduction was expected, along with increased moose calf survival.

During the mid 1980s, bear harvests increased by 29% in Unit 12. Most of the increase was due to greater harvest by Alaska residents, apparently in response to more liberal hunting seasons and 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

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

increased. However, moose calf survival also improved in portions of Unit 12 where little bear harvest was reported (Gardner 1994).

During the 1990s to 2008, the brown 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 brown bear harvest until moose numbers approached stated objectives or until brown bear harvest was too high to ensure the viability of the population. However, brown bear reductions through harvest were ineffective at increasing moose calf survival (Miller and Ballard 1992). In 1994 the Unit 12 brown bear management goal to reduce the brown bear population to increase moose calf survival was revised to provide for maximum opportunity to hunt brown bears in Unit 12. The management goal has remained the same since 1994.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Provide maximum opportunity to hunt brown 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 estimated brown 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 should be adult females >5 years old.

All brown 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., RY07 = 1 July 2007 through 30 June 2008).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

During RY06–RY07, the Unit 12 brown bear population trend likely remained stable at 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 (53.9 bears/1000 mi²; 20.8 bears/1000 km²; C. Gardner, unpublished data) support the 2000 grizzly bear density estimate.

During RY06 and RY07, 17 and 11 brown bears were killed in Unit 12, which is within the estimated sustainable yield of 5–8% of the population (Reynolds and Boudreau 1992). About 80% of harvest in Unit 12 was 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 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 RY06–RY07 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 brown bear population composition or density.

MORTALITY

Harvest

Season and Bag Limit. During RY06–RY07 the brown bear hunting season in Unit 12 for both resident and nonresident hunters was 10 August–30 June. A bear taken in Unit 12 did not count against the bag limit of 1 bear every 4 years in other units. During RY06–RY07 the \$25 resident tag fee was required to hunt brown bears in Unit 12.

Alaska Board of Game Actions and Emergency Orders. There were no regulation changes and no emergency orders were issued for Unit 12 during RY06–RY07.

Harvest by Hunters. Our management objective of an average estimated sustainable harvest of 28 bears (including 6 adult females) was not exceeded during RY05–RY07. During RY05–RY07 average annual harvest was 17 bears/year (range = 11–22), with an average of ≤ 7 adult females (range = 5–11) and an average of 60% males (range = 50–71%) (Table 1).

Hunter Residency and Success. During RY06 and RY07, nonresidents took 71% and 45% of the harvest (Table 2). Based on discussions with local and nonlocal residents, their interest in hunting for brown bears in Unit 12 was relatively low because 1) they had already harvested a brown 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 RY06 and RY07, all successful nonresident hunters hunted with a guide. These nonresidents 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 RY06 and RY07, 94% and 72% of the harvested brown 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. Between RY94 and RY03, 28% of the annual harvest of brown bears in Unit 12 was taken in the spring (May–June). However, during RY04–RY07, only 11% average annual harvest occurred during the spring. This decline in spring harvest was likely caused by fewer guided nonresident hunters during spring in the Nabesna and Chisana River drainages.

Transport Methods. During RY06–RY07, most successful brown bear hunters used airplanes 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 RY06–RY07 were guided nonresident hunters within the Nabesna, Chisana, and White River drainages. Use of ATVs began to increase in the late 1990s, primarily by residents who hunted moose. In RY06–RY07 the majority of successful resident hunters used ATVs, while no successful nonresident 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). No brown bears were recorded taken in defense of life or property incidents during RY06–RY07 (Table 1).

HABITAT

Assessment

Unit 12 offers moderate quality brown bear habitat with the exception of 2,500 mi² of unvegetated mountaintops and ice fields. Bear habitat is relatively undisturbed, except near a few small communities, the Alaska Highway, and the Tok Cutoff. Like most other areas in Interior Alaska, streams in Unit 12 do not contain reliable seasonal salmon runs accessible to bears.

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. Twenty- to 80-acre clearcuts will be treated to encourage hardwood regeneration with the objective of simulating natural succession. Beginning in 2008 about 1,000 acres of forest are planned to be logged and treated during a 5- to 10-year period. Wildfires in Unit 12 burned approximately 434 mi² in 1990 and in 2004. Data suggest avoidance of burned areas by brown bears for several years following large scale fires (C. Gardner,

unpublished data). In the long term however, bears and their prey species are expected to benefit from both natural fires and habitat enhancement efforts.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

There were no nonregulatory issues identified for brown bears in Unit 12 during RY06–RY07.

CONCLUSIONS AND RECOMMENDATIONS

Brown bears continue to be distributed throughout Unit 12. The 2007 population was likely near Gardner's 2000 estimate of 350–425 bears (46.6–57.7 bears of all ages/1000 mi² of useable habitat; 18.0–21.9 bears of all ages/1000 km²; Gardner 2003). Harvest regulations are liberal and allow for maximum hunting opportunity while sustaining the brown bear population in concert with other components of the ecosystem.

Research from Unit 13 indicates that brown bear populations with access to salmon may be able to sustain a higher harvest rate than previously predicted (Tobey 2005). Although, higher harvest levels may also be sustainable in Unit 12, the current harvest does not exceed 5%, well within accepted sustainable limits (Reynolds and Boudreau 1992). Future work on Interior Alaska brown bear populations will help to further refine sustainable harvest levels.

All management objectives were achieved during this report period. The 3-year mean harvest did not exceed 28 bears and includes more than 55% males in the harvest. The mean harvest during RY06–RY07 was 14 bears, with 68% males. Most of the Unit 12 brown bear harvest is concentrated within the Tok, Nabesna, Chisana, and White River drainages. Harvest has remained relatively stable within these areas.

To better reflect the current management objectives and harvest structure for brown bears in Unit 12, the management goals will be expanded in the next report period to include:

- Maintain the brown bear population and its habitat in concert with other components of the ecosystem.
- Provide the greatest sustained opportunity to hunt brown bears in Unit 12.

LITERATURE CITED

- ALASKA WILDLAND FIRE COORDINATING GROUP. 1998. Alaska interagency wildland fire management plan. <<http://forestry.alaska.gov/pdfs/98AIFMP.pdf>> Accessed 20 Jul 2009.
- BALLARD, W. B., T. H. SPRAKER, AND K. P. TAYLOR. 1981. Causes of neonatal moose calf mortality in south-central Alaska. *Journal of Wildlife Management* 45:335–342.
- GARDNER, C. 1994. Unit 12 moose. Pages 91–103 in M. V. Hicks, editor. Moose management report of survey and inventory activities 1 July 1991–30 June 1993. Alaska Department of Fish and Game. Study 1.0. Juneau, Alaska, USA.

- . 2003. Unit 12 brown bear. Pages 126–140 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.
- MILLER, S. D., AND W. B. BALLARD. 1992. Analysis of an effort to increase moose calf survivorship by increased hunting of brown bears in south-central Alaska. *Wildlife Society Bulletin* 20:445–454.
- , R. A. SELLERS, AND J. A. KEAY. 2003. Effects of hunting on brown bear cub survival and litter size in Alaska. *Ursus* 14:130–152.
- , G. C. WHITE, R. A. SELLERS, H. V. REYNOLDS, J. W. SCHOEN, K. TITUS, V. G. BARNES, JR., R. B. SMITH, R. R. NELSON, W. B. BALLARD, AND C. C. SCHWARTZ. 1997. Brown and black bear density estimation in Alaska using radiotelemetry and replicated mark-resight techniques. *Wildlife Monographs* 133.
- REYNOLDS, H. V., III, AND T. A. BOUDREAU. 1992. Effects of harvest rates on brown bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-5, W-22-6, W-23-1, W-23-2, W-23-3, and W-23-4. Study 4.19. Juneau, Alaska, USA.
- TOBEY, R. W. 2005. Unit 13 brown bear. Pages 137–147 *in* C. Brown, editor. Brown bear management report of survey and inventory activities 1 July 2002–30 June 2004. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

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TABLE 1 Unit 12 brown bear mortality, regulatory years 1991–1992 through autumn 2008

Regulatory year	Reported							Total estimated kill					
	Hunter kill				Nonhunting kill (DLP) ^a								
	M	F	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>1994–1995</i>													
Autumn 1994	5	6	0	11	1 (1)	0 (0)	0 (0)	6	(50)	6	(50)	0	12
Spring 1995	2	1	0	3	1 (1)	0 (0)	0 (0)	3	(75)	1	(25)	0	4
Total	7	7	0	14	2 (2)	0 (0)	0 (0)	9	(56)	7	(44)	0	16
<i>1995–1996</i>													
Autumn 1995	4	2	0	6	0 (0)	0 (0)	0 (0)	4	(67)	2	(33)	0	6
Spring 1996	2	1	0	3	0 (0)	0 (0)	0 (0)	2	(67)	1	(33)	0	3
Total	6	3	0	9	0 (0)	0 (0)	0 (0)	6	(67)	3	(33)	0	9
<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

Regulatory year	Reported							Total estimated kill					
	Hunter kill				Nonhunting kill (DLP) ^a								
	M	F	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<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
<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 ^b	15	6	0	21	0 (0)	0 (0)	0 (0)	15	(71)	6	(29)	0	21

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

^b Preliminary data.

TABLE 2 Unit 12 brown bear successful hunter residency, regulatory years 1989–1990 through autumn 2008^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
Autumn 2008 ^b	2 (10)	10 (48)	9 (43)	21

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

^b Preliminary data.

TABLE 3 Unit 12 brown bear harvest chronology by month, regulatory years 1989–1990 through autumn 2008^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
Autumn 2008 ^c	5 (24)	16 (76)	0 (0)	0 (0)				21

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

TABLE 4 Unit 12 brown bear harvest by transport method, regulatory years 1989–1990 through autumn 2008^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
Autumn 2008 ^b	4 (19)	4 (19)	1 (5)	8 (38)	0 (0)	0 (0)	1 (5)	3 (14)	0 (0)	21

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

**WILDLIFE
MANAGEMENT REPORT**

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

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006

To: 30 June 2008

GAME MANAGEMENT UNIT: 13 (23,368 mi²)

GEOGRAPHIC DESCRIPTION: Nelchina Basin

BACKGROUND

The brown bear harvest in Unit 13 has increased substantially over the last 40 years. The average annual harvests for the decades of the 1960s, 1970s, 1980s and 1990s were 39, 59, 105, and 113 respectively. Interest in brown bear hunting and yearly harvests by recreational hunters increased over the years as seasons were lengthened and bag limits increased. Liberalization of brown bear hunting regulations started in 1980 with the initiation of a spring season. The bag limit was increased to one bear a year between 1983 and 1988, and again starting in 1995. Brown bear harvests have been the highest in those years when the bag limit has been 1 bear per year and the resident tag fee waived.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

To maintain a minimum unit population of 350 brown bears.

METHODS

Alaska Department of Fish and Game 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 department staff for genetic studies. Sealing agents collected information on date and location of harvest and time spent afield by successful hunters. A study to evaluate brown bear population trends and indices in the expanded Nelchina Study Area in western 13A was initiated in 2006; 75 bears have been captured to date. Monitoring of movements, productivity and survival is ongoing with a census scheduled for spring 2010.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Densities observed in 13A and 13E are among the highest estimates for brown bears in interior and northern Alaska (Testa et al. 1998). Capture-mark-resight (CMR) brown bear density estimates are available for 2 study areas in subunit 13E and a study area in western 13A. More recently, line transect surveys were used to derive density estimates for all of 13E, and both 13A and 13B together. On the upper Susitna River (13E), the 1987 estimate of 6.46 independent

bears/1000 km² (Ballard et al. 1982; Miller 1988, 1995) was down from the 1979 removal-based estimate of 10.5 independent bears/1000 km². Though 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. Density estimates for the Su-Hydro Study Area (13E) in 1985 and 1995 were 18.75 and 23.31 independent bears/1000 km² (27.1 and 40.8 all bears), respectively (Miller 1995). Similar census techniques were used, indicating increasing brown bear numbers in southeastern 13E through 1995. The line transect survey for all of 13E from 2000, 2001, and 2003 resulted in a density estimate of 32.2 bears/1000km² (all bears; Becker pers. comm.).

In 1998, Testa et al. reported a CMR density estimate for the Nelchina study area in western 13A of 21.3 independent bears/1000 km² (27.49 all bears/1000 km²). Preliminary data from spring capture events in largely the same area from 2006 through 2008 indicate a known minimum density estimate of 13.4 independent bears/1000 km² (25.4 all bears/1000 km²). In 2004, Becker (ADF&G biologist, pers. comm.) reported 16.3 bears/1000km² (all bears) following a 2-year line transect survey for all of 13A and 13B.

Population Size

Four separate population estimates have been calculated for brown bears in Unit 13 in the past 30 years. 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 brown bears, of which 823 were ≥ 2 years of age (Miller 1990). Three years later, based solely on a model of sustainable harvest rates, Miller re-estimated only 640–1,120 bears in Unit 13 (Miller 1993). In 1995, a second bear research project in the Su-Hydro Study Area was completed, resulting in an updated Unit 13 population estimate of 1,450 brown bears (Miller, personal communication). The most recent population estimate based on line transect surveys between 2000 and 2004 was approximately 1,300 bears.

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 2008 indicate average litter sizes of 2.2 cubs of the year ($n=29$), 2.1 yearlings ($n=16$), and 2.1 two-year-olds ($n=16$).

Miller (1995) reported the sex ratios of brown bears in the Su-Hydro Study Area during two different censuses 10 years apart; 82.4 males per 100 females in 1985, compared to only 27.8 males per 100 females in 1995. In 1998, Testa et al. reported 48 males per 100 females in the Nelchina Study Area in western 13A. Preliminary data from the same area indicate a further reduction in males in recent years, with 31.6 males per 100 females ($n=75$) captured between 2006 and 2008. Observed declines in male to female ratios may be a reflection of high harvest

pressure, and particularly, the protection reproductive sows have under the current hunting regulations.

MORTALITY

Harvest

Since 2002, there has been no closed season in GMU 13, except for that portion of 13E within Denali State Park where the season remained 10 August–15 June. The resident \$25 tag fee requirement has been waived annually since 1995 by the Board of Game in GMU 13, except for that portion of 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 GMU 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 reported 2007–08 harvest of brown bears was 149 (Table 1). Harvests since 1995 have averaged 136 bears a year with no trend evident. Since regulations were liberalized 13 years ago in 1995 a total of 1,767 bears have been taken.

The 2007–08 brown bear harvest by subunit was 36 in 13A, 21 in 13B, 4 in 13C, 20 in 13D, and 68 in 13E. More bears have been reported from 13E over the years than any other subunit.

The 2007–08 brown bear harvest was composed of 90 males (61%) and 58 females (39%; Table 1). The mean skull size was 21.2 inches for males and 19.8 inches for females. Since 1995 when harvests increased, males have composed 57% of the harvest. The mean ages for bears taken in 2007–08 are not yet available. Mean ages from the prior year were 5.6 for males and 6.6 for females. No significant trends are evident in the sex or age harvest data.

Interpretation of skull size, age, and sex ratios in harvest data is difficult (Miller 1993). Kontio et al. (1998) suggest that even with an 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. Considering older males are the first to emerge from dens, they are more often taken during spring, and hunters can select for older bears by hunting early in April. Males killed in the fall incidentally by hunters pursuing other big game species tend to be younger. Alternately, females taken during the fall tend to be older, larger, bears compared to females taken in the spring. We speculate that a larger number of older females are available for harvest in the fall because cubs that accompanied them during the spring may not be with them later in the year.

Hunter Residency and Success. Successful hunter residency data are presented in Table 2. Nonresident hunters took 45 (30%) bears in 2007–08. The number of bears taken by nonresidents has averaged 34 (range = 21–45) over the last 30 years and no trend is evident. The lack of growth in the nonresident harvest largely reflects the high cost of guided hunts which limit participation by most nonresidents. Local residents took 6 (4%) bears in 2007–08 and nonlocal Alaska residents 98 (66%). There is considerable variation in the number of bears taken

by local residents, and it appears to be unrelated to 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. Liberal seasons and waived tag requirements are necessary so they can take bears incidentally. Resident bear tags were purchased by only 3–13% of the successful resident hunters since eliminating the tag fee requirement for GMU 13 in 1995.

Successful hunters averaged 3.6 days in the field in 2007–08, similar to the 3.7 days reported for 2006–07. Between 1995 and 2005, hunters in Unit 13 averaged 4.3 days hunting to take a bear. Successful nonresidents tend to spend 2 additional days in the field to take a bear than residents.

Harvest Chronology. For the 2007–08 regulatory year, 61% of the harvest was during the fall and 39% in the spring (Table 3). Throughout the current reporting period, the fall season has been the most important for bear harvests. Spring harvests have fluctuated between years but no trend is evident (Table 1). This variation is likely related to snow conditions influencing access in relation to den emergence. Deep, late, snows provide good snowmachine access that results in an increase in the April harvest. Alternatively, a particularly late breakup could interfere with ORV access and limit harvests later in May.

Since 1980, when the spring season was implemented, males have averaged 67% of the total harvest (range = 49–83%). Since spring season dates were liberalized in 2003, the percent males in the spring harvest has declined slightly (Table 1). Males composed 59% ($n = 52$) of the fall harvest in 2007, and 63% ($n = 38$) of the harvest in spring 2008.

Transport Methods. The most important method of transportation for successful brown bear hunters in Unit 13 during 2007–08 was 4-wheelers (Table 4). Aircraft and highway vehicles are 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. The importance of 4-wheelers as a transportation method for all hunting in GMU 13 has increased over the last 15 years. Unit 13 has many far-reaching trail systems that are ideally suited to 4-wheeler transportation during fall hunting seasons. Caribou and moose hunters report that 4-wheelers have also become the most important method of transportation for them. Because many bears are taken on combination hunts in the fall, it was expected that 4-wheelers would have increased in importance for bear harvests.

Hunter Attitudes. Hunter questionnaires were sent to 235 successful bear hunters who took a bear in Unit 13 between 1995 and 1997. Hunter response was 54% ($n = 128$). Brown bears were the primary species hunted by 33% of those responding ($n = 40$ out of 120), the remainder being incidentally taken while on hunts primarily for another species. Hunters seeking moose and caribou were responsible for 85% of the incidental take.

The 10 August opening was important to bear hunters; 60% reported this extension allowed them added hunting opportunity. Successful hunters said the most important regulation influencing their decision to hunt or take a bear was the bag limit of 1 bear per year. Forty-nine percent felt they would not have taken a bear without this liberalization. The impact of this liberal bag limit becomes apparent when 42% of the hunters reported they may hunt brown bears in another unit

next year. This is quite high and shows that having the opportunity to hunt bears in another unit is important. The bag limit change was not as important for Unit 13-only hunters; 36% felt they would probably take another bear in Unit 13. However, 72% of Unit 13-only hunters said they would only take another Unit 13 bear if it was a significantly larger bear or a better trophy. The bag limit change was important here in allowing additional hunting opportunity for a better trophy.

Other Mortality

There were 3 brown bears (all males) reported killed in defense of life or property (DLP) in 2007–08. The 5-year average DLP kill of 1.2 bears/year for this report period was below the 2.9 bears per year average since 1961. The reported DLP harvest has always been considered a minimum estimate because some bears are shot and not reported, especially at remote cabins, home sites and mining claims. The state requirement to salvage and surrender the hides of DLP bears often deters individuals from reporting kills. Bears may also not be reported because individuals fear they may be cited if Alaska Bureau of Wildlife Enforcement does not deem their DLP claim as valid. By going to a year-round season since 2003, problem bears can now be taken with a hunting license and the hunter keeps the bear.

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 has received more complaints of problem bears and requests to tranquilize and relocate bears. Publications, including news articles about bear problems and mauings encourage and maintain the public's fear of bears. The frequent "scare" articles in the media are hard to overcome, and tend to perpetuate the bear-human conflict problem. 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 low density and secretive behavior, observing and counting bears is both difficult and expensive. This is especially true of interior-type grizzly populations that do not congregate on salmon streams and are wary of motorized vehicles. Because of this, population data are available for only limited portions of Unit 13. 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.

A population estimate of 1,450 bears was extrapolated in 1998 following CMR censuses in portions of subunits 13A and 13E, though the lower, more recent population estimate of 1,300 was extrapolated from line transect surveys in 13A, 13B and 13E. If the difference in population estimates is not due to the differences in methodology, there has been a small decline in the

population. Such a result would suggest the liberal seasons and bag limit changes have finally started to be effective in reducing the Unit 13 population.

The most recent research focused on monitoring the bear population composition and trend in Unit 13 began in May 2006, in the Nelchina Study Area in western 13A. Preliminary analysis of capture data through May 2008 has resulted in a minimum known density estimate of 13.4 independent bears/1000 km² (25.4 all bears/1000 km²). This initial minimum estimate is comparable to the 1998 density figure of 21.3 independent bears/1000 km² (27.49 all bears/1000 km²). While independent bear numbers are lower, the similar estimate of all bears suggests the population may be resilient in the face of heavy harvest pressure. We recommend continuing this work, and developing a CMR estimate that is comparable to the 1998 census. This area is an important moose hunting area with high neonatal calf predation from bears and receives high bear hunting pressure. Given all the prior work in this area, it is only logical to continue monitoring the impact of bear harvests on bear density as well as moose calf survival.

Unit 13 has been identified as an intensive management area where the primary management objective is to provide high harvests of ungulates for human use. Research over the last 30 years in GMU 13 has identified brown bears as important predators of moose, taking over 50% of the calves born every year as well as an unknown number of adults. An experimental reduction in bears during the late 1970s was shown to result in an increased survival of moose calves and recruitment of these calves into the population the following spring. The Board of Game has focused on these results and has tried to meet intensive management mandates for more moose, partially by increasing neonatal calf survival. The only practical management option to attempt a reduction in bear numbers unitwide has been to increase the general season harvest of bears. Initial predictions were that liberalized hunting regulations (beginning in 1995) would dramatically reduce the unitwide population; however, no dramatic trends are apparent from harvest or preliminary research data.

Board of Game actions liberalizing season dates and bag limit as well as dropping the resident tag fee were effective in increasing the bear harvest. Since 1995, more than 1,700 bears have been taken in Unit 13, with a yearly average harvest of 136. Prior to these board actions, the average yearly take was only 85 bears (1987–1995). Harvests have stabilized at current levels and no trends are evident. Yearly fluctuations in take are attributed to changes in weather and access, as well as hunting effort for other species such as moose and caribou.

The high reported harvests since 1995 exceed predicted sustainable harvest guidelines for brown bears in GMU 13. Miller (1988, 1993) calculated sustainable harvest rates of 5.7% for all bears or 8% for bears ≥ 2.0 year. These rates would give a maximum unitwide sustainable harvest of only 83 given a population of 1,450 bears, and only 74 for the most recent estimate of 1,300 bears. The average yearly take of 136 bears results in an estimated harvest rate of just over 10%, roughly the same rate that radiocollared bears have been harvested at since May 2006. This harvest rate exceeds all modeled sustainable rates for Alaska grizzlies or brown bears.

Whether continued harvests at the current level can reduce bear numbers enough to appreciably reduce brown bear predation on moose calves is unknown. Estimates of changes in productivity, cub survival, and immigration following high harvests are being researched in the 13A study. Current regulations that protect the reproductive portion of the population (sows with cubs, and

cubs) may protect enough sows to maintain recruitment, thus delaying a population reduction. A reproductively active adult sow is only legal every third or fourth year, thus not as vulnerable to hunting as a male. A decline in the sex ratio suggests that males are being replaced by productive sows.

Immigration of bears from lightly hunted areas within Unit 13, or from adjacent Denali and Wrangell-St. Elias National Parks, may be another reason high harvests of brown bears may not have the predicted impact on bear numbers in this unit. The Unit 13 brown bear population is not a closed population, and the extent and effects of migration on bear numbers is unknown. The sex ratio for bears harvested through age 5 shows more males than females are taken even though there is a 50:50 sex ratio at birth, and likely age limits on precocial behavior by young males. The most reasonable explanation for the higher take of males, particularly in the age 4 and 5 classes is that there is immigration into the unit of young dispersing males. Continued bear research in 13A will help determine the impact increased harvests have on productivity and immigration.

We recommend maintaining the current season, bag limit, and resident tag fee waiver. Continued high harvest pressure must be maintained to determine the impacts on this interior-type brown bear population. The most we can conclude to date is that while providing substantial hunting opportunity and an increased harvest, the population within the study area has not dramatically declined as originally predicted. The only discernable population impacts have been to alter the sex ratio towards females, and possible increases in recruitment and immigration. A slow decline in the population may be occurring, though due to the difficulty in enumerating bears, any change detected may be insignificant. We would likely be a lot further along in both our management objective and knowledge of how high harvest rates impact interior brown bears if we had maintained the liberal regulations we had between 1983 and 1988. Substantially altering the regulations at this point, before fully determining the effects of current harvest levels would be a mistake we do not need to repeat. Regardless of anticipated results, we recommend continuing the 13A research and completion of another CMR census for comparison to past estimates.

Research since 2005 has documented continued high neonatal moose calf mortality from bears in 13A (Dale, pers. comm.), however there are very limited options for further increasing the take of brown bears in this area. One viable option to further increase hunting effort in GMU 13 would be to change the guide requirement to allow any nonresident to hunt in GMU 13 with an Alaska resident; a permit from ADF&G could be issued to take nonresident friends or relatives hunting without compensation. Although the majority of GMU 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 GMU 13 to nonresidents accompanied by a permitted resident would be the only way to create a large, new pool of hunters looking for an inexpensive opportunity to take a legal brown bear, and subsequently increase the harvest.

LITERATURE CITED

- BALLARD, W. B., S. D. MILLER, AND T. H. SPRAKER. 1982. Home range, daily movements, and reproductive biology of brown bear in southcentral Alaska. *Canadian Field Naturalist* 96:1–5.
- KONTIO, B. D., D. L. GARSHELIS, E. C. BIRNEY, AND D. E. ANDERSEN. 1998. Resilience of a Minnesota black bear population to heavy hunting: self-sustaining population or population sink? *Ursus* 10:139–146.
- MILLER, S. D. 1987. Big Game Studies. Vol. VI. Final 1986 Report. Susitna Hydroelectric Project. Alaska Department of Fish and Game. Juneau. 276 p.
- . 1988. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-22-6. Job IVG-4.21. Juneau. 149 p.
- . 1990. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-23-3. Study 4.21. 88 p.
- . 1993. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Final Report. Project W-23-5. Study 4.21. 182 p.
- . 1995. Impacts of heavy hunting pressure on the density and demographics of brown bear populations in southcentral Alaska. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-24-3. Study 4.26. 28 p.
- TESTA, W. J., W. P. TAYLOR, AND S. D. MILLER. 1998. Impacts of heavy hunting pressure on the density and demographics of brown bear populations in Southcentral Alaska. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-24-5. Study 4.26. Juneau.

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TABLE 1 Unit 13 brown bear harvest, 2003–2007

Regulatory Year	Hunter kill						Nonhunting kill ^a			Total Kill			
	M	(%)	F	(%)	Unk.	Total	M	F	Unk.	M	F	Unk.	Total
2003–04													
Fall 03	35	(47)	39	(53)	0	74	0	0	0	35	39	0	74
Spring 04	24	(55)	20	(45)	1	45	1	0	0	25	20	1	46
Total	59	(50)	59	(50)	1	119	1	0	0	60	59	1	120
2004–05													
Fall 04	48	(53)	43	(47)	0	91	0	1	0	48	44	0	92
Spring 05	34	(69)	15	(31)	0	49	0	0	0	34	15	0	49
Total	82	(59)	58	(41)	0	140	0	1	0	82	59	0	141
2005–06													
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
2006–07													
Fall 06	44	(58)	32	(42)	0	76	0	1	0	44	33	0	77
Spring 07	28	(54)	24	(46)	0	52	0	0	0	28	24	0	52
Total	72	(56)	56	(44)	0	128	0	1	0	72	57	0	129
2007–08													
Fall 07	52	(59)	36	(41)	1	89	1	0	0	53	36	1	90
Spring 08	38	(63)	22	(37)	0	60	2	0	0	40	22	0	62
Total	90	(61)	58	(39)	1	149	3	0	0	93	58	1	152

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

TABLE 2 Unit 13 brown bear successful hunter residency, 2003–2007

Regulatory year	Local ^a		Nonlocal		Nonresident		Successful hunters ^b
	Resident	(%)	resident	(%)		(%)	
2003–04	10	(8)	88	(74)	21	(18)	119
2004–05	13	(9)	90	(64)	37	(26)	140
2005–06	17	(13)	86	(64)	32	(24)	135
2006–07	11	(9)	92	(72)	25	(20)	128
2007–08	6	(4)	98	(66)	45	(30)	149

^a Local resident means resident of GMU 13.

^b Includes unknown residency.

TABLE 3 Unit 13 brown bear harvest chronology percent by time period, 2003–2007

Regulatory year	Harvest periods																		n
	July		August		September		October		November		March		April		May		June		
	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	
2003–04	3	(3)	17	(20)	40	(48)	3	(3)	0	(0)	0	(0)	12	(14)	13	(16)	13	(15)	119
2004–05	7	(10)	16	(22)	36	(51)	6	(8)	0	(0)	0	(0)	14	(20)	10	(14)	11	(15)	140
2005–06	5	(7)	22	(30)	36	(48)	6	(8)	0	(0)	0	(0)	13	(18)	10	(14)	7	(10)	135
2006–07	10	(13)	12	(15)	34	(43)	2	(3)	2	(2)	1	(1)	13	(17)	15	(19)	12	(15)	128
2007–08	9	(13)	21	(31)	27	(40)	3	(5)	0	(0)	0	(0)	7	(10)	15	(22)	17	(25)	146

TABLE 4 Unit 13 brown bear harvest percent by transport method, 2003–2007

Regulatory year	Airplane	Horse	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walking	<u>n</u> ^a
2003–04	17%	2%	15%	28%	10%	6%	16%	6%	118
2004–05	20%	1%	12%	31%	12%	6%	12%	6%	139
2005–06	19%	1%	9%	37%	10%	0%	16%	7%	134
2006–07	13%	0%	19%	27%	15%	5%	12%	10%	124
2007–08	20%	0%	17%	30%	7%	5%	13%	9%	147

^a Includes only reported method of transportation.

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006
To: 30 June 2008

GAME MANAGEMENT UNIT: 14 (6,625 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 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–bear encounters with brown bears were more common than they had been 10–15 years earlier. More recently, there have been increasing reports of defense of life and property kills and problems with nuisance brown bears in the Matanuska-Susitna Valley.

The Board of Game accepted the human-use objective of 10–15 bears with no more than 5 females older than 2 years, based on the recommendation of Griese (1999). The management objectives have not been updated since that time.

About 40 percent of the state's population lives in the Municipality of Anchorage, in Subunit 14C. With large natural areas surrounding the developed portions of the city, large numbers of outdoor recreationists, and a healthy population of brown bears, bear-human encounters and conflicts are high and increasing. In the past 2 decades, 9 people have been injured and 2 killed by brown bears in Subunit 14C. There are no documented maulings before the late 1980s, and the number of people injured in the last decade (1999–2008; n=5) is less than the number of people injured or killed in the previous decade (1989–1998; n=6). During the last decade (1999–2008), 23 brown bears have been reported killed in Subunit 14C in defense of life or property or by authorities because they constituted an immediate threat to public safety.

The department has coordinated with other local, state, and federal agencies to address urban bear issues. The department has conducted a detailed public survey, 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 subunit. Committee members and other agency information/education experts have developed web pages, brochures, classroom presentations, bear-safety talks, 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 with the goal of maximizing the public benefits of bears while minimizing bear-human conflicts.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

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

MANAGEMENT OBJECTIVES

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

Human-Use Objectives

- To allow optimum opportunity to hunt brown bears with an annual allowable harvest (AAH) of 10–15 bears, including no more than 5 females greater than 2 years of age.

METHODS

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 practical way to census brown bears in a forested environment, such as in most of Unit 14. Previously biologists have attempted to estimate the GMU 14 brown bear population based on the information available (see Background section). Recent public reports and human–bear encounters indicate a viable brown bear population throughout GMU 14.

MORTALITY

Harvest

Season and Bag Limit. In Subunits 14A and 14B the season was 1 September–31 May. Within Subunit 14C brown bear hunting was closed in the Eagle River, Fort Richardson, Elmendorf, Anchorage, Eklutna, and Birchwood management areas. The Chugach State Park Management Area was opened to a draw hunt beginning in 2008. The season dates for this draw hunt were 1 January–31 May. The season in the remainder portion of Subunit 14C was 1 September–31 May.

The bag limit for brown bears was 1 bear every 4 regulatory years. Harvesting cubs and sows accompanied by cubs was prohibited. Residents were required to get a \$25 tag for brown bear hunting. Nonresidents paid \$500 for a brown bear tag and had to be accompanied by a guide or a relative within second degree of kindred.

Board of Game Actions. During spring 2007 the Board of Game created a spring draw hunt for the Chugach State Park Management area.

Hunter Harvest. During the past 5 years hunters harvested an average of 19.6 bears (range 10–26; Table 1). This 5-year average is greater than the average of 15 for the previous 5-year period (range 9–19). The female component of the brown bear harvest for the past 5 years ranged from 19% to 46%, averaging 33%. The average yearly total of female bears >2 years of age known killed in the 5-year period 2003–2007 was 8.2 (including DLP - defense of life or property- and other nonhunting mortality).

Hunter Residency. Nonresidents harvested an average of 6.4 bears from 2003 through 2007 (Table 2). All remaining bears were harvested by residents of Unit 14 during this period, except one each year taken by nonlocal residents in 2007, 2005, and 2003.

Harvest Chronology. Harvest chronology in Unit 14 has typically peaked during September and secondarily in May (Table 3). In 2007, 73% of the bears were harvested during the fall. During the period of 2003 to 2007 on average 58.6% of the harvest occurred in September. The proportion taken in the fall is usually higher than the proportion taken in the spring and suggests that brown bears are often taken opportunistically by moose hunters and not specifically targeted as would be seen in a larger spring harvest (Table 3).

Transport Methods. With 23% of them using ATVs, successful bear hunters preferred this transport over any other method during the period of 2003–2007 (Table 4). During this same period the percentages of hunters accessing the hunting area by aircraft and highway vehicle were similar (18% and 17.2% respectively).

Other Mortality

Defense of life or property (DLP) is the primary cause of nonhunting mortality. There were 3 reported nonhunting mortalities in both 2006 and 2007. Most were DLP mortalities from Subunit 14A. We estimate an additional 2 bears per year killed and not reported (Table 1). In Subunit 14C 4 brown bears were shot in DLP in summer 2007 and 3 were shot in summer 2008. Two cubs were captured after one of the sows was shot in DLP, and they were sent to a zoo. Three brown bears were killed by vehicles and one by a train in summer 2008 in Subunit 14C.

CONCLUSIONS AND RECOMMENDATIONS

The total human use objective of 10–15 bears has been met or exceeded for the last 9 years, and the average number of independent females harvested exceeded the objective in 6 of the last 10 years. Harvest objectives are expected to be exceeded in the future.

In 1999, the department recommended to the Board of Game that the brown bear human use objective be increased to the current harvest levels. The human use objective established at that time has been met or exceeded every year since, and by all indicators appears to be sustainable. Frequency of bear sign observed by biologists, reports from the public and black bear bait hunters, incidents and reports of nuisance bears, and an increased harvest level indicate that there are healthy brown bear subpopulations in Unit 14. We suggest that a harvest objective of 10–15 bears (AAH of 15) with a maximum of 5 independent females is low and should be adjusted

upward. We also suggest that harvest objectives should be set for each subunit to address the individual management challenges. The department should continue to monitor the harvest closely, the age of bears taken, and the ratio of females in the total mortality in order to determine the need for adjustments to the harvest objective.

Management goals for observation and photography of brown bears in the unit are being met. Brown bears in and around Anchorage and the Matanuska-Susitna valleys are seen and reported often during the summer months, creating a tremendous number of calls from concerned citizens. Efforts to inform Alaskans and visitors how to act around bears and how to minimize undesirable interactions (Griese 1999) should be the basis for information and education programs intended to reduce bear mortality and the possibility of property damage and attacks by brown bears. Recently, videos and DVD's titled "Staying Safe in Bear Country" and "Living in Bear Country" have been produced with input from staff bear biologists, and made available to the public at ADF&G area offices and at the regional headquarters office. These and similar efforts should be emphasized in Anchorage and the Mat-Su areas to address issues such as garbage storage, bird feeders, and human-bear encounters, and to provide advice on how to respond to potentially negative encounters with brown bears.

We recommend the following revised management goals:

In Subunit 14C the goals are to (1) provide an opportunity to view, photograph, and enjoy brown bears, (2) work with local home and recreational cabin owners to reduce bear attractants and defense of life or property kills (DLP), and (3) provide an opportunity to hunt brown bears under aesthetically pleasing conditions.

We recommend the following revised management objectives:

- To maintain a brown bear population whose sex ratio, age structure, and average skull size are largely unaffected by human-caused mortality. However, population size may be reduced below maximum carrying capacity and bears may be conditioned to minimize encounters with humans by providing additional hunting opportunity or control programs near communities.
- To allow optimum opportunity to hunt brown bears with an annual allowable harvest (AAH) of up to 25 bears, including no more than 8 females greater than 2 years of age.

LITERATURE CITED

- DEL FRATE, G. G. 2003. Unit 14 brown bear management report. Pages 152–160 in C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game.
- GRAUVOGAL, C.A. 1990. Unit 14 brown bear survey-inventory progress report. Pages 84–94. S.O. Morgan, editor. Annual report of survey-inventory activities. Part V. Brown/grizzly bears. Vol. XX. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-23-2, Study 4.0. Juneau. 189 p.

GRIESE, H. J. 1999. Unit 14 brown bear management report. Pages 138–145 in M. V. Hicks, editor. Management report of survey-inventory activities, 1 July 1996–30 June 1998. Brown Bear. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Grants W-24-5 and W-27-1. Study 4.0. Juneau, Alaska, USA.

HARKNESS, D. 1993. Unit 14 Brown bear management report. Pages 129–135. M. V. Hicks, editor. Management report of survey-inventory activities. Brown bear. 1 July 1990–30 June 1992. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Program. W-23-4 and W-23-5, Study 4.0. Juneau. 283 p.

KAVALOK, T. P. 2007. Unit 14 brown bear management report. Pages 155 – 163 *in* p. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2004 – 30 June 2006. Alaska Department of Fish & Game. Juneau, Alaska.

WILD EYE PRODUCTIONS. 2002. “Staying safe in bear country.” International Association for Bear Research and Management. VHS and DVD.

WILD EYE PRODUCTIONS. 2005. “Living in bear country.” International Association for Bear Research and Management. VHS and DVD.

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TABLE 1 Unit 14 brown bear harvest, 1998–2007

Regulatory year	Reported								Estimated unreported kill	Estimated					
	Hunter kill					Nonhunting kill ^a				Total estimated kill					
	M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
1998															
Fall 98	6	3	(33)	0	9	3	0	0	1	9	(75)	3	(25)	1	13
Spring 99	0	0	(-)	0	0	0	1	0	1	0	(0)	1	(100)	1	2
Total	6	3	(33)	0	9	3	1	0	2	9	(69)	4	(31)	2	15
1999															
Fall 99	5	4	(44)	0	9	2	1	0	1	7	(58)	5	(42)	1	13
Spring 00	5	1	(17)	0	6	1	0	1	1	6	(86)	1	(14)	2	9
Total	10	5	(33)	0	15	3	1	1	2	13	(68)	6	(32)	3	22
2000															
Fall 2000	8	4	(33)	0	12	2	1	0	1	10	(67)	5	(33)	1	16
Spring 2001	2	0	(0)	0	2	3	1	1	1	5	(83)	1	(17)	2	8
Total	10	4	(29)	0	14	5	2	1	2	15	(71)	6	(29)	3	24
2001															
Fall 2001	8	5	(38)	0	13	2	0	0	1	10	(67)	5	(33)	1	16
Spring 2002	1	5	(83)	0	6	0	0	0	1	1	(17)	5	(83)	1	7
Total	9	10	(53)	0	19	2	0	0	2	11	(52)	10	(48)	2	23
2002															
Fall 2002	6	9	(60)	0	15	0	0	1	1	6	(40)	9	(60)	2	17
Spring 2003	3	0	(0)	0	3	1	0	0	1	4	(100)	0	(0)	1	5
Total	9	9	(50)	0	18	1	0	1	2	10	(53)	9	(47)	3	22
2003															
Fall 2003	8	3	(27)	0	11	1	2	1	1	9	(75)	5	(25)	2	16
Spring 2004	9	1	(10)	0	10	1	2	0	1	10	(77)	3	(23)	1	14
Total	17	4	(19)	0	21	2	4	1	2	19	(70)	8	(30)	3	30

TABLE 1 continued

Regulatory year	Reported								Estimated unreported kill	Total estimated kill					
	Hunter kill					Nonhunting kill ^a									
	M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
2004															
Fall 2004	3	2	(40)	0	5	1	0	0	1	4	(67)	2	(33)	1	7
Spring 2005	5	0	(0)	0	5	1	0	0	1	6	(100)	0	(0)	1	7
Total	8	2	(20)	0	10	2	0	0	2	10	(83)	2	(17)	2	14
2005															
Fall 2005	10	9	(47)	0	19	0	0	0	1	10	(53)	9	(47)	1	20
Spring 2006	2	1	(33)	0	3	0	0	0	1	2	(67)	1	(33)	1	4
Total	12	10	(45)	0	22	0	0	0	2	12	(55)	10	(45)	2	24
2006															
Fall 2006	4	6	(60)	0	10	1	1	2	1	5	(42)	7	(58)	1	13
Spring 2007	8	1	(11)	0	9	0	1	1	1	8	(80)	2	(20)	1	11
Total	12	7	(37)	0	19	1	2	3	2	13	(59)	9	(41)	2	24
2007															
Fall 2007	8	11	(58)	0	19	2	0	2	1	10	(48)	11	(52)	1	22
Spring 2008	6	1	(14)	0	7	1	0	1	1	7	(88)	1	(12)	1	9
Total	14	12	(46)	0	26	3	0	3	2	17	(59)	12	(41)	2	31

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

TABLE 2 Unit 14 brown bear successful hunter residency, 1998–2007

Regulatory year	Local ^a resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
1998	8	(89)	0	(0)	1	(11)	9
1999	11	(73)	0	(0)	4	(27)	15
2000	10	(71)	0	(0)	4	(29)	14
2001	13	(68)	0	(0)	6	(32)	19
2002	16	(89)	1	(6)	1	(6)	18
2003	17	(81)	1	(5)	3	(14)	21
2004	6	(60)	0	(0)	4	(40)	10
2005	14	(64)	1	(4)	7	(32)	22
2006	11	(58)	0	(0)	8	(42)	19
2007	15	(58)	1	(4)	10	(38)	26

^aUnit 14 residents

TABLE 3 Unit 14 brown bear harvest chronology percent by month, 1998–2007

Regulatory year	Harvest periods							<i>n</i>
	August	September	October	November	March	April	May	
1998	11	56	33	0	0	0	0	9
1999	0	47	13	0	0	20	20	15
2000	0	36	50	0	0	0	14	14
2001	0	58	11	0	0	21	11	19
2002	0	72	6	6	0	0	16	18
2003	0	42	10	0	0	0	48	21
2004	0	50	0	0	0	30	20	10
2005	5	81	0	0	0	9	5	22
2006	0	47	5	0	0	37	11	19
2007	0	73	4	0	0	12	12	26

TABLE 4 Unit 14 brown bear harvest percent by transport method, 1998–2007

Regulatory year	Percent of harvest							<i>n</i>
	Airplane	Horse	Boat	ATV/ORV	Snowmachine	Highway vehicle	Foot	
1998	11	0	11	44	0	22	11	9
1999	13	0	0	27	20	40	0	15
2000	29	0	21	14	7	7	21	14
2001	16	0	11	26	21	11	16	19
2002	11	0	11	50	0	17	11	18
2003	14	0	19	38	0	14	14	21
2004	10	0	10	20	30	10	20	10
2005	18	0	27	18	5	23	9	22
2006	21	0	5	21	21	16	16	19
2007	27	0	12	23	12	23	4	26

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006
To: 30 June 2008

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 by Giese (1993) at 586–1,156. Brown bear densities ranged from no bears on Kalgin Island to a presumed unit high in the coastal and foothill areas of Redoubt Bay and Trading Bay. More recently, Del Frate (2003) reported the number of brown bears in Unit 16 was similar. With limited data available, biologists have tracked harvest data to estimate population trends and have also relied on reports by long-time residents to refine estimated trends (Giese 1998). Also, line transect surveys conducted in Lake Clark National Park and by Earl Becker in GMU 13A were used to estimate bear densities in 16B.

Hunter harvest increased substantially in 1984 following a lengthening of seasons in Unit 16 to allow hunting during den emergence in March and April. Females generally emerge after the males, and their emergence tends to coincide with “rotting” snow conditions and reduced access by hunters. Prior to the liberalization, 1961–1983, harvest ranged from 17 to 46 bears annually. In 1984, harvest had increased to 66 bears. Additional liberalizations in 2003 and 2005 resulted in more interest in brown bear hunting in Unit 16 with a reported record harvest of 126 in 2005. During the last 5 years, the harvest averaged 114 bears.

An annual sustainable harvest of 55 bears was first estimated by Giese (1993). This included no more than 18 females older than 2 years. Harvest annually exceeded this level during 1984–1992. Brown bear numbers, at least sows and young, appeared to increase during the 1990s (Del Frate 2003). Also, Giese (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. Giese (1995) modified the brown bear population objective to reflect that priority. It was modified again in 1998, producing the current 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 1999. More recently, in 2003, the tag requirement was dropped and the 1 in every 4 years bag limit was raised to 1 per year. Then in 2005, the board raised the limit to 2 bears.

MANAGEMENT GOAL

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

POPULATION OBJECTIVE

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

HUMAN-USE OBJECTIVE

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

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 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.

In 2003 and 2004 Alaska Department of Fish and Game (ADF&G) research staff, with cooperative funding from Denali National Park, investigated the application of a method to survey bears using aerial transect surveys in northeastern Unit 16 and eastern Unit 13 (Quang and Becker 1999). This survey method was applied to black bears in the core area of Unit 16B in spring 2007, following the Board of Game's approval of a black bear predation control program in GMU 16. Limited brown bear data from this survey combined with Lake Clark National Park and previous GMU 13A line transect surveys were used to come up with an approximate estimate for 16B.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Staff observations during the past 20 years, and comments from area residents and others who regularly visit the unit, indicate a healthy brown bear population in the unit. Results for the survey using the Quang and Becker approach suggested that the density of brown bears in northern 16B was in the range of 26.7 bears per 1,000 km². Kavalok (2005) reported that the southern end of the unit appeared to have bear density more like adjacent Unit 9A, which is about 150 bears per 1,000 km². This is probably a higher density estimate than what would be expected in most of Unit 16. Bear surveys conducted by Lake Clark National Park wildlife

biologists who conducted bear surveys in spring 2008 indicated similar high densities in northern Unit 9A.

Population Size

The Quang and Becker 2003 surveys in portions of Unit 16 and the surrounding area showed data indicating the brown bear population in Unit 16 is likely similar to the number reported by Griese in 1993. It is possible that the population may have decreased following the higher harvests reported in recent years.

MORTALITY

Harvest

The average annual reported brown bear harvest for regulatory years (RY) 2003 - 2007 in Unit 16 was 114 bears (A regulatory year runs 1 July through 30 June; e.g., RY 2006 = 1 July 2006–30 June 2007) . This included 39 females older than 2 years, which exceeded the management objectives. Nonhunting mortality and estimates of unreported kills from wounding loss and poaching accounted for 11 bears annually (Tables 1 and 2). The average age of female bears for this report period was 5.78 years ($n = 87$). This was down from 6.45 reported for 2003-2005 ($n=53$).

Season and Bag Limit. In Unit 16A within Denali State Park the hunting season was 1 September–31 May. The bag limit was 1 bear every 4 regulatory years. Outside of the park the limit was 1 bear every regulatory year. Beginning fall 2007 the resident tag fee was dropped for Unit 16A, except in Denali State Park. The season in Unit 16B was 10 August–31 May with a bag limit of a bears every regulatory year (as of fall 2005) and no resident tag fee. The exception to this was the season within one mile of Wolverine Creek, where it was 15 September–31 May. Cubs and females accompanied by cubs were not legal to take.

Board of Game Actions and Emergency Orders. In 2007 the Board of Game eliminated the resident tag requirement in all of Unit 16A except within Denali State Park. The bag limit in Denali State Park was raised to 1 bear per regulatory year.

Hunter Harvest. Hunter harvest has decreased during RY 2006 through RY2007 from the previous reporting period. (228 compared to 251 for RYs 2004–2005). Overall harvest has increased significantly during the 2000s from the previous decades. During the last 5 years, the harvest averaged 114 bears (Tables 1 and 2).

Hunter Residency and Success. Nonresident harvest increased from the previous reporting period and was down from historic trends. Nonresidents claimed 41% and 44% of the harvest in 2006 and 2007 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). Most fall bears were taken in September, and most spring bears were taken in April.

Transport Methods. Successful brown bear hunters reported using airplanes for transportation more often than all other methods combined (Table 5). During 2006 and 2007 respectively, 62% and 60% of successful hunters used aircraft. Snowmobile use coincides with years of good spring snow. Excellent snow conditions in 2007 allowed for 10% of the successful hunters to report using snowmachines; however, only 6% of successful hunters reported using this method in 2006 due to poor snow conditions.

Other Mortality

During the report period there were no reports of nonhunting mortality (Tables 1 and 2). We estimated that approximately 10 bears annually might not be reported.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Bear viewing along the lower portion of Unit 16B has been increasing in popularity. Griese (1998) noted dangerous interactions between humans and bears caused by sport fishing at Wolverine Creek. 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 (WCMC), 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. WCMC and ADF&G have continued to monitor and evaluate this program and the activities at Wolverine Creek.

CONCLUSIONS AND RECOMMENDATIONS

Harvest continues to exceed management objectives during this reporting period. The harvest objective exceeded the desired 3-year average of 28 females older than 2 years, and at the same time the overall harvest was at record levels. By liberalizing seasons and bag limits and eliminating the resident tag fee in Unit 16B, the Board of Game increased the likelihood of additional harvests to reach the desired objectives. Recent estimates of the Brown bear population in 16B indicate that there is no danger to the stability of the population at this time.

Bear viewing and hunting are becoming more popular in the unit. At the same time, interest remains in increasing the harvest because of low moose numbers and desire by the public to reduce predators in Unit 16. These factors likely will have a continuing effect on management direction and programs for the foreseeable future. The department must continue to closely monitor harvest, particularly age and sex of bears, in order to identify and prevent any serious declines in the population.

LITERATURE CITED

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

- GRIESE, H. 1993. Unit 16 brown bear survey-inventory progress report. Pages 136–151 *in* M.V. Hicks, editor. Management report of survey-inventory activities 1 July 1990–30 June 1992. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-23-4 and W-23-5. Study 4.0. Juneau.
- . 1995. Unit 16 brown bear survey-inventory progress report. Pages 142–152 *in* M.V. Hicks, editor. Management report of survey-inventory activities 1 July 1992–30 June 1994. Brown bear. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Progress Report. Project W-24-1 and W-24-2. Study 4.0. Juneau.
- . 1998. Unit 16, West side of Cook Inlet. Pages 139–146 *in* M.V. Hicks, editor. Federal aid in wildlife restoration management report, survey-inventory activities 1 July 1994–30 June 1996. Brown bear. Alaska Department Fish and Game. Grants W-24-3 and W-24-4. Study 4.0. Juneau.
- . 1999. Unit 16, West side of Cook Inlet. Pages 139–146 *in* M.V. Hicks, editor. Federal aid in wildlife restoration management report, survey-inventory activities 1 July 1994–30 June 1996. Brown bear. Alaska Department Fish and Game. Grants W-24-3 and W-24-4. Study 4.0. Juneau.
- KAVALOK, T. 2005. Unit 16 brown bear management report. Pages 157–168 *in* C. Brown, editor. Brown bear management report of survey and inventory activities 1 July 2002–30 June 2004. Alaska Department Fish and Game. Juneau.
- QUANG, P.X., AND E.F. BECKER. 1999. Aerial survey sampling of contour transects using double-count and covariate data. Pages. 87–97 *in* G.W. Garner, S.C. Amstrup, J.L. Laake, B.F.J. Manly, L.L. McDonald, and D.G. Robertson, editors. Marine Mammal Survey and Assessment Methods. Rotterdam, Netherlands: Balkema, A.A. Publishers.

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TABLE 1 Unit 16A human-caused brown bear mortality, RY 1998–2007

Regulatory year	Reported								Estimated unreported kill	Total estimated kill					
	Hunter kill					Nonhunting kill ^a									
	M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
1998–99															
Fall	0	1	(100)	0	1	0	0	0		0	(0)	1	(100)	0	1
Spring	0	1	(100)	0	1	0	0	0		0	(0)	1	(100)	0	1
Total	0	2	(100)	0	2	0	0	0	2	0	(0)	2	(100)	2	4
1999–00															
Fall	9	2	(18)	0	11	0	0	0		9	(82)	2	(18)	0	11
Spring	4	0	(0)	0	4	0	1	0		4	(80)	1	(20)	0	5
Total	13	2	(13)	0	15	0	1	0	2	13	(81)	3	(19)	2	18
2000–01															
Fall	6	3	(33)	0	9	0	0	0		6	(67)	3	(33)	0	9
Spring	4	0	(0)	0	4	0	0	0		4	(100)	0	(0)	0	4
Total	10	3	(23)	0	13	0	0	0	2	10	(77)	3	(23)	2	15
2001–02															
Fall	5	2	(29)	0	7	0	0	0		5	(71)	2	(29)	0	7
Spring	1	0	(0)	0	1	0	0	0		1	(100)	0	(0)	0	1
Total	6	2	(25)	0	8	0	0	0	2	6	(75)	2	(25)	2	10
2002–03															
Fall	3	1	(25)	0	4	0	0	0		3	(75)	1	(25)	0	4
Spring	1	0	(0)	0	1	1	0	0		2	(100)	0	(0)	0	2
Total	4	1	(20)	0	5	1	0	0	1	5	(83)	1	(17)	1	7

TABLE 1 continued

Regulatory year	Reported								Estimated unreported kill	Estimated					
	Hunter kill					Nonhunting kill ^a				Total estimated kill					
	M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
2003–04															
Fall	3	3	(50)	0	6	0	0	0		3	(50)	3	(50)	0	6
Spring	4	0	(0)	0	4	0	0	0		4	(100)	0	(0)	0	4
Total	7	3	(30)	0	10	0	0	0	2	7	(70)	3	(30)	2	12
2004–05															
Fall	3	1	(25)	0	4	0	0	0		3	(75)	1	(25)	0	4
Spring	6	1	(14)	0	7	0	0	0		6	(86)	1	(14)	0	7
Total	9	2	(18)	0	11	0	0	0	2	9	(82)	2	(18)	2	13
2005–06															
Fall	4	6	(60)	0	10	0	0	0		4	(40)	6	(60)	0	10
Spring	1	1	(50)	0	2	0	0	0		1	(50)	1	(50)	0	2
Total	5	7	(58)	0	12	0	0	0	2	5	(42)	7	(58)	2	14
2006–07															
Fall	4	4	(50)	0	8	0	0	0		4	(50)	4	(50)	0	8
Spring	4	6	(60)	0	10	0	0	0		4	(40)	6	(60)	0	10
Total	8	10	(56)	0	18	0	0	0	2	8	(42)	10	(56)	2	20
2007–08															
Fall	5	2	(29)	0	7	0	0	0		5	(71)	2	(29)	0	7
Spring	4	2	(33)	0	6	0	0	0		4	(67)	2	(33)	0	6
Total	9	4	(31)	0	13	0	0	0	2	9	(69)	4	(31)	2	15

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

TABLE 2 Unit 16B human-caused brown bear mortality, RY 1998–2007

Regulatory year	Reported									Estimated unreported kill	Total estimated kill					
	Hunter kill					Nonhunting kill ^a										
	M	F	(%)	Unk.	Total	M	F	Unk.	M		(%)	F	(%)	Unk.	Total	
1998–99																
Fall	29	21	(42)	0	50	0	3	0		29	(55)	24	(45)	0	53	
Spring	10	2	(17)	0	12	0	0	0		10	(83)	2	(17)	0	12	
Total	39	23	(37)	0	62	0	3	0	6	39	(60)	26	(40)	6	71	
1999–00																
Fall	39	19	(40)	0	58	1	3	0		40	(65)	22	(35)	0	62	
Spring	13	1	(7)	0	14	0	1	0		14	(87)	2	(13)	0	15	
Total	41	20	(33)	0	61	1	4	0	6	44	(64)	24	(36)	6	74	
2000–01																
Fall	17	22	(56)	0	39	1	5	0		18	(45)	27	(60)	0	45	
Spring	25	3	(11)	0	28	0	0	0		25	(89)	3	(11)	0	28	
Total	42	25	(37)	0	67	1	5	0	6	43	(59)	30	(41)	6	79	
2001–02																
Fall	22	24	(52)	0	46	0	0	0		22	(48)	24	(52)	0	46	
Spring	32	2	(6)	0	34	0	0	0		32	(94)	2	(6)	0	34	
Total	54	26	(33)	0	80	0	0	0	6	54	(67)	26	(33)	6	86	
2002–03																
Fall	21	19	(48)	0	40	0	2	0		21	(50)	21	(50)	0	42	
Spring	21	3	(13)	0	24	0	0	0		21	(87)	3	(13)	0	24	
Total	42	22	(34)	0	64	0	2	0	5	42	(64)	24	(36)	5	71	

TABLE 2 continued

Regulatory year	Reported								Estimated unreported kill	Estimated					
	Hunter kill					Nonhunting kill ^a				Total estimated kill					
	M	F	(%)	Unk.	Total	M	F	Unk.		M	(%)	F	(%)	Unk.	Total
2003–04															
Fall	22	17	(44)	0	39	0	0	0		22	(56)	17	(44)	0	39
Spring	38	4	(10)	0	42	0	0	0		38	(90)	4	(10)	0	42
Total	60	21	(26)	0	81	0	0	0	6	60	(74)	21	(26)	6	87
2004–05															
Fall	32	12	(27)	0	44	1	1	0		33	(72)	13	(28)	0	46
Spring	56	13	(19)	1	70	0	1	0		56	(80)	14	(20)	1	71
Total	88	25	(22)	1	114	1	2	0	9	89	(77)	27	(23)	10	126
2005–06															
Fall	37	25	(40)	1	63	0	0	0		37	(60)	25	(40)	1	63
Spring	37	13	(26)	1	51	0	0	0		37	(74)	13	(26)	1	51
Total	74	38	(34)	2	114	0	0	0	9	74	(66)	38	(34)	11	123
2006–07															
Fall	35	21	(38)	0	56	0	0	0		35	(62)	21	(38)	0	56
Spring	36	5	(12)	0	41	0	0	0		36	(88)	5	(12)	0	41
Total	71	26	(27)	0	97	0	0	0	9	71	(73)	26	(27)	9	106
2007–08															
Fall	38	26	(41)	0	64	0	0	0		38	(60)	26	(41)	0	64
Spring	29	7	(19)	0	36	0	0	0		29	(81)	7	(19)	0	36
Total	67	33	(33)	0	100	0	0	0	9	67	(67)	33	(33)	9	109

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

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

TABLE 3 Unit 16 brown bear successful hunter residency, RY 1998–2007

Regulatory year	Local ^a resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total ^b successful hunters
1998	0	(0)	33	(52)	31	(48)	64
1999	5	(7)	39	(51)	32	(42)	77
2000	3	(4)	27	(34)	50	(63)	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	1	(1)	67	(58)	47	(41)	115
2007	5	(4)	58	(51)	50	(44)	113

^a Unit 16 residents^b Includes unknown residency

TABLE 4 Unit 16 brown bear harvest chronology percent by month, RY 1998–2007

Regulatory year	Harvest periods							<i>n</i>
	August	September	October	November	March	April	May	
1998	0	69	9	2	2	16	3	64
1999	16	56	4	1	0	19	4	77
2000	20	39	1	0	1	33	6	80
2001	23	28	8	1	0	33	7	88
2002	15	41	9	0	0	29	7	69
2003	10	32	7	1	0	37	13	91
2004	12	23	3	1	1	42	17	125
2005	14	33	10	0	1	19	22	126
2006	17	33	5	1	0	22	22	115
2007	24	31	5	3	0	22	14	113

TABLE 5 Unit 16 brown bear harvest percent by transport method, RY 1998–2007

Regulatory year	Percent of harvest							Other/ Unknown	<i>n</i>
	Airplane	Horse	Boat	ATV/ORV	Snowmachine	Highway vehicle	Foot		
1998	83	3	8	4	2	0	0	2	64
1999	53	10	9	7	9	4	5	1	77
2000	76	4	5	5	6	1	3	0	80
2001	66	0	9	7	10	2	6	0	88
2002	71	1	10	6	4	1	6	0	69
2003	66	2	8	9	12	1	2	0	91
2004	62	3	8	4	15	0	8	0	125
2005	63	5	14	6	5	2	6	0	126
2006	62	3	15	9	6	2	3	1	115
2007	60	7	12	9	10	3	0	0	113

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006

To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: 17 A, B, and C (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 established alternate year seasons in Unit 9 in 1973, the number of bears reported killed in Unit 17 increased. Between 1970 and 1997, annual reported harvests rarely exceeded 50 bears per year. Since 1997, annual reported bear harvests have increased substantially. From 1972–73 to 1980–81, 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 2007). 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 multispecies 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, most 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.

POPULATION OBJECTIVE

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

METHODS

Each brown bear legally harvested or 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 AND DISCUSSION

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	10 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. No changes to brown bear hunting season or bag limits were made by the Board of Game during this reporting period, and no emergency orders were issued during this reporting period.

Human-Induced Mortality. During the 2006–07 hunting seasons, 115 hunters reported killing brown bears in Unit 17, 68 males (59%) and 47 females (41%; Table 1). During the 2007–08 hunting seasons, 117 hunters reported killing brown bears in Unit 17, 62 males (53%) and 55 females (47%; Table 1). These harvests from this reporting period are greater than the mean annual reported harvest of the previous five years (99 bears).

The average skull size of bears presented for sealing in 2006–07 was 23.4 inches ($n = 69$, range 15.4 in.– 28.4 in.) for males and 20.7 inches ($n = 47$, range 17.3 in– 23.4 in) for females. The average skull size of bears presented for sealing in 2007–08 was 23.2 inches ($n = 62$, range 18.1 in–27.5 in) for males and 20.8 inches ($n = 53$, range 16.3 in–24.0 in) for females. In 2006–07, 11 bears (9 males, 2 females) were reported killed in Unit 17A; 84 (45 males, 39 females) were reported killed in Unit 17B; and 20 (14 males and 6 females) were reported from Unit 17C. In 2007–08, 21 bears (8 males, 13 females) were reported killed in Unit 17A, 66 (34 males and 32 females) were reported killed in Unit 17B, and 30 (20 males and 10 females) were reported from Unit 17C. In the past 5 years, 12% of the bears reported killed in the unit have been taken in Unit 17A, 62% in 17B, and 26% in 17C (Table 2).

Hunter Residency and Success. Nonresidents account for most of the brown bear harvest in Unit 17. During the 2006–07 seasons, nonresidents took 80.0% of the bears reported killed in the unit. During the 2007–08 seasons, nonresidents took 77.8% of the bears reported killed in the unit (Table 3).

Harvest Chronology. Seventy-two bears were reported killed during the fall 2006 hunting season, and 43 bears were reported killed during the spring 2007 season. Seventy-one bears were reported killed during the fall 2007 hunting season, and 46 bears were reported killed during the spring 2008 season (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 other species (moose and caribou), as well as 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

Five brown bears were reported killed in defense of life or property in Unit 17 during the 2006–07 regulatory year, with no reports of bears killed illegally; however, based on previous years, illegal kills likely occurred. One brown bear was reported killed in defense of life or property in Unit 17 during the 2007–08 regulatory year, with no known illegal kills.

HABITAT

Assessment

Brown bear habitat in Unit 17 is virtually unaltered and in excellent condition. Salmon stocks are carefully managed, and escapements are adequate for the needs of the current bear population. Abundant ungulates in the unit have also provided 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 make these areas attractive to bears; 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.

NON-REGULATORY 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.

RESULTS AND CONCLUSIONS

Despite harvests during the reporting period of almost twice the historical average, we are meeting our population objective of maintaining a brown bear population that will support a harvest of 50 bears per year. Subjective evidence indicates the population is large enough to support such a harvest. The population objective of at least 50% males in the reported harvest has been met in most years, though the sex ratio for all bears killed (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.

LITERATURE CITED

- VAN DAELE, L.J. 1997. Mulchatna caribou survey-inventory management report. Pages 23–36 *in* M.V. Hicks, editor. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Management Report. Grants W-24-3 and W-24-4, Study 3.0. Juneau.
- WOOLINGTON, J.D. 2002. Unit 17 moose management report. Pages 250–272 *in* C. Healy, editor. Moose management report of survey and inventory activities 1 July 1999–30 June 2001. Alaska Department of Fish and Game. Project 1.0. Juneau.
- WOOLINGTON, J.D. 2003. Mulchatna caribou management report. Pages 34–45 *in* C. Healy, editor. Caribou management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau.
- WOOLINGTON, J.D. 2007. Mulchatna caribou management report, Units 9B, 17, 18 south, 19A & 19B. Pages 14–32 *in* P. Harper, editor. Caribou management report of survey and inventory activities 1 July 2004–30 June 2006. Alaska Department of Fish and Game. Juneau.

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TABLE 1 Unit 17 brown bear harvest, 1996–97 through 2007–08

Regulatory year	Hunter Kill				Nonhunting Kill				Total reported kill			
	Male	Female	Unk	Total	Male	Female	Unk	Total	Male	Female	Unk	Total
1996												
Fall 1996	19	10	1	30	3	0	2	5	22	10	3	35
Spring 1997	12	5	0	17	1	0	0	1	13	5	0	18
Total	31	15	1	47	4	0	2	6	35	15	3	53
1997												
Fall 1997	20	17	0	37	8	4	0	12	28	21	0	49
Spring 1998	22	7	0	29	0	0	1	1	22	7	1	30
Total	42	24	0	66	8	4	1	13	50	28	1	79
1998												
Fall 1998	20	16	0	36	2	2	1	5	22	18	1	41
Spring 1999	36	6	0	42	2	0	0	2	38	6	0	44
Total	56	22	0	78	4	2	1	7	60	24	1	85
1999												
Fall 1999	23	15	0	38	0	0	1	1	23	15	1	39
Spring 2000	35	9	0	44	0	0	0	0	35	9	0	44
Total	58	24	0	82	0	0	1	1	58	24	1	83
2000												
Fall 2000	33	27	1	61	4	2	4	10	37	29	5	71
Spring 2001	36	7	0	43	0	0	0	0	36	7	0	43
Total	69	34	1	104	4	2	4	10	73	36	5	114
2001												
Fall 2001	21	25	1	47	0	2	5	7	21	27	6	54
Spring 2002	41	4	1	46	0	0	0	0	41	4	1	46
Total	62	29	2	93	0	2	5	7	62	31	7	100

TABLE 1 Continued

Regulatory year	Hunter Kill				Nonhunting Kill				Total reported kill			
	Male	Female	Unk	Total	Male	Female	Unk	Total	Male	Female	Unk	Total
2002												
Fall 2002	35	35	0	70	4	0	2	6	39	35	2	76
Spring 2003	21	6	0	27	0	0	0	0	21	6	0	27
Total	56	41	0	97	4	0	2	6	60	41	2	103
2003												
Fall 2003	26	42	0	68	1	2	1	4	27	44	1	72
Spring 2004	27	5	0	32	0	0	0	0	27	5	0	32
Total	53	47	0	100	1	2	1	4	54	49	1	104
2004												
Fall 2004	23	27	0	50	0	1	1	2	23	28	1	52
Spring 2005	30	5	0	35	1	0	0	1	31	5	0	36
Total	53	32	0	85	1	1	1	3	54	33	1	88
2005												
Fall 2005	35	39	0	74	0	1	1	2	35	40	1	76
Spring 2006	32	13	0	45	0	0	0	0	32	13	0	45
Total	67	52	0	119	0	1	1	2	67	53	1	121
2006												
Fall 2006	32	40	0	72	2	2	1	5	34	42	1	77
Spring 2007	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 2007	34	37	0	71	0	1	0	1	34	38	0	72
Spring 2008	28	18	0	46	0	0	0	0	28	18	0	46
Total	62	55	0	117	0	1	0	1	62	56	0	118

TABLE 2 Unit 17 brown bear harvest by subunit, 1991–92 through 2007–08

Regulatory year	Unit															
	17(A)				17(B)				17(C)				Unit 17 total			
	M	F	Unk	Total	M	F	Unk	Total	M	F	Unk	Total	M	F	Unk	Total
1991–92	2	2	0	4	18	12	2	32	6	3	0	9	26	17	2	45
1992–93	1	3	0	4	21	7	0	28	13	4	0	17	35	14	0	49
1993–94	1	2	0	3	16	6	0	22	4	4	0	8	21	12	0	33
1994–95	0	3	0	3	17	13	0	30	7	3	0	10	24	19	0	43
1995–96	1	3	0	4	18	13	0	31	8	3	0	11	27	19	0	46
1996–97	3	0	0	3	18	9	1	28	11	6	0	17	31	15	1	47
1997–98	3	0	0	3	28	18	0	46	11	6	0	17	42	24	0	66
1998–99	4	0	0	4	36	19	0	55	16	3	0	19	56	22	0	78
1999–00	7	3	0	10	34	16	0	50	17	5	0	22	58	24	0	82
2000–01	6	1	0	7	44	26	1	71	19	7	0	26	69	34	1	104
2001–02	3	2	0	5	31	17	0	48	28	10	2	40	62	29	0	93
2002–03	3	1	0	4	41	36	0	77	12	4	0	16	56	41	0	97
2003–04	5	5	0	10	29	31	0	60	19	11	0	30	53	47	0	100
2004–05	6	1	0	7	23	25	0	48	24	6	0	30	53	32	0	85
2005–06	11	5	0	16	33	39	0	72	23	8	0	31	67	52	0	119
2006–07	9	2	0	11	45	39	0	84	14	6	0	20	68	47	0	115
2007–08	8	13	0	21	34	32	0	66	20	10	0	30	62	55	0	117

TABLE 3 Unit 17 brown bear successful hunter residency, 1991–92 through 2007–08

Regulatory Year	Local ^a resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters ^b
1991–92	5 (11.1)	2 (4.4)	38 (84.4)	45
1992–93	8 (16.3)	4 (8.1)	35 (71.4)	49
1993–94	2 (6.0)	2 (6.0)	28 (84.8)	33
1994–95	4 (9.3)	2 (4.7)	37 (86.0)	43
1995–96	2 (4.4)	11 (23.9)	33 (71.7)	46
1996–97	4 (8.5)	4 (8.5)	39 (83.0)	47
1997–98	1 (1.5)	9 (13.6)	56 (84.9)	66
1998–99	5 (6.4)	3 (3.9)	70 (89.7)	78
1999–00	9 (11.0)	11 (13.4)	62 (75.6)	82
2000–01	1 (1.0)	13 (12.5)	90 (86.5)	104
2001–02	6 (6.5)	16 (17.2)	71 (76.3)	93
2002–03	2 (2.1)	14 (14.4)	81 (83.5)	97
2003–04	7 (7.0)	17 (17.0)	76 (76.0)	100
2004–05	5 (5.8)	9 (10.6)	71 (83.5)	85
2005–06	17 (14.3)	23 (19.3)	79 (66.4)	119
2006–07	3 (2.6)	20 (17.4)	92 (80.0)	115
2007–08	7 (6.0)	19 (16.2)	91 (77.8)	117

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

TABLE 4 Unit 17 brown bear harvest chronology percent by season, 1991–92 through 2007-08

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	
1991–92 ^a	6.7%	53.3%	11.1%	----	----	11.1%	15.6%	45
1992–93 ^a	12.2%	46.9%	6.1%	----	----	20.4%	14.3%	49
1993–94 ^{a, b}	9.1%	48.5%	24.2%	----	----	6.1%	12.1%	33
1994–95 ^{a, b}	11.6%	58.1%	16.3%	----	----	4.7%	9.3%	43
1995–96 ^{a, b}	10.9%	45.6%	10.9%	----	----	15.2%	17.4%	46
1996–97 ^{a, b}	6.4%	34.0%	23.4%	----	----	17.0%	19.2%	47
1997–98 ^c	7.6%	30.3%	18.2%	----	22.7%	13.6%	7.6%	66
1998–99 ^c	1.3%	25.6%	18.0%	----	26.9%	19.2%	9.0%	78
1999–00 ^c	3.7%	30.5%	12.2%	4.9%	20.7%	23.2%	4.9%	82
2000–01	4.8%	44.3%	9.6%	1.9%	18.3%	14.4%	6.7%	104
2001–02 ^d	6.5%	35.5%	7.5%	6.5%	26.9%	10.8%	4.3%	93 ^e
2002–03 ^d	5.2%	52.6%	14.4%	1.0%	9.3%	12.4%	5.2%	97
2003–04 ^f	11.0%	48.0%	8.0%	4.0%	16.0%	11.0%	----	100 ^g
2004–05	4.7%	47.1%	7.1%	16.5%	17.7%	5.9%	1.2%	85
2005–06	25.2%	29.4%	7.6%	3.4%	21.0%	7.6%	5.9%	119
2006–07	25.2%	33.0%	4.4%	7.0%	13.0%	14.8%	2.6%	115
2007–08	27.4%	30.0%	3.4%	1.7%	23.9%	10.3%	3.4%	117

^a Season dates: Spring - Unit 17 10 May–25 May
 Fall - Units 17A & C 10 Sep–10 Oct
 Unit 17B 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, 1991–92 through 2007-08

Regulatory Year	Percent of harvest									Total
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unknown	
1991–92	80.0	---	15.5	---	---	---	---	---	4.4	45
1992–93	83.6	---	14.2	---	---	---	---	2.0	---	49
1993–94	81.8	---	15.1	---	---	---	---	3.0	---	33
1994–95	83.7	---	16.3	---	---	---	---	---	---	43
1995–96	91.3	---	6.5	---	---	---	2.2	---	---	46
1996–97	78.7	---	17.0	---	---	---	2.1	---	2.1	47
1997–98	74.2	---	18.2	---	6.1	---	---	1.5	---	66
1998–99	73.1	---	7.7	1.3	18.0	---	---	---	---	78
1999-00	58.5	---	17.1	2.4	20.7	---	---	---	1.2	82
2000-01	77.9	---	7.7	1.1	10.6	---	---	3.8	---	104
2001-02	61.3	---	11.8	---	25.8	---	---	---	---	93
2002–03	92.8	---	7.2	---	---	---	---	---	---	97
2003–04	73.0	---	16.0	---	9.0	---	---	2.0	---	100
2004-05	57.7	---	10.6	---	31.8	---	---	---	---	85
2005-06	66.4	--	10.9	---	20.2	---	0.8	1.7	---	119
2006-07	79.1	---	5.2	0.9	12.2	---	---	2.6	---	115
2007-08	69.2	---	11.1	---	18.8	---	0.9	---	---	117

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006

To: 30 June 2008

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

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

MANAGEMENT DIRECTION

MANAGEMENT GOALS

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

MANAGEMENT OBJECTIVES

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

METHODS

During the 2006–2007 and the 2007–2008 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 1,000km² 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, 75% of the bears taken were males, compared to 65% 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

2006-2007 and 2007-2008

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

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

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

Board of Game Actions and Emergency Orders The Board of Game reauthorized the brown bear tag fee exemption associated with subsistence registration permit hunting in the unit. In the winter of 2004 the Board of Game 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 2006–2007 regulatory year, the Unit 18 reported harvest was 22 bears (0 subsistence and 22 general season), and during 2007–2008 the reported harvest was 33 bears (0 subsistence and 33 general season). Nearly all of the total reported harvest occurs in the area south of the Kuskokwim River; only 12 of 182 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 17.8 bears/year, and 2) close to a 6% harvest rate of the estimated population in Unit 18 inferred from census work completed in adjacent areas. This level of harvest is not believed to

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

Harvests of brown bears have increased in response to increased hunting of the Mulchatna caribou herd in Unit 18, particularly as a result of opportunistic harvests by residents hunting in the Kilbuck Mountains. 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 2006–2007 regulatory year, 10 of 22 brown bears harvested under general hunting regulations were taken by nonresidents. During the general hunt in 2007–2008, 19 residents and 14 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 2006–2007 and 2007–2008 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 2006–2007, 20 successful hunters used airplanes to access their hunting areas and 2 used a boat. In 2007–2008, 27 successful hunters used airplanes, 1 used a boat, 3 used a snowmachine and 1 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 22 to 33 bears per year during the reporting period and represent a 6% harvest rate on the estimated population in Unit 18. As the Mulchatna caribou herd (MCH) continues to use Unit 18, we expect resident hunters to use the Kilbuck Mountains in greater numbers than a decade ago, and with that, we expect greater opportunistic bear harvest. In contrast, 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 composes the majority of hunt areas in Unit 18.

Based on harvest rates and a high proportion of males in the harvest (75%), we recommend no changes to seasons and bag limits for general season hunts. Subsistence hunts have low participation and success and should be continued as a registration permit hunt to allow use of a subsistence resource.

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

LITERATURE CITED

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

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

PERRY, P. 2009. Unit 18 brown bear management report. Pages 191–198 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2006–30 June 2008. Alaska Department of Fish and Game. Juneau, Alaska.

TABLE 1 Unit 18 general hunting season brown bear harvest, July 1997 through June 2008

Regulatory year	Total harvest	<u>Southeast of the Kuskokwim</u>								<u>North of the Yukon</u>							
		Fall harvest				Spring harvest				Fall harvest				Spring harvest			
		Before 20-Sep		After 20-Sep		Before 15-May		After 15-May		Before 20-Sep		After 20-Sep		Before 15-May		After 15-May	
		♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀
1997–1998	4			2	1			1									
1998–1999	13	2	2	1		5	1			1			1				
1999–2000	5	1			1	1		2									
2000–2001	5		1			3	1										
2001–2002	8	2	1		2			2	1								
2002–2003	14	1	2	4	3	1		3									
2003–2004	15	4	2	4	3		1			1							
2004–2005	39	6	11	8	8	1		1			1				3		
2005–2006	24	8	3	5	4	3									1		
2006–2007	22	6	5	5	2	4											
2007–2008	33	14	5	5	1			2	1	1					3		1

TABLE 2 Subsistence brown bear permits and harvest in Western Alaska Brown Bear Management Area (WABBMA) and Unit 18, 1996–2006

Regulatory year	Permits issued	Permits returned	Number hunting	Bears harvested in WABBMA ^a	Bears harvested in Unit 18
1996–1997	57	28	12	0	0
1997–1998	54	16	6	0	0
1998–1999	95	42	21	4	1
1999–2000	85	63	27	8	2
2000–2001	26	20	9	1	1
2001–2002	69	56	19	3	1
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

^a WABBMA includes Units 9, 17, 18 and portions of Units ; 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

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006
To: 30 June 2008¹

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 pressure is at the higher elevations within the Alaska Range and associated foothills (Units 19B and 19C). Harvest is generally low in other portions of the 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 sharply, and as a result, harvest declined by the early 1980s. Harvest has been fairly constant in all units except Unit 19B in which harvest increased from the late 1980s through spring 2004 (Fig. 1) to a high of 63 grizzly bears taken in regulatory year (RY) 2003 (RY = 1 July through 30 June, e.g., RY03 = 1 July 2003–30 June 2004). Since RY03 harvest in Unit 19B has declined slightly.

In 2001 the department established the Experimental Micro Management Area (EMMA) within a 20-mile radius of McGrath (528 mi²; Fig. 2). The purpose of the EMMA was to study the effects of predator management around McGrath to provide more moose for subsistence needs. This area encompasses the highest density of moose in Unit 19D East (Fig. 2) 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 includes capture and removal of grizzly bears and killing grizzly bears under predation control regulations (Keech 2005).

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

MANAGEMENT DIRECTION

MANAGEMENT GOALS

That portion of Units 19D and 19A north of the Kuskokwim River and Units 21A and 21E

- Provide the greatest sustained opportunity to hunt grizzly bears.

Unit 19D East and the EMMA

- 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 EMMA.

Units 19C and 19B upstream from the Aniak River drainage

- 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 subsistence uses of 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 and hunting methods, bear demographics, sex ratio of the harvest, and 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 EMMA.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size and Composition

Population surveys or density estimates have not been conducted in these units and 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/1000 mi² = 30 bears). Unit 19D (12,405 mi²) generally contains poor quality habitat (15 bears/1,000 mi² = 185 bears) and the population in Unit 19D East (8,513 mi²) is estimated to

be 128 grizzly 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 185 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.

<u>Units and Bag Limits</u>	<u>Resident Open Season (Subsistence and General Hunts)</u>	<u>Nonresident Open Season</u>
<u><i>RY06 and RY07</i></u>		
Units 19A and 19D. 2 bears every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun
Units 19B and 19C. One bear every regulatory year.	1 Sep–31 May	1 Sep–31 May
Units 19A and 19B downstream of and including the Aniak River drainage. One bear every regulatory year by registration permit RB600.	10 Aug–30 Jun	No open season
Units 21A and 21E. One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun

Alaska Board of Game Actions and Emergency Orders. In March 2006 the Alaska Board of Game (board) increased the bag limit to 2 bears per year in Units 19A and 19D. In May 2006 the board added brown bear to predation control efforts within the EMMA in Unit 19D East, and adopted an updated predator control implementation plan. The plan was approved for 5 years, beginning on 1 July 2004 and is up for reauthorization at the March 2009 board meeting. In addition, the board modified hunting regulations to allow hunters and bear control permittees to sell the raw hides and skulls of bears if they obtain a permit and a department legal sale tag. To our knowledge no bears have been sold.

The board also reauthorized the resident tag fee exemptions in Units 19A, 19D, and 21E in RY06 and RY07. Resident tag fee exemptions must be reauthorized each year by the board.

Harvest by Hunters. Grizzly bear harvest was highly variable among units (Tables 1a–1f). In Unit 19A, 5–16 grizzlies were harvested each year from RY03 to RY07 (Table 1a). Most harvest occurred during the fall season. Unit 19B had by far the highest harvest in the area during this 5-year period with 47–63 bears reported (Table 1b). Most of this harvest was also during the fall season. Unit 19C has historically had the second highest reported harvest in the McGrath area, however from RY03 to RY07 harvest was similar to Unit 19A with 6–15 grizzlies taken (Table 1c). Harvest in Unit 19C was highest in the fall. Unit 19D had the lowest reported harvest in all of Unit 19 (Table 1d) with 4–8 bears per year. In RY05, 2 grizzlies were killed in unknown locations within Unit 19. Harvest was low in both Units 21A and 21E with 0–10 bears reported (Tables 1e and 1f).

The 5-year mean annual harvest (RY03–RY07) for the entire area was 86 grizzly bears, a slight increase from the previous 5-year average of 82 (Peirce 2007). The proportion of males in the reported harvest averaged 60% during RY03–RY07.

Transport Methods. During RY03–RY07, the vast majority 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 RY03–RY07, nonresidents harvested 352 of the 431 bears harvested 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 and specifically in September (Table 4) which averaged 69% of all harvest.

Nonhunting Mortality

During RY06–RY07, 1 bear was killed in Unit 19A in defense of life and property near Kalskag and 1 bear was killed illegally in the Salmon River drainage of Unit 19B.

Predator Control Efforts. In 2003 the department captured and moved 9 grizzly bears (including 2 cubs-of-the-year) from the EMMA and surrounding area to distant locations. In 2004 we relocated 1 grizzly from the EMMA.

The department began issuing grizzly bear control permits on 1 September 2006 in the Unit 19D Black and Grizzly Bear Control Area. Predation control permittees were required to follow the requirements and restrictions included in the Alaska Hunting Regulations, except that predation control permittees could take an unlimited number of grizzly bears, they could use bait and up to 10 bait stations, and could take grizzly bears same-day-airborne at those bait stations. During RY06, 2 grizzly bear control permits were issued but no bears were taken. In RY07, 4 grizzly bear control permits were issued and no bears were taken. In RY08, 7 grizzly bear control permits were issued and 3 grizzlies were taken over bait in the EMMA by predator control permittees.

CONCLUSIONS AND RECOMMENDATIONS

Grizzly bear harvest has been stable in all units except Unit 19B where harvest increased steadily from RY88 to RY03 (Fig. 1). This substantial increase occurred primarily in the fall and may be due to changing guiding pressures as the Mulchatna herd continues to decline. Males still represent the majority of grizzlies harvested in Unit 19B at 58% (RY03–RY07) and the age structure of bears harvested has changed little since RY88. From RY88 to RY97 and RY98 to RY07, over half of all bears harvested were under 6 years of age and over the same time frame there has not been a significant decline in skull size of bears harvested. In Unit 19B, while harvest has increased from approximately 7% of the estimated population in RY00 to approximately 10% of the estimated population in RY07, at this time data do not indicate overharvest is occurring. In the central Alaska Range, Reynolds (1997) found that continued harvest rates of 10–12% were not sustainable. Therefore, although no changes are recommended to seasons and bag limits at this time, close monitoring of harvest in Unit 19B should continue.

Sex ratios of harvested bears continue to favor males in all units, including Unit 19B. Harvest reporting by local residents still appears to be low in remote areas and the recent resident tag fee exemptions have had little effect on harvest. Additionally, the bear control program in the EMMA has generated little additional effort and to date only 3 grizzly bears have been taken under this program. It is unlikely this has influenced moose calf survival as intended and the current program has been ineffective to date.

The management objective of fewer than 100 total bears taken with at least 50% of them males throughout the area was met during RY06–RY07.

For the next reporting period the management goals will be:

MANAGEMENT GOALS

Unit 19D East and the EMMA

- 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 EMMA.

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.

LITERATURE CITED

- BOUDREAU, T. A. 2005. Units 19, 21A, and 21E brown bear. Pages 190–202 *in* C. Brown, editor. Brown bear management report of survey and inventory activities 1 July 2002–30 June 2004. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.
- KEECH, M. A. 2005. Factors limiting moose at low density in Unit 19D East, and response of moose to wolf control. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Performance Report. Grants W-27-5 and W-33-1 through W-33-3. Project 1.58. Juneau, Alaska, USA.
- MILLER, S., G. C. WHITE, R. A. SELLERS, H. V. REYNOLDS, J. W. SCHOEN, K. TITUS, V. G. BARNES, JR., R. B. SMITH, R. R. NELSON, W. B. BALLARD, AND C. C. SCHWARTZ. 1997. Brown and black bear density estimation in Alaska using radiotelemetry and replicated mark-resight techniques. Wildlife Monographs 133.
- PEGAU, R. 1987. Unit 19 brown bear. Pages 42–43 *in* B. Townsend, editor. Brown bear management report of survey and inventory activities. Part V. Volume XVIII. Alaska Department of Fish and Game. Study 4.0. Juneau, Alaska, USA.
- PEIRCE, J. M. 2007. Units 19, 21A, and 21E brown bear. Pages 195–211 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2004–30 June 2006. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.
- REYNOLDS, H. V. 1997. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-24-1, W-24-2, W-24-3 and W-24-4. Study 4.25. Juneau, Alaska, USA.

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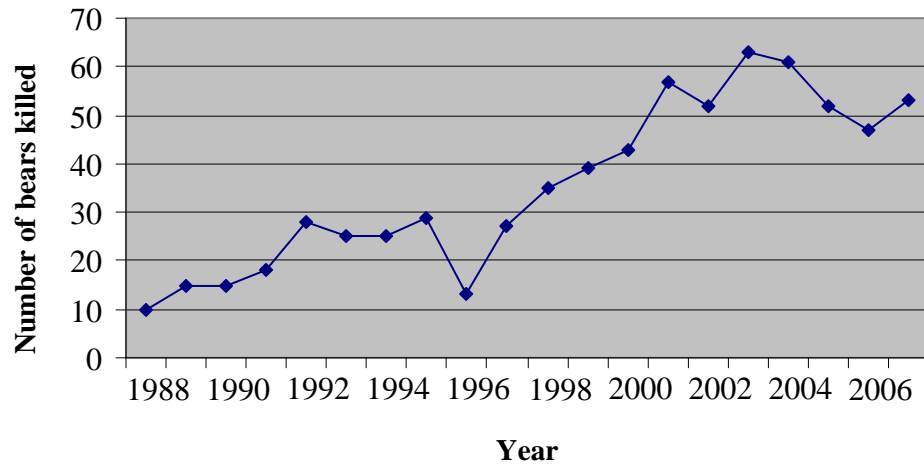


FIGURE 1 Number of grizzly bears killed in Unit 19B by regulatory year

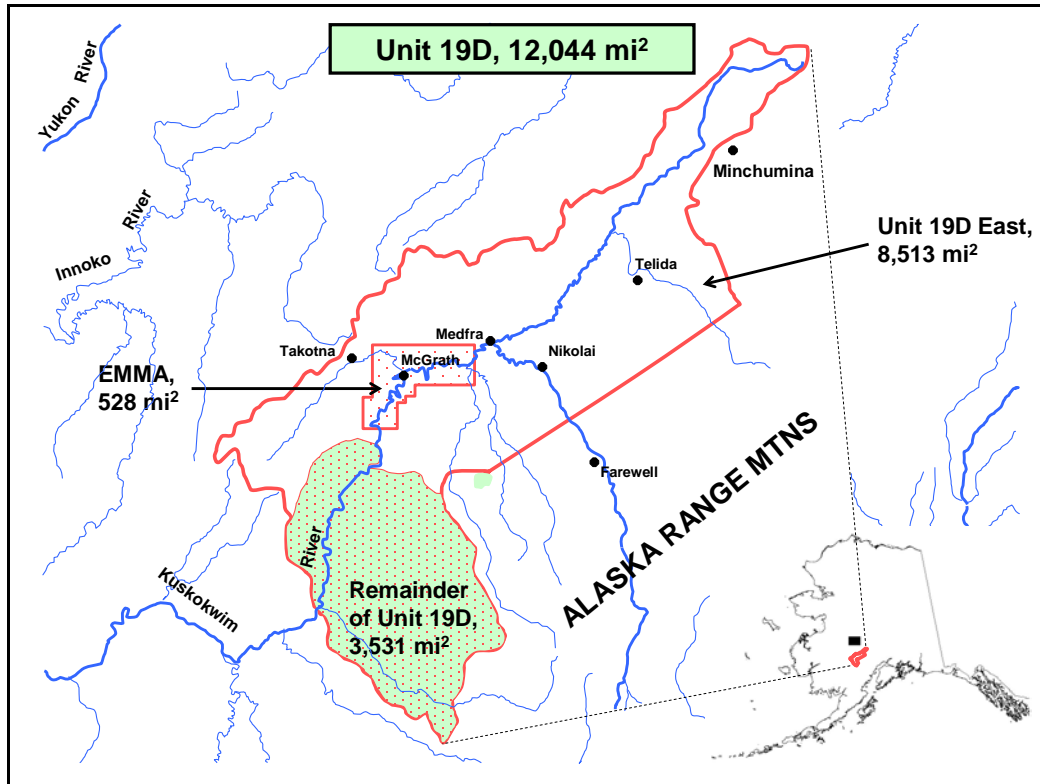


FIGURE 2 Detail area map of Unit 19D

TABLE 1A Unit 19A grizzly bear harvest by type of kill, regulatory years 2003–2004 through 2007–2008

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F	Unk	Total
2003–2004													
Fall 2003	4	1	0	5	0	0	0	0	4	(80)	1	0	5
Spring 2004	0	1	0	1	0	0	0	0	0	(0)	1	0	1
Total	4	2	0	6	0	0	0	0	4	(67)	2	0	6
2004–2005													
Fall 2004	4	5	0	9	0	0	0	0	4	(44)	5	0	9
Spring 2005	0	1	0	1	0	0	0	0	0	(0)	1	0	1
Total	4	6	0	10	0	0	0	0	4	(40)	6	0	10
2005–2006													
Fall 2005	1	2	0	3	1	0	0	1	2	(50)	2	0	4
Spring 2006	1	0	0	1	0	0	0	0	1	(100)	0	0	1
Total	2	2	0	4	1	0	0	1	3	(60)	2	0	5
2006–2007													
Fall 2006	2	3	0	5	0	0	0	0	2	(40)	3	0	5
Spring 2007	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Total	2	3	0	5	0	0	0	0	2	(40)	3	0	5
2007–2008													
Fall 2007	7	2	0	9	1	0	0	1	8	(80)	2	0	10
Spring 2008	5	1	0	6	0	0	0	0	5	(83)	1	0	6
Total	12	3	0	15	1	0	0	1	13	(81)	3	0	16
Total	24	16	0	40	2	0	0	2	26		16	0	42
Avg/Yr	5	3	0	8	0	0	0	0	5	(58)	3	0	8

TABLE 1B Unit 19B grizzly bear harvest by type of kill, regulatory years 2003–2004 through 2007–2008

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F	Unk	Total
2003–2004													
Fall 2003	29	25	0	54	0	1	0	1	29	(53)	26	0	55
Spring 2004	5	3	0	8	0	0	0	0	5	(63)	3	0	8
Total	34	28	0	62	0	1	0	1	34	(54)	29	0	63
2004–2005													
Fall 2004	26	15	2	43	0	0	1	1	26	(59)	15	3	44
Spring 2005	9	8	0	17	0	0	0	0	9	(53)	8	0	17
Total	35	23	2	60	0	0	1	1	35	(57)	23	3	61
2005–2006													
Fall 2005	27	9	0	36	0	0	0	0	27	(75)	9	0	36
Spring 2006	10	6	0	16	0	0	0	0	10	(63)	6	0	16
Total	37	15	0	52	0	0	0	0	37	(71)	15	0	52
2006–2007													
Fall 2006	19	13	0	32	0	0	0	0	19	(59)	13	0	32
Spring 2007	4	11	0	15	0	0	0	0	4	(27)	11	0	15
Total	23	24	0	47	0	0	0	0	23	(49)	24	0	47
2007–2008													
Fall 2007	26	19	0	45	0	1	0	1	26	(57)	20	0	46
Spring 2008	3	4	0	7	0	0	0	0	3	(43)	4	0	7
Total	29	23	0	52	0	1	0	1	29	(55)	24	0	53
Total	158	113	2	273	0	2	1	3	158		115	3	276
Avg/Yr	32	23	0	55	0	0	0	1	32	(57)	23	0	55

TABLE 1C Unit 19C grizzly bear harvest by type of kill, regulatory years 2003–2004 through 2007–2008

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F	Unk	Total
<i>2003–2004</i>													
Fall 2003	2	2	0	4	0	0	0	0	2	(50)	2	0	4
Spring 2004	1	1	0	2	0	0	0	0	1	(50)	1	0	2
Total	3	3	0	6	0	0	0	0	3	(50)	3	0	6
<i>2004–2005</i>													
Fall 2004	5	1	0	6	0	0	0	0	5	(83)	1	0	6
Spring 2005	2	0	0	2	0	0	0	0	2	(100)	0	0	2
Total	7	1	0	8	0	0	0	0	7	(88)	1	0	8
<i>2005–2006</i>													
Fall 2005	6	4	0	10	0	0	0	0	6	(60)	4	0	10
Spring 2006	3	2	0	5	0	0	0	0	3	(60)	2	0	5
Total	9	6	0	15	0	0	0	0	9	(60)	6	0	15
<i>2006–2007</i>													
Fall 2006	7	6	0	13	0	0	0	0	7	(54)	6	0	13
Spring 2007	2	0	0	2	0	0	0	0	2	(100)	0	0	2
Total	9	6	0	15	0	0	0	0	9	(60)	6	0	15
<i>2007–2008</i>													
Fall 2007	3	3	0	6	0	0	0	0	3	(50)	3	0	6
Spring 2008	1	0	0	1	0	0	0	0	1	(100)	0	0	1
Total	4	3	0	7	0	0	0	0	4	(57)	3	0	7
Total	32	19	0	51	0	0	0	0	32		19	0	51
Avg/Yr	6	4	0	10	0	0	0	0	6	(63)	4	0	10

TABLE 1D Unit 19D grizzly bear harvest by type of kill, regulatory years 2003–2004 through 2007–2008

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill			Unk	Total
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F		
2003–2004													
Fall 2003	2	1	0	3	0	0	0	0	2	(67)	1	0	3
Spring 2004	1	0	0	1	0	0	0	0	1	(100)	0	0	1
Total	3	1	0	4	0	0	0	0	3	(75)	1	0	4
2004–2005													
Fall 2004	2	2	0	4	1	0	0	1	3	(60)	2	0	5
Spring 2005	1	0	0	1	0	0	0	0	1	(100)	0	0	1
Total	3	2	0	5	1	0	0	1	4	(67)	2	0	6
2005–2006													
Fall 2005	7	0	0	7	0	0	0	0	7	(100)	0	0	7
Spring 2006	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Total	7	0	0	7	0	0	0	0	7	(100)	0	0	7
2006–2007													
Fall 2006	5	1	0	6	0	0	0	0	5	(83)	1	0	6
Spring 2007	1	0	0	1	0	0	0	0	1	(100)	0	0	1
Total	6	1	0	7	0	0	0	0	6	(86)	1	0	7
2007–2008													
Fall 2007	2	0	0	2	0	4	0	4	2	(33)	4	0	6
Spring 2008	2	0	0	2	0	0	0	0	2	(100)	0	0	2
Total	4	0	0	4	0	4	0	4	4	(50)	4	0	8
Total	23	8	0	31	1	0	0	1	24		8	0	32
Avg/Yr	5	2	0	6	0	0	0	0	5	(75)	2	0	6

TABLE 1E Unit 21A grizzly bear harvest by type of kill, regulatory years 2003–2004 through 2007–2008

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F	Unk	Total
<i>2003–2004</i>													
Fall 2003	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Spring 2004	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Total	0	0	0	0	0	0	0	0	0	n/a	0	0	0
<i>2004–2005</i>													
Fall 2004	0	2	0	2	0	0	0	0	0	(0)	2	0	2
Spring 2005	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Total	0	2	0	2	0	0	0	0	0	(0)	2	0	2
<i>2005–2006</i>													
Fall 2005	2	0	0	2	0	0	0	0	2	(100)	0	0	2
Spring 2006	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Total	2	0	0	2	0	0	0	0	2	(100)	0	0	2
<i>2006–2007</i>													
Fall 2006	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Spring 2007	0	1	0	1	0	0	0	0	0	(0)	1	0	1
Total	0	1	0	1	0	0	0	0	0	(0)	1	0	1
<i>2007–2008</i>													
Fall 2007	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Spring 2008	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
Total	2	3	0	5	0	0	0	0	2		3	0	5
Avg/Yr	0	1	0	1	0	0	0	0	0	(40)	1	0	1

TABLE 1F Unit 21E grizzly bear harvest by type of kill, regulatory years 2003–2004 through 2007–2008

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F	Unk	Total
<i>2003–2004</i>													
Fall 2003	0	2	0	2	0	0	0	0	0	(0)	2	0	2
Spring 2004	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Total	0	2	0	2	0	0	0	0	0	(0)	2	0	2
<i>2004–2005</i>													
Fall 2004	0	0	0	0	0	0	0	0	0	n/a	0	0	0
Spring 2005	1	0	0	1	0	0	0	0	1	(100)	0	0	1
Total	1	0	0	1	0	0	0	0	1	(100)	0	0	1
<i>2005–2006</i>													
Fall 2005	4	1	0	5	0	0	0	0	4	(80)	1	0	5
Spring 2006	0	1	0	1	0	0	0	0	0	(0)	1	0	1
Total	4	2	0	6	0	0	0	0	4	(67)	2	0	6
<i>2006–2007</i>													
Fall 2006	7	2	0	9	0	0	0	0	7	(78)	2	0	9
Spring 2007	0	1	0	1	0	0	0	0	0	(0)	1	0	1
Total	7	3	0	10	0	0	0	0	7	(70)	3	0	10
<i>2007–2008</i>													
Fall 2007	2	0	0	2	0	0	0	0	2	(100)	0	0	2
Spring 2008	2	0	0	2	0	0	0	0	2	(100)	0	0	2
Total	4	0	0	4	0	0	0	0	4	(100)	0	0	4
Total	16	7	0	23	0	0	0	0	16		7	0	23
Avg/Yr	3	1	0	5	0	0	0	0	3	(70)	1	0	5

TABLE 2 Units 19, 21A, and 21E percent grizzly bear harvest^a by transport method, regulatory years 2003–2004 through 2007–2008

Regulatory year	Percent harvest by transport method									<i>n</i>
	Airplane	Dog team/ Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	
2003–2004	88	0	5	5	0	0	0	1	1	81
2004–2005	88	0	5	0	5	0	1	1	1	88
2005–2006	86	1	6	1	4	0	0	2	0	89
2006–2007	89	0	5	0	5	0	0	2	0	85
2007–2008	85	0	5	0	3	0	0	6	1	88
Total <i>n</i>	374	1	21	5	15	0	1	11	3	431
Avg <i>n</i> /Yr	75	0	4	1	3	0	0	2	1	86

^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 2003–2004 through 2007–2008^a

Regulatory year	Local resident ^b	Nonlocal resident	Nonresident	Total successful
2003–2004	3	8	70	81
2004–2005	8	10	70	88
2005–2006	3	10	76	89
2006–2007	6	14	65	85
2007–2008	7	10	71	88
Total	27	52	352	431
Avg/Yr	5	10	70	86

^a Includes defense of life or property kills.

^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 2003–2004 through 2007–2008

Regulatory	Harvest chronology by month (%)						
year	Aug	Sep	Oct	Apr	May	Other	<i>n</i>
2003–2004	4 (5)	73 (90)	1 (1)	2 (2)	1 (1)	0 (0)	81
2004–2005	4 (5)	66 (75)	3 (3)	7 (8)	6 (7)	2 (2)	88
2005–2006	3 (3)	60 (67)	1 (1)	16 (18)	7 (8)	2 (2)	89
2006–2007	0 (0)	53 (62)	3 (4)	19 (22)	8 (9)	2 (2)	85
2007–2008	14 (16)	45 (51)	3 (3)	10 (11)	12 (14)	4 (5)	88
Total	25 (6)	297 (69)	11 (3)	54 (13)	34 (8)	10 (2)	431
Avg/Yr	5 (6)	59 (69)	2 (3)	11 (13)	7 (8)	2 (2)	86

^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 2006
To: 30 June 2008¹

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, the department initiated a long-term grizzly bear research project in Unit 20A in 1981 to 1) gather baseline data on population status and reproductive biology (1981–1985; Reynolds and Hechtel 1986); 2) study the effects of high exploitation rates on grizzly bear population dynamics (1986–1991; Reynolds and Boudreau 1992; Reynolds 1993); and 3) measure recovery (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 2005), 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

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

humans. These estimates provided more precise measures of harvest rates across the 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 with 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., RY06 = 1 Jul 2006 through 30 Jun 2007), 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.

Because of the high number of grizzly bears taken in DLP in the Fairbanks vicinity during summer 2007, we collected tissue samples from those bears for DNA analysis to determine relatedness of those individuals. Samples were sent to Wildlife Genetics International (Nelson, British Columbia, Canada) for 22-locus microsatellite genotype analysis. The purpose of investigating relatedness of bears taken in DLP over the long term is to determine whether these bears tend to be "residents" (i.e., related) or "transients" (i.e., unrelated). This information could be beneficial in developing a management strategy to address grizzly bear–human conflicts in the Fairbanks vicinity in the future.

POPULATION SIZE AND DENSITY

In June 1993, Reynolds and Eagan (Eagan 1995) categorized uniform coding units in Units 20A, 20B, 20C, 20F, and 25C into 4 grizzly bear density strata: low, medium, high, and super. The low-density stratum consisted of areas with significant human development, poorly drained soils (or permafrost), and black spruce. The medium-density stratum included upland forest and tundra

habitats at elevations generally between 500 and 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 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 prereduction 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 prereduction levels by 2002.

The Tanana Flats in Unit 20A provide relatively poor grizzly bear habitat, resulting in low densities. Some grizzly bears on the Tanana Flats probably 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 rated medium density because the area was better habitat and relatively inaccessible.

Unit 20C. Eagan (1995) classified the mountainous portion of Unit 20C into the super-density stratum (52–78 bears/1000 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 bears/1000 mi² (6.2 grizzly bears/1000 km²). However, this estimate is likely conservative based on recent work in Unit 20E (C. Gardner, ADF&G, personal communication) 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. Females exhibited high fidelity to home ranges and little emigration or immigration (Reynolds 1993).

MORTALITY

Harvest

Season and Bag Limit. From RY90 through RY93, the season for grizzly bears was 1 September–31 May with a bag limit of 1 bear every 4 regulatory years (1 bear/4 yr). Cubs (<2 yr of age) and females accompanied by cubs were illegal to harvest. Commensurate 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 Sep–31 May) based on evidence that the population had recovered to prereduction levels. All other areas covered in this report retained the 1 September opening. Beginning RY04 the board liberalized the bag limit from 1 bear/4 years to 1 bear/year in all units. These seasons and bag limits applied to both resident and nonresident hunters.

Harvest by Hunters. Total harvest by hunters in Units 20A, 20B, 20C, 20F, and 25C was higher in RY05–RY07 (\bar{x} = 38.7) than during RY02–RY04 (\bar{x} = 31.7) (Tables 1a–e). Other human-caused mortality (DLP kills, illegal kills, etc.) also was higher in RY05–RY07 (\bar{x} = 5.3) than during the previous 3-year period (\bar{x} = 2.7).

Harvest Zones.

Unit 20A Mountains — We estimate the 3-year (2005–2007) mean annual human-caused mortality (14.7 bears) was approximately 11–13% of bears ≥ 2 years old, 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 (2005–2007) mean annual human-caused mortality of 7.7 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 (2005–2007) mean annual human-caused mortality of 20.3 brown bears ≥ 2 years of age and met 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 (2005–2007) mean annual human-caused mortality of bears ≥ 2 years of age for western Unit 20B with 3.0 bears (objective ≤ 3 bears), Unit 20C with 4.7 bears (objective ≤ 7 bears), and Unit 20F with 2.3 bears (objective ≤ 7 bears), but exceeded the objective for Unit 20A Tanana Flats with 4.0 bears (objective ≤ 3 bears) and Unit 25C with 6.7 bears (objective ≤ 6 bears).

Percent Males in Harvest by Unit. The objective for a 3-year (RY05–RY07) mean proportion of $\geq 55\%$ males in the harvest was met in all units (Unit 20A = 56%, Unit 20B = 58%, Unit 20C = 83%, Unit 20F = 67%, and Unit 25C = 67%; Tables 1a–e).

Hunter Residency and Success. As in previous years, Alaska residents harvested the majority (74%) of the grizzly bears during RY05–RY07 (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 again dropped to 23% in RY07 (Table 5). Thus it appears the increase during RY04–RY06 may have been temporary rather than a long-term change in trend.

Nonhunting Mortality. During summer 2007 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 and the number taken in 2008 was 3 bears (an adult female with 2 yearlings). 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 tended to avoid recent large-scale burns (C. Gardner, ADF&G biologist, personal communication)

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 this 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), but 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. We have observed steady improvement in the proportion of males in the harvest. For example, we met the objective of 55% males in the harvest in 2 of 5 units during RY02–RY03, 4 of 5 units in RY04–RY05, and 5 of 5 units in RY06–RY07.

We recommend continued harvest monitoring, particularly in areas with high harvest densities or small harvest quotas, and to encourage hunters to select for males. We will continue to address this issue through education (e.g., Public Information Service and bear hunting seminars). We recommend stepping up the “Take a Closer Look” program to educate hunters.

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 high and has been improving. Second, in areas where we have exceeded the recommended harvest, the overharvest has been minimal, except in Unit 20A. 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 (i.e., the Delta herd in Unit 20A and the Fortymile herd in portions of Units 20B and 25C); with this designation, managing these populations for elevated yields is mandated by statute.

LITERATURE CITED

- BALLARD, W. B., AND S. D. MILLER. 1990. Effects of reducing brown bear density on moose calf survival in Southcentral Alaska. *Alces* 26:9–13.
- , T. H. SPRAKER, AND K. P. TAYLOR. 1981. Causes of neonatal moose calf mortality in Southcentral Alaska. *Journal of Wildlife Management* 45:335–342.
- BOERTJE, R. D., D. G. KELLEYHOUSE, AND R. D. HAYES. 1995. Methods for reducing natural predation on moose in Alaska and Yukon: an evaluation. Pages 505–513 *in* L. G. Carbyn, S. H. Fritts, and D. R. Seip, editors. *Ecology and conservation of wolves in a changing*

- world. Canadian Circumpolar Institute Occasional Publication 35, Edmonton, Alberta, Canada.
- , C. T. SEATON, D. D. YOUNG, M. A. KEECH, AND B. W. DALE. 2000. Factors limiting moose at high densities in Unit 20A. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Performance Report. Grant W-27-3. Study 1.51. Juneau, Alaska, USA.
- DEAN, F. C. 1987. Brown bear density Denali National Park, Alaska, and sighting efficiency adjustment. *International Conference on Bear Research and Management* 7:37–43.
- EAGAN, R. M. 1995. Units 20A, 20B, 20C, 20F, and 25C brown bear. Pages 192–212 *in* M. V. Hicks, editor. Brown bear management report of survey and inventory activities. Alaska Department of Fish and Game. Study 4.0. Juneau, Alaska, USA.
- GASAWAY, W. C., R. D. BOERTJE, D. V. GRANGAARD, D. G. KELLEYHOUSE, R. O. STEPHENSON, AND D. G. LARSEN. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. *Wildlife Monographs* 120.
- , R. O. STEPHENSON, J. L. DAVIS, P. E. K. SHEPHERD, AND O. E. BURRIS. 1983. Interrelationships of wolves, prey, and man in Interior Alaska. *Wildlife Monographs* 84.
- KEECH, M. A. 1999. Life history consequences of maternal condition in Alaskan moose. Thesis, University of Alaska Fairbanks, Alaska, USA.
- . 2005. Factors limiting moose at low density in Unit 19D East, and response of moose to wolf control. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Performance Report. Grants W-27-5, W-33-1, and W-33-3. Project 1.58. Juneau, Alaska USA. <http://www.wildlife.alaska.gov/pubs/techpubs/research_pdfs/mo-19d-wolf05.pdf> Accessed 3 April 2009.
- MCNAY, M. E. 1990. Units 20A, 20B, 20C, 20F, and 25C brown bear. Pages 121–136 *in* S. O. Morgan, editor. Brown bear management report of survey and inventory activities. Alaska Department of Fish and Game. Study 4.0. Juneau, Alaska, USA.
- MILLER, S. D. 1990. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-23-3. Study 4.21. Juneau, Alaska, USA.
- REYNOLDS, H. V. 1993. Evaluation of the effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grant W-23-5. Study 4.23. Juneau, Alaska, USA.
- . 1997. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration.

- Research Final Report. Grants W-24-1, W-24-2, W-24-3 and W-24-4. Study 4.25. Juneau, Alaska, USA.
- . 1999. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-24-5 and W-27-1. Study 4.28. Juneau, Alaska, USA.
- , AND T. A. BOUDREAU. 1992. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-5, W-22-6, W-23-1, W-23-2, W-23-3, and W-23-4. Study 4.19. Juneau, Alaska, USA.
- , AND J. L. HECHTEL. 1986. Population structure, reproductive biology, and movement patterns of grizzly bears in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-21-2, W-22-2, W-22-3, and W-22-4. Study 4.16R. Juneau, Alaska, USA.
- TESTA, W. 2004. Population dynamics and life history trade-offs in moose (*Alces alces*) in south-central Alaska. *Ecology* 85:1439–1452.
- TOBEY, R. W. 2005. Unit 13 brown bear. Pages 137–147 in C. Brown, editor. Brown bear management report of survey and inventory activities 1 July 2002–30 June 2004. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.
- VALKENBURG, P. 1997. Investigation of regulating and limiting factors in the Delta caribou herd. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-23-5, W-24-1, W-24-2, W-24-3, and W-24-4. Study 3.37. Juneau, Alaska, USA.
- YOUNG, D. D., JR. 2007. Units 20A, 20B, 20C, 20F, and 25C brown bear. Pages 212–228 in P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2004–30 June 2006. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

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TABLE 1A Unit 20A grizzly bear harvest, regulatory years 2002–2003 through 2007–2008

Regulatory year	Reported												% Males
	Hunter kill ^a				Nonhunting kill ^b			Total estimated kill ^c					
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total		
2002–2003													
Fall 2002	5	5	0	10	0	0	0	5	5	0	10		
Spring 2003	0	0	0	0	0	0	0	0	0	0	0		
Total	5	5	0	10	0	0	0	5	5	0	10	50	
2003–2004													
Fall 2003	6	5	0	11	0	0	0	6	5	0	11		
Spring 2004	0	2	0	2	0	0	0	0	2	0	2		
Total	6	7	0	13	0	0	0	6	7	0	13	46	
2004–2005													
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	
2005–2006													
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	
2006–2007													
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	
2007–2008													
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	

^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 2002–2003 through 2007–2008

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			
2002–2003														
Fall 2002	5	3	0	8	1	0	0	6	3	0	9			
Spring 2003	0	1	0	1	0	0	0	0	1	0	1			
Total	5	4	0	9	1	0	0	6	4	0	10	60		
2003–2004														
Fall 2003	1	0	0	1	1	2	0	2	2	0	4			
Spring 2004	0	0	0	0	0	1	1	0	1	1	2			
Total	1	0	0	1	1	3	1	2	3	1	6	40		
2004–2005														
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		
2005–2006														
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		
2006–2007														
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		
2007–2008														
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		

^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 2002–2003 through 2007–2008

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>2002–2003</i>												
Fall 2002	1	5	0	6	0	0	0	1	5	0	6	
Spring 2003	0	0	0	0	0	0	0	0	0	0	0	
Total	1	5	0	6	0	0	0	1	5	0	6	17
<i>2003–2004</i>												
Fall 2003	2	0	0	2	0	0	0	2	0	0	2	
Spring 2004	0	0	0	0	0	0	0	0	0	0	0	
Total	2	0	0	2	0	0	0	2	0	0	2	100
<i>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

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 2002–2003 through 2007–2008

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>2002–2003</i>												
Fall 2002	1	0	0	1	0	0	0	1	0	0	1	
Spring 2003	0	1	0	1	0	0	0	0	1	0	1	
Total	1	1	0	2	0	0	0	1	1	0	2	50
<i>2003–2004</i>												
Fall 2003	0	1	0	1	0	0	0	0	1	0	1	
Spring 2004	1	0	0	1	0	0	0	1	0	0	1	
Total	1	1	0	2	0	0	0	1	1	0	2	50
<i>2004–2005</i>												
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
<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	1	2	0	3	0	0	0	1	2	0	3	
Spring 2007	1	0	0	1	0	0	0	1	0	0	1	
Total	2	2	0	4	0	0	0	2	2	0	4	50
<i>2007–2008</i>												
Fall 2007	0	0	0	0	0	0	0	0	0	0	0	
Spring 2008	1	0	0	1	0	0	0	1	0	0	1	
Total	1	0	0	1	0	0	0	1	0	0	1	100

^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 2002–2003 through 2007–2008

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>2002–2003</i>												
Fall 2002	3	0	0	3	0	0	0	3	0	0	3	
Spring 2003	0	0	0	0	0	0	0	0	0	0	0	
Total	3	0	0	3	0	0	0	3	0	0	3	100
<i>2003–2004</i>												
Fall 2003	0	0	0	0	0	0	0	0	0	0	0	
Spring 2004	0	1	0	1	0	0	0	0	1	0	1	
Total	0	1	0	1	0	0	0	0	1	0	1	0
<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>2007–2008</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

^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 2002 through 2007

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	2002	10 (1)	9	11.3	10.3	2.9
		2003	9 (0)	8	10.3	9.3	2.6
		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
Eastern half of Unit 20B	4,929	2002	8 (1)	8	7.3	7.0	1.6
		2003	3 (1)	3	5.0	5.0	0.6
		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
Unit 20A Flats, western half of Unit 20B, Unit 20C outside Denali National Park, Units 20F and 25C	26,278 ^e	2002	19 (2)	18	18.0	16.7	0.7
		2003	9 (1)	9	14.0	13.7	1.8
		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

^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 2002–2003 through 2007–2008

Regulatory year	Resident (%)	Nonresident (%)	Unknown (%)	<i>n</i>
2002–2003	22 (73)	8 (27)	0 (0)	30
2003–2004	13 (68)	6 (32)	0 (0)	19
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

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

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

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

TABLE 4 Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest chronology percent by month/day, regulatory years 2002–2003 through 2007–2008

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		
2002–2003	60	27	7	93	0	7	0	7	30
2003–2004	68	11	0	79	11	0	11	21	19
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

^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 2002–2003 through 2007–2008

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	
2002–2003	27	7	23	27	0	7	3	7	30
2003–2004	53	5	5	21	0	0	16	0	19
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

^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 on 19 August 2006 in Unit 20F and another bear on 29 August 2006 in Unit 25C.

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

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006
To: 30 June 2008¹

LOCATION

GAME MANAGEMENT UNIT: 20D (5637 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 Jul through 30 Jun; e.g., RY91 = 1 Jul 1991 through 30 Jun 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 resident tag fee exemption was expanded to the entire 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

I calculated brown bear population estimates for Unit 20D in May 1993. The Unit 20D estimate was 185–220 total bears, with 140–167 bears ≥ 2 years old. For the population estimate, I calculated separate estimates for Unit 20D north and south of the Tanana River as described below. I used these estimates during RY06–RY07 even though harvest rates have increased since 1993 and evidence suggests that brown bears largely vacate recent large burns such as occurred in 2003–2004. Anecdotal observations indicate that brown bears remain common to abundant in the unit and I 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/1000 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 4000-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/1000 mi² in unburned habitat in May, plus 23% for cubs and yearlings. C. Gardner (ADF&G, unpublished data) 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 RY06–RY07 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 Unit 20D during each year of this reporting period.

Harvest by Hunters and Other Mortality.

RY06 — Hunters killed 11 bears and 1 bear was killed in defense of life or property (Table 1). The harvest by hunters met the harvest objective. The 3-year average mortality was 54% males which is 1% below the management objective. Eleven bears were killed in Unit 20D south of the Tanana River and 1 north of the Tanana River (Table 1). Nine bears were killed during fall and 3 were killed during spring (Table 2). The total reported mortality of 12 bears was an estimated 5–6% of the unitwide brown bear population and 7–9% of bears ≥ 2 years old.

I estimated that 1 bear was killed each year and not reported. Adding this estimated mortality to known mortality results in total estimated mortality of 13 bears or $< 7\%$ of the estimated total population for the unit (Table 2).

RY07 — Hunters killed 6 bears (Table 1) and met the harvest objective. The 3-year average mortality was 56% males, which meets the management objective. Hunters killed 4 bears in southern Unit 20D and 2 north of the Tanana River.

The total reported mortality of 6 bears was an estimated 3% of the unitwide brown bear population and 4% of the estimated bears ≥ 2 years old.

I estimated that 1 bear was killed each year and not reported. Adding this estimated mortality to reported mortality results in estimated total mortality of 7 bears (Table 2).

Hunter Residency and Success. Most brown bears continued to be killed in Unit 20D by Alaska residents. During RY06–RY07, local residents killed 67% of bears, nonlocal residents killed 28%, and nonresidents killed 6% (Table 3).

Harvest Chronology. No substantive changes occurred in previous patterns of harvest chronology during RY06–RY07. 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 RY06–RY07 the most commonly used transportation types for hunting brown bears in Unit 20D were 3- or 4-wheelers (Table 5).

CONCLUSIONS AND RECOMMENDATIONS

The harvest objective of 5–15 bears per year was met in RY06–RY07, although the objective to harvest predominantly male bears was not met in RY06. 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 liberalized the season and bag limit in Unit 20D so that regulations were uniform throughout the unit.

Annual mortality increased in Unit 20D after the \$25 resident tag fee was eliminated in portions of Unit 20D beginning in 1992. Based on my population estimates, brown bear mortality may be exceeding sustainable levels in southern Unit 20D. A substantial portion of the brown bear mortality west of the Gerstle River 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.

LITERATURE CITED

- BOERTJE, R. D., W. C. GASAWAY, D. V. GRANGAARD, D. G. KELLEYHOUSE, AND R. O. STEPHENSON. 1987. Factors limiting moose population growth in Subunit 20E. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-22-5. Study 1.37. Juneau, Alaska, USA.
- GASAWAY, W. C., R. D. BOERTJE, D. V. GRANGAARD, D. G. KELLEYHOUSE, R. O. STEPHENSON, AND D. G. LARSEN. 1990. Factors limiting moose population growth in Subunit 20E. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-3 and W-23-3. Study 1.37. Juneau, Alaska, USA.
- REYNOLDS, H. V. 1990. Population dynamics of a hunted grizzly bear population in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-23-2. Study 4.19. Juneau, Alaska, USA.

———. 1993. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-24-1. Study 4.25. Juneau, Alaska, USA.

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TABLE 1 Unit 20D brown bear mortality^a with differing hunting regulations, regulatory years 1987–1988 through 2007–2008

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		

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					
	1 bear/yr, 10 Aug–30 Jun, no tag fee ^b												
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
Total kill	15	14	9	4	0	0	24	18	5	5	29	23	52
Kill/Year	Avg 6		Avg 3		Avg 0		Avg 8		Avg 2		Avg 10		
% Male	52		69		0		57		50		56		

^a Includes nonhunting mortality.

^b Hunting regulation.

TABLE 2 Unit 20D brown bear mortality^a, regulatory years 2000–2001 through 2007–2008

Regulatory year	Reported							Total reported and estimated kill					
	Hunter kill				Nonhunting kill ^a			Estimated kill		estimated kill			
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M	F	Unk	Total
<i>2000–2001</i>													
Fall 2000	7	5	0	12	1	2	0	1	0	8	7	1	16
Spring 2001	4	0	0	4	1	0	0	0	0	5	0	0	5
Total	11	5	0	16	2	2	0	1	0	13	7	1	21
<i>2001–2002</i>													
Fall 2001	6	3	1	10	1	0	0	1	0	7	3	2	12
Spring 2002	1	0	0	1	0	0	0	0	0	1	0	0	1
Total	7	3	1	11	1	0	0	1	0	8	3	2	13
<i>2002–2003</i>													
Fall 2002	4	4	0	8	0	0	0	1	0	4	4	1	9
Spring 2003	3	2	0	5	0	0	0	0	0	3	2	0	5
Total	7	6	0	13	0	0	0	1	0	7	6	1	14
<i>2003–2004</i>													
Fall 2003	3	0	0	3	0	0	0	1	0	3	0	1	4
Spring 2004	1	1	0	2	0	0	0	0	0	1	1	0	2
Total	4	1	0	5	0	0	0	1	0	4	1	1	6
<i>2004–2005</i>													
Fall 2004	5	7	0	12	0	0	0	1	0	5	7	1	13
Spring 2005	2	1	0	3	0	0	0	0	0	2	1	0	3
Total	7	8	0	15	0	0	0	1	0	7	8	1	16
<i>2005–2006</i>													
Fall 2005	5	4	0	9	0	0	0	1	0	5	4	1	10
Spring 2006	1	4	0	5	0	0	0	0	0	1	4	0	5
Total	6	8	0	14	0	0	0	1	0	6	8	1	15
<i>2006–2007</i>													
Fall 2006	6	2	0	8	1	0	0	1	0	7	2	1	10
Spring 2007	2	1	0	3	0	0	0	0	0	2	1	0	3
Total	8	3	0	11	1	0	0	1	0	9	3	1	13

Regulatory year	Reported							Estimated kill		Total reported and estimated kill			
	Hunter kill				Nonhunting kill ^a								
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M	F	Unk	Total
<i>2007–2008</i>													
Fall 2007	2	2	0	4	0	0	0	1	0	2	2	1	5
Spring 2008	1	1	0	2	0	0	0	0	0	1	1	0	2
Total	3	3	0	6	0	0	0	1	0	3	3	1	7

^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 2007–2008

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

^a Residents of Unit 20D.

TABLE 4 Chronology of Unit 20D brown bear harvest and nonhunting mortality by month, regulatory years 1989–1990 through 2007–2008

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

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 2007–2008

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

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006
To: 30 June 2008¹

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 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 keeping 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 year (RY) 1984 through RY89 and RY02–RY08 (RY = 1 Jul through 30 Jun; e.g., RY02 = 1 Jul 2002 through 30 Jun 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–RY05 to a mean of 14. In 2004 the Alaska Board of Game further increased the annual bag limit to 2 bears. In 2004 the board also 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 (a practice that had not been permitted previously), 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.

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

During the mid 1980s, Boertje et al. (1987) estimated the brown bear population in a 4000-mi² portion of Unit 20E at 41 bears of all ages/1000 mi² (16 bears/1000 km²) as of 1 May and 31 bears of all ages/1000 mi² (12/1000 km²) by 1 November annually. Even with liberal hunting 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 during that time and variable harvest distribution, a population decline was not clearly documented. Though the moose population increased temporarily, this could not be unequivocally ascribed to a possible decline in brown bear numbers (Gasaway et al. 1992).

MANAGEMENT DIRECTION

When developing brown bear management goals and objectives for Unit 20E, the management goals and objectives for moose and caribou populations of the area were also considered. 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 (Alaska Statute 16.05.255), 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 by hunters and predator control permittees 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 vestigial premolar tooth, and collected information on date and location of harvest, transport method, 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.

Population estimates for Unit 20E were based on extrapolations of density estimates obtained during telemetry studies in a 1540-mi² low elevation portion of central Unit 20E during 1985–1986 (Boertje et al. 1987) and in Unit 20A (100 miles to the west) during 1981–1998 (Reynolds and Boudreau 1992), and on harvest statistics collected during 1977–2001 (Gardner 2001). During May–July 2006, ADF&G (C. Gardner, ADF&G, unpublished data, Fairbanks, 2007) conducted a brown bear population survey within a 2002-mi² portion of southern Unit 20E using a DNA-based mark–recapture estimation technique. From this data we also developed a density estimate for the 686.5 mi² core of the 2002-mi² survey area, which was entirely within the west-central portion of the bear control area.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Based on Unit 20E harvest statistics, Gardner (2001) estimated that the Unit 20E brown bear population was stable at 475–550 bears (44.3–51.3 bears of all ages/1000 mi², 17.1–19.8/1000 km²) in autumn 2000. This estimate is higher than the telemetry-based 1987 estimate of 31–41 bears of all ages/1000 mi² (16/1000 km²; Boertje et al. 1987).

During May–July 2006, we calculated a new population estimate using a DNA-based mark–recapture technique (C. Gardner, unpublished data). The 2006 mark–recapture survey results indicated the brown bear density was 28–35 bears/1000 mi² (10.7–13.4 bears/1000 km²) within the core area (C. Gardner, unpublished data). This was similar to the 31–41 bears/1000 mi² estimated from spring to fall 1985–1986 by Boertje et al. (1987). Based on the conclusions of Boertje et al. (1987) and the results of Gardner’s 2006 population survey, Gardner’s 2001 Unit 20E brown bear population estimate may have been an overestimate (C. Gardner, personal communication).

By extrapolating the density estimate developed from the 2006 brown bear population estimate in southern Unit 20E, Gardner estimated the 2006 brown bear population within the 4074-mi² bear control area to be 114–141 bears of all ages during midsummer. This is less than the 2005 estimate of 170 brown bears within the bear control area, which was based on extrapolation of a density estimate obtained in central Unit 20E during 1985–1986 (Boertje et al. 1987) and on intensive research studies in Unit 20A, 100 miles to the west, during 1981–1998 (Reynolds and Boudreau 1992).

The habitat within the 4074-mi² bear control area is representative of the majority (7310 mi²) 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/1000 mi² following the fires of 2004–2005, similar to the control area. The 3370-mi² 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/1000 mi² (C. Gardner, personal communication). By extrapolating these density estimates, I estimated the Unit 20E brown bear population, during midsummer 2008, to be 320–394 bears of all ages.

Brown bear hunting regulations in Unit 20E were liberalized in 1982 in an effort to reduce bear numbers and predation on moose calves. Gardner (2003) estimated a 2% annual decline in the

brown 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 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 considerably higher than 6% where brown bears have access to salmon (Tobey 2005). Future work on Interior Alaska brown bear populations will help define sustainable harvest levels. During RY06–RY07, 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 RY06–RY08

Unit and Bag Limit	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

A bear taken in Unit 20E did not count against the bag limit of 1 bear every 4 years in other units. During RY04–RY08 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. Starting in 2008 the Alaska Board of Game allowed grizzly bears taken in Unit 20E to be sealed anywhere in the state. In March 2009 the Alaska Board of Game 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 during 2004–2008 because harvest by hunters and kill by predation control permittees remained low.

Harvest by Hunters. Hunters reported killing 6 bears in RY06 and 13 in RY07 (Table 1). The 5-year (RY03–RY07) average harvest was 13 bears. The mean percentage of males harvested during RY03–RY07 was 62%. During RY06 and RY07, males represented 57% and 74% of the harvest, respectively.

Hunter Residency and Success. Resident hunters took 50% and 92% of the brown bears harvested in RY06 and RY07 (a total of 3 and 12 bears taken by residents and 3 and 1 taken by nonresidents, in RY06 and RY07 respectively (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 RY06–RY07, 69–100% of brown bears harvested in Unit 20E were taken during August and September when moose and caribou hunters were afield. Zero to 31% of the total annual harvest was taken in the spring (Table 3).

Transport Methods. During RY06, airplanes (67%) and highway vehicles (33%) were the modes of transportation used by most successful bear hunters (Table 4). Again during RY07, airplanes (46%) were used by most successful bear hunters, while highway vehicles (15%) and boats (15%) were used by fewer successful bear hunters. Use of airplanes by brown bear hunters in Unit 20E increased as more big game hunters attempt to access remote areas.

Other Mortality

During RY06–RY07 no brown bears were reported killed in defense of life or property. Most nonhunting-caused brown bear mortality was likely the result of intraspecific strife and cannibalism (Boertje et al. 1987).

During RY06 and RY07, 1 and 6 bears were killed by brown bear control permittees respectively, with 4 of these bears killed over bait in spring 2008 (Table 1). Further details are 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 1875 mi² (4856 km²) 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. However, Gardner's recent study (ADF&G, unpublished data) indicates that brown bears avoided the large recent burns in Unit 20E, likely redistributing themselves in the unburned habitat. 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. Although we do not know the long-term demographic consequences of reduction in available habitat caused by the burn, short-term reductions in bear density within the burns, displacement of female bears, and increased density-dependent mortality along the edges of the burns are all likely.

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 during the past 23 years and the implementation of the bear control program in RY04–RY08 have proven ineffective at reducing brown bear numbers enough to result in a measurable increase in the moose population.

We continue to explore additional methods for reducing brown bear numbers. To substantially increase moose numbers in Unit 20E we may need to recommend other brown bear control measures to the Board of Game. Although we need to conduct further research, one measure may include extensive fire. The brown bear population appears to have redistributed out of portions of the bear control area that were burned during 2004–2005, which likely resulted in reduced predation on moose calves in those areas (C. Gardner, unpublished data). Additional research will evaluate moose calf survival within the bear control area.

CONCLUSIONS AND RECOMMENDATIONS

In July 2004, an estimated 363–438 bears of all ages (34–41 bears/1000 mi²) resided in Unit 20E. Harvest data indicated the population had fluctuated little since 1981, despite the most liberal hunting regulations in Alaska. Low harvest rates were likely due to 1) the relative inaccessibility of most of the unit; 2) dense forest cover which hinders hunters' ability to 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, among other factors, 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 bear harvest by high numbers of moose and caribou hunters, liberal seasons and bag limits, and an active brown bear control program were unsuccessful at reducing the bear population. During RY06–RY07, total hunter harvest and bear control kills likely had no effect on the Unit 20E population trend, because kills averaged <4% of the total estimated population. 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. Therefore, the management objective to reduce bear harvests to allow for bear population stabilization or recovery after the moose populations increased to desired levels was also not met.

Additional 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. 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.

LITERATURE CITED

- ALASKA WILDLAND FIRE COORDINATING GROUP. 1998. Alaska interagency wildland fire management plan. <http://forestry.alaska.gov/pdfs/98AIFMP.pdf> (accessed 25 May 2009)
- BOERTJE, R. D., AND C. GARDNER. 1999. Reducing mortality on the Fortymile caribou herd. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-27-2. Study 3.43. Juneau, Alaska, USA.
- , W. C. GASAWAY, D. V. GRANGAARD, D. G. KELLEYHOUSE, AND R. O. STEPHENSON. 1987. Factors limiting moose population growth in Subunit 20E. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Project W-22-5. Job 1.37. Juneau, Alaska, USA.
- GARDNER, C. 2001. Unit 20E brown bear. Pages 229–245 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 1998–30 June 2000. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.
- . 2003. Unit 20E brown bear. Pages 233–251 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.
- GASAWAY, W. C., R. D. BOERTJE, D. V. GRANGAARD, D. G. KELLEYHOUSE, R. O. STEPHENSON, AND D. G. LARSEN. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. Wildlife Monographs 120.
- REYNOLDS, H. V., AND T. A. BOUDREAU. 1992. Effects of harvest rates on brown bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-5, W-22-6, W-23-1, W-23-2, W-23-3, and W-23-4. Study 4.19. Juneau, Alaska, USA.
- TOBEY, R. W. 2005. Unit 13 brown bear. Pages 137–147 *in* C. Brown, editor. Brown bear management report of survey and inventory activities 1 July 2002–30 June 2004. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

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TABLE 1 Unit 20E brown bear mortality, regulatory years 1992–1993 through autumn 2008

Regulatory year	Reported							Estimated kill		Total estimated kill					
	Hunter kill				Nonhunting kill ^a					M (%)	F (%)		Unk	Total	
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal						
<i>1994–1995</i>															
Autumn 1994	6	4	0	10	0	0	0	0	2	7	(58)	5	(42)	0	12
Spring 1995	1	0	0	1	0	0	0	0	0	1	(100)	0	(0)	0	1
Total	7	4	0	11	0	0	0	0	2	8	(62)	5	(38)	0	13
<i>1995–1996</i>															
Autumn 1995	5	8	0	13	0	0	0	0	0	5	(38)	8	(62)	0	13
Spring 1996	5	3	0	8	0	0	0	0	0	5	(63)	3	(38)	0	8
Total	10	11	0	21	0	0	0	0	0	10	(48)	11	(52)	0	21
<i>1996–1997</i>															
Autumn 1996	10	10	0	20	0	0	0	0	1	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	0	0	0	0	1	13	(52)	12	(48)	0	25
<i>1997–1998</i>															
Autumn 1997	7	4	0	11	0	0	0	0	1	7	(58)	4	(33)	1	12
Spring 1998	0	0	0	0	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	7	4	0	11	0	0	0	0	1	7	(58)	4	(33)	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

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>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>																
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	
<i>2005–2006</i>																
Autumn 2005	5	3	0	8	1	0	0	0	0	6	(67)	3	(33)	0	9	
Spring 2006	3	1	0	4	2	0	0	0	0	5	(83)	1	(17)	0	6	
Total	8	4	0	12	3 ^b	0	0	0	0	11	(73)	4	(27)	0	15	
<i>2006–2007</i>																
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	
<i>2007–2008</i>																
Autumn 2007	7	2	0	9	1	0	0	0	0	8	(80)	2	(20)	0	10	
Spring 2008	2	2	0	4	4	1	0	0	0	6	(66)	3	(33)	0	9	
Total	9	4	0	13	5	1	0	0	0	14	(74)	5	(26)	0	19	
<i>2008–2009</i>																
Autumn 2008 ^c	6	4	0	10	0	0	0	0	0	6	(60)	4	(40)	0	10	

^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 2008

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
Autumn 2008 ^a	10 (100)	0 (0)	0 (0)	10

^a Preliminary harvest.

TABLE 3 Unit 20E chronology of brown bear harvest by month, regulatory years 1992–1993 through autumn 2008

Regulatory year	Chronology of 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
Autumn 2008 ^a	4 (40)	6 (60)	0 (0)	0 (0)				10

^a Preliminary harvest.

TABLE 4 Unit 20E brown bear percent harvest by transport method, regulatory years 1992–1993 through autumn 2008

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
Autumn 2008 ^a	40	0	20	30	0	10	0	0	0	10

^a Preliminary 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 2006
To: 30 June 2008¹

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.

Annual reported harvest in Units 21B, 21C, and 21D historically was <10 bears per year with an estimated additional unreported human-caused mortality of 10 bears per year that probably resulted from 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, time 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., RY07 = 1 Jul 2007 through 30 Jun 2008).

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 RY06.

<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.	1 Aug–30 Jun	10 Aug–30 Jun
Unit 21D One bear every regulatory year by registration permit.	10 Aug–30 Jun (Subsistence hunt only)	No open season
One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun
Unit 24 One bear every regulatory year by registration permit.	10 Aug–30 Jun (Subsistence hunt only)	No open season
One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun

Seasons and Bag Limits in RY07.

<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
Unit 21D One bear every regulatory year by	10 Aug–30 Jun	No open season

<u>Units and Bag Limits</u>	<u>Resident Open Season (Subsistence and General Hunts)</u>	<u>Nonresident Open Season</u>
registration permit. One bear every regulatory year.	(Subsistence hunt only) 10 Aug–30 Jun	10 Aug–30 Jun
Unit 24 One bear every regulatory year by registration permit.	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 sows 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, and aircraft could not be used. 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 tag fee requirement 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 through 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 tag fee exemption was again adopted for Unit 21B at the 2006 board meeting.

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, 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) from 10 August to 30 June with a bag limit of 1 bear every regulatory year in the general hunt.

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 RY02–RY07 (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 RY02–RY07 was approximately 17 bears/year in Units 21B, 21C, and 21D. Based on the estimated sustainable harvest rate of 5–6%, 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 RY02 through fall 2008, males made up 72% of the reported harvest, which was adequate to maintain recruitment. The percent of males in the harvest was similar to the 76% reported for RY00 through fall 2005 (Stout 2007). In RY06–RY07 the average age of bears harvested in Units 21B, 21C, 21D, and 24 was 6.7 years, younger than the 30-year average (RY76–RY05) of 8.7 years of age for bears harvested. Due to the small sample size of the harvest, the RY06–RY07 age is susceptible to the influence of a few animals, and it is difficult to define trends when so few animals are evaluated.

Among Units 21B, 21C, and 21D, most grizzly bear harvest occurred in Unit 21D (Table 3), where most of the moose hunting also occurred. Unit 21C 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 RY02–RY07 was 14.5 bears (Table 2). The reported average harvests during RY05–RY07 in the northern (north of Allakaket) and southern (remaining) portions of Unit 24 were 11.0 and 1.3 bears, respectively. The number of bears taken by fishermen or trappers and not reported is unknown, but was likely <6 bears annually. The RY02–RY07 mean annual reported and estimated unreported harvest in the entire unit was 19.7 bears. Of the reported harvest for that same period, 64% were males and 36% were females, a higher percentage of males than the RY00–RY05 harvest of 55% males and 45% 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 RY05–RY07 in those units was 2.3 bears for local hunters, 1.7 for nonlocal residents, and 4.3 for

nonresidents. From RY98 through fall 2008 the mean annual number of successful hunters was 7.5, which was similar for the period of RY96 through fall 2006 (Stout 2007).

Nonlocal resident hunters accounted for 62% of the reported harvest in Unit 24 during RY98–RY07 (Table 5). Most of this harvest was incidental to fall moose hunting. Local resident harvest did not change noticeably during RY06–RY07. Reported harvest in Unit 24 was in the range of 10–15 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 RY05–RY07 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 from 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 from RY05 through RY07 most kills occurred during the fall (73%), incidental to hunting other game species. From RY05 to RY07, transportation to the hunt area was via highway vehicle (33%), airplane (19%), boat (31%), horseback–dog team (11%), or by foot and other methods (6%), and was 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 18.3 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 this reporting period (RY06–RY07), 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 65% of the harvest being males. With the current conservative population estimate of 770–930 bears, a

sustainable annual harvest of 77–112 grizzly bears can probably be supported (10–12% 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.

LITERATURE CITED

- BALLARD, W. B., K. E. RONEY, D. N. LARSEN, AND L. A. AYRES. 1988. Demography of Noatak grizzly bears in relation to human exploitation and mining development. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grants W-22-5 and W-22-6. Study 4.20. Juneau, Alaska, USA.
- CROOK, J. L. 1972. Grizzly bear survey and inventory activities. Alaska Department of Fish and Game. Mimeo.
- DUBOIS, S. D. 1989. Unit 20D brown–grizzly bear. Pages 119–127 *in* S. O. Morgan, editor. Brown–grizzly bear management report of survey and inventory activities. Part V. Volume XIX. Alaska Department of Fish and Game. Study 4.0. Juneau, Alaska, USA.
- MILLER, S. 1993. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-22-6, W-23-1, W-23-2, W-23-3, W-23-4, and W-23-5. Study 4.21. Juneau, Alaska, USA.
- REYNOLDS, H. V. 1976. North Slope grizzly bear studies. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-17-6 and W-17-7. Study 4.8R, 4.9R, 4.10R, and 4.11R. Juneau, Alaska, USA.
- . 1989. Units 24, 25A, 25B, 25D, and 26B and 26C brown–grizzly bear. Pages 174–184 *in* S. O. Morgan, editor. Brown–grizzly bear management report of survey and inventory activities. Alaska Department of Fish and Game. Part V. Volume XIX. Study 4.0. Juneau, Alaska, USA.
- , AND J. L. HECHTEL. 1984. Structure, status, reproductive biology, movements, distribution, and habitat utilization of a grizzly bear population. Alaska Department of

Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-21-1, W-21-2, W-22-1, and W-22-2. Study 4.14R. Juneau, Alaska, USA.

STOUT, G. W. 2007. Units 21B, 21C, 21D and 24 brown-grizzly bear. Pages 253–264 *in* P. Harper, editor. Brown-grizzly bear management report of survey and inventory activities 1 July 2004–30 June 2006. Alaska Department of Fish and Game. Project 4.0. Juneau, Alaska, USA.

WOOLINGTON, J. 1997*a*. Unit 24 brown-grizzly bear. Pages 235–240 *in* M. V. Hicks, editor. Brown-grizzly bear management report of survey and inventory activities. Alaska Department of Fish and Game. Study 4.0. Juneau, Alaska, USA.

———. 1997*b*. Unit 21 brown-grizzly bear. Pages 208–212 *in* M. V. Hicks, editor. Brown-grizzly bear management report of survey–inventory activities. Alaska Department of Fish and Game. Study 4.0. Juneau, Alaska, USA.

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TABLE 1 Units 21B, 21C, and 21D brown-grizzly bear mortality, regulatory years 2002–2003 through fall 2008

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>2002–2003</i>														
Fall 2002	1	0	0	1	0	0	0	0	5	0	1	0	5	6
Spring 2003	4	0	0	4	0	0	0	0	5	0	4	0	5	9
Total	5	0	0	5	0	0	0	0	10	0	5	0	10	15
<i>2003–2004</i>														
Fall 2003	2	0	0	2	0	0	0	0	5	0	2	0	5	7
Spring 2004	3	0	0	3	0	0	0	0	5	0	3	0	5	8
Total	5	0	0	5	0	0	0	0	10	0	5	0	10	15
<i>2004–2005</i>														
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
<i>2005–2006</i>														
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
<i>2006–2007</i>														
Fall 2006	4	1	0	5	0	0	0	0	5	0	4	1	5	10
Spring 2007	1	1	0	2	0	0	0	0	5	0	1	1	5	7
Total	5	2	0	7	0	0	0	0	10	0	5	2	10	17
<i>2007–2008</i>														
Fall 2006	1	1	0	2	0	0	0	0	5	0	1	1	5	7
Spring 2007	5	2	0	7	0	0	0	0	5	0	5	2	5	12
Total	6	3	0	9	0	0	0	0	10	0	6	3	10	19
<i>2008–2009</i>														
Fall 2008	1	2	0	3	0	0	0	0	5	0	1	2	5	8

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

TABLE 2 Unit 24 brown–grizzly bear mortality, regulatory years 2002–2003 through fall 2008

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
2002–2003														
Fall 2002	6	5	0	11	0	0	0	0	3	2	6	5	5	16
Spring 2003	4	3	0	7	0	0	0	0	0	0	4	3	0	7
Total	10	8	0	18	0	0	0	0	3	2	10	8	5	23
2003–2004														
Fall 2003	9	6	0	15	0	0	0	0	3	2	9	6	5	20
Spring 2004	2	3	0	5	0	0	0	0	0	0	2	3	0	5
Total	11	9	0	20	0	0	0	0	3	2	11	9	5	25
2004–2005														
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
2005–2006														
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
2006–2007														
Fall 2006	8	2	0	10	0	0	0	0	3	2	8	2	5	15
Spring 2007	3	0	0	3	0	0	0	0	0	0	3	0	0	3
Total	11	2	0	13	0	0	0	0	3	2	11	2	5	18
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	6	4	0	10	0	0	0	0	3	2	6	4	5	15

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

TABLE 3 Units 21B, 21C, and 21D reported brown–grizzly bear harvest by subunit, regulatory years 1996–1997 through fall 2008^a

Regulatory year	Unit			Total
	21B	21C	21D	
1996–1997	1	2	0	3
1997–1998	1	1	8	10
1998–1999	0	2	4	6
1999–2000	1	0	6	7
2000–2001	1	4	8	13
2001–2002	0	1	8	9
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
Fall 2008	1	1	1	3

^a Nonhunting kill not included.

TABLE 4 Units 21B, 21C, and 21D brown–grizzly bear successful hunter residency, regulatory years 1994–1995 through fall 2008

Regulatory year	Local ^a resident	Nonlocal resident	Nonresident	Total successful hunters
1994–1995	2	3	3	8
1995–1996	2	0	2	4
1996–1997	1	2	0	3
1997–1998	4	1	5	10
1998–1999	2	1	3	6
1999–2000	2	2	3	7
2000–2001	1	3	9	13
2001–2002	3	0	6	9
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
Fall 2008 ^b	0	1	2	3

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

^b Preliminary.

TABLE 5 Unit 24 brown–grizzly bear successful hunter residency, regulatory years 1996–1997 through fall 2008

Regulatory year	Local ^a resident	Nonlocal resident	Nonresident	Total successful hunters
1996–1997	2	7	6	15
1997–1998	0	4	4	8
1998–1999	2	10	4	16
1999–2000	0	9	3	12
2000–2001	2	16	7	25
2001–2002	0	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
Fall 2008 ^b	2	5	3	10

^a Unit residents.

^b Preliminary.

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006

To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: 22 (25,200 mi²)

GEOGRAPHIC 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 slowly recover until these activities diminished substantially during the 1940s and federal predator control efforts ended at statehood in 1959 (Grauvogel, 1986). Since then, bear numbers have increased in most areas, presumably in response to conservative management policies, higher prey densities, and favorable environmental conditions.

Growth of the Unit 22 bear population has had many effects and consequences. There is considerable interest in hunting by residents, principally from the Nome area, and by nonresidents through general season and drawing permit hunts. Predation on moose calves is believed to be depressing moose populations in many parts of the unit. Human-bear encounters in the Nome area, and in Unit 22 villages and camps, are of serious concern to the public and many local residents believe that bear densities in Unit 22 are excessive. Since 1997, in response to public demand, brown bear hunting regulations have been incrementally liberalized to increase annual harvest and to attempt to reduce the number of bears 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, and interviews with successful hunters, and analyze data.
- Improve communication with the public to reduce illegal and unreported harvest, and improve understanding of defense of life and property situations.
- Provide opportunity for subsistence hunting of brown bears.
- Assist the public in dealing with nuisance bear problems.
- Educate the public about bear behavior and safety to minimize conflicts between bears and the public.
- Provide information to the Board of Game on brown bear management.

METHODS

Various methods were used to assess the bear population and to meet the management objectives in Unit 22. Population status was assessed from observations made during other wildlife surveys and fieldwork. Information was also gathered through general conversation with knowledgeable local residents. Efforts were made to inform residents about Defense of Life and Property (DLP) regulations. Bears were sealed by Nome staff and approved sealing agents in several Unit 22 villages. Harvest data were summarized from sealing certificates, harvest reports from nonresident drawing permits and subsistence registration permits, village-based big game harvest surveys, and DLP reports. Problems with nuisance bears were addressed through public education and by working with Alaska Wildlife Troopers and Village Public Safety Officers to deter or destroy problem bears. An electric fence bear enclosure was maintained as a demonstration project at a camp with a history of bear problems in the vicinity of Nome. A second fence was available for seasonal loan and was used by a local Nome resident to deter bears from entering his fish camp.

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 unitwide during the 1990s and early 2000s. During that time reports of bear encounters and complaints about nuisance bears were frequent and the take of DLP bears reached an all-time high of 10 bears during the 2000–2001 regulatory year. Destruction of cabins and raids on subsistence food caches began occurring in the westernmost parts of the unit where bears previously were seldom seen (Persons, 2001). Since 1997 the Alaska Board of Game has incrementally liberalized bear hunting regulations in Unit 22 and since 1998 the average annual reported harvest has been 70% greater than the average harvest during 1990–1997. Observations indicate we still have a productive bear population, but in the last few years there have been indications from staff and public observations of fewer bears. The increased harvest may be stabilizing or reducing bear numbers, at least in the readily accessible areas along the Nome road system.

Population Composition

There were no activities to determine population composition in Unit 22 during the reporting period.

Distribution and Movements

There were no activities to determine distribution and movements in Unit 22 during the reporting period.

MORTALITY

Harvest

Season and Bag Limit.

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

<i>2006–2007 and 2007–2008</i>		
<i>Regulatory Year</i>	<i>Resident Open Season</i>	
	<i>(Subsistence and</i>	<i>Nonresident</i>
<i>Unit and Bag Limits</i>	<i>General Hunts)</i>	<i>Open Season</i>
<i>Unit 22(A), that portion south of and including the Golsovia River drainage</i>		
RESIDENTS : Two bears every regulatory year	1 Aug–31 May	
NONRESIDENTS: One bear every regulatory year	1 Aug–31 May	

<i>2006–2007 and 2007–2008</i>		
<i>Regulatory Year</i>	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
<i>Unit and Bag Limits</i>		
<i>22(A) remainder</i>		
RESIDENTS: Two bears every regulatory year	1 Aug–15 June	
NONRESIDENTS: One bear every regulatory year		1 Aug–15 June
<i>Unit 22(B)</i>		
RESIDENT HUNTERS: One bear every regulatory year	1 Aug–31 May	
NONRESIDENT HUNTERS: 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 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	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>2006–2007 and 2007–2008</i>		
<i>Regulatory Year</i>	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit and Bag Limits		
<i>Unit 22(E)</i>		
RESIDENTS: 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 22D		1 Aug–31 May
<i>Units 22(A), 22(B), 22(D), 22(E) – Subsistence Hunt</i>		
RESIDENTS: One bear per regulatory year by registration permit	1 Aug–31 May	
NONRESIDENTS:		No open season
<i>22(C) – Subsistence Hun</i>		
RESIDENTS: One bear per regulatory year by registration permit	1 Aug–31 Oct 10 May–25 May	
NONRESIDENTS:		No open season

Board of Game Actions and Emergency Orders. In January 2004 the board adopted administrative changes to subsistence bear hunts by eliminating subsistence management areas and allowing administration of subsistence registration bear hunts on a unit-by-unit basis.

In March 2006 and 2007 the board reauthorized the brown bear resident tag fee exemption in Unit 22. The Board adopted two changes during the November 2005 meeting which liberalized brown bear regulations in Unit 22A. The first change increased the resident bag limit to two brown bears per regulatory year, and the second lengthened the resident and nonresident season north of the Golsovia River drainage to 1 August 1–15 June.

Human-Induced Harvest. The department maintained a brown bear population in accordance with its management goal during the reporting period. The population sustained a 2-year mean

annual reported harvest of at least 50% males when 108 of 171 (63 %) reported bears harvested during this 2-year reporting period were male.

Ninety-four bears were harvested during the 2006 regulatory year and 77 bears were taken during the 2007 regulatory year (Table 1). The average annual harvest since 1998 has been 92 bears, which is a 70% increase over the 1990–1997 average annual harvest of 54 bears. Liberal bear regulations, bear abundance, reduced ungulate populations in areas of the unit, and a desire by local residents to reduce bear numbers were contributing factors to the high harvests in recent years.

The management goal of sustaining a 3-year mean annual reported harvest of at least 50% males has been achieved with male bears averaging approximately 67% of the harvest for the period 1961 through 2003. In 2006–2007 male bears composed 56% of the harvest, and in 2007–2008 males bears composed 71% of the harvest.

Since Unit 22 age records began in 1967 the age of harvested bears has averaged 6.3 years annually, and during this reporting period harvested bears averaged 6.1 years (6.2 in 2006 and 6.1 in 2007).

The fall hunt generally targets bears in more accessible places where most of the older, larger bears have been eliminated and results in a lower average age compared to bears harvested in the spring hunt when travel conditions and snowmachines allow access to remote areas of the unit. The average age of harvested bears from the fall portion of the season since 1967 has been 5.7 years, and bears taken from the spring portion of the season have averaged 7.0 years.

Much of the harvest is by local recreational hunters who are not selective and shoot whatever bear presents itself first. The average skull size during July 2006 to June 2008 was 20.9 inches (n=169) and 7% of those bears had skull sizes of 24 inches or larger. The number of record book bears taken in Unit 22 with a minimum skull size of 24 inches or larger during 1990–2007 (n=181) averaged 10.1 bears per year, or 17% of the total harvest.

Resident harvest generally exceeds nonresident harvest in Unit 22. The exceptions are in Unit 22A and Unit 22E where local residents show little interest in hunting brown bears so nonresident harvest generally exceeds resident harvest.

Sixteen bears were reported as defense of life and property (DLP) kills during the 2-year reporting period. These totals do not represent the actual number of nonhunting kills for the reporting period. Each year, we receive unverified reports of bears being shot and left unattended, or of not being sealed. The accuracy of these reports and the extent of illegal harvest are unknown.

In 2006–2007, two Unit 22 residents registered for subsistence hunt RB699, and in 2007–2008, three Unit 22 residents registered for subsistence hunt RB699; however, hunters did not harvest a bear in either regulatory year. Brown bears are seldom hunted for food in Unit 22 and most residents register so they may keep the hide and skull if they are forced to kill a bear under DLP circumstances.

Nome staff continued work on a community harvest assessment project with Subsistence Division and Kawerak Inc. in an attempt to better quantify unreported subsistence harvest of big game species, including brown bears, by village residents. A Bering Strait Region Local Traditional Knowledge survey for subunits A, B, D, and E conducted by Kawerak, Inc. indicated 7 bears were harvested in 2005–2006 (Ahmasuk, 2007).

Permit Hunts. During each year of the reporting period 27 drawing permits were available to nonresident hunters in Units 22B and 22C in combination, and 12 permits were allocated to nonresidents in Units 22D and 22E in combination. A continuous season from 1 August – 31 May, except in Unit 22C, allowed drawing permit holders to hunt during either spring or fall. The alternate list for brown bear drawing permit applications is no longer in effect, however over-the-counter permits are available first-come first-serve when there are undersubscribed drawing permits from the draw period.

Hunter Residency and Success. We cannot easily evaluate hunter effort and success for residency of 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 rate during 2006–2007 was 50% for permit hunt DB685 in Units 22B and 22C, and 67% for permit hunt DB690 in Units 22D and 22E. Success rates in 2007–2008 were 56% for DB685 and 100% for DB690. It is difficult to evaluate nonresident hunter success in Unit 22A because drawing permits are not required; however, 55 nonresidents were successful in harvesting a brown bear in 22A during the reporting period.

Harvest Chronology. In 2006–2007, 48% of the harvest occurred in the spring and in 2007–2008 spring harvest represented 64 of the total harvest (Table 3) 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; however, it is thought the poor spring traveling conditions during spring 2008 prevented hunters from using snowmachines to hunt and caused the reduced spring harvest.

Transport Methods. The Nome road system makes it possible for bear hunters to use highway vehicles as the primary transportation for hunting or to use roads as access points for boats, 4-wheelers and snowmachines. During this reporting period snowmachines (34%, n=163, Table 4), boats (26%), and off-road vehicles (21%) were the main modes of transportation used by hunters who harvested bears. Boats and off-road vehicles are favored in fall while most spring hunters use snowmachines. Aircraft use in the unit is generally limited to registered guides moving clients in and out of camps. Other transport methods are used from the camps.

Other Mortality

There were no observations of other mortality during the reporting period.

HABITAT

Assessment

There were no brown bear habitat assessment activities in Unit 22 during the reporting period.

Enhancement

There were no brown bear habitat enhancement activities in Unit 22 during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Moose research in Unit 22B indicates that brown bear predation on moose calves reduces calf survival in western Unit 22B (Persons, 1998), and research in other parts of Alaska has shown that brown bear predation can be the primary factor in limiting moose population growth. During the 1990s and early 2000s, moose recruitment rates declined to less than 10% in much of Unit 22, during which time bear numbers are believed to have increased. Anecdotal evidence suggests bear predation on adult moose, particularly in the spring, is common.

CONCLUSIONS AND RECOMMENDATIONS

Throughout the 1990s observations by staff, guides, and residents of Unit 22, and increasing reports of bear encounters and complaints about nuisance bears all indicated bear numbers were increasing unitwide. The take of DLP bears reached a high of 10 bears during the 2000–2001 regulatory year. Damage to cabins and raids on subsistence food caches were reported in the westernmost parts of the unit where bears were previously seldom seen. Beginning in 1997 the Board began incremental liberalization of bear hunting regulations, resulting in higher harvests. In the last few years, in the most heavily hunted part of the unit (Units 22B west, Unit 22C and the more accessible parts of Unit 22D), staff and public observations, a reduction in complaints about problem bears, and harvest data now suggest that bear numbers may have stabilized.

We believe Unit 22 brown bear numbers increased above the density estimated in the bear census and research study conducted from 1989–1991 (Miller and Nelson, 1993), and through the 1990s. During the same period moose populations and recruitment rates declined in most parts of the unit and we attribute current moose declines to be largely the result of bear predation on calves. As recommended in the previous progress report, we have maximized opportunity to hunt brown bears (except Unit 22C) in an attempt to reduce bear numbers. Although effects are as yet uncertain, the reduction of brown bear density may have the benefit of reducing bear predation on moose calves. In Unit 22C bears are heavily harvested and the Unit 22C moose population is above our management goal.

From 1990 to 2000, Unit 22 brown bear harvest approximately doubled and has since appeared to stabilize after a record high 104 bears were taken during the 2000–2001 regulatory year. During the regulatory years since 2000–2001 annual harvest has decreased to between a low of 84 bears in 2002 and a high of 101 bears in 2006 (Figure 1).

We should continue to strive for high harvest rates and reductions in the bear population only 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 and moose recruitment fails to show improvements, then: 1) bear harvest rates should be reduced to prevent depleting the bear population to very low levels, and 2) factors affecting the moose population should be evaluated to determine the role of predation by brown bears.

It is important to increase educational efforts aimed at understanding bear behavior, bear safety, and minimizing bear/human conflicts, emphasizing the importance of clean camps and not leaving food, dog food, scraps or garbage unattended or accessible to bears. We should continue efforts to improve understanding of hunting and DLP regulations in the villages.

LITERATURE CITED

- AHMASUK, A., AND E. TRIGG. August 2007. A comprehensive subsistence use study of the Bering Strait region. Page 129 in R. Kawerak, Incorporated. Nome, AK.
- GRAUVOGEL, C. A. 1986. GMU 22 brown/grizzly bear survey-inventory progress report. Pages 46 56 in B. Townsend, ed. Annual report of survey-inventory activities. Part V. Brown/Grizzly Bear. Vol. XVII. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-22 4 and W-22-5. Job. 4.0 Juneau. 70pp.
- MILLER, S.D. AND R. N. NELSON. 1993. A brown bear density and population estimate for a portion of the Seward Peninsula, Alaska. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Management Report Supplement Grant W-23-4 and W- 23-5. Study 4.0. Juneau. 48pp.
- NELSON, R. N. 1993. Unit 22 brown bear survey-inventory progress report. Pages 226-237 in S. Abbott, ed. Management Report of Survey-Inventory Activities. Brown Bear. Alaska Dep. Fish and Game. Fed Aid in Wildl. Rest. Prog. Rep. Proj. W-23-4 and W-23-5. Study 4.0. Juneau. 283pp.
- PERSONS K. 1998. Unit 22 moose survey-inventory progress report. Pages 378-397 in MV HICKS, ed. Moose. Survey-Inventory Management Report. Alaska Department Fish and Game. Federal Aid Wildlife Restoration. Progress Report. Grant W-24-4 and W-24-5 Study 1.0 Juneau. 485pp.
- PERSONS K. 2001. Unit 22 Brown bear management report. Pages 252-263 in C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 1998-30 June 2000. Alaska Department Fish and Game. Juneau Alaska.
- PERSONS K. 2003. Unit 22 brown bear management report. Pages 259-270 in C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000-30 June 2002. Alaska Department Fish and Game. Juneau Alaska.

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TABLE 1 Unit 22 brown bear harvest for regulatory years 2006–2007 and 2007–2008

Regulatory year	Reported harvest											
	Hunter kill				Non-hunting kill				Total ^a			
	M	F	Unk.	Total	M	F	Unk.	Total	M	F	Unk.	Total
<u>2006–2007</u>												
Fall 2006	18	31	0	49	2	0	0	2	20	31	0	51
Spring 2007	35	10	0	45	2	3	0	5	37	13	0	50
Subsistence	0	0	0	0	0	0	0	0	0	0	0	0
Total	53	41	0	94	4	3	0	7	57	44	0	101
<u>2007–2008</u>												
Fall 2007	19	9	0	28	3	4	1	8	22	13	1	36
Spring 2008	36	12	1	49	0	1	0	1	36	13	1	50
Subsistence	0	0	0	0	0	0	0	0	0	0	0	0
Total	55	21	1	77	3	5	1	9	58	26	2	86

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

TABLE 2 Proportion of Unit 22 successful brown bear hunters based on residency for regulatory years 2002–2003 through 2007–2008

Regulatory year	Successful hunters									
	Local residents ^a		Nonlocal residents		Nonresidents		Unknown		Total	
	(n)	%	(n)	%	(n)	%	(n)	%	(n)	
2002–2003	36	43%	13	15%	32	38%	3	4%	84	
2003–2004	39	43%	16	18%	31	34%	4	2%	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	

^a Hunters residing in Unit 22

TABLE 3 Unit 22 brown bear harvest by sex and subunit for regulatory years 2006–2007 and 2007–2008

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>2006–2007</u>																		
Fall 2006	6	16	0	6	7	0	3	3	0	1	5	0	2	0	0	18	31	0
Spring 2007	16	3	0	5	4	0	6	2	0	6	1	0	2	0	0	35	10	0
<u>2007–2008</u>																		
Fall 2007	6	3	0	4	2	0	4	2	0	2	1	0	3	1	0	19	9	0
Spring 2008	12	6	0	17	3	1	1	0	0	5	2	0	1	1	0	36	12	1

TABLE 4 Unit 22 brown bear harvest by transport method for regulatory years 1997–2007

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	91
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

^a ORV is defined as off road vehicle

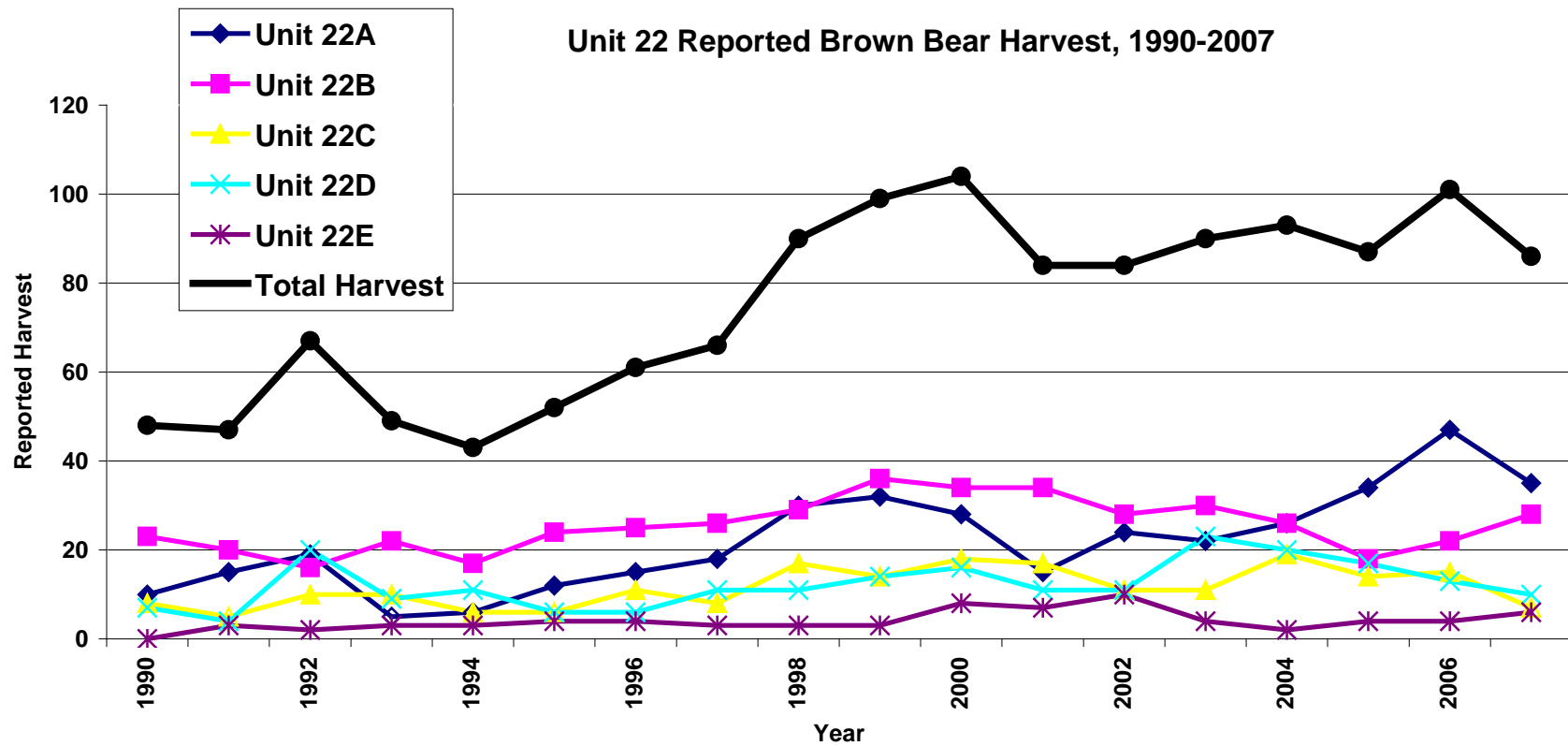


FIGURE 1 Unit 22 reported brown bear harvest, 1990-2007

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: July 2006
To: June 2008

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, this data should be viewed as a minimal estimate of harvest. In contrast, most nonlocal hunters seal their bears, so this data is reasonably accurate. We believe community-based harvest assessments and harvest reports from the registration subsistence hunt are 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 an extensive data cleanup effort conducted this year.

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 sighted 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 Noatak study. Results from this study are not yet available (Brad Shults, NPS, 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 results in Unit 23 occurred in the vicinity of the Red Dog Mine during 1987. This census estimated a

density of one adult bear (2.5+ years) per 25.7 mi² (Ballard et al. 1991). There is no other published, quantitative data for this unit to indicate population trend.

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, 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, 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>2006–2007 and 2007–2008</i>		Resident
Unit and Bag Limits		Open Season
Unit 23		(Subsistence and General Hunts)
		Nonresident Open Season
Residents: One bear per regulatory year; no tag required	1 Aug–31 May (General hunt)	
Nonresidents: One bear every regulatory year by drawing permit (2006-2007 34 permits fall; 24 permits spring) (2007-2008 40 permits fall; 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 2007 the Board of Game increased the number of nonresident brown bear permits for the fall hunt from 34 to 40 and split the drawing hunt previously administered as DB781 into 7 distinct drawing hunts (DB761–767). Additionally, the number of nonresident brown bear permits for the spring hunt was increased from 24 to 28 and the hunt previously administered as DB791 was split into 7 distinct drawing hunts (DB771–777). Federally-qualified hunters were required to register for a subsistence permit (RB700) before hunting brown bears in Cape Krusenstern National Monument, Kobuk Valley National Park, or Gates of the Arctic National Park.

Hunter Harvest. Harvest levels in 2006–2007 and 2007–2008 showed a decline from previous years; however the data of the last 20 years indicates a gradual increase in harvests ($R^2 = 0.1315$), with substantial annual variability that is seen throughout the entire sealing dataset (Fig. 1). During this reporting period, only 5 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 15 brown bears (0.0050 brown bears per capita) are taken annually (Table 2). 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 20–25 brown bears annually in recent years. Compare to reported harvest, this is about twice as high as the number of bears reported through the registration permit and sealing systems (median = 12 bears/yr during 1988–1989 through 2007–2008).

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. 1, 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 trend of approximately 70% males in the harvest over the last 20 years (Fig. 2). Likewise, there was a steady or slightly increasing trend in median skull size for all bears over the last 20 years when analyzed by sex (Fig. 3). 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 (Fig. 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.

Despite these myriad changes, brown bear harvests have shown a slowly increasing trend through time (Fig. 1). 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. Five bears were reported taken under the subsistence registration permit hunt during this reporting period (Table 1). This hunt should remain in place for 2 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 2 drawing permit hunts, DB781 (fall hunt; 34 permits available for 2006–2007, 40 permits available 2007–2008) and DB791 (spring hunt; 24 permits available for 2006–2007, 28 permits available 2007–2008). Hunters took 9 bears through hunt DB781 in 2006–2007 (5 males, 4 females); and 7 bears through hunt DB791 in 2007–2008 (6 males, 1 female). Hunters took 8 bears through hunt DB781 in 2006–2007 (7 males, 1 female); and 2 bears through hunt DB791 in 2007–2008 (all males, Table 1).

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 79% and 69% of the total reported Unit 23 harvest during 2006–2007 and 2007–2008, respectively (Fig. 5, Table 4; these percentages do not include community harvest assessment data). Numbers of nonresident bears 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. 5).

Harvest Chronology. Since 1970 the majority of the brown bear harvest has been taken during fall. In recent years the department has provided more nonresident drawing permits during fall than during spring (Fig. 6). 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 5). April and May are the second and third most popular months.

Transport Methods. As in previous years, aircraft were 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 6). 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 census data, human harvests could skew population sex and age structures and not be reflected in harvest data. Therefore, I recommend the following activities:

- Survey a large portion of Unit 23 in 2010 or 2011 to determine bear density.
- Continue community-based assessments to monitor harvests of brown bears by residents of Unit 23.

LITERATURE CITED

- BALLARD, W.B., L.A. AYRES, K.E. RONEY, D.J. REED AND S.G. FANCY. 1991. Demography of Noatak grizzly bears in relation to human exploitation and mining development. Final Report. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Grant W-23-1, W-23-2, and W-23-3 Study 4.20. Juneau. 227 pp.
- DAU, J. 2007. Unit 23 brown bear management report. Pages 277-299 *in* P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2004-30 June 2006. Alaska Department Fish and Game. Juneau, Alaska.
- HARRIS, R.B. AND L.H. METZGAR. 1987. Harvest age structures as indicators of decline in small populations of grizzly bears. International Conference on Bear Research and Management. 7:109-116.
- LOON, H. AND S. GEORGETTE. 1989. Contemporary brown bear use in NW Alaska. Alaska Department Fish and Game, Division of Subsistence. Tech. Paper No. 163. Kotzebue, AK.

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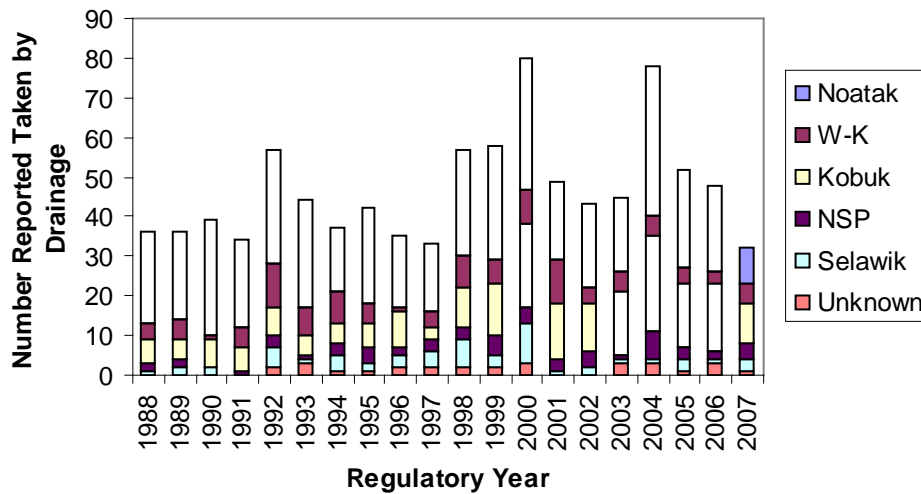


FIGURE 1 Unit 23 brown bear harvest by drainage, 1988 through 2007 (sealing and registration permit data). NSP = Northern Seward Peninsula; W-K = Wulik/Kivalina

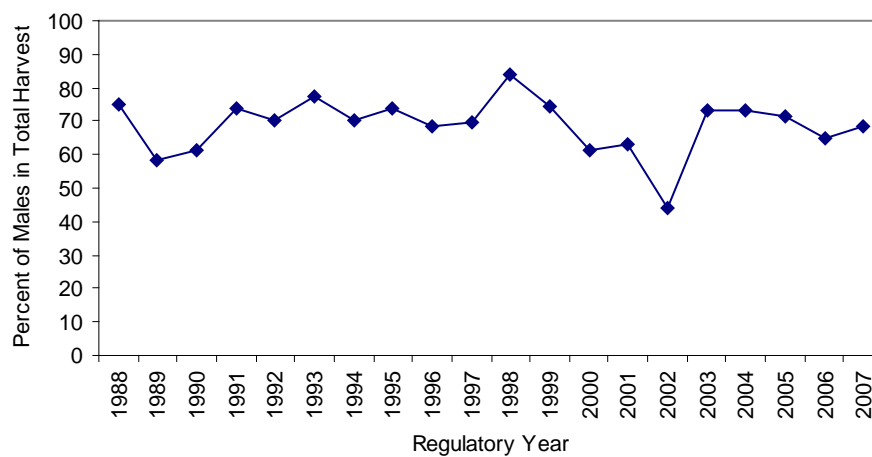


FIGURE 2 Percentage of males in Unit 23 brown bear harvest, 1988-1989 through 2007-2008 (sealing and registration permit data)

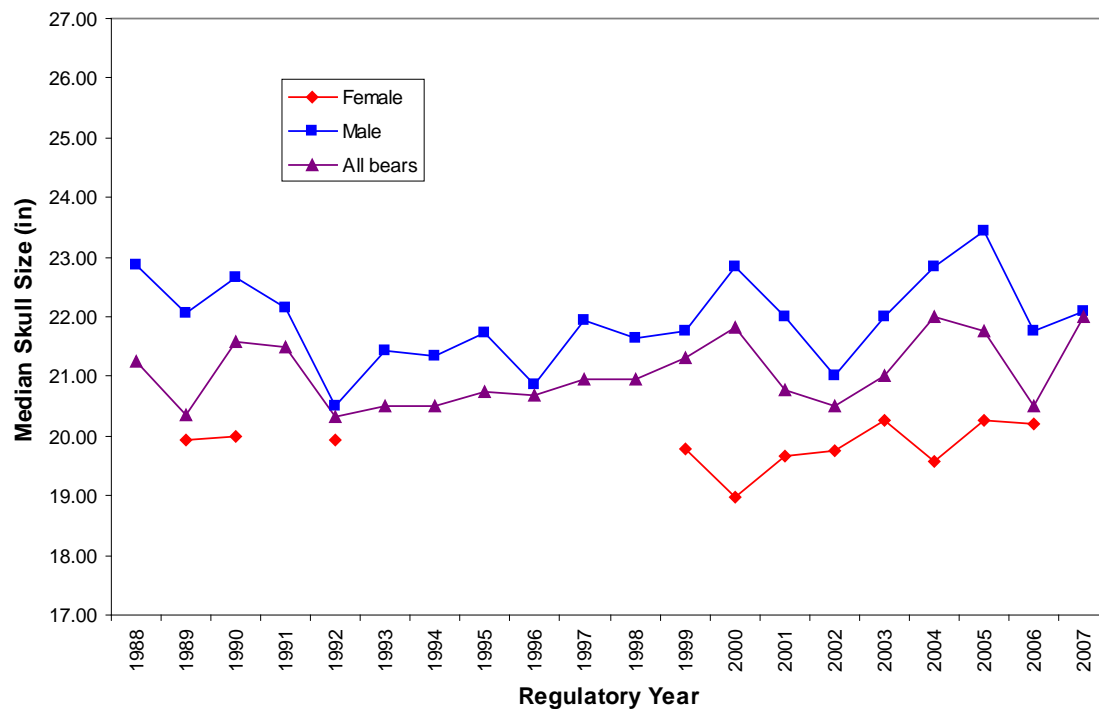


FIGURE 3 Median skull size of brown bears taken in Unit 23, 1988 through 2007 (sealing data; excludes years when sample size <10 bears)

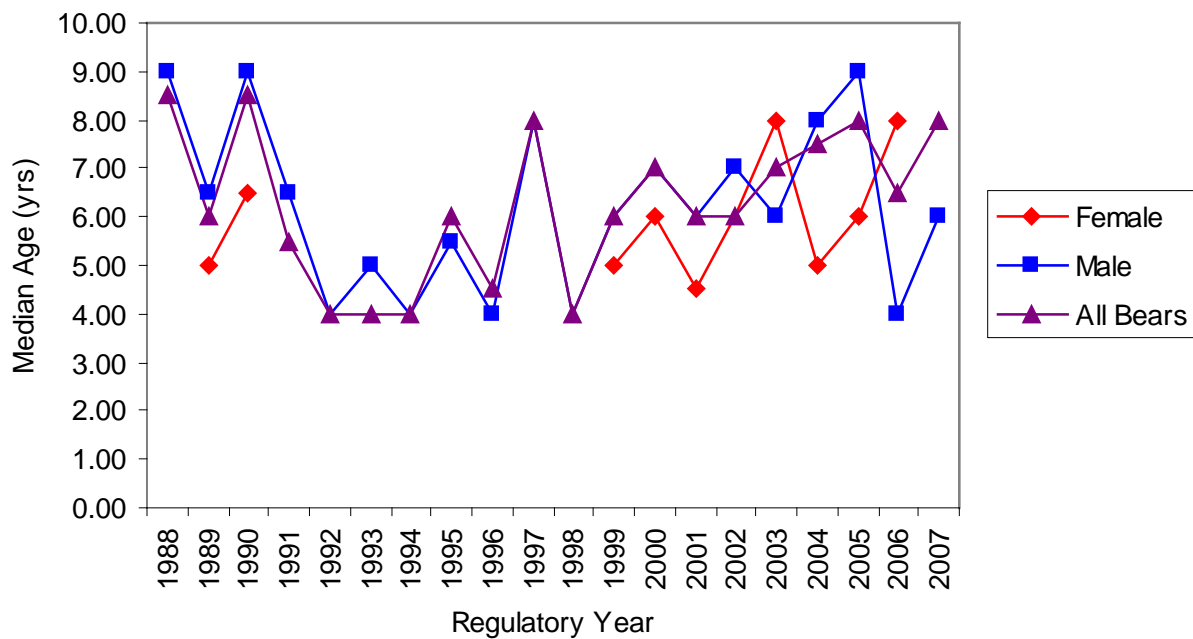


FIGURE 4 Median age of brown bears harvested in Unit 23 by sex, 1988–1989 through 2007–2008 (sealing data; excludes years when sample size <10 bears).

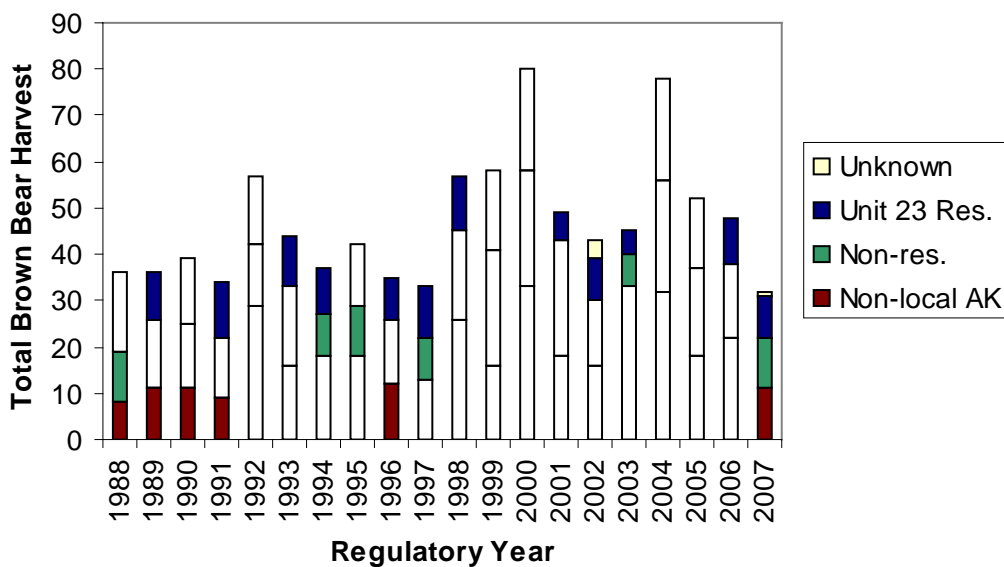


FIGURE 5 Unit 23 brown bear harvest by hunter residence, 1988–1989 through 2007–2008 (sealing and registration permit data).

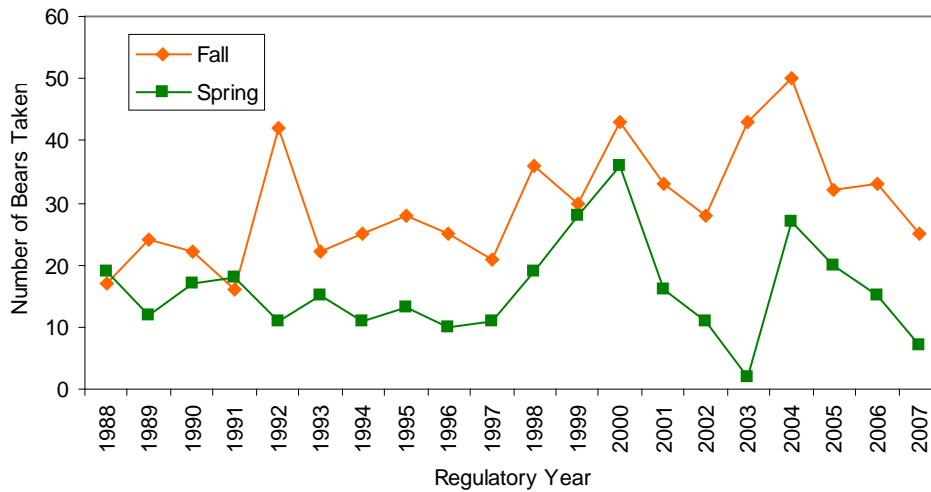


FIGURE 6 Unit 23 brown bear harvest by season (fall defined as August-December; spring January-April), 1988–1989 through 2007–2008 (does not include records where season was unknown.)

TABLE 1 Reported harvest of brown bears in Unit 23, 1998–1999 through 2007–2008, by hunt type (sealing and registration permit data)

Regulatory Year	General Hunt	DB781	DB791	RB700	Unk. & DLP	Total
1998-1999	27	12	6	7	0	52
1999-2000	20	12	9	5	7	53
2000-2001	48	6	11	10	3	78
2001-2002	23	12	12	0	2	49
2002-2003	27	8	4	4	0	43
2003-2004	35	4	1	3	2	45
2004-2005	47	12	10	5	2	76
2005-2006	33	12	7	0	0	52
2006-2007	27	9	7	5	0	48
2007-2008	18	8	2	0	4	32

TABLE 2 Brown bear harvests in Unit 23 based on community harvest assessments.

Community	Year	Human Population	Brown Bears Harvested (Estimate)	Brown Bears Taken per Capita (Estimate) ^a
Ambler	2002–2003	291	1	0.0034
Kiana	1999, 2006	398, 384	2, 0	0.0025
Kobuk	2003-2004	123	4	0.0325
Noatak	2001, 2007	455, 526	1, 2	0.0030
Noorvik	2002	677	5	0.0074
Selawik	1999, 2006	767, 769	1, 1	0.00134
Shungnak	1998, 2002	255, 248	1, 1	0.0040
Total		2993	15	0.0050

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

Source: CSIS: Community Subsistence Information System

TABLE 3 Reported Unit 23 brown bear harvest by drainage, 1988–1989 through 2007–2009 (sealing and registration permit data).

Regulatory year	Noatak	Kobuk	Selawik	N. Seward Peninsula	Wulik/ Kivalina	Total ^a
1988–1989	23	6	1	2	4	36
1989–1990	22	5	2	2	5	36
1990–1991	29	7	2	0	1	39
1991–1992	22	6	0	1	5	34
1992–1993	29	7	5	3	11	55
1993–1994	27	5	1	1	7	42
1994–1995	16	5	4	3	8	36
1995–1996	24	6	2	4	5	41
1996–1997	18	9	3	2	1	34
1997–1998	17	3	2	3	4	31
1998–1999	27	10	4	3	8	52
1999–2000	29	13	0	5	6	53
2000–2001	33	22	8	4	9	78
2001–2002	20	14	1	3	11	49
2002–2003	21	12	2	4	4	43
2003–2004	19	16	1	1	5	45
2004–2005	38	24	1	7	5	76
2005–2006	25	16	3	3	4	52
2006–2007	22	17	1	2	3	48
2007–2008	9	10	3	4	5	32

^aTotal may include uncoded harvest.

TABLE 4 Unit 23 brown bear harvest by hunter residency, 1988–1989 through 2007–2008 (sealing and registration permit data; does not include community harvest assessment data)

Regulatory year	Unit 23 resident	Nonlocal resident	Nonresident	Unk.	Total
1988–1989	17	8	11	0	36
1989–1990	10	11	15	0	36
1990–1991	14	11	14	0	39
1991–1992	12	9	13	0	34
1992–1993	15	27	13	0	55
1993–1994	11	14	17	0	42
1994–1995	10	17	9	0	36
1995–1996	13	17	11	0	41
1996–1997	9	11	14	0	34
1997–1998	11	11	9	0	31
1998–1999	12	21	19	0	52
1999–2000	17	11	25	0	53
2000–2001	22	31	25	0	78
2001–2002	6	18	25	0	49
2002–2003	9	16	14	4	43
2003–2004	5	33	7	0	45
2004–2005	22	30	24	0	76
2005–2006	15	18	19	0	52
2006–2007	10	22	16	0	48
2007–2008	9	11	11	1	32

TABLE 5 Monthly harvest of brown bears in Unit 23 reported through sealing records and permit hunt reports, 1988–1989 through 2007–2008

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Unk	Total
1988–1989	1	1	13	2	0	0	0	0	0	12	7	0	0	36
1989–1990	0	3	18	3	0	0	0	0	0	7	4	1	0	36
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	13	3	0	2	42
1994–1995	1	0	23	1	0	0	0	0	0	7	4	0	0	36
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	0	34
1997–1998	1	0	17	1	0	0	0	0	0	9	2	0	1	31
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	26	2	0	0	0	0	1	6	4	0	4	43
2003–2004	0	9	31	2	0	0	0	0	0	2	0	0	1	45
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	1	48
2007–2008	0	1	18	2	0	0	0	0	0	5	2	0	4	32

TABLE 6 Reported Unit 23 brown bear harvest by transport method reported through sealing records and permit hunt reports, 1988–1989 through 2007–2008

Regulatory Year	Airplane	Boat	Off road vehicle	Snow- machine	Other	Unknown	Total
1988–1989	13	3	7	11	2	0	36
1989–1990	24	4	1	6	1	0	36
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	5	42
1994–1995	17	8	1	7	2	1	36
1995–1996	20	5	2	7	3	4	41
1996–1997	18	3	0	4	4	5	34
1997–1998	15	7	1	4	1	3	31
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	22	9	0	7	1	4	43
2003–2004	28	11	1	1	1	3	45
2004–2005	34	14	4	21	2	1	76
2005–2006	29	5	0	18	0	0	52
2006–2007	27	8	1	11	1	0	48
2007–2008	17	2	3	7	0	3	32

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2006
To: 30 June 2008¹

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 (grizzly) 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 or 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 Jul through 30 Jun, e.g., RY71 = 1 Jul 1971 through 30 Jun 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

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

date of 20 August in Units 26B and 26C in response to closure of the September moose hunting season in most of Unit 26 the same year. A decline in brown bear harvest was expected to accompany the decline in moose hunting activity during September. These regulations worked as intended in Units 25A and 26C, but resulted in an elevated harvest in Unit 26B. Following the harvest of 25 bears in Unit 26B during RY96 and 25 during fall 1997, the 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, and only 3 bears were reported taken by resident hunters. Up to 3 drawing permits were issued for nonresident hunters in RY99 and RY00, with a 1 September–31 October open season.

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

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 the eastern Brooks Range in Units 26B and 25A (3600 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 called the 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, Application of a double-count line transect method to estimate density of brown bears in arctic Alaska; unpublished data).

HARVEST

Harvest data were obtained from mandatory sealing documents. 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 the report period, RY06–RY07. Population estimates are listed below for the eastern Brooks Range and upper Yukon River drainage in Units 25A, 25B, 25D, 26B, and 26C.

Units 25A, 25B, and 25D. The current estimate of brown bears in Units 25A, 25B, and 25D is based on the 1993 estimate of approximately 1200 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 some bears 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 269 brown bears (1.8 bears/100 mi²) in Unit 26B was based on a double-count line transect population estimate conducted during 1999–2003 (H. Reynolds, unpublished data). This more recent estimate confirmed the reliability of the 1993 estimate of 1.7 bears/100 mi², a low to moderate density of brown bears in the Arctic. During the 1990s, we suspected that bear densities near Prudhoe Bay were at an artificially high concentration because food was available in dumpsters and the Prudhoe Bay landfill, and

productivity of bears was high for northern Alaska (Shideler and Hechtel 2000). However, postweaning mortality was high (91%) due to human-induced mortality (R. Shideler, ADF&G, unpublished data). Thus, the subpopulation near Prudhoe Bay probably was not inflated and the area may have become a population sink. Beginning in 2000, access to human food became difficult for bears in Prudhoe Bay because the landfill was made inaccessible and bear-proof dumpsters were distributed.

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 was 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, unpublished data) indicated that females that had access to human food were younger at age of first year of reproduction (6 yr, $n = 5$) compared with those that were not food conditioned (8.6 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, unpublished data). This indicates 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 and mountains of the Brooks Range and lowest on the coastal plain of the North Slope. We observed movement of some brown bears from the mountains to the Porcupine caribou herd calving area on the coastal plain. 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

Season and Bag Limits RY04–RY07.

Units and Bag Limits	Resident Open Season	Nonresident Open Season
Unit 25A.		
RESIDENT AND NONRESIDENT HUNTERS:	10 Aug–30 Jun	10 Aug–30 Jun
One bear every regulatory year.		

Units and Bag Limits	Resident Open Season	Nonresident Open Season
Unit 25B. RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun
Unit 25D. RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	1 Jul–30 Nov 1 Mar–30 Jun	1 Sep–30 Nov 1 Mar–15 Jun
Unit 26B, 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. One bear every regulatory year.	1 Sep–31 Dec 1 Mar–31 May	
NONRESIDENT HUNTERS: One bear every regulatory year by drawing permit only; up to 20 permits will be issued.		1 Sep–31 Dec 1 Mar–31 May
Remainder of Unit 26B RESIDENT HUNTERS: One bear every regulatory year. NONRESIDENT HUNTERS: One bear every regulatory year by drawing permit only; up to 10 permits will be issued.	1 Sep–31 May	1 Sep–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

RY08.

Units and Bag Limits	Resident Open Season	Nonresident Open Season
Unit 25A. RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun
Unit 25B. RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	10 Aug–30 Jun	10 Aug–30 Jun

Units and Bag Limits	Resident Open Season	Nonresident Open Season
Unit 25D.		
RESIDENT AND NONRESIDENT HUNTERS:	1 Jul–30 Nov	1 Sep–30 Nov
One bear every regulatory year.	1 Mar–30 Jun	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.	25 Aug–31 Dec	
One bear every regulatory year.	1 Mar–31 May	
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
Remainder of Unit 26B.		
RESIDENT HUNTERS: One bear every regulatory year.	25 Aug–31 May	
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:	10 Aug–30 Jun	10 Aug–30 Jun
One bear every regulatory year.		

Additional state regulations that affect 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.

March 2002 — In March 2002 the Board of Game extended the brown bear season in Unit 25D to 1 March–30 November. This proposal was based on recommendations from the *Yukon Flats Cooperative Moose Management Plan* (ADF&G 2002), in which one of the main objectives was

to reduce predation on moose. This extended season provided opportunity for residents to take brown bears, particularly during the summer, at their fish camps on the Yukon River.

In Unit 26B the board established a drawing permit hunt (DB990) for brown bears in the DHCMA. Up to 10 permits could be issued and the bag limit was 1 bear every 4 years, with a 1 September–31 May season. This regulation was prompted by the increasing number of bowhunters using the DHCMA and the desire to limit opportunistic brown bear hunting by inexperienced bowhunters in the open terrain in Unit 26B, yet provide opportunity for bowhunters who intended to hunt brown bears.

March 2004 — In March 2004 the Board of Game extended the season in Units 25A, 25B, and 26C to 10 August–30 June, while maintaining existing seasons in Units 25D and 26B. All areas were changed to a 1 bear every year bag limit. 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 hunts DB987 and DB997. The board also increased the number of permits that may be issued from 10 to 20 and limited the permit season to 1 September–31 December. Thus, a general grizzly bear hunting season of 1 March–31 May was established for residents only. For the nonresident hunts DB987 and DB997, the hunt boundary was changed from Unit 26B, outside the Dalton Highway Corridor Management Area to all of Unit 26B. 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 for the nonresident hunts. The intent was to make it similar to the resident hunt.

March 2006 — No regulatory changes were implemented during the March 2006 Board of Game meeting.

March 2008 — In March 2008 the Board of Game passed a housekeeping proposal to clarify the number of drawing permits issued for nonresident hunts DB987 and DB997 in Unit 26B. The board increased the number of permits that may be issued from 10 to 20, and agreed that having one drawing hunt (DB987) with a fall and spring season was adequate. In addition, the resident and nonresident brown bear season was opened earlier in Unit 26B, on 25 August instead of 1 September.

Harvest by Hunters.

Units 25A, 25B, and 25D — In Unit 25A, 28 and 25 brown bears were reported harvested during RY06 and RY07, respectively (Table 2). The proportion of males in the harvest was 64% and 60%, respectively. Most harvest occurred in the Chandalar drainage between the North Fork Chandalar and Wind River ($\geq 64\%$). 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 number of bears harvested has remained stable since RY02, even though the season was opened 20 days earlier (on 10 Aug) beginning in RY04. The 3-year mean annual human-caused mortality (RY05–RY07) in Unit 25A was 26 bears with 58% males. This met our management objective of sustaining a 3-year mean annual human-caused mortality of 30 bears

with at least 60% males. During the past 10 years (RY98–RY07), 197 brown bears were sealed, 60% were males ($n = 118$), 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 harvested was 8.4 ($n = 23$) and 10.4 years ($n = 24$) in RY06 and RY07 compared to a 10-year mean age of 8.9 years (RY98–RY07; $n = 170$). The 10-year mean age for females was 8.4 years ($n = 66$) and for males, it was 9.1 years ($n = 104$). The mean skull size was 19.9 ($n = 22$) and 20.6 ($n = 24$) inches in RY06 and RY07 compared to a 10-year mean skull size of 19.8 inches (RY98–RY07; $n = 203$). Reported nonhunting kills were low (Table 2), and included DLP, illegal take, research mortalities, or other known human-caused accidental mortality.

In Units 25B and 25D, 4 and 6 brown bears were reported harvested in RY06 and RY07 (Table 3). Reported harvest in these units has been 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*. The study of moose calf mortality in Unit 25D (Bertram and Vivion 2002) led to a greater awareness of the importance of bear predation on moose calves and as a result, the harvest of bears by local residents increased on the Yukon Flats. We suspect that many bears were not reported because of the difficulty of sealing a bear in this remote area. Subsequently, the Council of Athabaskan Tribal Government (CATG) conducted bear harvest interviews for RY05 with community hunters in Beaver, Birch Creek, Chalkyitsik, Circle, Fort Yukon, Stevens Village, and Venetie. During this survey, 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, 9 and 5 brown bears were reported killed in RY06 and RY07, respectively (Table 4). The 3-year mean annual human-caused mortality (RY05–RY07) in Unit 26B was 6 bears with 41% males, partially meeting our management objective of sustaining a 3-year mean annual human-caused mortality of 13 bears with 60% males. Sample sizes were too small annually to conclusively determine what effect this large proportion of female harvest had on the population. During a 10-year period (RY98–RY07), 83 bears were sealed and 56% were males (includes nonhunting kills and other known human-caused mortality; Table 4). No trends were detected in mean age and mean skull size (\bar{x} age = 7.1 yr, $n = 62$; \bar{x} skull size = 19.6 inches, $n = 73$). The 10-year mean age was 6.7 ($n = 26$) for female bears and 7.5 ($n = 36$) for males. Sample sizes were too small annually to examine mean age by sex. In addition, due to the small sample sizes in RY06 and RY07, no comparisons were made to the 10-year average.

Other human-caused mortality has been documented in Unit 26B. Most of the reported nonhunting kills in Unit 26B were DLP. In RY01 a higher number of nonhunting kills were reported (7; Table 4). These bears were food-conditioned and in RY01, bear-proof dumpsters were distributed in Prudhoe Bay and the dump was made inaccessible to bears. This resulted in some bears trying to access buildings to find food. Harvest and nonhunting kills combined did not exceed the sustained yield of 13 bears, except in RY01 (Table 4). It is worth noting that since 2000, at least 5 marked bears that were killed by humans were not reported.

In Unit 26C, 9 and 11 brown bears were reported harvested in RY06 and RY07 (Table 5). Males made up 67% of the harvest in RY06 and 36% in RY07. Since RY98, reported harvest ranged 3–14 bears annually, a total of 93 bears were sealed and 53% were males (Table 5). Our management objective is to manage for a 3-year mean annual human-caused brown bear mortality of 19 brown bears ($\geq 60\%$ males). The 3-year mean was 12 bears (47% males). Although, the proportion of males was $<60\%$, annual human-caused mortality was small. The proportion of males in the harvest over a 10-year period was higher at 53%. No trends were detected in mean age and mean skull size during the past 10 years (RY98–RY07; \bar{x} age = 8.9 yr, $n = 84$; \bar{x} skull size = 19.8 inches; $n = 89$). The 10-year mean age was 9.4 years ($n = 40$) for females and 8.5 years ($n = 43$) for males. Due to small sample sizes in RY06 and RY07, no comparisons were made to the 10-year average.

Permit Hunts. During RY06–RY07, nonresident hunters in Unit 26B were required to obtain drawing permits for the 1 September–31 December hunting season. The bag limit was 1 bear every regulatory year. For hunt DB987, 8 permits were available each year in RY06 and RY07. However, only 6 permits were issued in RY06 and 7 permits were issued in RY07 (Table 6). One bear was harvested each year. For hunt DB997, 4 permits were available in both regulatory years and the season was 1 March–31 May. One permit was issued in RY06 and no permits were issued in RY07, and no bears were harvested in either year (Table 6).

A drawing permit was required for Alaska residents hunting within the DHCMA in Unit 26B during the 1 September–31 December season. The bag limit was 1 bear every regulatory year. Twenty permits were available in RY06 and RY07 (Table 6). All available permits were issued in RY06 and 19 were issued in RY07 because one applicant was on the Failure to Report list. Only 1 bear (a female) was harvested in RY06 (Table 6).

Hunter Residency and Success.

Units 25A, 25B, and 25D — In Unit 25A, residents of Alaska took 35% (9) and 48% (12) of the reported harvest during RY06 and RY07, and nonresidents took 65% (17) and 52% (13) of the reported harvest. The proportion of nonresidents who harvested brown bears has been $\geq 48\%$ since 1998 and frequently $\geq 70\%$ (Table 7). In Units 25B and 25D combined, 1 and 2 brown bears were reported harvested by local residents in RY06 and RY07 and 3 and 4 by nonlocal Alaska residents (Table 8). Generally, only a 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, 88% (7) and 40% (2) of the reported harvest was taken by Alaska residents during RY06 and RY07. Since 1998 most of the reported harvest was taken by residents of Alaska when the permit system was more restricted for nonresidents and some guides were not present in the area (Table 9). In Unit 26C, 45% (4 and 5) of the reported harvest was taken by Alaskan residents during both years in RY06 and RY07. In general, since 1998, 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: 6–14; Table 10).

Transport Methods. In Unit 25A, most brown bears were harvested during aircraft-supported hunts, with some taken by hunters who accessed the area by horse or boat (10-yr \bar{x} = 84% ,7%, and 4%; n = 194). In Units 25B and 25D, boats and snowmachines were used for transportation. In Unit 26B, hunters mainly used aircraft, highway vehicles, and boats (10-yr \bar{x} = 41%, 25%, 20%; n = 71). In Unit 26C, hunters used aircraft (10-yr \bar{x} = 93.5%, n = 93).

Harvest Chronology.

Units 25A, 25B, and 25D — In Unit 25A, 35% (n = 26) in RY06 and 40% (n = 25) in RY07 of the brown bears were harvested in August, similar to the previous 2 regulatory years when the August season was first opened (29% in RY04 [n = 24] and 32% in RY05 [n = 24]). The remaining bears were harvested in September, except in RY07 when 1 bear was harvested in April and in June. The earlier August season did not appear to increase harvest as that has remained stable since RY02 (Table 7). In Units 25B and 25D most harvested bears were not reported, but data collected by CATG in 2005 indicated that bears in these units were harvested primarily in June and September (Thomas and Fleener, CATG unpublished data).

Units 26B and 26C — In Unit 26B, 55% (n = 9) and 100% (n = 5) of the bears were harvested in September during RY06 and RY07. During the past 10 years (RY98–RY07), 79% were harvested (excluding nonhunting kills) in September, 11% in October, and 8% in May (n = 66). In Unit 26C, 89% (n = 9) and 100% (n = 11) of the brown bears were harvested in August RY06 and RY07 compared with a 10-year mean of 84% (RY98–RY07; n = 92). 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 killed but not sealed, especially near villages in Unit 25 (Thomas and Fleener, 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. Shideler (unpublished data) observed 2 adult mortalities due to natural causes out of 34 known adult mortalities (6%).

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 (RY05–RY07) of $\leq 5\%$ of the current estimated brown bear population in each unit. In Unit 25A, the 3-year mean was 26 bears, fewer than 5% (30 bears) of the estimated population (Table 1). In Unit 25B and 25D combined the 3-year mean harvest was 4 bears, fewer than 5% (29 bears) of the estimated population. In Unit 26B the 3-year mean was 6 bears, fewer than 5% (13 bears) of the estimated population. In Unit 26C the 3-year mean was 12 bears, and 5% of the estimated population was 19 bears.

We did not meet our second objective to maintain a brown bear population capable of sustaining a 3-year mean annual human-caused brown bear mortality (RY05–RY07) of at least 60% males in each unit. In Unit 25A the 3-year mean was 58% males, similar to a 10-year period (RY98–RY07) when the average proportion of males in the harvest was 60%. In Units 25B and 25D the 3-year mean was 90% males. In Unit 26B the 3-year mean was 47% males. However, over a 10-year period, the proportion of males in the harvest was 56%. In Unit 26C the proportion of males killed by humans over a 3-year period was also 47%. However, over a 10-year period the average proportion of males in the harvest was 53%. We will continue to monitor the sex ratio in the harvest in both Units 26B and 26C, although we are still harvesting below sustained yield and sample sizes are small on an annual basis.

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 us the flexibility to liberalize brown bear regulations to aid us in reducing brown bear predation on moose. Few bears were reported harvested in Unit 25D; however, household surveys conducted by CATG indicated that 37 brown bears were taken in 2005.

Management goals and objectives for moose populations have been considered in setting brown bear management goals and objectives in Unit 25D in accordance with the *Yukon Flats Cooperative Moose Management Plan* (Alaska Department of Fish and Game 2002). One of the goals of the *Yukon Flats Cooperative Moose Management Plan* is to increase moose numbers and reduce predation by grizzly bears. Brown bears are known to be an important predator on newborn moose calves (Gasaway et al. 1992; Bertram and Vivion 2002).

Goals and objectives for brown bear in Unit 25D are also influenced by the state's intensive management law (Alaska Statute 16.05.255). The Board of Game determined that the moose population in Unit 25D is important for providing high levels of human consumptive use, and the board must consider intensive management in this area if regulatory action to significantly reduce moose harvest becomes necessary. We are developing an intensive management plan for portions of Unit 25D. More specific brown bear management objectives for Unit 25D may be developed from this plan.

Other ungulate populations of concern that involve predation by brown bears include muskoxen on the eastern North Slope in Units 26B and 26C. Muskoxen numbers on the eastern North Slope have declined substantially and the decline (in combination with other factors) may be partially due to predation by brown bears (Lenart 2007). Research investigating the factors influencing this muskox population was initiated in spring 2007 and will continue through July 2010. In 2006 separate research was initiated to identify feeding sites and carcass use, including

muskoxen, by grizzly bears. More information about the effects of predation by brown bears on muskoxen may surface during these research projects.

Preliminary data for RY08 in Unit 26B indicate that 23 brown bears were harvested in fall 2008 (11 in Aug and 12 in Sep). This exceeds the sustained yield of 13 bears annually. We will monitor the harvest in fall 2009 to determine if the August season can remain open. If harvest exceeds 13 bears in fall 2009, the department will submit a proposal to the March 2010 Board of Game meeting to close the August season.

LITERATURE CITED

- ALASKA DEPARTMENT OF FISH AND GAME. 2002. Yukon Flats cooperative moose management plan. Fairbanks, Alaska, USA.
<http://www.wildlife.alaska.gov/management/planning/planning_pdfs/yukonflats_plan.pdf> Accessed 6 May 2009.
- BECKER, E. F., AND P. X. QUANG. 2009. A gamma-shaped detection function for line-transect surveys with mark-recapture and covariate data. *Journal of Agricultural, Biological and Environmental Statistics* 14(2): 207–223.
- BERTRAM, M., AND M. VIVION. 2002. Moose mortality in eastern Interior Alaska. *Journal of Wildlife Management* 66:747–756.
- GASAWAY, W. C., R. D. BOERTJE, D. V. GRANGAARD, D. G. KELLEYHOUSE, R. O. STEPHENSON, AND D. G. LARSEN. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. *Wildlife Monographs* 120.
- LENART, E. A. 2007. Units 26B and 26C muskox. Pages 49–69 in P. Harper, editor. Muskox management report of survey and inventory activities 1 July 2004 through 30 June 2006. Alaska Department of Fish and Game. Project 16.0. Juneau, Alaska, USA.
- McLOUGHLIN, P. D., M. K. TAYLOR, H. D. CLUFF, R. J. GAU, R. MULDER, R. L. CASE, AND F. MESSIER. 2003. Demography of baren-ground grizzly bears. *Canadian Journal of Zoology* 81:294–301.
- NAGY, J. A., R. H. RUSSELL, A. M. PEARSON, M. C. S. KINGLSEY, AND B. C. GOSKI. 1983. Ecological studies of the grizzly bear in the Arctic Mountains, northern Yukon, northern Yukon Territories, 1972 to 1975. Canadian Wildlife Service, Edmonton, Alberta, Canada.
- REYNOLDS, H. V. 1976. North Slope grizzly bear studies. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-17-6 and W-17-7. Jobs 4.8R, 4.9R, 4.10R, and 4.11R. Juneau, Alaska, USA.
- . 1981. North Slope grizzly bear studies. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Volume II. Project W-21-1. Job 4.14R. Juneau, Alaska, USA.

- . 1992. Grizzly bear population ecology in the western Brooks Range, Alaska. Alaska Department of Fish and Game. Progress Report to National Park Service, Alaska Regional Office. Fairbanks, Alaska, USA.
- , AND G. W. GARNER. 1987. Patterns of grizzly bear predation on caribou in northern Alaska. *International Conference on Bear Research and Management* 7:59–68.
- , AND J. L. HECHTEL. 1984. Structure, status, reproductive biology, movement, distribution, and habitat utilization of a grizzly bear population. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-21-1, W-21-2, W-22-1, and W-22-2. Study 4.14R. Juneau, Alaska, USA.
- SHIDELER, R. T., AND J. L. HECHTEL. 2000. Grizzly bears. Pages 105–132 *in* The natural history of an Arctic oil field. J. C. Truett and S. R. Johnson, editors. Academic Press, New York, USA.

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TABLE 1 Units 25A, 25B, 25D, 26B, and 26C brown bear population parameters and estimated sustainable harvest, 1993–2007^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
25 Subtotal	47,940		1164	58
26B	15,500	1.8	269	13
26C	10,272	3.8	391	19
26 Subtotal	25,772		653	32
Total	73,712	2.5	1843	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 1996–1997 through 2007–2008

Regulatory year	Reported													
	Hunter kill ^a					Nonhunting kill ^b			Total known kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>1996–1997</i>														
Fall 1996	11	9	(45)	1	21	0	0	0	11	(55)	9	(45)	1	21
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	11	9	(45)	1	21	0	0	0	11	(55)	9	(45)	1	21
<i>1997–1998</i>														
Fall 1997	6	6	(50)	0	12	1	0	0	7	(54)	6	(46)	0	13
Spring 1998	0	2	(100)	0	2	0	0	0	0	(0)	2	(100)	0	2
Total	6	8	(57)	0	14	1	0	0	7	(47)	8	(53)	0	15
<i>1998–1999</i>														
Fall 1998	8	4	(33)	1	13	0	0	0	8	(67)	4	(33)	1	13
Spring 1999	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0
Total	8	4	(33)	1	13	0	0	0	8	(67)	4	(33)	1	13
<i>1999–2000</i>														
Fall 1999	11	2	(15)	0	13	0	0	0	11	(85)	2	(15)	0	13
Spring 2000	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	11	2	(15)	0	13	0	0	0	11	(85)	2	(15)	0	13
<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

Regulatory year	Reported													
	Hunter kill ^a					Nonhunting kill ^b			Total known kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<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
<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

^a Includes permit harvest.

^b 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 1996–1997 through 2007–2008

Regulatory year	Reported													
	Hunter kill ^a					Nonhunting kill ^b			Total known kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>1996–1997</i>														
Fall 1996	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
<i>1997–1998</i>														
Fall 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Spring 1998	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
<i>1998–1999</i>														
Fall 1998	0	0	(0)	1	1	0	0	0	0	(0)	0	(0)	1	1
Spring 1999	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	1	0	(0)	1	2	0	0	0	1	(100)	0	(0)	1	2
<i>1999–2000</i>														
Fall 1999	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Spring 2000	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	4	2	(33)	0	6	0	0	0	4	(67)	2	(33)	0	6
<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

Regulatory year	Reported													
	Hunter kill ^a					Nonhunting kill ^b			Total known kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<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	(75)	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	(75)	0	(0)	1	4
<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

^a Includes permit harvest.

^b 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 1996–1997 through 2007–2008

Regulatory year	Reported											
	Hunter kill ^a				Nonhunting kill ^b			Total known kill				
	M	F (%)	Unk	Total	M	F	Unk	M (%)	F (%)	Unk	Total	
<i>1996–1997^c</i>												
Fall 1996	15	7 (32)	0	22	1	0	0	16 (70)	7 (30)	0	23	
Spring 1997	1	2 (67)	0	3	0	0	0	1 (33)	2 (66)	0	3	
Total	16	9 (36)	0	25	1	0	0	17 (65)	9 (35)	0	26	
<i>1997–1998^c</i>												
Fall 1997	17	8 (32)	0	25	0	1	0	17 (65)	9 (35)	0	26	
Spring 1998	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0	
Total	17	8 (32)	0	25	0	1	0	17 (65)	9 (35)	0	26	
<i>1998–1999</i>												
Fall 1998	1	3 (75)	0	4	0	0	0	1 (25)	3 (75)	0	4	
Spring 1999	0	0 (0)	0	0	0	1	0	0 (0)	1 (0)	0	1	
Total	1	3 (75)	0	4	0	1	0	1 (20)	4 (80)	0	5	
<i>1999–2000</i>												
Fall 1999	2	1 (33)	0	3	0	0	0	2 (67)	1 (33)	0	3	
Spring 2000	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0	
Total	2	1 (33)	0	3	0	0	0	2 (67)	1 (33)	0	3	
<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^d</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	

Regulatory year	Reported											
	Hunter kill ^a				Nonhunting kill ^b			Total known kill				
	M	F (%)	Unk	Total	M	F	Unk	M (%)	F (%)	Unk	Total	
<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 (37)	0	8	0	1	0	5 (56)	4 (44)	0	9	
<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	

^a Includes 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 Harvest was high in regulatory years 1996 and 1997 because the nonresident drawing permit hunts (DB987 and DB997) were eliminated. They were reinstated in 1998.

^d There were several defense of life or property bears in the Prudhoe Bay complex because they were food-conditioned bears and garbage was not properly managed.

TABLE 5 Unit 26C brown bear mortality^{a,b}, regulatory years 1996–1997 through 2007–2008

Regulatory year	Reported										
	Hunter kill				Nonhunting kill ^b			Total known kill			
	M	F (%)	Unk	Total	M	F	Unk	M (%)	F (%)	Unk	Total
<i>1996–1997</i>											
Fall 1996	5	3 (38)	0	8	0	0	0	5 (63)	3 (38)	0	8
Spring 1997	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0
Total	5	3 (38)	0	8	0	0	0	5 (63)	3 (38)	0	8
<i>1997–1998</i>											
Fall 1997	4	2 (33)	0	6	0	0	0	4 (67)	2 (33)	0	6
Spring 1998	2	0 (0)	0	2	0	0	0	2 (100)	0 (0)	0	2
Total	6	2 (25)	0	8	0	0	0	6 (75)	2 (25)	0	8
<i>1998–1999</i>											
Fall 1998	2	1 (33)	0	3	0	0	0	2 (67)	1 (33)	0	3
Spring 1999	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0
Total	2	1 (33)	0	3	0	0	0	2 (67)	1 (33)	0	3
<i>1999–2000</i>											
Fall 1999	6	2 (25)	0	8	1	0	0	7 (78)	2 (22)	0	9
Spring 2000	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0
Total	6	2 (25)	0	8	1	0	0	7 (78)	2 (22)	0	9
<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

Regulatory year	Reported												
	Hunter kill				Nonhunting kill ^b				Total known kill				
	M	F (%)	Unk	Total	M	F	Unk	M (%)	F (%)	Unk	Total		
<i>2003–2004</i>													
Fall 2003	2	4 (66)	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 (66)	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		
<i>2007–2008</i>													
Fall 2007	4	7 (64)	0	11	0	0	0	4 (36)	7 (64)	0	11		
Spring 2008	0	0 (0)	0	0	0	0	0	0 (0)	0 (0)	0	0		
Total	4	7 (64)	0	11	0	0	0	4 (36)	7 (64)	0	11		

^a Includes permit harvest.

^b 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 2007–2008

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
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								
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 ^b	19	11 (58)	8 (100)	0 (0)	0	0	0	0

^a DB987 was for nonresidents outside of the Dalton Highway Corridor Management Area (DHMCA) in the fall during 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 instituted beginning in regulatory year 2002 and was a resident and nonresident drawing hunt within the DHCMA. Beginning in regulatory year 2004–2005, it was a resident only hunt.

^b 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 1996–1997 through 2007–2008

Regulatory year	Local resident ^a (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1996–1997	0 (0)	2 (10)	18 (90)	20
1997–1998	0 (0)	3 (23)	10 (77)	13
1998–1999	1 (8)	3 (23)	9 (69)	13
1999–2000	0 (0)	4 (29)	10 (71)	14
2000–2001	0 (0)	1 (14)	6 (86)	7
2001–2002	0 (0)	6 (50)	6 (50)	12
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

^a Includes only residents of the subunit.

TABLE 8 Unit 25B and 25D residency of successful brown bear hunters, regulatory years 1996–1997 through 2007–2008

Regulatory year	Local resident ^a (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1996–1997	1 (33)	0 (0)	2 (67)	3
1997–1998	0 (0)	0 (0)	0 (0)	0
1998–1999	1 (50)	0 (0)	1 (50)	2
1999–2000	4 (80)	0 (0)	1 (20)	5
2000–2001	1 (100)	0 (0)	0 (0)	1
2001–2002	0 (0)	1 (100)	0 (0)	1
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

^a Includes only residents of the subunit.

TABLE 9 Unit 26B residency of successful brown bear hunters^a, regulatory years 1996–1997 through 2007–2008

Regulatory year	Local resident ^b (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1996–1997	1 (4)	11 (44)	13 (52)	25
1997–1998	0 (0)	9 (36)	16 (64)	25
1998–1999	0 (0)	3 (100)	0 (0)	3
1999–2000	0 (0)	4 (100)	0 (0)	4
2000–2001	0 (0)	9 (82)	2 (18)	11
2001–2002	0 (0)	13 (93)	1 (7)	14
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

^a Includes permit harvest.

^b Includes only residents of the subunit

TABLE 10 Unit 26C residency of successful brown bear hunters^a, regulatory years 1996–1997 through 2007–2008

Regulatory year	Local ^b resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1996–1997	0 (0)	4 (50)	4 (50)	8
1997–1998	2 (25)	0 (0)	6 (75)	8
1998–1999	0 (0)	0 (0)	3 (100)	3
1999–2000	0 (0)	1 (12)	7 (88)	8
2000–2001	0 (0)	5 (38)	8 (62)	13
2001–2002	0 (0)	2 (25)	6 (75)	8
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 (45)	5 (55)	9
2007–2008	0 (0)	5 (45)	6 (55)	11

^a Includes permit harvest.

^b Includes only residents of the subunit.

WILDLIFE
MANAGEMENT REPORT

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

From: 1 July 2006
To: 30 June 2008

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.

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

There was a radiotelemetry study in the southern portion of Unit 26A for a number of years, with methods previously reported in research progress reports (Reynolds 1984, 1989) and management reports (Trent 1985, 1989; Carroll 1993).

Population densities for broad habitat zones in Unit 26A were estimated using subjective comparisons to areas of the North Slope with known bear densities from work completed by

Reynolds (1984, 1989, and his other unpublished data). The habitat zones include the coastal plain (<800 ft elevation), the foothills (800–2,500 ft elevation), and mountains (>2,500 ft elevation).

A prototype methodology of the line transect technique developed by Becker and Quang (2009) was used to complete a 3-year project in 2000, 2001, and 2003 that surveyed bears in Unit 26B, western Unit 26C, and eastern Unit 26A. (Reynolds, unpublished).

We used brown bear sealing certificates to determine seasonal harvests. For sealed bears we summarized the date and location of taking, skull sizes, and sex/age composition of harvested animals. Hunting activity was summarized by residency of hunters and their methods of transportation. For reporting population estimates and harvest summaries, we divided Unit 26A at 159° W longitude into Unit 26A East and Unit 26A West.

The sealing certificate system has not proven to be an effective method to determine local harvest, so we reviewed several community-based harvest assessment studies to get an insight into local harvest. Some of the communities have been studied more than once, so we were able to calculate mean harvests for these villages. In 1992 nearly all the villages were studied, so we determined the total harvest for that year. For the villages of Anaktuvuk Pass and Nuiqsut, which are on the border of Unit 26A, we assumed that half of their bear harvest came from Unit 26A.

We participated in radio talk shows, produced written public notices, and spoke at public meetings to provide educational materials designed to minimize negative interactions between the public and brown/grizzly bears and explain to people how the Defense of Life and Property system works. We have also helped write and commented upon 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 and around their work camps.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

A population estimate for bears in Unit 26A of 900–1,120 was made by Reynolds (1989). He estimated that there were 400 bears in Unit 26A West and 500–720 bears in Unit 26A East (Table 1). The bear population has probably increased since that time.

Reynolds (personal communication) completed a study in the western foothills region of Unit 26A in June 1992. Density was calculated at 29.5 bears/1,000 km² with a 95% confidence interval of 28.1–31.5 bears/1,000 km² for the Utukok and Kokolik drainages.

A 3-year bear survey was flown in 2000, 2001, and 2003 in Unit 26B, western Unit 26C, and eastern Unit 26A. A density of 18.3 grizzly bears/1,000 km² was found in an area of 20,000 km² (8,000 mi²) between 1,500 and 4,000 feet elevation. (Reynolds, unpublished).

Bear populations in the Brooks Range apparently declined during the 1960s due to guided hunting (H. Reynolds, ADF&G [retired], personal communication) and have been recovering since permit hunts were instituted during the 1977–78 regulatory year (Trent 1989). The drawing permit hunt has since been eliminated, but bear densities appear to be at high levels relative to carrying capacity of the habitat.

Population Composition

Reynolds (1984) completed population composition and productivity surveys for the western portion of the unit in the Utukok and Kokolik River drainages. The sex ratio for bears older than 1 year was approximately 40% males and 60% females; for cubs and yearlings it was approximately 50:50, but may have slightly favored females.

Age composition was as follows: cubs of the year – 13%; yearlings – 10%; 2-year-olds – 14%; 3 and 4-year-olds – 11%; and bears over 5 years – 52%. Mean age at first reproduction was 8.0 years, mean litter size was 2.0 cubs, mean reproductive interval was 4.0 years, and mean productivity was 0.5 cubs/year.

Distribution and Movements

We estimated 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 (Carroll 1995).

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>
Unit 26A General Hunt		
Resident and Nonresident Hunters:		
1 bear every regulatory year.	1 Aug–31 May	1 Aug–31 May
Unit 26A Subsistence Hunt		
Resident Hunters:		
1 bear per regulatory year by registration permit	1 July–31 May	No open season

Board of Game Actions and Emergency Orders. During its spring 1996 meeting, the Board of Game eliminated the drawing permit requirements for nonresident brown bear hunters in Unit 26A and lengthened the season to 20 August–31 May. The change was made to simplify the complex permit system. The harvest in Unit 26A had been well below the maximum sustained yield, and the permit hunt was undersubscribed. Our goal will be to keep the harvest at or below an average of 5% of the bear population during any 2-year period. Therefore, the maximum allowable harvest will be 31 bears per year in Unit 26A East and 20 bears in Unit 26A West. If this quota is exceeded during one year, the quota for the next year will be reduced by as much as it was exceeded during the first year. If the average is exceeded, more restrictive regulatory action, including emergency orders, will be considered. The system depends on open lines of communication among the Alaska Department of Fish and Game (ADF&G), guides, and hunters.

In 1999 the Board increased the bag limit from 1 bear every 4 years to 1 bear per year.

During the fall 2003 meeting the Board of Game did away with the Northwest Alaska Brown Bear Management Area regulation and created a Unit 26A subsistence registration brown bear hunt that is designed for people who hunt bears for food. Tags and sealing procedures are not required, hunters cannot use aircraft for transportation, and people can report by mail.

During the fall 2005 meeting, the Board of Game lengthened the seasons for the general brown bear hunt from 20 August–31 May to 1 August–31 May and the season for the subsistence registration brown bear hunt from 20 August–31 May to 1 July–31 May.

Human-Induced Harvest. Thirteen bears were sealed during 2006–2007. No bears were reported killed in defense of life and property (DLP). Three bears were killed in Unit 26A West and 13 were killed in Unit 26A East. Eleven bears were taken in fall 2006 and 2 during spring 2007 (Table 1). Nine bears were males and 4 were females (Table 2).

Nine bears were sealed during 2007–2008. No bears were reported killed in defense of life and property (DLP). Three bears were killed in Unit 26A West and 6 were killed in Unit 26A East. Eight bears were taken fall 2007 and 1 during spring 2008 (Table 1). Six bears were males and 3 were females (Table 2).

The sealing certificate system has not proven to be an effective method to determine actual local harvest, so ADF&G personnel worked with the North Slope Borough (NSB) to develop a harvest documentation system that is more acceptable to local residents. Harvest monitors have been hired in some villages and are collecting harvest information for several species. We reviewed the results of the NSB program, ADFG studies, 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. Fuller and George (1997) obtained information from nearly every village in 1992 which indicated that local residents harvested at least 9–10 bears that year. Sealing certificates indicated a reported local harvest of 3 bears in 1992.

The reported harvest was similar to recent years in 2006–2007 (13 bears) and below average for 2007–2008 (9 bears). The range from 2000–2005 was 13–18 (Table 1). Both years were well below the average number of 27.6 harvested from 1988 to 1996 (Carroll 2007). This difference might be explained by the recent reduction in the number of guided moose hunters that would have secondarily harvested bear.

For bears harvested during 2006–2007, the mean skull size for males was 20.3 inches and 20.4 inches for females; the mean age was 8.7 years for males and 8.0 years for females. During 2007–2008 the mean skull size for males was 22.1 inches and 19.5 for females; the mean age for males was 13.3 years and 9.7 years for females (Table 3).

Permit Hunts. Drawing permit hunts were discontinued by board action as of the 1996–1997 regulatory year. There was 1 bear taken under the subsistence permit hunt in 2007.

Hunter Residency and Success. Of the 13 bears sealed in Unit 26A during 2006–2007, 10 were harvested by nonresidents and 3 by nonlocal Alaska residents; none were harvested by North Slope residents. During 2007–2008, 3 bears were reported harvested by nonresidents, 5 by nonlocal Alaska residents, and 1 by a local resident (Table 4).

Harvest Chronology. During 2006–2007, 8 bears were harvested during August, 3 in September, and 2 in May. During 2007–2008, 5 bears were reported harvested in August, 3 in September, and 1 in May (Table 5).

Transport Methods. Most bear hunters continued to use aircraft as transportation in Unit 26A. During 2006–2007, all 13 hunters used aircraft for transportation. During 2007–2008, 6 hunters used aircraft, 2 used ATVs, and 1 walked (Table 6).

Other Mortality

No recent estimate of natural mortality for grizzly bears in Unit 26A is available. However, Reynolds and Hechtel (1983) reported mortality rates among offspring accompanied by marked adult females in the western Brooks Range to be 44% for cubs, 9% for yearlings, and 14% for 2-year-olds from 1977 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). An attempt should be made to catalog as many of these areas as possible. These areas should be considered critical habitat for brown bears and given special protection in the future.

Enhancement

There were no habitat enhancement activities in Unit 26A during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

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.

CONCLUSIONS AND RECOMMENDATIONS

Hunters reported 13 and 9 bears harvested during 2006–2007 and 2007–2008. This was similar to recent years, but below the average number of bears harvested between 1988 and 1996 (27.6) and well below the allowable sustained yield of approximately 51 bears. Even if unreported harvest is as high as 100% of the reported harvest, the total estimated yearly harvest would still be well within safe harvest limits.

Oil, gas, and mineral exploration and development are potential hazards to brown bear habitat. H. Reynolds (ADF&G [retired], personal communication) has stated that some areas, particularly some east/west-oriented ridges, have very high brown bear densities. We should identify these critical habitat areas and catalog them so they can be given special protection during upcoming exploration and development projects.

A significant management problem in Unit 26A continues to be unreported harvest and noncompliance with bear hunting regulations. To accommodate rural hunting practices, the Board of Game established alternate hunting regulations for subsistence users. The regulations are designed for people who hunt bears for food. The regulation eliminates tags and sealing procedures and allows harvest reports by mail. These regulations have improved harvest reporting and compliance.

The Board of Game has liberalized bear regulations in Unit 26A several times in recent years. In 1996 the brown bear drawing permit system was discontinued and the season was lengthened. The board increased the bag limit from 1 bear every 4 years to 1 bear every year in 1999. The season was again lengthened in 2005, so the general season starts on 1 August and the subsistence season on 1 July. It has been surprising that since 1996 the bear harvest has been 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. Eliminating the drawing permit system has reduced paperwork and time spent administering the hunt and has not led to overharvest. Because the harvest remains well below the allowable sustained yield of approximately 51 bears, we recommend that the season for the subsistence hunt be increased to include the month of June so that subsistence hunters can harvest bears 12 months per year.

LITERATURE CITED

- BECKER E. F. AND P. X. QUANG. 2009. A gamma-shaped detection function for line-transect surveys with mark-recapture and covariate data. *Journal of Agricultural, Biological, and Environmental Statistics* 14(2):207-223.
- BRAUND, S.R. & ASSOCIATES, AND INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH. 1991. North Slope Subsistence Study – Barrow, 1987, 1988, and 1989. Technical Report No. 149. Prepared for the U.S. Department of Interior, Minerals Management Service.
- . 1993. North Slope Subsistence Study – Wainwright, 1988 and 1989. Technical Report No. 147. Prepared for the U.S. Department of Interior, Minerals Management Service.
- BROWER, H.K. AND R.T. OPIE. 1996. North Slope Borough Subsistence Documentation Project: Data for Anaktuvuk Pass, Alaska for the Period July 1, 1994 to June 30, 1995. North Slope Borough Department of Wildlife Management Report. 36 pp. Available from North Slope Borough Department of Wildlife Management, Box 69, Barrow, Alaska 99723 USA.
- , AND ———. 1997. North Slope Borough Subsistence Documentation Project: Data for Nuiqsut, Alaska for the Period July 1, 1994–June 30, 1995. North Slope Borough Department of Wildlife Management Report. 44 pp. Available from North Slope Borough Department of Wildlife Management, Box 69, Barrow, Alaska 99723 USA.
- CARROLL, G.M. 1993. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 271–283 in S.M. Abbott, editor. Management report of survey-inventory activities, 1 July 1990–30 June 1992. Alaska Department Fish and Game Federal Aid in Wildlife RESTORATION PROGRESS REPORT GRANT W-23-1 AND W-23-5, STUDY 4.0. JUNEAU. 283PP.
- . 1995. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 289–303 in M.V. Hicks, editor. Management report of survey-inventory activities, 1 July 1992–30 June 1994. Alaska Department Fish and Game Federal Aid in Wildlife RESTORATION PROGRESS REPORT GRANT W-24-1 AND W-24-2, STUDY 4.0. JUNEAU. 303PP.
- . 2007. Unit 26A brown bear management report. Pages 324–339 in P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2004–30 June 2006. Alaska Department OF FISH AND GAME. JUNEAU, ALASKA.
- FULLER, A.S. AND J.C. GEORGE. 1997. Evaluation of Subsistence Harvest Data from the North Slope Borough 1993 Census for Eight North Slope Villages: for the Calendar Year 1992. North Slope Borough Department of Wildlife Management Report. 76 pp. Available from

North Slope Borough Department of Wildlife Management, Box 69, Barrow, Alaska 99723 USA.

- HEPA, R.T., H.K. BROWER AND D. BATES. 1997. North Slope Borough Subsistence Harvest Documentation Project: Data for Atkasuk, Alaska for the Period July 1, 1994 to June 30, 1995. Department of Wildlife Management, North Slope Borough, Barrow, Alaska. 40pp.
- PEDERSEN, S. 1989. Pt. Lay Subsistence Land and Resource Use. In Impact Assessment, Inc: Pt. Lay Case Study. Technical Report No. 139. U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, Anchorage, Alaska.
- . 1995. Nuiqsut. Chapter XXII, Vol. 5. In J. Fall and C. Utermohle, editors. An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska. Technical Report No. 160. U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, Anchorage, Alaska.
- . 2001. Subsistence Harvest Levels and Spatial Dimensions of Caribou, Moose, Brown bear and Muskox Hunting in Nuiqsut during Regulatory Year 2000. Draft Report: Division of Subsistence, Arctic Region, Alaska Department of Fish and Game, Fairbanks, Alaska.
- REYNOLDS, H.V. 1984. Unit 24–26 brown/grizzly bear survey-inventory progress report. Pages 94–96 in J.A. Barnett, editor. Annual report of survey-inventory activities. Part I. Brown/grizzly Bears. Vol. XIV. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–22–1 and W–22–2. Job 17.0 and 4.0. Juneau. 96pp.
- . 1989. Unit 24–26 brown/grizzly bear survey-inventory progress report. Pages 174–184. S.O. Morgan, editor. Annual report of survey-inventory activities, 1987. Vol. XIX, Part V. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–23–1, Study 4.0. Juneau. 189pp.
- REYNOLDS, H.V. Unpublished. Application of a double-count line transect method to estimate density of brown bears in arctic Alaska. Alaska Department Fish and Game, Fairbanks.
- , AND J.L. HECHTEL. 1983. Reproductive biology, movement, distribution, and habitat utilization of a grizzly bear population. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report. Grant W–22–1. Job 4.14R. Juneau. 22pp.
- TRENT, J.N. 1985. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 65–69 in B. Townsend, editor. Annual report of survey-inventory activities. Part V. Brown Bears. Vol. XVI. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–22–4. Job 4.0. Juneau. 69pp.
- . 1989. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 174–184. S.O. Morgan, editor. Annual report of survey-inventory activities, 1987. Vol. XIX, Part V. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report. Grant W–23–1, Study 4.0. Juneau. 189pp.

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TABLE 1 Estimated population size and reported harvest of brown/grizzly bears in Unit 26A by unit and season, 2000–2008^a

Unit	26A West	26A East	Total	Fall Harvest	Spring Harvest
Estimated Pop Size	400	500-720	900-1120		
5% Harvest Rate	20	25-36	45-56		
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

^aFigures for 1988–1999 available in Carroll (2007)

TABLE 2 Unit 26A brown bear harvest by sex, 2000–2008^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

^aFigures for 1985-1999 available in Carroll (2007)

TABLE 3 Unit 26A brown bear skull size and age, 2000–2008^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

^aFigures for 1985–1999 available in Carroll (2007)TABLE 4 Unit 26A brown bear successful hunter residency, 2000–2008^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

^aFigures for 1985–1999 available in Carroll (2007)^bLocal means North Slope residents.

TABLE 5 Unit 26A brown bear harvest chronology by time period, 2000–2008^a

Regulatory year	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

Data for 1985–1999 available in Carroll (2007)

TABLE 6 Unit 26A brown bear harvest percent by transport method, 2000–2008^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

^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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