

CHAPTER 7: BROWN BEAR MANAGEMENT REPORT

From: 1 July 2012

To: 30 June 2014¹

LOCATION

GAME MANAGEMENT UNIT: 8 (5,097 mi²)

GEOGRAPHIC DESCRIPTION: Kodiak and adjacent islands

BACKGROUND

Kodiak's geologic character is not conducive to preserving fossil evidence, so it is not possible to confirm how long bears have been on the archipelago. Genetic analyses, however, indicate that Kodiak brown bears (*Ursus arctos middendorffi*) have been isolated from other bear populations since the last ice age (about 12,000 years ago) and during that time developed into a unique subspecies (Talbot et al. 2006). 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.

Kodiak brown bears have significant importance to Kodiak's indigenous community as well as the non-Native community. Beginning in the late 1700s, Russian entrepreneurs came to the island to capitalize on fur resources, including the Kodiak brown bear. After the United States acquired Alaska in 1867, the commercial and sport harvest of bears continued for a number of years; however, as professional interest in guided Kodiak bear hunts grew so did the concern for the unregulated harvest of Alaska's resources. In 1925, the newly established Alaska Game Commission abolished commercial bear hunting on the archipelago in a successful effort to restore bear populations. Both the bear population and the regulations governing harvest fluctuated for the next 50 years with increased pressure from sportsmen, hunting guides, ranchers, and fisheries managers. Van Daele and Barnes (2010) and Van Daele et al. (2013) provide an extensive history on management of Kodiak brown bears during this time period.

Except for changes in how permits were issued to nonresidents, only minor changes in bear hunting regulations have occurred since 1976. Hunting on Afognak and part of northeastern Kodiak Island was changed from an unlimited permit hunt to a limited permit hunt in regulatory year (RY) 1987 (regulatory year begins 1 July and ends 30 June; e.g., RY87 = 1 July 1987–30 June 1988. State hunting regulations allowed for a subsistence bear hunt in 1986–1987, with hunters required to salvage all bear meat for human consumption. The state subsistence bear hunt

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

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 National Wildlife Refuge (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 bears could tolerate viewing programs as long as human activities were predictable and restricted to specific areas (Wilker and Barnes 1998).

In 2001 a Citizens Advisory Committee was established to work closely with the Alaska Department of Fish and Game (ADF&G) in cooperation with 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* (Citizens Advisory Committee 2002) was crafted.

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 mandatory 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, measurement, and collection of biological data. We determined bear ages from cementum annuli of premolar teeth removed from each bear (Matson et al. 1993). Mandatory hunting reports provided information on hunting effort and success. We monitored hunting activity in the field with periodic patrols by boat and aircraft.

Brown bear population estimates were developed for 9 study areas with the “intensive aerial survey technique” detailed in Barnes and Smith (1997). Data from these surveys were extrapolated to develop a unitwide bear density and population estimate. We cooperated 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 collaborated with Old Harbor Native Corporation to capture and monitor female brown bears to estimate productivity, cub survival, and reproductive interval. We input harvest and population data into a population model to objectively estimate appropriate harvest strategies and guidelines (Van Daele 2007).

Efforts were made in 1995 to assess the feasibility of using genetic analysis to distinguish individual bears on Kodiak and the surrounding islands. The intent was to investigate the feasibility of developing a genetic based population estimate for the Kodiak Archipelago. At the time, individual bear identification was not possible due to the high degree of relatedness among individuals (i.e., low heterozygosity) and the inability to identify sufficient genetic markers. In spring 2014, in another attempt to assess individual identification using genetic techniques, we collected and submitted 30 tissue samples from brown bears harvested throughout the archipelago. Samples were dried and preserved and sent to Wildlife Genetics International (Nelson, British Columbia, Canada) where they are being analyzed.

In 2008, 2009, and 2012, we deployed VHF radio collars on female brown bears on Sitkalidak Island to estimate recruitment, cub survival, and reproductive interval of females. This research will provide area-specific population data necessary to sustain high quality hunting and maximize hunting opportunities for hunters without compromising population health. Information gathered through this project will allow managers to compare brown bear population dynamics on Sitkalidak Island with other areas of the Kodiak Archipelago.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Recent estimates of the Unit 8 brown bear population are higher than subjective estimates made in the 1950s. The bear population has likely 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 stable to increasing in most areas (ADF&G, unpublished data, Kodiak).

Population Size

Working with Kodiak NWR, we conducted 23 intensive aerial brown bear surveys from 1987 to 2013 (Table 1). Surveys were performed in 10 separate areas on Kodiak Island, and 7 areas have been surveyed more than once. Data from these surveys were extrapolated to estimate the total bear population on the archipelago in 1995 (Barnes et al. 1988, Barnes and Smith 1998) and 2005 (Van Daele and Barnes 2010). The estimated population in 2005 was 3,526 bears, 2,378 of which were independent (≥ 3 years old). There were an estimated 430 bears on the islands north of Kodiak, 908 on northwest Kodiak, 101 bears on northeast Kodiak, 744 on southeast Kodiak, 1,094 on southwest Kodiak, and 249 on the Aliulik Peninsula. The average density on Kodiak Island was 308 bears/1,000 km² (0.8 bears/mi²), and for the northern islands it was 189 bears/1,000 km² (0.5 bears/mi²). We have not conducted aerial surveys on northeastern Kodiak,

Afognak, or the other northern islands where dense Sitka spruce (*Picea sitchensis*) forest makes it difficult to observe bears, so the population estimates for those areas are less precise. Extrapolation of intensive aerial survey data from all of the survey units on Kodiak Island, coupled with model predictions, suggest a 16.7% increase in the archipelago-wide bear population from 1995 to 2005 (Van Daele 2009).

We successfully completed an intensive aerial survey of the brown bear population in the Karluk Lake area during 24–30 May 2013. Survey data indicate the bear density in this area decreased significantly ($P > 0.001$) during the past decade from an estimated 483 independent bears/1,000 km² (± 70 , SE = 29.77) in 2003 to 248 independent bears/1,000 km² (± 20 , SE = 8.46) in 2013. Conditions during the 2013 intensive aerial brown bear surveys were among the best on record and suggest a decline in the number of bears using the Karluk Lake Basin. Density estimates obtained during the 2013 survey were comparable to those obtained in 2010 (252 independent bears/1,000 km²; ± 22.3); however, due to various factors (e.g., late den emergence, irregular movement patterns) it was unclear if the reduced number of bears observed in 2010 was a result of these factors or a true decline in bear density. Interestingly, survey results from 2013 support the 2010 findings suggesting a decline in bear density has occurred in the Karluk Lake Basin. It is important to note Karluk Lake has experienced a great deal of change during the past decade including significantly declining sockeye runs, greatly increased bear research, and major construction activity on Camp Island. Any or all of these factors may have negatively impacted bear productivity, survival, and/or movement patterns and warrants increased examination.

Aerial surveys along salmon streams in southwestern Kodiak Island conducted by the Kodiak NWR indicate considerable inter-annual variation in composition of brown bears observed. In addition, recent surveys suggest an apparent decrease in the proportion of maternal females. Analysis of these data by 5-year periods indicates maternal females comprised 15.4% of the bears classified during 1985–1989, 16.8% during 1990–1994, 19.6% during 1995–1999, and 18.2% during 2000–2004 (Kodiak NWR, unpublished data). No surveys were conducted in 2006 and 2007, however data collected from 2008 to 2012 indicate maternal females declined to 9.6% of the bears observed. No aerial stream survey data was available for 2013. The recent decline in observed females may be in response to temporal fluctuations in berry and salmon abundance; however, a more in-depth investigation is necessary to assess these relationships.

Distribution and Movements

Several studies investigating population dynamics and brown bear movements have occurred on Kodiak Island in the past 50 years. Troyer and Hensel (1969) investigated brown bear population dynamics in the Karluk Lake area from 1954 through 1962. Additionally, there were 4 major brown 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 addressed 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 bear-hunter encounters were increasing and resulting in hunters losing their game and/or 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 southwest Kodiak areas were described and compared in 1990 (Van Daele et al. 1990). In 2007, a meta-analysis of data collected during and subsequent to those projects was completed (Van Daele 2007, Van Daele and Barnes 2010, Van Daele et al. 2012).

In 2008, we deployed GPS radio collars to investigate bear movements and resource use near the village of Old Harbor and Sitkalidak Island, and near Karluk and Frazer Lakes. In 2012 we deployed GPS collars on brown bears on Afognak Island to assess seasonal and annual movements and changes in resource use. Extensive commercial logging has occurred on Afognak Island since 1979 and has generated concern regarding the potential impact on brown bear population dynamics and resource availability. This project will examine habitat and forest stand characteristics impacting bear distribution, resource use, and abundance.

Productivity and Survival

During this reporting period, 6 flights occurred to assess cub survival and female productivity. Three bears captured and radiocollared in 2012 were recaptures from previous collaring efforts (2 previously captured in 2008 and 1 in 2009). Of the 10 bears radiocollared in 2012, 2 were no longer transmitting data in 2013 and 1 was transmitting a mortality signal in 2014 and was no longer being tracked. This resulted in the continuous monitoring of 7 females during this reporting period and 16 females overall.

The mean number of young per litter was 2.56 cubs/litter ($n = 13$). The mean reproductive cycle was 1 litter every 4.75 years ($n = 2$). Annual survival for cubs of the year, 1-year olds, and 2-year olds was 0.75 ($n = 4$), 0.88 ($n = 6$), and 1.00 ($n = 4$), respectively. Interestingly, 3 females were observed for a total of 7 years (2 bears for 2 years, 1 bear for 3 years) during which time no cubs were observed.

MORTALITY

Harvest

Since statehood (1959), the reported sport harvest of brown bears in Unit 8 has varied significantly from a low of 77 (RY68) to a high of 250 (RY08) per regulatory year (Table 2). However, regulations have been modified in the recent past to be more consistent and better distribute hunting pressure. From RY80 to RY89 the mean annual brown bear harvest was 165.4 (range = 124–202), from RY90 to RY99 mean annual harvest was 160.0 (range = 149–177), from RY00 to RY09 the mean annual harvest was 178.0 (range = 142–250), and from RY10 to RY13 the mean annual harvest was 192.5 (range = 164–222). If the bear population in the 1980s and 1990s was approximately 2,980 bears (2,085 independent bears), the estimated sport harvest (Table 3) was 5.5% of the total bear population annually (8.0% of the independent bears). If the bear population in the 2000s increased to 3,526 bears (2,378 independent bears), the estimated annual sport harvest from RY00 to RY09 was 5.1% of the total bear population (7.5% of the independent bears). Similarly, the estimated annual sport harvest from RY10 to RY13 remains consistent at 5.5% of the total bear population (8.1% of the independent bears).

Season and Bag Limit. The season for resident and nonresident hunters on northeast Kodiak, including all drainages into Chiniak, Anton Larsen, and northeast Ugak (east of the Saltery drainage) Bays, and including Spruce, Near, Woody, Long, Ugak and other adjacent islands, was 15 October–30 November and 1 April–15 May. The bag limit was 1 bear every 4 regulatory years by registration permit only. In the remainder of Unit 8, the season dates and bag limit were the same with drawing permits available in 31 individual hunt areas. Drawing permits were allocated between resident (66%) and nonresident (34%) hunters, and all nonresident hunters were required to hunt with either a registered guide or a resident relative within second degree of kindred.

An additional federal season for subsistence hunters is open on Kodiak NWR lands during 1 April–15 May, and during 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.

Alaska Board of Game Actions and Emergency Orders. No changes in Unit 8 bear hunting regulations were made during the 2013 Board of Game meeting. No emergency orders were issued during this reporting period.

Harvest by Hunters. Hunters harvested 184 bears in RY12 and 164 bears in RY13, a rate 21% lower than the previous 5-year mean of 211.4 bears (Table 2). The RY13 harvest was the lowest in the past decade. There were 59 bears harvested in fall RY12 and 57 in fall RY13. The mean annual fall harvest for the previous 5 years was 90.8 bears. During spring of RY12 and RY13, 125 and 107 bears were harvested, respectively. The mean annual harvest for the previous 5-year period was 120.6 bears. Totals do not include bears killed under federal subsistence regulations. One male bear was killed under a federal subsistence permit in RY12 and no subsistence bears were shot in RY13.

Male bears dominated the harvest, composing 76% of the sport harvest in RY12 and 77% in RY13, a rate higher than the previous 5-year average of 70.4% and above our management objective of 60% male harvest. Additionally, sport hunters harvested 45 females in RY12 and 37 females in RY13, lower than the preceding 5-year mean of 62.2. Considering all known female mortalities (e.g., non-sport harvest), 50 and 43 females were killed in RY12 and RY13, respectively, lower than the previous 5-year mean of 70.6.

Mean total skull size of male bears harvested in RY12 and RY13 was 25.5 inches (64.8 cm), and 25.7 inches (65.3 cm), respectively, slightly larger than the mean skull size of 25.4 inches (64.5 cm) for the previous 5 years. Harvested female skull sizes averaged 21.8 inches (55.4 cm) in RY12 and 22 inches (55.9 cm) in RY13. The average female skull size during the previous 5 years was 22.1 inches (56.1 cm; Table 3). The mean age of males harvested in RY12 was 6.2 years, considerably younger than the 5-year mean age of harvested male bears (8.6 years). The mean age of females harvested in RY12 was 8.6 years, similar to the mean age of female bears harvested during the previous 5 years (8.3 years; Table 3). No age data were available for male or female bears harvested during RY13.

Permit Hunts. Starting in RY07, the number of drawing hunt areas for brown bears in Unit 8 increased from 29 to 31, and the total number of permits obtainable annually increased from 472

to 501. Drawing permits available annually to Alaska residents increased from 319 (107 in fall, 212 in spring) to 331 (116 in fall, 215 in spring). Nonresident drawing permits increased from 153 (53 in fall, 100 in spring) to 170 (64 in fall, 106 in spring). Nonresidents hunting with resident relatives were allocated permits from the resident quota. Successful drawing applicants were required to come to Kodiak to pick up their permits prior to going afield. In RY12, 348 (69%) successful applicants received their permits and in RY13, 340 (68%) permits were received by hunters (Table 4). All hunters who received and returned permits reported they attempted to hunt during the regulatory year their permit was issued. Annual harvest in the drawing permit areas was 154 in RY12 and 157 in RY13, lower than the previous 5-year average of 187.0.

The northeastern portion of Kodiak Island, also known as the “road system,” was managed as a registration hunt area (RB230 and RB260). Seasons in the registration area were similar to those in the drawing hunt areas, but the number of permits issued was not limited. In RY12 and RY13 we issued 292 and 232 registration permits, respectively (Table 5). During the previous 5 years, the mean number of registration permits issued was 255.8. The number of hunters afield in the registration hunt was 199 in RY12 and 120 in RY13, inconsistent with the mean number of hunters afield for the previous 5 years, 167.2. Annual harvest in the registration permit area was 32 in RY12 and 7 in RY13 highly variable when compared with the average annual registration harvest during the previous 5 years of 24.4.

Hunter Residency and Success. Hunters participating in drawing hunts had a success rate of 46% in RY12 and 47% in RY13 (Table 4). Mean hunter success rate for drawing hunts the previous 5 years was 56.0%. Hunters participating in registration hunts had a success rate of 16% in RY12 and 6% in RY13 (Table 5). Mean hunter success rate for registration hunts the previous 5 years was 14.4%.

Although 66% of the drawing permits and the vast majority of registration permits are issued to Alaska residents, nonresidents typically harvest more bears and have a higher success rate in Unit 8 than residents. This is likely due to nonresident hunters obtaining professional hunting guides as required by regulation.

In RY12, residents harvested 86 bears (30 local residents, 56 nonlocal residents) and had a success rate of 16% and 30%, respectively for local and nonlocal residents (Table 6). In RY13, residents harvested 67 bears (6 local residents, 61 nonlocal residents) and had a success rate of 4% and 37%, respectively for local and nonlocal residents. In RY12, nonresidents harvested 98 bears and had a 53% success rate and in RY13, nonresidents harvested 97 bears and had a 59% success rate. Mean harvest for the previous 5 years was 99.6 for residents and 111.8 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) typically resulted in the highest harvest (Table 7). In RY12, 86% of the harvest occurred during the first third of the fall season, and in RY13, 83% of the harvest occurred in the first third of the season. During the preceding 5 years, the mean annual percentage of harvest in the first third of the fall season was 78.6%. In RY12, 62% of the harvest occurred during the last third of the spring season, and in RY13, 58% of the harvest

occurred in the last third. The mean annual harvest percentage in the last third of the spring season during the preceding 5 years was 58.4%.

Transport Methods. Bear hunters in Unit 8 are commonly transported to hunt areas by aircraft or boat. The proportion of hunters reporting their method of transport varies by year; however, transport via aircraft is clearly the most commonly used method of transportation (Table 8). It is important to note hunters regularly fly into a hunt area and then use a skiff or inflatable raft while in the area. The use of multiple transportation methods in one hunt area can lead to inconsistent reporting by hunters and may result in the potential misinterpretation of transportation methods.

Other Mortality

Animals killed in defense of life or property, illegal kills, and other non-sport mortality resulted in 22 bear mortalities in RY12 and 16 in RY13 (Table 2). All mortalities were recovered and sealed by ADF&G staff. The number of non-sport mortalities in RY12 and RY13 was lower than the mean annual non-sport mortality of 30.8 bears/year during the previous 5 years.

Reported defense of life or property kill data are most appropriately analyzed on a calendar year basis, rather than regulatory year (Table 9). During 2006 we saw a spike in the number of bears killed in villages as communities transitioned to bear resistant garbage practices, but numbers have generally been declining since.

HABITAT

Assessment

Kodiak's inland habitat is contiguous and intact with very few roads all of which exist on the northeastern portion of the island near the city of Kodiak. The majority of the human activity occurs along coastal areas; however, it is generally restricted to isolated areas and involves small numbers of people. Management for a sustained yield of salmon is a high priority on the archipelago and may impact land management decisions. The only large-scale anthropogenic disruption of inland habitat on Kodiak Island occurred when the Terror Lake hydroelectric project was completed in 1985. Despite the invasive nature of the project, a concerted effort was made to alleviate any negative impacts on Kodiak's bear population (Smith and Van Daele 1990).

Extensive logging has occurred on Afognak Island since 1979 generating concern regarding the potential impact on wildlife resources. The island has experienced considerable habitat alteration due to the widespread commercial logging that has occurred over the past 35 years. Although there have been no focused research studies addressing this concern, we suspect these activities have not had major adverse impacts on the bear population. The salmon runs on Afognak remain healthy and the island produces abundant berries and grasses. Bear survival and productivity do not appear to be negatively impacted by increased hunting pressure likely because land access fees dissuade (non-shareholder) hunters from using Native corporation lands.

There are approximately 3.2 million acres of brown bear habitat on Kodiak, Afognak, and adjacent islands in Unit 8, half of which 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 the signing of the Alaska Native Claims Settlement Act in December 1971. However, by the year 2000 more than 80% of

the refuge lands that had been transferred to Native corporations as a result of the Alaska Native Claims Settlement Act were reinstated into the Kodiak NWR. These lands were reacquired through direct purchase or through the implementation of conservation easements. Some land was also purchased on Afognak and Shuyak islands and subsequently transferred to state ownership. Recent developments possibly impacting brown bears include expanding rural settlement, commercial fishing, recreational activities in remote areas, including hunting, sport fishing, and wildlife viewing, and widespread commercial timber harvest.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

In 2002 the Alaska Department of Fish and Game and many collaborators worked cooperatively to complete the *Kodiak Archipelago Bear Conservation and Management Plan* (Citizens Advisory Committee 2002). The final plan included more than 270 recommendations (agreed upon by all parties) and continues to be incorporated into our current management program.

Following completion of the management plan, the Citizens Advisory Committee requested the formation of the Kodiak Unified Bear Subcommittee (KUBS) to make recommendations to management agencies regarding bear conservation and management. The KUBS group remained active during this reporting period, meeting as necessary during the winter and spring. The group developed a series of public service announcements for local radio stations, focusing on bear awareness and safety while stressing respect for bears.

We continue to make progress working with area villages to implement responsible waste management plans and reduce human-bear interactions. The landfill at Larsen Bay continues to be successful, minimizing bear access to human foods and waste and is well maintained by local villagers. In 2008, the village of Port Lions completed fencing of their landfill, including the installation of an electric fence that was retrofitted to an 8-ft chainlink fence in 2009. Port Lions also installed bear resistant dumpsters greatly reducing bear problems. In 2010, the village of Old Harbor took an active role in cleaning their landfill and initiating a village “bear patrol” to warn residents of unruly bears and condition misbehaving animals. In addition, local students and teachers obtained data from our radiotelemetry study to monitor bear movements and gather information on bear ecology. The village of Old Harbor was also awarded a federal grant for landfill improvements and a fence surrounding the landfill was completed in 2012.

Throughout this reporting period we have observed increased participation from the Road System Bear Safety Group following brown bear sightings near the city of Kodiak. The Road System Bear Safety Group is comprised of representatives from the U.S. Coast Guard military police, Kodiak Police Department, Alaska State Troopers, Alaska State Parks, Kodiak Island Borough, and Alaska Waste Management. We continued to maintain regular communication and close coordination with the Road System Bear Safety Group when responding to bears sighted near Kodiak city. The bear safety group encourages agencies receiving bear reports to work with ADF&G to provide a clear and consistent message to the media and the public regarding each situation.

RESEARCH

Brown bear research this reporting period involved collaboration with our project partners including Koniag Native Corporation, Afognak Native Corporation, and the National Park Service with contributions from the Kodiak Brown Bear Trust and Dallas Safari Club.

During 26–27 June 2013 we captured 7 bears (6 females, 1 males) and deployed 6 GPS radio collars on females on the west side of Afognak Island and on Ban Island, Alaska. All bears were captured using standard helicopter darting techniques with a Hughes 500D helicopter and rifle-fired tranquilizer darts filled with Telazol®. Afognak Native Corporation provided fuel transport, food, and lodging for field personnel on Afognak Island during the capture operation and helicopter and fixed-winged charges and the cost of the drugs and collars were covered by ADF&G. Captured bears ranged in age from 8 to 16 years and all were in good physical condition. Due to marginal weather and limited helicopter availability, we focused our capture efforts on western Afognak Island. This study is the first phase of a baseline investigation of bear movements on the west side of Afognak Island.

CONCLUSIONS AND RECOMMENDATIONS

Harvest numbers of brown bears were relatively consistent in the 1980s and 1990s with variability attributed to weather and hunter participation; however, starting in the 2000s there has been an increasing trend in harvest coincident with an increasing population. In every regulatory year from RY96 to RY13, the percent males in the harvest exceeded 68%. We have achieved our management objective of at least a 60% male harvest for over 25 consecutive years and in 46 of 50 years since statehood.

Van Daele (2007) developed a Kodiak-specific model concluding survival rates of productive adult females were the most critical factor driving brown bear population dynamics. Further, female survival and productivity were the most sensitive parameters driving population trends. The Kodiak bear population has been steadily increasing (ADF&G, unpublished data, Kodiak); the *Kodiak Archipelago Brown Bear Management Plan* (Citizens Advisory Committee 2002) recommends maintaining the population within a “wildlife-acceptance capacity,” particularly in areas where human-bear interactions are likely to occur (i.e., Kodiak road system). Wildlife acceptance capacity was determined to be no more than 10% above the estimated bear population level in 2001. At that time the bear population was estimated to be 2,980 animals resulting in a target wildlife acceptance capacity of 3,278 bears throughout the archipelago. The most recent population estimate occurred in 2005 and resulted in an estimated 3,526 bears archipelago-wide suggesting a need to adjust harvest levels. Consequently, the number of bear permits issued to hunters increased in 2007 on Afognak Island and again in 2011 on the Aliulik Peninsula and in the Kaiuganak area. No population estimates have been generated since 2005. ADF&G will continue to monitor population trends to determine if further action is necessary and, in collaboration with our partners, will strive to develop an updated population estimate. In addition to recommending a wildlife acceptance capacity, the *Kodiak Archipelago Brown Bear Management Plan* also recommended maintaining the tradition of bear hunting; consistent with a conservative management and regulatory regime that avoids overharvest of the resource (Citizens Advisory Committee 2002).

An increasing number and percentage of trophy males have been in the harvest during the past 30 years and continued throughout this reporting period. In spring 2014, the highest number ($n = 19$) and percentage (18%) of trophy skulls (>28 inches) was recorded, with 5 skulls exceeding 29 inches. In an effort to stabilize the population, maintain the current annual harvest of trophy-sized males, and avoid overcrowding of hunters, ADF&G implemented a slight increase in adult female harvest in some subunits (i.e., Afognak Island [2007], Aliulik Peninsula [2011])

and will investigate the impact of these changes as practical. Results also suggest harvest rates ranging from 5.6% to 7.9% of the estimated bear population would be appropriate in various harvest subunits on Kodiak. Currently, and on average, hunters harvest an estimated 6% of the estimated bear population (ADF&G, unpublished data, Kodiak) archipelago-wide.

Intensive aerial surveys combined with composition counts along streams in southern Kodiak Island have provided important information for monitoring bear populations on Kodiak Island during the past 25 years. Kodiak NWR and the Alaska Department of Fish and Game will continue these annual surveys while simultaneously reviewing the methods to refine data collection, analysis, and population estimates. Current methodology is predicated on having experienced observers and survey pilots; therefore, agencies will train and instruct new staff on current methods to ensure consistent and accurate data collection. Disruption of survey consistency may violate critical assumptions and thereby impact accuracy of the data.

Overall, harvest and population survey data suggest a healthy bear population in Unit 8. Harvest data indicate an overall reduction in sport harvest during RY12 ($n = 184$) and RY13 ($n = 164$); however, harvest numbers do not differ substantially from the previous 10-year mean of 177.8 and overall hunter success has remained relatively consistent. Further, it is important to note the number of hunters participating in the registration hunt declined significantly in RY13, likely reducing overall harvest. Interestingly, the age structure of male harvest in RY12 was the lowest in a decade. The reduced harvest combined with a reduction in mean age raises some concern; however, additional information regarding the 2013 harvest age structure has not been obtained or considered. ADF&G will continue to closely monitor harvest and age structure to determine if management action is necessary. ADF&G contends the Kodiak bear population can support current harvest pressure and remain stable while producing an adequate number of trophy-sized bears.

The development of the *Kodiak Archipelago Bear Conservation and Management Plan* was a successful endeavor that reiterated the importance of the Kodiak bear population to a large number of user groups. The success of public participation in bear management on the Kodiak Archipelago has gained worldwide recognition since its implementation. In 2001, the Japanese government sent a contingent of biologists and civic leaders from Hokkaido to Kodiak to learn about our program. They have since adopted several of the things they learned, including a citizen-driven bear management planning effort, and there have been substantial improvements in the number of problems and injuries bears have caused. In August 2002 and 2008, we worked with the Northern Forum to host a delegation of Japanese and Russian bear biologists as they spent a week in Alaska, including Kodiak, gathering information they could use to improve their brown bear management and public education programs. In March 2004, Russian government representatives invited the Kodiak area wildlife biologist to give the keynote address to a conference in Yakutsk, Russia. In 2005, 2006, 2009, 2010, and 2012 a similar address was given at conferences in Canada, Russia, Sweden, and Japan. In 2010, the Russian Republic of Sakha sent 3 representatives (2 wildlife biologists and a translator) to spend 3 weeks in the field with us to learn about our bear survey and capture techniques and our management program. In 2014, ADF&G Kodiak staff was asked to participate as a guest speaker at the International Wildlife Conference in Sapporo, Japan. Government representatives from various parts of the world understand improving human-bear relations is necessary to protect brown bear populations

internationally. The Kodiak brown bear program has proven to be an excellent example of how bears and people have learned to coexist for the benefit of a wide range of user groups.

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Table 1. Unit 8 estimated density and observation rates of independent bears^a in intensive aerial survey areas, Kodiak Island, Alaska, 1987–2013.

Survey area	Year	Replicate surveys	Survey rate (min/km ²)	Observed independent bears/hr	Observed independent bears/1,000 km ²	Sightability	Estimated density independent bears/1,000 km ²	Standard error	Size of survey area (km ²)
Aliulik Peninsula	1993	8	1.6	4.0	108	0.53	209	16.95	350
Aliulik Peninsula	2002	5	1.4	4.1	92	0.53	173	18.32	350
Aliulik Peninsula	2009	3	1.4	6.6	149	0.53	282	27.15	350
Karluk Lake	1994	4	2.1	5.4	180	0.45	401	25.76	267
Karluk Lake	2003	4	2.3	5.8	218	0.45	483	29.77	274
Karluk Lake	2010	4	2.1	3.3	113	0.45	252	22.25	274
Karluk Lake	2013	4	2.4	2.8	111	0.45	248	8.46	274
Kiliuda Bay	1996	4	2.5	2.4	101	0.37	270	24.52	159
Kiliuda Bay	2005	4	2.2	3.6	134	0.37	363	23.51	159
Olga Lakes	1993	5	1.2	1.8	33	0.41	80		262
Shearwater Peninsula	1996	3	2.2	2.6	92	0.37	252	28.87	269
Shearwater Peninsula	2005	4	1.8	4.8	147	0.37	398	17.41	269
Sitkalidak	2012	3	1.8	3.2	94	0.41	228	23.50	299
Southwest Kodiak	1987	4	1.5	3.5	88	0.41	218		632
Spiridon Lake	1995	4	1.9	1.2	38	0.33	118	24.26	287
Spiridon Lake	2000	4	1.8	1.5	44	0.33	134	23.28	287
Sturgeon River	1987	4	1.6	4.3	120	0.41	293	22.32	264
Sturgeon River	1993	4	1.8	2.6	77	0.41	190	18.20	264
Sturgeon River	1998	4	1.9	3.0	94	0.41	227	4.43	264
Sturgeon River	2007	4	1.5	3.9	95	0.41	231	24.72	264
Terror Lake	1987	3	1.4	3.1	75	0.33	228	25.29	355
Terror Lake	1997	4	1.7	3.4	92	0.33	276	31.70	355
Terror Lake	2011	4	1.4	3.1	73	0.33	222	7.81	400

^a Does not include cubs still with mother.

Table 2. Reported brown bear harvest data for the Kodiak archipelago by regulatory year^a and season, Alaska, regulatory years 2000–2013.

Regulatory year	Fall harvest				Spring harvest				Total sport harvest				Reported non-sport				Total reported bear kill ^b				
	M	F	Unk ^c	Total	M	F	Unk	Total	M	%M	F	Unk	Total	M	F	Unk	Total	M	F	Unk	Total
2000	34	15	0	49	87	34	0	121	121	71	49	0	170	5	2	5	12	126	51	5	182
2001	47	13	0	60	99	25	0	124	146	79	38	0	184	3	5	10	18	149	43	10	202
2002	33	16	0	49	70	23	0	93	103	73	39	0	142	5	4	11	20	108	43	11	162
2003	39	15	0	54	85	26	0	111	124	75	41	0	165	9	5	13	27	133	46	13	192
2004	44	13	0	57	94	18	0	112	138	82	31	0	169	7	8	15	30	145	39	15	199
2005	40	22	0	62	118	28	0	146	158	76	50	0	208	11	7	5	23	169	57	5	231
2006	49	23	0	72	103	27	0	130	152	75	50	0	202	14	14	10	38	166	64	10	240
2007	53	23	0	76	79	29	0	108	132	73	52	0	184	5	7	13	25	137	59	13	209
2008	72	37	0	109	100	41	0	141	172	69	78	0	250	10	13	13	36	182	91	13	286
2009	63	21	0	84	86	31	0	117	149	74	52	0	201	9	8	14	31	158	60	14	232
<i>10-year mean</i>	<i>47.4</i>	<i>19.8</i>	<i>0.0</i>	<i>67.2</i>	<i>92.1</i>	<i>28.2</i>	<i>0.0</i>	<i>120.3</i>	<i>139.5</i>	<i>75</i>	<i>48</i>	<i>0.0</i>	<i>187.5</i>	<i>7.8</i>	<i>7.3</i>	<i>10.9</i>	<i>26</i>	<i>147.3</i>	<i>55.3</i>	<i>10.9</i>	<i>213.5</i>
2010	55	43	0	98	96	28	0	124	151	68	71	0	222	8	8	22	38	159	79	22	260
2011	55	31	1	87	84	29	0	113	139	70	60	1	200	7	6	11	24	146	66	12	224
2012	44	15	0	59	95	30	0	125	139	76	45	0	184	3	5	14	22	142	50	14	206
2013	39	18	0	57	88	19	0	107	127	77	37	0	164	2	6	8	16	129	43	8	180

^a Regulatory year (RY) begins 1 July and ends 30 June, e.g., RY00 = 1 July 2000–30 June 2001.

^b Reported kill data derived from sealing records (RY60–RY89) and annual harvest reports (RY90–present).

^c Unknown or unreported gender.

Table 3. Total skull size, age, and gender of brown bears killed by sport hunters in Unit 8, Alaska, regulatory years^a 2002–2013.

Regulatory year	Males				Females			
	Mean skull size	<i>n</i>	Mean age ^b	<i>N</i>	Mean skull size	<i>n</i>	Mean age ^b	<i>N</i>
2002	25.8	100	9.4	103	22.0	37	7.3	39
2003	24.9	120	7.8	124	21.8	40	7.8	40
2004	25.2	134	7.6	137	21.7	29	6.3	31
2005	24.7	156	6.4	154	22.1	50	7.0	48
2006	25.0	146	7.4	146	22.2	49	7.1	49
2007	25.6	130	7.8	127	21.8	52	7.2	51
2008	25.4	172	8.6	171	22.2	77	7.1	78
2009	24.9	147	8.7	148	22.3	52	8.5	52
2010	25.4	147	8.7	146	22.3	69	9.7	70
2011	25.6	139	9.4	136	22.1	59	9.2	58
2012	25.5	137	6.2	137	21.8	44	8.6	44
2013	25.7	122			22.0	34		

^a Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2002 = 1 July 2002–30 June 2003.

^b Mean age data not available for regulatory year 2013.

Table 4. Unit 8 brown bear harvest data for drawing permit hunts DB101–DB163 and DB201–DB293, Alaska, regulatory years^a 2002–2013.

Season/ Drawing hunt no.	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total ^b harvest
Fall (DB101– DB163) (DB201– DB293)	2002	113	112	4	44	32	68	15	32	0	47
	2003	121	120	6	41	33	72	13	28	0	46
	2004	113	112	3	48	39	76	12	24	0	51
	2005	107	107	0	52	35	63	21	38	0	56
	2006	110	110	0	55	40	67	20	33	0	60
	2007 ^c	139	137	0	49	44	68	21	32	0	65
	2008	129	127	0	66	56	67	28	33	0	84
	2009	138	137	1	49	51	76	16	24	0	67
	2010	136	134	0	60	43	54	37	46	0	80
	2011	128	128	0	50	40	61	26	39	0	66
	2012	133	133	0	35	32	73	12	27	0	44
	2013	134	134	0	52	34	65	18	35	0	52
	Spring (DB131– DB193) (DB231– DB293)	2002	213	210	3	44	68	76	22	24	0
2003		194	194	2	54	80	78	23	22	0	103
2004		205	201	0	52	88	83	18	17	0	106
2005		214	214	1	66	113	81	26	19	0	139
2006		197	197	0	62	98	80	24	20	0	122
2007 ^c		210	207	0	48	73	73	27	27	0	100
2008		204	201	0	66	92	69	41	31	0	133
2009		219	219	2	53	85	75	29	25	0	114
2010		191	184	4	64	96	81	23	19	0	119
2011		196	195	1	55	81	76	26	24	0	107
2012		215	212	1	52	85	77	25	23	0	110
2013		206	201	0	54	86	82	19	18	0	105
Combined Fall and Spring		2002	326	322	3	43	100	73	37	27	0
	2003	315	314	4	49	113	76	36	24	0	149
	2004	318	313	3	51	127	81	30	19	0	157

Season/ Drawing hunt no.	Regulatory year	Permits issued	Permits returned	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total ^b harvest
(DB101– DB193)	2005	321	321	1	61	148	76	47	24	0	195
	2006	307	307	0	59	138	76	44	24	0	182
(DB201– DB293)	2007 ^c	349	344	0	48	117	71	48	29	0	165
	2008	333	328	0	66	148	68	69	32	0	217
	2009	357	356	2	51	136	75	45	25	0	181
	2010	327	318	3	62	139	70	60	30	0	199
	2011	324	324	0	53	121	70	52	30	0	173
	2012	348	345	0	46	117	76	37	24	0	154
	2013	340	335	0	47	120	76	37	24	0	157

^a Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2002 = 1 July 2002–30 June 2003.

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

^c Starting in regulatory year 2007, the northern islands of Afognak, Shuyak, and Raspberry were split from 1 hunt area into 3 areas.

Table 5. Unit 8 brown bear harvest data for registration permit^a hunt numbers RB230 and RB260, Alaska, regulatory years^b 2002–2013.

Season/ Registration hunt no.	Regulatory year	Permits issued ^a	Permits returned	Hunters afield	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total harvest
Fall (RB230)	2002	85	77	54	30	4	1	50	1	50	0	2
	2003	118	118	81	31	10	5	63	3	38	0	8
	2004	144	143	96	33	6	5	83	1	17	0	6
	2005	143	139	94	32	6	5	83	1	17	0	6
	2006	154	154	102	34	12	9	75	3	25	0	12
	2007	157	156	110	29	10	7	64	4	36	0	11
	2008	208	198	140	29	18	14	56	11	44	0	25
	2009	174	172	114	34	15	12	71	5	29	0	17
	2010	172	169	98	42	18	12	67	6	33	0	18
	2011	180	179	110	39	19	16	76	5	24	0	21
	2012	190	188	130	31	13	14	88	2	12	0	16
2013	161	157	84	46	6	5	100	0	0	0	5	
Spring (RB260)	2002	75	67	46	31	7	2	67	1	33	0	3
	2003	117	108	76	30	11	5	63	3	37	0	8
	2004	100	95	74	26	9	5	83	1	17	0	6
	2005	122	122	85	30	8	6	86	1	14	0	7
	2006	99	97	66	32	12	4	50	4	50	0	8
	2007	75	71	51	28	16	6	75	2	25	0	8
	2008	89	84	61	27	13	8	100	0	0	0	8
	2009	62	61	41	33	7	1	33	2	67	0	3
	2010	92	91	63	31	8	1	20	4	80	0	5
	2011	70	69	48	30	13	4	67	2	33	0	6
	2012	102	101	69	32	22	10	67	5	33	0	15
2013	71	57	36	37	6	2	100	0	0	0	2	
Combined Fall and Spring	2002	160	144	100	31	5	3	60	2	40	0	5
	2003	235	226	157	31	10	10	63	6	37	0	16
	2004	244	238	166	30	7	10	83	2	17	0	12

Season/ Registration hunt no.	Regulatory year	Permits issued ^a	Permits returned	Hunters afield	Percent did not hunt	Percent successful hunters	Males	%	Females	%	Unk	Total harvest
(RB230 and RB260)	2005	265	261	179	31	7	11	85	2	15	0	13
	2006	253	251	168	33	12	13	65	7	35	0	20
	2007	232	227	161	29	12	13	68	6	32	0	19
	2008	297	282	201	29	16	22	67	11	33	0	33
	2009	236	233	155	33	13	13	65	7	35	0	20
	2010	264	260	161	38	14	13	57	10	43	0	23
	2011	250	248	158	36	17	20	74	7	26	0	27
	2012	292	289	199	31	16	24	77	7	23	1	32
	2013	232	214	120	44	6	7	100	0	0	0	7

^a No limit on the number of permits issued.

^b Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2002 = 1 July 2002–30 June 2003.

Table 6. Residency of successful brown bear hunters^a in Unit 8, Alaska, regulatory years^b 2002–2013.

Regulatory year	Local residents ^c	%	Nonlocal residents	%	Nonresidents ^d	%	Total successful hunters
2002	6	4	51	36	85	60	142
2003	19	12	62	38	84	50	165
2004	17	10	52	31	100	59	169
2005	23	11	78	38	107	51	208
2006	16	8	81	40	105	52	202
2007	10	6	65	35	109	59	184
2008	34	14	85	34	131	52	250
2009	18	9	78	39	105	52	201
2010	24	11	82	37	116	52	222
2011	18	9	84	42	98	49	200
2012	30	16	56	30	98	53	184
2013	6	4	61	37	97	59	164

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

^b Regulatory year (RY) begins 1 July and ends 30 June, e.g., RY02 = 1 July 2002–30 June 2003.

^c Includes residents of Game Management Unit 8.

^d Includes the following successful nonresidents guided by next-of-kin: RY02 = 4; RY03 = 1; RY04 = 2; RY05 = 3; RY06 = 3; RY07 = 3; RY08 = 2; RY09 = 2; RY10 = 2; RY11 = 1; RY12 = 3; RY13 = 1.

Table 7. Chronology of brown bear harvest by season and period in Unit 8, Alaska, regulatory years^a 2002–2013.

Regulatory year	Fall season							Spring season							Total ^b
	25 Oct– 6 Nov		7 Nov– 18 Nov		19 Nov– 25 Nov		Fall total	1 Apr– 15 Apr		16 Apr– 30 Apr		1 May– 15 May		Spring total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	
2002	39	80	6	12	4	8	49	2	2	40	43	51	55	93	142
2003	45	83	9	17	0	0	54	4	4	40	36	67	60	111	165
2004	40	70	12	21	5	9	57	7	6	46	41	59	53	112	169
2005	50	81	9	14	3	5	62	13	9	75	51	58	40	146	208
2006	53	74	16	22	3	4	72	4	3	44	34	82	63	130	202
2007	51	67	21	28	4	5	76	8	7	54	50	46	43	108	184
2008	92	84	15	14	2	2	109	4	3	42	30	95	67	141	250
2009	64	76	14	17	6	7	84	5	4	41	35	71	61	117	201
2010	85	87	13	13	0	0	98	5	4	45	36	74	60	124	222
2011	69	79	15	17	3	3	87	4	4	40	35	69	61	113	200
2012	51	86	5	8	3	5	59	5	4	43	34	77	62	125	184
2013	47	83	7	12	3	5	57	5	5	40	37	62	58	107	164

^a Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2002 = 1 July 2002–30 June 2003.

^b Totals may differ from those in other tables due to varying classifications of illegal sport harvest.

Table 8. Unit 8 brown bear harvest percent by transport method, Alaska, regulatory years^a 2002–2013.

Regulatory year	Harvest percent by transport method								
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV ^b	Highway vehicle	Unknown	<i>n</i>
2002	73	0	23	2	0	0	1	1	142
2003	66	0	25	2	0	0	7	<1	165
2004	59	0	34	2	0	1	3	1	169
2005	55	1	36	3	0	1	2	2	208
2006	58	0	32	2	1	1	5	1	202
2007	51	0	38	2	0	0	7	2	184
2008	55	0	32	4	0	<1	8	<1	250
2009	67	0	21	4	0	<1	7	0	201
2010	72	0	17	<1	0	4	6	<1	222
2011	62	<1	25	0	0	3	9	1	200
2012	59	0	24	3	0	1	11	2	184
2013	70	0	24	2	0	0	3	1	164

^a Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2002 = 1 July 2002–30 June 2003.

^b ORV = off-road vehicle.

Table 9. Reported number of brown bears killed in defense of life or property on Kodiak Island, Alaska, calendar years 2002–2013.

Calendar year	Gender of bear				Location		Cause	
	Male	Female	Unknown	Total	Kodiak road system	Remote	Hunting related	Other
2002	2	1	0	3	1	2	1	2
2003	1	1	0	2	1	1	2	0
2004	3	7	1	11	3	8	8	3
2005	2	5	0	7	0	7	4	3
2006	14	7	1	22	3	19	5	17
2007	4	7	1	12	5	7	8	4
2008	8	6	1	15	3	12	6	9
2009	5	8	0	13	4	9	2	11
2010	5	7	1	13	3	10	5	8
2011	1	4	0	5	0	5	2	3
2012	2	4	0	6	1	5	4	2
2013	2	5	0	7	0	7	4	3