Annual Report to the Alaska Board of Game on Intensive Management for Moose with Wolf and Bear Predation Control in Game Management Unit 16

Prepared by the Division of Wildlife Conservation
February 2012

Interim annual updates are limited to sections that have changed substantially since the prior annual report in February. For complete information, see the prior annual report.

1) Description of IM Program[1] and Department recommendation for reporting period

A) This report is an interim review X or renewal evaluation ___ for a predation control program authorized by the Alaska Board of Game (Board) under 5 AAC 92.125

B) Date this report was submitted by the Department to the Board:

1 February X (annual report) 1 August ___ (interim annual update[2]) Year 2012

C) Program name (geographic description/UNIT and species/herd):
Unit 16 Predation Control Area/ Unit 16 / moose

D) Existing program incorporates an *Intensive Management Plan* in regulation *5AAC 92.125*

E) Game Management Unit(s) fully or partly included in IM program area:
Subunit 16A and 16B

F) IM objectives for moose: population size 6,500 – 7,500 harvest 310 - 600_

G) Month and year the current predation control program was originally authorized March 2004 by the Board. Indicate date(s) if renewed: May 2006, March 2011

H) Predation control is currently active X or temporarily inactive ____ in this IM area

I) If active, month and year the current predation control program began or resumed (if more than one predator species, list dates separately)
- Program originally authorized in March 2004 (wolf predation control)
- Program was reauthorized in May 2006 (wolf predation control)
- Program was modified to include black bear predation control in March 2007
- Program was reauthorized for 6 years and modified to include brown bear predation control in March 2011

J) Indicate if an habitat management program funded by the Department or from other sources is currently active in this IM area (Y/N) N

K) Size of IM program area (square miles) and geographic description:
All non-federal lands in Subunit 16B and the western half of Unit 16A (11,105 mi^2 total)

L) Size and geographic description of area for assessing ungulate abundance:
All available moose habitat in Subunit 16B below 3500 ft. elevation including park and preserve land. (7018 $miles^2$ total)

[1] For purpose and context of this report format, see appendix.
[2] The interim annual update may be limited only to sections that changed substantially since prior annual report [*e.g., only Tables 3 and 6 in areas with a fall ungulate survey and only wolf control*]

M) Size and geographic description of area for ungulate harvest reporting:
All available moose habitat in Subunit 16B below 3500 ft. elevation including park and preserve land. (7018 miles^2 total)

N) Size and geographic description of area for assessing predator abundance:
All available moose habitat in Subunit 16B below 3500 ft. elevation including park and preserve land. (7018 miles^2 total)

O) Size and geographic description of predation control area:
The predation control area includes all non-federal lands in Subunit16B and the western portion of Subunit 16A. Area available for control is 7862 mi^2 for black bears and 7777 mi^2 for wolves. Wolf control areas include buffers around local airstrips. Area available for brown bear predator control is 946 mi^2 in southern subunit 16B.

P) Criteria for evaluating progress toward IM objectives:
- Moose population in Subunit 16B between 6500 and 7500 animals
- Harvest between 310 and 600 moose.

Q) Criteria for success with this program:
The program will be considered successful when the moose population reaches population objectives of 6500 to 7500 animals and harvest reaches 310 to 600 moose.

R) **Department recommendation for IM program in this reporting period**:
Continue current IM program (details provided in section 7)

2) Prey data

Date(s) and method of most recent fall abundance assessment for moose (if statistical variation available, describe method here and show result in Table 1): 26 November 2011. Population estimation surveys were conducted using the Geo-Spatial Population Estimator, which is a quadrat-based survey methodology that extrapolates or interpolates numbers of moose detected in quadrats surveyed to quadrats not surveyed to produce a minimum population estimate for the entire GMU.

Compared to IM area, was a similar trend and magnitude of difference in abundance observed in nearby non-treatment area(s) since program inception (Y/N) N/A and in the last year (Y/N)? N/A Describe comparison if necessary: No comparison exists for the wolf control portion of the program. No control was available for GMU 16B bear treatments. However, bear harvest rates varied annually among UCUs within the GMU. Annual harvest rate of black bear has ranged from 2 – 16% of the estimated 2007 population among UCUs, and calf survival was not related to harvest rate of bears ($P > 0.186$) except in 2008, when UCUs with a low black bear harvest had higher calf survival. This is the opposite of what would be predicted if the bear harvest is expected to improve calf survival.

Date(s) of most recent age and sex composition survey (if statistical variation available, describe method here and show result in Table 1):

Subunit 16B South, 13-18 November 2010; 16B Middle, 20-26 November 2011; 16B North 29-31 October 2008

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 (Y/N) N/A and in the last year (Y/N)? N/A Describe comparison if necessary: No comparison exists for the wolf control portion of the program. No control was available for GMU 16B bear treatments. However, bear harvest rates varied annually among UCUs within the GMU. Annual harvest rate of brown bears has ranged from 1– 17% of the estimated 2007 population among UCUs, and calf survival was not related to harvest rate of brown bears (P > 0.238) in any year, 2005-2011.

Table 1. Moose abundance, age and sex composition in assessment area (L) since program implementation in Year 1 (2005) to reauthorization review in year 7 (2011) in Subunit 16B. Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011). Note: This table is subdivided into areas corresponding with Subunit 16B survey areas

16B North			Composition (number per 100 females)			
Period	RY	Abundance (variation)	Young	Yearlings	Males	Sample size
Year 0	2003	898 ± 162.5	17	14	35	326
Year 1	2005					
Year 2	2006	Not surveyed				
Year 3	2007	Not surveyed				
Year 4	2008	1042 ± 235	11	32	60	340
Year 5	2009	Not surveyed				
Year 6	2010	Not surveyed				
Year 7	2011	Not surveyed				

16B Middle			Composition (number per 100 cows)			
Period	RY	Abundance (variation)	Calves	Yearlings	Bulls	Sample size
Year 1	2005	1714 ± 218	14	8	29	628
Year 2	2006					
Year 3	2007	Not surveyed				
Year 4	2008	1905 ± 327	21	22	54	678
Year 5	2009	Composition Survey	19	Na	39	359
Year 6	2010	Not surveyed				
Year 7	2011	2843 ± 398	24	18	46	825

16B South			Composition (number per 100 cows)			
Period	RY	Abundance (variation)	Calves	Yearlings	Bulls	Sample size
Year 1	2005					
Year 2	2006					
Year 3	2007					
Year 4	2008		18	25	78	247
Year 5	2009					
Year 6	2010	1928 ± 421	18	30	52	703
Year 7	2011	Not surveyed				

Describe trend in abundance or composition:
The 2011 population estimate in 16B Middle was statistically greater (P = 0.008) than the 2005 estimate, and suggested an increase of approximately 8% per year. Much of this increase was in the bull segment of the population, as indicated by both bull numbers and bull:cow ratios. The increase in the bull:cow ratio was likely primarily due to restricted harvests that began in RY 2006. The cow segment of the population increased at < 5% per year, but the increase was not attributable to predator treatments because neither calf:cow ratio (r = 0.40; P = 0.370), calf survival (r = 0.45; P = 0.491), nor adult cow survival (r = –0.18; P = 0.737) changed during the RY 2005 through RY 2011 period.

Table 2. Moose harvest in assessment area (M). Methods for estimating unreported harvest are described in Survey and Inventory reports.

Period	RY	Reported		Estimated		Total harvest	Other mortality[a]	Total
		Male	Female	Unreported	Illegal			
Year 1	2005							
Year 2	2006	106	0	7	25	138	0	138
Year 3	2007	103	0	7	25	135	0	142
Year 4	2008	117	1	8	25	150	0	150
Year 5	2009	181	0	13	25	219	0	219
Year 6	2010	199	1	14	25	239	0	239

[a]Clarify other additional removal (Defense of Life and Property, etc.).

Describe trend in harvest:
Harvests of bull moose are generally increasing (r = 0.92; P = 0.026). This is likely due to both a liberalization of the harvest regulations that began in RY 2009 and an increase in the bull segment of the population that primarily resulted from the closure of the Tier 1 resident season from RY 2006 through RY 2008.

3) Predator data

Wolves

Date(s) May 2010 and method of most recent spring abundance assessment (if statistical variation available, describe method here and list in Table 3):
The population assessment is based on reports from control pilots, and trapper sealing records.

Date(s) September 2010 and method of most recent fall abundance assessment for wolves (if statistical variation available, describe method here and list in Table 3):
Fall abundance is based on spring estimate plus 4 pups per pack for packs greater than 2 individuals.

Other research or evidence of trend or abundance status in wolves: N/A

Table 3. Wolf abundance objectives and removal in wolf assessment area (N) of the Unit 16 Predation Control Area. Removal objective is 73-80 % of pre-control fall abundance in year 1 of wolf predation control program, so minimum number remaining by 30 April each RY in the IM area (N) must be at least 22. If non-lethal predation control methods used by Department personnel, clarify with footnote in control removal tally.

Period	RY	Fall abundance (variation)	Harvest removal		Dept. control removal	Public control removal	Total removal[a]	Spring abundance (variation)
			Trap	Hunt				
Year 0	2004	175 ± 25	11	26	0	91	128	47 ± 25
Year 1	2005	107 ± 16	25	12	0	24	61	46 ± 16
Year 2[b]	2006	121 ± 23	8	9	0	32	49	72 ± 23
Year 3	2007	117 ± 13	5	6	0	21	32	85 ± 13
Year 4	2008	92 ± 10	15	8	0	24	47	45 ± 10
Year 5	2009	84 ± 13	1	5	0	3	9	75 ± 13
Year 6	2010	82 ± 22	4	4	0	11	19	65 ± 13

[a] Additional removal may be Defense of Life and Property, vehicle kill, etc.
[b] In spring of 2006 the BOG increased the area for predator control to include the western portion of 16A. The wolf population goal for 16A was 8 to 15 wolves thus the population objective for Unit 16 is 30 to 60 wolves. The fall abundance and harvest estimates in Table 3 reflect these changes.

Bears

Date(s) May 2007 and method of most recent spring abundance assessment for black bears (if statistical variation available, describe method here and list in Table 4 Black bear densities were estimated for 16B unit wide by a line-transect sampling method (E. Becker, AKDFG, unpublished data) and the density estimates obtained (187.3 black bears/1000 km^2) were extrapolated to all bear habitat in 16B.

Date(s) N/A and method of most recent spring abundance assessment for brown bears (if statistical variation available, describe method here and list in Table 5) Brown bear densities were estimated for portions of 16B Middle and 16B North identically to black bear except that estimated brown bear density (40.6 brown bears/1000 km^2) was extrapolated to GMU 16B bear habitat and brown bear density estimates also integrated a density continuum from Units 9 and 13.

Other research or evidence of trend or abundance status in black or brown bears: N/A

Table 4. Black bear abundance objectives and removal in black bear assessment area (N) of the Unit 16 Predation Control Area. Removal objective is 80 % of pre-control spring abundance in year 1 of bear predation control program, so minimum number remaining by 31 October each RY in the IM area defined in (N) must be at least 600. If non-lethal predation control methods used by Department personnel, clarify with footnote in control removal tally.

Period	RY	Spring abundance (variation)	Harvest removal		Dept. control removal		Public control removal		Total removal[a]	Fall abundance (variation)
			FA	SP	FA	SP	FA	SP		
Year 1	2005		52	112	---	---	---	---	164	
Year 2	2006		75	251	---	---	---	---	326	
Year 3[b]	2007	3500± 300	73	210	0	0	1	106	390	
Year 4	2008		69	201	0	0	32	95	397	
Year 5	2009		43	105	0	0	58	131	337	
Year 6	2010		83	102	1	---	135	107	428	

[a]Additional removal may be Defense of Life and Property, vehicle kill, etc.
[b] Year 3 (RY 2007) was the first year of the black bear control program

While no surveys to estimate black bear abundance have been conducted in recent year, the population is above the minimum population objective based an analysis of harvests and incidental observations by biologists. Black bear harvests in Unit 16B show a strong increasing trend from an average of 130 during RY 2000 – RY 2004 to 340 during RY 2005 – RY 2010. Based on extrapolated densities from the 2007 population estimate, proportion of the black bear population harvested has ranged from 2–16% in relevant UCUs, well below levels necessary to achieve an 80% population reduction.

Table 5. Brown bear abundance objectives and removal in black bear assessment area (N) of the Unit 16 Predation Control Area. Removal objective is 60 % of pre-control spring abundance in year 1 of bear predation control program, so minimum number remaining by 31 October each RY in the IM area defined in (E) must be at least 250. If non-lethal predation control methods used by Department personnel, clarify with footnote in control removal tally.

Period	RY	Spring abundance (variation)	Harvest removal		Dept. control removal		Public control removal		Total removal[a]	Fall abundance (variation)
			FA	SP	FA	SP	FA	SP		
Year 1	2005		63	51	---	---	---	---	114	
Year 2	2006		56	41	---	---	---	---	97	
Year 3	2007	937 ± 313	64	36	---	---	---	---	100	
Year 4	2008		84	28	3	---	---	---	115	
Year 5	2009		34	35	---	---	---	---	69	
Year 6	2010		96	25	---	2	---	27	150	

[a] Additional removal may be Defense of Life and Property, vehicle kill, etc.

While no surveys to estimate brown bear abundance have been measured in recent year, the population is above the minimum population objective based incidental observations by biologists. Harvest of brown bears in Unit 16 has increased from RY 2000 - RY2004 (average = 83) to RY 2005 - RY 2010 (average = 108). Based on extrapolated densities from the 2007 population estimate, proportion of the brown bear population harvested has ranged from 1–17% annually in relevant UCUs and was above 9% in 6 of 7 years since 2004.

4) Habitat data and nutritional condition of prey species

Where active habitat enhancement is occurring or was recommended in the *Intensive Management Plan*, describe progress toward objectives:

Objective(s): N/A

Area treated and method: N/A

Observation on treatment response (specify which, and use table if ongoing program): N/A

Evidence of progress toward objective(s) (choose one: Apparent Statistical) N/A

Similar trend in nearby non-treatment areas (Y/N)? N/A

Describe any substantial change in habitat not caused by active program (e.g., new wildland fires, flooding, insect mortality of vegetation, etc.): N/A

Table 6. Nutritional indicators for Moose in assessment area (L) of the Unit 16 Predation Control Area.

Period	RY	Pregnancy Rate of radio collared cows[a]	Twinning Rate of radio collared cows[b]	Average Rump Fat on Lactating Females in the Fall (cm)[c]
Year 1	2005	71.4	51%	--
Year 2	2006	83.3	45%	3.7
Year 3	2007	79.8	50%	2.4
Year 4	2008	70.8	48%	1.8
Year 5	2009	79.0	59%	--
Year 6	2010	83.7	47%	--
Year 7	2011	72.2	54%	--

[a] Apparent pregnancy rate based on field observations of calves born to radio collared cows. The reported values likely underestimate calf production in cases where calves were born, but lost before they could be observed by biologists.
[b] Apparent twinning rate is based on field observations of the number of calves born to individual radio collared cows. The reported values likely underestimate twinning in cases where twins were born, but one or both were lost before they could be observed by biologists.
[c]Rump Fat measurements are collected using an ultrasonograph during the fall capture of adult cow moose.

Where objectives on nutritional condition were listed in the *Intensive Management Plan*, describe trend in condition indices since inception of (a) habitat enhancement or (b) enhanced harvest (clarify which: _____) (choose one: Positive, No change, Negative) N/A

Evidence of trend (choose one: Apparent Statistical)

Similar trend in nearby non-treatment areas (Y/N)? N/A

5) Costs specific to implementing Intensive Management

Table 7. Cost ($1000 = 1.0) of agency salary based on estimate of proportional time of field level staff and cost of operations for intensive management 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 the Unit 16 Predation Control Area. Fiscal year (FY) is also 1 July to 30 June but the year is one greater than the comparable RY (e.g, FY 2010 is 1 July 2009 to 30 June 2010).

			Operations and contracting			Total cost
Period	FY	Salary[a]	Federal Aid[b]	Public Funds[c]	Other[d]	
Year 1	2006	15.0				15.0
Year 2	2007	15.0				15.0
Year 3	2008	15.0				15.0
Year 4	2009	30.0		31.6		61.6
Year 5	2010	40.0		48.6		88.6
Year 6	2011	30.0		27.6		57.6

[a]State Fish and Game fund matched 1:3 with Federal Aid (see footnote b) except for activities directly involving predator control (state funding only).
[b]Federal Aid in Wildlife Restoration (excise tax on firearms and ammunition)
[c]Capital Improvement Project or General Fund revenue from Alaska Legislature
[d]Grants, donations from private organizations, etc.

6) Department recommendations[3] for annual evaluation (1 February) following Year 6 (RY 2010) for Subunit 16B —skip in final year and go to section 7

Has progress toward defined criteria been achieved (describe)?

There has been an increase in moose (primarily bull) abundance since 2005. However, moose calf survival during the first 6 months of life and calf recruitment have not been significantly improved, nor has cow survival

Has achievement of success criteria occurred (describe)?

No. Harvest and population objectives have not been met. It is also unlikely that the harvest objective will be achieved even if the population size objective is reached based on the low calf survival and recruitment

Recommendation for IM program (choose one): **Continue** Modify Suspend Terminate

The department recommends continuing the program to evaluate the brown bear control program, which began in the spring of 2011 (RY 2010). To date, the bear removal has not approached levels necessary to reach the reduction goals (remove 60% of the brown bear population and 80% of the black bear population) and has had no effect on calf

[3] Prior sections include primarily objective information from field surveys; Sections 6 and 7 involve professional judgment by area biologists to interpret the context of prior information for the species in the management area.

survival. Harvest of brown bears on the Brown Bear Control Area increased from 13 in 2009 to 48 in 2010. If increased harvest can be maintained in the Brown Bear Control Area, the cumulative impact may lessen brown bear predation. Additional monitoring of the brown bear harvest and calf survival may clarify whether high brown bear harvest can be maintained and whether the cumulative effect of this harvest can benefit calf recruitment. The department will continue to evaluate the predator control program during the next year and request additional guidance from the Board during the 2013 Region IV meeting in Wasilla.

7) Evaluation (1 February) for program renewal (following final Year 12 [RY 2016]) and Department recommendations for Unit 16

Has progress toward defined criteria been achieved (describe)?

Has achievement of success criteria occurred (describe)?

Recommendation for IM program (choose one): Continue Modify Suspend Terminate

Rationale for recommendation on overall program:

Other recommendations (if continuation is recommended, specific actions on individual practices):