Species Management Report and Plan ADF&G/DWC/SMR&P-2022-18

# **Brown Bear Management Report and Plan, Game Management Units 7 and 15:**

Report Period 1 July 2014-30 June 2019, and

Plan Period 1 July 2019–30 June 2024

# Jason Herreman



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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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**Cover Photo:** ADF&G wildlife biologists fitting a collar on a brown bear. ©2005 ADF&G Photo by ADF&G Biologist Thomas McDonough.

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# **Purpose of this Report**

This report provides a record of survey and inventory management activities for brown bear (*Ursus arctos*) in Game Management Units 7 and 15 for the 5 regulatory years 2014–2018 and plans for survey and inventory management activities in the next 5 regulatory years, 2019–2023. 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 brown bear management report of survey and inventory activities that was previously produced every 2 years.

# I. RY14–RY18 Management Report

# **Management Area**

Units 7 and 15 combined make up an area approximately 8,397 mi<sup>2</sup>, which encompasses the Kenai Peninsula. The Kenai Peninsula has 3 major population centers including Seward, Kenai/Soldotna, and Homer. There are also numerous smaller towns interspersed throughout the Peninsula. The U.S. Fish and Wildlife Service is the largest land manager on the Peninsula with land in Unit 7 and all administrative subunits of Unit 15 including Units 15A, 15B, and 15C.

Unit 7 is approximately 3,520 mi<sup>2</sup> in area and consists of the eastern portion of the Kenai Peninsula bounded by the western edge of the Kenai Mountains, the Russian River, and the Harding Ice Field on the west, and the western edge of the Sargent Ice Field and eastern edge of Spencer Glacier on the east (Fig. 1). The landscape of Unit 7 consists of mountainous terrain interspersed with river and creek drainages, a few large lakes, and ice fields. Riparian areas and hillsides are densely forested until reaching the alpine zone. Approximately 78% of Unit 7 is comprised of federally managed lands; 50% U.S. Forest Service-Chugach National Forest, 22% National Park Service-Kenai Fjords National Park, 5% U.S. Fish and Wildlife Service-Kenai National Wildlife Refuge, and 1% other federal land.



Figure 1. Map of Unit 7 boundaries with indicators of controlled use areas (numbered circles), administrative subunits, and federal lands as found in the Alaska Hunting Regulations.

Unit 15 incorporates the western portion of the Kenai Peninsula and is subdivided into 3 administrative units: Units 15A (1,314 mi<sup>2</sup>), 15B (1,121 mi<sup>2</sup>), and 15C (2,441 mi<sup>2</sup>); hereinafter referred to as units. Each unit is significantly different in its topography, flora, and ecological history. Unit 15A is the most northern unit separated from Unit 15B by the Kenai River and Skilak Lake. Unit 15C is the most southerly unit separated from Unit 15B by the Tustumena Glacier, Tustumena Lake, and the Kasilof River (Fig. 2).

Unit 15A is relatively flat with a multitude of small lakes leading up to the foothills of the Kenai Mountains in the east. The dominant flora is a mixed spruce-hardwood climax community. The Kenai National Wildlife Refuge is the largest landholder in Unit 15A. The most recent significant habitat disturbance was the Swan Lake Fire that began in June of 2019 and continued through the summer burning approximately 167,164 acres.

The Kenai National Wildlife Refuge is also the largest landholder in Unit 15B. The western portion of Unit 15B is similar to Unit 15A in topography and flora. As you go east however, Unit 15B becomes more mountainous and transitions into an alpine ecosystem. Forests within Unit 15B succumbed to widespread spruce bark beetle (*Dendroctonus rufipennis*) infestations that began in the 1990s. Unit 15B recently experienced significant habitat turnover in the form of the 2014 Funny River Fire that burned approximately 196,610 acres, the majority of which was in Unit 15B. This fire burned in a mosaic pattern and should provide good wildlife habitat in the near future.

Unit 15C is significantly different from both Units 15A and 15B. Refuge lands make up only a small portion of the unit in the northeast corner. The rest of Unit 15C is a mix of state, private, and municipal land ownership. The portion of Unit 15C north of Kachemak Bay and the Fox River peaks in the Caribou Hills and the Ninilchik Domes sloping down to the lowlands. Very few small lakes are present but numerous riparian areas exist draining from the highlands. Dominant vegetation is a mosaic consisting of spruce (*Picea* spp.), willow (*Salix* spp.), reed grass (*Calamagrostis* sp., particularly in salvage logged areas), alder (*Alnus* spp.), and some hardwood stands (*Betula* spp. *and Populus* sp.). The portion of Unit 15C north of Kachemak Bay has seen fairly consistent habitat disturbance over the past 2 decades in the form of wildfires, beetle kill, logging, and human development. The portion of Unit 15C south of Kachemak Bay and the Fox River consists of a very different ecotype compared to the northern portion of Unit 15C as it is comprised primarily of coastal temperate rain forest and subalpine habitat.



Figure 2. Map of Unit 15 boundaries with indicators of controlled use areas (numbered circles), administrative subunits, and federal lands as found in the Alaska Hunting Regulations.

# Summary of Status, Trend, Management Activities, and History of Brown Bears in Units 7 and 15

Brown bears are found throughout the Kenai Peninsula and occupy all known historical range. As a large carnivore, they are a species of great interest both locally and nationally. Due in part to this interest, the Interagency Brown Bear Study Team (IBBST) was formed in 1984 to discuss brown bear management and research needs on the Kenai Peninsula, and to coordinate joint studies. IBBST was comprised of representatives from ADF&G, the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and the National Park Service (NPS, who joined in 1990).

Numerous joint projects were conducted by IBBST which increased our understanding of brown bear ecology on the Kenai Peninsula. These studies included baseline inventory of salmon streams, known high-use brown bear areas, and detailed ground and habitat surveys (Bevins et al. 1984, Risdahl et al. 1986, Schloeder et al. 1987, Jacobs et al. 1988, Jacobs 1989). Studies by IBBST in the 1990s documented dietary requirements of Kenai Peninsula brown bears (Jacoby et al. 1999, Hilderbrand et al. 1999a), the importance of marine nitrogen in the ecosystem (Hilderbrand et al. 1999b), and the physiological effects of diet on reproduction (Hilderbrand et al. 2000). The IBBST is not currently active.

Brown bear habitat on the Kenai Peninsula at risk from human activities was identified using a cumulative effects model (Suring et al. 1998). ADF&G in cooperation with other members of the IBBST initiated a research project in 1995 to evaluate this model, assess brown bear habitat, estimate survival of bears, and ultimately model the brown bear population on the Kenai Peninsula (Schwartz and Arthur 1996, Schwartz and Del Frate 1999).

Del Frate (1993) derived a population estimate for the Kenai Peninsula by combining results from a habitat-based model and a density estimate using expert interpretation by comparing estimates of bear density to other parts of Alaska. In 2010, a survey was conducted by the USFWS and USFS using genetic mark–recapture techniques which estimated approximately 42 brown bears/1,000 km<sup>2</sup> (386 mi<sup>2</sup>) on USFWS and USFS lands. Extrapolating this number to all brown bear habitat on the Kenai Peninsula produced an estimate of 582 brown bears (Morton et al. 2015). Unfortunately, this technique is cost prohibitive; and therefore, unlikely to be repeated on a reasonable timeframe for management purposes.

Brown bears in what is now Alaska were first given game status in 1902 (Miller 1990) with liberal seasons and bag limits which have changed significantly over time. For example, in 1937–1938, the season was 1 September–20 June, with a bag limit of 2 bears for coastal areas in what is now Southcentral and all of southeastern Alaska. At that time, the rest of the Territory of Alaska did not have a closed season and there was no bag limit. At the time of statehood (1959), the bag limit was 1 brown bear on the Kenai Peninsula. The bag limit was further reduced in 1967 from 1 brown bear per year to 1 brown bear every 4 years. Brown bear regulations have gone through numerous changes since that time. From 1968–1989, brown bear harvest was regulated through a general season with season dates 1 September–5 October and 10 May–25 May with a bag limit of 1 bear every 4 years. Beginning in 1989, the fall season was shortened 14 days and ran 15 September–15 October to reduce incidental brown bear harvests by moose

hunters. The spring season remained 10 May-25 May, the hunt was administered through a general season, and the bag limit remained 1 bear every 4 regulatory years. In 1994, the fall season was adjusted to 1 October–25 October, with no change in bag limit or other restrictions. This adjustment was made to further address harvest concerns. In 1997 the general season was eliminated, and the hunt was managed under a registration permit with season dates 15 October-31 October and 10 May-25 May. A cap of 14 total human-caused mortalities (hunting and nonhunting), of which no more than 6 could be females, was also instituted by the Board of Game at that time. The cap was to be calculated on a 3-year running average. During 1999, the spring portion of the registration hunt was eliminated, but all other objectives and regulations remained the same until 2003. In 2003, the management objective was changed to no more than 20 human-caused brown bear mortalities, of which no more than 8 could be females older than 1 year (the number used to determine if the cap had been reached was calculated based on the most recent 3-year average). In 2007, the registration season was eliminated, and the board adopted a drawing permit hunt for brown bears with season dates 1 October-30 November and 1 April-15 June. The management objective did not change (20 human-caused mortalities no more than 8 females), but the 3-year running average method for determining the cap was discontinued, and bears counted against the cap were determined by the number killed each calendar year. This assured drawing permit holders the ability to hunt at least 1 of the 2 seasons (fall or spring) in a regulatory year (e.g., RY07 = 1 July 2007-30 June 2008). In 2009, the fall season dates were liberalized to 15 September-30 November, while retaining the same 1 April-15 June spring season. Additionally, the management objective was changed from a cap on the total number of bear mortalities that included a female-bear limit to limiting only female mortalities. This new objective allowed no more than 10 adult (at least 5-years old) female human-caused brown bear mortalities (hunting and nonhunting) during a calendar year.

In January 2012 the board adopted a new registration permit hunt for brown bears with season dates of 1 October–30 November during 2012, which were then changed to 15 September–30 November during 2013. The management objective (no more than 10 adult female mortalities) remained the same until fall 2012. Hunters who obtained drawing permits for regulatory year 2012 (the application period was November–December 2011) could still hunt, but the drawing permit system was replaced by the new registration permit system after those permits expired (15 June 2013).

At the March 2013 Board of Game meeting, the season dates were once again adjusted to 1 September–31 May, and the cap on the number of human-caused brown bear mortalities for 2013 was eliminated. A cap of 70 human-caused mortalities of which 17 could be adult females was instituted for 2014. In addition, the board passed a regulation allowing hunters to harvest brown bears at bait stations beginning in the spring of 2014.

# **Management Direction**

# **EXISTING WILDLIFE MANAGEMENT PLANS**

The 1976 Alaska Wildlife Management Plan (Alaska Department of Fish and Game 1976) includes the Kenai Brown Bear Management Plan. The primary goal of the plan was to provide the greatest opportunity to participate in brown bear hunting while providing for optimum harvest of bears. To accomplish these goals, managers encouraged sport harvest of brown bears to reduce human conflicts, attempted to increase public awareness of brown bear behavior, and discouraged land use practices that adversely affected brown bear habitat.

The Kenai Peninsula Brown Bear Conservation Strategy was written in 2000 to address conservation concerns surrounding brown bears (Alaska Department of Fish and Game 2000). The development of this strategy was a collaborative effort among the general public, state, federal, and local governments. Recommendations from the strategy were meant to be incorporated into government management plans and voluntarily implemented by private landowners.

Recent management objectives, harvest strategies, and subsequent changes have resulted from public comment, staff recommendations, and Board of Game actions. This report contains the current management plan for brown bears in Units 7 and 15.

# GOALS

The management goal for the Kenai brown bear population is to maintain a healthy brown bear population while minimizing negative human-bear interactions.

# **CODIFIED OBJECTIVES**

## Amounts Reasonably Necessary for Subsistence Uses

The Alaska Board of Game has not designated brown bears as a subsistence resource in Unit 7 or 15. The board produced a negative finding for brown bear Unit 15C and has not produced a determination for the other units.

## Intensive Management

The Alaska Board of Game has not designated brown bears an Intensive Management species in Unit 7 or 15.

# **MANAGEMENT OBJECTIVES**

Manage for a cap of 50–60 total human-caused brown bear mortalities of which 8–12 can be adult females.

# **MANAGEMENT ACTIVITIES**

## 1. Population Status and Trend

ACTIVITY 1.1. Maintain a minimum number of very high frequency (VHF) radiocollared bears on the Kenai brown bear population to determine population demographics including finite rate of change (lambda), age specific survival rates, litter size, estimated age of first reproduction, interbirth interval, and the natural mortality rate in collaboration with Region II research staff.

#### Data Needs

Brown bear population demographic information including the finite rate of change (lambda), age-specific survival rates, litter size, estimated age of first reproduction, interbirth interval, and the natural mortality rate are needed to determine if harvest is occurring at sustainable levels.

#### Methods

Brown bears were captured via helicopter darting and collared with VHF radio collars each spring using a fixed-wing spotter team. Worn and out-of-date collars were replaced, and new animals were collared to maintain sample size. Survival, age of first reproduction, and litter size were determined by resight overflights of collared animals throughout the year.

#### Results and Discussion

Population demographics were calculated from collared animals and reported in the Kenai Peninsula Brown Bear Population Demographics Project federal aid annual research performance reports (Farley 2014–2018). This work was conducted by DWC research staff with the assistance of DWC management staff. Reports can be found at: www.wildlifepublications.adfg.alaska.gov.

#### Recommendations for Activity 1.1

Modification of current VHF radiocollaring efforts should include satellite Global Positioning System (GPS) collars to better determine current movement patterns and home range size and use. Genotyping each collared and harvested animal should occur which would build a genetic reference database. The database could be used to compare relatedness to harvested animals, which would aid in the investigation of possible source-sink dynamics on the Kenai Peninsula and the development of area-specific harvest caps.

## 2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2.1. Monitor harvest through hunt permit reports.

## Data Needs

All human-caused mortalities, including harvest, must be assessed to avoid overharvest.

## Methods

Harvest data are collected through hunt permit reports which have a required 5-day reporting period for harvested animals, and mandatory sealing within 10 days of kill. Permit reports are entered into ADF&G's Wildlife Information Network (WinfoNet) database. Harvest data is summarized by calendar year and stored on the ADF&G Homer shared network drive. Sample collection and verification of sex of harvest occurs during the required sealing process.

## Season and Bag Limit

The hunting season in Units 7 and 15 for brown bear during RY14–RY18 was 1 September–31 May. The bag limit was 1 bear per year and the taking of sows with cubs was prohibited. Brown bears could be taken at a black bear bait station from 15 April–31 May. The most current seasons

and bag limits may be found online at: http://www.adfg.alaska.gov/index.cfm?adfg=wildliferegulations.hunting.

#### Results and Discussion

#### Harvest by Hunters

Hunter harvest peaked at 96 bears in 2013 (Selinger 2015). This peak occurred after the establishment of the current RB300 registration permit season, and after adjustments were made to both the season and to the method and means that had been in place until 2014. Since 2015, harvest has been around 40 bears each year with males representing approximately two-thirds of the harvest each year (Table 1). The 5-year average percentage of bears taken over bait was 55% during RY14–RY18 (Table 2).

#### Hunter Residency and Success

Most brown bear hunters on the Kenai Peninsula were Alaskan residents (Table 3). Yearly success rates for all hunters ranged between 7% and 11% each year. The average success rate of nonresident hunters was 21%, which was significantly higher than the 8% success rate of resident hunters during RY14–RY18 (Table 3). Note that a significant number of hunters receive a permit each year that do not hunt.

Regulatory		Hunting			Nonhunting <sup>a</sup>				All human caused mortality			
year	Male	Female	Total	Male	Female	Unknown	Total	Male	Female	Unknown	Total	
2014	22	9	31	2	3	0	5	24	12	0	36	
2015	27	13	40	3	3	0	6	30	16	0	46	
2016	25	13	38	5	8	1	14	29	21	1	51	
2017	25	16	41	2	4	0	6	27	20	0	47	
2018	25	12	37	3	9	1	13	28	21	1	50	

Table 1. Units 7 and 15 human-caused brown bear mortality, 2014–2018, Kenai Peninsula, Alaska.

<sup>a</sup> Nonhunting mortality includes defense of life and property (DLP) kills, agency kills, roadkill, illegal take, cubs removed from the population, and research related mortalities.

Table 2 Unit	s 7 and 15 k	rown hear b	narvest over h	ait during	regulatory vears	2014-2018	Kenai P	eninsula	Alaska
Table 2. Unit	5 / anu 13 i	JIUWII DEAL I		an uuring l	regulatory years	2014-2010,	INCHALL (	ciiiiisula, 1	maska.

Regulatory year	Number taken over bait	Percent taken over bait	Total harvest
2014	16	52	31
2015	25	63	40
2016	21	55	38
2017	20	49	41
2018	20	54	37

## Table 3. Units 7 and 15 brown bear hunter residency and success, 2014–2018, Kenai Peninsula, Alaska.

		Suc	cessful		Unsuccessful							
Regulatory					Percent					Total	Did not	Did not
year	Resident	Nonresident	Unknown	Total	success	Resident	Nonresident	Unknown	Total	hunters	report	hunt
2014	28	2	1	31	7	408	17	1	426	455	9	659
2015	38	2	0	40	9	409	13	0	422	462	7	670
2016	34	4	0	38	9	368	12	0	380	418	8	575
2017	34	4	3	41	11	341	9	1	351	388	9	628
2018	32	4	1	37	11	304	10	0	314	350	12	576

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#### Harvest Chronology

The largest portion of brown bear harvest occurs during the spring season each year (Table 4). High spring harvest is likely related to harvest over bait, which is allowed from 15 April–31 May.

Regulatory year	Fall	Spring	Total harvest
2014	13	18	31
2015	9	31	40
2016	14	24	38
2017	14	27	41
2018	6	31	37

Table 4. Units 7 and 15 brown bear harvest chronology, 2014–2018, Kenai Peninsula, Alaska.

#### Transport Methods

The most common mode of transportation used by brown bear hunters during RY14–RY18 was highway vehicle. This was followed closely by all-terrain vehicles (ATVs; Table 5).

Table 5. Units 7 and 15 successful brown bear hunter-harvest transportation me	thods
during 2014–2018, Kenai Peninsula, Alaska.	

Regulatory	ATV/				Highway	Horse/		Other/
year	ORV <sup>a</sup>	Airplane	Boat	Foot	vehicle	dog team	Snowmachine	unknown
2014	9	0	3	3	13	0	0	3
2015	15	0	7	2	16	0	0	0
2016	11	0	5	2	16	0	0	4
2017	13	0	9	1	12	2	0	4
2018	11	0	7	3	13	1	1	1

<sup>a</sup> ATV stands for all-terrain vehicle, and ORV stands for off-road vehicle.

#### Other Mortality

Nonhunter human-caused mortality has been decreasing since peaking in 2008. Two small spikes occurred in 2016 and 2018, both of which were due to defense of life and property (DLP) incidents and agency kills in the Seward area (Table 1). The majority of bears killed in Seward were sows and cubs and as such would not be legal animals to harvest.

#### Alaska Board of Game Actions and Emergency Orders

In 2015, the Board of Game approved a human-caused mortality cap of 50–60 brown bears each calendar year of which only 8–12 can be adult females.

#### Recommendations for Activity 2.1

Continue and modify the management period from calendar year to regulatory year. This will allow easier entering, tracking, and storage of data through the WinfoNet system, put brown bear management in line with our management of other species, and provide a clearer understanding of the management system for the general public.

ACTIVITY 2.2. Monitor nonharvest human-caused mortality.

## Data Needs

Nonharvest sources of human-caused mortality must be tracked to determine and manage for the total number of sustainable human-caused mortalities.

## Methods

Defense of life and property reports (DLP) are tracked through our DLP and sealing tools on WinfoNet. Road-kill brown bears are tracked through Alaska Wildlife Trooper reports and sealing certificates. Sex and age of animals are verified when possible.

## Results and Discussion

Defense of life and property kills decreased significantly with the establishment of the current registration hunt with the exception of the Seward area, where DLPs have increased in recent years. A number of factors could be playing into the increase in Seward area DLPs including an increase in development and human population levels, increased backyard poultry farming, a decrease in outreach and educational programs, an increase in salmon returns, and an overall increase in bear attractants. Interestingly, there appears to be a correlation with the number of salmon produced and returning in the Bear Lake Weir and the amount of bear activity in town as noted by local residents and ADF&G personnel. The 4-year average (equal to litter interval for brown bears in the Kenai area; Farley et al. 2001) salmon return (Hollowell et al. 2018) dramatically increased from 1992 to 2018 and has a strong correlation with an increase in DLP kills (Fig. 3). It is possible that an increase in salmon in the system attracted more bears to the area, which in turn led to more nuisance issues.



# Figure 3. Average brown bear defense of life and property (DLP) mortalities in the Seward municipal area compared to salmon returns at the Bear Lake weir, 1992–2019, Alaska (Hollowell et al. 2018).

## 3. Habitat Assessment-Enhancement

No habitat assessment work was conducted for brown bear management during RY14–RY18 in Units 7 and 15.

# NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Continued education of bear attractant management is needed on the Kenai Peninsula including education concerning the use, installation, and maintenance of electric fencing. Backyard poultry farming, beekeeping, and livestock (including livestock feed) are bear attractants that are increasing in the area. More stringent interpretation and application of current DLP laws across the Kenai Peninsula would be beneficial for brown bear management. Currently law enforcement officers are often unwilling to write citations when attractants are present and proper precautions have not been taken even though 5 AAC 92.410(a)(3), Taking game in defense of life or property states "(a) Nothing in 5 AAC prohibits a person from taking game in defense of life or property if (3) all other practicable means to protect life and property are exhausted before the game is taken."

# Data Recording and Archiving

Data from permit reports are entered into WinfoNet at http://winfonet.alaska.gov/index.cfm. Electronic records of all known brown bear mortalities are recorded on the Homer shared network drive at (O):DWC/ADF&G-Homer Files/Species Data/.

# Agreements

- The Russian River Management Agreement is a 5-year action plan that guides management of the Kenai-Russian River Complex. Partners in the agreement include the Alaska Department of Fish and Game (ADF&G), U.S. Fish and Wildlife Service (USFWS), Alaska State Parks, and the U.S. Forest Service (USFS). A copy of this agreement can be found on the Homer shared drive at (O):DWC/ADF&G-Homer Files/Species Info/Bear/Brown Bear/Miscell Bear Files/Russian River bears.
- The Interagency Brown Bear Study Team consisted of members from ADF&G, USFWS, National Park Service, and USFS. This group is no longer active.
- The Kenai Peninsula Brown Bear Working Group was formed to deal with negative human bear interactions but is no longer active.

# Permitting

Brown bear capture work is conducted under IACUC number 0044-2022-35.

# **Conclusions and Management Recommendations**

The Kenai brown bear population appears to be healthy at this time. Although a current population estimate does not exist, the finite rate of change (lambda) for the population as calculated from collared animals has been slightly greater than 1 over the last 2 decades (Farley 2017), indicating a growing population. Lambda did drop below 1 from 2010–2012 but overall has been above 1. The only survey-based population estimate for Kenai brown bears was conducted in 2010 by Morton et al. 2015, which yielded a Kenai Peninsula population estimate of 582 brown bears. This number is more than double the old objective of 250 bears stated in the Kenai Peninsula Brown Bear Conservation Strategy (no longer an objective, Alaska Department of Fish and Game 2000), and the population appears stable at this time. Observations by department staff and the general public support the idea of a stable to growing population, and the population appears to be able to support the current harvest and human-caused mortality levels. An increase in overall human-caused mortalities or an overharvest of females, however, would likely cause a population decrease.

More definitive harvest caps that include areas, sex, and age-specific caps should be investigated. As noted by Knight and Eberhardt (1985), the recruitment of subadult females into a population of reproductive females and the subsequent survival are the most critical variables influencing a population's productivity. Therefore, either a standalone cap on subadult female harvest or the inclusion of subadults in the current cap, as has occurred in the past, may be necessary.

The social carrying capacity of predators often drives management actions in Alaska. To avoid a decreased social carrying capacity for this species, efforts to educate the public concerning ways to decrease negative human-bear interactions should be continued and increased. As the human population on the Kenai continues to grow, so does the potential for negative interactions.

The Kenai National Wildlife Refuge, as the name would suggest, provides a refugia from harvest and human-caused mortalities based on harvest and DLP locations. Should current refuge regulations change, harvest on refuge lands may increase making harvest caps more important for species conservation.

Fish enhancement projects near Seward that could be increasing bear presence in the area should be further investigated; steps should be taken to minimize any negative human-bear interactions.

# II. Project Review and RY19-RY23 Plan

# **Review of Management Direction**

# **MANAGEMENT DIRECTION**

The existing management direction and goals appropriately direct management of brown bears in Units 7 and 15.

# GOALS

The management goal for the Kenai brown bear population is to maintain a healthy brown bear population while minimizing negative human-bear interactions.

# **CODIFIED OBJECTIVES**

## Amounts Reasonably Necessary for Subsistence Uses

No change is expected.

## Intensive Management

No change is expected.

# **MANAGEMENT OBJECTIVES**

The RY14–RY18 management objective for a cap of 50–60 total human-caused brown bear mortalities of which 8–12 can be adult females should be refined for RY19–RY23. A definitive harvest cap, rather than a range, should be established for total human-caused brown bear mortalities, and the number of females allowed within this cap should also be set. The new cap may need to be broken down by smaller management areas and would ideally include a specific cap for subadult females or total females rather than the RY14–R18 range of 8–12 for a total adult female cap and Kenaiwide total mortality cap.

# **REVIEW OF MANAGEMENT ACTIVITIES**

## 1. Population Status and Trend

ACTIVITY 1.1. Maintain a minimum number of very high frequency (VHF) radiocollared bears on the Kenai brown bear population to determine population demographics including finite rate of change (lambda), age specific survival rates, litter size, estimated age of first reproduction, interbirth interval, and the natural mortality rate in collaboration with Region II research staff.

## Data Needs

Continue collaring activities. Modify to collect GPS collar data to better delineate home range and habitat use of collared animals; and genotype all collared and harvested animals. Genotyping of all collared and harvested bears is needed to analyze the relatedness of these 2 groups, which would be used to look at possible source-sink population dynamics. This information is needed to help determine harvests caps.

## Methods

Bears will continue to be captured via helicopter darting and collared in the spring using a fixedwing spotter team as time and funding allows. Additional animals may be captured using snares or culvert traps at accessible locations. Worn and out of date collars will be replaced with GPSequipped satellite collars if funding allows and additional animals collared if needed to maintain sample size. Tissue samples from collared and harvested bears will be genotyped using microsatellite DNA or single-nucleotide polymorphisms (SNPs) and then analyzed using a program such as Kinship or KinLinks specifically designed to analyze relatedness of genotypes. Actual completion of work and collar choice (VHF vs. GPS) will depend on available funding. Genotyping of bears will be dependent on the establishment of the wildlife gene lab in Anchorage and continued financial support.

# 2. Mortality-Harvest Monitoring

ACTIVITY 2.1. Monitor harvest through permit reports.

## Data Needs

No change from the RY14-RY18 reporting period.

## Methods

No change from the RY14–RY18 reporting period.

# ACTIVITY 2.2. Monitor nonharvest human caused mortality.

## Data Needs

No change from the RY14–RY18 reporting period.

#### Methods

No change from the RY14–RY18 reporting period.

#### 3. Habitat Assessment-Enhancement

No habitat assessment work is currently being conducted for brown bear management in Units 7 and 15.

## NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

#### Data Recording and Archiving

No change from the RY14–RY18 reporting period.

#### Agreements

No change from the RY14–RY18 reporting period.

#### Permitting

The department does not expect to seek or issue any brown bear specific permits in Units 7 or 15 during RY19–RY23.

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