

---

**CHAPTER 28: MOOSE MANAGEMENT REPORT**

From: 1 July 2011  
To: 30 June 2013<sup>1</sup>

**LOCATION**

**GAME MANAGEMENT UNIT:** 21B (9,311 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Nowitna River drainage east of Poorman Road, Yukon River drainage between Melozitna and Tozitna Rivers

**BACKGROUND**

The earliest accounts of this portion of Interior Alaska mentioned the presence of moose (Osborne 1990). Moose had apparently become abundant by the time gold seekers converged on the area in the early 1900s. The village of Ruby had a population of 10,000 people during the 1910 gold rush, and many moose were harvested to supply the community with meat. Several severe winters in the late 1960s and early 1970s initiated widespread declines in moose populations throughout the Interior, including Unit 21B.

Historically, wildfires were a major force affecting the productivity and diversity of moose habitat in this area. Large fires (>50,000 ac) periodically occur in this area, and fire was ignited by gold miners to remove overburden and create fuel for dredges south of Ruby during the early 20<sup>th</sup> century. The 1982 *Alaska Interagency Fire Management Plan: Tanana–Minchumina Planning Area*, and more recently the *Alaska Interagency Wildland Fire Management Plan* (Alaska Wildland Fire Coordinating Group 1998), identified settlement resources needing protection from wildland fire and recognized the ecological role of fire in remote areas.

The Nowitna River to the east of Ruby is a popular hunting area for residents of Ruby, Tanana, and, to a lesser extent, Galena. It is also a popular hunting area for Fairbanks residents who use boats and aircraft for access. Because of its long history of use by both local and nonlocal hunters, this area has been the focus of much of the management effort in Unit 21B.

In addition to the lower Nowitna River drainage, Unit 21B includes the area east of the Ruby–Poorman Road, the banks of the Yukon River from Ruby to Tanana, the Blind River, and the Boney River drainages. The Alaska Board of Game (BOG) made several changes related to Unit 21B in 2004 and 2006 that substantially changed the data collection and analysis reflected in this report. In 2004 BOG adopted regulations to implement 3 drawing hunts and a registration hunt for the entire unit. In 2006 BOG added the upper Nowitna drainage (formerly part of

---

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

Unit 21A) to Unit 21B, adopted an additional drawing permit and a registration permit hunt in part of the area added, and added 10 days of fall moose hunting opportunity for resident hunters.

Unit 21B management reports prior to 2010 contained substantial differences in data analysis from subsequent management reports and are described in Stout (2008).

## MANAGEMENT DIRECTION

### MANAGEMENT GOAL, OBJECTIVES, AND ACTIVITY

**GOAL:** Manage Unit 21B moose on a sustained yield basis to provide both hunting and other enjoyment of wildlife in a manner that complements the wild and remote character of the area and that minimizes disruption of local residents' lifestyles.

OBJECTIVE 1: Provide for harvest of 50–200 moose or 5% of the posthunt fall moose population estimate, whichever is less.

OBJECTIVE 2: In combination with Unit 21C, implement at least 2 habitat enhancement activities every 5 years.

OBJECTIVE 3: Maintain a moose population of 4,000–6,000.

*Activity* — Conduct population estimation surveys when funding is available and monitor harvest through hunt reports.

## METHODS

No unitwide population surveys were conducted during RY11–RY12. Methods for geospatial population estimator (GSPE) surveys conducted in 2001 and 2008 in Unit 21B are described in Pamperin (2012a).

During 31 October–1 November 2011, the U.S. Fish and Wildlife Service (FWS) surveyed 2 established trend count areas (TCA) to assess population composition in a small portion of Unit 21B. These were the 149 mi<sup>2</sup> Nowitna–Sulatna confluence and the 102 mi<sup>2</sup> Nowitna mouth TCAs. Piper PA-18 (or equivalent) aircraft were used, and contiguous survey units of approximately 6 mi<sup>2</sup> each were searched at a rate of 4–8 min/mi<sup>2</sup> at 70–80 mph and 300–800 feet above ground level depending on terrain and vegetation. Surveys were conducted after sufficient snow had fallen to ensure adequate sightability and moose were classified by sex and age with cows classified by number of calves present and bulls classified by size based on antler width and configuration.

Harvest information was monitored through mandatory registration and drawing permit harvest reports, general season harvest reports, and operating a moose hunter checkstation on the Nowitna River. General season hunters received 1 reminder letter to report harvest. Hunters with registration or drawing permits received 1 or 2 reminder letters and usually an e-mail and telephone calls if we did not receive timely harvest reports. Report and survey information was used to determine total harvest, harvest location, hunter residency and success, harvest chronology, and transportation used. Survey and harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY11 = 1 July 2011–30 June 2012).

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size and Trend*

No unitwide GSPE surveys were conducted in Unit 21B during RY11–RY12 (Table 1). The Nowitna mouth and Nowitna–Sulatna confluence TCAs surveyed by FWS in 2011 and 2012 represent the only new population and composition data gathered in Unit 21B for RY11–RY12. Because of inadequate survey conditions, we did not include the results of the 2012 trend count survey data in this report.

TCA data from RY11 indicate that moose densities along the riparian corridor were relatively constant and within the range of past surveys (Tables 2 and 3). Data from TCAs (Tables 2–4) are not broadly representative of the unitwide moose population, the majority of which has lower moose densities than the riparian areas where TCAs are located.

Unit 21B Total Area. The most recent unitwide population estimate survey for Unit 21B was conducted in 2008 and indicated 2,317 observable moose ( $\pm 18\%$  relative error = 1,899–2,736 observable moose, 90% CI) in the survey area (Table 1). This resulted in an overall density of 0.27 moose/mi<sup>2</sup>.

#### *Population Composition*

No unitwide population composition surveys have been conducted in Unit 21B since 2008. The 2011 TCA surveys conducted by FWS at the Nowitna mouth and Nowitna–Sulatna confluence produced similar results to past surveys and no significant trend is apparent (Fig. 1). The yearling bull:cow ratios were low in 2010 and likely a carryover from poor production and survival of the calf cohort after the severe winter of 2008–2009 (Fig. 1). Bull:cow ratios from the TCAs (Tables 2 and 3) are consistently lower than the unitwide estimate of 50 bulls:100 cows from the 2008 GSPE survey (Table 1). This is not surprising, given that areas accessible from the Nowitna River corridor experience higher hunting pressure than most other areas in the unit.

#### *Distribution and Movements*

No recent studies have been done on moose distribution and movement in Unit 21B. Limited information on moose movements from radiocollared cow–calf pairs is available in Woolington (1998).

**MORTALITY**

*Harvest*

Season and Bag Limit.

<u>Unit and Bag Limits</u>	<u>Resident Open Season (Subsistence and General Hunts)</u>	<u>Nonresident Open Season</u>
<i>RY11–RY12</i>		
Unit 21B, that portion within the Nowitna River drainage upstream from the Little Mud River drainage and outside a corridor extending 2 miles on either side of and including the Nowitna River.		
RESIDENT HUNTERS: 1 bull.	22 Aug–31 Aug 5 Sep–25 Sep	
NONRESIDENT HUNTERS: 1 bull with 50-inch antlers or antlers with 4 or more brow tines on one side.		5 Sep–25 Sep
Remainder of Unit 21B.		
RESIDENT HUNTERS: 1 bull by registration permit only; or	22 Aug–31 Aug 5 Sep–25 Sep (Subsistence hunt only)	
1 bull by drawing permit only; up to 300 permits may be issued in Unit 21B.	5 Sep–25 Sep	
NONRESIDENT HUNTERS: 1 bull with 50-inch antlers or antlers with 4 or more brow tines on one side by drawing permit only; up to 300 permits may be issued in Unit 21B.		5 Sep–25 Sep

Alaska Board of Game Actions and Emergency Orders. No regulatory changes were adopted and no emergency orders were issued during RY11–RY12.

Harvest by Hunters. Reported harvest during RY11–RY12 in Unit 21B averaged 71 moose annually, consistent with average reported harvest during RY01–RY10 ( $\bar{x}$  = 76, range = 64–86) (Table 5; including harvest in Nowitna River drainage above the Little Mud River). In addition, we estimated the Unit 21B annual unreported harvest to be 5 moose by Ruby residents, 15 by Tanana residents, and 5 by hunters in the Nowitna River drainage above Little Mud River, for a

total estimated unreported harvest of 25 moose (Stout 2010). During RY11 and RY12, harvest from the lower Nowitna River corridor accounted for 26% of the reported harvest for Unit 21B, suggesting that regulations adopted in 2004 to improve harvest distribution remained successful in moving hunters away from the Nowitna River corridor. Prior to 2004 harvest from the lower Nowitna River corridor comprised 61% of total Unit 21B harvest (RY97–RY03, Tables 6 and 7).

Checkstation Results. A hunter checkstation located at the mouth of the Nowitna River has been in place since RY88 and historical patterns in success and numbers of hunters through the checkstation are outlined in Pamperin (2012a). During RY11 and RY12 we observed no substantial changes in hunter residency, harvest, or success of hunters passing through the checkstation.

Hunter Residency and Success. Based on harvest reports, most Unit 21B hunters were Alaska residents who resided outside the unit, principally in Fairbanks (Table 6). Average annual success rate for all hunters during RY99–RY10 was 37% (range = 26–48%). The annual success rate was 44% (range = 38–48%) in RY99–RY03, dropped to 31% (range = 26–39%) during RY04–RY10, and increased slightly to 36% and 37% in RY11 and RY12 (Table 7). Most of the decline can be explained by 3 changes in hunt administration. First, more hunters were forced to hunt away from the Nowitna River corridor in more difficult hunting terrain as a result of the new drawing and registration hunt regulations. Second, reporting rates by unsuccessful hunters increased with the higher level of reporting accountability associated with registration and drawing permit systems. Third, an individual hunter could possess more than one reporting mechanism, which increased the total number of permits reported but probably did not increase the number of individual hunters. The first 2 outcomes were implemented by design, and improved our ability to manage moose in Unit 21B. However, because of these changes, assessing harvest success rate trends has become problematic when comparing data before and after RY04.

Harvest Chronology. During RY11 and RY12, hunter reports indicated that most moose were shot during 15–25 September ( $\bar{x}$  = 64%; Table 8). This was probably due to relatively little movement of bulls in the earlier part of the season compared to later, when bulls actively engage in rutting behavior.

Winter harvest was not reported on harvest or permit report cards, but was probably about 20% of the annual kill. Winter harvest likely occurred during October–March (Andersen et al. 2001).

Transportation Methods. Consistent with past harvest methods, the majority of hunters (RY11–RY12;  $\bar{x}$  = 82%) used boats to hunt moose (Table 9). Most airplane access was by commercial transporters. Highway vehicle transportation occurred exclusively on the Poorman Road south of Ruby. Snowmachines were used during winter to hunt, but winter reporting rates were low because there was no open moose hunting season, and therefore snowmachine use was underrepresented in the data.

#### *Other Mortality*

Predation mortality on moose calves was previously found to be significant in Unit 21B (Osborne et al. 1991). During calf mortality studies of radiocollared newborn moose, black bears were the main predator, killing 38% of all calves. Wolves killed 11% of all calves, unidentified

predators killed 8%, grizzly bears killed 2%, and 5% died from other natural causes. No direct estimates of bear abundance have been done in Unit 21B, and no change in wolf abundance has been described for this area since 1996 (Pamperin 2012b).

## **HABITAT**

### *Assessment*

No new habitat data were collected in RY11 or RY12. One significant wildfire on the Nowitna River burned ~22,000 acres in 2012 (Alaska Interagency Coordination Center-Alaska Fire Service, [fire.ak.blm.gov/incinfo/aklgfire.php](http://fire.ak.blm.gov/incinfo/aklgfire.php)).

## **CONCLUSIONS AND RECOMMENDATIONS**

Classification data from the Nowitna TCAs indicated slightly higher total moose numbers in 2011 within the riparian zone of the lower Nowitna River compared to data from RY00 through RY10. Composition data varied within the range of values observed within the TCAs in the previous 8 years, with slight increases in yearling bull:cow and total bull:cow ratios. Observed variability in data from the TCAs is likely a factor of their small area and increased sensitivity to changes in the timing and conditions under which surveys are conducted. By transitioning to a system of larger scale GSPE surveys conducted at more frequent intervals, we hope to improve the quality of composition and population data gathered in Unit 21B.

We recommend biennial or triennial GSPE moose surveys to better document unitwide moose abundance, even if those surveys are conducted at a low sampling intensity (Kellie and DeLong 2006, Ver Hoef 2008). Although high sampling intensity surveys provide narrow confidence intervals and improve precision on an estimate, they are not likely to be conducted on a regular basis.

In RY11 and RY12 we met the goal to manage Unit 21B moose on a sustained yield basis to provide both hunting and other enjoyment of wildlife in a manner that complements the wild and remote character of the area and minimizes disruption of local residents' lifestyles. The moose population continued to support the consumptive demands as well as the nonconsumptive uses identified.

We also met the harvest objective of 50–200 moose or up to 5% of the population. Total estimated harvest was 98 moose in RY11 and 94 in RY12, approximately 4.2% of the Unit 21B observable moose population (2008 GSPE survey; Table 1).

The objective to implement at least 2 habitat enhancement projects every 5 years in combination with Unit 21C was not met.

The third management objective to maintain a moose population of 4,000–6,000 was likely not met during RY11–RY12. Based on the 2008 GSPE survey, the population estimate for all of Unit 21B was 2,317 observable moose (1,899–2,736; 90% CI), and it is unlikely that the population could have grown enough from 2008 to 2012 to fall within the population objective. The positive intensive management finding for Unit 21B moose adopted by BOG in 2010 allows for a wider range of management options, including strategies to improve recruitment to achieve

this population objective. Despite the positive finding, intensive management activities are improbable due to federal landownership in areas most frequented by moose hunters.

Predators likely remained relatively abundant and continued to be the primary factor limiting moose abundance in Unit 21B. Harvest of wolves ( $\leq 10$  annually) and black bears within the unit was low and unlikely to reduce their abundance sufficiently to increase calf or yearling moose survival. Efforts should be made to increase the harvest of predators if more moose are desired.

#### MANAGEMENT OBJECTIVES

The second management objective will be removed in the next reporting period. There have been no habitat enhancement projects in Units 21B or 21C and it is unlikely that resources will be available to do so in the foreseeable future.

#### REFERENCES CITED

- Alaska Wildland Fire Coordinating Group. 1998. Alaska interagency wildland fire management plan. <http://forestry.alaska.gov/pdfs/98AIFMP.pdf> (Accessed 1 July 2014).
- Andersen, D. B., C. J. Utermohle, and G. Jennings. 2001. The 1999–2000 harvest of moose, caribou, and bear in ten middle Yukon and Koyukuk river communities. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 262, Juneau.
- Gasaway, W. C., S. D. DuBois, D. J. Reed, and S. J. Harbo. 1986. Estimating moose population parameters from aerial surveys. Institute of Arctic Biology, Biological Papers of the University of Alaska, No. 22, Fairbanks.
- Kellie, K. A., and R. A. DeLong. 2006. Geospatial survey operations manual. Alaska Department of Fish and Game, Division of Wildlife Conservation, Fairbanks. <http://winfonet.alaska.gov/sandi/moose/surveys/documents/GSPEOperationsManual.pdf> (Accessed 1 July 2014).
- Osborne, T. O. 1990. Unit 21B moose. Pages 324–336 [In] S. O. Morgan, editor. Annual report of survey and inventory activities 1 July 1988–30 June 1989. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Study 1.0, Juneau.
- Osborne, T. O., T. F. Paragi, J. L. Bodkin, A. J. Loranger, and W. N. Johnson. 1991. Extent, cause, and timing of moose calf mortality in western interior Alaska. *Alces* 27:24–30.
- Pamperin, N. J. 2012a (*In prep*). Unit 21B moose. [In] P. Harper, editor. 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-2012, Juneau.
- Pamperin, N. J. 2012b. Units 21B, 21C and 21D wolf. Pages 212–220 [In] P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2008–30 June 2011. Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/SMR-2012-4, Juneau.

Stout, G. W. 2008. Unit 21B moose. Pages 455–476 [*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.

Stout, G. W. 2010. Unit 21B moose. Pages 446–465 [*In*] P. Harper, editor. Moose management report of survey and inventory activities 1 July 2007–30 June 2009. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Project 1.0, Juneau.

Woolington, J. D. 1998. Unit 21B moose. Pages 345–356 [*In*] M. V. Hicks, editor. Moose management report of survey and inventory activities 1 July 1995–30 June 1997. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Study 1.0, Juneau.

Ver Hoef, J. M. 2008. Spatial methods for plot-based sampling of wildlife populations. *Environmental and Ecological Statistics* 15(1):3–13. doi:10.1007/s10651-007-0035-y

**PREPARED BY:**

Nathan J. Pamperin  
Wildlife Biologist I

**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:

Pamperin, N. J. 2014. Unit 21B moose. Chapter 28, pages 28-1 through 28-18 [*In*] P. Harper and L. A. McCarthy, editors. Moose management report of survey and inventory activities 1 July 2011–30 June 2013. Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/SMR-2014-6, Juneau.

---

The State of Alaska is an Affirmative Action/Equal Opportunity Employer. Contact the Division of Wildlife Conservation at (907) 465-4190 for alternative formats of this publication.

---



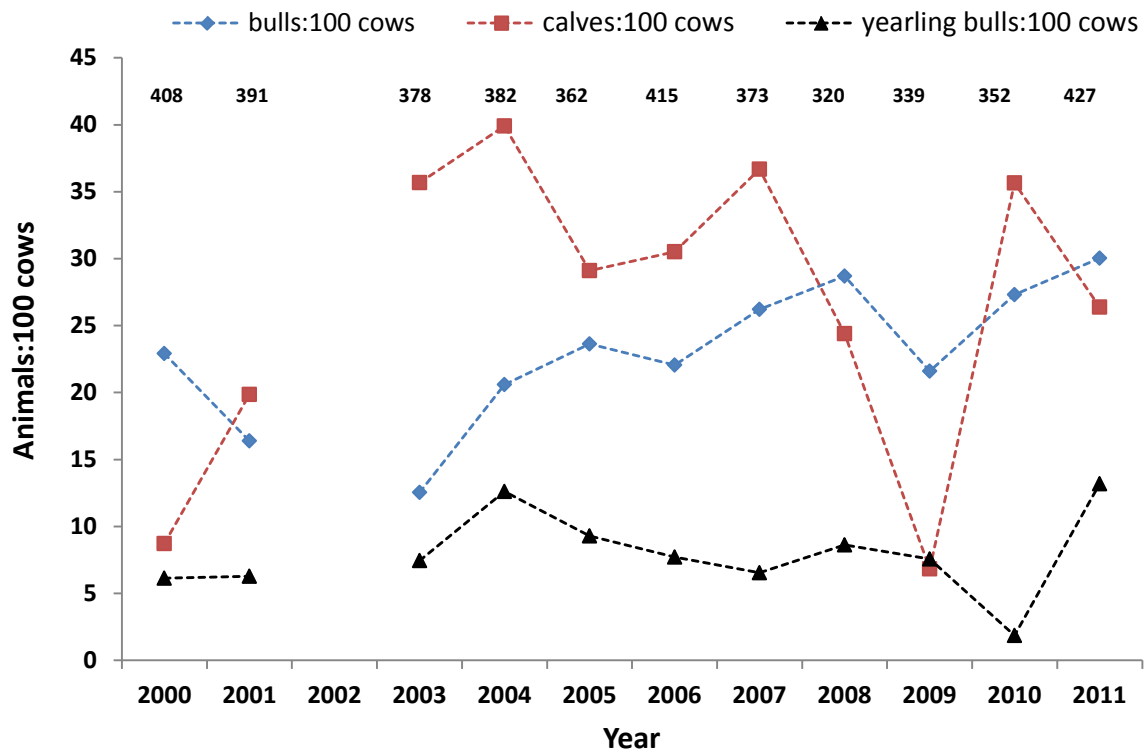


Figure 1. Ratios of calves, bulls, and yearling bulls per 100 cows in Nowitna mouth and Nowitna–Sulatna confluence trend count areas. The number of moose counted during each survey is provided at the top of the figure.

Table 1. Unit 21B moose population estimates, regulatory years<sup>a</sup> 1980–2008.

Area/Regulatory year	Area mi <sup>2</sup>	Bulls:100 Cows	Calves:100 Cows	Yrlg bulls:100 Cows	Percent calves	Adults	Population estimate (90% CI <sup>b</sup> )	Density
<i>21B–Nowitna West</i>								
1980 <sup>c</sup>	1,556	53	35	25	19	1,125	1,389 (±27%)	0.89
1986 <sup>c</sup>	1,596	37	39	12	22	685	878 (±24%)	0.55
1990 <sup>c</sup>	1,560	40	39	10	22	948	1,214 (±18%)	0.78
1995 <sup>d</sup>	1,338	34	30	14	19	856	1,052 (±20%)	0.79
2001 <sup>e,f</sup>	1,531	30	19	7	12	1,203	1,358 (±28%)	0.89
2008 <sup>d</sup>	1,531	35	36	9	21	646	816 (±9%)	0.53
<i>21B–Below Big Mud</i>								
2001 <sup>e,f</sup>	4,754	39	18	9	12	2,772	3,201 (±45%)	0.67
2008 <sup>e</sup>	4,754	45	43	12	23	1,110	1,438 (±15%)	0.30
<i>Total Area</i>								
2008 <sup>e</sup>	8,565	50	49	12	25	1,747	2,317 (±18%)	0.27

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1980 = 1 July 1980–30 June 1981).

<sup>b</sup> Confidence interval (% ±).

<sup>c</sup> MOOSEPOP analysis of Gasaway et al. (1986) survey with sightability correction factor (SCF).

<sup>d</sup> MOOSEPOP analysis (regression design) of Gasaway et al. (1986) survey with SCF.

<sup>e</sup> Geospatial population estimator (GSPE) analysis without SCF (observable moose).

<sup>f</sup> 2001 GSPE survey contained sampling errors and likely produced an overestimate of observable moose.

Table 2. Unit 21B Nowitna–Sulatna confluence aerial moose composition counts<sup>a</sup>, regulatory years<sup>b</sup> 1991–2011.

Regulatory year	Survey area (mi <sup>2</sup> )	Bulls:100 cows	Yrlg bulls: 100 cows	Calves:100 cows	Twins:100 cows	Percent calves	Moose	Moose/mi <sup>2</sup>
1991	76	21	9	29	8	20	200	2.7
1992	76	18	1	48	7	29	171	2.3
1993	76	22	7	20	0	14	195	2.6
1994	76	16	6	20	4	15	191	2.5
1995	76	15	4	33	6	22	148	2.0
1996	76	18	8	23	6	13	216	2.9
1998	76	19	2	28	6	19	180	2.5
1999 <sup>c</sup>	76	6	1	23	12	18	106	1.5
2000	149	25	7	11	0	8	202	1.4
2001	120	18	6	18	0	12	200	1.7
2003	143	15	10	28	3	20	172	1.2
2004	149	23	12	41	15	25	188	1.3
2005	149	29	10	37	12	22	167	1.1
2006	149	25	7	25	3	16	207	1.4
2007 <sup>c</sup>	149	31	9	42	19	24	177	1.2
2008	149	29	10	24	17	16	170	1.1
2009	149	23	7	8	0	6	173	1.2
2010	149	32	3	42	5	24	185	1.2
2011	149	28	14	38	8	23	224	1.5

<sup>a</sup> Conducted by the U.S. Fish and Wildlife Service.

<sup>b</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1991 = 1 July 1991–30 June 1992).

<sup>c</sup> Low snow conditions during survey.

Table 3. Unit 21B Nowitna mouth aerial moose composition counts<sup>a</sup>, regulatory years<sup>b</sup> 1992–2011.

Regulatory year	Survey area (mi <sup>2</sup> )	Bulls:100 cows	Yrlg bulls:100 cows	Calves:100 cows	Twins:100 cows	Percent calves	Moose	Moose/mi <sup>2</sup>
1992	59	21	0	31	0	20	138	2.9
1993	59	32	6	32	6	20	189	3.2
1994	59	19	8	23	0	22	148	2.5
1995	59	16	5	26	0	18	116	2.0
1996	59	21	7	22	0	16	185	3.1
1998	59	20	3	12	0	9	182	3.0
1999 <sup>c</sup>	59	11	8	21	0	16	87	1.4
2000	102	21	6	7	0	5	206	2.0
2001	102	15	7	15	6	18	191	1.9
2003	102	10	5	42	10	28	206	2.0
2004	102	19	13	39	7	25	194	1.9
2005	102	20	9	24	0	16	195	1.9
2006	102	19	8	37	17	24	208	2.0
2007 <sup>c</sup>	102	22	5	32	0	21	196	1.9
2008	102	29	7	24	9	16	150	1.5
2009	102	21	8	6	0	5	166	1.6
2010	102	23	1	29	0	19	167	1.6
2011	102	32	12	14	0	10	203	1.9

<sup>a</sup> Conducted by the U.S. Fish and Wildlife Service.

<sup>b</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1992 = 1 July 1992–30 June 1993).

<sup>c</sup> Low snow conditions during survey.

Table 4. Unit 21B Deep Creek aerial moose composition counts, regulatory years<sup>a</sup> 1982–2008.

Regulatory year	Survey area (mi <sup>2</sup> )	Bulls:100 cows	Yrlg bulls: 100 cows	Calves:100 cows	Twins:100 cows	Percent calves	Moose	Moose/mi <sup>2</sup>
1982	53	90	35	42	0	18	72	1.4
1987	53	43	7	55	14	27	87	1.7
1993	53	45	15	20	0	12	66	1.3
1995	53	48	8	30	8	17	89	1.7
1996	53	29	5	24	0	16	89	1.7
2001	130	33	8	18	0	12	152	1.2
2004	130	28	10	48	14	27	152	1.1
2008	130	28	2	38	14	23	144	1.1

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1982 = 1 July 1982–30 June 1983).

Table 5. Unit 21B<sup>a</sup> moose harvest, regulatory years<sup>b</sup> 1996–2012.

Regulatory year	Harvest by hunters				Unreported	Total
	Bull	Cow	Unk	Total		
1996	78	0	0	78	15	93
1997	67	1	0	68	15	83
1998	74	2	0	76	15	91
1999	81	0	0	81	20	101
2000	65	1	7	73	20	93
2001	75	0	4	79	20	99
2002	77	0	0	77	20	97
2003	75	0	0	75	25	100
2004	63	1	0	64	25	89
2005	77	0	0	77	25	102
2006	70	0	0	70	25	95
2007	84	0	0	84	25	109
2008	86	0	0	86	25	111
2009	66	0	1	67	25	92
2010	81	0	0	81	25	106
2011	73	0	0	73	25	98
2012	69	0	0	69	25	94

<sup>a</sup> All years include the Nowitna River drainage above the Little Mud River, which was added to Unit 21B in 2006.

<sup>b</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1996 = 1 July 1996–30 June 1997).

Table 6. Unit 21B Nowitna River checkstation hunters (R), harvest (H), and percent success (%S), regulatory years<sup>a</sup> 1997–2012<sup>b</sup>.

Regulatory year	Local villages <sup>c</sup>			Fairbanks			Other residents			Nonresident			Total		
	R	H	%S	R	H	%S	R	H	%S	R	H	%S	R	H	%S
1997	16	1	6	57	29	51	21	8	38	7	3	43	101	41	41
1998	17	4	24	57	26	46	27	17	63	22	3	14	123	50	41
1999	24	3	13	57	21	37	60	17	28	14	4	29	155	45	29
2000	11	2	18	59	21	36	56	18	32	28	6	21	154	47	31
2001	27	0	0	62	21	34	48	8	17	23	5	22	160	34	21
2002	18	3	17	56	25	45	45	20	44	15	3	20	134	51	38
2003	22	4	18	80	29	36	80	19	24	26	4	15	208	56	27
2004	19	2	11	59	13	22	60	12	20	13	0	0	151	27	18
2005	17	2	12	44	14	32	61	19	31	8	3	38	130	38	29
2006	21	2	10	66	17	26	41	14	34	5	0	0	133	33	25
2007	20	1	5	28	11	39	38	14	37	4	0	0	90	26	29
2008	16	3	19	43	19	44	48	18	38	3	1	33	110	41	37
2009	16	3	19	32	10	31	38	16	42	4	0	0	90	29	32
2010	17	2	12	35	12	34	53	20	38	5	0	0	110	34	31
2011	12	4	33	36	15	42	39	17	44	1	0	0	88	36	41
2012	17	5	29	23	8	35	32	14	44	4	2	50	76	29	38

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1997 = 1 July 1997–30 June 1998).

<sup>b</sup> U.S. Fish and Wildlife Service.

<sup>c</sup> Local residents reside in Tanana, Ruby, and Galena.

Table 7. Unit 21B moose hunter residency and success, regulatory years<sup>a</sup> 1996–2012<sup>b</sup>.

Regulatory year	Successful					Unsuccessful					Total hunters
	Local resident <sup>c</sup>	Nonlocal resident	Nonresident	Unk	Total (%)	Local resident <sup>c</sup>	Nonlocal Resident	Nonresident	Unk	Total	
1996	1	66	10	1	78 (38)	27	78	18	2	125	203
1997	10	51	7	0	68 (38)	27	74	9	0	110	178
1998	9	57	9	1	76 (62)	11	30	6	0	47	123
1999	13	55	12	1	81 (45)	13	69	15	3	100	181
2000	8	44	18	3	73 (48)	4	54	22	0	80	153
2001	14	43	21	1	79 (43)	20	65	21	0	106	185
2002	8	56	13	0	77 (45)	10	69	16	0	95	172
2003	14	51	10	0	75 (38)	18	86	18	1	123	198
2004	15	43	5	1	64 (27)	38	108	22	1	169	233
2005	17	52	8	0	77 (31)	63	99	9	0	171	248
2006	11	50	8	1	70 (26)	39	142	22	0	203	273
2007	25	48	11	0	84 (39)	38	76	15	0	129	213
2008	16	61	9	0	86 (34)	46	109	11	0	166	252
2009	16	44	7	0	67 (31)	43	95	10	1	149	216
2010	26	47	8	0	81 (31)	58	104	15	0	177	258
2011	17	44	12	0	73 (36)	37	80	15	0	132	205
2012	19	34	16	0	69 (37)	42	65	13	0	120	189

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1996 = 1 July 1996–30 June 1997).

<sup>b</sup> Some hunters had multiple permits.

<sup>c</sup> Local residents reside in Tanana, Ruby, and Galena.



Table 8. Unit 21B moose harvest chronology percent by month/day, regulatory years<sup>a</sup> 1996–2012.

Regulatory year	Harvest chronology percent by month/day			<i>n</i>
	8/22–8/31 <sup>b</sup>	9/1–9/14	9/15–9/25	
1996	n/a	40	60	73
1997	n/a	33	67	64
1998	n/a	39	61	69
1999	n/a	37	63	79
2000	n/a	35	65	68
2001	n/a	24	76	76
2002	n/a	28	72	74
2003	n/a	31	69	74
2004	n/a	33	67	62
2005	n/a	37	63	73
2006	3	15	82	67
2007	3	28	70	80
2008	2	29	68	85
2009	5	27	68	66
2010	6	21	72	80
2011	1	27	71	73
2012	1	42	57	69

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1996 = 1 July 1996–30 June 1997).

<sup>b</sup> August season started in 2006.

Table 9. Unit 21B moose harvest percent by transport method, regulatory years<sup>a</sup> 1996 through 2012.

Regulatory year	Harvest percent by transport method								<i>n</i>
	Airplane	Horse	Boat <sup>b</sup>	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk	
1996	17	0	82	1	0	0	0	0	77
1997	7	0	87	0	3	0	3	0	68
1998	20	0	74	0	3	0	3	0	74
1999	15	1	74	0	0	1	8	0	78
2000	30	0	69	0	0	1	0	0	67
2001	23	0	65	0	1	0	11	0	75
2002	18	0	80	0	0	0	1	0	76
2003	15	0	75	1	3	0	5	0	73
2004	13	0	78	0	0	2	8	0	64
2005	20	0	76	1	0	0	3	0	76
2006	24	0	68	0	0	2	6	0	66
2007	15	0	69	4	0	5	8	0	84
2008	13	0	81	2	0	0	3	0	86
2009	7	0	80	1	0	6	5	1	67
2010	15	0	65	1	0	3	16	0	80
2011	7	0	82	3	0	3	3	3	73
2012	10	0	81	3	0	0	4	1	69

<sup>a</sup> Regulatory year begins 1 July and ends 30 June (e.g., regulatory year 1996 = 1 July 1996–30 June 1997).

<sup>b</sup> Includes airboats.