

**Annual Report to the Alaska Board of Game
on Recovery of Muskoxen
with Brown Bear Predation Control
in Game Management Unit 26B**

**Prepared by the Division of Wildlife Conservation
February 2018**



1) Description of Recovery Program and Department recommendation for reporting period

- A) This report is the final annual evaluation for a recovery program authorized by the Alaska Board of Game (Board) under 5 AAC 92.126. This program was implemented in April 2012.**
- B) Month this report was submitted by the Department to the Board:**
February (annual report) Year 2018
- C) Program name: Unit 26B Muskoxen Recovery Program**
- D) Existing program has an associated Operational Plan: Operational Plan for recovery of muskoxen in game management unit 26B, 2012–2018 , version 2, January 13, 2012.**
- E) Game Management Unit fully or partly included in recovery area: Unit 26B**
- F) Objectives for muskoxen: population size 300 muskoxen that are ≥ 1 year old in April surveys harvest 3–9 muskoxen annually, once the population reaches 300 muskoxen**
- G) Month and year the current recovery program was originally authorized by the Board: January 2012. Indicate date(s) if renewed: Not renewed**
- H) Predation control is currently inactive in this recovery area.**
- I) If active, month and year the current recovery program began: April 2012**
- J) A habitat management program funded by the Department or from other sources is currently active in this recovery area: No.**
- K) Size of recovery program area (square miles) and geographic description: 15,330 mi², including all lands within Unit 26B; except bear control will not occur on National Park Service or National Wildlife Refuge lands unless approved by these federal agencies (Figure 1).**

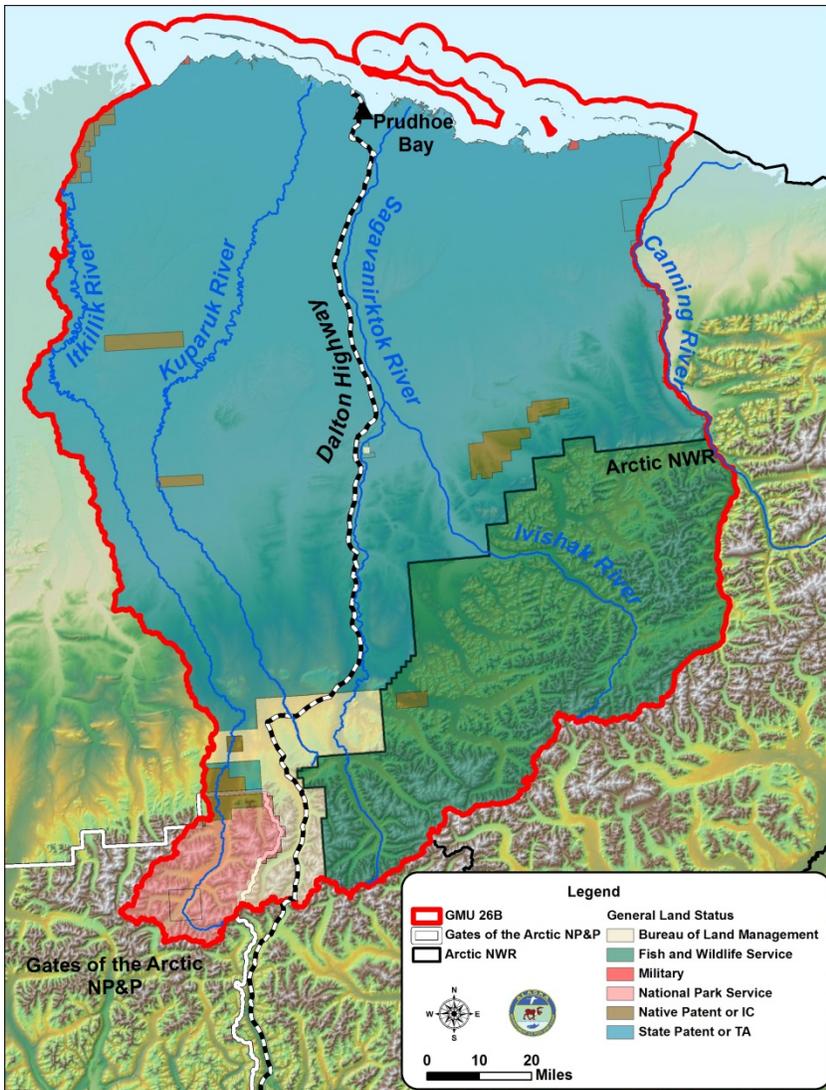


Figure 1. Unit 26B muskoxen recovery area.

- L) Size and geographic description of area for assessing muskoxen abundance:** approximately 24,000 mi², including all of Unit 26B, the portion of Unit 26A from the eastern boundary to Ikpikuk River, and the portion of Unit 26C from the western boundary to the Hulahula River.
- M) Size and geographic description of area for muskoxen harvest reporting:** 15,330 mi², including all of Unit 26B; currently no open season.
- N) Size and geographic description of area for assessing predator abundance:** 15,330 mi², including all of Unit 26B.
- O) Size and geographic description of recovery area:** See K.

- P) Criteria for evaluating progress toward objectives:** Number of muskoxen ≥ 1 year old in April population estimate; Ratio of yearlings per 100 cows > 2 years old in April composition survey.
- Q) Criteria for success with this program:** 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.
- R) Department recommendation for recovery program in this reporting period:** Suspend (details provided in section 5)

2) Prey data

Date(s) and method of most recent abundance assessment for muskoxen: April 20, 2017; conducted aerial survey using radiocollared animals to facilitate locating groups of muskoxen.

Compared to recovery area, was a similar trend and magnitude of difference in abundance observed in nearby non-treatment area(s) since program inception and in the last year: No non-treatment area established.

Date(s) of most recent age and sex composition survey: April 23, 2015; located groups of muskoxen by radiotracking from a fixed-wing aircraft or helicopter, then classified animals from the ground as ≥ 4 years old, 3 years old, 2 years old, yearling, and as male or female.

Compared to recovery area, was a similar composition trend and magnitude of difference in composition observed in nearby non-treatment area(s) since program inception and in the last year: No non-treatment area established.

Table 1. Muskoxen abundance, age and sex composition in assessment area that includes all of Unit 26B, the portion of Unit 26A from the eastern boundary to Ikpikpuk River, and the portion of Unit 26C from the western boundary to the Hulahula River beginning in year 1 of the recovery program. Regulatory year is 1 July to 30 June (e.g., RY 2011 is 1 July 2011 to 30 June 2012).

Period	RY	Abundance (variation)	Composition (number per 100 females)			
			Young	Yearlings:100 cows > 2 yrs	Adult Males > 3 yrs:100 cows > 2 yrs	Total <i>n</i>
Year 1	2011	191	--	32:100	42:100	175
Year 2	2012	197	--	40:100	46:100	190
Year 3	2013	181	--	17:100	30:100	173
Year 4	2014	198	--	22:100	43:100	159
Year 5	2015	228	--	--	--	--
Year 6	2016	218	--	--	--	--

Describe trend in abundance or composition: stable.

Table 2. Muskoxen harvest in Unit 26B beginning in year 1 of the recovery program. Methods for estimating unreported harvest are described in Survey and Inventory reports. Regulatory year is 1 July to 30 June (e.g, RY 2011 is 1 July 2011 to 30 June 2012).

Period	RY	Reported		Estimated		Total harvest	Other mortality ^a	Total
		Male	Female	Unreported	Illegal			
Year 1	2011	0	0	0	0	0	2	2
Year 2	2012	0	0	0	0	0	23 ^b	23
Year 3	2013	0	0	0	0	0	1	1
Year 4	2014	0	0	0	0	0	2	2
Year 5	2015	0	0	0	0	0	--	--
Year 6	2016	0	0	0	0	0	--	--

^aVehicle mortality, Defense of Life and Property, Mortuary, etc.

^bDrowning event in early winter 2012; 20 muskoxen fell through ice and drowned.

Describe trend in harvest: Not Applicable

Describe any other harvest related trend if appropriate: Not Applicable

3) Predator data

Date and method of most recent spring abundance assessment for brown bears: Spring 2017. During 2000–2003, a population estimate was determined using the double-count line transect method; data were re-analyzed in 2016 using more sophisticated statistics and the population was estimated at 333 bears

Other research or evidence of trend or abundance status in brown bears: June 2003; double-count line transect population estimate method:

BECKER, E. F, AND P. X. QUANG. 2009. A gamma-shaped detection function for line-transect surveys with mark-recapture and covariate data. Journal of Agricultural, Biological and Environmental Statistics 14(2): 207–223.

Table 3. Brown bear abundance and removal in Unit 26B beginning in year 0 (1 year before the recovery program began). Objective is to maintain the current estimated population of 200–320 bears, while annually removing up to 20 bears identified as

threatening or killing muskoxen. Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011).

Period	RY	Spring abundance (variation)	Harvest removal		Dept. control removal		Public control removal		Total removal ^a	Fall abundance (variation)
			Fall	Spring	Fall	Spring	Fall	Spring		
Year 0	2010	200–320	--	--	--	--	n/a	n/a	--	--
Year 1	2011	200–320	22	0	0	3	n/a	n/a	26	--
Year 2	2012	200–320	16	2	0	3	n/a	n/a	21	--
Year 3	2013	200–320	22	0	0	0	n/a	n/a	25	--
Year 4	2014	200–320	18	0	0	1	n/a	n/a	21	--
Year 5	2015	200–320	22	2	0	0	n/a	n/a	25	--
Year 6	2016	200-300	11	1	0	0	n/a	n/a	12	--

^aAdditional removal may be Defense of Life and Property, vehicle kill, etc.

4) Costs specific to implementing recovery program

Table 4. Unit 26B cost (\$1,000 = 1.0) of agency salary based on estimate of proportional time of field level staff and cost of operations for recovery activities (e.g., predator control or habitat enhancement beyond normal Survey and Inventory work) performed by personnel in the Department or work by other state agencies (e.g., Division of Forestry) or contractors in Unit 26B beginning in year 1 of the recovery program. Fiscal year (FY) is 1 July to 30 June but the year is one greater than the comparable RY (e.g, FY 2012 is 1 July 2011 to 30 June 2012).

Period	FY	Predation control ^a		Other recovery activities		Total recovery cost	Research cost ^d
		Time ^b	Cost ^c	Time ^b	Cost ^c		
Year 1	2012	0.2	126.1	1.8	23.5	149.6	22.5
Year 2	2013	0.3	126.0	1.6	19.5	145.5	2.0
Year 3	2014	0	0.0	0.5	22.0	22.0	0.0
Year 4	2015	<0.1	0.4	0.6	32.8	32.8	0.0
Year 5	2016	0	0	0.6	33.7	33.7	0.0
Year 6	2017	0	0	0.6	9.3	9.3	0.0

^aState or private funds only.

^bPerson-months (22 days per month)

^cSalary plus operations

^dSeparate from implementing recovery program but beneficial for understanding of ecological or human response to management treatment (scientific approach that is not unique to recovery).

5) Department recommendations for annual evaluation (1 February) following Year 3 for recovery of Muskoxen in Unit 26B.

Has progress toward defined criteria been achieved? Some progress was made in that the number of muskoxen \geq 1 year old in April population estimate in spring 2016 and 2017 was 228 and 218 compared to a range of 181–198 during 2007–2012.

No progress was made toward increasing the ratio of yearling:100 cows >2 years old in April composition surveys because no composition surveys were conducted in spring 2016 and 2017 due to poor weather and helicopter issues. In spring 2015, yearling:100 cows >2 years old in April was 22:100 compared to the 6-year mean of 30:100 during regulatory years 2007–2012 and in spring 2015

Has achievement of success criteria occurred? No. Objective is to achieve an April population of 300 muskoxen \geq 1 year old. In spring 2017, the April population was 218 muskoxen \geq 1 year old.

Recommendations for recovery practice(s):

- Suspend the predation control program. After 5 years, there is no evidence of improved survival or an appreciable increase in the Unit 26B muskoxen population. After removal of bears threatening or killing muskoxen in years 1, 2, and 4, there is no clear evidence of improved muskox survival or an increase in the Unit 26B muskoxen that can be attributed to the predation control program.
- Continue muskox hunting season closure;
- Continue surveys to estimate muskox population abundance and sex and age composition