Alaska Department of Fish and Game
Division of Wildlife Conservation
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CHAPTER 3: BROWN BEAR MANAGEMENT REPORT

From: 1 July 2012
To: 30 June 2014

LOCATION

GAME MANAGEMENT UNIT: Unit 4 (5,820 mi^2)
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 more than 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. 2007).

Management of Unit 4 brown bears has a colorful and controversial past. In the early part of the twentieth 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 division's WinfoNet harvest database contains records for about 5,900 bears from the unit in all categories of human-caused mortality (hunting, defense of life or property, public safety, vehicle collisions, and research); 94% of the mortality indicated in these records was due to hunter harvest. Most brown bear habitat in Unit 4 is managed by the U.S. Forest Service (USFS), Tongass National Forest under a multiple use concept. 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. To maintain hunting opportunity while minimizing the risk of overharvest, on heavily roaded northeast Chichagof Island there is a controlled use area prohibiting use of motorized land vehicles to assist with a brown bear hunt.

Unit 4 includes the most important brown bear hunting areas in Southeast Alaska. The unit supports an estimated 70% of Southeast's brown bears (Miller 1993) and since 1960 has produced 70–80% of the region's harvest (ADF&G 2010). Federal assumption of subsistence management under the terms of the Alaska National Interest Lands Conservation Act (ANILCA) included authority for brown bears on federal lands. Regulations adopted by the Federal Subsistence Board allowing the sale of brown bear parts including claws, skulls, teeth, and bones by federally qualified users 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.

Prompted by high numbers of brown bear guides and nonresident hunters, as well as a growing tourism industry, in July 1998 ADF&G published *Unit 4 Brown Bears – Past, Present, and Future: A Status Report and Issues Paper* (ADF&G 1998). The Board of Game (BOG) created the Unit 4 Brown Bear Management Team in January 1999 with 15 members nominated by organizations representing consumptive and nonconsumptive user groups. The team's purpose was to review issues of bear management and any human activities in Unit 4 affecting brown bears. The team agreed to several elements of a comprehensive management strategy that were used to publish a report, *Southeast Alaska Unit 4 Brown Bear Management Strategy* (ADF&G 2000). 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 and subsequently adopted (Mooney 2009).

Illegal guiding during 1999–2003 contributed to increased harvest above guidelines recommended by the Brown Bear Management Strategy (BBMS). A combined federal and state enforcement effort during that period is believed to be part of the reason harvest declined in the 2004–2005 seasons.

Big game guides and other commercial operators on U.S. Forest Service lands are required to obtain special use permits from that agency. To evaluate appropriate levels of use by commercial operators on various parts of the forest, in 1998 the U.S. Forest Service initiated the Shoreline Guide/Outfitter Environmental Impact Statement (EIS). This initial proposal identified specific recreation carrying capacity allocations for big game guided hunting, primarily for brown bear hunting. However, following public comment and additional analysis, the USFS determined that focus was too narrow. Thus, the Record of Decision for the EIS that was released in December 2004 proposed a broader category of commercial recreation providers that included big game guided hunting, along with other commercial recreation allocations. Specific allocations to individual guiding businesses now occur through the Special Uses administration process (U.S. Forest Service 2004). This process has affected the number and distribution of guides within Unit 4. A reallocation of some hunts to existing or new guides through a prospectus offering may also occur.

In 2000, the Brown Bear Management Team determined that the hunting success rate of guided nonresident hunters in Unit 4 was about 50%. That determination was based on historical hunt records as well as data from former and current registered guides. However, for many of the 10 years since the BBMS was implemented, the percentage of successful hunts each season has

ranged 60–85%. Higher success rates have resulted in bear harvests that are at, or slightly above, the mortality guidelines established for the unit.

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

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

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

During spring 2004, the Icy Strait-Point Sophia development (at Hoonah) began operations offering cruise ship passengers a bear viewing tour from an elevated platform built parallel to Spasski Creek. A proposal to house and display bears was initiated in Sitka in 2002 and entered a department project analysis phase in 2003. The project, Fortress of the Bear, continued with a demonstration phase using surrogate domestic animals in 2004. A final department decision to place bears in the Sitka facility was approved in July 2007 and the first 2 orphaned cubs were placed that summer (Mooney 2009). Currently, 5 brown bears and 3 black bears occupy the facility.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain an average age of harvested males of at least 6.5 years.
- Maintain a male-to-female harvest ratio of at least 3:2.
- Minimize the number of bears killed in defense of life or property (DLP).
- Maintain the annual human-caused mortality of all brown bears at no more than 4% of each island's estimated population (Admiralty, Baranof, Northeast Chichagof, and the rest of Chichagof), averaged over a 3-year period.
- Maintain the annual human-caused mortality of females at no more than 1.5% of each island's estimated population, averaged over a 3-year period.

METHODS

Registration permits for Unit 4 brown bear hunting were issued to the public at ADF&G offices during both years of the report period. Since regulatory year 2009 registration permits could be obtained via ADF&G's website. . Also, one license vendor in Hoonah is permitted, under strict guidelines, to issue registration permits for brown bear hunting in Unit 4. This exception was made to help accommodate hunters in the communities of Hoonah, Elfin Cove, and Pelican. Recent efforts to establish online access to registration permits have improved public access electronically, while maintaining accurate hunter data.

Successful bear hunters are required to present skulls and hides to a representative of ADF&G's Division of Wildlife Conservation (DWC) or the Alaska Wildlife Troopers (AWT) for sealing. Bear sealers measured skulls, extracted premolars, confirmed sex, and recorded data on the date and location of kill, hunter residency, hunt length, guide services used (if any), and primary transportation to the field. A commercial laboratory determined ages through cementum annuli analyses in premolars. All permittees were required to submit a hunt report within 10 days after taking a bear. Unsuccessful permittees or those who did not hunt were required to submit a report following the close of the season.

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

For reporting purposes, harvest data are organized by regulatory year (RY). A regulatory year begins 1 July and ends 30 June (e.g., RY12 = 1 July 2012–30 June 2013).

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 City and Borough of Sitka passed a local ordinance prohibiting negligent or unintentional access to trash by bears, joining other Alaska cities and towns trying to reduce habituation of bears to human-related food sources.

During this reporting period we captured 1 female and 4 male bears in Sitka and Angoon and fitted them with GPS radio collars and ear tags. The Sitka bears were monitored within residential areas of Sitka to help provide movement data through the community. A subadult male bear (bear 19Y) was captured in Sitka, radiocollared, relocated and released. He crossed between Baranof and Chichagof islands 7 times in a 1-year period and traveled within an area having a perimeter of 370 miles, going as far north as Pelican. The Angoon bear was relocated to the southern end of Admiralty and soon shed its collar.

During this reporting period we fitted 3 female bears with GPS radio collars at Pack and Swan creeks in the Stan Price Sanctuary. The intent was to gather data on how bears use the Pack Creek area, and to determine if bears at Pack Creek area travel out of the closed area and are vulnerable to hunters. Preliminary data indicated the bears make seasonal movements in and out of the closed area. We plan to deploy several more GPS collars to continue gathering information on brown bear movements in various parts of the unit.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Unit 4 brown bear populations are believed to be stable. Analysis of historical harvest data indicates bear numbers probably declined during the mid-1970s but have since recovered (Faro 1997). Intensive clearcut timber harvest occurred on eastern Chichagof and northern Baranof islands during the 1970s–1990s. Although young clearcuts provide an abundance of forage, within about 30 years of harvest clearcuts regenerate into stands of dense, closed-canopy second growth forest, shading-out understory plants important to bears, particularly blueberry (*Vaccinium, sp.*), red huckleberry (*Vaccinium parvifolium*), and salmonberry (*Rubus spectabilis*). Stem exclusion periods (where dense conifer growth shades out most understory grasses, forbs, and shrubs) will persist for decades, reducing food available to bears. Bear harvest levels from some areas of the unit continue to warrant close monitoring. Development and expansion of logging roads in the mid-1980s thru the mid-1990s (particularly on northeast Chichagof Island), increased the vulnerability of bears by improving hunter access (Young 1991; Titus and Beier 1992). To help ensure sustainable harvest, in 1990 a Controlled Use Area prohibiting use of a motorized land vehicle to assist with bear hunting was established on northeast Chichagof Island.

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 as well as a baseline for estimating bear densities in other parts of the region. The current population estimate for the entire unit is 4,155 bears; Chichagof and adjacent islands, 1,550; Baranof and adjacent islands, 1,045; and Admiralty Island, 1,560. These estimates remained unchanged since 1998 until they were revised during a Board of Game review in January 2013. The change was centered on northeast Chichagof research by Flynn et al. (2007) that indicated a higher density of bears. As a result, Chichagof was divided into northeast Chichagof Island with an estimated population of 458 bears, and Chichagof Island-remainder with 1,240 bears. This increased the total Unit 4 estimated population, at the 95% lower confidence limit, to 4,303 bears. For management purposes, the lower 95% confidence limit is used as a conservative population estimate, and attempts are made to maintain harvests at 4% or less of that population. The 3-year mean annual human-caused mortality guideline is 172 bears for the unit (Admiralty Island, 62 bears; Baranof/adjacent islands, 42 bears; Chichagof/remainder 50 bears, and northeast Chichagof Island, 18 bears. Some of the population increases may lie in recent habitat changes favorable to bears preceding a stem exclusion period from clearcut timber harvest.

Short-term fluctuations in wildlife populations are a natural occurrence and often more than one factor is responsible for them. For example, extremely deep snow during the late winter of 2006–2007 reduced the NE Chichagof Island deer population by an estimated 75–85%. This resulted in hundreds of deer carcasses being available to bears during the spring of 2007 and they undoubtedly benefitted from this abundant resource. However, in the following springs of 2008–2013, almost no carcasses were available due to very low winter kill. Salmon runs in streams on northeast Chichagof Island during the summers of 2008, 2010, and 2012 were minimal and many bears dispersed to other areas of the island in search of food. We noted more unaccompanied subadult bears in communities in 2012 than records indicate have occurred in the previous 20

years. In such circumstances, increased competition for limited food resources may cause greater mortality of juvenile bears.

Population Composition

Population composition data for the unit as a whole are limited. The number of bears captured during ADF&G research programs has been relatively few. It is possible a capture bias has resulted in a sample not fully representative of the sexes and age classes of bears in the population. Age and sex data from hunter harvest are biased by hunter selectivity, the vulnerability of young bears, and regulations protecting females with offspring.

In Unit 4 the 2012–2013 harvest by hunters was 77% males (n = 111) and 23% females (n = 27). The 2013–2014 harvest was 78% males (n = 87) and 22% females (n = 24). Wounding loss reported by hunters is accounted for in these regulatory years from direct reporting. When the sex of a wounded bear is not known it is counted as a female for purposes of wounding loss. Table 1 displays sex, wounding loss, and nonhunting mortality information for the last 5 regulatory years.

Distribution and Movements

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

Collar data from both female bears in the Sitka area during 2010 showed a routine pattern of movement in and out of residential areas. One of the females was killed illegally only 6 days after the collar was placed on her and her 2-year-old cubs had to be euthanized. The second female was killed illegally 26 days after being captured. Her 3 cubs of the year were placed at the Fortress of the Bear facility in Sitka. A subadult male bear (bear 19Y) was captured in Sitka, radiocollared, relocated and released. He crossed between Baranof and Chichagof islands 7 times in a 5-year period and had a travel perimeter of 370 miles.

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

MORTALITY

Harvest

Season and Bag Limit.

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

Board of Game Actions and Emergency Order: The Board of Game (BOG) heard management and status reports at the January 2013 meeting in Sitka. An evening workshop heard a number of the original members of the Brown Bear Management Team (BBMT) testify about the advantages of the subsequent Brown Bear Management Strategy (BBMS) adopted by the BOG in 2000. Discussion from registered guides and the public considered the guiding industry as well as the nonconsumptive users of the resource. Items to be worked on were identified by all user groups, as well as maintaining effective communications between all parties. The BOG reiterated their support for the BBMS and directed the department to look at establishing minimums for female harvest based on skull size, drop the wounding loss tallies as part of the annual harvest numbers, and look at developing a strategy to address second degree of kindred hunt numbers. The BOG did not adopt proposals to have alternating fall seasons, increasing the harvest guideline above 4%, and shortening the fall season to protect females. The BOG directed the

department to use the revised population estimate that resulted from the most current bear research for NE Chichagof Island into a 4-island approach (splitting off NE Chichagof Island from the remaining Chichagof Island). This raised the annual recommended limit for human-caused mortality from 166 bears to 172 bears.

The fall registration hunt (RB077) has been closed by emergency order twice since RY11. The hunt was closed on Chichagof, Baranof, and Admiralty islands in early October 2011 because harvest objectives were met and due to concern over the number of female bears in the harvest. Baranof Island had a partial fall closure in 2012 when harvest objectives were met.

Hunter Harvest and Other Mortality

RY 2012: Hunters took 29 bears in fall 2012 and 89 bears in spring 2013 for a regulatory year total of 118 bears. An additional 20 bears are known to have died from nonhunting situations, bringing the year's total combined mortality to 138 bears.

RY 2013: Hunters took 23 bears in fall 2012 and 88 bears in spring 2013 for a regulatory year total of 111 bears. An additional 10 bears are known to have died from nonhunting situations, bringing the year's total combined mortality to 121 bears. Data concerning brown bear harvests for the past 5 years are presented in Tables 1 and 2. In both regulatory years of this period the 3-year mean annual human-caused mortality was well below the guideline harvest of 172.

Skull measurements and mean ages of bears harvested during this reporting period were within historic ranges and were similar among Admiralty, Baranof, and Chichagof islands. Following a long period of stability, age of harvested bears increased slightly during the last decade. We do not know if this trend reflects a change in the age structure of the population or occurred by chance.

Hunter Residency and Success: Spring hunts in Unit 4 are administered through 2 registration permits. The outside drainages are covered under permit RB088, while the inside drainages are covered under permit RB089. All fall Unit 4 permit hunts are administered under a single registration permit (RB077). Hunting pressure in each area is derived from required hunt reports.

Historically, residents of Unit 4 take a small percentage of the annual harvest (Table 3), averaging about 13% over the last 5 years. Most bears are taken by nonresidents or Alaska hunters from outside Southeast. In RY12–RY13 nonlocal Alaska hunters and nonresidents harvested 82% of the bears. Compared to the previous reporting period there was a slight decrease (1%) in harvest by local hunters and a 4% decline in nonlocal resident harvest. However, harvest by nonresident hunters as a proportion of total harvest increased by 4%. Anecdotal accounts attribute that increase to improving economic conditions in the United States and other countries.

Spring and fall hunting effort is presented in Table 4. In fall 2012, 50 Alaska residents hunted a total of 172 days, and 40 nonresidents spent 147 days afield. In fall 2013, 59 residents hunted 242 days and 49 nonresidents hunted 171 days. The fall 2011 season was closed in October for all of Unit 4 by Emergency Order due to harvest objectives being met or exceeded.

Spring seasons produced greater hunting pressure (Table 4) and a larger harvest (Table 1). In spring 2013, 93 residents hunted 391 days and 140 nonresidents hunted 692 days. In spring 2014, 106 residents hunted 457 days and 141 nonresidents hunted 586 days. Over the last 5 years, fall seasons produced an average of one bear for every 13 hunt days, and spring seasons produced one bear for every 10 days.

Harvest Chronology: In most years more than 80% of the annual harvest takes place during the spring hunt. Most hunters prefer the spring season because bears are easier to locate and they often have longer hair (if not rubbed) than in the fall, making for a better trophy hide. The greatest number of bears is available to hunters late in the spring season because nearly all bears have left their dens to seek food prior to breeding season. Most spring bears are killed in May (Table 5).

When green-up occurs late in the spring, bears concentrate and feed on grass/sedge flats near salt water. Harvests in such years are higher compared to years with earlier, warm springs that provide bears more dispersed feeding opportunities. During this reporting period, the 2013 spring season was much cooler and green-up was delayed by cold conditions and a later than normal green-up. As a result, 30% fewer bears were taken during the first 10 days of May in 2013 than in 2014. A much higher number and percentage of male bears (5-year average of 85% with a high year of 94% and a low year of 81%) are taken in the spring than in the fall season (Table 1).

In most years greater than 70% of 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, and bears dispersing from the streams make it increasingly difficult to locate bears later in the fall season.

The fall harvest is characteristically composed of a high percentage (5-year average of 37%) of female bears (Table 1). Fall bear hunting usually occurs along salmon streams in thick vegetation and often under low light conditions. Hunters who do not have the luxury of watching a bear for a long time are less selective. Also, in the fall, some of the females have separated from their cubs, making them legal targets. During this report period, we experienced an average annual fall female harvest of 38%, with a single year high of 45%. High female harvest in the fall remains a management concern and may require changes in the fall season to maintain the guideline harvest of the Brown Bear Management Strategy.

Transport Methods: Unit 4 bear hunters overwhelmingly use boats as the most common form of transportation (Table 6). In 2010–2011, 98% of successful hunters used boats. In 2012–2013 successful hunters also used boats 92% of the time. Aircraft are the second most important means of hunter transport but were used by only 2% of successful hunters in 2010–2011 and by 5% of successful hunters in the 2012–2013 season.

Other Mortality

To reduce DLP mortality, the department works with local communities, agencies associated with public safety, and nongovernmental organizations. A significant amount of nonhunting mortality results from bears entering areas developed for human use. Such situations are most effectively addressed by eliminating improper garbage disposal or food storage. Most DLP

incidents involve bears that have been food-conditioned by access to human food/garbage. In Sitka, a committee of residents and agencies worked to reduce the incidence of improper garbage disposal and storage through greater awareness, education, and the design of a local ordinance. This ordinance went into effect in 2008. Plans to replace about 3,000 conventional trash cans with bear resistant containers remain a challenge, primarily due to cost.

At Hoonah, Angoon, Pelican, Elfin Cove, Tenakee Springs, Funter Bay, and Port Alexander landfills are used or communities do not have an organized garbage control program. Those communities have had varying degrees of success keeping bears from becoming food conditioned. Other remote locations where people live, including the Green's Creek Mine, Little Port Walter Research Station, and Port Armstrong Hatchery have adopted secure food and trash storage and aggressive and proactive methods to prevent bears from accessing attractants; they have been relatively successful.

Even with continuing department educational efforts and work with community bear task forces, during this reporting period, 14 bears were killed under DLP scenarios and 8 were killed as agency/public safety actions associated with food conditioning and a fatal mauling. Another 7 bears died from illegal actions during this reporting period.

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

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

Beginning in 2009 the department formally initiated research with conducted electrical weapons (CEWs), also known as Tasers, with the goal of developing a nonlethal tool to haze and aversively condition large animals such as bears and moose to reduce human encounters in residential and other urban, and work areas. In 2010, research work moved to Port Armstrong Hatchery on south Baranof Island where large numbers of brown bears congregate around the fish hatchery as salmon move into the area. The hatchery is uniquely advantageous for evaluating CEWs because it has a long elevated boardwalk well above ground level, which offers a safe platform for approaching and hazing bears that are on the ground. Through this reporting period, more than 150 bears have been exposed. To date, the bear response to CEW exposures has resulted in a 100% flight response and a marked increase in avoidance of people in the work and

residential areas of the hatchery. We believe 8 bears that otherwise would have been killed for human safety reasons were deterred and fled the area due to CEW exposures.

In RY12, 20 nonhunting mortalities were formally reported (Table 1) and 10 occurred in RY13. Generally, high bear densities throughout the unit lead to more bears in and around human population centers and remote work sites, and relatively high numbers of bears taken under DLP provisions. In recent years, known illegal kills have made up 15–30% of nonhunting mortality (Mooney 2009).

BEAR VIEWING

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

CONCLUSIONS AND RECOMMENDATIONS

Management objectives for the age of harvested male brown bears were met in both years. Mean ages of harvested bears from all subpopulations exceed the 6.5-year minimum objective. The male-to-female harvest ratio in regulatory years 2012 and 2013 achieved the management objective of no more than 3:2.

The 3-year (RY10–RY12) mean annual human-caused mortality was 148 bears, well under the management guideline of 172 bears. The 3-year (RY's 2011–2013) mean annual human-caused mortality declined to 134 bears and again was well under the guideline of 172 bears. Reductions in hunter-caused mortality in RY12 and RY13 are, in part, due to hunter awareness and emergency closures when hunter harvest objectives were achieved. Also the U.S. Forest Service has been using a one-third holdback of special use permits from registered guides transferring their businesses. At this time, the 12–15 permits relinquished by guides leaving Unit 4 will not be reissued to other guides until some parameters are in place to help balance pressure by Guide Use Areas /USFS special use permits as per BBMS recommendations. Success for the objective of reducing DLP mortality is more difficult to measure. The division continues to work with communities, the USFS, and the Alaska Department of Environmental Conservation to address landfill and residential garbage problems in communities that contribute to such losses through food-conditioned bears.

For harvest purposes, Admiralty Island, Baranof/Kruzof Islands, Northeast Chichagof, and the remainder of Chichagof/Yakobi Islands are managed as 4 subpopulations. These areas are large enough to encompass viable bear populations, and water barriers largely restrict dispersal of

bears between Admiralty Island and the other two major islands. Movement by bears between Baranof and Chichagof islands has been documented by radiocollared individuals; however, how common interisland movements are remains unknown. 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 hunter harvest mortality levels (Table 2) near or at the conservative guideline of 4% of the population. Recent department research using DNA-based analyses indicates numbers of bears in surveyed watersheds are higher than previously thought. 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 needed before attempting to manage on a finer scale.

Expansion of the Northeast Chichagof Controlled Use Area (NECCUA) in 1994 to north of Port Frederick remains helpful in keeping harvest levels within guidelines. Chichagof Island has experienced the greatest long-term habitat alteration from logging/second growth thinning of anywhere in Unit 4. Old-growth timber harvest and second growth thinning on lands managed by the U.S. Forest Service and Alaska Native corporations continue to alter the Chichagof landscape more than elsewhere in Unit 4. However, timber harvest and thinning has also affected habitat and access on north Baranof and Kruzof islands and northwest Admiralty Island. The department plans to continue monitoring how changing habitat conditions and human access affect bear populations in Unit 4.

The combined annual mortality from harvest and other human-caused mortality on specific islands of the unit exceeded the biological guideline of 4% of the estimated population in RY09 and RY10 (Table 2). In RY12 and RY13 the numbers dropped well below the 4% guideline. If hunter harvest, DLPs, illegal kills, and wounding loss exceed 4% of the estimated population again in future years, it may be necessary to modify existing seasons, place quotas on the number of registration permits issued, and establish mortality quotas by unit, island, or individual Guide Use Area. The total number of guides remains above the BBMS's recommendations although the number of guides has dropped through business consolidations. Reinstatement of the state Big Game Commercial Services Board (BGCSB) has provided better oversight of guides and transporters, but increased communication and coordination is needed between the BGCSB, U.S. Forest Service, Native corporations, outfitter/guides, and the department to adhere to short-term and long-term strategies and recommendations of the BBMS.

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While this unit report was actually published in 2016, it is part of the set of 2015 unit species management reports, so we suggest citing the report as a 2015 report to maintain its relationship to the other 2015 unit reports.

Table 1. Unit 4, Alaska, brown bear harvest, regulatory years[a] 2009–2013.

Regulatory year	Hunter kill					Nonhunting kill[b]				Total Reported
	M	F	(%F)	Unk[c]	Total	M	F	Unk	Total	
2009										
Fall 09	20	10	(31)	2	32	6	6	0	12	44
Spring 10	116	8	(06)	4	128	3	3	0	6	134
Total	136	18	(11)	6	160	9	9	0	18	178
2010										
Fall 10	26	9	(26)	1	36	8	4	0	12	48
Spring 11	85	20	(19)	7	112	1	0	0	1	113
Total	111	29	(21)	8	148	9	4	0	13	161
2011										
Fall 11	9	11	(55)	1	21	4	3	1	8	29
Spring 12	88	15	(15)	6	109	2	4	0	6	115
Total	97	26	(21)	7	130	6	7	1	14	144
2012										
Fall 12	16	13	(45)	0	29	9	7	0	16	45
Spring 13	75	14	(16)	0	89	4	0	0	4	93
Total	91	27	(23)	0	118	13	7	0	20	138
2013										
Fall 13	16	7	(30)	0	23	2	5	0	7	30
Spring 14	71	17	(19)	0	88	3	0	0	3	91
Total	87	24	(22)	0	111	5	5	0	10	121

[a] A regulatory year (RY) runs from 1 July through 30 June (e.g., RY13 = 1 July 2013–30 June 2014).
[b] Includes defense of life or property (DLP) kills, illegal kills, research mortalities, and other known human-caused accidental mortality.
[c] Wounding loss.

Table 2. Unit 4 brown bear hunting pressure [a] and hunter harvest [b] by major geographic areas, regulatory years[c] 2009–2013.

Hunt area	Regulatory year	No. hunters	M	(%)[d]	F	(%)[d]	Unknown	(%)[e]	Total harvest	Percent (%) estimated population[f]
Northeast Chichagof Island [g]										354[h]
	2009	27	7	(70)	3	(30)	0	0	10	(2.8)
	2010	33	7	(78)	2	(22)	0	0	9	(2.5)
	2011	27	12	(71)	5	(29)	0	0	17	(4.8)
	2012	18	8	(100)	0	(0)	0	0	8	(2.3)
	2013	23	8	(89)	1	(11)	0	0	9	(2.5)
Remainder of Chichagof Island										1,196[h]
	2009	153	52	(88)	7	(12)	2	(3)	61	(5.1)
	2010	114	39	(76)	12	(24)	0	0	51	(4.3)
	2011	95	30	(77)	9	(23)	0	0	39	(3.3)
	2012	115	32	(80)	8	(20)	0	0	40	(3.3)
	2013	111	23	(77)	7	(23)	0	0	40	(3.3)
Baranof and Kruzof Islands										1,045[h]
	2009	65	27	(90)	10	(9)	2	(6)	32	(3.1)
	2010	90	26	(79)	7	(21)	0	0	33	(3.2)
	2011	67	16	(73)	6	(27)	0	0	22	(2.1)
	2012	80	19	(56)	15	(44)	0	0	34	(3.3)
	2013	93	18	(72)	7	(28)	0	0	25	(2.4)
Admiralty Island										1,560[h]
	2009	137	50	(91)	9	(9)	2	(4)	57	(3.7)
	2010	114	39	(83)	8	(17)	0	0	47	(3.0)
	2011	100	39	(87)	6	(13)	0	0	45	(2.9)
	2012	110	32	(89)	4	(11)	0	0	36	(2.3)
	2013	128	38	(81)	9	(19)	0	0	47	(3.0)

Table 2 continues next page.

Hunt area	Regulatory year	No. hunters	M	(%)[d]	F	(%)[d]	Unknown	(%)[e]	Total harvest	Percent (%) estimated population[f]
Unit 4 Totals										4,155[h]
	2009	382	136	(88)	18	(11)	6	(4)	160	(3.9)
	2010	353	111	(79)	29	(21)	0	(0)	140	(3.4)
	2011	293	97	(79)	26	(21)	0	(0)	123	(3.0)
	2012	323	91	(77)	27	(23)	0	(0)	118	(2.8)
	2013	355	87	(78)	24	(22)	0	(0)	111	(2.7)

[a] Registration permit data.
[b] Bear sealing data.
[c] A regulatory year (RY) runs from 1 July through 30 June (e.g., RY13 = 1 July 2013–30 June 2014).
[d] Percentage based on known sex bears.
[e] Percentage based on total bears.
[f] Estimated populations: NE Chichagof Island, 354 bears; remainder of Chichagof Island, 1,196; Baranof and Kruzof Islands, 1045 bears; Admiralty Island, 1,560 bears; all Unit 4, 4,155 bears.
[g] X35 only.
[h] Guideline population estimate.

Table 3. Unit 4 brown bear successful hunter residency[a], regulatory years[b] 2009–2013.

Regulatory year	Local resident[c]	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
2009	17	(11)	35	(22)	108	(68)	160
2010	17	(12)	25	(18)	98	(70)	140
2011	18	(15)	18	(15)	87	(71)	123
2012	23	(19)	11	(9)	84	(71)	118
2013	8	(7)	16	(14)	87	(78)	111

[a] Hunt kill only, other kill types not included.
[b] A regulatory year (RY) runs from 1 July through 30 June (e.g., RY13 = 1 July 2013–30 June 2014).
[c] Resident of Unit 4.

Table 4. Unit 4 hunting effort by island, by residency, and regulatory year[a] (RY) 2009–2013.

Island	Season	No. resident hunters	No. nonresident hunters	Total hunters	Days hunted by residents	Days hunted by nonresidents	No. days hunted	No. bears killed	Effort (Days per bear)
Admiralty									
RY 2009	Fall 2009	23	17	40	96	63	159	8	20
	Spring 2010	47	50	97	202	263	465	49	9
RY 2010	Fall 2010	20	9	29	73	50	123	10	12
	Spring 2011	50	35	85	206	226	432	39	11
RY 2011	Fall 2011	14	11	25	52	51	103	6	17
	Spring 2012	35	40	75	126	221	347	39	9
RY 2012	Fall 2012	17	14	31	69	51	120	5	24
	Spring 2013	31	48	79	165	262	427	31	14
RY 2013	Fall 2013	26	20	46	105	68	173	12	14
	Spring 2014	38	44	82	192	249	441	36	12
Baranof									
RY 2009	Fall 2009	15	5	20	38	37	75	9	8
	Spring 2010	23	22	45	67	85	152	23	7
RY 2010	Fall 2010	17	10	27	73	61	134	13	10
	Spring 2011	34	29	63	128	116	244	20	12
RY 2011	Fall 2011	6	10	16	21	64	85	6	14
	Spring 2012	31	20	51	60	87	147	18	8
RY 2012	Fall 2012	19	6	25	49	21	70	13	5
	Spring 2013	30	25	55	85	123	208	21	10
RY 2013	Fall 2013	13	9	22	59	33	92	8	12
	Spring 2014	40	31	71	164	101	265	17	16

Island	Season	No. resident hunters	No. nonresident hunters	Total hunters	Days hunted by residents	Days hunted by nonresidents	No. days hunted	No. bears killed	Effort (days per bear)
Chichagof									
RY 2009	Fall 2009	19	28	47	50	116	166	15	11
	Spring 2010	49	84	133	175	310	485	56	9
RY 2010	Fall 2010	19	17	36	97	87	184	14	13
	Spring 2011	42	69	111	116	333	449	46	10
RY 2011	Fall 2011	7	14	21	12	58	70	9	8
	Spring 2012	46	55	101	181	196	377	51	7
RY 2012	Fall 2012	14	20	34	54	75	129	11	12
	Spring 2013	32	67	99	141	307	448	36	12
RY 2013	Fall 2013	20	20	40	78	70	148	4	37
	Spring 2014	28	66	94	101	236	337	35	10
Unit 4 Totals									
RY 2009	Fall 2009	57	50	107	184	216	400	32	13
	Spring 2010	119	156	275	444	658	1102	128	9
RY 2010	Fall 2010	57	36	93	243	198	441	37	12
	Spring 2011	127	133	260	450	675	1125	105	11
RY 2011	Fall 2011	29	36	65	86	179	265	21	13
	Spring 2012	113	115	228	368	504	872	108	8
RY 2012	Fall 2012	50	40	90	172	147	319	29	11
	Spring 2013	93	140	233	391	692	1083	88	12
RY 2013	Fall 2013	59	49	108	242	171	413	24	17
	Spring 2014	106	141	247	457	586	1043	88	12

[a] A regulatory year (RY) runs from 1 July through 30 June (e.g., RY13 = 1 July 2013–30 June 2014).

Table 5. Unit 4 brown bear harvest[a] chronology, regulatory years[b] 2009–2013.

	Fall harvest periods										
Regulatory Year	9/11-9/20	9/21-9/30	10/1-10/10	10/11-10/20	10/20-10/31	11/11-11/20	11/21-11/31	12/1-12/10	12/11-12/20	12/21-12/31	Total
2009	11	13	6	2	0	0	0	0	0	0	32
2010	17	8	6	0	1	0	3	0	0	0	35
2011	10	6	4	0	0	0	0	0	0	0	20
2012	18	4	2	1	2	2	0	0	0	0	29
2013	10	7	1	2	2	0	0	0	0	1	23

	Spring harvest periods						
	4/1-4/10	4/11-4/20	4/21-4/30	5/1-5/10	5/11-5/20	5/21-5/31	Total
2009	0	1	10	54	51	12	128
2010	0	0	6	29	57	13	105
2011	0	0	6	19	61	17	103
2012	0	1	4	19	53	12	89
2013	0	0	4	27	50	7	88

[a] Hunt kill type only.
[b] A regulatory year (RY) runs from 1 July through 30 June (e.g., RY13 = 1 July 2013–30 June 2014).

Table 6. Unit 4 brown bear harvest[a] by transport method, regulatory years[b] (RY) 2009–2013.

Regulatory year	Airplane	Boat	Walked	Off-road vehicle	Highway vehicle	Unknown
2009	10	149	0	1	0	0
2010	2	137	0	1	0	0
2011	3	120	0	0	0	0
2012	5	107	5	0	1	0
2013	6	104	0	0	1	0

[a] A regulatory year (RY) runs from 1 July through 30 June (e.g., RY13 = 1 July 2013–30 June 2014).
[b] Hunt kill only, other kill types not included.