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CHAPTER 20: MOOSE MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 18 (42,000 mi^2)

GEOGRAPHIC DESCRIPTION: Yukon-Kuskokwim Delta

BACKGROUND

Moose are thought to have begun moving into to the Yukon-Kuskokwim Delta during the mid-to-late 1940s. Local elders from the Yukon River have confirmed this timing. The Yukon population occupies most of the available riparian habitat and the population is growing. The Kuskokwim population is growing and is still in the process of colonizing the available riparian habitat. Most of the Yukon-Kuskokwim Delta is lowland treeless tundra, which is not suitable as winter habitat for moose.

Moose densities are moderate to high and growing in the Yukon River drainage, and low to moderate and growing in the lower Kuskokwim River drainage. Low numbers are also reported in the southwestern portions of the unit (Aderman and Woolington 2001). Although moose are now more common than in the past, overall densities in Unit 18 vary from low to high relative to habitat availability.

Heavy hunting pressure from communities along the Kuskokwim River had effectively limited moose population growth along that riparian corridor. While moose population growth along the Yukon River had been slowed for similar reasons, compliance with hunting regulations has improved and moose populations there have responded. Extensive habitat is available for moose colonization and range expansion along most of the lower Kuskokwim River and its larger tributaries.

The Alaska Department of Fish and Game has been working cooperatively with local leaders and other agencies for more than a decade on strategies to increase the moose population within the Kuskokwim River drainage. Acting on a cooperative strategy that focused on a 5-year moratorium on hunting, the Lower Kuskokwim Fish and Game Advisory Committee (LKAC) voted unanimously to submit a proposal to the Board of Game to initiate the moratorium beginning in the fall of 2004. Anecdotal evidence later suggested that the population had increased and surveys conducted in January and February of 2008 estimated a minimum of 668 moose on the Kuskokwim drainage. In November of 2008, the LKAC made an Agenda Change Request (ACR) to the BOG to open the season on the Kuskokwim Drainage within Unit 18 to a short 10-day season in fall of 2009. The Board approved a registration hunt for September 1–10.

The boundaries of Unit 18 and those of the Yukon Delta National Wildlife Refuge (YDNWR) nearly coincide. The southern tip of Unit 18 is within the Togiak National Wildlife Refuge (TNWR). The Alaska Department of Fish and Game (ADF&G, the department) shares common interests with the refuge and we regularly cooperate during surveys, field projects, and public meetings.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Allow the Unit 18 moose populations to increase to the levels the habitat can support.
- Maintain healthy age and sex structures for moose populations within the Yukon and Kuskokwim River drainages.
- Determine population size, trend, and composition of Unit 18 moose populations.
- Achieve a continual harvest of bulls without hindering population growth.
- Improve harvest reporting and compliance with hunting regulations.
- Minimize conflicts among user groups interested in moose within and adjacent to Unit 18.

MANAGEMENT OBJECTIVES

- Allow the lower Yukon River moose population to increase above its estimated size of 2,500–3,500 moose. Allow the lower Kuskokwim River moose population to increase above its estimated size of 75–250 moose to at least 2,000 moose.
- Maintain the current age and sex structure for both populations, with a minimum of 30 bulls:100 cows.
- Conduct seasonal sex and age composition surveys as weather allows.
- Conduct winter censuses and recruitment surveys in the established survey areas on a rotating basis.
- Conduct fall and/or winter trend counts to determine population trends.
- Conduct hunts consistent with population goals.
- Improve knowledge of and compliance with harvest reporting requirements and hunting regulations through education and incentives.
- Address user conflicts through education and hunter contacts.

METHODS

We monitor moose harvests and hunting activity in Unit 18 using harvest ticket hunt reports and by contacting hunters in the field. Whenever possible, we collect incisors and take antler measurements; hunter participation is voluntary.

In each of 2012 and 2013, we conducted a moose population survey in January and February in the Andreafsky (Middle Yukon) and Paimiut count areas using the Geospatial Population Estimator (GSPE) method developed by Ver Hoef (2001), also described by Kellie and DeLong (2006). The survey area boundaries are shown in Figure 1 and are delineated within Unit 18 as follows:

- Paimiut Area: The Yukon River from old Paimiut Village downstream to Pilot Village.
- Andreafsky (Middle Yukon) Area: The Yukon River from Pilot Village downstream to Mountain Village.
- Lowest Yukon Area: The Yukon River downstream from Mountain Village.
- Lower Kuskokwim Area: The Kuskokwim River riparian corridor between Kalskag and Kwethluk.

These survey areas are small compared to other areas in the state. This was done to achieve cost savings, safety, and other efficiencies and to allow us to conduct a census in more than one area per year. Table 1 lists the size of the areas surveyed during each census and Figure 1 depicts the larger survey areas. Table 1 also lists the methods used to assess moose abundance in Unit 18, spatial methods during the reporting period, and 'minimum count' or 'Gasaway methods' in previous periods (Gasaway et al. 1986). We plan to conduct GSPE surveys in 2 areas per year and alternate with the remaining 2 areas in the following year.

We continued the cooperative strategy to establish and expand the moose population along the Lower Kuskokwim River, working with the Lower Kuskokwim Fish and Game Advisory Committee (LKAC), the Association of Village Council Presidents (AVCP), interested individuals, and the U.S. Fish and Wildlife Service (USFWS). This began with a LKAC proposal to the BOG to close moose hunting in the Lower Kuskokwim for 5 years starting the fall of 2004, followed by a 5-year hunting closure during 2004–2008, and continued with management of quota-based registration permit hunts during the reporting period.

We provided public information and education through public service announcements made available to the media, regular newspaper articles, and informal hunter contacts. We distributed coffee cups emblazoned with an educational logo depicting the potential production of one cow moose to hunters, advisory committee members, village leaders, Board of Game members, and others influential with hunters. This "moose circle coffee cup" has become a valuable focus for our educational efforts.

We provided enforcement information to the Alaska Department of Public Safety, Division of Alaska Wildlife Troopers in Bethel and Aniak.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

In January and February 2012 and 2013, we conducted moose population estimates in the Middle Yukon (Andreafsky) and Paimiut count areas, respectively (Table 1). Unless otherwise noted, the following results are reported at the 95% confidence interval (CI).

The moose population in Middle Yukon count area grew from an estimate of 418 ± 22.4% in 2002 to 2,748 ± 16.6% moose in 2012. The density of this moose population has changed from 0.4 moose/mi^2 in 2002 to 2.4 moose/mi^2 in 2012.

The moose population in Paimiut count area grew from an estimate of 3,614 ± 18.1% in 2006 to 5,597 ± 14.9% moose in 2013. The density of this moose population has changed from 2.3 moose/mi^2 in 2006 to 3.6 moose/mi^2 in 2013.

Population Composition

In November 2013 we were able to classify bulls, cows, and calves in the Lowest Yukon and Lower Kuskokwim count areas (Table 2). Adequate survey conditions are present only every 3 or 4 years so these surveys are not conducted on an annual basis, only as conditions allow. Moose calf survival was extremely high in the Lower Kuskokwim count area. This area also had a high bull to cow ratio, probably due to the fact that it had not been hunted before 2009 and is growing rapidly.

Distribution and Movements

Moose are distributed throughout the Yukon River riparian corridor with highest concentrations occurring during the winter. Within this riparian corridor, the densities are greatest in the Paimiut area followed by the Lowest Yukon and Andreafsky areas. Moose are usually found at low density near the villages, but along the Yukon River that tendency is less pronounced now compared to previous reporting periods. Some moose are also found along the tributaries and distributaries of the Yukon and in the highlands north of the Yukon River.

Moose can be found throughout the year along the riparian corridor of the Kuskokwim River from Lower Kalskag to nearly the mouth of the Kuskokwim near the community of Tuntutuliak. They exist at low but increasing densities given the available habitat. Moose are seen in the downriver third of this corridor more and more often.

The area drained by the tributaries of the Kuskokwim River and those rivers draining into Kuskokwim Bay support small numbers of moose as colonizing animals from adjacent areas. These moose appear to have established local populations, most notably in the Kwethluk and Eek river drainages. In March 2010, YDNWR conducted a line transect method moose population estimate on the Eek, Kwethluk, Kisaralik, Kasigluk and Tuluksak rivers. The midpoint of that estimate was 340 moose (Eric Wald, Yukon Delta NWR Biologist, USFWS, personal communication, 2010).

We have some radiotelemetry data which show that moose are entering Unit 18 from adjacent Unit 17. These moose appear to be colonizing the southern drainages of Unit 18, including the Goodnews and Kanektok river drainages where TNWR staff observed 204 moose in March 2011. We also have reports from local residents of increasing numbers of moose in this area. (Andy Aderman, Togiak NWR Biologist, USFWS, personal communication, 2011).

During the summer, moose are found in low numbers throughout the unit. Moose have been reported along the Manokinak and Izaviknek rivers, near Chevak, on Nelson Island, and even swimming in the ocean beyond the mouth of the Yukon River. While these reports are unusual, they show that moose move about broadly throughout the Yukon-Kuskokwim Delta.

MORTALITY

Harvest

Season and Bag Limit. A regulatory year (RY) begins on 1 July and ends on 30 June (e g. RY11 = 1 July 2011–30 June 2012). The bag limit in most of Unit 18 is 1 antlered bull in the fall. In the winter the bag limit is 1 antlered bull, except in the hunt area below Mountain Village, where it is 1 moose.

Federal seasons in Unit 18 have been mostly the same as State of Alaska seasons, except that there is no federal season in Unit 18 south of and including the Kanektok River drainages and in 2009 there was no federal season in the Kuskokwim Drainage.

Regulatory year *RY11* Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 18 Kuskokwim Area, east of a line from the mouth of the lshkowik River to Dall Lake, then to the Johnson River at its entrance into Nunavakanukakslak Lake (N 60° 59.41 ' Lat; W 162° 22.14' Long), then upstream 1/2 mile south of the south bank of the Johnson River to Crooked Creek, then upstream along the creek to Arhymot Lake to the Unit 18 boundary, and north of and including the Eek River- drainage.		
1 antlered bull by registration permit only (RM615)	1 Sep – 10 Sep	No open season
Unit 18, that portion south of and including the Goodnews River drainage		
1 antlered bull by registration permit only (RM620)	1 Sep – 30 Sep	No open season
Unit 18, that portion south of the Eek River drainage and north of the Goodnews River drainage:		

Regulatory year *RY11* Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
1 antlered bull	1 Sep – 30 Sep	No open season
Unit 18, Lower Yukon Area, that portion north and west of the Kashunuk River including the north bank from the mouth of the river upstream to the old village of Chakaktolik, west of a line from Chakaktolik to Mountain Village, excluding all Yukon River drainages upriver from Mountain Village		
1 antlered bull; or	10 Aug – 30 Sep	1 Sep – 30 Sep
1 moose	20 Dec – 28 Feb	No open season
Remainder of Unit 18		
1 antlered bull; or	10 Aug – 30 Sep	1 Sep – 30 Sep
1 antlered bull	20 Dec – 10 Jan	No open season

Regulatory year *RY12* Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit **18** Kuskokwim Area, east of a line from the mouth of the lshkowik River to Dall Lake, then to the Johnson River at its entrance into Nunavakanukakslak Lake (N 60° 59.41 ' Lat; W 162° 22.14' Long), then upstream 1/2 mile south of the south bank of the Johnson River to Crooked Creek, then upstream along the creek to Arhymot Lake to the Unit 18 boundary, and north of and including the Eek River- drainage.		
1 antlered bull by registration permit (RM615)	1 Sep – 10 Sep	No open season
Unit 18 that portion south of and including the Goodnews River drainage		
1 antlered bull by registration permit (RM620)	1 Sep – 30 Sep	No open season
Unit 18, that portion south of the Eek River drainage and north of the Goodnews River		

Regulatory year *RY11* Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
1 antlered bull	1 Sep – 30 Sep	No open season
Unit 18, Lower Yukon Area, that portion north and west of the Kashunuk River including the north bank from the mouth of the river upstream to the old village of Chakaktolik, west of a line from Chakaktolik to Mountain Village, excluding all Yukon River drainages upriver from Mountain Village		
2 moose; only one of which may be an antlered bull, taking of cows accompanied by calves or calves is prohibited; or	1 Aug – 30 Sep	No open season
2 antlerless moose	1 Oct – 28 Feb	No open season
1 antlered bull		1 Sep – 30 Sep
Unit 18, Remainder		
1 antlered bull; or	10 Aug – 30 Sep	No open season
1 moose	20 Dec – 28 Feb	No open season
1 antlered bull		1 Sep – 30 Sep

Board of Game Actions and Emergency Orders. At the November 2010 BOG meeting effective in RY11, the board changed the hunt area boundaries of the Kuskokwim Area and Lower Yukon Area, and added a registration permit requirement for residents hunting in the Kuskokwim Area (RM615) and that portion south of and including the Goodnews River drainage (RM620). At the November 2011 BOG meeting the board extended the seasons and liberalized the bag limits in both the Lower Yukon Area and Unit 18 Remainder hunt areas. The department issued two EOs in early February 2012 that made these changes effective for the remaining portion of the RY11 season. In one EO we increased the bag limit in the Lower Yukon Area from 1 to 2 moose. In the hunt that is described as the Remainder of Unit 18, we changed the bag limit from an antlered bull to any moose and added additional hunting opportunity from 11 February to 29 February. .

Human-Induced Harvest.

General Season Harvest. During the RY11 general season, 861hunters reported a harvest of 546 moose**.** For RY12, 909 hunters reported a harvest of 527 moose. This shows a stabilized trend in

hunting with slightly fewer general season hunters taking similar numbers of moose compared to RY09–RY10 (Table 3). The hunt statistics for the permits hunts are reported under that following section.

The reported harvest of moose in Unit 18 does not reflect the actual harvest. Rather, it shows only the harvest by people who operate within the regulatory system. Compliance with regulations is improving, particularly among local residents hunting during the fall season, so harvest summaries based on hunt reports are getting better. On the Yukon River, we believe that harvest reporting has improved largely because of the increase in acceptance of harvest tickets/reports, the willingness of most hunters to harvest only bulls, and the successful cooperative effort that resulted in both a huntable moose population below Mt. Village and greater public confidence in the regulatory system. However, there are hunters who do not report; consequently, reported moose harvests from Unit 18 should be regarded as minimum estimates.

The majority of the reported Unit 18 moose harvest comes from the Yukon River drainage, which accounted for approximately 80% (545 moose) of the reported harvest in RY11 and 82% (509 moose) in RY12. The other moose reported harvested were either in the new Kuskokwim River drainage hunt (116 moose in RY11 and 101 in RY12) or in the Goodnews drainage where 17 and 13 were harvested.

There is recurring harvest of moose through Alaska State regulation 5 AAC 92.019, which allows moose to be taken outside established seasons for customary and traditional Alaska Native funerary or mortuary religious ceremonies. Typically, Unit 18 hunters contact the department prior to hunting under this regulation and the department provides a letter of authorization outlining the regulation, informing them which animals are legal, and describing how to accomplish harvest reporting. We also provide the hunters with a copy of the administrative code (regulation) and contact the Alaska Wildlife Troopers to inform them of the arrangement. This regulation requires the department to publicize a list of big game populations and areas, if any, for which the taking of a big game animal would be inconsistent with sustained yield principles.

Permit Hunts. There were 2 permit hunts for moose in Unit 18 during the reporting period. Forty-six and 53 hunters obtained RM620 registration permits in RY11 and RY12, respectively. In RY11, 5 reported that they did not hunt, 18 were successful, and 19 hunted but were not successful. In RY12, 10 reported that they did not hunt, 13 were successful, and 24 were not successful. Almost all hunters used boats to access the area.

For the RM615 permit, 1,573 and 1,455 potential hunters obtained registration permits in RY11 and RY12, respectively. In RY11, 292 did not hunt, 1,171 reported that they did hunt, and 117 harvested moose. In RY12, 241 did not hunt, 1,130 reported hunting, and 102 harvested moose (Table 4). The success rate in RY11 was 10% and 9 % in RY12.

Hunter Residency and Success. As reported in past years, Alaska residents accounted for most of the moose hunting activity in Unit 18 with the vast majority being Unit 18 residents. Of 861 hunters who participated in the general season hunts during the RY11 season, 31 were nonresidents. Of 909 hunters who participated during the RY12 season, 42 were nonresidents.

This is a higher number than in the past and is due to federal refuge lands becoming open to residents and nonresidents of the state in the Yukon drainage. Nonresidents are not eligible to participate in either of the registration permit hunts.

Based on reported harvest in the general season, the moose hunter success rates based on harvest ticket reports were 63% for RY11 and 58% for the RY12 seasons. Registration permit hunt success rates were 10% in RY11 and 9 % in RY12. . Successful hunters spent an average of 4.9 days hunting in RY11 and 5.1 days in RY12.

On the Kuskokwim River, many of the residents who hunted moose between Kalskag and McGrath (in Unit 19) have been from Unit 18. This has changed in recent years as moose populations in Unit 19 have declined and some areas are now closed to moose hunting and other areas are now hunted only under Tier II subsistence permits. On the Yukon River, Unit 18 residents had regularly hunted in Unit 21E but the number of hunters making these upriver trips is declining.

Harvest Chronology. The majority of reported moose harvest occurs during September when the general season is open. Winter harvest has increased to approximately 25% of annual harvest (Table 5).

As the Yukon River moose population grows and becomes more accessible to Yukon River villagers, extended camping trips to hunt moose are being replaced by day trips from home. Harvest chronology is being driven by these day hunts and is influenced more by weather and the workweek than by moose movements. Furthermore, hunters prefer to take moose early in the season citing better meat quality. As a consequence, only about 5% of the fall harvest takes place during the last 5 days of September. The new registration permit hunt on the Kuskokwim occurs in the first 10 days of September

Transport Methods. During the reporting period, boats were by far the most frequently used mode of transportation by moose hunters in Unit 18. Other minor reported modes of transportation were snowmachines and aircraft. There has been virtually no change in the method of access reported by moose hunters in Unit 18 since moose harvest reporting began.

Other Mortality

Black and grizzly bears occur along the major river corridors and large tributaries in Unit 18. We regularly see black and grizzly bears during moose calving surveys and local residents have complained of heavy predation on calves by bears. However, little direct information is available regarding this type of predation in Unit 18. Certainly, some predation occurs, but the effect bears have on moose numbers, particularly through predation on calves, is unknown.

Incidental reports from the public and department fur sealing records indicate that wolf numbers have probably remained stable in the northern part of the unit and increased during this reporting period on the Kuskokwim drainage. We estimate that 250–300 wolves in 25–30 packs reside in Unit 18. Throughout most of Unit 18 the distribution and density of wolves reflects the distribution and density of moose, especially in the Yukon River drainage. In the lower Kuskokwim River drainage, caribou and moose are the main prey item for wolves and wolf distribution is not exclusively linked to moose.

HABITAT

Assessment

We estimate a minimum of 8,000 mi^2 of moose habitat exists in Unit 18. Approximately 4,500 mi^2 of this habitat occurs along the riparian zone of the Yukon River and the remaining 3,500 mi^2 is found along the Kuskokwim River and its tributaries. The islands and adjacent sloughs along the Yukon River corridor from Paimiut to Mountain Village represent the most productive moose habitat in Unit 18. The Yukon Delta has many distributaries fringed by willows and cottonwoods, and even though the moose population has grown in this area it still has fewer moose than could be supported by the available forage.

The riparian corridor along the Kuskokwim River in Unit 18 downstream of Kalskag is excellent moose habitat. Between Lower Kalskag and Akiachak, the forest and brush along the Kuskokwim provide some escape cover for moose. Downstream of Akiachak toward the mouth of the Kuskokwim, the riparian corridor narrows and escape cover is lacking. Along the Kanektok, Goodnews, and Arolik rivers moose are rarely found in the riparian corridor because cover and browse are very sparse.

Tributaries of the Kuskokwim bordered by spruce and cottonwood, interspersed with willow and alder, extend onto the tundra along the Gweek and Johnson rivers to the west, and along the Tuluksak, Fog, Kisaralik, Kasigluk, Akulikutak, Eek, and Kwethluk rivers, and smaller unnamed rivers to the east. In each of these drainages, the habitat could support more moose. Lack of escape cover from illegal hunters is the limiting factor affecting moose numbers in these low-density areas.

Enhancement

There were no habitat enhancement activities in Unit 18 during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

An issue that had greater importance during previous reporting periods is the allocation of hunting effort and harvest by local residents of Units 18, 19 and 21E. This is a “downriver resident” versus “upriver resident” issue along the Yukon and Kuskokwim rivers. This issue has not been resolved but has lessened along the Yukon River as more moose have become available within Unit 18, and as understanding of upriver land ownership has grown. We hope to address this issue along the Kuskokwim through the Kuskokwim River moose strategy described above.

CONCLUSIONS AND RECOMMENDATIONS

Within living memory, moose have colonized the Yukon-Kuskokwim Delta in moderate densities along the Yukon River from Paimiut to the mouths of the Yukon, but remain at low to very low densities throughout the remainder of the unit. Although much of Unit 18 is lowland tundra unsuitable as moose winter habitat, moose could be present in higher numbers because areas of riparian habitat remain unoccupied and, in most areas where moose are present, their numbers are lower than the habitat could support. Calf production and yearling recruitment are high. In the past, we had seen hunting pressure from the relatively dense human population in the unit impede moose population growth and prevent a Kuskokwim River moose population from becoming established. In September of 2009 the first hunt in five years was allowed in the Lower

Kuskokwim. Participation in this hunt was higher than expected, with more than 1,300 hunters obtaining permits. It is noteworthy that more moose were harvested during this 10-day hunt (110) than were estimated in a survey 5 years previously (67). Hunting and harvests have continued at similar levels and by any measure the cooperative effort between USFWS, AVCP, ADF&G and the local communities has been a success. Continued close monitoring and limited harvest on this population should ensure continued growth and greater opportunities for harvest.

The illegal harvest, particularly of cows and particularly within the Kuskokwim River drainage, has decreased dramatically during this reporting period. Other factors that can still affect moose management are a poorly developed cash economy, declining commercial fishing opportunities, and a high and growing density of people along the major rivers. These factors complicate moose management considerably. More than 20,000 rural residents live in 42 communities throughout Unit 18 and we need continued effort to curb illegal harvest of moose. Another factor is the declining number of Mulchatna caribou, which will affect the ability of local hunters to gather meat.

Recent actions by user groups to shoulder some responsibility for the growth of local moose populations are welcome signs of increasing participation with existing management systems. Continued efforts to work with local user groups are vital for effective management and we are encouraged by the efforts of the LKAC to adopt a strategy to improve moose numbers within the Kuskokwim drainage.

We recommend that monitoring and taking inventory of the moose population remain priorities in Unit 18, especially the continuation of the population censuses along the Yukon and Kuskokwim rivers. We should also continue to conduct composition counts and trend counts. As populations have increased, habitat assessment will become a more important part of our management activities. The census results, in conjunction with composition surveys, will provide the department with baseline demographic and recruitment information to properly manage the moose population.

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While this unit report was actually published in 2016, it is part of the set of 2014 unit species management reports, so we suggest citing the report as a 2014 report to maintain its relationship to the other 2014 unit reports.

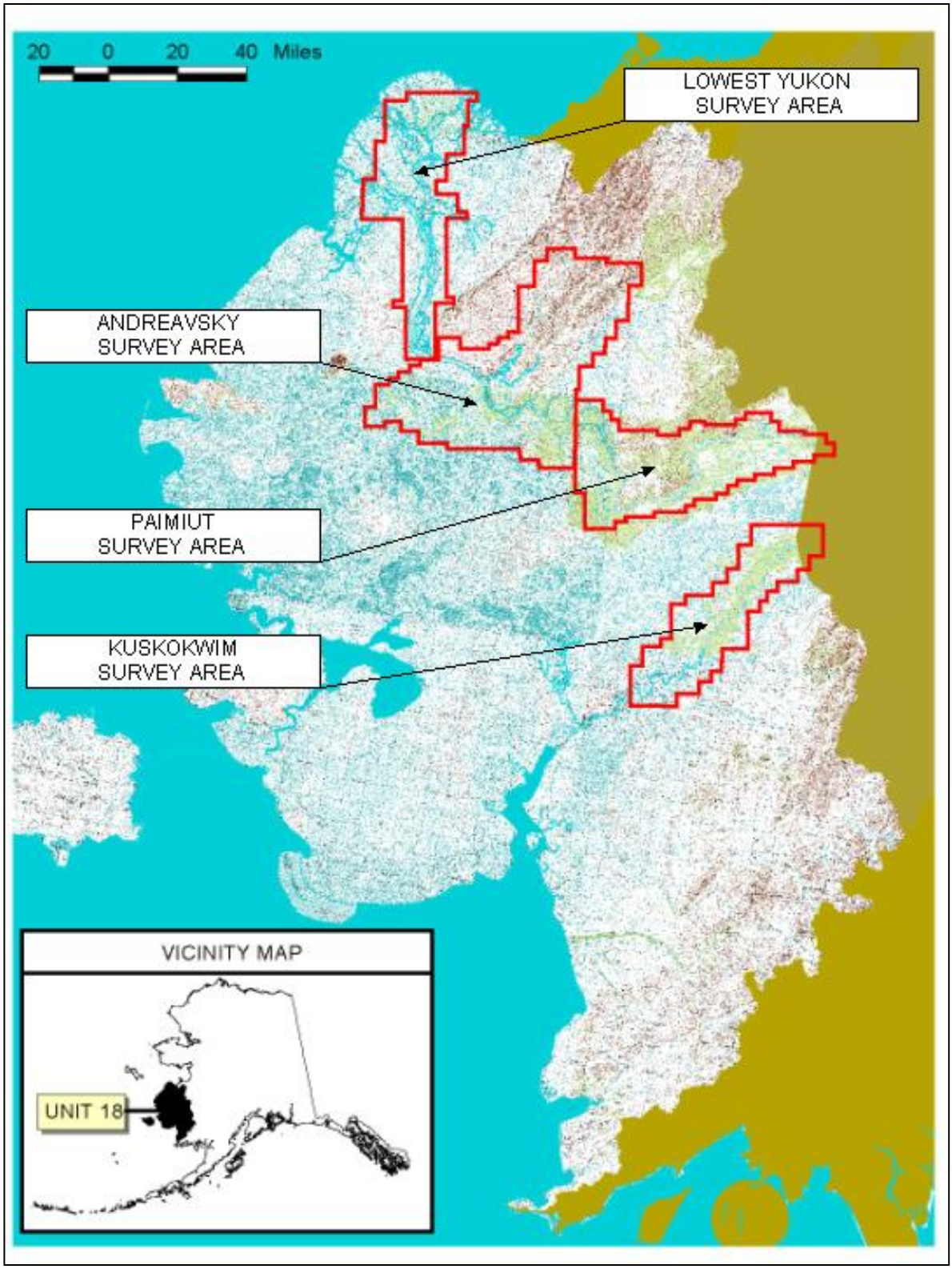

Figure 1. Unit 18 showing geostatistical population survey areas (Ver Hoef style survey areas).

Table 1. Unit 18 moose population estimate history, 1988 through 2013.

Survey Area	Year	Area (mi^2)	Estimate at 95%CI	Density (moose/mi^2)	Census Technique
Lowest Yukon	1988	1703	0	NA	Minimum count
	1992	1703	28	< 0.1	Minimum count
	1994	1703	65	< 0.1	Minimum count
	2002	1151	674 ± 21.9%	0.7	Spatial method
	2005	1193	1341±21.0%	1.1	Spatial method
	2008	1193	2827±11.9%	2.5	Spatial method
	2008	1193	3230±21.0%	2.7	Spatial with SCF [a]
Andreafsky	1995	1393	52 ± 74.0%	< 0.1	Gasaway method
	1999	2279	524 ± 29.8%	0.2	Spatial method
	2002	1150	418 ± 22.4%	0.4	Spatial method
	2012	1150	2748±16.6%	2.4	Spatial Method
Paimiut	1992	1558	994 ± 19.7%	0.6	Gasaway method
	1998	1558	2024 ± 12.9%	1.3	Gasaway method
	2002	1571	2382 ± 16.1%	1.5	Spatial method
	2006	1571	3614 ± 18.1%	2.3	Spatial method
	2013	1571	5597± 14.9%	3.6	Spatial Method
Lower Kuskokwim	1993	648	216 ± 44.6%	0.3	Gasaway method
	2000	907	86 ± 26.4%	0.1	Spatial method
	2002	907	117 ± 18.3%	0.1	Spatial method
Lower Kuskokwim (Unit 18 only)	2002	869	94 ± 23.0%	0.1	Spatial method
	2004	869	70 ±32.4%	0.1	Spatial method
	2008	869	515±17.5%	0.6	Spatial method
	2008	869	668±22.0%	0.8	Spatial with SCF [a]
	2011	869	672±21.2%	0.8	Spatial Method

[a] Sightability correction factor applied to census estimate.

Table 2. Moose composition surveys, Unit 18, November 2013.

Survey Area	Calves:100 Cows	Bulls:100 Cows
Lower Kuskokwim	72	41
Lowest Yukon	48	40

Table 3. Number of hunters and reported general season harvest in Unit 18, RY93 through RY12.

Regulatory year	Number of hunters	Reported Harvest
RY93	249	96
RY94	247	87
RY95	301	74
RY96	350	97
RY97	363	95
RY98	383	125
RY99	436	143
RY00	421	175
RY01	428	162
RY02	589	223
RY03	633	233
RY04	528	226
RY05	661	317
RY06	648	330
RY07	827	458
RY08	849	465
RY09	964	486
RY10	1121	582
RY 11	861	546
RY 12	909	527

Table 4. Unit 18 Moose registration permit hunts, RY08 through RY12.

	RM615			RM620		
RY	Permits issued	Hunted	Harvested	Permits issued	Hunted	Harvested
RY08	NA	NA	NA	40	35	13
RY09	1,397	1,042	110	45	33	10
RY10	1,527	1,149	102	48	44	11
RY11	1,573	1,171	116	46	36	17
RY12	1,455	1,130	101	53	37	13

Table 5. Fall and winter moose harvests for Unit 18, all hunts RY85 through RY12.

	Fall harvest		Winter harvest		Unknown harvest		Total
RY	(N)	(%)	(N)	(%)	(N)	(%)	Harvest (N)
RY85	43	83	8	15	1	2	52
RY86	54	90	6	10	0	0	60
RY87	40	83	8	17	0	0	48
RY88	67	98	0	2	1	0	68
RY89	31	94	1	3	1	3	33
RY90	55	90	6	10	0	0	61
RY91	63	94	4	6	0	0	67
RY92	64	83	13	17	0	0	77
RY93	93	97	3	3	0	0	96
RY94	76	87	11	13	0	0	87
RY95	71	96	3	4	0	0	74
RY96	97	100	0	0	0	0	97
RY97	95	100	0	0	0	0	95
RY98	124	99	1	1	0	0	125
RY99	136	95	7	5	0	0	143
RY00	166	95	5	3	4	2	175
RY01	140	86	9	6	13	8	162
RY02	202	91	10	4	11	5	223
RY03	220	94	13	6	0	0	233
RY04	189	84	36	16	1	1	226
RY05	253	80	64	20	0	0	317
RY06	256	78	70	21	4	1	330
RY07	370	81	86	19	2	1	458
RY08	374	78	81	17	23	5	478 [a]
RY09	479	79	123	20	4	1	606 [b]
RY10	494	71	175	25	26	4	695 [b]
RY 11	469	69	166	24	43	6	678[b]
RY 12	401	64	146	23	76	12	623[b]

[a]Total general season harvest plus RM620 Registration permit harvests

[b]Total General season harvests plus RM620 and RM615 Registration permit harvests.