

CHAPTER 9: MOOSE MANAGEMENT REPORT

From: 1 July 2011

To: 30 June 2013¹

LOCATION

GAME MANAGEMENT UNIT: 9 (33,600 mi²)

GEOGRAPHIC DESCRIPTION: Alaska Peninsula

BACKGROUND

Moose were present in the northern area of the Alaska Peninsula by 1900 but more recently colonized the southern portion of the peninsula, demonstrating fairly typical dynamics of a colonizing ungulate: rapid increase, overbrowsing, and long-term decline. Moose occupied drainages of Cook Inlet (Unit 9A), Lake Clark and Iliamna Lake (Unit 9B), Naknek River (Unit 9C), and King Salmon River and Ugashik Lakes in (Unit 9E) in the early 1900s in very low numbers and patchy distribution (Osgood 1904). Moose populations began increasing in the 1930s and rapidly colonized southwest along the Alaska Peninsula, reaching the Black Lake area by the 1940s and occupying nearly all suitable habitat in Unit 9E by the early 1950s. The geographic barrier of Port Moller delayed colonization of Unit 9D, and lack of habitat south of Port Moller limited population growth, but eventually a limited hunt was permitted in Unit 9D. The Unit 9E population peaked in the mid-1960s, followed by a deliberate reduction in numbers to protect habitat (Sellers and McNay 1983). In response to range damage in Unit 9E from overbrowsing, nutritional stress, and low calf:cow ratios, the Alaska Board of Game adopted liberalized regulations from 1964 to 1973, first to slow population growth and later (during the early 1970s) to reduce the population to allow recovery of the habitat. Once the population declined to the desired objective, a series of hunting restrictions began after 1973, including an experimental bag limit of bulls having 50-inch antlers or 3 brow tines in Unit 9E, and reducing the bull season by 10 days in 1981 (Sellers and McNay 1983). The population, however, continued to decline because of poor recruitment. By the early 1980s, moose densities in Unit 9E were 60% below peak levels, and calf:cow ratios were very low despite evidence that range conditions had improved. A 1983 census in the central portion of Unit 9E resulted in a rough estimate of 2,500 moose. Estimates for moose in other units during this time were: Unit 9C outside of Katmai National Park - 800; Unit 9B - 2,000; Unit 9A - 300; and Unit 9D - 600. During the 1990s and early 2000s, the Unit 9 moose population was considered stable to declining in localized areas. Recently the Unit 9 population is thought to be slowly decreasing with the possible exception of Unit 9E which appeared to finally stabilize.

¹ At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

In response to increasing hunting pressure in the 1980s when moose were declining in Unit 9E and stable in other areas, the Board of Game eliminated cow harvest in Unit 9E (1983), reduced and eventually eliminated cow harvest in Units 9B and 9C (1984, 1991), shortened nonsubsistence hunting seasons in Units 9E and 9C (1987–1988), and expanded the 50"/3 bull bag limit to Units 9B and 9C (1991) (Sellers 1990). Also during this period, federal agencies agreed to a moratorium on permitting additional guides and outfitters on federal lands. Average number of hunters decreased to 569 hunters during the 1990s, 414 hunters during the 2000s, and 337 during the last reporting period. Declining hunter participation more recently can be attributed to crashing caribou populations on the Alaska Peninsula that reduced and then eliminated the possibility of simultaneously hunting caribou (Butler 2006).

Brown bear predation on neonatal moose was considered the primary limiting factor of moose on the Alaska Peninsula from the 1990s through the present, and widely fluctuating calf:cow ratios were normal for Unit 9 (Sellers 1990, Butler 2008). Illegal cow harvest contributed to population declines in areas accessible to villages (Butler 2008). Household surveys conducted by the Division of Subsistence of Unit 9 communities and testimonies of village residents indicated that many moose harvests were not reported by hunters or were illegally harvested. For example, the villages of Igiugig, Kokhanok, and Nondalton reported a combined harvest of 1 moose during 2001, whereas household surveys by the Division of Subsistence estimated a combined harvest of 123 moose for the 3 villages (Community Subsistence Harvest Information System, <http://www.adfg.alaska.gov/sb/CSIS>). In 2005, Igiugig and Kokhanok reported harvesting 3 moose under state hunts, but Krieg et al. (2008) estimated a harvest of 29 moose for the 2 villages. Much of the unreported harvest occurred during closed seasons and a significant proportion of the animals taken were cow moose according to village residents.

Tensions between subsistence, resident, and nonresident hunters increased with the decline of caribou populations throughout Unit 9 during the 2000s (Butler 2008). At the suggestion of the Board of Game, a working group of stakeholders was formed to address user group conflicts. The Unit 9 Moose Working Group met in 2010 and drafted recommendations for moose management including a transition to registration permit hunts, and providing educational outreach on moose conservation and wolf trapping to Unit 9 residents.

MANAGEMENT DIRECTION

POPULATION OBJECTIVES

Population objectives for moose in Unit 9 are to 1) maintain existing densities in areas with moderate (0.5–1.5 moose/mi²) or high (1.5–2.5 moose/mi²) densities, 2) increase low density populations (where habitat conditions are not limiting) to 0.5 moose/mi², and 3) maintain sex ratios of at least 25 bulls:100 cows in medium to high density populations and at least 40 bulls:100 cows in low density areas.

In March 1999 the Board of Game found that moose in Units 9B, 9C, and 9E met the criteria to be considered “important for providing high levels of human consumptive use” under the state’s intensive management law. Intensive management objectives (Alaska Administrative Code 5AAC 92.108) are as follows:

Population	Finding	Population objective	Harvest objective
Unit 9A	negative		
Unit 9B	positive	2,000–2,500	100–250
Units 9C and 9E	positive	3,000–3,700	165–320
Unit 9D	negative		

METHODS

We conducted fall sex and age composition surveys within established trend areas in Units 9B, 9C, and 9E during November through early December when adequate snow cover was available. Staff conducted a geospatial population estimator (GSPE) survey in Unit 9B in March 2012, the first attempt to use this technique in Unit 9.

Under the new registration permit hunts, hunters were required to report hunting activities to the department. We used that hunt data to monitor harvest during the reporting period.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Low moose density and patchy distribution, linear habitat over very large landscapes, inadequate knowledge of moose movements, poor weather conditions, and inadequate snow cover hinder our attempts to estimate moose abundance on the Alaska Peninsula. Most trend areas are surveyed irregularly and incompletely from year to year.

The 2012 GSPE survey flown in Unit 9B resulted in a population estimate of $1,160 \pm 278$ (90% CI) and density of 0.3 moose per mi^2 , outside of national park boundaries. This was a low density population based on our management objectives. Lake Clark National Park reported approximately 540 moose present inside the park in 2010 for an approximate total of 1,700 moose in Unit 9B. Moose densities presumably remained low in Units 9A, 9B, 9D, and the southern portion of Unit 9E during the reporting period. Hunter success rate in Unit 9C decreased from an average of 34% in the 1990s to 22% during the 2010s, suggesting a decrease in moose density, unlike the other subunits where hunter success was stable. Coincidentally, from 1990 to 2013, the human population of Unit 9C (which is roughly the same as Bristol Bay Borough) also declined by 34% (Williams 2000, Alaska Department of Labor and Workforce Development 2015), which may have contributed to declining moose harvest.

Population Composition

The same problems apply to composition surveys for moose in Unit 9, particularly the lack of snow before December (when bulls shed antlers) in the central and southern portions of the peninsula. In 2011 a composition count in Unit 9B outside of Lake Clark National Park indicated 16 calves:100 cows, and 33 bulls:100 cows (Table 1). In Unit 9C a composition count yielded 27

bulls:100 cows and 9 calves:100 cows in 2011. A 2012 survey was abandoned after only 42 moose were observed. The bull management objective was exceeded in Units 9C and 9E in 2010, and was below in Unit 9B in 2011 assuming low moose density (<0.5 moose/mi²) (Table 1).

MORTALITY

Harvest

Seasons and Bag Limits. In Unit 9A, residents could hunt 1–15 September and nonresidents could hunt 5–15 September, both with a bag limit of 1 bull. In Unit 9B nonresidents could hunt 5–15 September with a bag limit of 1 bull with ≥ 50 -inch antlers or ≥ 4 brow tines on at least one side. Unit 9B residents could hunt 1–15 September and 15 December–15 January, with a bag limit of 1 bull. Only antlered bulls could be harvested during the 15 December–15 January hunt. In 1997, meat of moose taken in Unit 9B was required to remain on the bone until processed for human consumption. The federal subsistence season in Unit 9B was 20 August–15 September and 1 December–15 January with a bag limit of 1 bull.

The nonresident season dates in Unit 9C were the same as for Unit 9B; however, the nonresident bag limit was 1 bull with ≥ 50 -inch antlers or ≥ 3 brow tines on at least one side. The resident fall season was 1–15 September throughout Unit 9C, but resident winter season dates were different between the Naknek River drainage and the remainder of Unit 9C. Within the Naknek drainage the state hunting season was open 1–31 December, while the remainder of Unit 9C was open 15 December–15 January. The bag limit was 1 bull; however only antlered bulls could be harvested during the winter season. Within the southern portion of the Naknek drainage, the federal subsistence season was open 20 August–15 September and 1–31 December with a bag limit of 1 bull under a registration permit. The winter season was open only to local rural residents of Units 9A, 9B, 9C, and 9E.

The nonresident season in Unit 9E was 10–20 September, and the bag limit was 1 bull with an antler spread of ≥ 50 inches or ≥ 3 brow tines on at least one side. The resident season was 10–20 September and 1 December–20 January in Unit 9E. The resident bag limit in Unit 9E was 1 bull; however, moose taken 10–20 September were required to have a spike or fork, an antler spread of ≥ 50 inches, or ≥ 3 brow tines on at least one side and moose taken during 1 December–20 January were required to be antlered. The federal subsistence season in Unit 9E was open 20 August–20 September and 1 December–31 January with a bag limit of 1 bull. Only antlered bulls could be harvested during the 1 December–31 January hunt.

Unit 9D was open to residents only 15 December–20 January with a bag limit of 1 bull under state regulations. Federal subsistence permits were issued in Unit 9D for a federal hunt with the same season and bag limit. However, the federal season was scheduled to close once 10 bulls had been harvested from both the state and federal hunts combined.

Alaska Board of Game Actions and Emergency Orders. In March 2011 the board converted all moose hunts in Unit 9 from a general harvest ticket hunt to a registration permit hunt. Fall season dates were also extended by 5 days in Units 9C (from 1–15 September to 1–20 September) and 9E (from 10–20 September to 10–25 September). The proposal for these season extensions was precipitated by the high bull:cow ratios observed in Unit 9C and 9E composition surveys in recent years.

Federal Subsistence Board Actions. No changes were made to the federal moose hunting regulations in Unit 9 during this reporting period.

Harvest by Hunters. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY11 = 1 July 2011–30 June 2012). Reported moose harvests ranged between 84 and 177 moose annually since RY03 (Table 2). Although hunters were concerned when the Board of Game changed the winter season bag limit from 1 bull to 1 antlered bull in 2009 for Units 9B, 9C and 9E, reported participation and harvest increased during the reporting period from a record low in RY10, possibly stabilizing a downward trend that began in the 1990s; however, it is also probable that the recent switch to registration permit hunts has resulted in better reporting of hunting activity.

Hunter Residency and Success. Participation in the Unit 9 moose hunt decreased to 260 hunters in 2010 but increased to an average of 400 during this reporting period (Table 3). Local hunter success in Unit 9E increased from a low of 7% in RY10, to 29% in RY12; and in Unit 9C increased from 10% in RY09 to approximately 20% during the reporting period. Local hunter success was stable in Unit 9B at about 30%. Nonresident hunter success decreased in Units 9B and 9C during the reporting period to less than resident success, probably because the Board of Game gave resident hunters a 4-day head start on the season beginning in RY11. As usual, nonresident hunter success remained lower than that of residents in Unit 9A. Nonresidents had a higher success rate in Unit 9E (47% and 58% for reporting period) because most were guided and flew out to hunt, and season dates were the same as for residents. Only 2 moose were killed in Unit 9D during the reporting period, both by nonlocal residents.

Permit Hunts. Federal subsistence registration permits are required for the early fall season hunt (FM233) and the December moose hunt (FM232) within the Becharof National Wildlife Refuge in Unit 9C. Participation in these hunts is low.

Harvest Chronology. Since RY03 the majority of the reported moose harvest occurred in September (Table 4). Reported harvest levels during the winter season remained low and ranged from 4% to 16% of the total harvest. However, the total winter harvests exceed reported values according to many sources.

Transportation Methods. No major change in transportation type occurred during this reporting period. Aircraft continue to be the most common method of transportation reported in Unit 9. Boats were the second most common method of transportation (Table 5).

Other Mortality

Moose calf production and condition appear to be good, but calf recruitment has remained low. Bear predation of neonatal moose appears to remain a primary factor. Bear:moose ratios in Unit 9 ranged from >1:1 to 1:10, and were much higher than predator:prey ratios within the indigenous range of moose in Alaska (Sellers 2002).

CONCLUSIONS AND RECOMMENDATIONS

GSPE surveys should be added as an activity to, and planned for, Units 9B, 9C and 9E to be conducted during years when snow is abnormally abundant. We do not have adequate data to

assess if moose density objectives have been achieved. Bull:cow ratio in Unit 9C apparently declined below the desired objective of 40 bulls:100 cows. An unknown number of unreported moose are taken each year, many of which are cows. These illegal practices primarily occur in specific geographic areas and are not pervasive enough to impact the overall Unit 9 moose population.

Brown bear predation on neonate moose is the major factor limiting the moose population in Unit 9. However, altering bear:moose ratios would require substantial reduction in bear densities to achieve a measurable improvement in moose calf survival. The drastic reduction in bear numbers required to improve moose calf survival would probably be opposed by a powerful segment of the public. Concern about local, detrimental effects of illegal moose harvest is addressed regularly during public meetings and through law enforcement efforts, but a cessation of these practices will not occur without community support and involvement to deter these behaviors. With implementation of the new registration permit hunt, area staff travel to Unit 9 villages to issue hunting licenses and permits. These visits allow for improved exchange of information with the public and afford biologists additional opportunities to address the conservation concerns associated with illegal harvest.

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Table 1. Moose composition counts in Unit 9, Alaska, 2003–2012.

Unit	Year	Bulls: 100 cows	Yearling bulls: 100 cows	Calves: 100 cows	Calf %	Adults	Total moose	Moose/hour
9B	2003	14	3	26	19	74	91	30
	2005	23	6	19	13	158	182	20
	2007	39	4	4	3	71	73	
	2011	33	7	16	11	117	131	
9C	2005 ^a	34	20	19	12	440	502	36
	2006	24	9	9	7	57	61	
	2007	42	9	21	13	231	265	
	2008	47	4	13	8	166	181	
	2009 ^b	35	1	16	10	111	125	
	2010 ^a	48	12	13	8	180	199	18
	2011	27	13	9	7	217	232	
9E	2003 ^b	46	10	10	6	131	140	19
	2005 ^b	25	5	22	15	81	95	19
	2006	39	7	29	17	43	52	27
	2009 ^b	43		33	19	60	74	
	2010	62	18	24	13	172	197	

^a Includes surveys conducted by National Park Service staff.

^b Surveys conducted by U.S. Fish and Wildlife Service staff.

Table 2. Unit 9 annual moose harvest, Alaska, regulatory years^a 2003–2012.

Regulatory year	Reported				Estimated	
	Male	Female	Unknown	Total	Unreported	Total
2003	177	0	0	177	100	277
2004	158	3	0	161	100	261
2005	158	0	2	160	100	260
2006	124	1	0	125	100	225
2007	147	1	0	148	100	248
2008	107	0	0	107	100	207
2009	116	0	0	116	100	216
2010	83	0	1	84	100	184
2011	104	0	1	105	100	205
2012	102	0	0	102	100	202

^a Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2003 = 1 July 2003–30 June 2004.

Table 3. Unit 9 moose hunter residency and success, Alaska, regulatory years^a 2008–2012.

Unit/ Regulatory year	Successful hunters					Unsuccessful hunters					Total hunters	
	Local resident	Nonlocal resident	Nonresident	Unk	Total (%)	Local resident ^b	Nonlocal resident	Nonresident	Unk	Total (%)		
Unit 9B												
2008	17	9	5	1	32 (25)	40	44	14	0	98 (75)	130	
2009	10	12	6	0	28 (31)	27	26	9	1	63 (69)	91	
2010	14	8	4	0	26 (35)	23	23	2	0	48 (65)	74	
2011	29	6	4	1	40 (23)	78	33	19	5	135 (77)	175	
2012	14	16	5	0	35 (21)	74	38	19	4	135 (79)	170	
Unit 9C												
2008	12	5	4	0	21 (23)	50	13	7	0	70 (77)	91	
2009	6	5	5	1	17 (19)	59	13	2	0	74 (81)	91	
2010	16	3	0	0	19 (21)	56	10	5	0	71 (79)	90	
2011	16	6	0	1	23 (21)	70	8	9	0	87 (79)	110	
2012	12	5	2	0	19 (16)	78	11	8	0	97 (84)	116	
Unit 9E												
2008	4	2	41	0	47 (39)	15	12	46	0	73 (61)	120	
2009	4	7	46	6	63 (53)	12	17	26	2	57 (47)	120	
2010	1	3	28	1	33 (42)	14	10	18	3	45 (58)	78	
2011	4	3	30	0	37 (37)	20	8	34	0	62 (63)	99	
2012	6	1	37	2	46 (45)	18	13	25	0	56 (55)	102	
Unit 9 Total ^c												
2008	33	17	54	1	105 (29)	105	79	77	0	261 (71)	366	
2009	20	30	62	7	119 (37)	98	58	39	4	199 (63)	318	
2010	31	17	35	1	84 (32)	93	51	29	3	176 (68)	260	
2011	49	18	38	2	107 (27)	168	54	63	6	291 (73)	396	
2012	32	24	44	2	102 (25)	170	75	54	4	303 (75)	405	

^a Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2008 = 1 July 2008–30 June 2009.

^b Residents of Unit 9

^c Also includes moose harvested in Units 9A and 9D.

Table 4. Unit 9 reported moose harvest chronology percent by period, Alaska, regulatory years^a 2003–2012

Regulatory year	Harvest chronology (%) by period									
	20–31 Aug	1–5 Sep	6–10 Sep	11–15 Sep	16–20 Sep	16–20 Sep	1–15 Dec	16–31 Dec	1–20 Jan	Other
2003	1	7	26	41	15	0	5	4	1	1
2004	0	9	22	45	13	0	6	3	1	1
2005	0	11	20	38	19	0	3	4	4	1
2006	0	12	16	35	25	0	2	4	4	2
2007	1	3	19	44	19	0	6	5	3	0
2008	0	10	15	44	14	0	2	12	2	1
2009	2	7	27	41	18	0	1	2	1	1
2010	1	10	18	39	17	0	5	9	1	0
2011	1	13	12	27	15	10	3	10	4	4
2012	0	3	19	46	14	9	2	3	3	2

^a Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2003 = 1 July 2003–30 June 2004.

Table 5. Unit 9 successful moose hunter percent by transport methods, regulatory years^a 2003–2012

Regulatory year	Transport methods (%)							
	Airplane	Boat	3- or 4- wheeler	Snowmachine	Other ORV	Highway vehicle	Airboat	Unspecified
2003	57	22	8	9	1	2	1	0
2004	62	26	4	3	3	2	0	0
2005	61	26	8	2	0	3	0	0
2006	62	22	5	8	0	1	2	0
2007	68	14	11	5	0	1	1	0
2008	56	21	8	11	2	2	0	0
2009	65	23	6	2	0	2	2	0
2010	53	28	13	5	0	1	0	0
2011	42	33	8	12	1	1	0	2
2012	52	28	13	2	2	2	0	1

^a Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2003 = 1 July 2003–30 June 2004.