Brown Bear Management Report and Plan, Game Management Unit 22:

Report Period 1 July 2014–30 June 2019, and Plan Period 1 July 2019–30 June 2024

Sara R. Germain



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Cover Photo: ©2020 ADF&G. Photo by Sara Germain. A brown bear walks across subalpine habitat.

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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 Unit 22 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

Unit 22 encompasses approximately 25,230 mi² of western Alaska, covering much of the Seward Peninsula and southern Norton Sound including the St. Lawrence and Little Diomede Islands. Unit 22 is divided into 5 administrative units (22A, 22B, 22C, 22D, 22E; Fig. 1). The terrain within the unit varies from rugged mountains to flat, coastal wetlands. Spruce forests and wide expanses of rolling hills characterize eastern portions of the unit (Units 22A and 22B), while western portions (Units 22C, 22D, and 22E) are predominantly subarctic tundra interspersed with willow thickets along riparian corridors with rugged mountains bordering some of the units.

Summary of Status, Trend, Management Activities, and History of Brown Bears in Unit 22

The Unit 22 brown bear (*Ursus arctos*) population has likely fluctuated throughout the past century due to varying hunting efforts over time. Pressure on bears was very high in the first half of the 1900s due to pressure from miners and reindeer (*Rangifer tarandus tarandus*) herders (Smith et al. 1990). In fact, early reports noted that long-time Unit 22 residents observed that bears were scarce on the peninsula between 1900 and 1960 (Smith et al. 1990, Georgette 2001). Furthermore, federal predator control programs included poison bait stations intended to lower wolf (*Canis lupus*) populations near reindeer herds. These methods were indiscriminate between predators and likely incidentally killed bears during the 1940s and 1950s (Smith et al. 1990).

In the second half of the 1900s, pressure on brown bears in Unit 22 began to decrease. Miners had mostly abandoned the Seward Peninsula, and federal predator control programs aimed to reduce predators around reindeer herds ended upon statehood (Smith et al. 1990). Hunting seasons for brown bears were highly conservative in the 1950s in hopes of increasing the previously heavily hunted brown bear population. Management reports suggest that brown bears likely recovered to pre-1900 levels by the 1960s (Grauvogel 1985). By the 1970s, they were considered common (Pegau 1971).



Figure 1. Map of Unit 22 in Northwest Alaska as found in the Alaska Hunting Regulations.

Muskoxen (*Ovibos moschatus*) were reintroduced to Unit 22 beginning in 1971 (Gorn 2015). By the 1960s moose (*Alces alces*) expanded their range into the unit and became widespread (Gorn 2012). This influx of ungulates onto the peninsula allowed for an abundance of prey for brown bears. Combined with the rebound of pink, chum, and silver salmon running up Seward Peninsula rivers beginning in the 2000s (Menard et al. 2020), the Unit 22 brown bear population increased further. In response to this increased brown bear abundance, the Alaska Board of Game (BOG, board) incrementally liberalized bear hunting regulations in Unit 22 beginning RY98.

Present day brown bear populations appear to have continued to increase beyond the numbers estimated in the 1970s, despite sustained heavy harvest of bears in the unit. Ungulate species in the unit include moose, which now exist at low densities of 0.35 moose/mi² (Gorn *In prep*); muskoxen, which have remained stable at around 2,300 muskoxen (Gorn and Dunker 2015); and occasionally Western Arctic Herd (WAH) caribou (*Rangifer tarandus granti*), which fluctuated between 200,000 and 259,000 caribou during RY14–RY18 (Alex Hansen, Wildlife Biologist, ADF&G, Kotzebue, Western Arctic Caribou Herd Short-Yearly Survey memorandum, 1 June 2022). The 3 road systems collectively amounting to 400 mi (645 km) in length allow for easy access to brown bear habitat. The long seasons and 2 bears per regulatory year bag limits offered in Unit 22 allow for hunters to pursue brown bears nearly year-round, especially along the road system (Unit 22B west of the Darby Mountains, Unit 22C, and Unit 22D).

The sentiment that the recovery of the local moose population is being hindered by brown bear depredation is a view shared by many Unit 22 residents, especially those from Nome. Many hunters set out in pursuit of brown bears each year as a result. The regulatory liberalizations of RY98 resulted in an estimated 74% increase in the local brown bear harvest, and the annual brown bear harvest in Unit 22 since RY98 averages 99 bears annually. These high harvests have led some residents to believe that the brown bear harvest is unsustainable, while others believe that the harvest should increase further. Conflicting desires for the management of bears, particularly in Unit 22C, have existed for decades (Grauvogel 1986). Without commensurate bear population surveys of similar design or other research projects aimed at understanding local brown bear population dynamics, it is difficult to properly assess the status of the brown bear population in order to identify if the population has continued to increase or is now in decline.

Management Direction

EXISTING WILDLIFE MANAGEMENT PLANS

The direction in the Seward Peninsula Brown Bear Management Plan outlined by ADF&G (1971) has been reviewed and modified through public comments, staff recommendations, and Board of Game actions over the years. A record of these changes may be found in the division's species management report series. The plan portion of this report contains the current management plan for brown bears in Unit 22.

GOALS

- Provide for an optimum harvest of brown bears.
- Maintain a population that sustains a 3-year mean annual reported harvest of at least 50% males.

CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

Brown bears are considered necessary for customary and traditional uses in Unit 22 (5 AAC 99.025). In 1997, the Board of Game made a positive determination (October 1997) that the population of brown bears in Units 21 and 22 combined was harvested for customary and traditional uses, and that has remained in effect since. The amounts necessary for subsistence (ANS) for brown bears in both Units 21 and 22 combined was determined by the board in 2000 to be 20–25 bears.

Intensive Management

There is no intensive management objective for brown bear in Unit 22.

MANAGEMENT OBJECTIVES

- 1. Monitor the brown bear harvest through field observations, analyses of brown bear sealing data, and interviews with hunters.
- 2. Collect harvest data, determine sex, and extract a tooth for aging from brown bears presented for sealing.
- 3. Obtain estimates of ages of sealed bears by tooth sectioning.
- 4. Analyze registration permit harvest data collected for subsistence hunts.
- 5. Use public education programs and/or increased communication with the public to improve understanding of hunting regulations and the value of conserving brown bear populations, and to obtain better harvest data through increased harvest reporting.
- 6. Educate the public on bear awareness and safety and provide demonstrations of how to use electric bear fences to reduce human-bear problems.
- 7. Communicate and coordinate with local residents to reduce human-bear problems, improve understanding of defense of life or property (DLP) situations, and reduce the need for DLP kills.

MANAGEMENT ACTIVITIES

Integral components of brown bear management in Unit 22 include assessing population status and trends through field observations and analyses of sealing data, analyzing drawing permit harvest data collected for nonresident drawing hunts, and completing surveys and data analysis on a brown bear census project with the National Park Service (NPS) in Unit 22. Survey and inventory (S&I) management activities used to monitor brown bear populations in Unit 22 are described further below.

1. Population Status and Trend

ACTIVITY 1.1. Assess brown bear population trends through field observations, analysis of sealing data, and aerial surveys.

Data Needs

Aerial surveys of brown bears are conducted in Unit 22 to estimate the abundance and density of brown bears in a specified area and allow managers to estimate a harvest rate (Management Objective 1). Brown bears are difficult to survey due to their rare and secretive nature, therefore it is impractical to conduct annual aerial surveys to estimate the abundance and density of brown bears within an area as is done for ungulate species. Collaring brown bears for mark-recapture enumeration is costly and time-intensive, and it is difficult to meet the assumptions of the technique (Miller et al. 1987). Various studies have attempted to establish a cost-effective, statistically sound, and repeatable aerial bear survey method in northwestern Alaska over time (Miller et al. 1987, Lindberg and Schmidt 2007). However, these surveys have proven largely prohibitive due to time and logistic constraints.

Without multiple replicated bear surveys in the area, managers must instead attempt to utilize population reconstruction methods with harvest data gathered through bear sealing (Management Objective 1). Aerial surveys that result in estimates of abundance and density of brown bears in the area that are completed infrequently within Unit 22 may complement harvest trend data and allow managers to calculate realized harvest rates derived from the extrapolated density of brown bears within the unit. Recommendations from studies done in the area suggest that Unit 22 brown bears should be harvested at a rate of 5.7% for all bears and 8% for bears \geq 2-years old (Miller and Nelson 1993, Miller 1988). Moreover, Miller (1988) observed that if greater than 50% of the brown bear harvest in an area was comprised of females, then the population may be in decline. Monitoring trends and changes in these estimates, combined with the metrics gathered through bear sealing, may elucidate changes in the local bear population and inform proper management actions.

Methods

Hunters are required to bring the hide and skull of a harvested brown bear to an either an authorized bear sealer or department staff member within 30 days of harvest with the exception of bears harvested under the RB699 permit. However, harvest occurring under the RB699 permit does require the hunter to seal the bear hide and skull if it is transferred out of the unit in which it was taken. Harvest data were summarized collectively from nonresident drawing and subsistence hunt reports, DLP forms, community-based big game harvest surveys, and sealing certificates.

Field observations are gathered through anecdotal sightings by staff during aerial surveys and captures. and. Other anecdotal information is gathered from members of the public at advisory committee meetings, during village visits, and from reported sightings.

Two different methodologies have been used to gather population and density data on the Unit 22 brown bear population. In 1991, an aerial capture-mark-resight survey design was used. Methodology is described by Miller and Nelson (1993); this survey involved searching for previously collared brown bears in survey grids. In 2015, a novel photographic mark-resight methodology was implemented in Unit 22 as a noninvasive method of surveying brown bears. The photographic mark-resight methodology is outlined by Schmidt et al. (2017) and Robison et al. (2018) and involves pilot-observer teams "marking" bears by taking photos of any bears in a given survey grid, with a bear being "recaptured" by a second pilot-observer team subsequently surveying the same grid after the first pilot-observer team. Estimates were expressed in terms of independent (bears excluding offspring) and total (including offspring) bears.

Results and Discussion

The 1991 aerial mark-recapture survey occurred over a 2,067 km² (798 mi²) area in the western portion of Unit 22B and eastern portions of Units 22C and 22D. The resulting densities were estimated at 15 independent bears/1000 km² and 29 total bears/1000 km², and the extrapolated abundance for the portion of Unit 22 west of the Darby Mountains was estimated at 458 independent bears.

The second brown bear survey in Unit 22 was completed by the National Park Service in 2015 with contributions from ADF&G. Brown bears were surveyed in a 19,998 km² (7,721 mi²) area in a central portion of Unit 22 west of the Darby Mountains (Fig. 2). Resulting estimates included densities of 21 (95% CI = 13.7–32.5) independent bears/1000 km² (54.4 bears/1000 mi²) and 36 (95% CI = 23.7–53.5) total bears/1000 km² (93 bears/1000 mi²). Abundance for the study unit was estimated at 420 (95% CI = 274–650) independent bears and 713 (95% CI = 474–1,070) total bears.

The differing methodologies and study areas, in addition to the large time gap that occurred between the 1991 and 2015 brown bear surveys, make it difficult to compare results or make inferences regarding the status and trend of the brown bear population in Unit 22 based solely on the aerial surveys. Densities of independent bears appear to be similar between the 1991 and 2015 survey, but it is unclear if densities have remained stable, increased, or decreased during the 24-year gap between surveys.

Realized harvest rates, or the proportion of bears removed from the estimated population through hunting, were then calculated based on the extrapolated bear density estimates from the 2015 aerial bear survey in addition to the harvest within the unit during a given regulatory year. Based on the 2015 survey, harvest levels in western Unit 22 (average of 74 bears per regulatory year) during RY14–RY18 represent approximately a 6% harvest rate for total bears (all ages) and approximately 10% harvest rate for independent bears (not including cubs). These estimates suggest that current harvest rates are slightly above the recommended harvest levels for all bears and independent bears.

Anecdotal reports regarding the local brown bear population are inconsistent. Some members of the public posit that the bear population has continued to increase, and encounters in the backcountry or at fish camps are becoming more common. Others suggest that the local population has decreased and believe that brown bear sightings have become rare within the unit. Indeed, Unit 22 appears to support a productive population, and sightings of sows with 3 or 4



Figure 2. The survey area and sample units of the Seward Peninsula brown bear survey occurring in 2015 in portions of Unit 22, Alaska. Adapted from Robison et al. (2018).

cubs are common; however, it is unclear whether this is a density-dependent response to high harvest or a sign of a healthy bear population.

Recommendations for Activity 1.1

Continue. Brown bear mark-resight surveys should be continued in cooperation with the National Park Service (NPS); currently, surveys are scheduled to be completed once every 5 years. The next brown bear survey for Unit 22 is tentatively scheduled to be completed in the spring of 2021.

2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2.1. Monitor brown bear harvest through sealing records. Monitor skull and age data (from tooth samples taken at the time of sealing) every regulatory year.

Data Needs

Monitoring for potential changes in brown bear skull and age data may help managers detect changes in the local population that irregular population surveys may not show (Management Objectives 1, 2, 3). Brown bear harvest is monitored through sealing forms and analyzed by regulatory year. It is often further parsed out by administrative subunits (Units 22A, 22B, 22C, 22D, and 22E), residency, spring versus fall seasons, and sex of harvested bears. In addition to data gathered at the time of sealing, some brown bear permit hunts exist in Unit 22 that allow managers to gather additional information from subsistence hunters (Management Objective 4) and nonresident hunters. Nonharvest kills such as defense of life and property (DLP) and natural mortalities are also recorded when possible. These data provide insight on nuisance bear interactions and identify communities that would benefit from educational materials and outreach to decrease bear encounters (Management Objectives 5, 6, 7).

Methods

Upon harvest of a brown bear, a hunter is required to bring the skull and hide into an appointed bear sealer in order to get the hide and skull sealed. Appointed bear sealers exist in nearly all Unit 22 villages. Data gathered from sealing includes skull length, skull width, and age. Age is obtained from counting the cementum rings on extracted teeth. Additional data on hunter effort may be gathered from the 2 nonresident drawing permits (DB685 and DB690) that occur in Unit 22. Household surveys from the ADF&G Division of Subsistence are also considered when available.

Results and Discussion

A total of 563 brown bears were harvested at an average of 113 brown bears annually during RY14–RY18 (Table 1). The 3-year mean proportion of males harvested during RY14–RY16 was 63% (n = 201) and was 66% (n = 155) for the remainder of the reporting period (RY17–RY18; Table 1). This suggests that the management goal to maintain the 3-year mean proportion of males harvested at 50% was successfully met.

Regulatory year		Hunte	er kill			Nonhu	nting kill		Total ^a				
(RY) and season	Male	Female	Unknown	Total	Male	Female	Unknown	Total	Male	Female	Unknown	Total	
<u>RY14</u>													
Fall 2014	14	20	1	35	1	2	2	5	16	23	3	42	
Spring 2015	34	17	1	52	0	1	2	3	34	17	2	53	
Total	48	37	2	87	1	3	4	8	49	40	6	95	
RY15													
Fall 2015	28	27	0	55	2	3	2	7	30	30	2	62	
Spring 2016	45	11	0	56	1	0	0	1	46	11	0	57	
Total	73	38	0	111	3	3	2	8	76	41	2	119	
RY16													
Fall 2016	32	27	1	60	0	0	1	1	32	27	2	61	
Spring 2017	42	12	0	54	0	0	0	0	42	12	0	54	
Total	74	39	1	114	0	0	1	1	74	39	2	115	
RY17													
Fall 2017	28	19	0	47	0	1	0	1	28	20	0	48	
Spring 2018	58	22	0	80	1	1	0	2	59	23	0	82	
Total	86	41	0	127	1	2	0	3	87	43	0	130	
RY18													
Fall 2018	18	19	0	37	1	0	0	1	19	19	0	38	
Spring 2019	49	17	0	66	0	0	0	0	49	17	0	66	
Total	67	36	0	103	1	0	0	1	68	36	0	104	

Table 1. Unit 22 brown bear hunting and nonhunting mortality, Alaska, regulatory years 2014–2018.

^a Represents the total known harvest including nonresident permit hunt harvest, defense of life or property (DLP), and other human-caused accidental mortality.

Brown bears are harvested somewhat equally between the fall and spring seasons. An average of 56% (n = 312) of the harvested brown bears were taken during the spring season (April–June), while 45% (n = 251) were taken during the fall months (August–October; Table 1).

The liberalized brown bear regulations that began in RY98 resulted in a 78% increase in brown bear harvest from RY98 to RY18 in Unit 22. During RY90–RY97, harvest was maintained at an average of 55 bears annually, and from RY98–RY18, the average annual harvest rose to 98 bears annually.

During RY14–RY18, an average of 50% of the brown bear harvest in Unit 22 was by local residents that reside within Unit 22 (Table 2). A large portion (39%) of the harvest occurred by nonresidents, followed by nonlocal Alaska residents (11%; Table 2).

Regulatory	Unit 22	e residents	Nonloc resi	al Alaska idents	Nonre	Total	
year	<i>(n)</i>	Percent	(n)	Percent	<i>(n)</i>	Percent	<i>(n)</i>
2014	46		7	7	43	45	96
2015	57	48	15	13	47	40	119
2016	54	47	11	10	49	43	114
2017	75	58	12	9	43	33	130
2018	53	51	16	15	35	34	104

Table 2. Number and residency of Unit 22 successful brown bear hunters, Alaska, regulatory years 2014–2018.

Note: Excludes defense of life and property (DLP) or other nonhunting kills.

Harvest by Hunters-Trappers

Annual harvest in Unit 22 has continued to increase since the regulatory liberalizations of RY98. During RY14–RY18, brown bear harvest averaged 113 bears annually (up 14% from the previous average of 99 bears annually during RY11–RY13). The desire by some local Unit 22 residents to harvest brown bears is high. Many residents believe that brown bears are detrimental to the local ungulate populations and the desire to increase brown bear harvest has been reflected in the adoption of many Board of Game proposals to further liberalize brown bear harvest. These regulatory changes adopted by the board during RY14–RY18 appear to have played a role in increasing brown bear harvest by providing additional opportunity for Nome hunters, particularly with the extension of the Unit 22C spring hunting season.

The largest harvests in Unit 22 occurred in Unit 22A, where 30% (n = 171) of the total harvest was taken during RY14–RY18 (Table 3). This large harvest in Unit 22A is likely due to heavy hunting pressure by guided nonresident hunters. Unit 22B had the next largest harvest, where 25% (n = 141) of the harvest occurred, and Unit 22C, where 24% (n = 137) of the bears were harvested. Harvest levels in Units 22B and 22C are likely a result of access from the road system. The smallest brown bear harvest occurred in Units 22D and 22E, where 14% (n = 80) and 6% (n = 34) of bears were taken, respectively.

Regulatory year (RY)	U	nit 22	2A	U	nit 2	2B	U	nit 22	2C	U	nit 2	2D	U	nit 2	2E		Tota	1
and season	Μ	F	Unk	М	F	Unk	М	F	Unk	М	F	Unk	М	F	Unk	Μ	F	Unk
<u>RY14</u>																		
Fall 2014	4	6	0	5	7	1	4	4	0	2	3	0	1	1	2	16	21	3
Spring 2015	17	6	0	5	2	0	5	6	0	5	2	3	3	2	0	35	18	3
<u>RY15</u>																		
Fall 2015	7	6	2	10	9	0	9	7	0	4	5	0	1	2	0	31	29	2
Spring 2016	18	4	0	7	0	0	10	6	0	7	1	0	3	1	0	45	12	0
<u>RY16</u>																		
Fall 2016	9	7	0	7	4	0	13	7	0	3	8	1	0	1	0	32	27	1
Spring 2017	16	5	0	7	2	0	6	2	0	4	2	0	9	1	0	42	12	0
<u>RY17</u>																		
Fall 2017	9	4	0	6	7	0	6	4	0	6	4	0	1	1	0	28	20	0
Spring 2018	15	4	0	19	6	0	17	10	0	5	3	0	3	0	0	59	23	0
<u>RY18</u>																		
Fall 2018	10	5	0	2	3	0	4	8	0	2	3	0	1	0	0	19	19	0
Spring 2019	15	2	0	24	8	0	5	4	0	4	3	0	1	0	0	49	17	0

 Table 3. Unit 22 brown bear hunter harvest by sex and unit, Alaska, regulatory years 2014–2018.

Note: Excludes defense of life and property (DLP) or other nonhunting kills.

The average age of harvested Unit 22 brown bears during RY14–RY18 was 7-years old. This was the same for both sows and boars during RY14–RY18. The average age of harvested brown bears in Unit 22 has been consistently 7-years old for both RY12–RY13 and the long-term average. The highest average age of harvested brown bears observed during RY14–RY18 was in Unit 22A, where brown bears are mostly harvested during guided nonresident trophy hunts. The harvested males and females in Unit 22A averaged 9-years old. The youngest bears were harvested in Unit 22C, where the average age of a harvested sow was 5-years old, and the average age of a harvested boar was 4-years old. Throughout Unit 22, the age of brown bears ranged from 1-year old for both males and females, to 24-years old for females, and 32-years old for males.

The average skull size (skull length plus skull width) of harvested brown bears during RY14– RY18 was 19.8 inches for sows and 22.1 inches for boars. Since RY12–RY13, the average skull size has increased by 0.8 inches for boars and decreased by 1.4 inches for sows. The smallest average total skull size for sows was 18.2 inches from Unit 22E. The largest sows harvested came from Unit 22A, where the average skull size was 20.0 inches. The smallest average skull size for boars came from Unit 22C, where average skull size was 20.4 inches. The largest skull sizes were harvested in Unit 22A, where average skull size was 22.7 inches. During RY14– RY18 a total of 107 bears (106 males and 1 female) or 19% of the harvest in Unit 22 had skull sizes greater than or equal to 24 inches. This is an increase from RY12–RY13 when 13% of skull sizes from harvested bears were greater than or equal to 24 inches. The total skull length for sows ranged from 15.4 to 24.3 inches, while the total skull length for boars ranged from 15.4 to 27.4 inches.

Season and Bag Limit

RY14–RY18 brown bear hunting season dates and bag limits for Unit 22 are available in Appendix A.

Permit Hunts

Two nonresident drawing permit hunts for brown bears are offered in Unit 22. DB685 is available to nonresidents wishing to hunt brown bear in Units 22B and 22C, and DB690 is open to nonresidents seeking to hunt brown bear in Units 22D and 22E. The bag limit for both hunts is 1 bear per regulatory year. The DB685 season in Unit 22B is open from 1 Aug–31 May and in Unit 22C the season is open during 1 Aug–31 Oct in the fall, and 1 Apr–31 May in the spring. The DB690 permit is open from 1 Aug–31 May. A total of 27 DB685 permits and 21 DB690 permits are available to nonresident hunters annually. These unsubscribed permits are available to nonresident applicants on a first-come, first-serve basis.

In 2016, the board adopted a proposal to increase the number of permits issued through the DB690 hunt from 12 to 21 permits issued annually. In RY16 and RY17 the maximum number of permits were issued, but in RY18 just 13 total permits were issued. This decrease may be due to a change in guiding services in the area that occurred between RY17 and RY18.

An average of 19 DB685 permits were issued annually during RY14–RY18 resulting in an average harvest of 10 bears per year. The sex composition under the DB685 permit was

composed of 62% boars and 38% sows. The average age of harvested sows and boars under the DB685 permit was 8 years. The average skull size of brown bears harvested under the DB685 permit was 19.7 inches for sows and 21.5 inches for boars.

An average of 10 DB690 permits were issued annually during RY14–RY18 resulting in an average harvest of 7 bears per year. Hunting effort appears to be evenly distributed with 54% of permit holders attempting to harvest a brown bear in Unit 22D and 46% attempting to harvest a bear in Unit 22E. Like the DB685 permit, the harvest composition for the DB690 hunt is 62% boars and 38% sows. The average skull size under the DB690 permit, was 19.1 inches for sows and 21.6 inches for boars. The average age for harvested sows under the DB690 permit is 6 years and the average age for harvested boars is 5 years.

In addition to the nonresident drawing permit hunts a resident subsistence registration permit (RB699) is offered annually to residents with the same season and bag limit as the general season brown bear hunts throughout Unit 22. However, this permit is not extensively used by residents, with just 16 total permits issued during RY14–RY18. Of those 16 permits, 6 hunters attempted to harvest a brown bear and 1 hunter successfully harvested a female during RY14–RY18. Few Unit 22 residents actually consume brown bear meat (Georgette and Loon 1981), and considering the RB699 subsistence hunt's salvage requirements, it is unsurprising that few hunters take advantage of the registration hunt permit.

Hunter Residency and Success

During RY14–RY18, 6 hunters obtained an RB699 permit, and 1 hunter successfully harvested a bear which is a success rate of 17%. This is an increase from the 0% success rate of RY12–RY13 from a total of 5 hunters.

A total of 66 hunters attempted to harvest a brown bear using the DB690 permit during RY14– RY18 and 29 hunters harvested a bear at a success rate of 44%. The success rate for the DB690 hunt appears to have increased from the RY12–RY13 when the success rate was 27%. During RY14–RY18, 72 hunters attempted to harvest a brown bear under the DB685 permit and 48 hunters were successful, which is a success rate of 67%. The success rate for the DB685 hunt has remained relatively stable since the RY12–RY13 when the success rate was 64%.

Harvest Chronology

During RY14–RY18, 57% (n = 305) of hunters harvested a brown bear during the spring season and 43% (n = 233) during the fall season. May was the most popular month for brown bear harvest. This is likely due to late-season snow which made it easier to track and hunt by snowmachine. September was the second most popular month for brown bear harvest likely due to incidental harvest by hunters primarily pursuing moose during the RM840 season. With the adoption of the extended spring season in Unit 22C beginning RY17, April became the third highest month of bear harvest in Unit 22. Harvest increased from 6 brown bears in April of RY14 to 30 bears in April of RY18. The extended season in Unit 22C, beginning RY17, quickly became popular for hunters within the unit. In Unit 22C, 58% (n = 15) of bear hunters harvested their bear in April of RY17 compared to 43% (n = 4) in April of RY18. The ideal snow conditions for travel by snowmachine in the winters of RY17 and RY18, paired with the regulatory changes in Units 22B and 22C, appear to have caused exceptionally high harvests in spring of these years. The spring brown bear harvest for all of Unit 22 was an average of 54 bears in RY17 and RY18, a 41% increase from the average of 54 bears during RY14–RY16. Spring harvest rose 300% in Unit 22B from an average of 7 bears annually during RY14–RY16 to an average harvest of 28 bears during RY17–RY18. Spring harvest rose 90% in Unit 22C from an average of 10 bears during RY14–RY16 to an average of 10 bears during RY14–RY16 to an average of 19 bears during RY17–RY18. A peak harvest of 29 bears occurred in Unit 22C during the spring of RY17, which was more than double any previous spring harvest within the unit. Notably, after the high Unit 22C spring harvest of 29 bears in RY17, harvest dropped to just 9 bears in the spring of RY18. The reasoning behind this apparent drop in spring bear harvest is unclear and may be due to a variety of factors. These may include a decrease in hunter effort, decrease in brown bears, or a return to normal harvest levels after the inflation in harvest in RY18 following a regulatory change.

Transport Methods

Transport data may only be gathered from successful hunters and permit holders because the general season brown bear hunt does not require unsuccessful hunters to submit a hunt report. The most popular method of transportation for brown bears hunters during RY14–RY18 was snowmachine (30.6%, n = 172), followed by 14.6% (n = 82) plane, then 14.9% (n = 80) highway vehicle (Table 4).

Table 4. Unit 22 brown bear harvest by transp	port method, Alaska, regulatory ye	ars 2014–
2018.		

Regulatory			All-terrain	Snow-	Off-road	Highway			
year	Airplane	Boat	vehicle	machine	vehicle	vehicle	Foot	Unknown	Total
2014	16	13	14	24	11	9	0	9	96
2015	12	23	19	19	9	25	4	8	119
2016	17	16	21	24	11	21	2	2	114
2017	19	13	11	60	3	15	5	4	130
2018	18	10	10	45	9	10	0	2	104

Snowmachines remain a popular method of transport for brown bear hunters in Unit 22. The lack other big game species to pursue during winter creates a high demand for brown bears when they emerge from their dens in the spring months. Additionally, snow allows for easy detection of den sites and tracks, allowing hunters to find bears with ease.

Other Mortality

During RY14–RY18 a total of 20 brown bears were reported killed by means other than legal harvest during the general season. These other means include defense of life or property (DLP) harvest, agency kills, illegal take, natural mortality, and unknown cause of death. Thirteen DLP kills were reported in RY14–RY18 at an average of 3 per year. DLP harvests occurred at similar rates among Units 22A, 22B, 22C, 22D, and 22E. The number of reported DLP harvests during RY14–RY18 are notably lower than the previous reporting period of RY12–RY13 when 26 DLP

harvested bears were reported at a rate of 13 DLP harvests annually. This apparent decrease in DLP harvest may be due to increased education and outreach, especially in villages and at fish camps. ADF&G biologists strive to visit villages for bear safety talks when staff time allows. Some department staff attended a Wildlife Human Attack Response Training (WHART) class in RY18. This training improves our responses to bear maulings and also our communication between agencies.

Alaska Board of Game Actions and Emergency Orders

Some changes to the Unit 22 brown bear seasons and bag limits occurred during RY14–RY18. In 2014, the Board of Game adopted a proposal, effective RY15, to adjust the bag limit for brown bears in Unit 22C from 1 bear every 4 regulatory years to 1 bear every regulatory year for residents and nonresidents.

Later in 2017 the board adopted 2 new proposals. One of these lengthened the Unit 22C brown bear hunting season with an earlier start of 1 April, a change from the previous start of 1 May. The other increased the Unit 22B resident brown bear bag limit from 1 to 2 bears every regulatory year. A permit allowing the sale of brown bear hides and/or skulls was also approved in units where a bag limit of 2 brown bears per regulatory year exists (Units 22A and 22B). At the 2016 statewide meeting, the board also adopted regulations to increase the number of DB690 permits issued from 12 to 21 permits annually. Finally, tag fee exemptions for residents were reauthorized in RY14 and RY17.

Recommendations for Activity 2.1

Continue.

3. Habitat Assessment-Enhancement

The department did not engage in habitat assessment or enhancement activities for brown bears during RY14–RY18.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Though both moose and muskoxen have only become commonplace in Unit 22 within the past few decades they have rapidly become a highly sought-after resource. Members of the public have expressed hope that reducing brown bear numbers will ultimately increase local populations and harvest opportunity. In addition, the reduction of brown bears is hoped to result in reduced nuisance muskox problems around Nome because muskox groups are suspected to move into residential areas as a consequence of harassment by bears.

Either a brown bear population dynamics project or a genetics project is warranted in Unit 22. For example, outfitting brown bears with very-high frequency (VHF) or Global Positioning System (GPS) radio collars within the unit would have many benefits. Collared bears would help to inform area managers of the status of the Unit 22 population. Monitoring vital rates like birthing and mortality of collared bears may help to assess whether the population is stable, declining, or increasing. Birthing rates may help provide insight on density dependent responses to heavy harvest in Unit 22. Radiocollared bears may also provide valuable movement data to determine the source-sink dynamics of specific units. Moreover, radiocollared bears could supplement the current photographic mark-resight survey in order to obtain more precise estimates of density and abundance. A genetics project can help managers assess the relatedness of bears in Unit 22, especially in conjunction with neonate muskox or moose projects, where it is unclear whether one individual bear is killing most neonates, or if many bears are killing neonates.

Managers lack research-based data to support their management decisions; consequently, many management recommendations to the Board of Game are based on observations and sentiments from the public and from observations ADF&G biologists. Additionally, ADF&G staff have repeatedly heard a desire from the Northern Norton Sound Advisory Committee for a bear research project.

Data Recording and Archiving

Original copies of sealing and DLP forms are sent to the ADF&G office in Anchorage where they are scanned and entered into the WinfoNet bear sealing database.

Carbon copies of DLP and sealing forms are stored in filing cabinets in the Nome office.

Agreements

The department has established a data sharing agreement with the National Park Service in relation to the brown bear abundance survey completed in Unit 22 during 2015 (Appendix B).

Permitting

There were no permits required to conduct brown bear activities in Unit 22 during RY14-RY18.

Conclusions and Management Recommendations

The department continues to hear conflicting testimony from members of the public regarding the perceived number of bears in Unit 22. Some individuals, particularly residents of Nome, feel strongly that the bear population is too large and that the Board of Game should further liberalize hunting seasons within the unit. Many proposals with the intent to increase bag limits, extend open seasons, and increase the number of available nonresident permits have subsequently been adopted this reporting period (RY14–RY18). The effect of these regulatory changes is apparent. Brown bear harvest has increased since RY12–RY13 and many of the highest annual harvests in Unit 22 to date have been observed during RY14–RY18. However, other members of the public believe that the local bear population has been severely reduced and feel that hunting seasons should become more restrictive. It is difficult to respond to concerns regarding whether the local bear population has increased, remained stable, or decreased without meaningful abundance information or major changes in age (from skull size) or composition data.

The realized harvest rates observed throughout the western portion of Unit 22 suggest that brown bears within the unit are being harvested slightly above recommended rates. Additionally, densities estimated from the 1991 and 2015 aerial bear surveys appear similar. No major changes

have been observed in the age data (from teeth) of harvested bears and the harvest composition remains at the desired level of \geq 50% males. All data available appear to indicate that harvest is not causing the Unit 22 brown bear population to decline in a significant way despite the increased harvest opportunity. These indices should continue to be monitored closely to assess any potential effects from recent regulatory actions and with any new regulatory actions that might occur during RY19–RY23. New regulatory changes have the potential to further increase brown bear harvest in Unit 22 to levels that may not be sustainable.

Previous management reports recommended that high brown bear harvest should continue with the intent to allow local moose populations to recover (Hughes 2011, 2015). Both moose and muskoxen in Unit 22 are thought to have high production with >90% of female muskoxen (Schmidt and Gorn 2013) and at least 49% of female moose (Persons 1998) expected to be parturient annually. The effects of these high parturition rates may not be realized in annual population growth due to the predation rates of brown bears on neonates particularly during the first month of life (Gorn 2012). The increased brown bear harvest observed in Unit 22 during RY14–RY18 may be beneficial to local ungulate populations. Recruitment rates for the Unit 22 moose and muskox populations appear to have increased since RY12–RY13 though it is unclear if the increase in recruitment is a direct result of the increased brown bear harvest. Research suggests that the Unit 22 moose population is not limited due to nutritional stress (W. Hansen, Wildlife Research Biologist, and L. Parrett Wildlife Research Coordinator, 2020, unpublished data). Therefore, it is possible that predation by brown bears is preventing the local moose population from recovering to pre-1990 levels.

Education and outreach efforts by Unit 22 staff to increase public knowledge about bear safety, bear behavior, minimizing human-bear conflicts, and proper food storage appears to be effectively reducing negative brown bear encounters and should continue. Electric bear fence installation and maintenance, properly securing drying salmon at fish camps, and other demonstrations should occur opportunistically or as needed in Unit 22 towns and villages. Issues specific to individual communities like illegal harvests or improper salvage of harvested bears should be identified through conversations with the public or wildlife troopers and attempted to be resolved through education efforts.

Ultimately, it appears that the current management strategies implemented for brown bears in Unit 22 should continue. The regulatory changes in Unit 22C that increased the brown bear bag limit to 1 bear every regulatory year and extended the spring season from 1 May to start earlier on 1 April may also be effective at further increasing harvest in an area where complaints about nuisance bears and other bear encounters are common. These changes will ideally continue to provide for an optimum harvest of brown bears while also aid in allowing local ungulate populations to recover.

II. Project Review and RY19–RY23 Plan

Review of Management Direction

MANAGEMENT DIRECTION

The existing management direction and goals for Unit 22 brown bears remain adequate for the sound management of brown bears in the area.

GOALS

No change. The management goal for RY19–RY23 will remain as follows:

- Provide for an optimum harvest of brown bears.
- Maintain a population that sustains a 3-year mean annual reported harvest of at least 50% males.

CODIFIED OBJECTIVES

No change recommended.

Amounts Reasonably Necessary for Subsistence Uses

No change recommended from ANS that was established by the board in 2000.

Intensive Management

No change is anticipated for RY19–RY23.

MANAGEMENT OBJECTIVES

- 1. Monitor the brown bear harvest through field observations, analyses of brown bear sealing data, and interviews with hunters.
- 2. Collect harvest data, determine sex, and extract a tooth for aging from brown bears presented for sealing.
- 3. Obtain estimates of ages of sealed bears by tooth sectioning.
- 4. Summarize registration permit harvest data collected for subsistence hunts.
- 5. Use public education programs and/or increased communication with the public to improve understanding of hunting regulations and the value of conserving brown bear populations, and to obtain better harvest data through increased harvest reporting.
- 6. Educate the public on bear awareness and safety and provide demonstrations of how to use electric bear fences to reduce human-bear problems.
- 7. Communicate and coordinate with residents to reduce human-bear problems, improve understanding of defense of life or property (DLP) situations, and reduce need for DLP kills.
- 8. Complete surveys and data analysis on a brown bear census project with National Park Service (NPS) in Unit 22.

REVIEW OF MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Assess brown bear population trends through field observations, analysis of sealing data, and aerial censuses.

Data Needs

No change from RY14–RY18.

Methods

The department will continue to cooperate with NPS to complete aerial mark-resight brown bear surveys. Future surveys will resemble the methodology as was used in the 2015 survey and outlined in Schmidt et al. (2017) and Robison et al. (2018). Surveys are expected to be completed once every 5 years as weather, budgets, and time constraints allow. The next aerial brown bear survey is tentatively scheduled for spring 2021.

2. Mortality-Harvest Monitoring

ACTIVITY 2.1. Monitor brown bear harvest through sealing records. Monitor skull and age data (from tooth samples taken at the time of sealing) every regulatory year.

Data Needs

The lack of ability to explain the sudden drop in the Unit 22C brown bear harvest in 2018 versus 2017 elucidates the need for harvest data to be supplemented by hunter effort information. At the 2020 Board of Game meeting a proposal was adopted to require a registration permit in Unit 22C with intentions to gather hunter effort data through a questionnaire sent to permit holders at the end of the season. This registration permit has the potential to expand upon sealing data by gathering information on hunter motives, anecdotal sightings of bears and sows with cubs, and other details that would provide insight on brown bear harvest in an area that receives heavy hunting pressure on bears.

Methods

Conduct harvest monitoring using the same methods as RY14–RY18 and continue to consult a biometrician about better ways to analyze data.

3. Habitat Assessment-Enhancement

No change recommended.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

No new issues have been identified.

Data Recording and Archiving

No change from RY14–RY18.

Agreements

If an aerial census for brown bears is conducted in 2021, a data sharing agreement will likely reoccur between NPS and ADF&G. The previous data sharing agreement expired in RY16.

Permitting

No change from RY14–RY18.

References Cited

- Alaska Department of Fish and Game. 1971. Alaska's species management policies: Game division. Division of Game, Juneau.
- Georgette, S., and H. Loon. 1989. Contemporary brown bear use in Northwest Alaska. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 175, Juneau.
- Georgette, S. 2001. Brown bears on the Northern Seward Peninsula, Alaska: Traditional knowledge and subsistence uses in Deering and Shishmaref. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 248, Juneau.
- Gorn, T. S. (*In prep*). Moose management report and plan, Game Management Unit 22: Report period 1 July 2010–30 June 2015, and plan period 1 July 2015–30 June 2020. Alaska Department of Fish and Game, Species Management Report and Plan ADF&G/DWC/SMR&P, Juneau.
- Gorn, T. 2012. Unit 22 moose management report. Pages 534–559 [*In*] P. Harper, editor. Moose management report of survey and inventory activities 1 July 2009–30 June 2011. Alaska Department of Fish and Game, Species Management Report, ADF&G/DWC/SMR-2012-5, Juneau.
- Gorn, T., and W. R. Dunker. 2015. Unit 22 muskox. Chapter 2, pages 2-1 through 2-44 [*In*] P. Harper and L. A. McCarthy, editors. Muskox management report of survey and inventory activities 1 July 2012–30 June 2014. Alaska Department of Fish and Game, Division of Wildlife Conservation, Species Management Report ADF&G/DWC/SMR-2015-2, Juneau.
- Grauvogel, C. 1985. Unit 22 brown/grizzly bear survey-inventory progress report, Pages 52–55
 [*In*] B. Townsend, editor. Annual report of survey-inventory activities 1 January 1984–31
 December 1984: Part V brown/grizzly bear. Alaska Department of Fish and Game, Division of Game, Federal Aid in Wildlife Restoration Job 4.0, Juneau.
- Grauvogel, C. 1986. Annual report of survey-inventory activities 1 January 1985–31 December 1985 Part V – Brown/grizzly bear. Alaska Department of Fish and Game, Division of Game, Federal Aid in Wildlife Restoration Job 4.0, Juneau.
- Hughes, L. 2011. Unit 22 brown bear management report. Pages 267–279 [*In*] P. Harper, editor. Brown bear management report of survey and inventory activities 1 July 2008–30 June 2010. Alaska Department of Fish and Game, Juneau.
- Hughes, L. J. 2015. Unit 22 brown bear. Chapter 23-1 through 23-13 [*In*] P. Harper and L. A. McCarthy, editors. Brown bear management report of survey and inventory activities 1 July 2012–30 June 2014. Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/SMR-2015-1, Juneau.

- Lindberg, M. S., and J. Schmidt. 2007. Monitoring populations of brown bears (*Ursus arctos*) within the Arctic Network Park Units: An evaluation of occupancy models. University of Alaska, Fairbanks.
- Menard, J., J. Soong, J. Bell, L. Neff, and J. M. Leon. 2020. 2018 Annual management report Norton Sound, Port Clarence, and Arctic, Kotzebue areas. Alaska Department of Fish and Game, Fishery Management Report No. 20-05, Anchorage.
- Miller, S. D., E. F. Becker, and W. B. Ballard. 1987. Black and brown bear density estimates using modified capture-recapture techniques in Alaska. Pages 23–35 [*In*] P. Zager, editor. Bears: Their Biology and Management: A Selection of Papers from the 7th International Conference on Bear Research and Management, February and March 1986, Williamsburg, Virginia, USA, and Plitvice Lakes, Yugoslavia. International Association for Bear Research and Management. https://www.bearbiology.org/wp-content/uploads/2017/10/Miller_Becker_Ballard_Vol_7.pdf
- Miller, S. D. 1988. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Management Unit 13. Alaska Department of Fish and Game, Division of Game, Federal Aid Research Final Report 1 July 1986–30 June 1988, Federal Aid in Wildlife Restoration Job 4.21, Juneau.
- Miller, S. D., and R. R. Nelson. 1993. A brown bear density and population estimate for a portion of the Seward Peninsula, Alaska. Alaska Department of Fish and Game, Division of Game, Federal Aid Management Report Supplement December 1993, Federal Aid in Wildlife Restoration Study 4.0, Juneau.
- Pegau, R. E. 1971. Unit 22 brown/grizzly bear survey-inventory progress report. Page 74 [*In*] D. E. McKnight, editor. Annual report of survey-inventory activities 1970: Part II caribou, brown-grizzly bear, sheep, furbearers, marine mammals, bison, goat, wolf, wolverine, and black bear. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration Jobs 3, 4, 6, 7, 8, 9, 12, 14, 15, and 17, Juneau.
- Persons, K. 1998. Unit 22 moose. Pages 378–397 [*In*] M.V. Hicks, editor. Moose management report of survey-inventory activities 1 July 1995–30 June 1997. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid Wildlife Restoration Study 1.0, Juneau.
- Robison, H. L., J. H. Schmidt, K. L. Rattenbury, B. S. Schults, and S. D. Miller. 2018. Protocol for monitoring brown bears: Arctic network (ARKN), version 1.0. Natural Resource Report NPS/AKRO/NRR–2018/1763. National Park Service, Fort Collins, Colorado.
- Schmidt, J. H., and T. S. Gorn. 2013. Possible secondary population-level effects of selective harvest of adult male muskoxen. PLoS ONE 8(6): e67493. https://doi.org/10.1371/journal.pone.0067493
- Schmidt, J. H., K. L. Rattenbury, H. L. Robinson, T. S. Gorn, and B. S. Shults. 2017. Using noninvasive mark-resight and sign occupancy surveys to monitor low-density brown bear populations across large landscapes. Biological Conservation 207:47–54.

Smith, T. E., R. Nelson, and W. B. Ballard. 1990. Demography of Seward Peninsula grizzly bears in relation to human exploitation and reindeer herding. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid Progress Report 1 January 1989–1 January 1990, Juneau.

Appendix A. Unit 22 brown bear seasons and bag limits, regulatory years 2014–2019, Alaska.

Area	Residency	Season	Bag Limit				
Unit 22A, that portion south	Residents	1 Aug–31 May ¹	2 bears every regulatory year by registration permit (RB699)				
of and including the	Residents	1 Aug–31 May	2 bears every regulatory year				
Goisovia River dramage	Nonresidents	1 Aug–31 May	1 bear every regulatory year				
Unit 22A remainder	Residents	1 Aug–15 June ¹	2 bears every regulatory year by registration permit (RB699)				
	Residents	1 Aug–15 June	2 bears every regulatory year				
	Nonresidents	1 Aug–15 June	1 bear every regulatory year				
Unit 22B	Residents	1 Aug–31 May ¹	1 bear every regulatory year by registration permit (RB699)				
	Residents	1 Aug–31 May	2 bears every regulatory year				
	Nonresidents	1 Aug–31 May	1 bear every regulatory year by drawing permit only; up to 27 permits may be issued in combination with 22C (DB685)				
Unit 22C	Residents	1 Aug–31 Oct ¹	1 bear every regulatory year by registration permit (RB699)				
		1 April–31 May ¹					
	Residents	1 Aug–31 Oct	1 bear every regulatory year				
		1 April–31 May					
	Nonresidents	1 Aug–31 Oct	1 bear every 4 regulatory year by drawing permit only; up to 27				
		1 April–31 May	permits maybe issued in combination with Unit 22B (DB685)				
Unit 22D	Residents	1 Aug–31 May ¹	1 bear every regulatory year by registration permit (RB699)				
		1 Aug–31 May	1 bear every regulatory year				
	Nonresidents	1 Aug–31 May	1 bear every regulatory year by drawing permit only; up to 12 permits maybe issued in combination with Unit 22E (DB690)				
Unit 22E	Residents	1 Aug–31 May ¹	1 bear every regulatory year by registration permit (RB699)				
		1 Aug–31 May	1 bear every regulatory year				
	Nonresidents	1 Aug–31 May	1 bear every regulatory year by drawing permit only; up to 12 permits maybe issued in combination with Unit 22D (DB690)				

¹ Subsistence hunt only.

Appendix B. Draft agreement for use of wildlife data for brown bear studies in Unit 22, Alaska.

AGREEMENT FOR USE OF WILDLIFE DATA

BETWEEN

ALASKA DEPARTMENT OF FISH AND GAME (ADF&G) DIVISION OF WILDLIFE CONSERVATION, NOME

AND

NATIONAL PARK SERVICE (NPS) WESTERN ARCTIC NATIONAL PARKLANDS

FOR

GRIZZLY BEAR STUDIES

I. PURPOSE AND OBJECTIVES

The purpose for this agreement is to enable and facilitate completion of a project designed to estimate grizzly bear abundance and occupancy in a portion of Game Management Unit 22 and Bering Land Bridge National Preserve. The project addresses the shared and individual study objectives between the two agencies to gain knowledge of grizzly bears in this area. This agreement defines responsibilities of each agency for project duties as conceived by the parties during planning of the project during Spring 2015. Parties will contribute funds individually and labor cooperatively toward data collection for mutual benefit to all parties. <u>No funds will be transferred or exchanged among cooperators for tasks described in this agreement</u>. Data from this project are expected to provide a better understanding, and thus facilitate better management, of grizzly bears in Unit 22 and Bering Land Bridge National Preserve, including areas previously surveyed by the Department and NPS (Miller and Nelson 1993, Lindberg and Schmidt 2007). No precise, statistical abundance estimate has been produced in the proposed survey area since 1993.

This project builds on previous research projects in Units 22, 23, 24, and 26 in the development of a method for estimating occupancy rates and/or abundance of grizzly bears across large landscapes (Shults and Miller 2012; and NPS unpublished data 2005, 2007, 2008, 2010). Repeated counts of survey units by 2 pilot/observer teams will be used to adjust observed numbers of bears for incomplete detection. Standard occupancy modeling techniques will be used to estimate rates of occupancy, and the data will be assessed for possible utility in estimating grizzly bear abundance within the study area. This agreement continues the highly cooperative and mutually beneficial working relationships between the agencies in Unit 22.

The shared study objectives are to improve design elements of an abundance estimator, and provide data for occupancy modeling for grizzly bear populations in northwestern Alaska. Additional study objectives by NPS include estimating occupancy rates for grizzly bears

throughout the study area, and estimating the number of bears within the study area, if data quantity and quality are adequate.

II. RESPONSIBILITIES OF THE PARTIES

ADF&G shall

- Provide 1 agency aircraft and observer and,
- 1 chartered survey aircraft and observer for two weeks of survey work from May 18-June 5, 2015. The exact start date for all pilot-observer teams will depend on spring snow melt timing.

NPS shall

- Provide 1 agency aircraft and observer and,
- 3 chartered survey aircraft and observers for two weeks of survey work from May 18-June 5, 2015. The exact start date for all pilot-observer teams will depend on spring snow melt timing.
- Compile and distribute data generated during the project
- Provide biometric support for data analyses; expected products include:
 - o A fully developed occupancy model, and,
 - o An abundance and density estimate of independent bears, if appropriate.
- · Prepare a final survey summary report including survey objectives, methods, and results.

Both parties shall

- · Work cooperatively to ensure successful completion of the project
- Retain confidentiality of wildlife location records, in so much as possible, as described in AS 16.05.815 and NPS Management Policies (2006) 4.1.2.

III. PERIOD OF PERFORMANCE

The period of performance of this agreement begins on the date of last signature below and ends on 30 June 2016, unless the study is extended one year, in which instance the period ends on 30 June 2017. The period may be further extended by mutual agreement for peer-reviewed publication of results from data collected in this project (see section V).

All compiled data will be shared in common within 30 days after the conclusion of field work.

Analysis of the data will be completed by 30 June 2016.

The final survey summary report for the project (e. g., final report), not inclusive of any peerreviewed publications, will be completed by 30 July 2016.

IV. DATA, REPORTING, AND DELIVERY STANDARDS

Population survey data/information will be shared in media formats mutually agreeable between agencies.

Preliminary interpretations, analyses, or conclusions (i.e., prior to the final reporting) should be conducted conservatively within the framework of the study design.

News releases and other publicity issued by any party concerning these research results and interpretations, prior to the stated project end date (see section III), are subject to approval by both parties before release by the respective agencies. Any approved publicity shall give due credit to all parties in this agreement. After the period of performance ends, the opportunity for a courtesy review should be offered prior to any news releases or other publicity initiated by any party.

Presentations of preliminary or final results at scientific meetings can be authored by the agencies project cooperators and additional authors as mutually agreeable. Copies of progress and final reports by respective agencies will be submitted to the project cooperators. Final reports should include a courtesy review by project cooperators prior to release, for the opportunity to comment, but final decisions on content and interpretation will rest with agency authors. Manuscripts submitted for peer-reviewed scientific publication may be authored and/or reviewed by the project cooperators, although lack of consensus among cooperators shall not preclude publication. Contributions by all parties will be given due credit in any publications, regardless of authorship. Authorship by Department employees is not assumed, but may occur if project cooperators mutually agree co-authorship is appropriate. Department authorship assumes internal agency review has taken place.

V. MODIFICATION

Amendment or renewal of this data sharing agreement may be proposed at any time during the period of performance by any party and shall become effective only when reduced to writing and signed by all parties.

VI. TERMINATION

Individual agency participation in this agreement may be terminated prior to the period of performance at any time by giving 30 days advance written notice to the other parties. Project property shall be retained by the purchasing agency.

VII. REFERENCES

Miller, S. D. and R. R. Nelson. 1993. A brown bear density and population estimate for a portion of the Seward Peninsula, Alaska. Federal Aid in Wildlife Restoration Management Report.

Lindberg, M. and J. Schmidt. 2007. Monitoring populations of brown bears (*Ursus arctos*) within the Arctic Network Park Units: An evaluation of occupancy models. University of Alaska, Fairbanks.

Shults, B. S. and S. Miller. 2012. Protocol for monitoring brown bear (Ursus arctos) population trends and distributions-Version 1.0. NPS Arctic Network Vital Signs Monitoring Plan.



IX. AGENCY PRINCIPAL INVESTIGATORS/COOPERATORS

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- B. Alaska Department of Fish & Game Tony Gorn
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XI. SIGNATURES

Steve Machida Regional Supervisor Alaska Department of Fish and Game Date

Jim Lawler Manager, Arctic Network Inventory Monitoring National Park Service Date



Alaska Department of Fish and Game

Division of Wildlife Conservation