

**Annual Report to the Alaska Board of Game  
on Intensive Management for Moose  
with Wolf, Black Bear, and Grizzly Bear Predation  
Control in Game Management Unit 19D East**

**Prepared by the Division of Wildlife Conservation  
February 2023**



1) **Description of IM Program<sup>1</sup>**

**A) This report is an annual evaluation for a predation control program authorized by the Alaska Board of Game (board) under 5 AAC 92.123**

**B) Month this report was submitted by the Department to the board:**

Annual Report, February 2023

**C) Program name:** Unit 19D East wolf and bear predation control program (Fig. 1).

**D) Existing program has an associated Operational Plan.**

**E) Game Management Unit fully or partly included in IM program area:** Unit 19D East.

**F) IM objective is a moose population size of 6,000–8,000 with a harvest of 400–600.**

**G) Month and year the current predation control program was originally authorized by the board:** Fall 1995. **Indicate date(s) if renewed:** January 2000, March 2003, January 2006, May 2006, March 2009, February 2014, March 2020.

**H) Predation control is currently active in this IM area.**

**I) If active, month and year the current predation control program began:**  
December 2003.

**J) A habitat management program funded by the department or from other sources is currently active in this IM area:** No.

**K) Size of IM program area (square miles) and geographic description:** Unit 19D East is 8,513 mi<sup>2</sup>.

**L) Size and geographic description of area for assessing ungulate abundance:** Wolf Control Focus Area (WCFA) is 5,579 mi<sup>2</sup>; Bear Control Focus Area (BCFA) is 528 mi<sup>2</sup>.

**M) Size and geographic description of area for ungulate harvest reporting:** WCFA is 5,579 mi<sup>2</sup>.

**N) Size and geographic description of area for assessing predator abundance:** WCFA is 5,579 mi<sup>2</sup>; BCFA is 528 mi<sup>2</sup>.

**O) Size and geographic description of predation control area:** WCFA is 5,579 mi<sup>2</sup>; BCFA is 528 mi<sup>2</sup>.

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<sup>1</sup> For purpose and context of this report format, see *Intensive Management Protocol, section on Tools for Program Implementation and Assessment*

P) **Criteria for evaluating progress toward IM objectives:** Moose abundance and harvest.

Q) **Criteria for success with this program:** WCFA abundance=1.0 moose/mi<sup>2</sup> (~5,600 moose) moose and WCFA harvest=225 moose.

R) **Department recommendation for IM program in this reporting period:** Continue program (details provided in section 6).

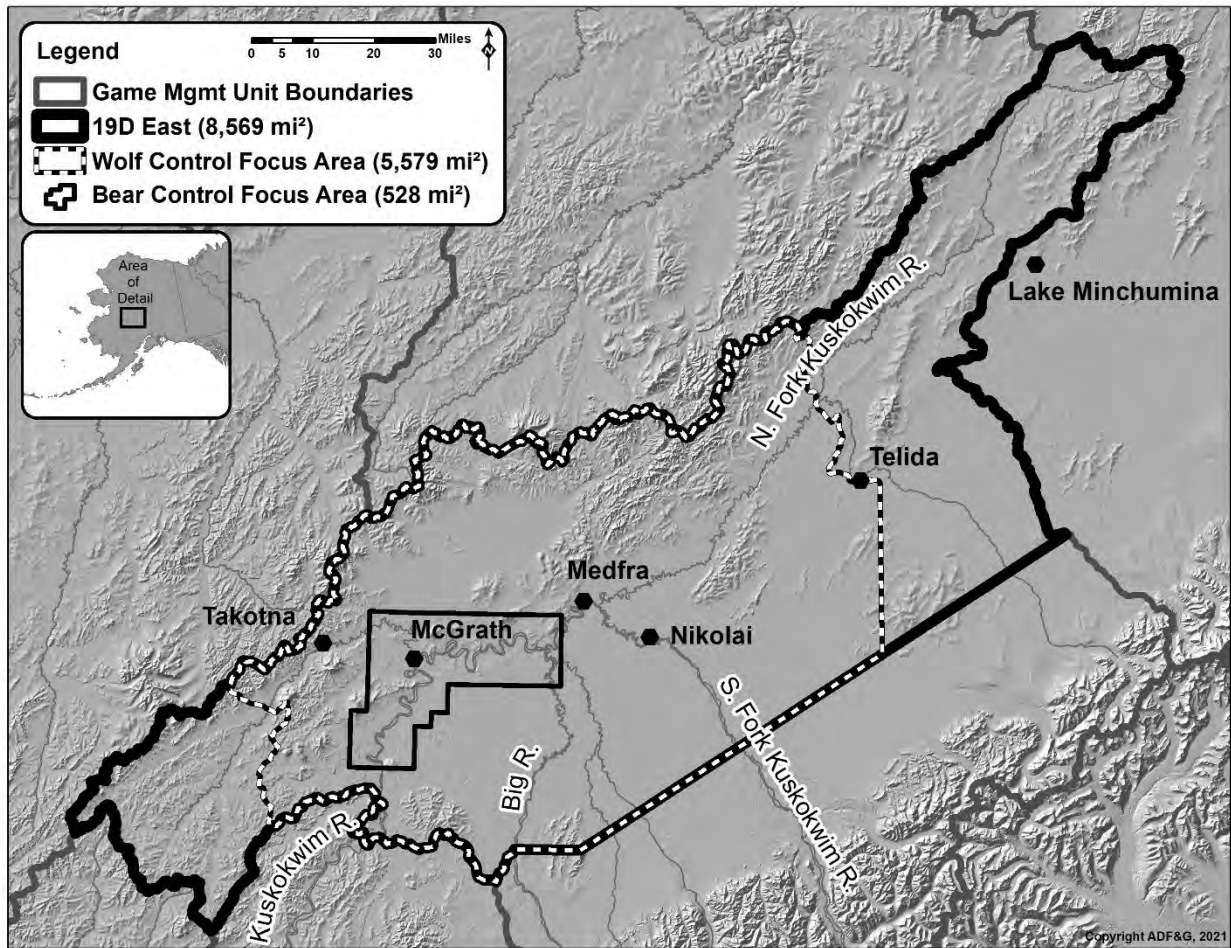


Figure 1. Unit 19D East intensive management areas.

## 2) Prey data

**Date(s) and method of most recent abundance assessment for moose:** November 2022  
Geospatial Population Estimator (GSPE) in a 1,118 mi<sup>2</sup> area surrounding the BCFA.

**Compared to IM area, was a similar trend and magnitude of difference in abundance observed in nearby non-treatment area(s) since program inception:** Non-treatment area not established.

**Date(s) of most recent age and sex composition survey:** November 2022 GSPE in a 1,118 mi<sup>2</sup> area surrounding the BCFA.

**Compared to IM area, was a similar composition trend and magnitude of difference in composition observed in nearby non-treatment area(s) since program inception:** Non-treatment area not established.

**Table 1. Moose abundance, age and sex composition in a 1,118 mi<sup>2</sup> area surrounding the BCFA since program implementation in year 1. Regulatory year is 1 July to 30 June (e.g., Regulatory Year 2001 is 1 July 2001 to 30 June 2002).**

Period	Regulatory Year	Abundance <sup>a</sup> (90% CI)	Composition (number per 100 Cows)			
			Calves (90% CI)	Yearling Bulls (90% CI)	Bulls (90% CI)	Total <i>n</i>
Year 1	2001	868(+147)	36(+10)	8(+3)	21(+6)	455
Year 2	2002	--	--	--	--	--
Year 3	2003	--	--	--	--	--
Year 4	2004	1,192(+228)	66(+18)	8(+4)	18(+6)	578
Year 5	2005	--	--	--	--	--
Year 6	2006	1,308(+174)	55(+10)	12(+3)	30(+8)	762
Year 7	2007	1,720(+306)	53(+14)	15(+4)	36(+10)	844
Year 8	2008	1,718(+352)	44(+12)	14(+5)	40(+11)	678
Year 9	2009	1,820(+323)	38(+10)	11(+4)	40(+11)	711
Year 10	2010	1,796(+312)	43(+11)	16(+5)	49(+13)	712
Year 11	2011	1,647(+296)	42(+11)	10(+3)	33(+10)	639
Year 12	2012	1,337(+199)	35(+11)	7(+2)	38(+5)	650
Year 13	2013	--	--	--	--	--
Year 14	2014	--	--	--	--	--
Year 15	2015	2,014(+398)	41(+12)	14(+5)	36(+11)	811
Year 16	2016	--	--	--	--	--
Year 17	2017	2,389(+372)	42(+3)	N/A	31(+6)	1,089
Year 18	2018	--	--	--	--	--
Year 19	2019	2,291(+443)	33(+3)	N/A	35(+10)	1,246
Year 20	2020	2,201(+414)	34(+3)	N/A	31(+10)	1,122
Year 21	2021	--	--	--	--	--
Year 22	2022	2,471(+429)	39(+3)	N/A	40(+9)	1277

<sup>a</sup>Estimate with sightability correction factor applied

**Describe trend in abundance or composition:** Moose numbers have increased substantially since predator removals began in 2003. Within the BCFA, a pre-control survey in 2001 resulted in an estimate of 868 moose, while there were 2,471 moose in 2022.

**Table 2. Moose harvest from a 1,118 mi<sup>2</sup> area surrounding the BCFA since program implementation in Regulatory Year 2001 (Year 1). Moose harvest from WCFA (5,579 mi<sup>2</sup>) since Regulatory Year 2013. Regulatory year is 1 July to 30 June (e.g., Regulatory Year 2001 is 1 July 2001 to 30 June 2002).**

Period	Regulatory Year	Reported		Other mortality <sup>a</sup>	Total
		Male	Female		
Year 1	2001	29	0	- <sup>b</sup>	29
Year 2	2002	23	0	- <sup>b</sup>	23
Year 3	2003	32	0	- <sup>b</sup>	32
Year 4	2004	7	0	- <sup>b</sup>	7
Year 5	2005	14	0	- <sup>b</sup>	14
Year 6	2006	12	0	3	15
Year 7	2007	25	0	1	26
Year 8	2008	61	0	1	62
Year 9	2009	56	0	2	58
Year 10	2010	50	0	2	52
Year 11	2011	100	0	1	101
Year 12	2012	73	0	1	74
Year 13	2013	108	1	2	111
Year 14	2014	140	0	3	143
Year 15	2015	154	1	2	157
Year 16	2016	135	0	2	137
Year 17	2017	135	0	2	137
Year 18	2018	115	0	2	117
Year 19	2019	118	0	1	119
Year 20	2020	118	1	3	122
Year 21	2021	102	8	2	112
Year 22 <sup>c</sup>	2022	89	1	0	90

<sup>a</sup> Mortuary harvest

<sup>b</sup> Records destroyed by fire

<sup>c</sup> Preliminary

**Describe trend in harvest:** Harvest reached a peak in Regulatory Year 2015 and has been stable since RY18.

**Describe any other harvest related trend if appropriate:** None.

### 3) Predator data

#### Wolves

**Date(s) and method of most recent spring abundance assessment for wolves in the WCFA:**  
March 2018, pilot interviews.

**Date(s) and method of most recent fall abundance assessment for wolves in the WCFA:**  
Calculated for fall 2017 by adding total removal from WCFA to spring 2018 abundance estimate.

**Other research or evidence of trend or abundance status in wolves:**

Gardner, C. L., and N. J. Pamperin. 2014. Intensive aerial wolf survey operations manual for Interior Alaska. Alaska Department of Fish and Game, Wildlife Special Publication ADF&G/DWC/WSP-2014-01, Juneau.

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.

Keech, M. A. 2012. Response of moose and their predators to wolf reduction and short-term bear removal in a portion of Unit 19D. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration, Final Wildlife Research Report ADF&G/DWC/WRR-2012-7, Grants W-33-4 through W-33-10, Project 1.62, Juneau, Alaska

**Table 3. Wolf abundance objectives and removal in Wolf Control Focus Area (WCFA) since program implementation in year 1. Removal objectives are to reduce wolf numbers by 60-80% in the WCFA. Only removing wolves from the WCFA will ensure wolves persist in the unit. The current WCFA was established in Regulatory Year 2020. Prior to Regulatory Year 2020, control was conducted in different geographic areas. Regulatory year is 1 July to 30 June (e.g, RY 2001 is 1 July 2001 to 30 June 2002).**

Period	Regulatory Year	Fall abundance <sup>a</sup>	Harvest removal		Dept. control removal	Public control removal <sup>b</sup>	Total removal	Spring abundance
			Trap	Hunt				
Year 1	2001	89	19	3	0	N/A	22	67 <sup>c</sup>
Year 2	2002	--	28	5	0	N/A	33	--
Year 3	2003	--	9	1	0	17	27	--
Year 4	2004	--	12	2	0	14	28	--
Year 5	2005	27	9	1	0	4	14	13 <sup>c</sup>
Year 6	2006	29	13	1	0	2	16	13 <sup>c</sup>
Year 7	2007	--	6	2	0	29	37	--
Year 8	2008	--	4	3	0	19	26	--
Year 9	2009	37	7	4	0	4	15	22 <sup>c</sup>
Year 10	2010	--	4	2	0	13	19	--
Year 11	2011	57	11	0	0	22	33	24 <sup>d</sup>
Year 12	2012	33	5	0	0	8	13	20 <sup>d</sup>
Year 13	2013	27	9	0	0	9	18	9 <sup>d</sup>
Year 14	2014	42	13	0	0	10	23	19 <sup>d</sup>
Year 15	2015	--	18	1	0	12	31	--
Year 16	2016	--	14	0	0	12	26	--
Year 17	2017	83	22	1	0	29	52	31 <sup>d</sup>
Year 18	2018	83	9	1	0	63	73	10 <sup>d</sup>
Year 19	2019	--	9	3	0	30	42	--
Year 20	2020	--	12	0	0	55	67	--
Year 21	2021	--	11	4	0	39	54	--
Year 22	2022 <sup>e</sup>	--	0	0	0	8	--	--

<sup>a</sup>Calculated by adding total removal to WCFA spring abundance during each regulatory year.

<sup>b</sup>Public control removal began in regulatory year 2003

<sup>c</sup>Calculated by extrapolating density within a 3,210 mi<sup>2</sup> aerial reconnaissance survey area within the WCFA to the entire WCFA

<sup>d</sup>Abundance based on private pilot and department biologist observations.

<sup>e</sup>Preliminary, season in progress

## **Black Bears**

**Date(s) and method of most recent spring abundance assessment for black bears in the BCFA:** May 2016, mark-recapture estimator.

**Date(s) and method of most recent fall abundance assessment for black bears in the BCFA:** August 2010, calculated for fall 2010 by subtracting total removal in Regulatory Year 2009 from the May 2010 abundance estimate.

**Other research or evidence of trend or abundance status in black bears:**

- 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
- Keech, M. A. 2012. Response of moose and their predators to wolf reduction and short-term bear removal in a portion of Unit 19D. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration, Final Wildlife Research Report ADF&G/DWC/WRR-2012-7, Grants W-33-4 through W-33-10, Project 1.62, Juneau, Alaska.
- Keech, M. A., B. D. Taras, T. A. Boudreau, and R. D. Boertje. 2014. Black bear population reduction and recovery in western Interior Alaska. *Wildlife Society Bulletin* 38:71-77.



**Table 4. Black bear abundance and removal in Bear Control Focus Area (BCFA) since program implementation in year 1. Public bear control ended June 30, 2014. When active, the removal objective was to reduce bear numbers as low as possible within the BCFA. The May 2004 estimated black bear population for all of Unit 19D East was approximately 1,700. The regulatory year is 1 July to 30 June (e.g, regulatory year 2001 is 1 July 2001 to 30 June 2002).**

Period	Regulatory Year	Spring abundance <sup>a</sup> (95% CI)	Harvest removal		Dept. control removal		Public control removal		Total removal	Fall abundance <sup>a,d</sup>
			FA <sup>b</sup>	SP <sup>c</sup>	FA <sup>b</sup>	SP <sup>c</sup>	FA <sup>b</sup>	SP <sup>c</sup>		
Year 1	2001	--	1	0	0	0	0	0	1	--
Year 2	2002	96(+13) <sup>e</sup>	4	0	0	67 <sup>f</sup>	0	0	71	--
Year 3	2003	30(+9) <sup>e</sup>	1	5	0	26 <sup>f</sup>	0	0	32	23
Year 4	2004	--	0	1	0	0	0	0	1	Near 0
Year 5	2005	--	1	5	0	0	0	0	6	--
Year 6	2006	70(+14) <sup>g</sup>	0	0	0	0	0	0	0	--
Year 7	2007	--	1	7	0	0	0	0	8	70
Year 8	2008	--	1	5	0	0	0	0	6	--
Year 9	2009	123(96–162) <sup>g</sup>	4	0	0	0	0	6	10	--
Year 10	2010	--	1	3	0	0	4	13	21	113
Year 11	2011	--	7	1	0	0	1	2	11	--
Year 12	2012	--	0	0	0	0	0	0	0	--
Year 13	2013	113(89–149) <sup>g</sup>	1	1	0	0	4	0	6	--
Year 14	2014	--	13	2	0	0	0	0	15	
Year 15	2015	--	1	2	0	0	0	0	3	--
Year 16	2016	96	0	5	0	0	0	0	5	--
Year 17	2017	--	5	3	0	0	0	0	8	--
Year 18	2018	--	2	2	0	0	0	0	4	--
Year 19	2019	--	5	0	0	0	0	0	5	--
Year 20	2020	--	3	3	0	0	0	0	6	--
Year 21	2021	--	3	8	0	0	0	0	11	--

<sup>a</sup>Does not include cubs of the year

<sup>b</sup>Fall

<sup>c</sup>Spring

<sup>d</sup>Calculated by subtracting total removal from spring abundance estimate in the previous RY

<sup>e</sup>Removal estimator

<sup>f</sup>Non-lethal removal

<sup>g</sup>Mark-recapture estimator

## **Brown Bears**

**Date(s) and method of most recent spring abundance assessment for brown bears in the BCFA:** May 2004, Estimated by extrapolation from BCFA.

**Date(s) and method of most recent fall abundance assessment for brown bears in the BCFA:** November 2003, calculated by subtracting total removal from the May 2004 abundance estimate.

**Other research or evidence of trend or abundance status in brown bears:**

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

Keech, M. A. 2012. Response of moose and their predators to wolf reduction and short-term bear removal in a portion of Unit 19D. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration, Final Wildlife Research Report ADF&G/DWC/WRR-2012-7, Grants W-33-4 through W-33-10, Project 1.62, Juneau, Alaska.

**Table 5. Brown bear abundance and removal in Bear Control Focus Area (BCFA) since program implementation in year 1. When active the removal objective is to reduce bear numbers as low as possible within the BCFA. Public bear control ended June 30, 2013. The May 2004 estimated brown bear population for all of Unit 19D East was approximately 128. The regulatory year is 1 July to 30 June (e.g, Regulatory Year 2001 is 1 July 2001 to 30 June 2002).**

Period	Regulatory Year	Spring abundance <sup>a</sup>	Harvest removal		Dept. control removal		Public control removal		Total removal	Fall abundance <sup>a,d</sup>
			FA <sup>b</sup>	SP <sup>c</sup>	FA <sup>b</sup>	SP <sup>c</sup>	FA <sup>b</sup>	SP <sup>c</sup>		
Year 1	2001	--	0	0	0	0	0	0	0	--
Year 2	2002	12 <sup>c</sup>	0	0	0	6 <sup>f</sup>	0	0	6	--
Year 3	2003	--	0	0	0	0	0	0	0	6
Year 4	2004	--	0	0	0	0	0	0	0	--
Year 5	2005	--	0	0	0	0	0	0	0	--
Year 6	2006	--	0	2	0	0	0	0	2	--
Year 7	2007	--	0	2	0	0	0	0	2	--
Year 8	2008	--	0	0	0	0	0	0	0	--
Year 9	2009	--	2	0	0	0	0	0	2	--
Year 10	2010	--	0	0	0	0	0	0	0	--
Year 11	2011	--	0	0	0	0	0	0	0	--
Year 12	2012	--	0	0	0	0	0	0	0	--
Year 13	2013	--	0	0	0	0	0	0	0	--
Year 14	2014	--	1	1	0	0	0	0	2	--

Period	Regulatory Year	Spring abundance <sup>a</sup>	Harvest removal		Dept. control removal		Public control removal		Total removal	Fall abundance <sup>a,d</sup>
			FA <sup>b</sup>	SP <sup>c</sup>	FA <sup>b</sup>	SP <sup>c</sup>	FA <sup>b</sup>	SP <sup>c</sup>		
Year 15	2015	--	0	0	0	0	0	0	0	--
Year 16	2016	--	2	0	0	0	0	0	2	--
Year 17	2017	--	0	0	0	0	0	0	0	--
Year 18	2018	--	0	0	0	0	0	0	0	--
Year 19	2019	--	0	0	0	0	0	0	0	--
Year 20	2020	--	0	0	0	0	0	0	0	--
Year 21	2021	--	1	0	0	0	0	0	1	--

<sup>a</sup>Does not include cubs

<sup>b</sup>Fall

<sup>c</sup>Spring

<sup>d</sup>Calculated by subtracting total removal from spring abundance estimate in the previous regulatory year

<sup>e</sup>Estimated by using density extrapolated from other areas of Interior Alaska with comparable habitat

<sup>f</sup>Non-lethal removal

#### 4) Habitat data and nutritional condition of prey species

**Where active habitat enhancement is occurring or was recommended in the Operational Plan, describe progress toward objectives:** No active habitat enhancement occurring.

**Table 6. Nutritional indicators for moose in a 1,118 mi<sup>2</sup> area surrounding the BCFA since program implementation in regulatory year 2001 (year 1). A regulatory year is 1 July to 30 June (e.g, Regulatory Year 2001 is 1 July 2001 to 30 June 2002).**

Period	Regulatory year	Twining rate for radiocollared cows >2 yrs ( <i>n</i> )	Twining rate for uncollared cows ( <i>n</i> )
Year 1	2001	59% (22)	
Year 2	2002	24% (25)	39% (46)
Year 3	2003	32% (31)	36% (39)
Year 4	2004	44% (45)	39% (31)
Year 5	2005	40% (60)	50% (40)
Year 6	2006	52% (56)	35% (29)
Year 7	2007	55% (51)	50% (30)
Year 8	2008	33% (43)	--
Year 9	2009	33% (40)	26% (87)
Year 10	2010	--	29% (45)
Year 11	2011	--	37% (38)
Year 12	2012	--	34% (47)
Year 13	2013	--	22% (55)
Year 14	2014	--	--
Year 15	2015	--	49% (45)
Year 16	2016	--	32% (53)

Period	Regulatory year	Twinning rate for radiocollared cows >2 yrs (n)	Twinning rate uncollared cows (n)
Year 17	2017	--	27% (44)
Year 18	2018	--	13% (39)
Year 19	2019	--	18% (49)
Year 20	2020	--	15% (48)
Year 21	2021	--	23% (40)
Year 22	2022	--	35% (43)

## 5) Costs specific to implementing Intensive Management

**Table 7. Unit 19D East program cost (\$1,000 = 1.0) of agency salary based on estimate of proportional time of field level staff and cost of operations for intensive management activities performed by personnel in the Department or work by other state agencies (e.g., Division of Forestry) or contractors in Unit 19D East during years 10-20. Fiscal year is also 1 July to 30 June but the year is one greater than the comparable regulatory year (e.g., Fiscal Year 2011 is 1 July 2010 to 30 June 2011).**

Period	Fiscal Year	Predation control <sup>a</sup>		Other IM activities		Total IM cost	Research cost <sup>d</sup>
		Time <sup>b</sup>	Cost <sup>c</sup>	Time <sup>b</sup>	Cost <sup>c</sup>		
Year 10	2011	0.4	3.5	0.4	5.0	8.5	56.0
Year 11	2012	1.2	7.3	4.0	43.6	50.9	39.0
Year 12	2013	1.3	8.0	2.0	44.2	52.2	119.3
Year 13	2014	1.0	11.3	0.4	5.0	16.3	256
Year 14	2015	1.4	11.5	0.4	5.0	16.5	0.0
Year 15	2016	1.4	9.5	0.4	5.0	14.5	242.2
Year 16	2017	1.4	9.5	0.4	5.0	14.5	242.2
Year 17	2018	0.1	1.2	7.9	139.4	140.6	190.3
Year 18	2019	0.8	6.4	5.6	139.7	146.1	23.0
Year 19	2020	0.3	4.4	6.2	86.3	90.7	111.9
Year 20	2021	0.7	5.5	13.2	139.1	174.5	90.0
Year 21	2022	0.8	6.2	12.6	208.7	214.9	72.5

<sup>a</sup>State or private funds only.

<sup>b</sup>Person-months (22 days per month)

<sup>c</sup>Salary plus operations. Beginning in Fiscal Year 2019, Other IM activities includes normal survey and inventory work, which is typically more robust than standard survey and inventory work.

<sup>d</sup>Separate from implementing IM program but beneficial for understanding of ecological or human response to management treatment (scientific approach that is not unique to IM).

## 6) Evaluation (February 2021) for program renewal following Year 20 and department recommendations for Unit 19D East

**Has progress toward defined criteria been achieved?** Yes. The moose population and harvest have increased compared to pre-control. The density of moose in the WCFA is slightly above objective with 1.1 moose per mi<sup>2</sup>.

**Has achievement of success criteria occurred?** The population objective has been achieved, but the harvest objective has not.

**Recommendation for IM program:** Continue program.

**Rationale for recommendation on overall program:** Population objectives have been achieved, while harvest objectives have not. Continued wolf control will help maintain hunting opportunities, high success rates, and allow for additional harvest of antlerless moose in the winter. A winter hunt in place since RY20 has incrementally increased harvest and appears to be gaining in popularity. This hunt provides an additional opportunity for hunters who were not able to harvest a moose in the fall. The two-year average twinning rate has been improving and is now 29%. Short yearling weights collected in RY22 were above average and the population appears to be healthy and stable at this time. The current program was reauthorized by the board in March 2020 and expires June 30, 2026.