United States Department of the Interior
KENAI NATIONAL WILDLIFE REFUGE
P.O. Box 2139
Soldotna, Alaska 99669-2139
(907) 262-7021

In reply refer to:
12002ajl

January 12, 2012

RC 39

Mr. Cliff Judkins, Chairman
Alaska Board of Game
Boards Support Section
P.O. Box 115526
Juneau, Alaska 99811-5526
Fax: 907-465-6094

Dear Chairman Judkins:

The Kenai National Wildlife Refuge (Refuge), administered by the U.S. Fish and Wildlife Service (Service), appreciates the opportunity to provide these comments to proposals currently before the Alaska Board of Game (Board) during its January 13-17 Statewide Regulations Cycle B Schedule session.

Proposals 35 & 36

The Refuge previously commented on Proposals 35 & 36 for the Western and Arctic Regions meeting held in Barrow in November 2011. We have reviewed the Feasibility Assessments developed by the Alaska Department of Fish and Game (ADF&G) for implementation of aerial wolf control under the State of Alaska's Intensive Management (IM) program. While we recognize that wolf control activities are currently proposed only for lands lying outside of the Refuge, wildlife populations within the Refuge would be affected, and our concerns relative to predator control under the State IM plans for Units 15A and 15C remain unchanged. We believe that existing scientific information suggests that wolf control is neither justified nor likely to succeed. Further, critical scientific information necessary to understand the interrelated roles of multiple factors influencing moose populations is lacking. This includes information on moose productivity, survivorship, and status of predator (wolves, brown and black bears) populations and habitat conditions (especially winter range). We are concerned also about the potential long-term adverse impacts of wolf control on moose and wolf populations and habitats, and more so in light of this lack of critical information. Lastly, we believe the implementation of aerial wolf control in these units on lands immediately adjacent to the Refuge has the potential to create significant law enforcement issues for the public and the Service due to difficulty of ascertaining land ownership from the air. Please consider our November 3, 2011 letter (attached) as our current position in opposition to these proposals.

Proposal 95

Proposal 95 would allow the use of falconry for taking of small game in several wildlife management areas, including the Skilak Loop Wildlife Management Area (SLWMA). The SLWMA lies within the Refuge. While the Refuge anticipates supporting this proposal, its adoption by the Board would create an inconsistency with the Service's existing management plan for the area (Kenai National Wildlife Refuge Skilak Wildlife Recreation Area Revised Management Plan, May 2007). Addressing this such that the activity could be allowed on the SLWMA would require that the Service undertake an administrative process to formally amend our management plan, which would include coordination with ADF&G. We request that the Board defers a decision on that portion of Proposal 95 that affects the SLWMA to allow for this coordination.

Proposal 258

Proposal 258 would replace the existing limited entry drawing permit hunts for brown bears in Units 7 and 15 with a registration hunt. This proposal was added as an agenda change to the statewide regulations cycle in December 2011 despite it dealing specifically with Units 7 & 15 (Southcentral Region) regulations. The Board considered a similar proposal (Proposal 154, which sought to institute a registration hunt for brown bears in Unit 15) during its March 26-30, 2011, Southcentral Region meeting. ADF&G's final recommendation on this proposal was "Do Not Adopt," and the proposal subsequently "Failed" at the March 2011meeting. It is unclear as to why the Board would consider a similar proposal at the Statewide meeting, outside of the normal cycle for Southcentral Region proposals, only 10 months following this decision.

During the 2010 field season, the Refuge and the U.S. Forest Service cooperated on a DNA-based mark recapture study to estimate the brown bear population on the Refuge and a portion of the Chugach National Forest. Further coordination with ADF&G will occur once data analyses are complete, and we anticipate finalizing a population estimate for brown bears in the study area in 2012. We believe coordination with the ADF&G on the population estimate, and on brown bear harvest management in the context of this new information, will benefit conservation of this important wildlife species. We respectfully request that the BOG take no action on this proposal and defer it to the 2013 Southcentral Region meeting.

Thank you for your time to review our comments on these important issues. The Refuge remains committed to cooperation and coordination with the ADF&G and other federal agencies, and to full public involvement, as we move forward with our shared management responsibilities on the Kenai Peninsula.

Sincerely,

Andy Loranger

Andy Loranger
Refuge Manager
Kenai National Wildlife Refuge

Attachment

United States Department of the Interior
KENAI NATIONAL WILDLIFE REFUGE
P.O. Box 2139
Soldotna, Alaska 99669-2139
(907) 262-7021

In reply refer to:
11067ajl

November 3, 2011

Mr. Cliff Judkins, Chairman
Alaska Board of Game
Boards Support Section
P.O. Box 115526
Juneau, Alaska 99811-5526

Dear Chairman Judkins:

The U.S. Fish and Wildlife Service (Service) thanks the Alaska Board of Game for this opportunity to comment on proposals to be considered during its November 11-14 meeting for the Western and Arctic Regions.

Proposal 35 and 36

The Service is opposed to Proposals 35 and 36, which would establish Intensive Management (IM) plans for Game Management Units (GMU) 15A and 15C. The proposed IM plans state that all lands with GMUs 15A and 15C would be designated as a "Wolf Predation Control Area," within which control of wolf populations would be authorized through: 1) hunting and trapping of wolves by the public under State regulations; 2) same day aerial shooting and land and shooting by the public under State-issued permits; and 3) aerial and land and shooting using any type of aircraft, and ground-based shooting, by agents of the State or department employees. The proposed IM plans establish wolf control objectives to remove 25-40 wolves in GMU 15A and 25-60 wolves in GMU 15C, and retain a minimum of 15 wolves post-control in each unit. The IM plans would be implemented for a five-year period from 2012 to 2017.

Lands within the Kenai National Wildlife Refuge (Kenai NWR) comprise approximately 60 percent of lands in Game Management Unit 15, including approximately 80 percent of all lands in GMU 15A and 30 percent of lands in GMU 15C. Predator control and other management activities proposed under State IM plans cannot be conducted on national wildlife refuges in Alaska unless authorized by the Service.

The Alaska National Interest Lands Conservation Act (ANILCA), the National Wildlife Refuge System Administration Act, as amended, and other laws that apply to administration of all

national wildlife refuges provide the legal framework for administering Alaska refuges. Under ANILCA, legally mandated purposes for the Kenai NWR related to fish and wildlife management include conserving all fish and wildlife species and habitats in their natural diversity, meeting international treaty obligations related to conservation of fish and wildlife, and providing opportunities for wildlife-oriented recreation including hunting, fishing, camping, hiking, and canoeing as long as they are consistent with meeting other refuge purposes.

ANILCA also designated 1.35 million acres of Wilderness within the Kenai NWR, making protection of the Wilderness resource a refuge purpose on those lands. The Service must also implement Title VIII of ANILCA and its provisions for providing subsistence opportunities and a meaningful preference for federally qualified subsistence users on the Kenai NWR. Lastly, the Service must manage all national wildlife refuges so as to conserve biological integrity, biological diversity and environment health. In consideration of its broad range of legal mandates, as well as the available biological information, the Service will not authorize predator control under State IM plans to increase moose populations on the Kenai NWR, including wolf control under Proposals 35 and 36.

The Service also provides the following specific input to the State IM plans for GMUs 15A and 15C.

Most wolves in GMU 15A are found on the Kenai NWR. The Service is opposed to the wolf control objectives of removing 25-40 wolves in this unit. While no scientifically rigorous surveys or studies to determine the population status, productivity and distribution of wolves have been conducted in GMU 15A since the 1990's, reductions of this magnitude on the Kenai NWR within this unit would be considered excessive by the Service based on historic data and the limited available information from a recent spring survey conducted by the Alaska Department of Fish and Game (ADFG). To our knowledge no wolf population surveys or studies whatsoever have been conducted in GMU 15C. The Service is very concerned that updated scientific information on the status, productivity and distribution of wolf populations is insufficient for GMU 15A, and entirely lacking for GMU 15C (such that putting the control objective of removing 25-60 wolves and the minimum post-control population objective of 15 wolves into context in this unit is not possible). Furthermore, we believe these post-control wolf population minimum objectives, if reached through control efforts, could pose a risk to the conservation of this important wildlife resource.

Similarly, little or no scientific information is available on the role of multiple predators (wolves, brown bears, black bears), habitat conditions, disease, weather and highway mortality, or on the complex interactions and relationships between all of these factors, in influencing moose population dynamics on the Kenai Peninsula. Lack of critical baseline information will preclude an adequate quantitative assessment of ecological consequences of predator control (as well as an adequate assessment of the program's effectiveness in meeting its stated objectives).

In the Service's professional opinion, available scientific information calls into question both the need for predator control on the Kenai Peninsula and certainly whether it would be effective in increasing moose populations:

- We concur with the ADFG that habitat is the major factor influencing moose populations on the northern Kenai Peninsula. This relationship has been well documented in the scientific literature, and the recent moose population decline in GMU 15A was predicted in the absence of fire. Forest succession in GMU 15A has proceeded to the point following large wildfires in 1947 (310,000 acres) and 1969 (80,000 acres) such that carrying capacity for moose is significantly less than it was 20-40 years ago when those burns were producing large amounts of high quality wintering habitat. Fires have burned less than 13,000 acres in GMU 15A in the last 42 years.
- Available information suggests that nutritional stress due to habitat conditions is currently adversely affecting moose productivity in GMU 15A through reduced twinning and pregnancy rates. In fact, reported twinning (16%) and pregnancy (73%) rates for moose in GMU 15A are below the IM plan's minimum objective levels (20% and 80%, respectively).
- The moose population in GMU 15C on the southern Kenai Peninsula is currently within the State's IM population objective range, and increased by approximately 29 percent from 1992 to present. Documented ongoing winter mortality in portions of this unit's moose wintering range suggests that this moose population is currently at or near carrying capacity.
- Extremely low bull:cow ratios are a significant conservation concern in both GMUs 15A and 15C. We concur with the ADFG that low bull:cow ratios are the result of excessive annual harvest of yearling bulls and potentially of illegal harvest. New harvest regulations, implemented in 2011, are now in place to improve bull:cow ratios in the short-term and are expected to preclude or reverse negative impacts of a skewed sex ratio on moose productivity over the 2011 and 2012 hunting seasons.
- Significant reductions in the annual harvest of bulls under the new regulations over this 2-year timeframe will add animals to the GMU 15C moose population. Given its current size, harvest reductions would be expected to result in a moose population in GMU 15C near the upper range of the State's IM population objective, without implementation of predator control. An average of 215 bulls per year were previously harvested (2006-2010) in GMU 15C; preliminary harvest data indicates bull harvest was reduced over 90 percent in 2011.

It is worth noting that even if calf and/or adult moose survival increases with predator control, unintended consequences such as damage to wintering habitats due to overbrowsing and more dramatic moose die-offs during severe winters are a distinct possibility.

In closing, the Service believes that there are several opportunities for collaboration with the ADFG and other agencies to address moose conservation issues on the Kenai Peninsula. These include: 1) coordination on long-term harvest management strategies which sustain productive moose populations in balance with available habitat and provide a wider range of opportunity once bull:cow ratios increase; 2) interagency efforts to develop and implement a strategic approach to treat habitats in or near the urban interface which have the dual benefit of protecting communities and enhancing moose habitat, such that we increase opportunities to safely manage backcountry fires for ecological benefits; 3) coordination with transportation agencies and others to reduce moose-vehicle collisions and enhance connectivity for all wildlife; 4) collaborative law enforcement efforts; 5) expanded surveys and studies, including collaborative research into new stressors on moose browse abundance and quality such as exotic insect defoliators. We look forward to these discussions with the ADFG and would welcome the Alaska Board of Game's support of these interagency efforts.

Thank you for this opportunity to provide comments. The Service remains committed to cooperation and coordination with the ADFG and other State and federal agencies, and to full public involvement, as we move forward with our shared management responsibilities on the Kenai Peninsula.

Sincerely,

Andy Loranger

Andy Loranger
Refuge Manager
Kenai National Wildlife Refuge

RC 40

B 4001

STATE O
DEPARTMENT O
333 Raspberry Rd., Anc

REPORT OF ACQUISITION OF FURS AND HIDES

Date _____ 20 ____

BUYER'S NAME _____

BUYER'S LICENSE NUMBER _____

SELLER'S NAME _____

SELLER'S ADDRESS _____

SELLER'S LICENSE NUMBER _____

SPECIES	NUMBER	TAKEN IN GMU	SPECIES	NUMBER	TAKEN IN GMU
1. BEAVER			10. MINK		
2. COYOTE			11. MUSKRAT		
3. FOX, BLUE			12. OTTER, LAND		
4. FOX, WHITE			13. RED, SQUIRREL		
5. FOX, CROSS			14. WEASEL		
6. FOX, RED			15. WOLF		
7. FOX, SILVER			16. WOLVERINE		
8. LYNX			17. BLACK BEAR		
9. MARTEN			18.		

FALSIFICATION OF INFORMATION ON THIS FORM IS PUNISHABLE UNDER AS 11.56.210(a)

I CERTIFY THAT THE INFORMATION PROVIDED HEREIN IS ACCURATE AND TRUE TO THE BEST OF MY KNOWLEDGE

SIGNATURE OF SELLER _____

MAIL THIS COPY TO STATE OF ALASKA, DEPARTMENT OF FISH AND GAME, DIVISION OF WILDLIFE CONSERVATION, INFORMATION SERVICES, 333 RASPBERRY RD., ANCHORAGE, ALASKA 99518-1599 WITHIN 30 DAYS AFTER END OF MONTH SHOWN IN DATE ABOVE.

1-076(11/10)

PRINTED IN JUNEAU BY ALASKA LITHO, INC.

RC41

PROPOSAL 50A

5 AAC 92.050. Required permit hunt conditions and procedures.(a) The following conditions and procedures for permit issuance apply to each permit hunt:

...

(3) the applicant must obtain or apply for an Alaska hunting license before the time of permit application; **before receiving a permit, the permittee shall acknowledge in writing that he or she has read, understands, and will abide by, the conditions specified for the hunt;**

...

(8) a person who has been issued a permit, or that person's proxy under 5 AAC 92.011, shall return the permit harvest report, **with information requested by the department about the hunt,** to the department within the time period **set by the department and** stated on the permit; in addition to other penalties provided by law for failure to report harvest, and except as provided in this paragraph and (c) of this section, if a permittee or the permittee's proxy fails to provide the required report for a drawing permit, registration permit, Tier I subsistence permit, or Tier II subsistence permit, the permittee will be ineligible to be issued a drawing, registration, Tier I subsistence, or Tier II subsistence permit during the following regulatory year; notwithstanding the provisions of this paragraph, the department may determine that, for specific hunts, it is administratively impracticable, to apply the penalty for failure to report;

...

5 AAC 92.052. Discretionary permit hunt conditions and procedures. The department may apply any or all of the following additional conditions to a permit hunt, when necessary for management of the species hunted:

(1) a permittee shall register at a designated station before entering, and upon leaving, the field; except as authorized under AS 16.05.405, a person may not hold more than one permit for the same species in a hunt area at one time;

(2) a permittee shall demonstrate

(A) the ability to identify the species hunted;

(B) the ability to identify the permit hunt area;

(C) a knowledge of weapon safety and use;

(3) a permittee shall attend an orientation course;

[(4) A PERMITTEE SHALL CARRY AN OPERATIVE RADIO WHILE IN THE FIELD;]

(5) a permittee who takes an animal under a permit shall deliver specified biological specimens to a check station or to the nearest department office within a time set by the department; the trophy value of an animal taken under a subsistence permit may be nullified by the department;

[(6) A PERMITTEE MUST BE ACCOMPANIED BY A DEPARTMENT REPRESENTATIVE;]

(7) only a specified number of permittees may hunt during the same time period, and a permittee may hunt only in a specified subdivision within the permit hunt area;

(8) a permittee may not use specified mechanized vehicles for hunting big game or for transporting meat from the hunting area;

(9) a permittee who cancels his or her plan to hunt shall notify the department at an office, and within a time limit, specified by the department;

(10) a permittee may use only weapons and ammunition specified by the department;

[(11) BEFORE RECEIVING A PERMIT, THE PERMITTEE SHALL ACKNOWLEDGE IN WRITING THAT HE OR SHE HAS READ, UNDERSTANDS, AND WILL ABIDE BY, THE CONDITIONS SPECIFIED FOR THE HUNT;]
(12) a permittee may hunt only during specified time periods;
[(13) A PERMIT APPLICANT MUST BE AT LEAST 10 YEARS OLD;]
[(14) A PERMITTEE SHALL SUBMIT, ON A FORM SUPPLIED BY THE DEPARTMENT, INFORMATION REQUESTED BY THE DEPARTMENT ABOUT THE HUNT; THE PERMITTEE SHALL SUBMIT THIS FORM TO THE DEPARTMENT WITHIN THE TIME LIMIT SET BY THE DEPARTMENT;]
(15) the permit applicant must hold a valid Alaska hunting license; however, this does not apply to a resident under the age of 16; an applicant's hunting license number must be entered on the permit application; a resident under the age of 16 shall enter his or her age instead of a license number;
[(16) A HUNTER PARTICIPATING IN A PERMIT HUNT THAT ALLOWS ONLY THE USE OF A BOW AND ARROW MUST HAVE COMPLETED A DEPARTMENT - APPROVED BOWHUNTER EDUCATION COURSE;]
(17) a permittee may take only an animal of a sex specified by the department;
(18) a person with physical disabilities, as defined in AS 16.05.940 , with a special permit to hunt with a motorized vehicle, must be accompanied by another hunter who has a valid hunting license and is capable of assisting the permittee in retrieving game taken by the permittee;
(19) a person may be limited to one big game registration permit at a time in Units 1, 17, 20(E), 22 and 23;
(20) the number of registration permits that may be issued per household for a specified big game hunt may be limited;
(21) the permit hunt area authorized by the Board of Game may be subdivided into smaller permit hunt areas;
(22) a permittee may transfer the permittee's Unit 13 subsistence permit to a resident member of the permittee's family, within the second degree of kinship; a person may not receive remuneration for the transfer of a permit under this paragraph;
(23) except as otherwise provided, if a drawing permit hunt is undersubscribed, surplus permits may be made available at the division of wildlife conservation office responsible for management of the applicable hunt. Surplus permits are not subject to the limitations in 5 AAC 92.050(2) and (4)(F).
(24) a permittee must dispose of parts of game not required to be salvaged as directed by the department;

RC 42

Excerpt from the Ruby AC Meeting Minutes that took place on Wednesday, January 11, 2012 at the Ruby Tribal Office, meeting called to order at 4:47 pm-

Statewide BOG Comment on Proposal 52

Proposal 52 **Action: Support**

Clarify ADF&G discretionary authority to require antler locking tags for certain permit hunts

Discussion: Bootlegging and high grading moose in the Koyukuk CUA area discussed. The Department noted that this practice of issuing locking tags for drawing permit recipients is already being done, but the department submitted this proposal to get things down on paper. The AC agreed with the Department's reasoning on this- that if this was the practice already being done, then it should continue and be official.

Submitted by
ADFG Boards

RC 43

Proposal 131

Effect of the proposal:

Add bears to the Unit 19A Predation Control Implementation Plan

Department Recommendation:

- **Adopt**
- **Advisory Committee recommendations:**
- **CKAC – Adopt**
- **SHAC – Adopt**

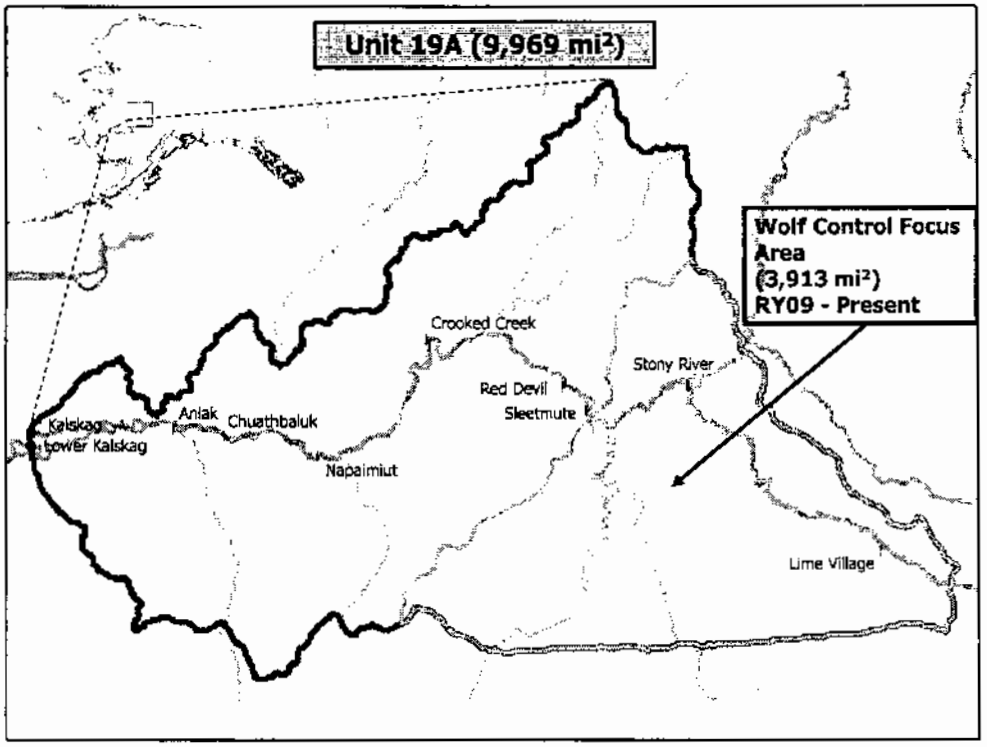
CKMMP

- Board endorsed this plan in spring 2004
- "Research from Unit 19(D)-East suggests that black and brown bear predation is likely a factor that contributes to limiting the moose population" in 19A as well.

Unit 19A Predation control implementation plan dates

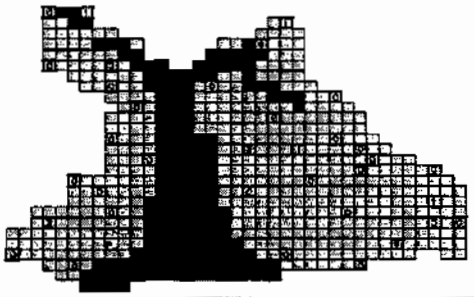
Adopted in 2004, reauthorized in 2009 through June 2014

In 2009, aerial wolf control area restricted to approx. 3,913 mi^2 area to focus effort



Moose density

(3874 mi²)

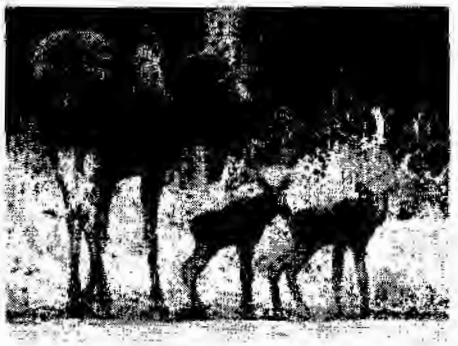


Year	Moose/mi²	90% CI	Range
2005	0.28	± 17%	897–1270
2008	0.44	± 28%	1225–2181
2011	0.25	± 18%	789–1135
2011 w/scf	0.43	± 36%	1066–2266

Spring Twinning Surveys

Small sample sizes

Year	twins	Cows with calves
2007	7	11
2009	3	4
2010	12	19
total	22	34



Combined twinning rate: 65%

2006 browse removal was 10%

Fall moose composition data: Holitna

Year	Bulls: 100 cows	Calves: 100 cows
2005	8	24
2007	35	45
2008	34	27
2009	51	36
2010	48	19
2011	38	31

Fall moose composition data: Holitna vs. McGrath

Avg = 30

Year	Calves: 100 cows
2005	24
2007	45
2008	27
2009	36
2010	19
2011	31

Avg = 55

Year	Calves: 100 cows
2003	56
2004	63
2005	51
2006	58
2007	56
2008	43

UNIT 19A COMPARISION OF POPULATION ESTIMATES AND IM OBJECTIVES

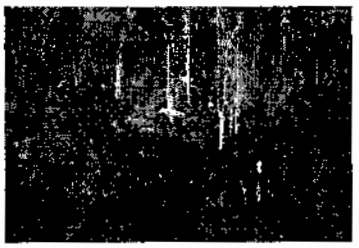
	Population Objective 7,600 – 9,300
	Population Estimate for 19A
Total moose	2,791 - 5,782

UNIT 19A COMPARISION OF POPULATION ESTIMATES AND IM OBJECTIVES

YEAR	Harvest Objective 420 - 530 Reported Harvest for 19A
2010-11	92

Wolf population

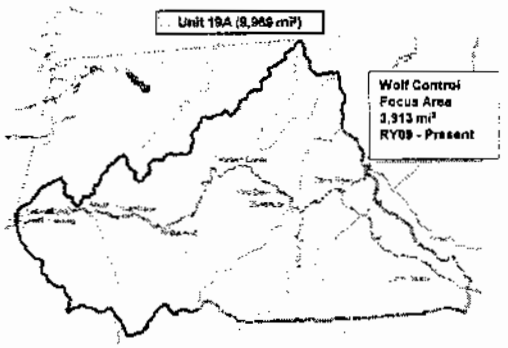
- 2004 estimate was 125 – 150
  - (75 – 100 in wolf control focus area)
- Control objective 30 – 36 unit wide
- Reduce wolf numbers by 60% or more in the focus area



Wolf harvest and wolf control take in Unit 19A, RY01–RY10.

Regulatory Year	Hunting and Trapping Harvest	Wolf Control Take	Total Kill
2001–2002	49	-	49
2002–2003 .	25	-	25
2003–2004	30	-	30
2004–2005	29	43	72
2005–2006	33	47*	80*
2006–2007	3	7	10
2007–2008	10	15	25
2008–2009	11	20	31
2009-2010	10	2	12
2010-2011	4	10	14

* Includes one SDA wolf killed & not recovered.



Regulatory Year	Post season wolf estimate in 19A WCA	% reduction from precontrol estimate of 75-100 in the 19A WCA
2004-05	31 - 56	44 - 59%
2005-06	5 - 7	91 - 95%
2006-07	9 - 10[a]	87 - 91%
2007-08	12	84 - 88%
2008-09	7 - 13[b]	83 - 93%
2009-10	13 – 16[c]	79 – 87%
2010-11	19	75 – 81%

[a] based on average of post season estimate RY05 - RY07
[b] post season estimate based on pilot reports
[c] based on average of RY08 and RY10 post season estimates

Unit 19A Bear Population Sizes

	Population estimate	Population Density (bears/1000mi²)
Black bear	2,475 – 2,970	250 – 300
Grizzly bear	200	20

Unit 19A Black bear harvest

Year	Harvest
2002-03	2
2003-04	2
2004-05	14
2005-06	2
2006-07	8
2007-08	6
2008-09	8
2009-10	15
2010-11	10

5 bear bag limit
Little effect on harvest

Unit 19A Grizzly bear harvest

Year	Harvest
2002-03	8
2003-04	3
2004-05	5
2005-06	6
2006-07	10
2007-08	18
2008-09	11
2009-10	13
2010-11	17

2 bear bag limit
Little effect on harvest

Recap to this point:

- No hunt & Tier II hunts since 2006
- Not meeting IM objectives
- Wolf numbers have been reduced
- Moose population growth is indefinite
- Liberalizing bear regulations has not changed bear harvest

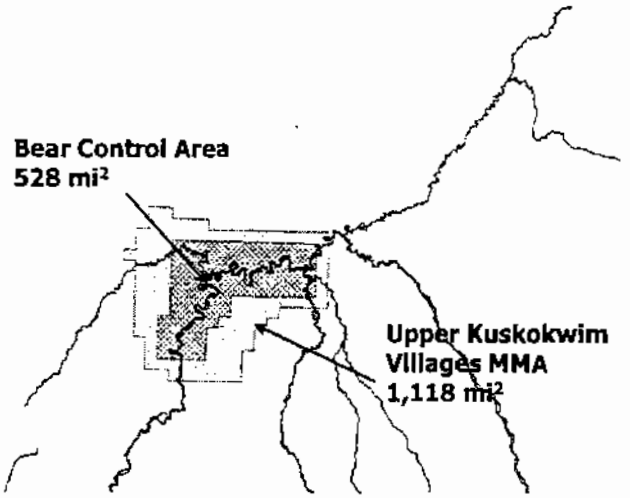
Next step – address bear predation

- McGrath example
- Techniques
- Salvage
- Timeline

McGrath Model

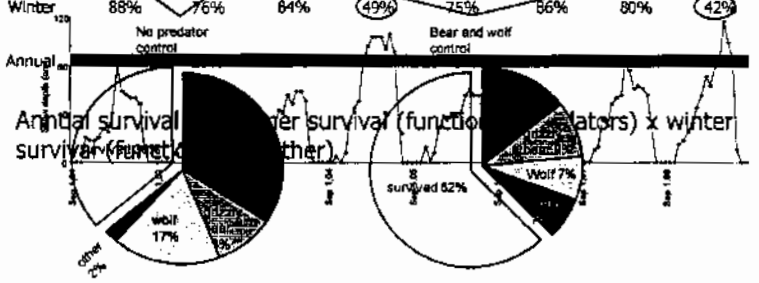
- Keech, M. A., M. S. Lindberg, R. D. Boertje, P. Valkenburg, B. D. Taras, T. A. Boudreau, K. B. Beckmen. 2011. Effects of Predator Treatments, Individual Traits, and Environment on Moose Survival in Alaska. The Journal of Wildlife Management 75(6):1361–1380.

Bear Control Area and Upper Kuskokwim Villages MMA



Survival of McGrath area moose calves

Season	2001	2002	2003	2004	2005	2006	2007	2008	2009
Summer/Fall	37%	36%	62%	79%	54%	73%	45%	54%	55%
Winter	88%	76%	84%	49%	75%	86%	80%	42%	–
Annual									–



Annual survival = summer survival (function of predators) x winter survival (function of other)

Moose population response UKVMMA

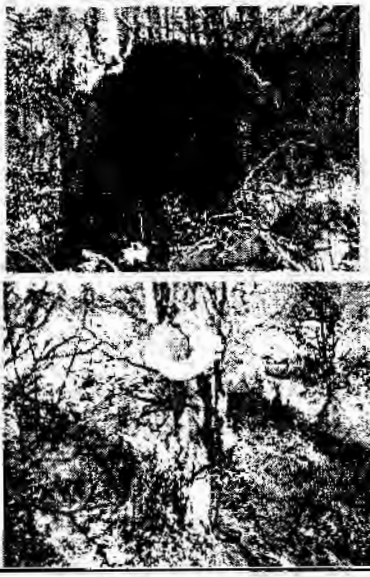
Year	Abundance 90% CI
2001	868(±147)
2002	--
2003	--
2004	1192(±228)
2005	--
2006	1308(±174)
2007	1720(±306)
2008	1718(±352)
2009	1820(±323)
2010	1796(±312)[a]
2011	1648[a]

[a] preliminary data

Techniques to reduce bear numbers

Helicopters

Foot snares



Effectiveness and intensity

- In McGrath, 96% of black bears and 50% of grizzlies were removed
- 85% Aerial capture:
  - 94 black bears; 5 grizzlies
- 15% Foot snares:
  - 5 black bears; 2 grizzlies
- Public bear snaring:
  - Summer 2010: 11 black bears (H: 1 C: 10)
  - Summer 2011: 21 black bears (H: 7 C: 14)
- Reduction of bear numbers on this scale requires aerial methods

What would a Unit 19A bear control program look like?

- Establish Bear Control Area
  - Small enough to remove at least 90% of the black bears and at least 50% of grizzlies
  - Small enough to conduct removal during the short window after hibernation and before leaf emergence
  - Small enough that removal does not threaten the long-term bear population in Unit 19A
    - Proposed BCA is 5% of Unit 19A
  - Large enough to protect enough moose that we get a response

What would a Unit 19A bear control program look like?

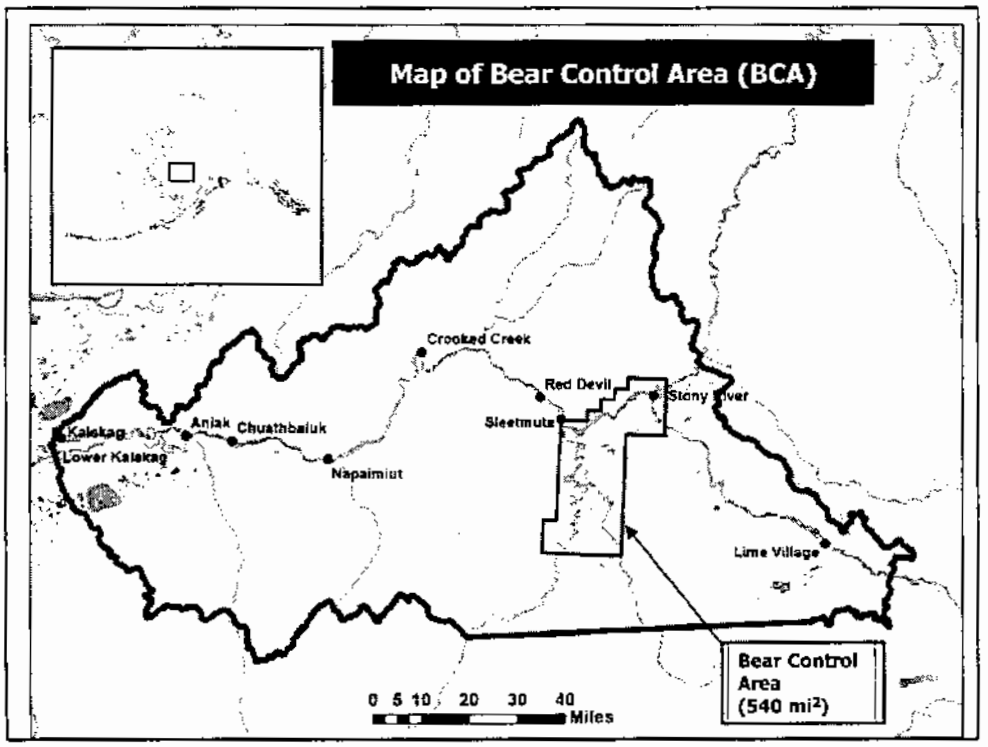
- Establish Bear Control Area
- Department would reduce bear numbers to lowest levels possible w/in BCA
  - Using fixed-wing spotters, and helicopter based gunners
  - Remove black and grizzly bears from BCA, including sows and sows with cubs
  - Use foot snares opportunistically

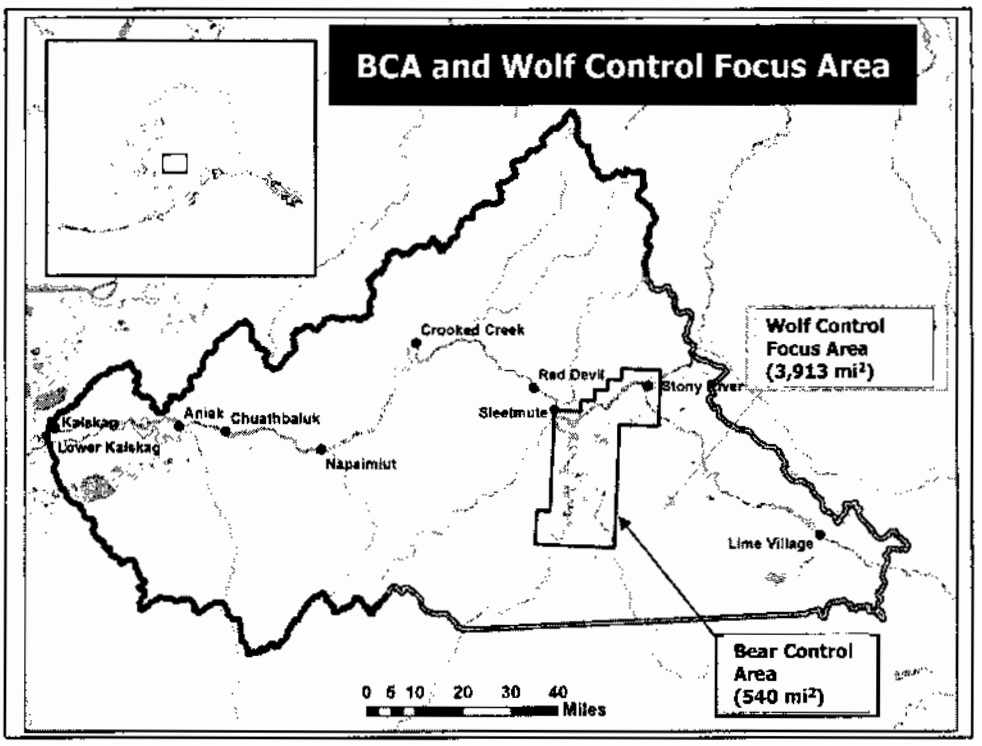
What would a Unit 19A bear control program look like?

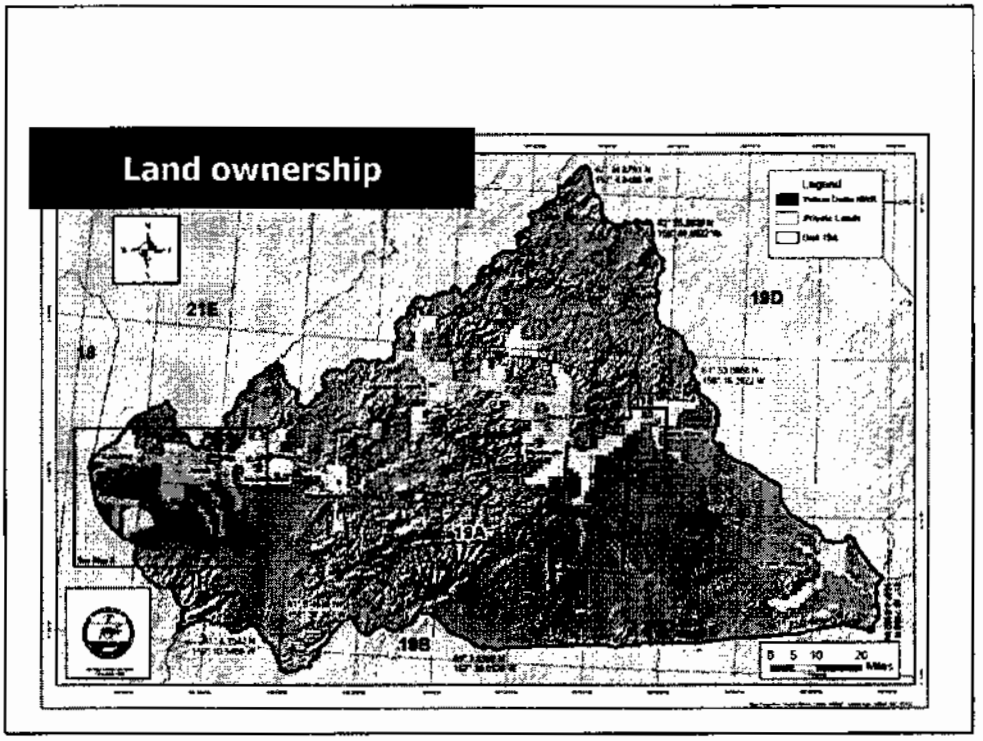
- Establish Bear Control Area
- Department would reduce bear numbers to lowest levels possible w/in BCA
- Would not include translocations
  - Cost – additional 25.0 to 30.0
  - Lack of release sites
  - Local support lacking

What would a Unit 19A bear control program look like?

- Establish Bear Control Area
- Department would reduce bear numbers to lowest levels possible w/in BCA
- Would not include translocations
- Public participation using foot snares
  - Streamline administration
  - March BOG proposal to establish a black bear trapping season in Unit 19A could make this provision unnecessary




BCA and Wolf Control Focus Area
Crooked Creek
Red Devil
Stony River
Sleetmute
Kalskag
Aniak
Chuathbaluk
Lower Kalskag
Napaimiut
Lime Village
Wolf Control Focus Area (3,913 mi²)
Bear Control Area (540 mi²)
0 5 10 20 30 40 Miles


Land ownership
21E
19D
19B
19A
Legend
0 5 10 20 Miles

Salvage

- Hides and skulls
- Meat to satisfy local demand
- Sample collection

Timeline

- Two bear removal events, in consecutive years
- Expedited implementation would allow the first effort in 19A in spring 2012
- Second effort in spring 2013
- If snaring permits are issued, these would continue through 2014
- The entire predation control implementation plan is due for review during spring 2014

Proposal 131 Summary

- **Effect of the proposal:**
  - **Add black and grizzly bears to the Predation Control Implementation Plan for Unit 19A**
- **Department recommendation:**
  - **Adopt**

END

RC 4

OPERATIONAL PLAN FOR INTENSIVE MANAGEMENT OF MUSKOXEN IN GAME MANAGEMENT UNIT 26B, 2012–2018

INTRODUCTION

This operational plan has been prepared by the Alaska Department of Fish and Game (ADF&G) to: 1) provide supporting information for the proposed Intensive Management (IM) plan in 5 AAC 92.125 which authorizes a muskoxen recovery program in Unit 26B during 2012–2018, and 2) provide guidance to staff whose job it will be to implement the recovery program if it is adopted by the Board. Muskoxen are not identified in 5AAC 92.108 as being managed intensively for high levels of harvest, but they are managed to provide hunting and viewing opportunities. Based on the biological and management information for this area, this operational plan describes rationale for evidence of limiting factors; choice of indices for evaluating treatment response; and decision frameworks for predation control and prey harvest strategies.

AREA

Unit 26(B) muskoxen recovery area consists of all lands within Unit 26(B); but does not apply to any National Park Service or National Wildlife Refuge lands unless approved by these federal agencies (Fig. 1).

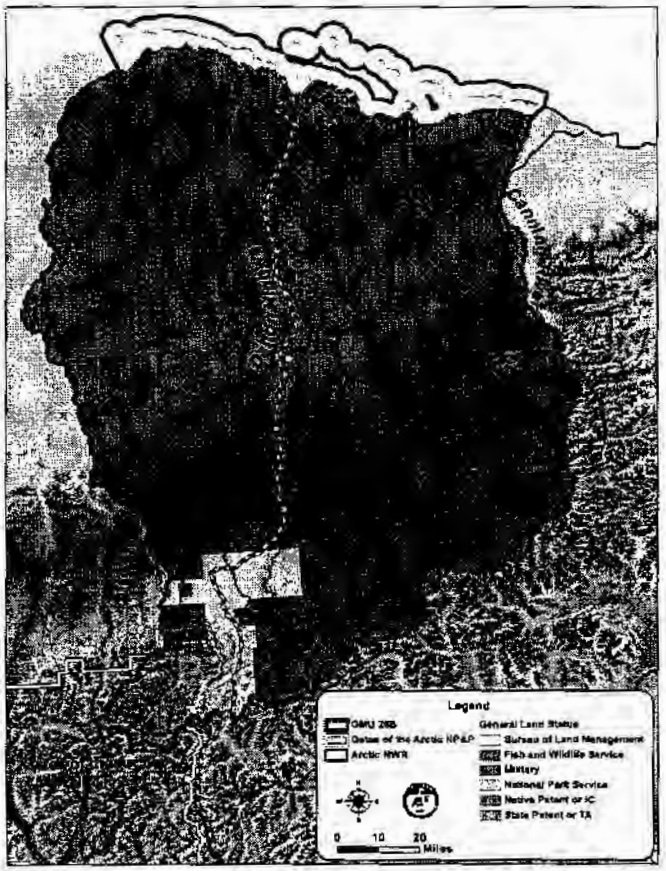


FIGURE 1. Unit 26B muskoxen recovery area.

BACKGROUND

MUSKOXEN POPULATION SIZE

ADF&G reintroduced muskoxen from Nunivak Island to the eastern North Slope when 51 animals were released in 1969 on Barter Island and 13 were released in 1970 at Kavik River. The number of muskoxen increased steadily during the 1970s and 1980s in Unit 26C, and expanded eastward into Yukon, Canada and westward into Unit 26B and eastern Unit 26A during the late 1980s and early 1990s. The population was believed to be stable during the mid-1990s at around 600 muskoxen in Units 26B and 26C with an additional 100 animals in Yukon, Canada (Fig. 2). Beginning in 1999, numbers of calves, yearlings, and adults declined substantially in Unit 26C. During 2004–2008, the number of muskoxen observed in Unit 26C was 1–44 (Reynolds 2008). Muskox numbers in Unit 26B remained stable to slightly increasing from the mid 1990s through 2003 when they reached 302 individuals. The population declined to 216 by 2006, and during 2007–2010, it stabilized at a reduced size of just below 200 muskoxen. ADF&G was concerned about the decline in Unit 26B during 2003– 2006. Furthermore, we recognized that the Unit 26C population essentially disappeared in a relatively short time period and not all of the decline could be attributed to emigration. Therefore, beginning in 2007, ADF&G initiated a research project to 1) estimate annual birth rates for muskox cows, 2) estimate annual calf recruitment through late June, and 3) determine rates and causes of mortality of muskox. Since 2007, research staff has documented that brown bear predation on muskoxen is the primary source of mortality for muskoxen in Unit 26B.

MUSKOXEN HUNTING AND HARVEST HISTORY

Hunting for muskoxen in the eastern North Slope in Alaska has only been allowed by permit. ADF&G first opened a hunting season in Unit 26C in 1982 and in Unit 26B in 1990. Several regulatory scenarios have been in effect since then (Lenart 2003). Beginning in 1992, muskoxen hunting in Unit 26C has been by federal permit. Since 1999, The *North Slope Muskox Harvest Plan* (1999, ADF&G files, Fairbanks) has been the template for managing harvest of muskoxen in Unit 26B. Consistent with that plan, in March 1998, the Board of Game (Board) established an amount necessary for subsistence (ANS) of 20 muskoxen in Unit 26B, west of the Dalton Highway and established a Tier II subsistence permit hunt. The Board also determined an ANS of 4 muskoxen in Unit 26B, east of the Dalton Highway and established a Tier I registration permit hunt for residents only. A resident only drawing permit hunt east of the Dalton Highway was also established and 3 permits were issued annually. The $25 resident muskox tag fee was waived for subsistence hunters in Units 26B and 26C. Beginning in regulatory year 2003–2004, permits to hunt muskoxen were not issued for federal lands in Unit 26C, except in regulatory year 2008–2009 when 1 permit was issued. In regulatory year 2005–2006, ADF&G did not issue permits for the drawing and Tier I registration hunts east of the Dalton Highway in Unit 26B; however, the Tier II subsistence hunt west of the Dalton Highway remained open. Since regulatory year 2009–2010, no permits to hunt muskoxen have been issued for state and federal lands in eastern Unit 26A, Unit 26B, and Unit 26C.

Harvest rates of muskoxen averaged 2% annually (range: <1–4.5%) of the estimated population during 1990–2005 (Table 2). Ninety-three percent of the reported harvest was male muskoxen. It is unlikely that reported harvest caused the recent population decline.

CAUSES OF MORTALITY 2007–2011

Results from the research study conducted during 2007–2011 in Unit 26B indicated 67% of the documented adult cow mortality ($n = 45$) was caused by brown bear predation (Table 1; Arthur, 2007, 2008, 2009, in prep). This represented an average of 6 adult cows annually. Fifty-six percent of the documented adult bull mortality was caused by brown bears ($n = 16$) representing an average of 2 adult bulls annually. Total documented adult muskoxen mortality caused by brown bear predation was 62% ($n = 73$) representing an average of 9 adult muskoxen annually. The remaining documented causes of death for adults included unknown cause (11%), starvation/other non predation (8%), vehicle collision/shot (11%), disease (3%), and drowning (1%). During the same time period, 58% ($n = 45$) of the documented calf mortality was caused by brown bear predation. This resulted in an average of 5 calves annually. The remaining documented causes of death for calves included perinatal (18%), abandoned (11%; often due to a brown bear scattering the group), disease (7%), starvation (2%), vehicle collision (2%), and gored (2%). Over the 5 years, a total 74 calves were classified as "missing"; their fates were unknown and not included in the above calculations.

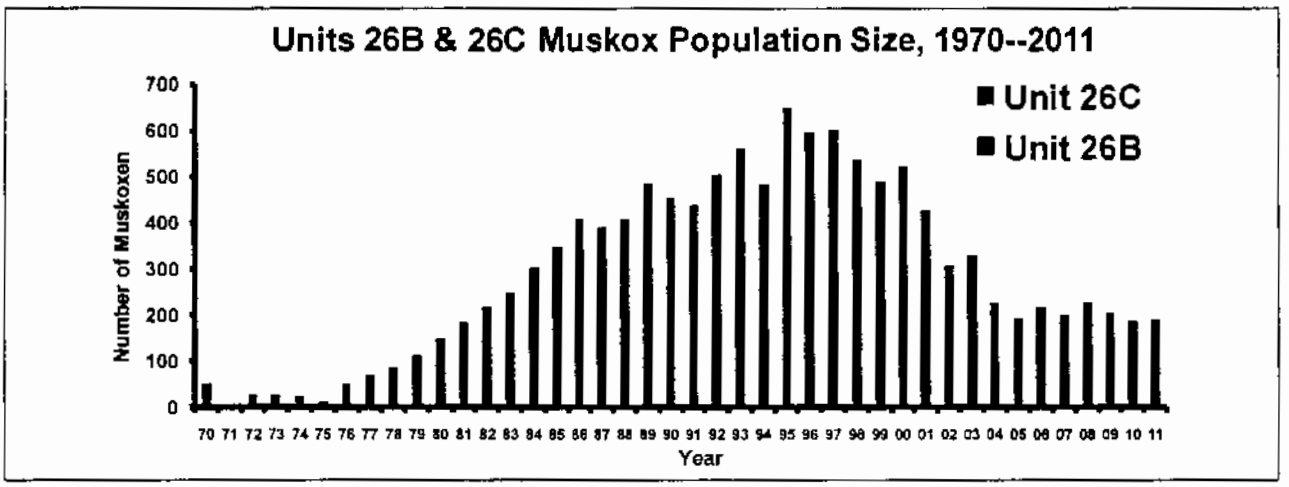


Figure 2. Unit 26B & 26C muskoxen population size, 1970–2011.

Table 1. Causes of muskoxen mortality in Unit 26B, by percent, 2007–2011.

Age/Sex	*Bear*	*Disease*	*Starvation/ non-pred*	*Vehicle/ shot*	*Drown*	*Perinatal*	*Abandoned*	*Gored*	*Unknown*	*n*
Calf	58	7	2	2	0	18	11	2	na	45
Adult cow	67	0	7	13	9	na	na	na	4	45
Adult Bull	56	13	19	13	0	na	na	na	0	16

Total Adults	62	3	8	11	5	na	na	na	11	73

Table 2. Units 26B and 26C muskoxen harvest data by unit, regulatory years 1990–1991 through 2005–2006.

Regulatory year	Unit	Bulls	Cows	Unknown	Total harvest	Estimated Population Size	Harvest Rate
1990–1991	26B	2	0	0	2	122	2%
	26C	8	0	0	8	332	2%
1991–1992	26B	0	0	0	0	156	na
	26C	5	0	0	5	282	2%
1992–1993	26B	0	0	0	0	224	na
	26C	10	0	0	10	283	3.5%
1993–1994	26B	1	0	0	1	237	<1%
	26C	8	0	0	8	326	2%
1994–1995	26B	0	0	0	0	166	na
	26C	9	0	0	9	318	3%
1995–1996	26B	3	0	0	3	330	1%
	26C	8	1[d]	0	9	321	3%
1996–1997	26B	3	0	0	3	266	1%
	26C	12	3[d]	0	15	332	4.5%
1997–1998	26B	3	0	0	3	279	1%
	26C	9	1[d]	0	10	324	3%
1998–1999	26B	9	1	0	10	207	5%
	26C	8	0	0	8	331	2%
1999–2000	26B	3	0	0	3	237	1%
	26C	8	0	0	8	254	3%
2000–2001	26B	13	1	0	14	277	5%
	26C	5	1	0	6	246	2%
2001–2002	26B	9	0	0	9	286	3%
	26C	2	0	0	2	168	1%
2002–2003	26B	4	0	5	9	281	3%
	26C	0	0	0	0	35	na
2003–2004	26B	3	0	0	3	302	1%
	26C	0	0	0	0	29	na
2004–2005	26B	7	1	0	8	198	4%
	26C	0	0	0	0	30	na
2005–2006	26B	2	2	0	4	186	2%
	26C	0	0	0	0	9	na

ADAPTIVE MANAGEMENT FRAMEWORK

TREATMENTS

Predation control

The proposal to selectively remove brown bears that are observed threatening or killing muskoxen, thereby reducing predation, is an experimental approach. It is based on the hypotheses that relatively few individual bears, predominately males, commonly kill muskoxen during late winter and spring and that mortality as a result of predation is mostly additive. Brown bear radiotracking data collected during 1991–2011 indicated that several radiocollared adult males were responsible for multiple predation events in early spring, and a few individuals were observed killing muskoxen over multiple years (R. Shideler, ADF&G unpublished data; Reynolds et al. 2002*a*). In addition, research conducted by ADF&G and Arctic National Wildlife refuge staff indicated that some adult male brown bears that reside near muskoxen herds do not kill muskoxen, especially during periods when caribou are wintering in the area or other natural food is available (Reynolds et al. 2009). This evidence suggests that targeting individual bears may be effective, especially for reducing the incidence of multiple kills in spring, and that most of the documented predation was caused by male bears.

Monitoring Muskoxen. ADF&G will maintain radio collars in as many groups of muskoxen as possible and will intensively monitor them with fixed-wing aircraft and helicopters during early April through mid–May. Monitoring periods will consist of 2–7 day periods of intensive radiotracking of muskoxen groups and will be followed by 2–4 day periods of inactivity. The following procedures will be used during the monitoring period: 1) small fixed-wing aircraft equipped with VHF radiotracking equipment will locate all radiocollared muskoxen groups and search to locate potential groups of muskoxen without radio collars, 2) for each group of muskoxen a GPS location, total count, and composition (adults and calves) will be recorded as well as the presence of brown bears, brown bear tracks, carcasses, and kill sites at or within the vicinity of groups, 3) if a brown bear is detected at or near muskoxen, the Selective Brown Bear Removal Plan will be implemented.

Selective Brown Bear Removal. Selectively targeting bears and lethally removing them would be more effective at quickly and efficiently minimizing predation on muskoxen than would reducing the bear population through liberalized hunting seasons and bag limits or other means that remove random bears. Removing specific individual brown bears that are known or identified predators of muskoxen as soon as they are detected is necessary to have an immediate effect of reducing predation on muskoxen. ADF&G staff anticipates that fewer than 20 bears may need to be removed annually during the control program.

The preferred option for conducting selective brown bear removal is by shooting from a helicopter. In the event that a helicopter is not available, brown bears may be removed by landing in fixed-wing aircraft and shooting from the ground. All of brown bears identified as threatening or killing muskoxen will be removed, regardless of sex or age.

The following procedures will be used to lethally remove brown bears: 1) shooting from a large caliber rifle or shotgun slug from a helicopter in accordance with Animal Care and Use Committee (ACUC)

protocol and 2) shooting with a large caliber rifle from the ground after landing with fixed-wing aircraft or helicopter in accordance with ACUC protocol.

Habitat enhancement

No habitat enhancement is being considered because the habitat appears capable of supporting a larger muskoxen population. Adult female productivity and body condition was used as an index of habitat quality. Data collected during 2007–2011 indicating captured muskoxen were generally in good condition, and birth rates were sufficient to provide for population growth, if survival had been higher. The minimum estimated birth rate averaged 65 calves per100 mature cows (n= 52 calves, n= 82 mature cows). It was based on the number of 3 year old or greater cows observed during the April composition surveys and the number of calves observed between April and the end of June. Some calves may not have been observed; thus, this is a minimum estimated birth rate.

However, it is possible that habitat limitations may have been obscured by high mortality due to predation. An imbalance of trace minerals (particularly low copper and selenium with elevated concentrations of zinc and iron) was detected in some muskoxen tissues. This imbalance can negatively affect immune systems and make muskoxen more susceptible to diseases and potentially more vulnerable to predation. However, we have not observed any indication of a negative effect on the population. Also, some diseases and parasites were detected, but mortality attributed to this cause was only 3% of adults found dead. Deep snow and icing events may also result in lower survival and less successful reproduction of muskoxen (Reynolds et al 2002*a;*2002*b)*.

Prey harvest

Hunting seasons for Unit 26B muskoxen will remain closed during brown bear removal. Hunting will not resume until the population has reached at least 300 animals ≥ 1 year old during April surveys, and other criteria for establishing a harvestable surplus have been met. Most likely hunting will initially occur under a Tier II permit system.

ANTICIPATED RESPONSES TO TREATMENTS

Predator abundance

The objective of this treatment is to selectively remove individual bears, not substantially reduce the brown bear population size. The brown bear population objective for Unit 26(B) is to maintain the current estimated population of 200–320 (midpoint 265 bears, based on 2003 estimate) while annually removing up to 20 brown bears identified as threatening or killing muskoxen. Limiting the number of bears removed will assure that human-caused mortality of brown bears are managed within sustained yield principles and will assure long-term brown bear hunting and viewing opportunities in the treatment area.

The removal objective for brown bears in Unit 26B is to maintain a 3-year mean annual human-caused mortality of ≤8% of bears ≥2 years old, with no more than 40% females (21 bears; 8 females). This

includes human-caused mortality from all sources. To achieve this objective, the hunting season may be adjusted or closed by emergency order.

Predation Rate

The rate of predation is expected to be reduced following removal of brown bears.

Prey Abundance

Results from aerial surveys and radiotracking indicate that the number of yearling muskoxen being recruited annually approximately equaled the number of adult muskoxen >1 year old dying annually. If survival rates of either adults, yearlings, or calves increase, the muskoxen population is expected to increase. Estimating population growth rate as a result of the selective removal treatment is difficult. However, during 1987–1995, the annual rate of increase for the population was 7%. This growth rate may reasonably represent the population growth potential if bear predation is reduced and habitat is not limiting. Under this scenario, it would take approximately 7 years for the muskoxen population to increase from 190 ≥ 1 year old (the 2011 estimated population size) to 300 ≥ 1 year old. If the muskoxen population reaches 300, a hunt could be established for the harvestable surplus.

Prey Recruitment

Following predator control treatments, an increase in adult, yearling, and calf survival will be reflected in the total number of muskoxen counted annually in April. Because annual survival of adults is more stable than calves, a change in population size would most likely be the result of increased or decreased calf survival and yearling recruitment. Composition surveys conducted annually in April will be used as an index of yearling recruitment.

Prey Productivity or Nutritional Condition

During 2007–2011, muskoxen in Unit 26B were producing calves at a rate comparable to other muskoxen populations that were considered to be increasing (Reynolds et al. 2002*b*, Larter and Nagy 1999), therefore, poor nutrition was not considered to be a primary limiting factor. During 2007–2011, an estimated minimum birth rate was determined based on the number of 3-year-old or older females observed during the April composition surveys and the minimum number of calves observed during calving between April and the end of June. The birth rate averaged 65 calves per 100 mature cows (n= 52 calves, n= 82 mature cows). (Table 4 this document; Arthur, 2007, 2008, 2009, in prep).

Harvest

The harvest objective is 3–9 muskoxen annually, once the population reaches 300 muskoxen ≥1 year old and a harvestable surplus is available.

Use of Nontreatment Comparisons

There will be no nontreatment comparisons of muskox predation by bears outside the treated area. A single group of muskoxen occupies eastern Unit 26A and sometimes joins the groups in Unit 26B, and a few animals move between Alaska and Yukon in eastern Unit 26C. The closest non-treatment group in Alaska is on the Seward Peninsula (Unit 22).

Table 3. Yearling:100 cows>2 years old ratio for muskoxen in Unit 26B during April 2007–2011.

Location Year	Date	Muskoxen classified (no. cows >2 yr)	Yearling: 100 cows>2 yr (no. yearling)
2007	Apr 13	153 (73)	16 (12)
2008	Apr 21	165 (79)	18 (14)
2009	Apr 14–15	174 (82)	39 (32)
2010	Apr 15–16	187 (88)	35 (31)
2011	Apr 14–15	171 (84)	37 (33)

Table 4. Minimum estimated birth rates, 2007-2011.

Year	No. Cows	No. calves	Calves:100 cows
2007	77	35	45
2008	80	64	82
2009	82	56	72
2010	88	50	59
2011	84	55	67

EVALUATION CRITERIA AND STUDY DESIGN TO DOCUMENT TREATMENT RESPONSE

Adaptive management with the intent to increase harvestable surplus of prey requires evaluating the biological response and achievable harvest after treatments are implemented. Evaluation will be reported to the Board on 1 February each year with an interim update of selected criteria on 1 August each year.

Predator Abundance and Potential for Recovery

Brown bears removed as part of the selective removal program are not expected to reduce the size of estimated population (200–320, midpoint 265 bears, based on 2003 estimate) in Unit 26B. The total removal rates will not exceed 8% of the population (20 brown bears) and are sustainable. Localized areas around muskoxen groups may experience decreased abundance due to selective removal. In these areas, recovery may occur quickly as a result of immigration.

Habitat

No habitat surveys will be conducted.

Prey Abundance, Herd Composition, and Nutritional Condition

The population will be estimated annually by radiotracking and searching for groups of muskoxen during the first 2 weeks of April. Composition surveys will be conducted during mid-April and muskoxen will be classified as newborn calves, yearlings, 2 year old bulls and cows, 3 year old bulls and cows, and adult bulls and cows. The ratio of yearlings per 100 cows >2 years old will be determined to estimate yearling recruitment. The number of adult bulls and cows will be monitored to aid in determining adult mortality.

Prey Harvest

No harvest will occur until the population has grown to 300 muskoxen ≥1 year old and the population growth rate is sufficient to indicate that it can support a harvest.

DECISION FRAMEWORK TO IMPLEMENT OR SUSPEND A TREATMENT

Predation Control

Predator control will be implemented on 15 March 2012. The program will be reviewed and modified or suspended if there is no evidence of improved survival or a detectable increase in the Unit 26B muskoxen population following 3 years of bear removal.

Habitat Enhancement

No habitat enhancement will be conducted.

Prey Harvest Strategy

Muskoxen will be harvested when the population reaches at least 300 muskoxen ≥1year old and a harvestable surplus is established. If the Board retains the same hunting regulations that were in effect when permits were last issued, hunting would likely be initiated as a Tier II hunt

PUBLIC INVOLVEMENT

Public involvement will include:

1. Outreach via fish and game advisory committee and Board of Game processes.
2. Continued engagement with the public to review and confirm criteria chosen for evaluating success.
3. Participation in prey and predator harvest through standard hunting seasons and bag limits.
4. Monitoring and mitigation of hunter concerns that may occur because ADF&G removes all of the brown bear harvestable surplus as part of the recovery program and the bear hunting season is shortened or closed.

OTHER CONSIDERATIONS

Liberalized Brown Bear Seasons

The Board liberalized brown bear seasons in Unit 26B in regulatory years 2010 and 2011 as a management action to reduce predation. Although seasons were liberalized, hunters were still restricted within the Dalton Highway Management Corridor (DHMC, extending 5 miles either side of the Dalton Highway) to using a bow and arrow only and to no use of a motorized vehicles except boats. These regulations remained in place as required by statutes AS 16.05.789 and AS 19.40. Most of the current population of muskoxen in Unit 26B occurs within the DHCMA and the Prudhoe Bay Closed Area. In regulatory year 2010–2011, the Board opened the fall hunting season 15 days earlier in August, eliminated the requirement for a drawing permit for residents within the Dalton Highway Management Corridor, and issued all unused nonresident drawing permits on a first-come, first-served basis. A total of 28 bears were harvested in that year (2 were taken illegally by nonresidents). Of the 28 bears, 18 were males, 10 females. Twenty-seven were harvested in the fall 2010 (including 2 illegal), and 1 was taken in late spring 2011. Following the harvest of 27 bears in the fall, department staff documented 10 adult muskoxen and 9 calves that were killed by brown bears in April and May 2011. This indicated that predation continued to occur despite the increased harvest. However, 1 brown bear known to have killed muskoxen was harvested in late May 2011. Beginning March 2011, the Board opened a resident and nonresident registration hunt in a portion of Unit 26B (surrounding muskox groups) with no closed season. The remainder of Unit 26B, where nonresidents were required to have a drawing permit, opened 1 September. The registration hunt was put into effect to focus bear hunters near groups of muskoxen. In fall 2011, 23 bears were harvested (including 1 DLP) in Unit 26B (15 males, 8 females). One was a radiocollared bear known to have killed at least 5 muskoxen. In regulatory years 2008–2009 and 2009–2010, when the season opened 25 August and residents were required to have a drawing permit within the DHMCA, and all nonresidents were required to have a drawing permit, 18 (including 1 illegal) and 23 bears were killed respectively.

Liberalizing the bear season is not the optimal management technique for reducing bear predation on muskoxen because it is nonselective and results in the random removal of bears. Although target bears may be taken by chance, the effects of 2 years of liberalized seasons were inconclusive. In addition, if the bear population was reduced, brown bear hunting opportunity would also be reduced for several years. In fall 2011, 437 hunters obtained a registration permit for the brown bear hunt in Unit 26B. Preliminary data indicated that of the 437 permits issued, 267 hunters returned reports, resulting in 153 who hunted and 114 who did not hunt. These numbers indicate a strong interest in brown bear hunting in Unit 26B. Most of this hunting occurs opportunistically by caribou and sheep hunters who are already in the field. However, hunters did have to make an effort to obtain a registration permit, thereby indicating their interest in the hunt.

Relocating Bears

Relocation of bears is an alternative to lethal removal that would directly target bears identified as threatening or killing muskoxen. Department staff would immobilize bears from a helicopter and relocate

them to prevent them from returning to the area until after the critical time period during 15 April–15 June. Some challenges include 1) maintaining the welfare of bears during transport, 2) logistics of transporting bears, and 3) locating suitable drop-off sites. If bears are relocated a long distance from Unit 26B, it is possible that bears will not return to the area. However, past bear relocation projects conducted by the Department have demonstrated that some relocated bears, predominately adult males, return to the area from which they were removed. Bears that return to the area may need to be removed the following spring if they begin predating on muskoxen. Similar to the lethal removal program, this program would take place during April and May. However, it would incur substantially higher costs than lethal removal.

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APPENDIX A. Summary of supporting information.

Geographic area and land status	
Management area(s)	Unit 26B state, private, and BLM lands – see Figure 1
Land status	Most of Unit 26(B) is state land; the landownership pattern is 69% state, 29% federal, and 2% private; of the 29% federal lands, 12% is Bureau of Land Management, and these lands are available for bear control; total land available for bear control is 72–74% of the unit. See Figure 1
Biological and management situation	
Prey population	The management objectives is to increase the Unit 26B muskoxen population to at least 300 muskoxen ≥1 year old by reducing brown bear predation on muskoxen in Unit 26B.
Prey harvest	When the muskox population has reached 300 muskoxen ≥1 year old, establish a harvestable surplus. In 1989, a positive C&T finding was established and Amounts Reasonably Necessary for Subsistence were established in 1998 and are 4 in Unit 26B, for that portion east of the Dalton Higway and 20 in Unit 26A and Unit 26B for that portion west of the Dalton Highway Corridor Management Area (DHCMA).
Feasibility of access for harvest	During winter and spring, Unit 26B is accessible via snowmachines outside the DHCMA, skis and foot in the DHCMA. During fall, in is accessible by boat, airplane, or foot.
Nutritional condition	During 2007–2011, the habitat appeared capable of supporting a larger muskoxen population; captured muskoxen were generally in good condition, and birth rates were sufficient to provide for population growth, but growth was not realized because of poor survival. It is possible that habitat limitations may have been obscured by high mortality due to predation. An imbalance of trace minerals (particularly low copper and selenium with elevated concentrations of zinc and iron) was detected in some muskoxen tissues. This imbalance can negatively affect immune systems and make muskoxen more susceptible to diseases and potentially more vulnerable to predation. However, we have not observed any indication of a negative effect on the population. Also, some diseases and parasites were detected, but mortality attributed to this cause was only 3% of adults found dead. Deep snow and icing events may also result in lower survival and less successful reproduction of muskoxen (Reynolds et al

	2002*a*;2002*b*).
Habitat status and enhancement potential	See nutritional condition section above for information on habitat status. No habitat enhancement is planned.
Predator(s) abundance	200–320 (midpoint 265) brown bears in Unit 26B
Predator(s) harvest	Regulatory Year 2008–2009 = 23 (15 males, 8 females) Regulatory Year 2009–20010 =17 (14 males; 3 females) Regulatory Year 2010–2011=28 (18 male, 10 female) includes 2 illegal
Evidence of predation effects	See Arthur, in prep.
Feasibility of predation control	Selective, lethal removal of brown bears by department personnel using aircraft is expected to result in increased muskoxen survival.
Other mortality	Late winter storms contribute to mortality of calves, yearlings, and adults. Some muskoxen were also killed by vehicles on the Dalton Highway. Other causes of death that were observed include disease, winter malnutrition, and falling through thin ice on lakes and rivers.