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CHAPTER 24: MOOSE MANAGEMENT REPORT

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

LOCATION

GAME MANAGEMENT UNITS: 20C (11,902 mi^2), 20F (6,267 mi^2), and 25C (5,149 mi^2)

GEOGRAPHIC DESCRIPTION: Unit 20C includes drainages into the west bank of the Nenana River and into the south bank of the Tanana River west of the Nenana River. Most of Denali National Park and Preserve is within Unit 20C. Unit 20F includes drainages into the north bank of the Tanana River west of Manley Hot Springs and into the Yukon River drainage between the village of Tanana and the Dalton Highway bridge. Unit 25C includes drainages into the south bank of the Yukon River upstream from Circle to, but not including, the Charley River drainage; the Birch Creek drainage upstream from the Steese Highway bridge; the Preacher Creek drainage upstream from and including the Rock Creek drainage; and the Beaver Creek drainage upstream from and including the Moose Creek drainage.

BACKGROUND

Moose densities in Units 20C, 20F, and 25C have been low for many years, presumably because of combined predation from wolves and bears (Gasaway et al. 1992). Wolf and bear populations are lightly harvested in these units. The high proportion of large bulls in the harvest suggests that harvest of bull moose is low. Thus, we consider harvest to be a minor factor affecting population dynamics relative to predation. Low densities do not appear to be related to habitat limitation. Although these units contain tracts of mature black spruce that are poor quality moose habitat, there appears to be a substantial amount of riparian area, subalpine hills, and recently burned habitat capable of sustaining moose densities higher than the current levels.

Trends in moose populations have been difficult to identify due to infrequent surveying and low moose density. Densities probably fluctuate within 0.1 and 1.1 moose/mi^2, and more likely 0.2–0.7 moose/mi^2, based on Alaska and Yukon studies in large areas (>800 mi^2) with 2 or more lightly harvested predators (Gasaway et al. 1992).

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

Moose within Denali National Park and Preserve (DNPP) have been studied more intensively than moose in the remainder of these units. Within DNPP, radiocollared moose have been monitored for movement, behavior, survival, and reproduction (Franzmann and Schwartz 1997). Also, composition surveys and population estimates have been conducted by DNPP biologists since 1970.

Moose in these units are an important source of food, trophies, and recreation for many residents and nonresidents. Nonconsumptive uses are particularly important in DNPP.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Provide for a sustained harvest of these low-density populations.

- Promote moose habitat enhancement by allowing natural fires to alter vegetation.

MANAGEMENT OBJECTIVE

- Maintain a bull:cow ratio of ≥30:100 in areas with aerial surveys and ≥20% large bulls in the harvest in areas without aerial surveys.

METHODS

POPULATION STATUS AND TREND

Population Estimation Surveys

No aerial moose surveys were completed in Units 20F and 25C during RY11 and RY12, but we did conduct a moose population survey in Unit 20C during RY11. Methods used in years outside the report period to estimate the RY11 and RY12 moose population status in each unit are outlined below.

Unit 20C. We conducted a geospatial population estimator (GSPE) moose survey (Ver Hoef 2001, 2008; Kellie and DeLong 2006) in eastern Unit 20C during November 2011. This is the first GSPE survey conducted in Unit 20C. The 2,962 mi^2 survey area is north of DNPP, south of the Tanana River, west of the Nenana River, and east of the Kantishna River drainages. We first stratified the area on 1–2 November and classified each survey unit (SU) as either high or low density moose habitat according to field stratification methods outlined by Kellie and DeLong (2006). A simple random sample of 100 SUs (60 high density and 40 low density) was selected from each stratum using Microsoft Excel® 2010 software. We then surveyed 100 (60 high density and 40 low density; 577 mi^2) of 514 SUs (2,962 mi^2) during 11–15 November. Survey conditions (Gasaway et al. 1986) with regard to snow (age and cover), light (intensity and type), and wind (strength and turbulence) were reported as excellent (24%; n = 24), good (62%; n = 62), fair (4%; n = 4), poor (1%; n = 1), or unclassified (9%; n = 9). We then extrapolated the mean moose density estimated in this area to all of Unit 20C outside DNPP. The GSPE method does not employ a sightability correction factor (SCF), thus does not correct for moose not seen during the survey. Rather, the GSPE method employs greater search intensity, 8–10 min/mi^2 versus 4–6 min/mi^2 (Gasaway et al. 1986), resulting in a higher level of sightability. Search time per SU in SUs with 100% moose habitat averaged 7.5 min/mi^2 (n = 100 SUs). Preliminary work with the sightability of radiocollared moose in adjacent Unit 20A indicates that an SCF of 1.16 to

1.25 may be appropriate. We applied an SCF of 1.21 to GSPE estimates of observable moose in Unit 20C to calculate total moose population size for comparison with intensive management population and harvest objectives (Boertje et al. 2009).

Unit 20F. No recent surveys have been conducted in Unit 20F.

Unit 25C. No recent surveys have been conducted in Unit 25C. The last survey was conducted in 2007 by Bureau of Land Management (BLM) with support from the Alaska Department of Fish and Game (ADF&G; Hollis 2010).

Nutritional Status

Calf Weights. To evaluate moose nutritional status east of the Kantishna River in Unit 20C, we captured and weighed 20 short-yearlings (11 male, 9 female) on 17–18 March 2011 and radiocollared the 9 female calves to assess seasonal movements.

Pregnancy Rate. During 10–11 March 2012 we captured and radiocollared 26 adult female moose in Unit 20C to evaluate use of the 2009 Railbelt Complex Burn. We used the presence of placental-derived pregnancy-specific protein B (PSPB) in blood obtained from these moose to measure the 2012 pregnancy rate.

Browse Survey. During March 2011 we conducted a browse survey east of the Kantishna River in Unit 20C to evaluate browse abundance relative to current levels of use by moose and determine if habitat may be a limiting factor preventing growth to the moose population in the area (Seaton et al. 2011). Preferred forage species were analyzed from 35 random plots throughout the area to determine the rate of consumption by moose. A detailed description of the survey methods, sampling design, and results can be found in an upcoming research report (Paragi and Kellie, *In prep*).

Twinning Surveys

We conducted twinning surveys in Unit 20C in June 2012 and 2013. To increase the power of statistical comparisons between survey areas and across years, we established, a priori, a desired sample size of ≥50 cows with calves. Since past attempts at twinning surveys have not been effective in obtaining an adequate sample size, we changed our technique in the area. Twinning rate surveys were to be flown in June during or within a few days of the median calving date (Boertje et al. 2007) to minimize potential biases resulting from predation on one calf of a pair of twins. The survey was conducted by radiotracking 30 adult females that were fitted with VHF radio collars in March 2012. While radiotracking these moose from the air we also looked for random cow-calf groups to include in the sample. The survey area was bounded by the Tanana River to the north, the DNPP boundary to the south, the Nenana River on the east, and the Kantishna River on the west. All moose observed during the survey were classified as bull; yearling cow; adult cow without a calf; or adult cow with single, twin, or triplet calves.

MORTALITY

Harvest

We estimated annual harvest and mortality in all units from 1) data from mandatory harvest reports, 2) our records of telephone calls from the public concerning nonhunting mortality,

3) Alaska Wildlife Trooper records of moose–motor vehicle collisions, and 4) Alaska Railroad records of moose–train collisions between railroad mileposts 327 and 371 in Unit 20C. To estimate unreported harvest by residents of Tanana, we used a 1987 study conducted by ADF&G-Division of Subsistence (Andersen and Alexander 1992). We summarized data regarding hunter residency and success, harvest chronology, and transport methods. When antler size of bulls was reported, we considered bulls with antler spreads <30 inches to be yearlings. Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY11 = 1 July 2011–30 June 2012).

Other Mortality

We located radiocollared adult female moose in Unit 20C once per month from September 2012 through March 2013. During each observation, we recorded the presence of a calf or yearling at heel. We approximated oversummer calf mortality as the number of adult females with a calf at heel divided by the number of females that were pregnant during capture in March 2012. We approximated overwinter calf mortality as the number of adult females with a calf at heel in March 2013 divided by the number of females with a calf at heel in September 2012. A calf was assumed dead when an adult female previously seen with a calf at heel was subsequently seen without a calf at heel during ≥2 consecutive observations.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Unit 20C. We estimate 3,800 moose inhabited Unit 20C outside DNPP during RY11 and RY12, based on the November 2011 GSPE survey in eastern Unit 20C (1,460 moose; 90% CI = 1,189–1,731). Because Unit 20C is similar in habitat type to Unit 20A, we applied an SCF of 1.21 to obtain a sightability corrected estimate of 1,767 moose (0.6 moose/mi^2). We then extrapolated this density to all of Unit 20C outside of DNPP (6,476 mi^2) to attain an estimated population of 3,801 moose.

Unit 20F. McNay (1990) estimated 0.25–0.50 moose/mi^2 occurred within the roughly 4,250 mi^2 of moose habitat in Unit 20F. Because there are no indications the population has changed substantially since that time, we have used 0.25–0.50 moose/mi^2 to estimate 1,000–2,000 moose in Unit 20F.

Unit 25C. We assume population density in Unit 25C during RY11 and RY12 remained similar to the estimate obtained during the 2007 GSPE survey (Hollis 2010). We estimate the Unit 25C moose density at 0.59 moose/mi^2 of moose habitat (5,149 mi^2 of moose habitat), with a total population estimate of 3,019 moose (90% CI ±24%). Recent data suggest that an SCF of 1.1 to 1.2 is appropriate for most of these units if October or November surveys are flown with good survey conditions (Gasaway et al. 1986, Boertje et al. 2007). Applying an SCF of 1.21 yields an estimated moose density of 0.66 moose/mi^2. Both estimates are within the expected range of 0.1–1.1 moose/mi^2 found in most large areas of Interior Alaska (>800 mi^2) with lightly harvested bear and wolf populations (Gasaway et al. 1992).

Population Composition

Unit 20C. Results of the 2011 GSPE survey in Unit 20C indicated ratios of 41 calves:100 cows and 49 bulls:100 cows. These ratios suggest light hunting pressure and moderate calf recruitment.

Unit 20F. Population composition data in Unit 20F (and Unit 20C in most years) were limited to the percentage of large bulls (antlers ≥50 inches) in the harvest (Fig. 1). Generally, if harvest rates of bulls were too high to be sustainable, the percentage of large bulls in the harvest would decline within a few years. During RY95–RY07 the percentage of large bulls in the reported harvest averaged 34% in Unit 20C and 38% in Unit 20F. During RY08–RY12 the percentage of large bulls in the harvest averaged 29% in Unit 20C and 31% in Unit 20F. These data suggest that there has been a decrease in the number of large bulls in the harvest. However, these percentages are above our management goal of 20% large bulls for Units 20C and 20F.

Unit 25C. During the 2007 GSPE survey in Unit 25C, the calf to cow ratio was 38:100, and the bull to cow ratio was 58:100 (Table 1). These ratios suggest light hunting pressure and moderate calf recruitment.

Population Nutrition

Calf Weights. Short-yearlings in northern Unit 20C averaged 442 lb (200 kg) and ranged 379–487 lb (172–221 kg). Male (n = 11) calves averaged 455 lb (206 kg) and females (n = 9) 426 lb (193 kg). These short-yearling weights demonstrate a relatively high level of nutrition. By comparison, Boertje et al. (2007) reported weights of female short-yearlings in adjacent subpopulations: in a low moose density area in southern Unit 20C, female short-yearlings averaged 450 lb (204 kg); and, in high moose density populations of Unit 20A, female short-yearlings averaged 379 lb (172 kg) in the Alaska Range foothills and 342 lb (155 kg) in the Tanana Flats.

Pregnancy Rate. Twenty-three of 26 adult females (88%) captured in March 2012 were pregnant based on PSPB protein analysis.

Browse Surveys. We determined that eastern Unit 20C had a low to moderate browse removal rate of 19% in spring 2011 (Paragi and Kellie, *In prep*). In comparison, adjacent Units 20A and 20B, where moose density and nutritional stress is higher, have removal rates of 40% and 28% respectively. With 81% of the available forage unbrowsed annually, it is likely that habitat is not a factor limiting population growth.

Twinning Surveys. During June 2012 twinning surveys, we located 25 of the 30 radiocollared moose in Unit 20C. Of these, 23 were observed; 15 were parturient and 4 of the parturient cows had twins. The observed twinning rate in 2012 was 27%.

During the June 2013 twinning survey, 28 radiocollared moose were located. A total of 12 cows were parturient and 3 had sets of twins. We also encountered 3 random cow-calf pairs during the survey in which all calves were singletons. The observed twinning rate in 2013 was 20%.

MORTALITY

Harvest

Season and Bag Limit. The hunting seasons and bag limits remained the same in Units 25C and 20F during RY11 and RY12; however, in Unit 20C during RY12 the season was lengthened to end 25 September for residents and 20 September for nonresidents and antler restrictions were added to the nonresident bag limit.

Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
RY11		
Unit 20C		
RESIDENT HUNTERS: 1 bull.	1 Sep–20 Sep	
NONRESIDENT HUNTERS: 1 bull.		5 Sep–15 Sep
RY12		
Unit 20C		
RESIDENT HUNTERS: 1 bull.	1 Sep–25 Sep	
NONRESIDENT HUNTERS: 1 bull with 50 inch antlers or 4 brow tines.		1 Sep–20 Sep
RY11 and RY12		
Unit 20F, drained by the Yukon River excluding the Tanana River drainage downstream from the drainage of Hess Creek.		
RESIDENT HUNTERS: 1 bull.	1 Sep–20 Sep or 1 Dec–10 Dec	
NONRESIDENT HUNTERS:		No open season
Unit 20F, drained by the Tanana River.		
RESIDENT HUNTERS: 1 bull.	1 Sep–20 Sep	
NONRESIDENT HUNTERS:		No open season
Remainder of Unit 20F		
RESIDENT HUNTERS: 1 bull.	1 Sep–15 Sep	
NONRESIDENT HUNTERS:		No open season
Unit 25C		
RESIDENT HUNTERS: 1 bull.	1 Sep–15 Sep	
NONRESIDENT HUNTERS: 1 bull.		5 Sep–15 Sep

Alaska Board of Game Actions and Emergency Orders. During the March 2012 meeting, in an attempt to increase harvest in Unit 20C to meet the intensive management harvest objective, the

Alaska Board of Game increased the length of the season for moose by 5 days for residents and 10 days for nonresidents and added antler restrictions for nonresidents. We recommended this change after completing an intensive management feasibility assessment and determining that increasing the season length would be the appropriate action to increase harvest in the area. No Alaska Board of Game actions were taken and no emergency orders were issued during RY11 and RY12 in Units 25C and 20F.

Harvest by Hunters. During RY03–RY12 reported moose harvest was stable in Unit 20C and increased in Units 20F and 25C (Table 2). During RY11 and RY12, reported moose harvest averaged 140 in Unit 20C, 49 in Unit 20F, and 88 Unit 25C, respectively.

Unreported Harvest and Estimated Nonhunting Mortality — We cannot easily estimate the number of unreported kills in Units 20C, 20F, and 25C. Harvest reports returned by residents of Tanana, Rampart, Manley, Livengood, Central, Circle, and Circle Hot Springs likely underestimate harvest. For example, information collected by the Division of Subsistence indicates that 10–20% of the actual harvest by Tanana residents was reported (Andersen and Alexander 1992). The reporting rate for other rural communities in this area is unknown. Gasaway et al. (1992) estimated unreported harvest, including wounding loss, at 17.7% (Table 3).

Illegal harvest and motor vehicle deaths were obtained from the Alaska Wildlife Troopers' mortality logs. Data concerning deaths caused by train collisions in Unit 20C were obtained from the Alaska Railroad. However these data were not available from the Alaska Wildlife Troopers or the Alaska Railroad for RY11 and RY12, therefore we have no estimates for those years.

Hunter Residency and Success. During RY11 and RY12, total number of hunters in Unit 20C averaged 480, this is compared to the RY06–RY10 average of 487. In Unit 20F, the average number of hunters in RY11 and RY12 was 149, this is compared to the average of 153 during RY06–RY10. The average number of hunters in Unit 25C was 311 during RY11 and RY12 compared to 346 during RY06–RY10 (Table 2). The number of moose harvested during RY11 and RY12 remained stable in Units 20F and 25C (Table 2). In Unit 20C, the moose harvest was stable during RY11, but increased during RY12. This was likely due to the increase in season length by 5 days.

During RY03–RY12, as many as 2 nonresident hunters annually reported hunting in Unit 20F (Table 2), even though this unit had no open moose season for nonresidents. These nonresident harvest data may be attributed to misreporting by hunters, data management errors by ADF&G, or legitimate harvest reports from illegal nonresident hunters.

In Units 20C and 20F most successful hunters were residents of Unit 20. In Unit 25C, however, most successful hunters (96%) resided outside Unit 25, including residents and nonresidents of Alaska (Table 2). This difference can be attributed to the fact that relatively few people reside in Unit 25C.

Harvest Chronology. During RY03–RY12 the highest proportion of the harvest occurred during the second week of the fall season in all 3 units. In Units 20C and 20F, the first and third weeks shared similar proportions of the harvest (Table 4). The fourth week of the season in Unit 20C

first occurred in RY12 and will likely continue to have a high proportion of the harvest because the onset of the moose breeding season makes bulls more vulnerable to harvest. Few moose were reported harvested during the December season in Unit 20F.

Transport Methods. The most successful hunters in Unit 20C use boats, 3- or 4-wheelers, and airplanes for transportation (Table 5). Extensive river systems, many lakes, and an expanding trail system make these transport methods most successful. In Unit 20F, boats and 3- or 4-wheelers are the primary modes of transportation for successful hunters. In Unit 25C, successful moose hunters use highway vehicles, 3- or 4-wheelers, or boats. Transportation methods used throughout this area reflect access opportunities.

Other Mortality

In Unit 20C, 3 of 9 radiocollared yearlings (33%) died within 1 year of capture and all were killed by wolves. Of 26 radiocollared adult females, only 1 died within a year of capture (4%). Cause of death was unknown. Twenty-two adult females survived until the May 2013 calving season and 14 (64%) were observed with calves at heel on 7 August 2013. By March 2013, only 6 of the original 22 pregnant females (27%) were observed with a calf at heel.

HABITAT

In remote country such as Units 20C, 20F, and 25C, the most effective means of habitat improvement is wildfire, although moose densities in these remote areas are generally limited by predation rather than forage (Gasaway et al. 1992, Boertje et al. 2009). Additionally, since bears are the dominant predator of moose calves in most of Alaska (Boertje et al. 2009), wildfires may be beneficial to moose if bear densities and/or bear use of burned areas decline following wildfires (C. Gardner, Wildlife Biologist, ADF&G, unpublished data, Fairbanks). Wildfires also increase deadfall, which may decrease the efficiency of predators (Boertje et al. 1995). Several wildfires and prescribed burns have occurred in these units over the last 25 years, including several hundred thousand acres in 2004 and 2005. Also, several large fires occurred in Unit 20C since 2007, enhancing habitat quantity for moose. For example, in eastern Unit 20C approximately 1,240 mi^2 (42% of the area) burned during the 2009 and 2010 Railbelt Complex fires. ADF&G staff have been members of an interagency fire management team and provided input recommending limited fire suppression in areas not inhabited by residents and recreational cabins. This recommendation was made to allow poor quality habitat to be altered by fire and regenerate into quality moose forage. A map of burned areas is available from BLM in Fairbanks.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Harvest reporting in these units is low, especially from people who live in remote villages. We recommend contacting more people in these areas to emphasize the importance and benefits of reporting harvest. It would be especially helpful to contact young people in village schools to establish harvest reporting as a responsibility of all hunters and to promote the positive aspects of reporting.

Periodic wildfire is an integral part of Interior Alaska ecosystems and is essential to producing early-successional moose habitat in the boreal forest. We should continue to coordinate wildlife

needs with the Department of Natural Resources and BLM and encourage maintaining a limited suppression burn response policy to allow wildfire to burn.

CONCLUSIONS AND RECOMMENDATIONS

Moose populations in Units 20C, 20F, and 25C are at low densities. Hunting pressure was relatively low. During RY11 and RY12, we met our goal to promote natural fires to enhance moose habitat through our efforts on an interagency fire management team. We also met our goal to provide for sustained harvest of these low-density populations by providing general season moose hunts. With ratios of 49 bulls:100 cows in Unit 20C in fall 2011, we likely met our objective to maintain a bull:cow ratio of ≥30:100 in areas with aerial surveys. We also met our objective of ≥20% large bulls in the harvest (33% in Unit 20F) in areas without aerial surveys.

No regulatory changes are recommended at this time in Units 20F and 25C. During the 2012 Alaska Board of Game meeting we recommended lengthening the hunting season by 5 days in Unit 20C. We based this recommendation on the high bull:cow ratio (49 bull:100 cows in 2011) and the need to meet the intensive management harvest objective of 150–400 moose as required in Alaska Administrative Code 5 AAC 92.108. It appears that the longer season increased harvest to within the range of the intensive management harvest objective.

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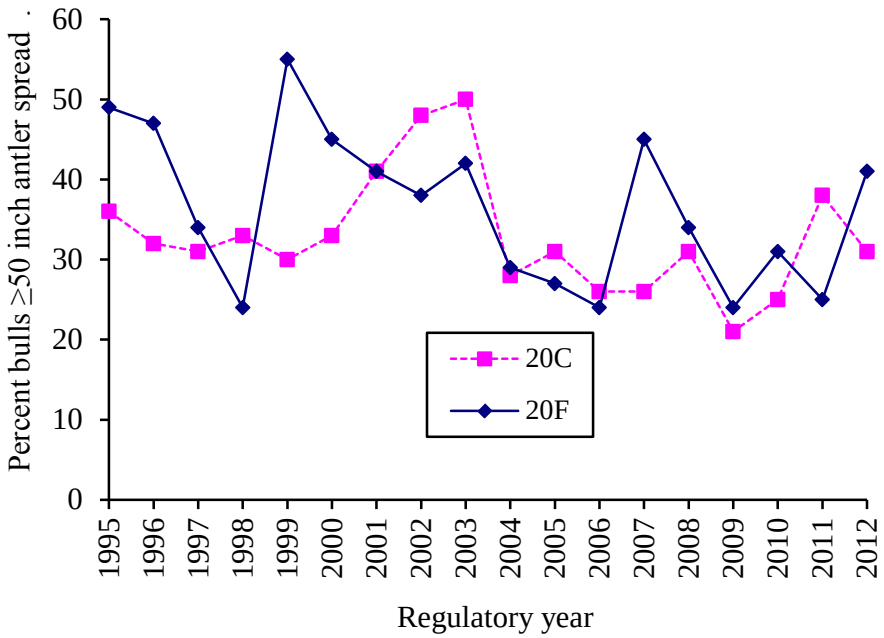

Figure 1. Percent of bull moose in the reported fall harvest with an antler spread ≥50 inches in Units 20C and 20F, regulatory years[a] 1995–2012.

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1995 = 1 July 1995–30 June 1996).

Table 1. Unit 25C fall aerial moose composition counts, 1986–2007

Year	Bulls:100 Cows	Yearling bulls:100 Cows	Calves:100 Cows	Calves	Percent calves	Adults	Moose observed
1986[a]	103	13	21	8	9	77	85
1987[a]	77	11	28	13	14	83	96
1988[a]	129	37	33	16	13	112	128
1996[a]	119	19	11	3	5	57	60
1996[b]	160	0	20	2	7	26	28
1997[c]	53	13	37	80	20	319	399
2002[a]	71	16	9	4	5	77	81
2002[b]	59	31	19	6	11	51	57
2004[c]	45	14	14	4	9	42	46
2007[d]	58	17	38	108	20	428	536

[a] O'Brien Creek count area.
[b] Ophir Creek count area.
[c] Geospatial population estimator moose population estimate (Kellie and DeLong 2006).
[d] Spatial trend survey.

Table 2. Units 20C, 20F, and 25C reported moose hunter residency and success, regulatory years[a] 2003–2012.

Unit and Regulatory year	Successful hunters				Unsuccessful hunters				Total hunters
	Local[b] resident	Nonlocal resident	Nonresident	Total[c] (%)	Local[b] resident	Nonlocal resident	Nonresident	Total[c] (%)	
Unit 20C									
2003	59	36	10	105 (21)	252	116	26	394 (79)	499
2004	66	23	8	97 (21)	228	108	19	355 (79)	452
2005	86	36	7	129 (30)	204	81	19	304 (70)	433
2006	92	35	16	143 (28)	218	124	35	377 (73)	520
2007	90	34	16	140 (28)	219	130	18	367 (72)	507
2008	86	40	13	142 (30)	178	136	14	328 (70)	470
2009	77	49	14	140 (29)	213	105	22	340 (70)	480
2010	53	39	7	101 (23)	178	135	18	331 (75)	432
2011	71	42	9	124 (30)	172	102	11	285 (69)	409
2012	79	68	1	155 (28)	219	153	12	384 (70)	539
Unit 20F									
2003	12	8	0	20 (15)	85	29	0	114 (85)	134
2004	18	7	0	25 (22)	60	26	1	87 (78)	112
2005	27	8	1	36 (29)	64	23	2	89 (71)	125
2006	27	12	1	40 (33)	58	22	2	82 (67)	122
2007	23	6	0	29 (20)	83	29	1	113 (80)	142
2008	31	19	2	52 (31)	72	41	1	114 (69)	166
2009	38	19	2	59 (32)	90	35	2	127 (68)	186
2010	24	18	0	42 (28)	78	31	0	109 (72)	151
2011	30	19	0	49 (37)	48	36	0	84 (63)	133
2012	36	12	1	49 (30)	77	36	2	115 (70)	164
Unit 25C									
2003	3	43	6	52 (17)	20	210	19	249 (83)	301
2004	4	41	6	51 (21)	15	164	15	194 (79)	245
2005	3	56	4	63 (17)	17	248	39	304 (83)	367
2006	3	53	6	62 (18)	18	226	41	285 (82)	347
2007	4	55	9	68 (19)	9	247	32	288 (81)	356
2008	6	64	10	80 (25)	16	191	32	239 (75)	319
2009	1	95	15	111 (33)	11	183	22	216 (64)	327
2010	7	77	8	92 (26)	16	222	21	259 (72)	351
2011	9	62	19	90 (32)	10	156	17	183 (66)	273
2012	12	55	15	86 (25)	12	204	34	257 (75)	343

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2003 = 1 July 2003–30 June 2004).
[b] Hunters who live within the unit in which they reported hunting were considered local.
[c] Some reports have unknown residency, so total may not reflect the sum of local, nonlocal, and nonresident hunters.

Table 3. Units 20C, 20F, and 25C estimated moose harvest and accidental death, regulatory years[a] 2003–2012.

Unit and Regulatory year	Harvest by hunters							Accidental death			Combined total
	Reported[b]				Estimated						
	M	F	Unk	Total	Unreported[c]	Illegal/Other[d]	Total	Road[e]	Train[f]	Total	
Unit 20C											
2003	105	0	0	105	19	0	19	0	0	0	124
2004	99	0	0	99	18	1	19	0	0	0	118
2005	131	1	2	134	23	0	23	0	1	1	158
2006	141	0	2	143	25	0	25	0	3	3	171
2007	140	0	0	140	25	0	25	0	0	0	165
2008	142	0	0	142	25	0	25	0	0	0	167
2009	139	0	1	140	25	0	25	0	0	0	165
2010	101	0	0	101	18	0	18	0	0	0	119
2011	122	0	2	124	22	0	22	0	0	0	146
2012	150	1	4	155	27	0	27	0	0	0	182
Unit 20F											
2003	20	0	0	20	4	1	5	0		0	25
2004	27	0	0	27	5	0	5	0		0	32
2005	35	0	1	36	6	0	6	0		0	42
2006	39	0	0	39	7	0	7	0		0	46
2007	29	0	0	29	5	0	5	0		0	34
2008	53	0	1	54	9	0	9	0		0	63
2009	56	2	3	61	10	0	10	0		0	71
2010	43	0	0	43	8	0	8	0		0	51
2011	48	0	1	49	8	0	8	0		0	57
2012	49	0	3	52	9	0	9	0		0	61
Unit 25C											
2003	52	0	0	52	9	0	9	0		0	61
2004	52	0	0	52	9	1	10	1		1	63
2005	63	0	0	63	11	0	11	0		0	74
2006	62	0	0	62	11	0	11	0		0	73
2007	68	0	0	68	12	0	12	0		0	80

Unit and Regulatory year[a]	Harvest by hunters							Accidental death			Combined total
	Reported[b]				Estimated						
	M	F	Unk	Total	Unreported[c]	Illegal/Other[d]	Total	Road[e]	Train[f]	Total	
2008	79	1	0	80	14	0	14	0		0	94
2009	114	0	0	114	20	0	20	0		0	134
2010	95	0	0	95	17	0	17	0		0	112
2011	91	0	0	91	16	0	16	0		0	107
2012	84	0	2	86	15	0	15	0		0	101

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2003 = 1 July 2003–30 June 2004).
[b] Data from moose harvest ticket reports in moose harvest database using ADF&G's Wildlife Information Network (WinfoNet).
[c] Based on 17.7% unreported harvest (including wounding loss) estimated by Gasaway et al. (1992).
[d] Data from Fairbanks Alaska Wildlife Troopers wildlife mortality logs and ADF&G records.
[e] Documented kills from Fairbanks Alaska Wildlife Troopers wildlife mortality logs.
[f] Confirmed dead Alaska Railroad mileposts 327.0–370.9; "missing" (moose hit but not recovered) are not included. Data provided by the Alaska Railroad and summarized by ADF&G, Palmer.

Table 4. Units 20C, 20F, and 25C reported percent moose harvest chronology by month/day, regulatory years[a] 2003–2012.

Regulatory year	Harvest percent chronology by month/day[b]					
	9/1–9/7	9/8–9/15	9/16–9/20	9/21–9/25	12/1–12/10	*n*
Unit 20C						
2003	21	54	25			102
2004	32	28	39			92
2005	25	40	35			124
2006	37	35	28			134
2007	31	47	22			137
2008	22	44	33			142
2009	31	39	30			137
2010	31	40	29			101
2011	27	40	33			122
2012[c]	17	30	28	25		151
Unit 20F						
2003	26	32	37		5	19
2004	26	41	30		4	27
2005	26	40	31		3	35
2006	31	46	23		0	39
2007	14	59	24		3	29
2008	23	53	23		2	53
2009	25	34	36		5	59
2010	16	49	26		9	43
2011	28	39	27		6	47
2012	16	56	24		4	51
Unit 25C						
2003	45	55				49
2004	44	56				52
2005	39	61				59
2006	43	56				57
2007	44	56				66
2008	44	56				75
2009	49	51				113
2010	45	55				95
2011	35	65				90
2012	41	59				82

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2003 = 1 July 2003–30 June 2004).
[b] Does not include kills reported outside open hunting seasons or hunters who did not report date of kill.
[c] The season was lengthened 5 days in Unit 20C beginning in regulatory year 2012.

Table 5. Units 20C, 20F, and 25C reported moose harvest percent by transport method, regulatory years[a] 2003–2012.

Unit and Regulatory year	Harvest percent by transport method								
	Airplane	Horse/ Dogsled	Boat	3- or 4-wheeler	Snowmachine	Other ORV	Highway vehicle	Unk/ Other	*n*
Unit 20C									
2003	27	5	24	24	0	12	7	2	105
2004	30	1	27	22	0	14	5	0	99
2005	21	1	32	25	1	13	3	3	134
2006	29	1	27	27	0	10	3	3	143
2007	24	1	28	28	0	11	7	1	140
2008	37	1	30	18	0	12	2	0	142
2009	20	1	32	26	0	14	6	1	140
2010	19	0	31	30	0	13	7	0	101
2011	23	0	31	35	0	7	4	0	122
2012	15	1	37	28	0	12	5	2	155
Unit 20F									
2003	0	0	50	30	5	10	5	0	20
2004	0	0	37	22	4	11	26	0	27
2005	6	0	28	31	3	5	25	2	36
2006	5	0	33	31	0	18	13	0	39
2007	3	0	31	38	7	7	14	0	29
2008	3	2	31	39	4	9	12	0	54
2009	0	0	36	46	7	2	8	2	61
2010	6	2	33	34	9	7	7	2	43
2011	2	0	35	37	6	6	14	0	49
2012	6	0	35	24	4	6	19	6	52
Unit 25C									
2003	6	0	29	44	0	8	12	2	52
2004	4	0	17	46	0	4	27	2	52
2005	0	0	30	48	0	6	14	2	63
2006	6	0	21	53	0	6	13	0	62
2007	1	0	22	53	0	0	25	0	68
2008	4	0	23	51	1	1	19	1	80
2009	5	0	21	51	0	6	15	2	114
2010	2	0	28	55	0	2	12	1	95
2011	1	0	26	51	0	2	20	0	91
2012	5	0	18	49	0	2	24	2	86

[a] Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 2003 = 1 July 2003–30 June 2004).