Black Bear Management Report and Plan, Game Management Unit 6:

Report Period 1 July 2013–30 June 2018, and

Plan Period 1 July 2018–30 June 2023

Charlotte L. Westing

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Alaska Department of Fish and Game   Division of Wildlife Conservation

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Species management reports and plans provide information about species that are hunted or trapped and management actions, goals, recommendations for those species, and plans for data collection. Detailed information is prepared for each species every 5 years by the area management biologist for game management units in their areas, who also develops a plan for data collection and species management for the next 5 years. This type of report is not produced for species that are not managed for hunting or trapping or for areas where there is no current or anticipated activity. Unit reports are reviewed and approved for publication by regional management coordinators and are available to the public via the Alaska Department of Fish and Game's public website.

This species management report and plan was reviewed and approved for publication by Jeff Selinger, Management Coordinator for the Division of Wildlife Conservation.

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Purpose of this Report

This report provides a record of survey and inventory management activities for black bears (*Ursus americanus*) in Game Management Unit 6 for the 5 regulatory years 2013–2017 and plans for survey and inventory management activities in the next 5 regulatory years, 2018–2022. A regulatory year (RY) begins 1 July and ends 30 June (e.g., RY14 = 1 July 2014–30 June 2015). This report is produced primarily to provide agency staff with data and analysis to help guide and record agency efforts but is also provided to the public to inform it of wildlife management activities. In 2016 the Alaska Department of Fish and Game's (ADF&G, the department) Division of Wildlife Conservation (DWC) launched this 5-year report to report more efficiently on trends and to describe potential changes in data collection activities over the next 5 years. It replaces the black bear management report of survey and inventory activities that was previously produced every 3 years.

I. RY13–RY17 Management Report

Management Area

Unit 6 covers approximately 10,140 mi^2 of land, including Prince William Sound, the Copper River Delta, and the North Gulf Coast of Alaska (Fig. 1). Unit 6 is divided into 4 administrative units (6A, 6B, 6C, and 6D), which are also referred to as subunits. Terrain includes rugged mountains, old-growth forest, coastal wetlands, and muskeg meadows.
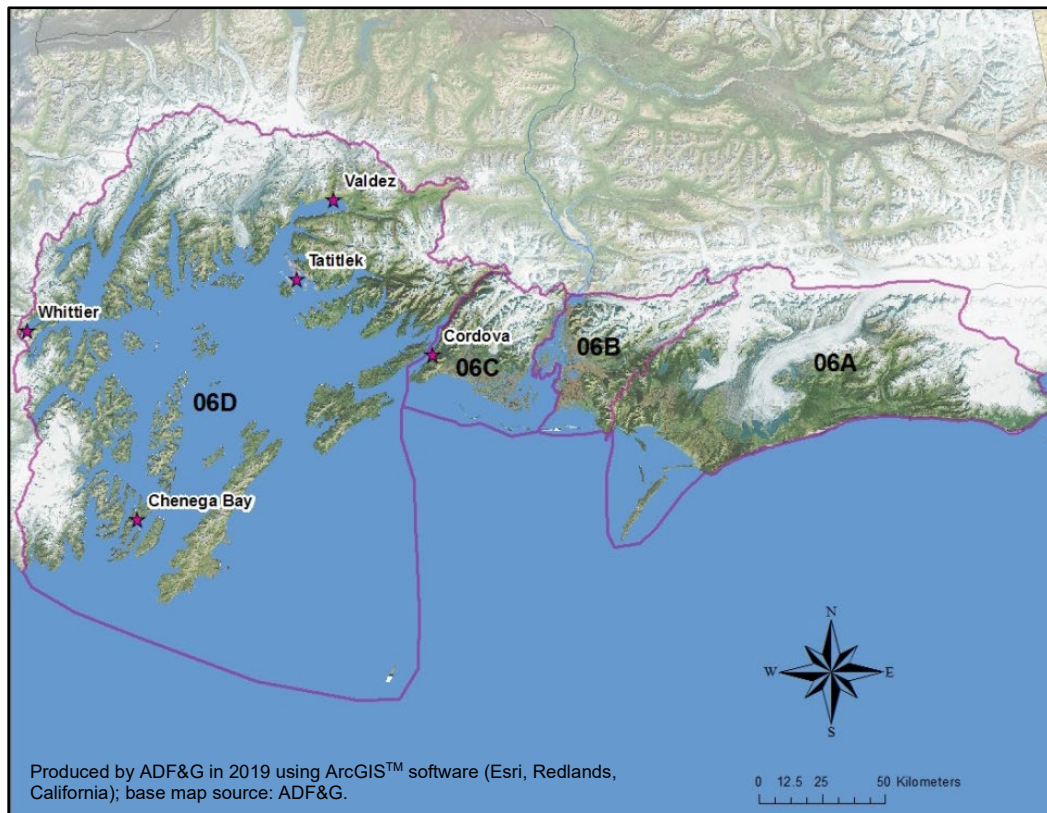
Figure 1. Game Management Unit 6 and its administrative units (subunits), Alaska.

Summary of Status, Trend, Management Activities, and History of Black Bears in Unit 6

Black bears are common throughout most of Unit 6, except on Montague, Hinchinbrook, several smaller islands in Prince William Sound (PWS), and Kayak and Middleton Islands along the North Gulf of Alaska Coast (NGC). Density is probably highest in western PWS and lower in eastern PWS and along NGC. Modafferi (1978) roughly estimated densities of 500, 230, and 300 bears per 1,000 km^2 (386 mi^2) in western PWS, eastern PWS, and along NGC, respectively. Other density estimates for good habitat in PWS have ranged from 400 to 10,000 bears per 1,000 km^2 (386 mi^2; Grauvogel 1967; McIlroy 1970; Modafferi 1982). Harvest data and incidental observations by guides, charters, and local hunters indicated that distribution and general abundance increased throughout Unit 6 during the 1990s to a high level, possibly in response to new salmon hatcheries that were put in place during the 1980s. None of these estimates, however, were obtained by methods considered reliable for estimating bear population size or density. Since the early 2000s, stakeholders have expressed concern that the population is declining throughout western PWS.

Black bears in Unit 6 primarily eat vegetation in the early spring. Especially important foraging areas are those that contain early emergent vegetation, including coastal sedge meadows and avalanche chutes. Major foods include grasses, sedges, skunk cabbage, and horsetail. Diets shift as the summer progresses and bears consume more fish, particularly salmon of any available species. Berries are also very important in the summer and fall. Meat from terrestrial animals probably comprises comparatively little of the diet of bears in PWS.

Weather conditions can lead to fluctuations in food abundance which affect black bear populations in Unit 6. Reduced food availability can impact the age of first reproduction, pregnancy rates (if fall resources are insufficient), and cub mortality (Elowe and Dodge 1989, Eiler et al 1989). Competition and predation by brown bears may also influence the distribution and abundance of black bears. The highest density of black bears occurs in western PWS where brown bears are not present.

Black bears exhibit sexual segregation during the spring (Modafferi 1982). Modafferi (1982) found that male black bears in Unit 6D used beaches after emerging from winter dens to feed on new sedges and grasses, making them more vulnerable to harvest during this period. Females tended to remain away from beaches, instead favoring south-facing slopes and avalanche chutes that green-up early in the season. In both Alaska (Schwartz et. al. 1986) and Minnesota (Rogers 1987), den emergence was correlated with weather conditions, though in Alaska it was a secondary correlate to Julian date.

Harvest monitoring began in RY73 with mandatory sealing of hides. Before this requirement, annual harvest estimates ranged from "practically nil" (Robards 1954) to more than 100 during 1965 and 1966 (McIlroy 1970). Sealing records indicated an average annual take of 108 bears from RY73 (when sealing records begin) to RY82. Annual harvest averaged 222 bears from RY83 to RY97 as interest in hunting in PWS began to build. An annual average of 460 bears were taken during RY98–RY07, when harvest reached its peak at 675 bears (RY07). Since that time, annual harvest has declined about 6% annually until RY12 when it declined 20% from the

year prior. RY13 and RY14 harvests were 44% and 46%, respectively, a decrease from the regulatory year prior.

There was a 100-year weather event in RY11 which exceeded records for snowfall and retention. While snowfall in RY12 was not nearly as significant as in the previous year, spring was late in RY12. Spring conditions significantly influence the phenology of forage plants, which in turn may influence the distribution of bears and whether or not they become available to hunters. These conditions may have also influenced cub survival and production with lingering effect and may have influenced availability of females for harvest. Females in the harvest in Unit 6D averaged 24% of the total between RY91–RY10. However, in RY11, RY12, and RY13 females in the harvest averaged 41%, 46%, and 41% respectively.

Most of the harvest in Unit 6 occurs in Unit 6D (75–90%). This is due to the high density of bears in proximity to a high-density human population. The Anton Anderson Memorial Tunnel (Whittier Road) opened to highway vehicles in June 2000 (RY99), which has allowed easier access for bear hunters in Unit 6D. Although the increasing trend in harvest began 4 years before the Whittier Road opened, the number of hunters in Unit 6D has continued to increase due to easier access.

Hunting pressure may affect local populations. McIlroy (1970) reported declining harvest, a declining hunter success rate, and an increasing number of hunter-days per harvested bear. This indicates that the black bear population in Valdez Arm (Unit 6D) was declining between 1966 and 1969. Relatively high hunter effort documented by Modafferi (1978) in the Whittier area in 1977 may also have resulted in a reduced population in western Unit 6D. Concern over the increase in black bear harvest in PWS has led to a series of regulatory actions starting in 2003 including season date changes, limitations on bear baiting, and the prohibition of shooting from a boat.

Wildlife viewing is an industry of economic importance in Prince William Sound. Wildlife viewing charters cycle 600–700 people per day (mid-May to late August) through the ports of Whittier and Valdez at $100–300 per day (Whittier and Valdez Chamber of Commerce figures). Bears are identified by operators as a species of interest on these trips[1].

New management objectives for population size (350–400 bears) were adopted to encompass a range instead of a minimum number of bears desired in the harvest (Westing 2014). A new management objective was also adopted for acceptable percentage of females (<30% in Unit 6D.)

The average male skull size in Unit 6D was less than 17 inches most years during RY03–RY12 (6 of 10 years), and above 17 inches most years during RY88–RY02 (10 of 15 years).

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[1] Based on a public meeting held on January 2015 in Valdez that was attended by operators of Stan Stevens Cruises; and other personal communications with Auklet Charters, Discovery Charters, and Babkin Charters.

Management Direction

EXISTING WILDLIFE MANAGEMENT PLANS

A formal plan for black bear management in Unit 6 has not been developed. A maximum allowable harvest (MAH) of 200 bears was set in the absence of population estimates. MAH was used as a guideline for management using previous harvest levels and corresponding percent of take for females. Success rates were also used as an indicator of population level. Directly estimating the population and developing appropriate harvest rates would be preferable to this technique but is currently not funded.

GOALS

Manage black bear populations to provide for sustained annual use by hunters and wildlife viewers.

CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

Black bears in Unit 6 have a positive customary and traditional use finding. The amount reasonably necessary for subsistence uses was set by the Board of Game at 80–120 black bears.

Intensive Management

Black bears in Unit 6 have a negative intensive management finding.

MANAGEMENT OBJECTIVES

The management objective for Unit 6 black bears is to sustain a 3-year average annual harvest of 350–400 bears composed of less than 30% females with a minimum male average skull size of 17 inches. Nonconsumptive users should have a reasonable chance at seeing bears while wildlife viewing.

MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Analyze age structure and sex composition of captured bears.

Data Needs

Sex and age structure of captured bears can be used to infer characteristics that may exist within the greater population.

Methods

Black bears were captured between June 2016 and July 2018 as part of a habitat usage study conducted cooperatively between ADF&G and the U.S. Forest Service (USFS)[2]. Black bears were captured on Esther Island during 2016, Knight Island during 2017, and on both islands during 2018. Bears were captured using M-15 bucket snare sets and Aldrich sets that were baited 2 weeks prior to trapping efforts. During this study, 96 unique bears were handled, and 53 bears received a radio collar. Samples were taken from each bear including hair, tissue, blood, and a premolar tooth (93 teeth taken); morphometric measurements were recorded. Teeth were cross-sectioned and aged by cementum at Mattson's Laboratory in Montana.

Results and Discussion

Some birth years were prevalent, and some were absent in captured bear data from both islands (Fig. 2). M-15 bucket snare sets and Aldrich sets are considered nonselective relative to other techniques (Johnson and Pelton 1980). Birth years 2011, 2012, and 2013 are more lightly represented than would be expected and may correlate with the extreme weather event of RY11 and the late spring of RY12 (Fig. 2.). Conversely, many captured bears were born in 2015. Overall, more "old bears" (born prior to 2003) were captured on Esther Island, whereas Knight Island captures consisted for more bears born in 2014–2016. As a result, we had to capture many more bears on Knight Island to deploy all collars because so many bears had not reached an adequate body size to receive a collar. To address this, we programmed some collars for early release after the first capture period on Knight Island.

During most capture sessions, sex ratios were very similar. On Esther Island slightly more captures were females (56%) whereas on Knight Island slightly more captures were males (56%; Table 1).

Table 1. Sex of bears captured on Esther and Knight Islands, Unit 6, Alaska, 2016–2018.

	Esther Island				Knight Island			
Sex	16-Jun	16-Jul	18-Jul	Total	17-Jun	17-Jul	18-Jun	Total
Males	2	8	11	21	7	10	10	27
Females	5	10	12	27	7	9	5	21

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[2] Milo Burcham, U.S. Forest Service, Chugach National Forest, and Charlotte Westing, Area Wildlife Biologist, ADF&G DWC, Cordova, Results from June 20–30 trapping session memorandum, 6 July 2016; Results from the final trapping session for 2016 memorandum, 25 August 2016; Results from June 12–21 Knight Island trapping session memorandum, 13 July 2017; Prince William Sound Black Bear Project Update, Fall 2017 memorandum, 13 September 2017; Results from final Knight Island trapping session June 12–2 memorandum, 13 August 2018; Results of Esther Island trapping session, July 2018 memorandum 4 September 2018.
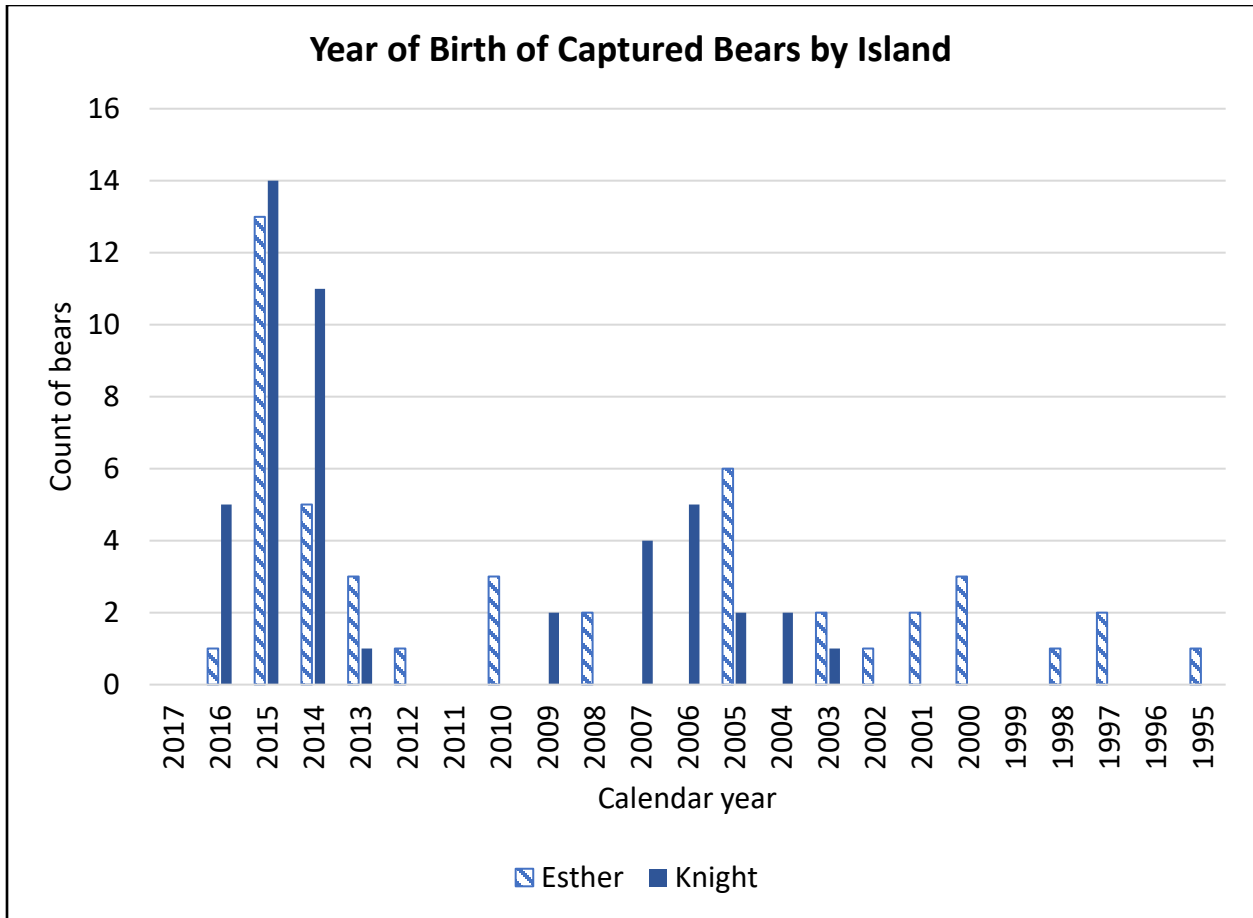
Figure 2. Captured bears by year of birth and island of capture, Unit 6, Alaska.

Recommendations for Activity 1.1.

Continue. Due to budget limitations, there are no future captures planned at this time. Either a demographic study, a population estimate, or a density estimate are essential in providing meaningful data regarding the status of this population.

ACTIVITY 1.2. Record observations of black bears seen incidentally during other survey work and anecdotal reports from the public.

Data Needs

Incidental observations are insufficient for estimating the population or detecting changes that would trigger management action. Statistical estimates of black bears derived from a sample-based estimator including a measure of the precision would be needed to detect change in the population. However, anecdotal reports from the public and incidental observations can spark further investigation and lead to regulatory proposals that can impact management. It is important to document user reports and compile all data to at least document user perceptions.

Methods

GPS locations and characteristics are recorded for any black bears observed during aerial survey flights. Most observations occur during fall goat surveys or spring moose twinning surveys when sightability is ideal. Anecdotal reports are recorded to the maximum level of detail available.

Results and Discussion

Incidental sightings from unrelated surveys must be considered very cautiously as they can be influenced greatly by where and when areas are flown. Late season surveys and surveys performed in higher density areas (since survey areas are on a rotating schedule) may make it difficult to compare numbers from year to year. For example, no surveys were flown after August 2015 due to pilot availability. Black bear sightings are much more likely in September. However, in 2016 all 4 areas that were surveyed were examined in September. This survey found 36 black bears (10 cubs and 26 adults total) including 3 sows with 3 cubs each in 2 goat hunt areas of Unit 6C. Similarly, in 2017 all surveys were conducted after September 1. Between 3 goat hunt areas (2 in Unit 6D and one in Unit 6C), 95 bears were observed including many sows with cubs. These data will continue to be collected incidentally and evaluated for their usefulness.

Stakeholder reports consistently indicate that black bears in western PWS became more difficult to find for everything from wildlife viewing to hunting. Numerous stakeholders expressed concern about the effects of the severe winter of RY11 and the late spring of RY12. Anecdotal reports suggest that cub survival may have been very poor during 2009–2013. More recently, anecdotal reports have indicated that observations of adults and cubs are returning to more "normal" levels.

Recommendations for Activity 1.2.

Either a demographic study, a population estimate, or a density estimate are essential in providing meaningful data to better understand population size and habitat use.

2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2.1. Monitor harvest through sealing records and effort through permit and harvest ticket reports.

Data Needs

Harvest and effort must be assessed to understand the potential impact of hunting on black bear populations.

Methods

Harvest information was gathered from sealing certificates, harvest tickets, and permit reports. Harvest densities are calculated as the number of bears harvested per kilometer, using the population zones that were used by Modafferi (1978) for density calculations.

Hides and skulls were sealed for all black bears in the reported harvest. Harvest included bears taken by licensed hunters and bears killed in defense of life or property. Staff checked each hide

for sex identifiers and took skull measurements for total length and zygomatic width. Sealers recorded harvest date, days hunted, transportation used, and location of harvest within Uniform Coding Units (UCUs). UCUs are small, defined areas within Unit 6 representing watersheds, islands, or island groups. Illegal kills were included when known. Unreported harvest could include wounding loss and bears taken by hunters and not sealed (unknown illegal kills) and has historically been believed to add 12% to the total reported harvest. However, there are undoubtably numerous unquantifiable variables affecting numbers from year to year. Tooth samples have been collected periodically since sealing began but consistently since RY04 from bears harvested in Unit 6D to determine age. Harvest ticket data have been available since RY09 and can be used to evaluate effort in all units. In Unit 6D, effort data are available from the registration hunt RL065 that came into effect in RY15.

Season and Bag Limit

The bag limit was 1 bear in Unit 6. The seasons for Unit 6 were as follows:

- Units 6A and 6B: 20 August–30 June.

- Unit 6C: 1 September–30 June.

- Unit 6D: 10 September–10 June.

Results and Discussion

<u>Harvest by Hunters</u>

Total harvest in Unit 6 grew at an average rate of about 12% annually from RY98 (303 bears) to RY07 (675 bears) when the harvest peaked. From RY07 to RY11, harvest declined at an average rate of about 6% annually. That decline began to accelerate in RY12 to 20% annually following the unprecedented snow fall of RY11 which may have impacted bear survival and cub production. Bears were vulnerable (evident by a slight increase in the RY11 harvest) as they searched for food in traditional foraging areas that were instead covered in snow. Harvest in RY13 was 232 bears, a 45% decline from the previous year. Harvest in RY14 was 124 bears, also a 45% decline from the previous year. Harvest in RY15 (110 bears) represented a 12% decline from the year prior, which was the lowest recorded since 1980. This harvest may have been impacted by the emergency order in Unit 6D (See the Alaska Board of Game Actions and Emergency Orders section below). Harvest in RY16 and RY17 increased to 173 bears, and 222 bears, respectively (Table 3). These changes were most evident in Unit 6D, where most harvest occurs (Fig. 3).

Sex composition of the harvest varies between units (Table 3). Unit 6A has the lowest proportional harvest of females with less than 15% females taken from RY93 to RY12. The percentage of females in the harvest during RY13 and RY14 was 20% and 14%, respectively. No females were taken in RY15, RY16, and RY17 in Unit 6A. The highly selective nature of this harvest is likely due to nearly all participants using guides, and the distance and expense relative to hunting that area.

Table 3. Unit 6, Alaska, black bear harvest, regulatory years 2013–2017.

Area	Regulatory year	Fall harvest M	F	Unk	Total	Spring harvest M	F	Unk	Total	Total hunting harvest M	% M	F	Unk	Total	Reported nonhunting M	F	Unk	Total	Total reported kill M	F	Unk	Total
6A	2013	0	0	0	0	4	1	0	5	4	80	1	0	5	0	0	0	0	4	1	0	5
	2014	1	0	0	1	5	1	0	6	6	86	1	0	7	0	0	0	0	6	1	0	7
	2015	1	0	0	1	4	0	0	4	5	100	0	0	5	0	0	0	0	5	0	0	5
	2016	0	0	0	0	10	0	0	10	10	100	0	0	10	1	0	0	1	11	0	0	11
	2017	2	0	0	2	2	0	0	2	4	100	0	0	4	1	0	0	1	5	0	0	5
6B	2013	0	0	0	0	3	0	0	3	3	100	0	0	3	0	0	0	0	3	0	0	3
	2014	0	0	0	0	4	0	0	4	4	100	0	0	4	0	0	0	0	4	0	0	4
	2015	0	1	0	1	1	0	0	1	1	50	1	0	2	0	0	0	0	1	1	0	2
	2016	0	0	0	0	3	0	0	3	3	100	0	0	3	0	0	0	0	3	0	0	3
	2017	0	0	0	0	2	0	0	2	2	100	0	0	2	0	0	0	0	2	0	0	2
6C	2013	1	3	0	4	17	9	1	27	18	60	12	1	31	2	1	1	4	20	13	2	35
	2014	0	1	0	1	6	1	0	7	6	75	2	0	8	0	0	0	0	6	2	0	8
	2015	0	1	0	1	6	4	0	10	6	55	5	0	11	0	1	0	1	6	6	0	12
	2016	1	0	0	1	17	2	0	19	18	90	2	0	20	0	0	0	0	18	2	0	20
	2017	0	0	0	0	8	7	0	15	8	53	7	0	15	0	0	0	0	8	7	0	15
6D	2013	21	23	0	44	85	53	4	142	106	58	76	4	186	2	1	0	3	108	77	4	189
	2014	5	8	0	13	68	21	1	90	73	72	29	1	103	1	1	0	2	74	30	1	105
	2015	0	3	0	3	67	18	1	86	67	76	21	1	89	1	0	1	2	68	21	2	91
	2016	4	3	0	7	109	18	1	128	113	84	21	1	135	1	3	0	4	114	24	1	139
	2017	14	6	0	20	142	31	4	177	156	80	37	4	197	0	0	1	1	156	37	5	198
Total	2013	22	26	0	48	109	63	5	177	131	60	89	5	225	4	2	1	7	135	91	6	232
	2014	6	9	0	15	83	23	1	107	89	74	32	1	122	1	1	0	2	90	33	1	124
	2015	1	5	0	6	78	22	1	101	79	74	27	1	107	1	1	1	3	80	28	2	110
	2016	5	3	0	8	139	20	1	160	144	86	23	1	168	2	3	0	5	146	26	1	173
	2017	16	6	2	24	154	38	4	196	170	79	44	6	220	1	0	1	2	171	44	7	222
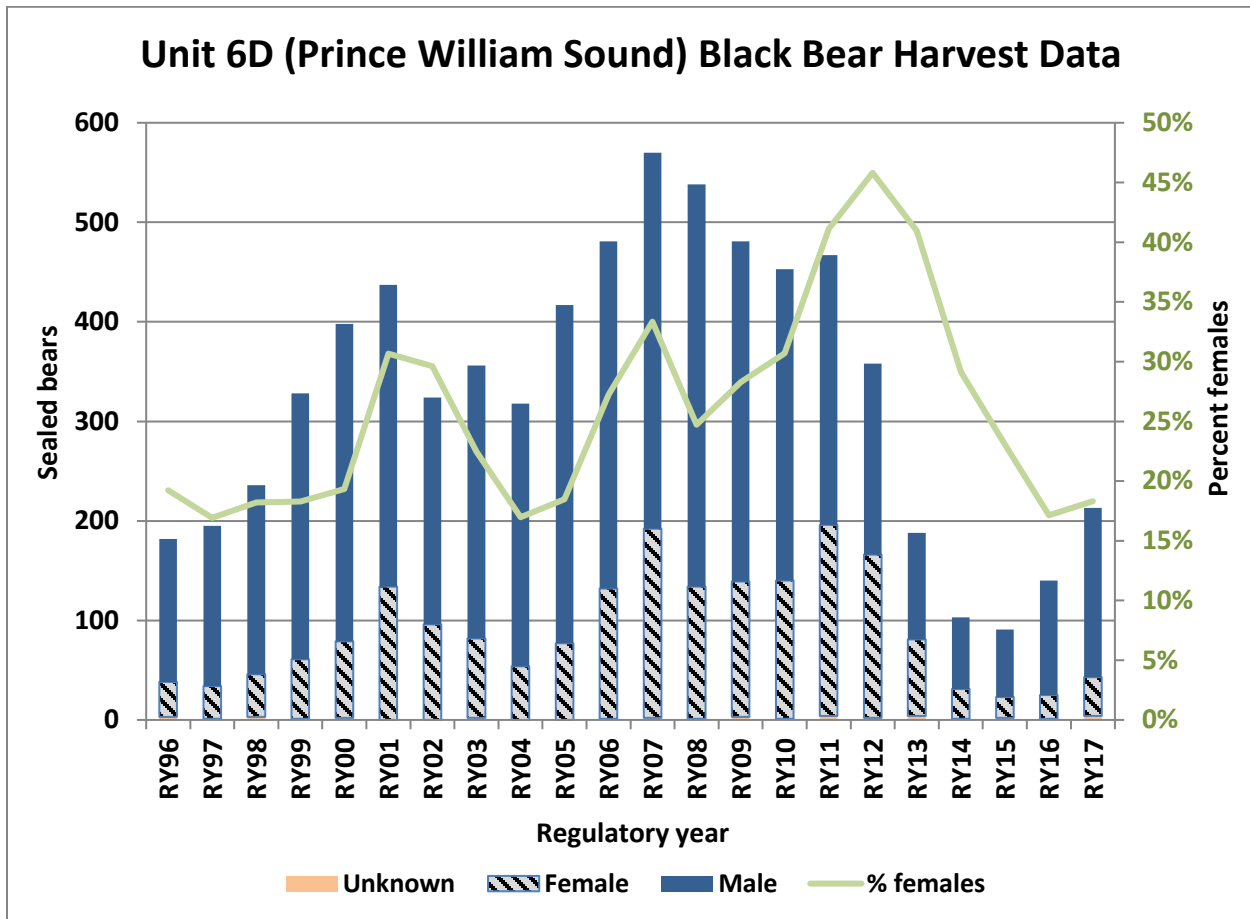
Figure 3. Harvest of black bears sealed from Unit 6D, Alaska, with percent of females in the harvest regulatory years (RY) 1996–2017.

Unit 6B experiences very little hunting pressure, especially since the closure of the Copper River Highway at Mile 34 in 2011. As a result, the percent take of females is highly volatile. In all but 1 year (RY15) of this reporting period (RY13–RY17) there were no females in the harvest. In RY15, 2 bears were harvested, and 1 was female.

Unit 6C experiences higher harvest pressure due to its proximity to Cordova and presence of the Copper River Highway. The 20-year average (RY93–RY12) percent of females in the harvest in Unit 6C is 25%. The 10-year average (RY03–RY12) in Unit 6C is 27%. Percent take of females in Unit 6C was >40% in RY13, RY15, and RY17; but ≤25% in RY14 and RY16. All hunters in Unit 6C are unguided; for this reason, it appears that this unit is subjected to less selective harvest.

The percent of females in the harvest in Unit 6D remained high for the first 2 years of the reporting period but declined to levels within management objectives (<30% female) during the last 3 years (Fig. 3). While the 20-year average (RY93–RY12) was 25% as in Unit 6D, the 10-year average (RY03–RY12) was higher with 29% females taken. Percent harvest of females peaked in RY13 with 47% females in the harvest. RY14 showed improvement with 29% females in the harvest. RY15, RY16, and RY17 had 25%, 16% and 21% females in the harvest respectively. Harvest in Unit 6D was 5–10 times higher than in Units 6A, 6B, or 6C; therefore, percent female calculations in this unit are less likely to be affected by sample size. Percentage

of females in the Unit 6D harvest exceeded management objectives from RY06 to RY14. Since RY15, it has returned to within objectives (<30% female) during a period of substantially lower overall harvest.

Most of the bear harvest (80–91% since RY98) in Unit 6 was from PWS (Unit 6D, Fig. 4). This pattern continued during the reporting period when 90% of the harvest was also from Unit 6D (Fig. 4). The largest harvest in Unit 6D occurred in RY17. A few population zones (Modafferi 1978) show the most dramatic increase in harvest densities relative to the late 1990s (Esther/Eaglek, Passage/Whittier, Knight Island, and SW PWS; Fig. 4). Harvest data relative to population abundance must be interpreted with caution because areas may receive harvest pressure that is disproportionate to resource availability. However, even before the effort for bears in PWS increased, bears were thought to be considerably more abundant in western PWS. Harvests during this reporting period declined and remained low in all units (Table 3) but most notably in Unit 6D. The harvest objective for Unit 6D was not met during this reporting period. Hunter numbers were down somewhat during this time but cannot account for magnitude of the decline in harvest. This suggests that lower harvest may be the result of lower bear abundance.

Mean skull size of all males harvested in Unit 6 varied from 16.68 to 17.26 inches during the reporting period (Table 4). The largest skulls came from Unit 6B (RY14 average = 18.53 inches), and the smallest from Unit 6C (RY16 average = 16.48 inches). In most years, Unit 6D had the lowest mean skull size compared with other units.

Table 4. Unit 6, Alaska, black bear harvest mean skull size (length + width), regulatory years 2013–2017, and in Unit 6D mean age in years.

| Unit	Regulatory year	Males Mean skull (inches)	n	Mean age	n	Females Mean skull (inches)	n	Mean age	n
6A	2013	17.97	4	–	–	–	0	–	–
	2014	17.93	6	–	–	15.75	1	–	–
	2015	18.31	5	–	–	–	0	–	–
	2016	17.78	11	–	–	–	0	–	–
	2017	18.51	5	–	–	–	0	–	–
6B	2013	18.21	3	–	–	–	0	–	–
	2014	18.53	4	–	–	–	0	–	–
	2015	18.38	1	–	–	15.56	1	–	–
	2016	18.52	3	–	–	–	0	–	–
	2017	16.84	2	–	–	–	0	–	–
6C	2013	17.40	20	–	–	15.27	13	–	–
	2014	17.82	6	–	–	15.47	2	–	–
	2015	16.78	6	–	–	15.08	5	–	–
	2016	16.48	18	–	–	15.06	2	–	–
	2017	16.54	8	–	–	15.40	7	–	–
6D	2013	17.01	100	7.3	91	15.86	74	10.8	68
	2014	16.79	70	6.6	64	15.52	30	8.5	27
	2015	17.43	65	7.8	60	15.64	18	7.7	15
	2016	16.81	112	6.5	95	15.19	23	6.6	22
	2017	16.67	155	–	–	15.19	35	–	–
Unit 6 total	2013	17.00	127	–	–	15.77	87	–	–
	2014	16.93	86	–	–	15.52	33	–	–
	2015	17.26	77	–	–	14.89	24	–	–
	2016	16.77	144	–	–	14.98	25	–	–
	2017	16.68	170	–	–	15.11	42	–	–

Note: En dashes represent data unavailable.
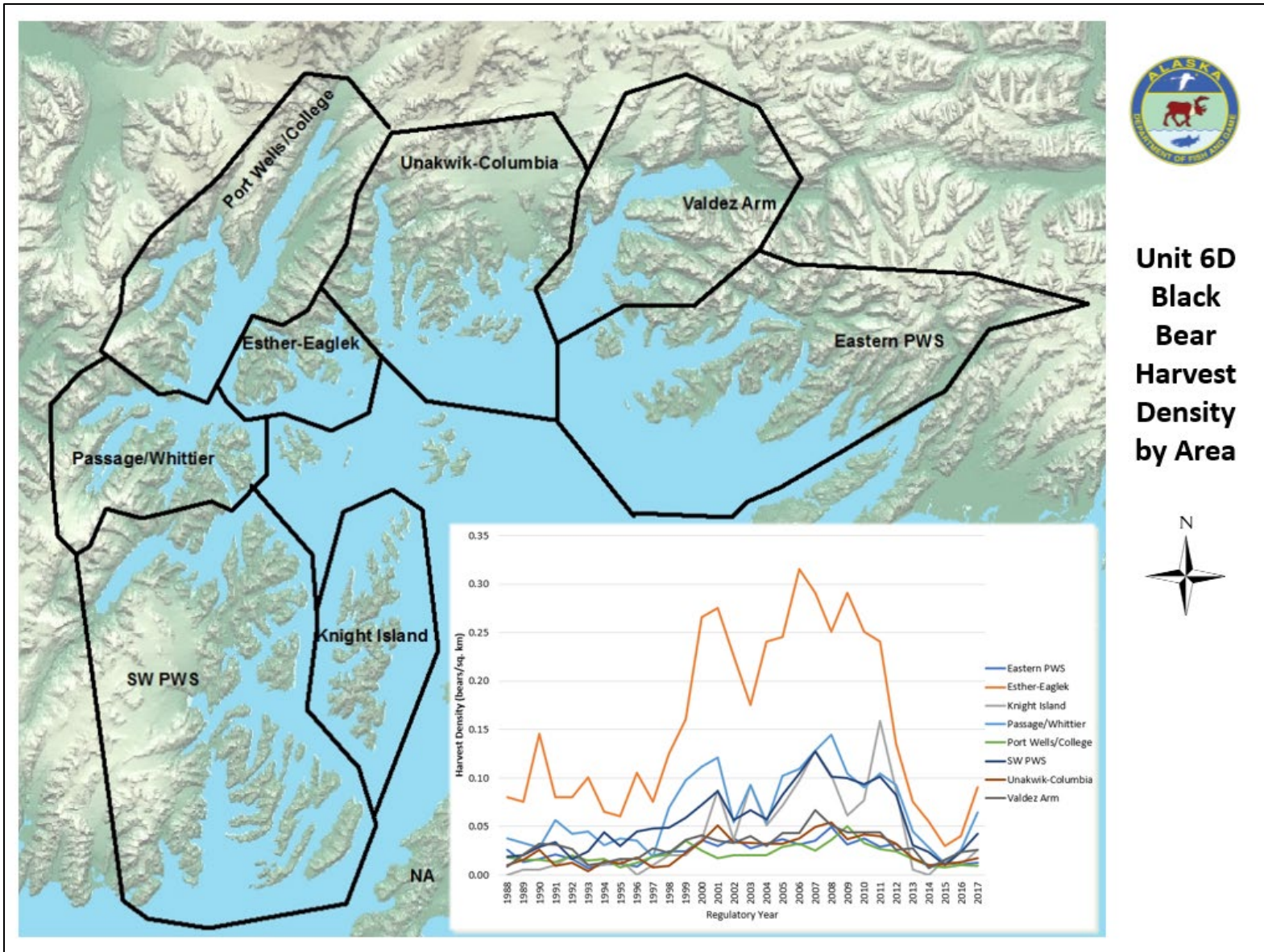
Figure 4. Harvest densities as determined by bears killed per square kilometer of land, Unit 6D, Alaska.

Tooth collection became a standard part of sealing for black bears in Unit 6D starting in RY04, however initially only 30% of samples were aged. The retained samples from these collections have been aged since the last reporting period (Table 5.) Since RY11, all collected teeth have been aged. The average age for male bears ranged from 6.5 to 7.8 years old each year in Unit 6D during the reporting period. The average age of females was considerably older, ranging from 6.6 to 10.7 years old each year. During the largest 3 years of female proportion in the harvest, the average age for females increased dramatically to 10.38, 10.49, and 10.69 years old in RY11, RY12, and RY13, respectively. This may suggest that more prime age females were unaccompanied by cubs in those years. Reproductive histories were constructed for some teeth in some years between RY04 and RY09. However, this reconstruction was not possible for many of the teeth submitted, and on most the reconstruction was only conclusive in a few of the years. One hypothesis is that PWS black bears may not appear to experience enough dietary fluctuation to lay deterministic annuli relative to parturition.

Table 5. Unit 6D, Alaska, age data for harvested black bears, regulatory years 2004–2017.

Regulatory year	Male		Female	
	n	Mean age	n	Mean age
2004	208	6.71	35	8.09
2005	257	5.60	58	7.31
2006	250	6.52	82	9.67
2007	221	5.93	105	8.46
2008	217	5.88	73	9.66
2009	196	7.07	65	7.71
2010	180	7.01	75	7.72
2011	185	7.30	107	10.38
2012	145	7.15	113	10.49
2013	91	7.33	68	10.69
2014	64	6.61	27	8.52
2015	61	7.85	16	7.81
2016	97	6.44	22	6.59
2017	136	5.77	29	5.76

Permit Hunts

Harvest tickets have been required since RY09 throughout Unit 6. Additionally, in RY15 a registration permit hunt (RL065) began in Unit 6D. During this reporting period, effort in Unit 6D was highest in RY13 with about 830 hunters reporting pursuing black bears (Table 6, Fig. 5). During this reporting period (RY13–RY17), the lowest effort reported was in RY14 at 585 hunters. This decline in participation may be attributed in part to increased awareness of the population concerns and the emergency order closure that occurred that year. Based on harvest ticket reports and sealing data, success rates declined from an annual average of 47% (RY09–RY12) to an annual average of 20% (RY13–RY17) in Unit 6D (Table 6, Fig. 5). Success rates declined in nearly all areas during RY13, RY14, and RY15.

The average number of days hunted by successful hunters in Unit 6D was between 3 and 4 during RY99–RY08, which was 10 years prior to the harvest ticket requirement. Based on permit data from RY09–RY17 for all hunters, the number of days hunted was somewhat higher, between 3.6 and 4.5 days.

Table 6. Black bear harvest effort and success in Unit 6, Alaska.

Area	Regulatory year	Hunted	Killed	Percent success
Unit 6A	2009	55	40	73
	2010	44	36	82
	2011	20	11	55
	2012	15	10	67
	2013	20	5	25
	2014	19	7	37
	2015	18	5	28
	2016	15	10	67
	2017	6	4	67
Unit 6B	2009	28	10	36
	2010	26	11	42
	2011	11	2	18
	2012	12	6	50
	2013	8	3	38
	2014	15	4	27
	2015	3	2	67
	2016	9	3	33
	2017	10	2	20
Unit 6C	2009	86	44	51
	2010	87	50	57
	2011	65	31	48
	2012	78	36	46
	2013	74	31	42
	2014	39	8	21
	2015	46	11	24
	2016	52	20	38
	2017	41	15	37
Unit 6D	2009	951	479	50
	2010	973	453	47
	2011	875	464	53
	2012	903	353	39
	2013	830	186	22
	2014	585	103	18
	2015	770	89	12
	2016	637	135	21
	2017	685	197	29

Note: Harvest tickets were used for all years in Units 6A, 6B, and 6C. In Unit 6D, harvest tickets were used from RY09–RY14; RL065 permit data was used in Unit 6D from RY15–RY17.
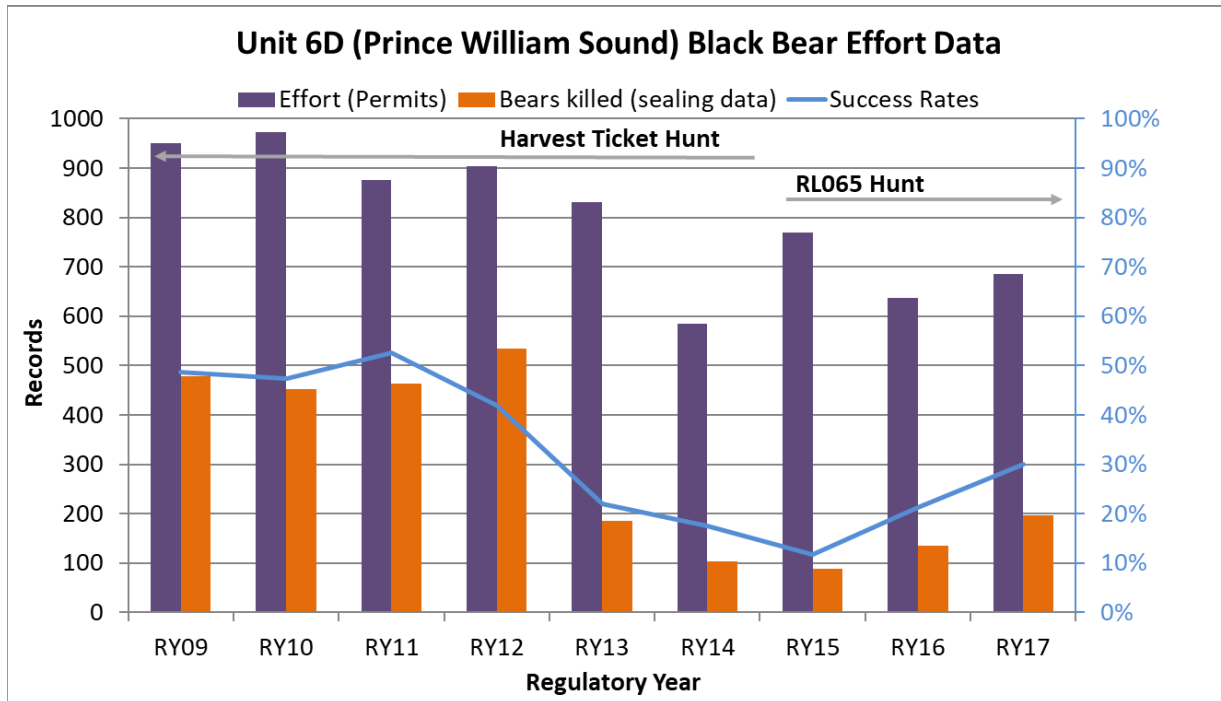
Figure 5. Unit 6D, Alaska, black bear effort and success data from harvest tickets and RL065 hunt permits.

Harvest of bears over bait in Unit 6D increased during the reporting period. While the 20-year average (RY93–RY12) was 9%; it was 25% during RY13–RY17.

Black bear baiting was the most popular method of take in Unit 6C and the proportion of bears that were taken over bait also increased this reporting period. While the 20-year average (RY93–RY12) was 17%, it was 36% during this reporting period. Black bear baiting is considered by some to be a technique that can lead to more selective harvest. In some regulatory years the harvest of females was lower among baiters than nonbaiters ("spot and stalk"), but in other years it was higher or the same. During RY93–RY12, hunters used bait stands and harvested fewer females in 12 of these years; and in 8 of these years hunters harvested more females. During this reporting period, baiters had a higher percentage of females in their harvest than nonbaiters in 2 years, a lower percentage in 2 years, and the same percentage in 1 year.

Hunter Residency and Success

Nonresident hunters harvested most of the bears taken in Unit 6A during the reporting period (RY13–RY17). In Unit 6B nonresident hunters were responsible for most of the harvest in all but 1 year (Table 7). Unit 6C harvest was >45% by nonresidents in RY13 and RY14 and by Unit 6 residents in RY15–RY17 with the remaining harvest evenly split between users. Despite changes in the overall harvest, the distribution between user groups appears mostly consistent with the previous 10- and 20-year averages. In Unit 6D nonlocal residents took an annual average of 54% of the harvested bears during this reporting period. In the 20 years prior (RY93–RY12), the average annual percentage of Unit 6D harvest taken by nonlocal residents was 61% and ranged from 53–74% of the total. Nonresident hunters took an average of 36% of the bears in Unit 6D and ranged from 32–45% during this reporting period (Table 7).

Table 7. Unit 6, Alaska, black bear successful hunter residency, regulatory years 2013–2017.

Unit	Regulatory year	Unit 6 resident Number	(%)	Nonlocal Alaska resident Number	(%)	Nonresident Number	(%)	Total successful hunters[a]
6A	2013	0	(0)	0	(0)	5	(100)	5
	2014	0	(0)	2	(29)	5	(71)	7
	2015	0	(0)	1	(20)	4	(80)	5
	2016	2	(18)	1	(9)	8	(73)	11
	2017	1	(20)	0	(0)	4	(80)	5
6B	2013	0	(0)	0	(0)	3	(100)	3
	2014	0	(0)	0	(0)	4	(100)	4
	2015	0	(0)	0	(0)	2	(100)	2
	2016	0	(0)	0	(0)	3	(100)	3
	2017	1	(50)	0	(0)	1	(50)	2
6C	2013	8	(23)	10	(29)	16	(46)	35
	2014	2	(25)	2	(25)	4	(50)	8
	2015	6	(50)	3	(25)	3	(25)	12
	2016	11	(55)	4	(20)	5	(25)	20
	2017	9	(60)	3	(20)	3	(20)	15
6D	2013	23	(12)	95	(51)	70	(37)	188
	2014	1	(1)	57	(54)	47	(45)	105
	2015	12	(13)	49	(54)	30	(33)	91
	2016	17	(12)	74	(53)	48	(35)	139
	2017	21	(10)	118	(58)	64	(32)	203
Unit 6 total	2013	31	(13)	105	(45)	94	(41)	231
	2014	3	(2)	61	(49)	60	(48)	124
	2015	18	(16)	53	(48)	39	(35)	110
	2016	30	(17)	79	(46)	64	(37)	173
	2017	32	(14)	121	(54)	72	(32)	225

[a] Total includes hunters with unknown residency and unit.

Harvest Chronology

Most of the harvest in all areas occurs in the spring, specifically in May (Table 8). Considering all units (6A, 6B, 6C, and 6D) and all years of this reporting period (RY13–RY17; when $n > 10$), less than 25% of bears were taken in the fall. For comparison, the Unit 6D 20-year average fall harvest was about 15% of the total harvest. Harvest of females is highest in the fall, and in some years and some units, it exceeds 50%. Most fall harvest occurs in early September. Spring harvest in Unit 6D was influenced in RY14 by the early emergency order closure of the season which went into effect May 27, 2015. In RY15, the Unit 6D harvest in June was low again despite there being no emergency order closure. In RY16 and RY17, the Unit 6D harvest in June returned to normal levels.

Transport Methods

Most successful hunters in Unit 6 used boats for transportation during the reporting period (Table 9). Airplanes provided most of the transportation in Units 6A and 6B. During RY03–RY12, 31% of the harvest in Unit 6B was taken using highway vehicles. During the reporting period, there was comparatively little harvest using highway vehicles. This is because a large portion of the Copper River Highway washed out in 2011 and much of Unit 6B has been inaccessible by highway vehicle since that time. Highway vehicles and 3 or 4 wheelers were most used in Unit 6C. Boats were the primary means of transportation used in Unit 6D.

Other Mortality

The number of bears (8) that were killed in defense of life and property was slightly below average during RY13–RY17 relative to the RY03–RY12 and RY93–RY12 averages. Most of these bears are taken in proximity to communities (e.g., Cordova, Whittier, and Valdez). Each year, zero to 2 bears were killed in vehicle collisions which is also consistent with historical data. Wounding loss is unknown and could be high for bears relative to other species. Unreported harvest is believed to be low. In April 2018, a camera that was set at a den to document cub emergence for the PWS black bear research project filmed the illegal killing of a sow and 2 cubs. All bears in Unit 6 must be sealed and are examined at that time for evidence of lactation.

Alaska Board of Game Actions and Emergency Orders

In March 2015, the Board of Game adopted a proposal that put registration hunt RL065 in regulation. This hunt has a 5-day reporting requirement to allow the department to respond swiftly to excessive harvest.

On May 7, 2015 (RY14), an emergency order was issued closing the season 2 weeks early on June 27. Despite this early closure, Memorial Day (the peak weekend of harvest) was within the open season which most likely lessened the impact of this change.

Recommendations for Activity 2.1.

Continue to monitor harvest data and mortality data as time and budget allows. Either a demographic study, a population estimate, or a density estimate are essential in providing meaningful data to determine appropriate levels of harvest.

Table 8. Unit 6, Alaska, black bear harvest chronology percent by harvest period, regulatory years 2013–2017.

Unit	Regulatory year	Aug % 16–31	Sep % 1–15	Sep % 16–30	Oct % 1–15	Oct % 16–31	Apr % 1–15	Apr % 16–30	May % 1–15	May % 16–31	Jun % 1–15	Jun % 16–30	n
6A	2013	0	0	0	0	0	0	20	20	60	0	0	5
	2014	0	0	14	0	0	0	0	29	57	0	0	7
	2015	20	0	0	0	0	0	0	40	20	0	20	5
	2016	0	0	0	0	0	0	0	45	55	0	0	11
	2017	20	0	0	20	0	0	0	20	20	20	0	5
6B	2013	0	0	0	0	0	0	0	33	67	0	0	3
	2014	0	0	0	0	0	0	0	50	25	25	0	4
	2015	0	50	0	0	0	0	0	50	0	0	0	2
	2016	0	0	0	0	0	0	0	67	33	0	0	3
	2017	0	0	0	0	0	0	0	50	50	0	0	2
6C	2013	0	0	11	8	0	0	0	28	31	17	0	36
	2014	0	0	0	13	0	0	0	25	63	0	0	8
	2015	0	0	8	0	0	0	17	58	17	0	0	12
	2016	5	0	0	0	0	0	5	25	40	25	0	20
	2017	0	0	0	0	0	0	0	20	53	13	13	15
6D	2013	1	9	11	3	1	0	1	17	34	24	0	187
	2014	0	4	8	1	0	0	0	26	61	1	0	105
	2015	1	0	2	1	0	0	6	20	66	4	0	90
	2016	0	1	3	1	0	0	1	25	40	28	1	139
	2017	0	5	5	0	0	1	0	11	48	28	0	204
Unit 6 Total	2013	1	7	11	4	0	0	1	19	35	22	0	231
	2014	0	3	7	2	0	0	0	27	60	2	0	124
	2015	2	1	3	1	0	0	6	26	57	4	1	109
	2016	1	1	2	1	0	0	1	27	40	25	1	173
	2017	1	4	4	1	0	1	0	12	48	27	1	226

[a] Includes non-hunting mortality and harvest from closed months. Less than 2 bears are taken in any year in months not included above.

Table 9. Unit 6, Alaska, black bear harvest percent by transport method, regulatory years 2013–2017.

					Percent of harvest				
Unit	Regulatory year	Airplane	Horse	Boat	3- or 4-wheeler	Snow machine	Highway vehicle	Unknown	*n*
6A	2013	100	0	0	0	0	0	0	5
	2014	71	0	14	14	0	0	0	7
	2015	80	0	20	0	0	0	0	5
	2016	64	0	0	18	0	0	18	11
	2017	100	0	0	0	0	0	0	5
6B	2013	100	0	0	0	0	0	0	3
	2014	75	0	25	0	0	0	0	4
	2015	100	0	0	0	0	0	0	2
	2016	100	0	0	0	0	0	0	3
	2017	50	0	0	0	0	0	50	2
6C	2013	0	0	3	23	0	40	34	35
	2014	13	0	13	50	0	13	13	8
	2015	0	0	8	25	0	67	0	12
	2016	5	0	20	45	0	25	5	20
	2017	0	0	27	40	0	20	13	15
6D	2013	2	0	84	6	0	5	4	188
	2014	3	1	90	3	0	2	1	105
	2015	1	0	87	3	0	3	5	91
	2016	1	0	78	11	0	6	4	139
	2017	0	0	88	5	0	5	1	203
Unit 6 total	2013	5	0	69	8	0	10	8	231
	2014	10	1	79	7	0	2	2	124
	2015	6	0	74	6	0	10	5	110
	2016	7	0	65	15	0	8	5	173
	2017	3	0	81	7	0	6	3	225

ACTIVITY 2.2. Assess prevalence of captured bears in the harvest.

Data Needs

Improving our understanding of mortality, both natural and human caused, can aid in the setting of appropriate harvest levels.

Methods

Black bears were captured between June 2016 and July 2018 as part of a habitat usage study conducted cooperatively between ADF&G and USFS. Black bears were captured on Esther Island during 2016, Knight Island during 2017, and on both islands during 2018. Bears were captured using M-15 bucket snare sets and Aldrich sets that were baited in the 2 weeks prior to trapping efforts. During this study, 96 unique bears were handled, and 53 bears received a radio collar.

Results and Discussion

During the summer of 2016, 25 bears were captured and marked on Esther Island. The subsequent spring (2017), 2 of the 5 bears that were harvested on Esther Island were marked animals. No additional captures were conducted on Esther Island in 2017. Two of the 10 bears that were legally harvested in the spring of 2018 were marked bears. Three bears (a marked sow and 2 cubs) were harvested illegally. During RY17 and RY18 14 male bears were harvested from Esther Island and of our 10 marked male bears, 4 were harvested.

During the summer of 2017, 33 bears were captured and marked on Knight Island. The subsequent spring (2018), 2 of the 5 bears that were killed on Knight Island were marked animals. One radio collar completely failed (VHF and Satellite not emitting signals) that was on a male bear and is unaccounted for. While this may be a simple equipment failure, it is also possible that the animal was harvested and not reported. The last transmissions we received were from a highly accessible section of beach on September 11, 2017, the day after the season opened.

Recommendations for Activity 2.2.

Continue to monitor harvest data for marked bears. Either a demographic study, a population estimate, or a density estimate are essential in providing meaningful data to determine appropriate levels of harvest.

3. Habitat Assessment-Enhancement

There were no habitat assessment or enhancement projects for black bears in Unit 6 during RY13–RY17.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Efforts continue to educate the public on the importance of securing attractants in urban settings from bears to prevent DLP kills. Outreach materials are widely distributed and are being explored in different mediums including social media.

Data Recording and Archiving

- Harvest data are stored on an internal database housed on a server (http://winfonet.alaska.gov/index.cfm).

- Research datasheets are entered, scanned, and stored on the Cordova ADF&G server (O:\DWC\Black bear).

- Original datasheets are stored in file folders located in the Cordova area biologist's office.

- Historical survey notes and data sheets are digitized and scanned for permanent storage on the file server.

Agreements

Alaska Department of Fish and Game and USFS Chugach National Forest have a cooperative agreement that allows for financial support and the sharing of harvest data and research data from the PWS cooperative black bear project.

Permitting

None.

Conclusions and Management Recommendations

Black bear populations and harvests in Units 6A, 6B, and 6C were lower during this reporting period than prior years, but probably at acceptable levels. No changes or management actions are recommended in these units. In 2015, registration hunt RL065 was implemented. Setting an appropriate harvest level with minimal population data is difficult. Initially, a Maximum Allowable Harvest (MAH) of 200 bears was set. This number was chosen as a recovery measure and is based off the harvest rate prior to the opening of the Anton Anderson Memorial Tunnel. However, since this implementation of this hunt, that harvest level has not been achieved despite there being no modifications to the season length. Success rates and percent female take have improved and are interpreted as signs of improved population status. As these measures continue to improve an increased MAH will be implemented.

Population estimation techniques are being developed that may estimate the population and harvest rates using genetics. Collection of teeth from harvested bears to determine age structure in the harvest will continue. Genetics data are being collected from archived samples as well as from newly sealed bears.

II. Project Review and RY18–RY22 Plan

Review of Management Direction

MANAGEMENT DIRECTION

A maximum allowable harvest (MAH) has been set in the absence of population estimates using previous harvest levels and corresponding percent take of females as a guideline as well as success rates as an indicator of population level. Directly estimating the population and developing appropriate harvest rates would be preferable to this technique but is currently not funded. MAH will be set using harvest, sex composition of the harvest, and success rates.

GOALS

Manage black bear populations to provide for sustained annual use by hunters and wildlife viewers.

CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

Black bears in Unit 6 have a positive customary and traditional use finding. The Amount Necessary for Subsistence is 80–120 black bears.

Intensive Management

Black bears in Unit 6 have a negative intensive management finding.

MANAGEMENT OBJECTIVES

The management objective for Unit 6 black bears is to sustain a 3-year average annual harvest of 350–400 bears, composed of less than 30% females, with a minimum male average skull size of 17 inches. Nonconsumptive users should have a reasonable chance at seeing bears while wildlife viewing.

REVIEW OF MANAGEMENT ACTIVITIES

1. Population Status and Trend

Note that due to limitations with budget and staffing, there are no future captures or further study planned at this time.

ACTIVITY 1.1. Record observations of black bears seen incidentally during other survey work and anecdotal reports from the public.

Data Needs

Either a demographic study, a population estimate, or a density estimate are essential in providing meaningful data to better understand population size and habitat use.

Methods

No change from methods in the RY13–RY17 report.

2. Mortality-Harvest Monitoring

ACTIVITY 2.1. Monitor harvest through sealing records and effort from permit and harvest ticket reports.

Data Needs

Either a demographic study, a population estimate, or a density estimate are essential in providing meaningful data to determine appropriate levels of harvest.

Methods

No change from methods in the RY13–RY17 report.

ACTIVITY 2.2. Assess prevalence of captured bears in the harvest.

Data Needs

Either a demographic study, a population estimate, or a density estimate are essential in providing meaningful data to determine appropriate levels of harvest.

Methods

No change from methods in the RY13–RY17 report.

3. Habitat Assessment-Enhancement

No activities planned.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Efforts should continue to educate the public on the importance of securing attractants in urban settings from bears to prevent defense of life or property (DLP) kills. Outreach materials will continue to be developed in different mediums including social media.

<u>Data Recording and Archiving</u>

- Harvest data are stored on an internal database housed on a server (http://winfonet.alaska.gov/index.cfm).

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<u>Agreements</u>

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<u>Permitting</u>

None.

Acknowledgments

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