Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 – PO Box 115526
Juneau, AK 99811-5526

CHAPTER 36: MOOSE MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013[1]

LOCATION

GAME MANAGEMENT UNITS: Units 26B and 26C (26,000 mi^2)

GEOGRAPHIC DESCRIPTION: North Slope of the Brooks Range and Arctic Coastal Plain east of the Itkillik River

BACKGROUND

Moose were scarce in Arctic Alaska prior to the early 1950s. Predation, as well as hunting, probably contributed to the historical scarcity of moose. During the 1940s to 1950s, populations expanded and became more common and in some places, even abundant, along the limited riparian habitat of major drainages (LeResche et al. 1973). The reduction in wolf numbers by federal control programs during that time period and the movement of Nunamiut people from inland/foothills to coastal locations were likely important in allowing moose populations to increase and become established in most of the riparian shrub habitat on the North Slope. This area represents the northern limit of moose range in North America, and habitat limits the potential size of moose populations.

The total number of moose in Units 26B and 26C probably peaked during the late 1980s at approximately 1,400 moose (Martin and Garner 1984; Mauer and Akaran 1994; Lenart 2004, 2008). Numbers of moose declined in the early 1990s by at least 50% and remained at lower numbers throughout the 1990s (Mauer 1997, Lenart 2008). The decline in moose numbers appeared to be widespread on the North Slope, including Unit 26A (Carroll 1998, Lenart 2006). Although surveys were not conducted in Unit 26C during the 1990s, we suspected moose numbers were also very low, based on anecdotal observations from residents, biologists, and hunters. Historical survey data for trend count areas can be found in Mauer 1997 and Lenart 2008. During the 2000s, the moose population slowly increased in Unit 26B and stabilized at approximately 500 observable moose. Surveys conducted in central Unit 26C on the coastal plain during the 2000s indicated moose numbers appeared to be stable at 50–60 observable moose. Approximately 200 moose were observed in surveys conducted in eastern Unit 26C in the Brooks Range in the early 2000s.

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

The low numbers of moose observed during the early 1990s resulted in closing the moose hunting seasons in Units 26B and 26C beginning in fall 1996. Two moose hunting seasons were reopened in regulatory year (RY) 2006 (e.g., RY06 = 1 July 2006–30 June 2007) in Unit 26B (excluding the Canning River drainage) to resident hunters only by drawing permit for a fall season and by general harvest ticket for a late winter season. Unit 26C remains closed to moose hunting. Regulations varied somewhat prior to closure of the hunting season in RY96; a historical summary can be found in Lenart (2008).

Kaktovik and Nuiqsut are the only communities within or near the area, and residents took 2–6 moose annually prior to the season closure in 1996. Local harvest was small because moose were scarce near Kaktovik and because most hunting by Nuiqsut residents occurred in the Colville River drainage in adjacent Unit 26A.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain viable populations of moose in their historic range throughout the region.
- Provide a sustained opportunity to harvest moose.
- Provide opportunity for viewing and photographing moose.

MANAGEMENT OBJECTIVES

- In Unit 26B, maintain a population of ≥300 moose with a 3-year mean proportion of ≥15% short yearlings in the population.

  Activities:

  - Conduct annual surveys during April.
  - Maintain an open moose season when the objective is met.

- In Unit 26C, maintain a population of ≥150 moose with a 3-year mean proportion of ≥15% short yearlings in the population.

  Activity: Maintain an open moose season when the objective is met.

- Maintain a bull:cow ratio of ≥35:100 when hunting seasons are open.

METHODS

POPULATION STATUS AND TREND

Population Size and Composition

A total count in trend count areas, rather than random sampling, is the most effective population survey method on the North Slope due to the limited and relatively open nature of winter moose habitat with its sparse, low vegetation. Moose are limited almost entirely to riparian shrub habitat during winter.

Unit 26B. During RY01–RY13, all surveys in Unit 26B were conducted in April by Alaska Department of Fish and Game (ADF&G) staff using a Piper PA-18 flown at 70–90 mph and/or a

Cessna 185 flown at 95–120 mph, at altitudes of 300–700 feet above ground level. During RY98–RY00, surveys in Unit 26B were conducted during April or May by Arctic National Wildlife Refuge (ANWR) staff in Unit 26B East (see below) and by ADF&G staff in Unit 26B West (see below) using a Cessna 185.

Moose were classified as short yearlings (11-month-old calves) and adults in surveys conducted by ADF&G staff. In 2002, spring surveys were conducted in early May when early antler development on males had initiated. Moose in this year were classified as bulls, cows, and short yearlings. Identification of bulls was likely conservative because we probably misclassified young bulls with little early antler development.

Survey data are reported as Unit 26B East, Unit 26B West (excluding the Itkillik River), Unit 26B West, Itkillik River drainage, and as central Unit 26C and eastern Unit 26C. In some years additional drainages or portions of drainages in Unit 26B were surveyed to determine extent of redistribution and these data are also reported as total moose observed in Unit 26B. Areas were analyzed and reported separately based on historical data collection to provide comparisons over a longer period of time. Recent data were also combined for some analyses because methods were standardized across all of Unit 26B. The geographic areas for each trend count areas and drainages included in the survey are described below:

Unit 26B East — This area encompasses Unit 26B east of the Sagavanirktok River, including a portion of the Canning River in Unit 26C. (The west bank of the Canning River is the boundary between Units 26B and 26C). Moose in Unit 26B East are found primarily in the northern foothills of the Brooks Range. The following drainages were surveyed as weather permitted: Sagavanirktok River from Happy Valley to Sagwon, Accomplishment Creek, Lupine River, Saviukviayak River, Flood Creek, Ivishak River, Gilead Creek, Echooka River, Shaviovik River, Juniper–Fin Creek, Kavik River, and Canning River. All of these drainages were surveyed during this report period (RY11 and RY12) and in RY13.

Unit 26B West, excluding the Itkillik River — This area encompasses Unit 26B west of the east bank of the Sagavanirktok River. Moose in Unit 26B West are found along major drainages on the coastal plain. Surveys were conducted along riparian willow habitat on the Sagavanirktok River from Happy Valley to Sagwon Bluffs and on the Toolik and Kuparuk rivers starting at approximately 68°52′N latitude to the White Hills or as moose habitat disappeared. All of these drainages were surveyed during this report period (RY11 and RY12) and in RY13.

Unit 26B West, Itkillik River drainage — Parts of the Itkillik River have been surveyed by ADF&G staff periodically since 1981. The lower Itkillik River (from Itkillik Lake downstream to the end of moose habitat) was surveyed in April or May during RY98–RY03. In RY98 a portion of the upper Itkillik (upstream of Itkillik Lake) was also surveyed. Beginning in RY04, we surveyed the Itkillik River in April from its mouth upstream to the headwaters. This area was also surveyed during this report period (RY11 and RY12) and in RY13.

Additional Areas in Unit 26B — During RY05–RY13, we surveyed additional drainages in some years. These included a portion of the upper Canning River upstream of Eagle Creek

(RY05 and RY11–RY13), the upper Sagavanirktok River upstream of Happy Valley to the extent of moose habitat in the upper Sagavanirktok (RY05, RY08–RY13), Oksrukuyik Creek (RY07–RY13), Ribdon River (RY11–RY13), and the Shaviovik River (RY12 and RY13). During this report period (RY11 and RY12) and in RY13, all of the additional areas listed above were surveyed.

Unit 26C. Surveys in Unit 26C were conducted using a Cessna 185 or 206 flown at 95–120 mph, at altitudes of 300–700 feet above ground level. Moose were not classified during the April surveys. Moose were classified as cow, bull, yearling bull, and calf during the early winter surveys.

Central Unit 26C — This area encompasses drainages in central Unit 26C east of the Canning River and the lower Kongakut River below Drain Creek. This area was surveyed by ANWR staff during April 2003, 2005, 2007, 2009, 2011 and 2014. Moose were not classified. The following drainages were surveyed as weather permitted: Itkilyariak, Sadlerochit, Hulahula, Okpilak, Jago, Aichilik, Leffingwell, Egaksrak, Ekaluakat, and lower Kongakut.

Eastern Unit 26C — In eastern Unit 26C, the upper drainages of the Kongakut River (upstream of and including Drain Creek) and Firth River–Mancha Creek were surveyed by ANWR staff during early winter 1991, 2000, and 2002 and by ADF&G staff in 2011.

Twinning Surveys

In early June 2007 and 2009, we conducted twinning surveys along riparian willow habitat in Unit 26B in the west and middle fork of Kuparuk River; Oksrukuyik Creek; Ivishak and Lupine rivers; Gilead, Juniper, and Fin creeks; and parts of the Sagavanirktok and Canning rivers. All moose observed were classified as bull; yearling cow; adult cow without a calf; or adult cow with single, twin, or triplet calves. Twinning rate was calculated as the proportion of cows with twins or triplets in the sample of all cows with calves. Twinning surveys were not conducted during this report period (RY11 and RY12).

HARVEST

Harvest and hunting pressure were monitored using harvest and drawing permit reports. One or 2 reminder letters were sent to hunters who did not report. Drawing permit holders also usually received an e-mail and telephone calls if we did not receive drawing permit reports. We summarized data on hunter residency, hunter success, harvest chronology, and transport methods. Total harvest, residency and success, chronology, and transportation data were summarized by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

A moose population survey has not been conducted in the entire area of Units 26B and 26C, but the terrain and sparse, low vegetation in these units makes trend surveys appropriate for counting a large percentage of the moose in areas supporting major concentrations.

Unit 26B.

Unit 26B East — During RY11 and RY12, 242 and 176 moose were observed during April surveys, respectively (Table 1). By RY13 the number of moose observed declined to only 41 moose during April surveys. The highest concentrations of moose were found along the Echooka, Ivishak, Kavik, and Canning rivers. Moose numbers had been slowly declining following the peak observed during the mid- to late 2000s when numbers were slightly above 300 moose (Table 1). The peak was preceded by a population decline that occurred in the late 1990s when the lowest numbers of moose observed during April surveys was 146 moose in RY00 (Lenart 2006).

Unit 26B West, excluding the Itkillik River — During RY11 and RY12, 79 and 56 moose were observed during April surveys, respectively (Table 2). By RY13 the number of moose observed declined to only 19 moose during April surveys. Most of the moose observed in Unit 26B West were in the Kuparuk River drainage. Moose numbers peaked during the mid- to late 2000s to 175 moose (Table 2). However, during RY08–RY11 we estimated approximately a 50% decline in observable moose compared to the previous 4 years when the peak had occurred ($\bar{x}$ = 71 moose; Table 2), indicating that the decline was more marked in Unit 26B West. Similar to Unit 26B East, moose in Unit 26B West had experienced a population decline in the early 1990s and recovered during the 2000s (Lenart 2006), until this most recent decline.

Unit 26B West, Itkillik River — During RY11 and RY12, 61 and 57 moose were observed during April surveys, respectively (Table 3). By RY13 the number of moose observed declined to 14 moose during April surveys. Prior to RY13, the number of moose observed in the Itkillik River drainage had remained relatively stable (range: 50–73 moose) during RY04–RY12 (Table 3).

All Unit 26B — During RY11 and RY12, 464 and 396 moose were observed during April surveys, respectively (Table 4). By RY13 the number of moose observed declined to 109 moose during April surveys. Moose numbers peaked during the mid- to late 2000s to 606 moose (Table 4) and gradually declined beginning in RY09 (Table 4). This trend follows the same trends observed in the separate trend count areas analyzed in Unit 26B, with the exception of the Itkillik River drainage. Additionally, moose numbers and recruitment declined in Unit 26A beginning in RY08 (L. S. Parrett, Wildlife Biologist, ADF&G, personal communication, 2011).

Unit 26C.

Central Unit 26C — No surveys were completed during RY11 and RY12. In RY13 only 22 moose were observed in central Unit 26C, indicating the population declined by approximately 50% compared to moose observed during RY02–RY10 when moose numbers were relatively stable ranging 47–61. ANWR staff observed 52 moose in RY02, 47 in RY04, 59 in RY06, 61 in RY07, and 48 in RY10 (E. Wald, USFWS, personal communication, 2014).

Eastern Unit 26C — During this report period, moose were surveyed in RY11 only. A total of 339 moose were observed in eastern Unit 26C in RY11 during an early winter survey in the upper Kongakut River (upstream of and including Drain Creek) and Firth River–Mancha Creek drainages. Results of the 339 moose observed in 2011 included 118 bulls (15 yearling bulls), 169 cows, and 52 calves (Table 5). In the upper Kongakut River, search time was 2 hours, 17 minutes and 127 moose were observed in 27 groups composed of 50 bulls, 56 cows, and 21 calves. In the

Firth River–Mancha Creek drainage, search time was 7 hours, 55 minutes and 212 moose were observed in 69 groups composed of 68 bulls, 113 cows, and 31 calves. We surveyed a portion of the Firth River–Mancha Creek drainage in early winter 2010 to determine if moose numbers increased since the 2002 survey (227 moose) and a complete survey was warranted. A total of 109 moose were observed including 43 bulls (2 yearling bulls), 53 cows, and 13 calves and survey time was 3 hours, 25 minutes. Results of this partial survey indicated there was likely more moose in the eastern Unit 26C in 2010–2011 compared to the early 2000s (Table 5).

No surveys were conducted in eastern Unit 26C during 2003–2009. ANWR staff observed 406 in 1991, 157 in 2000, and 227 in 2002 (Table 5). Direct comparisons between surveys before and after 2010 are problematic due to differences in search time, area searched, survey airplanes, and moose classification protocol; therefore some caution should be taken in interpreting the extent of increase in population size between 2002 and 2011.

Population Composition

Unit 26B.

Unit 26B East — During RY11 and RY12, the proportion of 11-month-old calves (short yearlings) in the population was 7% and 10%, respectively (Table 1). In RY13, no short yearlings were observed. The proportion of short yearlings during RY11 and RY12 was similar to previous years beginning RY08, just before the population began to decline. During RY99–RY07, the proportion of short yearlings was moderately good, ranging 13–22%, except in RY03 when it was 6% (Table 1). During this time period, the population increased and peaked (Table 1).

Bull:cow ratios were not available during RY03–RY12 because surveys were conducted after bulls had shed antlers and prior to early antler development. However, based on surveys conducted prior to 1998 (Mauer 1997, Lenart 2006), bull:cow ratios are likely high (≤60:100). In addition, we observed a high bull:cow ratio of 72:100 during a spring survey in May 2002. This is likely conservative because we probably misclassified young bulls with little early antler development.

Unit 26B West, excluding the Itkillik River — During RY11 and RY12, the proportion of 11-month-old calves (short yearlings) in the population was 21% and 9%, respectively (Table 2). In RY13, no short yearlings were observed. Short-yearling proportions were substantially higher in RY11 (21%) in contrast to proportions observed in Unit 26B East (7%). Otherwise, proportions observed in Unit 26 West were similar to Unit 26B East (Tables 1 and 2).

Bull:cow ratios were not available in Unit 26B West during RY03–RY12 because surveys were conducted after bulls had shed antlers and prior to early antler development. During the May 2002 survey in Unit 26B West, we observed a ratio of 34 bulls:100 cows, substantially lower than the bull:cow ratio observed in Unit 26B East. Although we have no data on movements, it is possible that some bulls leave Unit 26B West after the rut and winter in the foothills in Unit 26B East.

Unit 26B West, Itkillik River — During RY11 and RY12, the proportion of 11-month-old calves (short yearlings) in the population was 25% and 5%, respectively (Table 3). In RY13 no short

yearlings were observed. In RY11 the proportion of short yearlings (24%) was the highest observed since RY03 (Table 3). This was similar to the proportions observed in Unit 26B West.

All Unit 26B — During RY11 and RY12, the proportion of 11-month-old calves (short yearlings) in the population was for the combined survey areas of Unit 26B East, Unit 26B West, Itkillik River drainage, and miscellaneous survey areas was 13% and 9%, respectively (Table 4). In RY13 no short yearlings were observed. These numbers were similar to proportions observed when the areas were analyzed separately. The overall bull:cow ratio in the Unit 26B survey areas in May 2002 was 57:100.

Unit 26C

Central Unit 26C— No data were available on the proportion of short yearlings in central Unit 26C during RY02–RY13 because moose were not classified during spring surveys.

Eastern Unit 26C — During RY11 the bull:cow ratio was 70 bulls:100 cows and the calf:cow ratio was 13 calves:100 cows in the upper Kongakut (upstream from Drain Creek) and the Firth River–Mancha Creek drainages of eastern Unit 26C, indicating bull:cow ratios were good (Table 5). The yearling bull:cow ratio was 11 yearling bulls:100 cows (Table 5). These are lower than ratios observed in 2000 and 2002 when >100 bulls:100 cows and 35 and 24 calves:100 cows and 26 and 21 yearling bulls:100 cows were observed in the population (Table 5). As noted previously, detection of trends in moose composition over time is difficult due to differences in search time, area searched, survey airplanes, and moose classification protocol.

Twinning Rates

No twinning surveys were conducted during RY11 and RY12. In June 2007 we observed 9 cows with single calves and 1 cow with twins. In June 2009, we observed 10 cows with single calves and 1 cow with twins. Sample sizes were too small to estimate twinning rates (Boertje et al. 2007).

Distribution and Movements

Moose were generally associated with narrow strips of shrub communities along drainages, except during calving and summer when some seasonal movement occurred away from the riparian corridors. Historically, the greatest concentrations occurred along the Canning, Kavik, Ivishak, Toolik, Kuparuk, Itkillik, and Kongakut rivers and Juniper and Fin creeks. Moose movements have not been intensively studied, but surveys indicate there may be movements within or between North Slope drainages. Telemetry studies show that many moose that winter in the upper Kongakut River migrate south and east to summer on the Old Crow Flats in Yukon, Canada (Mauer 1998), and that moose in the Colville River area in Unit 26A are resident, rather than seasonally migratory (Carroll 2004).

MORTALITY

Harvest

Season and Bag Limit. There was no open season for moose in Units 26B during RY96–RY05 or in Unit 26C during RY96–RY11.

Units and Bag Limits	Resident Open Season	Nonresident Open Season
RY06–RY12 Unit 26B, excluding the Canning River drainage.		
RESIDENT HUNTERS: 1 bull by drawing permit; up to 30 permits may be issued, or	1 Sep–14 Sep	No open season
1 bull.	To be announced; up to a 14-day season during 15 Feb–15 Apr	

Alaska Board of Game Actions and Emergency Orders. In RY96 the hunting season was closed in Units 26B and 26C. The season was closed in Unit 26B through RY05 and remains closed in Unit 26C. During the March 2000 meeting, the Alaska Board of Game (board) determined that a harvest of 60–80 moose was necessary to satisfy subsistence needs in Unit 26. In March 2006 the board authorized 2 moose seasons to begin during fall 2006 in Unit 26B, excluding the Canning River drainage. These seasons were opened to resident hunters only and include up to 30 drawing permits for bulls during 1–14 September and up to a 14-day general season for bulls to be announced during 15 February–15 April. In November 2007 the board revised the amounts reasonably necessary for subsistence opportunity (ANS) in Unit 26 to 21–48, including 15–30 in Unit 26A, leaving 6–18 moose available to satisfy the ANS in Units 26B and 26C combined. No board actions occurred during December 2007–February 2011.

During the board meeting in March 2012, the board authorized a drawing permit hunt of up to 30 permits for residents and nonresidents in eastern Unit 26C in the drainages of the upper Kongakut River (upstream of and including Drain Creek) and the Firth River–Mancha Creek. The bag limit is 1 bull for residents and 1 bull with 50-inch antlers or 4 or more brow tines on one side for nonresidents. The season for both residents and nonresidents is 1–25 September. This area is on federal land and is currently closed to non-federally qualified hunters. The department requested a federal closure review by the Federal Subsistence Board for the upper Kongakut River and Firth River–Mancha Creek drainages due to new biological information. The Federal Subsistence Board did not lift the closure during their review in 2013. The drawing hunt will be implemented when or if the federal closure is removed.

Emergency orders to open the general moose season in Unit 26B were issued during RY06–RY12. The 14-day season during RY06–RY10 ranged 1–15 April.

Federal Subsistence Board — In RY96, federal public lands in Units 26B and 26C were closed to the taking of moose for all hunters. In 2004 the Federal Subsistence Board established a federal registration hunt on federal public lands in Units 26B and 26C for residents of Kaktovik, with a harvest quota of 3 moose. No more than 2 bulls may be harvested from Unit 26C. Three permits were issued annually to residents of Kaktovik, with an open season of 1 July–31 March. In RY07 the federal season was opened in Unit 26B to non-federally qualified Alaska residents to coincide with state regulations which opened a season in RY06. In RY12 the Federal Subsistence Board granted an emergency special action request and extended the moose season

to 14 April and increased the moose harvest quota to 4 by allowing the take of 1 additional moose in Unit 26B remainder.

Harvest by Hunters.

Unit 26B — Moose were reported harvested or hunted under the general hunting season in Unit 26B during RY06–RY12, which was open in April. However, most of the reported hunting on the general season harvest ticket was illegal because it took place in September when there was not a general moose hunting season (Table 6). In RY10 the first legal moose was reported harvested under the general season in April. Prior to the 1996 hunting season closure, the reported moose harvest in Unit 26B was relatively stable during the early 1990s, ranging 24–37, except in RY92, when harvest was 45 (Lenart 2006).

Harvest in drawing permit hunt DM966 (Unit 26B, excluding the Canning River drainage) during RY06–RY12 ranged 2–11 moose harvested by 4–20 hunters (Table 7). During RY06–RY12, 10 to 25 permits were issued (Table 7).

Hunter Residency and Success. The moose season in Unit 26B was open only to Alaska residents during RY06–RY12. Success rates ranged 25–69% (Table 8). Prior to the 1996 closure (RY90–RY95), Alaska residents living outside the area represented the majority of the resident hunters in Units 26B and 26C (Lenart 2008).

Harvest Chronology. During RY06−RY12, 67−100% of moose were harvested within the first week of September (Table 9). The remaining moose were taken during the second week of September; except in RY10, when 1 moose was harvested in April.

Transport Methods. Aircraft was the most common method of transport for successful hunters during most years (Table 10). In RY07 the most common method was split among airboat, aircraft, and highway vehicle (33% each). In RY09, airboat was the most common method of transport for successful hunters (67%), while highway vehicle represented the remaining 33% (Table 10).

Unit 26C — There has been no open state hunting season in Unit 26C since 1996. During RY90–RY95, harvest was low and ranged 3–6 moose taken by 5–12 hunters (Lenart 2006). Since RY06, 0–2 moose were harvested annually by federally qualified hunters using federal permits.

Natural Mortality

No intensive studies of the rate or causes of moose mortality were conducted in Units 26B and 26C. The decline in the early 1990s was probably due to a combination of mortality factors unrelated to humans.

Among radiocollared moose in Unit 26A along the Colville River, the average annual mortality rate was 6.7% during 1996–2003 (Carroll 2004). This suggests that mortality rates for adult female moose may have also been relatively low in Units 26B and 26C during the same time period.

CONCLUSIONS AND RECOMMENDATIONS

Moose on the eastern North Slope in Unit 26B and central Unit 26C experienced a severe population crash in spring 2014. The population declined by approximately 75% during 2013 to 2014 in Unit 26B with no short yearlings observed in spring 2014. Similarly, the population in central Unit 26C declined by approximately 50% with no short yearlings observed. Moose numbers in eastern Unit 26A also experienced a severe decline in RY13 (G. Carroll, ADF&G, personal communication, 2014). The severe decline from 2013 to 2014 may have been a result of poor nutrition related to a very late spring in 2013, resulting in high adult mortality and little or no recruitment. Predation by wolves on weakened moose may have also contributed as few alternate prey inhabit Unit 26B and central Unit 26C during winter. Some Teshekpuk caribou winter in eastern Unit 26A and western Unit 26B, but most of the Central Arctic caribou herd winters south of the Brooks Range. Moose in Units 26B and 26C inhabit the most northern extent of their range in Alaska, potentially making them more vulnerable to climatic or nutritional stresses. The population began to decline in spring 2010 in both population size and recruitment, indicating that either some nutritional, disease, or climatic factor had initiated a decline. A substantial population decline had occurred previously during the mid- to late 1990s, but not as markedly as this most recent crash (Lenart 2008).

MEETING GOALS AND OBJECTIVES

During RY11 and RY12, we met our first goal of maintaining viable populations of moose in their historic range throughout the region. We met our second goal by continuing to provide an opportunity to harvest moose. Moose were also available for viewing and photographing during RY11 and RY12, our third goal.

We met a portion of our first objective in Unit 26B during RY11 and RY12, as the population remained ≥300 moose. We did not meet the second portion of our objective, to maintain the 3-year mean proportion of short yearlings in the Unit 26B population at ≥15%. The 3-year mean proportion of short yearlings was 10% during RY10–RY12 (Table 4).

We likely met the portion of our second objective in Unit 26C to maintain a population of ≥150 moose. In RY10 we observed only 48 moose in spring 2011; but observed 339 in eastern Unit 26C in early winter 2012, indicating that the population was likely ≥150 moose during RY11 and RY12. We do not know if we met the 3-year mean (RY10–RY12) proportion of ≥15% short yearlings in the population because moose were not classified in central Unit 26C and we classified moose in early winter in eastern Unit 26C. However, 15% of the moose observed in early winter were 5-month-old calves.

The third population objective, to maintain a posthunting sex ratio of 35 bulls:100 cows when hunting seasons are open, was likely met during RY11 and RY12. Based on the high bull:cow ratios observed in early May 2002 (57:100), and little hunting pressure during RY06–RY12, we believe our bull:cow ratios exceeded 35:100 in Units 26B.

RECOMMENDATIONS

The population exceeded 300 moose in the Unit 26B population during the report period; although we did not maintain a 3-year mean proportion of ≥15% short yearlings. For RY13 we initially determined that even during years of low recruitment there is likely a small harvestable

surplus and issued 12 drawing permits to Alaska residents for the fall hunt in RY14. Issuance of drawing permits occurred prior to the survey we conducted in April 2014. Because the population experienced a severe decline, we closed all moose seasons in Unit 26B for RY14. We recommend keeping the seasons closed until the population recovers to 300 moose and a harvestable surplus.

REFERENCES CITED

Boertje, R. D., K. A. Kellie, C. T. Seaton, M. A. Keech, D. D. Young, B. W. Dale, L. G. Adams, and A. R. Aderman. 2007. Ranking Alaska moose nutrition: Signals to begin liberal antlerless harvests. Journal of Wildlife Management 71:1494–1506.

Carroll, G. M. 1998. Unit 26A moose. Pages 457–471 [*In*] M. V. Hicks, editor. Moose management report of survey and inventory activities 1 July 1995 through 30 June 1997. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Study 1.0, Juneau.

Carroll, G. M. 2004. Unit 26A moose. Pages 597–612 [*In*] C. Brown, editor. Moose management report of survey and inventory activities 1 July 2001–30 June 2003. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Project 1.0, Juneau.

Lenart, E. A. 2004. Units 26B and 26C moose. Pages 613–628 [*In*] C. Brown, editor. Moose management report of survey and inventory activities 1 July 2003–30 June 2005. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Project 1.0, Juneau.

Lenart, E. A. 2006. Units 26B and 26C moose. Pages 652–668 [*In*] P. Harper, editor. Moose management report of survey and inventory activities 1 July 2003–30 June 2005. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Project 1.0, Juneau.

Lenart, E. A. 2008. Units 26B and 26C moose. Pages 668–687 [*In*] P. Harper, editor. Moose management report of survey and inventory activities 1 July 2005–30 June 2007. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Project 1.0, Juneau.

LeResche, R. E., R. H. Bishop, and J. W. Coady. 1973. Distribution and habitats of moose in Alaska. Alaska Department of Fish and Game, Division of Game, Research Report, Federal Aid in Wildlife Restoration Project W-17, Fairbanks.

Martin, L. D., and G. W. Garner. 1984. Population size, composition, and distribution of moose along the Canning and Kongakut Rivers within the Arctic National Wildlife Refuge, Alaska, fall 1983. Pages 119–132 [*In*] G. W. Garner and P. E. Reynolds, editors. 1983 Update Report of the Fish, Wildlife, and their Habitats. U.S. Fish and Wildlife Service, Anchorage, Alaska.

Mauer, F. J. 1997. Moose surveys on the north slope of the Arctic National Wildlife Refuge. U.S. Fish and Wildlife Service, Arctic National Wildlife Refuge, Progress Report FY97–01, Fairbanks, Alaska.

Mauer, F. J. 1998. Moose migration: Northeastern Alaska to northwestern Yukon Territory, Canada. Alces 34:75–81.

Mauer, F. J., and J. Akaran. 1994. North Slope moose surveys on the Arctic National Wildlife Refuge. U.S. Fish and Wildlife Service, Arctic National Wildlife Refuge, Progress Report FY94-02, Fairbanks, Alaska.

PREPARED BY:

Elizabeth A. Lenart
Wildlife Biologist III

APPROVED BY:

Doreen I. Parker McNeill
Management Coordinator

REVIEWED BY:

Kalin A. K. Seaton
Wildlife Biologist III

Laura A. McCarthy
Publications Technician II

Please cite any information taken from this section, and reference as:

Lenart, E. A. 2012. Units 26B and 26C moose. Pages 36-1 through 36-20 [*In*] P. Harper and L. A. McCarthy, editors. Moose management report of survey and inventory activities 1 July 2009–30 June 2011. Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/SMR-2014-6, Juneau.

Table 1. Unit 26B East (east of the Sagavanirktok River, including Canning River) aerial moose composition counts[a,b], regulatory years 1998–2013.

Regulatory year	Adults	Short yearlings[c]	(%)	Unknown	Moose observed	Search time (hr:min)
1998	129	20	(13)	0	149	
1999[d]	151	14	(8)	0	165	
2000				146	146	
2001	148	22	(13)	0	170	
2002	183	41	(18)	0	224	8:19
2003	219	15	(6)	0	234	8:30
2004	226	62	(22)	0	288	9:12
2005	275	60	(18)	0	335	11:08
2006	267	41	(13)	0	308	10:07
2007[e]	262	47	(15)	0	309	13:50
2008	304	35	(10)	0	339	10:18
2009[e]	234	20	(8)	0	254	12:58
2010	209	12	(5)	0	221	10:44
2011[e]	224	18	(7)	0	242	11:59
2012	159	17	(10)	0	176	10:42
2013	57	0	(0)	0	41	10:19

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1998 = 1 July 1998–30 June 1999).
[b] Data source for regulatory years 1998–2000: F. Mauer, U.S. Fish and Wildlife Service, Arctic National Wildlife Refuge, Fairbanks.
[c] Short yearlings are 11-month-old calves.
[d] Moose were not circled and examined closely, so some short yearlings may have been identified as adults.
[e] Longer search time because sightability was not good due to low snow cover.

Table 2. Unit 26B West, excluding the Itkillik River drainage, spring aerial moose surveys, regulatory years[a] 1998–2013.

Regulatory year	Adults	Short yearlings[b]	(%)	Unknown	Moose observed	Search time (hr:min)
1998	50	6	(11)	0	56	n/a
1999	34	10	(23)	0	44	n/a
2000	65	5	(7)	0	70	2:35
2001[c]	56	11	(16)	0	67	n/a
2002	119	40	(25)	1	160	2:59
2003	96	21	(18)	0	117	3:30
2004	133	19	(13)	0	152	3:04
2005	125	25	(17)	0	150	3:12
2006	136	39	(22)	0	175	3:55
2007[d]	119	21	(15)	0	140	6:00
2008	77	1	(1)	0	78	3:41
2009	66	4	(6)	0	70	4:18
2010	55	3	(5)	0	58	3:47
2011	62	17	(21)	0	79	3:46
2012	51	5	(9)	0	56	3:04
2013	19	0	(0)	0	19	3:02

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1998 = 1 July 1998–30 June 1999).
[b] Short yearlings are 11-month-old calves.
[c] The Sagavanirktok River was not surveyed.
[d] Longer search time because sightability was poor due to low snow cover.

Table 3. Unit 26B, Itkillik River drainage[a,b] spring aerial moose surveys, regulatory years 1998–2013.

Regulatory year	Adults	Short yearlings[c] (%)	Moose observed	Search time (hr:min)
1998	26	1 (4)	27	2:01
1999	3	0 (0)	3	n/a
2000	3	0 (0)	3	1:05
2001	6	3 (33)	9	n/a
2002	11	2 (15)	13	1:07
2003	19	8 (30)	27	1:03
2004	44	6 (12)	50	1:39
2005	60	6 (9)	66	2:25
2006	47	5 (10)	52	2:05
2007[d]	59	4 (6)	63	3:06
2008	71	2 (3)	73	2:35
2009[d]	66	4 (6)	70	3:38
2010	56	8 (12)	64	2:43
2011	46	15 (25)	61	2:44
2012	54	3 (5)	57	2:44
2013	14	0 (0)	14	2:18

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1998 = 1 July 1998–30 June 1999).
[b] Regulatory years 1998–2003 included the portion below Itkillik Lake to the mouth. Beginning in regulatory year 2004, the area includes the headwaters of the Itkillik River to the mouth.
[c] Short yearlings are 11-month-old calves.
[d] Longer search time because sightability was not good due to low snow cover.

Table 4. Total moose observed in Unit 26B East, Unit 26B West, Itkillik River drainage, and miscellaneous drainages, during spring aerial moose surveys, regulatory years[a] 2003–2013.

Regulatory year	Adults	Short yearlings[b] (%)	Moose observed	Search time (hr:min)[c]
2003	334	44 (12)	378	13:03
2004	403	87 (18)	490	13:55
2005[d]	505	101 (17)	606	18:40
2006[e]	477	92 (16)	569	16:19
2007[f]	491	79 (14)	570	25:01
2008[f]	517	47 (8)	564	18:58
2009[f]	421	33 (7)	454	23:54
2010[g]	414	35 (8)	449	20:51
2011[h]	403	61 (13)	464	23:55
2012[i]	360	36 (9)	396	20:52
2013	109	0 (0)	109	20:04

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2003 = 1 July 2003–30 June 2004).
[b] Short yearlings are 11-month-old calves.
[c] Beginning in regulatory year 2005, search time in the upper Itkillik drainage increased. In regulatory year 2007, search time increased because sightability was not good due to low snow cover.
[d] Upper Sagavanirktok and upper Canning rivers surveyed.
[e] Oksrukuyik Creek, small portion of upper Sagavanirktok surveyed.
[f] Upper Sagavanirktok River, and Oksrukuyik Creek surveyed.
[g] Upper Sagavanirktok River, Oksrukuyik Creek, and Ribdon River surveyed.
[h] Upper Sagavanirktok River, Oksrukuyik Creek, Ribdon and upper Canning rivers surveyed.
[i] Upper Sagavanirktok River, Oksrukuyik Creek, Ribdon River, upper Canning and Shaviovik rivers surveyed.

Table 5. Eastern Unit 26C, Kongakut (upstream of and including Drain Creek; 199 mi^2) and Firth rivers and Mancha Creek (372 mi^2) early winter aerial moose composition, regulatory years[a] 1991–2011.

Regulatory year	Date[b]	Bulls:100 Cows (*n* bulls)	Yearling bulls:100 Cows (*n* yearling bulls)	Calves:100 Cows (*n* cows)	Calves	Percent calves	Adults	Moose observed	Search time (hr:min)
1991[c]	26–27 Oct	105 (176)	21 (36)	38 (167)	63	15	343	406	
2000[c]		118 (73)	26 (16)	35 (62)	22	14	135	157	
2002[c]	21–23 Oct	113 (108)	21 (20)	24 (96)	23	10	204	227	
2011	27 Oct, 7 Nov	70 (118)	11 (15)	31 (169)	52	15	287	339	10:12

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1991 = 1 July 1991–30 June 1992).
[b] First date represents the survey for Firth River–Mancha Creek; second date represents survey for upper Kongakut River.
[c] *Data Source*: Compiled from U.S. Fish and Wildlife Service data.

Table 6. Unit 26B reported general season moose harvest, regulatory years[a] 2006–2012.

Regulatory year	Reported harvest M (%)	F (%)	Unk	Total	Hunters (% success)	Illegal hunters (harvest)
2006	0 (0)	0 (0)	0	0	0 (0)	1 (0)
2007	0 (0)	0 (0)	0	0	0 (0)	2 (1)
2008	0 (0)	0 (0)	0	0	2 (0)	6 (0)
2009	0 (0)	0 (0)	0	0	0 (0)	1 (0)
2010	1 (100)	0 (0)	0	1	1 (100)	4 (0)
2011	0 (0)	0 (0)	0	0	3 (0)	3 (0)
2012	0 (0)	0 (0)	0	0	4 (0)	2 (0)

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

Table 7. Unit 26B DM996 permit moose harvest, regulatory years[a] 2006–2013.

Regulatory year	No. permits	DM996 harvest M (%)	F (%)	Unk	Total	No. hunters (% success)
2006	15	7 (100)	0 (0)	0	7	13 (54)
2007	15	3 (100)	0 (0)	0	3	11 (27)
2008	20	6 (100)	0 (0)	0	6	12 (50)
2009	20	3 (100)	0 (0)	0	3	12 (25)
2010	25	8 (100)	0 (0)	0	8	20 (40)
2011	10	4 (100)	0 (0)	0	4	7 (57)
2012	20	11 (100)	0 (0)	0	11	12 (92)
2013	12	2 (100)	0 (0)	0	2	4 (50)

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

Table 8. Unit 26B moose hunter residency and success, regulatory years[a] 2006–2012.

Regulatory year	Successful					Unsuccessful					Total hunters
	Local[b] resident	Nonlocal resident	Nonresident	Unk	Total (%)	Local[b] resident	Nonlocal resident	Nonresident	Unk	Total (%)	
2006	0	7	n/a	0	7 (54)	0	6	n/a	0	6 (46)	13
2007	0	3	n/a	0	3 (27)	0	8	n/a	0	8 (73)	11
2008	0	6	n/a	0	6 (43)	0	8	n/a	0	8 (57)	14
2009	0	3	n/a	0	3 (25)	0	9	n/a	0	9 (75)	12
2010	0	9	n/a	0	9 (43)	0	12	n/a	0	12 (57)	21
2011	0	4	n/a	0	4 (40)	0	6	n/a	0	6 (60)	10
2012	0	11	n/a	0	11 (69)	0	5	n/a	0	5 (31)	16

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).
[b] Residents of Units 26B.

Table 9. Unit 26B moose harvest chronology percent by month/day, regulatory years[a] 2006–2012.

Regulatory year	Harvest chronology percent by month/day							
	9/1–9/8	9/9–9/15	9/16–9/22	9/23–9/28	9/29–10/5	Oct	Apr	*n*
2006	100	0	n/a	n/a	n/a	n/a	0	7
2007	100	0	n/a	n/a	n/a	n/a	0	3
2008	83	17	n/a	n/a	n/a	n/a	0	6
2009	67	33	n/a	n/a	n/a	n/a	0	3
2010	78	11	n/a	n/a	n/a	n/a	11	9
2011	100	0	n/a	n/a	n/a	n/a	0	4
2012	82	18	n/a	n/a	n/a	n/a	0	11

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).

Table 10. Unit 26B moose harvest percent by transport method, regulatory years[a] 2006–2012.

Regulatory year	Harvest percent by transport method								*n*
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	Airboat	Highway vehicle	Unknown	
2006	71	0	0	0	0	14	14	0	7
2007	33	0	0	0	0	33	33	0	3
2008	67	0	17	0	0	0	17	0	6
2009	33	0	0	0	0	67	0	0	3
2010	67	0	0	0	0	11	11	11	9
2011	75	0	25	0	0	0	0	0	4
2012	64	0	9	0	0	9	18	0	11

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2006 = 1 July 2006–30 June 2007).