Species Management Report ADF&G/DWC/SMR-2012-4

Wolf management report of survey-inventory activities, 1 July 2008–30 June 2011

Patricia Harper, editor

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2012 set

Alaska Department of Fish and Game Division of Wildlife Conservation

Species Management Report ADF&G/DWC/SMR-2012-4

Wolf management report of survey-inventory activities, 1 July 2008–30 June 2011

Alaska Department of Fish and Game
Division of Wildlife Conservation
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Species management reports provide information about species that are hunted or trapped and management actions, goals, and recommendations for those species. Detailed information is prepared for each species every two or three years, depending on the species, by the area management biologist for game management units in their areas. Reports are not produced for species that are not managed for hunting or trapping or for areas where there is no current or anticipated activity. The individual unit reports are compiled in this statewide report. Unit reports are reviewed and approved for publication by regional management coordinators.

Any information taken from this report should be cited with credit given to authors and the Alaska Department of Fish and Game. Authors are identified at the end of each unit section.

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

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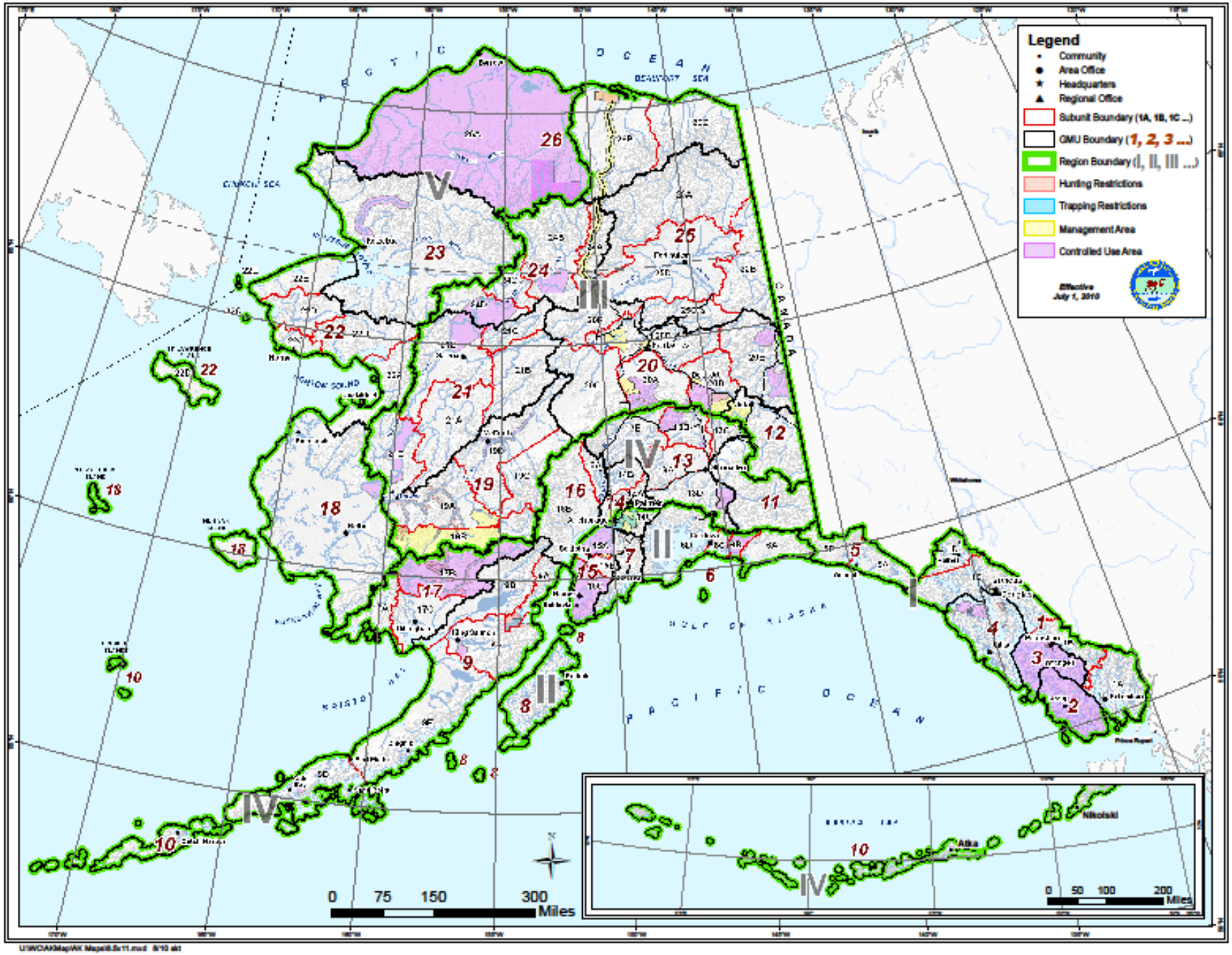
Legend
Community
Area Office
Headquarters
Regional Office
Subunit Boundary (1A, 1B, 1C ...)
GMU Boundary (1, 2, 3 ...)
Region Boundary (I, II, III ...)
Hunting Restrictions
Trapping Restrictions
Management Area
Controlled Use Area
Effective July 1, 2010
0 75 150 300 Miles
0 50 100 200 Miles
Nikolski
Atka
BERING SEA
CHUKCHI SEA
BEAUFORT SEA
ARCTIC OCEAN
GULF OF ALASKA
PACIFIC OCEAN
CANADA

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 1A (5,300 mi^2)

GEOGRAPHIC DESCRIPTION: Unit 1 south of Lemesurier Point, including all drainages into Behm Canal and excluding all drainages into Ernest Sound

BACKGROUND

Wolves live throughout the islands and mainland of Unit 1A, although densities on the mainland are generally lower than on maritime-influenced islands. Wolves are capable swimmers and regularly travel between nearby adjacent islands in search of prey.

Wolves feed primarily on deer in southern Southeast Alaska, particularly on islands in the area. For example, analysis of scats (feces) collected on Prince of Wales Island contained in order of frequency: deer, beaver, river otter, black bear, small mammals, and fish (Kohira and Rexstad 1997). Most wolf scat contained a combination of prey, suggesting they are opportunists rather than prey specialists. Fish are consumed seasonally in the fall when salmon spawning occurs. Szepanski et al. (1999) concluded that up to 25% of the diet of wolves may be from marine derived resources. Marine mammals, salmon, waterfowl, and small mammals supplement the diets of local wolves. Wolves along the lower mainland have fewer Sitka black-tailed deer available due to low densities and likely rely on a varied diet.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVE

- Maintain an average annual harvest of at least 30 wolves from Unit 1A.

METHODS

We obtained harvest information through a mandatory sealing program. Information obtained from hunters and trappers included the number and sex of wolves harvested, date and location of harvest, method of take, transportation used, and pelt color. We obtained anecdotal information about wolves from hunters, trappers, and department staff. Additional information was obtained from trappers through an annual mail out survey. Anyone who purchases a trapping license in the state receives a survey. Typical response rate to the survey is about 25% across the state. Questionnaire results can be found on our Division of Wildlife Conservation website under trapping (www.wildlife.alaska.gov).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Wolves are social animals that travel in packs and actively defend territories from encroachment by other individuals or packs (Mech 1970). In Southeast Alaska, minimum convex polygon (MCP) home ranges found for wolf packs on Revillagigedo Island averaged 279 square kilometers (108 mi^2) and ranged 79 to 447 square kilometers (30 to 170 mi^2) (Smith et al. 1987). Wolf pack sizes on Revillagigedo Island during this study averaged 5.4 wolves (range: 2 to 12; Smith et al. 1987).

No accurate population estimates are currently available for Unit 1A wolves. However, based on reported harvest levels, staff observations, and reports by trappers, the wolf population in Unit 1A appeared to be stable during this report period.

Gravina Island near Ketchikan is an area approximately 96 mi^2 with low deer numbers. Wolves on Gravina Island are having an impact on the already limited deer numbers in this popular deer hunting area near Ketchikan. The wolf predation in this area is compounding the effects of several moderately severe winters, poor habitat quality and productivity, black bear predation, and limited winter habitat for deer. Recent reports of wolves killing and eating domestic dogs near homes on Gravina Island suggest wolves are searching for alternative food sources.

Distribution and Movements

Wolves are found in all of Unit 1A, including all of the mainland, several islands, and along the Cleveland Peninsula. Wolves are known to move considerable distances in this unit. One radiocollared male wolf marked on Kupreanof Island near Petersburg was observed moving over 120 miles overland and across several saltwater crossings. During a 2-year period, this wolf moved from the study site on Kupreanof south to where it was caught by a trapper near Neets Bay on North Revillagigedo Island.

MORTALITY

Season and Bag Limit		Residents and Nonresidents
Hunting:	5 wolves	1 August–30 April
Trapping:	no limit	1 November–30 April

Hunter/Trapper Harvest. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 July 2008–30 June 2009). The Unit 1A wolf harvest during this report period was more than double the previous 3-year period (RY05–RY07) and higher than the long-term average. Unit 1A reported harvests for this period were 49, 37, and 42 wolves during RY08, RY09 and RY10, respectively. Males composed 54% of the reported harvest, just slightly higher than the 20-year average (51%). Trapping continued to be the most successful method of taking wolves during this reporting period (79%), followed by ground shooting (21%). Pelt color in Unit 1A is primarily gray (77%) with black being the next most common (Table 1).

Following below average trapper participation from approximately 2003–2007 (average 10 successful trappers per regulatory year), the number of successful trappers for this reporting period climbed to an average of 16 per year, substantially higher than the 10-year (RY01–RY10) average of 13 successful trappers per year (Table 2).

Transport Methods. Boats and off-road vehicles continue to be the transport methods most used by successful Unit 1A wolf hunters and trappers. During this 3-year report period most trappers used boats (90%) and highway vehicles, including ATVs (6%, Table 3).

Harvest Chronology. March has historically seen the peak of the Unit 1A wolf harvest, followed by February, when pelts are most prime. During this reporting period, March harvest still accounted for the peak of the reported harvest (24%), while April had the same harvest as February (19%, Table 4).

Hunter Residency and Success. Local residents regularly account for 90–100% of hunters and trappers taking wolves in Unit 1A. Ninety-five percent of the harvest since 1991 has been taken by local residents, with nonresidents and nonlocal residents splitting the remainder. Numbers of local residents harvesting wolves in Unit 1A peaked in the late nineties (1999–2001) when on average 43 wolves were taken each year. During RY08–RY10, residents harvested 96%, 100%, and 100% respectively, of the total on an annual basis, which is similar to the high levels seen in the late nineties (Table 5).

Board of Game Actions. During the November 2008 Board of Game meeting in Juneau, Alaska, the trapping season was extended. The opening date of trapping season was changed from 10 November to 1 November. This regulation took effect for the RY09 season. At the most recent November 2010 Board of Game meeting in Ketchikan, Alaska, the wolf hunting season was extended. The end of hunting season was changed from 30 April to 31 May. This change went into effect RY11. These changes will provide an additional 31 days to hunt, and an additional 10 days to trap wolves. This regulation was developed mostly for nonresident bear hunters to take wolves opportunistically while engaged in spring bear hunting. No emergency orders were issued for this unit during the report period.

Other Mortality

Mortality from natural causes (starvation, accidents, disease, fighting) in exploited populations is low, typically averaging 5% to 10% per year (Fuller 1989). We have documented wolves being taken illegally and occasionally they are also killed by automobiles near Ketchikan (Porter 2009).

CONCLUSIONS AND RECOMMENDATIONS

The management objective of harvesting 30 wolves per season was met all three years during this report period, and we believe Unit 1A wolf numbers have remained stable. Trapping effort was high during this 3-year period. With the new May wolf hunting opportunity and the longer wolf trapping season no additional regulation changes are recommended at this time.

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Table 1. Unit 1A wolf harvest, regulatory years 2001 through 2010.

Regulatory					Method of take			Pelt color			
year	Males	Females	Unk	Total	Shot	Trapped	Unk	White	Gray	Black	Unk
2001	19	25	0	44	11	31	2	0	33	6	5
2002	8	14	1	23	6	17	0	0	12	0	11
2003	15	10	1	26	7	19	0	0	22	4	0
2004	6	3	0	9	2	5	2	0	7	2	0
2005	5	5	0	10	6	4	0	0	8	2	0
2006	13	13	0	26	7	19	0	0	23	3	0
2007	10	17	0	27	7	20	0	0	14	4	9
2008	24	24	1	49	13	36	0	0	36	12	1
2009	20	17	0	37	10	27	0	0	19	4	14
2010	25	17	0	42	4	38	0	0	30	10	2
Average	14	14	0.3	29	7	21	0.4	0	20	10	2

Table 2. Number of license holders who killed Unit 1A wolves and average catch per trapper, regulatory years 2001 through 2010.

Regulatory year	Number of license holders harvesting wolves	Average catch/license holder
2001	17	2.6
2002	14	1.6
2003	10	2.6
2004	9	1.0
2005	7	1.4
2006	11	2.3
2007	13	2.1
2008	18	2.7
2009	16	2.3
2010	15	2.8
Average	13	2.1

Table 3. Unit 1A wolf hunter/trapper transport method, regulatory years 2001 through 2010.

Regulatory Year	Air	Boat	Highway[a] vehicle	Walked	Unknown
2001	0	35	8	0	0
2002	0	18	5	0	0
2003	0	19	7	0	0
2004	0	8	1	0	0
2005	0	6	4	0	0
2006	0	23	2	0	0
2007	2	21	4	0	0
2008	3	43	2	0	1
2009	0	34	2	1	0
2010	0	37	3	2	0
Average	0.5	24	4	0.3	0.1

[a] Includes 3- or 4-wheelers and off-road vehicles.

Table 4. Unit 1A wolf harvest chronology, regulatory years 2001 through 2010.

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
2001	0	2	2	3	5	6	11	7	3	0	0	0
2002	0	0	3	1	4	2	1	4	4	4	0	0
2003	0	0	6	1	3	4	7	3	2	0	0	0
2004	0	0	1	0	0	3	2	1	1	0	0	0
2005	0	1	1	1	0	2	1	2	1	0	1	0
2006[a]	0	0	1	2	0	5	4	8	5	1	0	0
2007	0	2[b]	3	0	1	1	2	7	6	5	0	0
2008	0	0	5	0	4	3	1	12	15	9	0	0
2009	0	1	1	0	3	2	8	6	10	6	0	0
2010	0	0	0	1	0	10	9	6	6	9	1	0
Average	0	0.4	2	1	2	4	5	6	5	3	0.2	0

[a] Hunting season changed from September 1st opening to August 1st and trapping extended from March 31 to April 30.
[b] Two additional wolves taken illegally from Revilla Island.

Table 5. Residency of Unit 1A wolf trappers/hunters, regulatory years 2001 through 2010.

Regulatory year	Local resident[a]	Nonlocal resident[b]	Nonresident
2001	42	0	2
2002	12	0	2
2003	9	0	1
2004	9	0	0
2005	7	0	0
2006	9	0	2
2007	11	1	1
2008	47	2	0
2009	37	0	0
2010	42	0	0
Average	23	0.3	0.8

[a] Local residents reside within the boundaries of Unit 1A.
[b] Nonlocal Alaska residents reside outside Unit 1A.

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: Unit 1B (3,000 mi^2)

GEOGRAPHIC DESCRIPTION: The Southeast Mainland from Cape Fanshaw to Lemesurier Point

BACKGROUND

Wolves inhabit the mainland of Unit 1B, where they immigrated following postglacial immigration and establishment of Sitka black-tailed deer populations. Deer are the primary food source for wolves in Southeast Alaska; however, on the Unit 1B mainland, deer typically occur in small isolated pockets and at relatively low density. Moose are probably important food sources for wolves in portions of the mainland where deer are absent or occur in low numbers. Because of the relatively short water crossing involved, population interchange between portions of the Unit 1B mainland and the adjacent Unit 3 islands probably occurs on a regular basis.

Wolf densities are higher in Unit 1B than in interior regions of Alaska, but due to dense forest cover, viewing opportunities are infrequent.

Government wolf control programs and bounties were maintained into the 1970s in an effort to reduce wolf populations and increase deer numbers. Today a few recreational trappers and opportunistic hunters harvest wolves in the subunit.

In fall 2002, due to concerns about early and late season pelt quality and harvesting of wolves during the denning period, the Board of Game shortened the Region 1 wolf season by closing the months of August and April to wolf hunting. In a similar action, the board also shortened the wolf trapping season by closing the month of April. We suspect these actions are primarily responsible for the reduced wolf harvest in Unit 1B during 2003–04 and 2004–05.

In fall 2004 the board, composed of new appointees, rescinded the previous board's decision to shorten the wolf hunting season and restored the 1 August to 30 April wolf hunting season throughout Region 1. In separate actions, the board restored the month of April to the wolf trapping season and eliminated the requirement that the left foreleg of any wolf taken in Units 1–5 remain naturally attached to the hide until sealed.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a sustainable wolf population in all areas of historic range.

METHODS

We monitored the wolf harvest through a mandatory pelt-sealing program. We collected data on the number of wolves killed, sex, date of take, method of take, method of transportation used from home to the field, and when possible, an estimate of the number of wolves accompanying those killed. From regulatory year 1997 to 2002 we collected the left foreleg from each sealed wolf for age determination and opportunistically collected tissue samples for genetic analysis.

We recorded observations of wolves made by Alaska Department of Fish and Game and U.S. Forest Service biologists, trappers, hunters, and other members of the public. An annual statewide trapper survey supplied additional information, including each trapper's subjective assessment of the population status of wolves in Unit 1B.

Data in this report are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 July 2008 through 30 June 2009).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Sealing records provide insufficient data to make a meaningful estimate of the Unit 1B wolf population. Current estimates of the population are based on estimates of average territory and pack size derived from extensive wolf research conducted in similar habitat on Prince of Wales Island (Person et al. 1996). Based on the amount of suitable habitat below 1,800 feet in elevation, we estimate the current wolf population in the subunit to be 45–85 animals in approximately 8 packs. Conversations with trappers, hunters, pilots, and other biologists, along with information from trapper questionnaires, indicated the wolf population increased during the 1990s in response to increases in deer numbers. More recently, increases in moose distribution and abundance have probably contributed to relatively high wolf density in Unit 1B.

MORTALITY

Harvest

RY 2008 and 2009

Season and Bag Limit	Residents and Nonresidents
Trapping: No limit	10 November–30 April
Hunting: 5 wolves	1 August–30 April

RY 2010

Unit 1B remainder

Season and Bag Limit	Residents and Nonresidents
Trapping: No limit	10 November–30 April
Hunting: 5 wolves	1 August–30 April

Unit 1B: south of Bradfield Canal and the East Fork Bradfield River

Season and Bag Limit	Residents and Nonresidents
Trapping: No limit	10 November–30 April
Hunting: 5 wolves	1 August–31 May

Board of Game Actions and Emergency Orders. In fall 2010, based on concerns about low deer numbers on the Cleveland Peninsula, the Board of Game extended the wolf hunting season to 31 May in that portion of Unit 1B located south of Bradfield Canal and the East Fork Bradfield River. At the request of the department, the regulation change was expedited and the wolf season extension took effect on 1 May 2011. While the department had opposed previous attempts to extend the wolf hunting season to the end of May, in this instance concerns about low deer numbers on the Cleveland Peninsula prompted the department to support the wolf season extension in southern Unit 1B. It was hoped that the wolf harvest could be increased by affording the annual influx of nonresident black bear hunters the opportunity to take wolves incidental to spring bear hunting.

No emergency orders were issued regarding Unit 1B wolf hunting or trapping during this report period.

Hunter/Trapper Harvest. In RY08, 3 individuals harvested 4 wolves, in RY09, 3 individuals harvested 4 wolves, and in RY10, 2 individuals harvested 6 wolves (Table 1).

Trapping is usually the primary method of take. During the report period 80% of the wolves harvested were taken with traps or snares and 20% were shot. Deer and bear hunters, and occasionally moose hunters, are generally responsible for wolves that are shot incidental to hunting for these other species.

While the Board of Game extended the RY10 wolf hunting season in the southern portion of Unit 1B until the end of May, no additional wolves were harvested as a result of the season extension. The fact that no wolves were harvested in May was likely due to the relatively short advanced notice regarding the season extension, and the fact that it was not possible to include the regulation change in the RY10 regulation booklet.

Most of the central Southeast Alaska wolf harvest takes place near local communities in nearby Unit 3. The majority of the Unit 1B mainland is not trapped.

Harvest Chronology. On average, most Unit 1B wolves are taken during January, December, February, and September, in descending order. In RY08, all of the wolf harvest occurred during January (Table 2). In RY09, the highest percentage of the harvest occurred in April, followed by October and March, which accounted for equal percentages of the overall harvest. In RY10, December and January, each with an equal percentage of the overall harvest, accounted for the highest percentages of the harvest, followed by February and March, each with an equal percentage of the harvest. Wolves harvested in August, September, and October are usually taken incidental to other hunting activities.

Transport Methods. Trappers and/or hunters using small boats typically account for most, if not all, wolves harvested annually in Unit 1B (Table 3). During the report period, no other methods of transportation were reported.

Other Mortality

The reported wolf harvest probably under represents the actual take of wolves during the report period. We suspect that some poaching of wolves is occurring and that each year some wolves are shot and left to lie, or otherwise go unsealed. Wolves are difficult animals to bring down, and it is not unreasonable to assume that some mortality also occurs as a result of wounding loss. Some wolves caught in traps that are not checked regularly, particularly intertidal drowning sets, are occasionally scavenged by other animals and the hides so badly damaged that they are frequently discarded in the field with the harvest going unreported.

CONCLUSIONS AND RECOMMENDATIONS

The Unit 1B wolf harvest fluctuates annually, primarily as a result of variations in hunting and trapping effort. Most wolves harvested by hunters are taken opportunistically during hunts for other species. Trapping effort and success fluctuate annually in response to fuel prices and winter weather conditions. Wolf hides from Southeast Alaska are generally considered to be of relatively poor quality by fur buyers, so there is little financial incentive to harvest wolves. Most wolf hunting and trapping occurring in the unit is recreational and viewed by many as simply a means of controlling wolf populations to improve deer and moose populations.

The regulatory change to lengthen the wolf hunting season through May 31 may change the chronology of harvest as well as the overall harvest as people get used to the longer season. Although this added opportunity may provide hunters with a chance of a lifetime to take a wolf, most effort will likely be tied to other forms of hunting such as spring bear hunting.

The wolf harvest remains relatively low in Unit 1B, and much of the unit is not hunted or trapped. We recommend no change in the wolf hunting or trapping regulations.

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Table 1. Unit 1B wolf harvest, regulatory years 1997 through 2010.

Regulatory	Reported harvest				Method of take			Successful
year	M	F	Unk.	Total	Trap/Snare	Shot	Unk.	trappers/hunters
1997	5	4		9	9	0		4
1998	6	7		13	8	5		6
1999	5	4	1	10	4	6		5
2000	5	4		9	4	5		8
2001	8	11		19	14	5		8
2002	10	5		15	12	3		4
2003	4	3	1	8	8	0		4
2004	11	3		14	6	8		9
2005	9	4		13	13	0		3
2006	5	7		12	10	2		7
2007	2	3		5	2	3		3
2008	3	1		4	3	1		3
2009	2	2		4	2	1	1	3
2010	3	2	1	6	6	0		2

Table 2. Unit 1B wolf harvest chronology, by percent by time period, regulatory years 1997 through 2010.

Regulatory	Harvest periods												
year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	April	May	Jun	*n*
1997						33	11	56					9
1998		15	8		8	23	38	8					13
1999			10	40			50						10
2000			33	22		22	12		11				9
2001		5	11				47	21		16			19
2002					13	8	33	33	13				15
2003						12	75	13					8
2004			21	36		36		7					4
2005						47	23	15	15				13
2006				8	8	17		42		25			12
2007			40					40	20				5
2008							100						4
2009				25					25	50			4
2010						33	33	17	17				6

Table 3. Unit 1B wolf harvest, by percent by transport method, regulatory years 1997 through 2010.

Regulatory year	Percent of harvest					
	Airplane	Boat	3-or 4-wheeler	Snowmachine	Other	*n*
1997		100				9
1998		100				13
1999		100				10
2000		100				9
2001		100				19
2002		87	13			15
2003		100				8
2004		79	14		7	14
2005		100				13
2006		100				12
2007		60		40		5
2008		100				4
2009		100				4
2010		100				6

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 1C (6,500 mi^2)

GEOGRAPHIC DESCRIPTION: That portion of the Southeast Alaska mainland from Cape Fanshaw to the latitude of Eldred Rock

BACKGROUND

Wolves are distributed throughout Unit 1C, but anecdotal evidence suggests they primarily inhabit major mainland river drainages such as the Taku River and Berners Bay. Exceptions include the Chilkat Mountains and the Gustavus Forelands, where wolves appear to be uniformly distributed, probably due to the presence of moose. During the report period we received reports of packs in the Gustavus Forelands, Endicott River, St. James Bay, Point Couverden, Berners Bay, Nugget Creek, Taku River, Snettisham Inlet, and Endicott Arm areas. The presence of wolves on Douglas Island has been in question since an incident during the winter of 2001–02; 7 animals suspected to make up the entire pack of wolves on the island were all trapped.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

No formal wolf management goals have been established for this unit; however, our general management objectives are to regulate seasons and bag limits to maintain a healthy population of wolves on a unitwide basis for viewing and harvest.

METHODS

We collected the following data through mandatory sealing of wolf hides taken by successful hunters and trappers: date and method of take, sex, transportation mode, and number of animals in the pack. The population was monitored in a general sense by whatever means available, including harvest data, anecdotal reports, aerial sightings incidental to surveys of other species, discussions with hunters and trappers, and information collected from the annual statewide trapper surveys.

Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY 08 = 1 July 2008–30 June 2009).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

We do not have a data collection protocol in place that allows us to make meaningful estimates of wolf populations within the unit. Although no quantitative data are available, the 2008–2009 Trapper Report and Questionnaire (Schumacher 2010) reported trappers felt wolves were common in Unit 1C and were increasing. Anecdotal reports and discussions with local hunters, trappers, and pilots, as well as harvest data, suggest that wolves continue to reside in all of the traditional areas. Wolves appear to be increasing on the Gustavus Forelands and within the Chilkat Range, where moose have become more abundant over the past 10–20 years.

MORTALITY

Harvest

Seasons and Bag Limits

	Season	*Bag Limit*
Hunting	1 August–30 April	5 wolves
Trapping	10 November–30 April	No limit

Board of Game Actions and Emergency Orders. During its November 2010 meeting, the Alaska Board of Game adopted a proposal adding several Juneau area trails to those where trapping is prohibited within one-quarter mile of the trail when using snares and large killer style traps. The intent of the proposal was to protect domestic pets from being trapped. The impact to wolf harvests due to these changes will likely be low. No emergency orders were issued for this unit during the report period.

Hunter/Trapper Harvest. The total harvest during RY08–RY10 was 38 wolves, with 6 taken in RY08, 11 in RY09, and 21 in RY10. The mean annual wolf harvest for the current report period is slightly higher (10) than the previous period (9). Harvest methods included 15 (39%) taken by firearm under authority of a trapping license or while hunting other species, 16 (42%) taken with snares, and 7 (18%) taken with foothold traps. Pelt colors during this report period included 28 gray wolves and 8 black wolves; the pelt color for 2 wolves was not recorded.

During the report period 22 wolves (56%) were taken from the Chilkat Range, 8 (21%) were taken north of Juneau, and 8 (21%) were taken south of Juneau; all wolves taken in Unit 1C during the report period were taken from mainland areas.

Hunter/Trapper Residency and Success. During the reporting period Alaska residents took 92% (35) of the wolves harvested, and nonresidents took 8% (3) wolves. Unit 1C residents took 39%

of the total wolves harvested; other Alaska residents residing in units outside of Unit 1C took 53%; and nonresidents took the remaining 8% of the harvest.

Harvest Chronology. Hunting and trapping harvests are spread throughout their respective seasons, and are not consistent from year to year (Table 2). Most recent harvest has occurred in September, when hunters take wolves opportunistically while pursuing other species, and in December, January, and March when pelts are prime and additional daylight is available. Few wolves are taken in intervening months.

Transport Methods. Boats and highway vehicles were the primary transportation modes used by wolf hunters and trappers though a few used airplanes and ORVs (Table 3). Those listed as running their traplines on skis or snowshoes almost all probably used a highway vehicle to access their traplines, but they failed to report this mode of transportation.

Other Mortality

A male wolf was found dead along a Juneau trail in a creek in May 2008. Department biologists believe the wolf died during the winter of 2007–2008 and was only discovered after snow melted. The wolf may have died somewhere other than where it was found, possibly having been washed down the creek or moved by an avalanche to the location where it was found. A field investigation did not reveal cause of death, but illegal activity is not believed to be involved.

In a January 2009 a black wolf was harvested by illegal methods and means. An investigation revealed the wolf was taken off the Juneau road system in an area open to wolf hunting and trapping, but was taken with a rimfire firearm.

CONCLUSIONS AND RECOMMENDATIONS

Little fine scale information is known about Unit 1C wolf populations. However, in the process of conducting research on moose in Berners Bay and Gustavus, and on goats, wolverines, and brown bears in Berners Bay, we have opportunistically logged information on when, where, and how many wolves have been seen while conducting this research. Reports from people afield and incidental observations by Alaska Department of Fish and Game staff indicate that wolves are common throughout the unit, except for some smaller islands.

Mountain goats and moose are the most common mainland big game prey species in the unit, and the effect of wolves on these populations may be considerable. Low mainland deer densities are likely due in part to wolf predation.

Although the wolf harvest increased slightly during the current report period, overall there is little effort exerted toward taking wolves in this unit, and the harvest remains well below the level that would negatively influence the population. No changes in seasons or bag limits are recommended at this time.

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Schumacher, T. 2010. Statewide Annual Report 1 June 2008–30 June 2009 Trapper Questionnaire. Alaska Department of Fish and G ame. Juneau, Alaska. 72 pp.

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Scott, R. 2012. Unit 1C wolf management report. Pages 17–22 [*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.

Table 1. Unit 1C wolf harvest chronology, regulatory years 1996 through 2010.

Reg. Year	Males	Females	Unknown	Total
1996	5	3	0	8
1997	6	3	0	9
1998	1	2	1	4
1999	3	2	0	5
2000	4	8	0	12
2001	7	7	0	14
2002	3	2	0	5
2003	6	7	0	13
2004	4	2	0	6
2005	3	1	0	4
2006	7	7	0	14
2007	5	5	0	10
2008	3	3	0	6
2009	7	4	0	11
2010	11	10	0	21
Mean annual harvest	5.0	4.4	.1	9.5

Table 2. Unit 1C wolf harvest chronology by month, regulatory years 1996 through 2010.

Reg. Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1996					1		3	3	1			
1997			1				6	1	1			
1998								3		1		
1999			1					3	1			
2000			1				1	4	3			
2001				2			7	2	3			
2002			2	1		1			1			
2003				1		1	4	6	1			
2004			1	1		1		1	2			
2005			1	1			2					
2006	1[a]		5	1				1	6			
2007			5			1			3	1		
2008			1	1		1	1		2			
2009			1		1	5	2		1	1		
2010			4		1	1	9	1	5			

a Illegal Harvest

Table 3. Unit 1C wolf harvest, percent by transport method, regulatory years 1996 through 2010.

Regulatory year	Airplane	Dogsled, skis, snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway vehicle	Unknown
1996	44		56					
1997	100							
1998	75						25	
1999	20		20				60	
2000		8		8	25	25	34	
2001			86	7			7	
2002			80				20	
2003			92				8	
2004		17	83					
2005			75				25	
2006	9		91					
2007	10		90					
2008		17	83					
2009		27	37			9	27	
2010		10	80				10	

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 1D (2,700 mi^2)

GEOGRAPHIC DESCRIPTION: That portion of the Southeast Alaska mainland lying north of the latitude of Eldred Rock, excluding Sullivan Island and the drainages of Berners Bay

BACKGROUND

We have not conducted any wolf population studies in this unit, so population information is based on anecdotal information, sightings made during aerial moose and goat surveys, discussions with hunters and trappers, and from sealing data. Unlike much of Southeast Alaska, few deer are present in this unit, and thus are not an important prey source for wolves. The most likely major prey species are moose, mountain goats, beaver, and salmon. The beaver population has increased over the past decade and probably represents a much greater portion of wolves' diet than in the past.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

No formal management goals have been established for wolves in this unit. However, our general management objectives are to regulate seasons and bag limits to maintain populations of wolves for viewing and harvest.

METHODS

Through the mandatory sealing of wolves taken by hunters and trappers, we collected the following data: date and method of take, sex, transportation mode, and number of animals in the pack.

The Unit 1D wolf population was monitored by whatever means were available, including anecdotal reports, sightings while conducting aerial surveys, discussions with trappers and hunters, and information collected from the annual statewide trapper survey. Alaska Department of Fish and Game and Alaska Wildlife Troopers sealed wolves in Haines. Data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY10 = 1 July 2010 through 30 June 2011).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Although no quantitative data on wolf population size were collected during the report period, anecdotal reports and discussions with local hunters, trappers, and pilots suggest that wolves are present throughout the unit and their numbers and distribution seem to be consistent with previous years.

MORTALITY

Harvest

Seasons and Bag Limits. Seasons and bag limits are the same for residents and nonresidents. They are as follows:

	Season	*Bag Limit*
Hunting	1 August–30 April	5 wolves
Trapping	1 November–30 April	No limit

Board of Game Actions and Emergency Orders. No Board of Game actions were taken to change wolf seasons or bag limits during this report period, nor did the department issue any emergency orders associated with wolf management. The board did, however, deliberate on two wolf related proposals in fall 2008; one to lengthen the wolf hunting season, and one to shorten it. Neither proposal was adopted by the board. In fall 2010 the board dealt with a single proposal on wolf management that was intended to lengthen the wolf hunting and trapping season. The board voted "Do Not Adopt" on this proposal as well.

Hunter/Trapper Harvest. During the report period (RY08–RY10) 24 wolves were taken in Unit 1D (Table 1). In RY08, 6 wolves (2 male, 4 female) were taken, the RY09 harvest was 7 wolves (5 males, 2 female), and the RY10 harvest was 11 wolves (6 males, 5 females). The Unit 1D mean annual harvest during the report period was 8 wolves, which is double the annual average wolf harvest from the preceding 15 years. Unit residents took 22 (92%) of the wolves harvested during the report period. Two nonresidents took the 2 additional wolves.

As in past years, far more wolves were taken by shooting than by trapping. Of the 24 wolves harvested, 11 (46%) were taken with firearms, and 13 (54%) were taken by trapping or in a snare. Fifteen gray wolves, 7 black wolves, and 1 white wolf were killed during this period. Seven of the wolves were harvested in road-accessible areas; the remaining 16 were taken in remote locations; many trappers and hunters accessed areas by snowmachine, on foot, or by boat. All but one of the wolves harvested in unit 1D came from the Haines area, where the road system allows hunters and trappers to access wolf habitat. Additionally, the sighting of wolves along logging roads and open river sandbars allows for opportunistic harvest with firearms.

Harvest Chronology. There was no pattern to harvest timing during the report period (Table 2). Other than opportunities to harvest wolves during hunts for other species, hunters and trappers targeting wolves generally harvest during peak winter months when pelts are prime. During the report period, the majority of wolves were harvested during August through April; January

represented the month with the highest number of wolves harvested during the preceding 15 years.

Transport Methods. Access methods used by trappers and hunters who took wolves during the report period show little year-to-year consistency (Table 3). Because the harvest is small and few hunters and trappers are represented in more than a single year, inconsistency is not surprising. Again, one or two individuals focusing on hunting or trapping in the subunit could dominate the harvest data. During the report period, snow-related conveyances and highway vehicles dominated the means of transportation used to harvest wolves in Unit 1D.

Other Mortality

No other mortalities were documented during the report period.

CONCLUSIONS AND RECOMMENDATIONS

Although we have not conducted any research on wolves in unit 1D, it appears that wolf abundance is similar to previous years. Information gathered from trappers, hunters, hunting guides, trapper surveys, and from observations of ADF&G biologists conducting moose surveys all suggest that wolves are widely distributed in the unit and the relative abundance seems to be stable. Only a moderate effort is made by hunters and trappers to harvest wolves in the area, and annual harvest is often influenced by incidental observations of wolves from the road system that are then taken with rifles.

Proposals on wolf management are likely to continue to be introduced to the board given the passion people have for wolves in this area. Wolves are valued by nonconsumptive resource users (wildlife viewers and photographers) as well as hunters and trappers. Additionally, the fact that wolves prey on moose results in many publics preferring low wolf numbers to enhance the moose population. Balancing interest in wolf hunting, trapping, and nonconsumptive uses provides the basis for the department recommending that no changes in seasons or bag limits be made at this time.

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Table 1 Unit 1D wolf harvest, regulatory years 1996–2010.

Regulatory Year	Males	Females	Unknown	Total
1996	4	4	0	8
1997	3	0	0	3
1998	1	2	1	4
1999	3	4	0	7
2000	3	2	1	6
2001	2	1	0	3
2002	5	7	0	12
2003	2	0	0	2
2004	2	4	0	6
2005	0	0	2	2
2006	2	1	0	3
2007	0	0	0	0
2008	2	4	0	6
2009	5	2	0	7
2010	6	5	0	11
Mean Harvest	2.7	2.4	.3	5.4

Table 2. Unit 1D wolf harvest chronology, regulatory years 1996–2010.

Reg. Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1996			2				2			4		
1997				1	1		1					
1998						2	1		1			
1999			2		1		1	1	2			
2000			1	1			2	1		1		
2001		1							1	1		
2002				2	3		2	2	3			
2003				1			1					
2004			1			1	1	3				
2005			1					1				
2006			2				1					
2007												
2008			1	1		1	3					
2009		1				3	1	1	1			
2010		2				1	5		1	2		

Table 3. Unit 1D wolf harvest, percent by transport method, regulatory years 1996–2010.

Regulatory year	Airplane	Dogsled, skis, snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway vehicle	Unknown
1996			43		14		43	
1997		25	25				50	
1998		25			25		50	
1999		29	29				13	29
2000		17	33	17			17	16
2001		33	33		34			
2002		17			33		50	
2003		50					50	
2004			17		66		17	
2005			50		50			
2006							100	
2007								
2008				17	33		50	
2009		14	14		72			
2010		9	27		55		9	

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 2 (3,600 mi^2)

GEOGRAPHIC DESCRIPTION: Prince of Wales and adjacent islands south of Sumner Strait and west of Kashevarof Passage

BACKGROUND

Wolves live throughout Unit 2, and densities on Prince of Wales (POW) and adjacent islands are generally higher than on the nearby Unit 1A mainland. Wolves are capable swimmers and regularly travel between adjacent islands in search of prey. Radio telemetry data show that dispersing wolves are able to move throughout the unit and probably function as a single breeding population (Person 2001). Nonetheless, genetic and telemetry data strongly suggest that wolves in Unit 2 are isolated from other island clusters and from the mainland (Person 2001, Weckworth et al. 2005).

Wolves feed primarily on deer in southern Southeast Alaska. For example, analysis of scats (feces) collected on Prince of Wales Island indicated that 90% contained deer remains, 31% contained beaver, 8% contained river otter, 8% contained black bear, 9% contained small mammals, and 5% contained fish (Kohira and Rexstad 1997). Fish are consumed seasonally when salmon spawning occurs. Szepanski et al. (1999) concluded that up to 25% of the diet of wolves may be from marine derived resources. Indeed, 21% of scats collected in fall contained remains of fish (Kohira and Rexstad 1997).

The coloration of Southeast Alaska wolf pelts varies; however, the brown-gray color is most common. During the past two decades, at the two coloration extremes, white or near-white pelts have been extremely rare, composing less than one half of one percent of the harvest, while black pelts have accounted for about 3.5% of the Unit 2 harvest. Despite variation in pelt color, wolves in Unit 2 have very low genetic diversity and exhibit only 1 maternal mtDNA lineage (Weckworth et al. 2005). They are clearly a distinct genetic population within Southeast Alaska.

MANAGEMENT OBJECTIVES

- Our objective is to maintain a sustainable harvest amounting to no more than 30% of the estimated autumn population. Unfortunately, we do not have a current population estimate of

wolves on POW, although from anecdotal reports and field observations we believe the population is lower than during the last reporting period.

METHODS

Prior to July 2005, the left foreleg was required to remain attached to the hide until sealed, to provide ages of harvested wolves. We obtained harvest information through a mandatory sealing program. Information obtained from hunters and trappers included the number and sex of harvested wolves, date and location of harvest, method of take, transportation used, and pelt color. We also obtained anecdotal information about wolves from hunters and trappers, as well as from department staff. Additional information was obtained from trappers through an annual mail out survey. Anyone who purchases a trapping license in the state receives a survey. Typical response to the survey is about 25% across the state. Questionnaire results can be found on our Division of Wildlife Conservation website under trapping (www.wildlife.alaska.gov).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Using data obtained from a sample of packs containing radiocollared wolves, Person *et al.* (1996) estimated that 336 wolves (Standard Error (SE) = 100) inhabited POW and surrounding islands during fall 1994, and 217 wolves (SE = 121) during spring 1995. The smaller spring estimate reflected overwinter mortality, primarily from trapping (Table 1). More recently (2003), similar methods using radio-marked wolves were used to estimate wolf populations. The fall population estimate for that year was 326 wolves (SE = 75). No current data of a similar nature are available, nor are subsequent estimates available. Low harvests during the past 5 seasons and staff observations suggest wolf numbers have declined throughout Unit 2. Between 1 September 2009 and 1 September 2010, ADF&G personnel encountered <25 wolf feces (scats) in an effort to collect DNA for a population estimate (Person 2011). In contrast, during 1993–1994, Kohira (1995) collected 154 scats suitable for food habits analyses from a smaller portion of the same area surveyed during 2009–2010. Moreover, Kohira collected scats opportunistically, whereas ADFG personnel were searching for scats intensively and systematically (Kohira 1995, Kohira and Rexstad 1997, Person 2011).

Population Trends

Wolf populations declined significantly during 1993–1995 (Person et al. 1996, Person and Russell 2008) but appeared to be stable or only slightly declining 1999–2003. During 1993–2004, litter sizes of wolves in the unit averaged about 4.1 (SE = 1.7) (Person and Russell 2009) and annual survivorship averaged 54% (SE = 17) for all wolves (Person and Russell 2008). However, survivorship for resident pack members was 65% (SE = 17) and 34% (SE = 17) for wolves unattached to resident packs. Person and Russell (2008) concluded that total annual mortality of about 38% could be sustained by the population. We are exploring new field data methods to track wolf population changes and to better estimate Unit 2 wolf trends. Field work to obtain an updated population estimate is expected to begin in summer 2012. No new regulatory changes are recommended at this time.

Distribution and Movements

In Unit 2, Person (2001) reported average home ranges of 109 mi^2. However, core areas where wolf activity was concentrated averaged 48 mi^2, or 55–60% smaller than total home ranges. Based on telemetry data as well as GIS spatial modeling, it is likely that 29–31 packs occupy the unit. Wolves and wolf sign have been documented throughout the unit except on the remote islands on the west side of the unit, such as Forrester. Dispersing wolves make up about 29% of the population and are able to reach all of the islands associated with Prince of Wales Island (Person 2001).

MORTALITY

Harvest

Season and Bag Limit		Resident and Nonresident
Hunting:	5 wolves	1 December–31 March
Trapping:	no limit	1 December–31 March

Federal Subsistence Season		All Rural Residents
Hunting	5 wolves	1 September- 31 March
Trapping	no limit	15 November -31 March

Hunter/Trapper Harvest. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 July 2008–30 June 2009). The Unit 2 reported wolf harvest has fluctuated in recent years from a high of 132 wolves during RY96 to a low of 20 during RY10. During RY08–RY10, the total reported annual harvests were 24, 24, and 20, respectively (Table 1). The total reported harvest for this reporting period is the lowest in the last 20 years and is half of the next lowest 3-year reporting period (RY05–RY07). The low reported harvest during this reporting period may be more a function of trapper numbers than wolf densities. As the human population continues to decline in Unit 2, mostly because of fewer timber-related jobs, there are fewer dedicated trappers. Only 7, 6, and 10 wolf trappers sealed wolves during RY08, RY09, and RY10, respectively, despite good market options for wolf hides. The increasing cost of fuel, changing fur market prices, and other more profitable pursuits, such as commercial king salmon fishing, may also influence the harvest more than the availability or abundance of wolves in Unit 2. We are also concerned about poor reporting of wolves harvested in Unit 2 after an emergency order was issued to close the wolf season during RY99. That season was closed a month early because our in-season harvest tally suggested we were near the established harvest cap. Reported harvest of wolves declined in subsequent years.

During this report period, the number of successful trappers fell to a 3-year average of 7.7, well below the 20 year average of 21 (range 6–38). Average reported wolf harvest per trapper during the last 20 years has ranged from a low of 2.0 in RY10 to a high of 5.6 during RY99 and averaged 3.3 wolves (Table 2). During this report period the average reported wolf harvest per trapper was 3.0, just below the 20-year average. So although trapper numbers are declining, those who are active are still having average success.

From RY91 to RY96 approximately 27% of the reported harvest was taken by shooting (both by trappers and hunters, Table 1). Between RY97 and RY04, when season dates for hunting and trapping changed from 1 August–30 April to 1 December–31 March, shooting accounted for only 11% of the reported harvest. We believe the reduction in the number of wolves shot was due to changes to the early and late season, which previously provided opportunity during fall deer

and spring bear hunts, when many hunters are afield. As of July 2005, the federal season was back to a 1 September–31 March season, providing local rural residents some additional wolf harvest opportunity during deer season and this is reflected in a 31% reported harvest by shooting since the RY05 regulatory change. During this reporting period, 21% of the reported wolf harvest was from ground shooting, right at the 20-year average of 20% (Table 1).
The sex ratio of reported harvest during the past 20 years slightly favors males, with an average of 56% male and 44% female. During the current 3-year report period, males accounted for 65% of the reported harvest (Table 1).

Transport Methods. Highway vehicles (74%) and boats (25%) were the primary transport methods used by successful Unit 2 wolf hunters and trappers during this reporting period (Table 3).

Harvest Chronology. Wolf harvests are affected by local weather conditions. Persistent freezing often makes intertidal sets inoperative, and deep snow can bury snares and trail sets, rendering them useless. Deep and persistent snow can also block vehicle access to many of the logging roads. Typically, the Unit 2 reported harvest has been highest during December through February. During the past 3 years, the cumulative reported monthly harvest has been greatest from January to March with 29%, 24%, and 31%, respectively, RY08–RY10. Only 1 wolf during this reporting period was harvested during September–November under federal subsistence regulations (Table 4).

Hunter Residency and Success. Another effect of the hunting and trapping regulations change in 1997 has been a shift in hunter/trapper residency. Prior to RY97, nonlocal and nonresident hunters figured prominently in the harvest of wolves on POW, presumably because wolves were incidentally taken by hunters coming to POW to pursue deer and black bears. Since RY97, approximately 91% of the hunters/trappers who have taken wolves on POW have been local residents (Table 5).

Board of Game Actions. No Board of Game (BOG) actions pertaining to wolves in Unit 2 have been adopted during this reporting period. At the November 2010 BOG meeting the sealing requirement for wolves was changed from 30 days to 14 days to help managers make quicker in-season management decisions. This regulatory change was to take effect during RY11.

Other Mortality

Mortality from natural causes (starvation, accidents, disease, fighting) in exploited populations is low, typically averaging 5–10% per year (Fuller 1989). We believe, based on past research, that substantial mortality results from unreported killing of wolves in this unit. For example, of 39 radiocollared wolves that were killed during the time periods 1993–1996 and 1999–2004, 18 were harvested legally, 16 harvested illegally, and 5 died from natural causes (Person and Russell 2008). Considering natural and unreported mortality are at least partially additive, total mortality could be 35% to 50% higher than reported, although some bias may exist against reporting legally killed wolves wearing a radio collar. Regardless, we believe that reported mortality substantially underestimates total human caused wolf mortality in Unit 2.

CONCLUSIONS AND RECOMMENDATIONS

Without current information on population numbers it is difficult to assess whether management objectives were met or not. We are fairly confident that the wolf population has declined during this reporting period,. However, the reported harvest is not necessarily indicative of the severity of the decline; no quantitative data are available to assess this. We are currently exploring new field methods to track wolf population changes and to better assess Unit 2 wolf harvest trends. Hopefully, field research beginning in 2012 will provide an updated population estimate.

The number of Unit 2 trappers who successfully catch wolves each year continues to decline, perhaps mirroring the slowly declining local human population and an aging trapper pool. The remaining trappers are among the more serious and skilled, and they continue to catch a high number of wolves per trapper each year. Fur market prices, and, consequently, incentives to trap, have remained steady during the last reporting period. No new regulatory changes are recommended at this time.

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Table 1. Unit 2 wolf harvests, RY91–RY10.

Regulatory year	Males	Females	Unk	Total	Method of take			Pelt color			
					Shot	Trapped	Unk	White	Gray	Black	Unk
1991	42	40	4	86	41	45	0	0	80	6	0
1992	59	46	0	105	26	79	0	0	93	11	1
1993	46	54	3	103	21	81	1	0	80	15	8
1994	50	32	3	85	21	64	0	0	82	2	1
1995	62	41	0	103	35	68	0	0	90	12	1
1996	82	50	0	132	24	108	0	0	118	14	0
1997	49	31	0	80	8	72	0	1	66	4	9
1998	44	47	0	91	10	79	2	0	90	1	0
1999	49	47	0	96	10	86	0	0	78	18	0
2000	36	37	0	73	10	63	0	0	69	4	0
2001	32	26	0	58	0	58	0	0	57	1	0
2002	33	28	1	62	7	54	1	0	55	7	0
2003	15	14	0	29	1	27	1	0	28	1	0
2004	44	32	1	77	12	65	0	0	65	8	4
2005	36	24	0	60	16	44	0	0	56	2	2
2006	19	19	0	38	14	23	1	0	36	2	0
2007	22	12	0	34	11	23	0	2	30	1	1
2008	19	5	0	24	7	17	0	0	20	0	4
2009	15	7	2	24	3	20	1	0	22	1	1
2010	9	11	0	20	4	16	0	0	17	0	3
Average	38.2	30.2	0.7	69	14.1	54.6	0.4	0.2	61.6	5.5	1.8

Table 2. Number of trappers who caught wolves in Unit 2, and average catch per trapper, RY91–RY10.

Regulatory year	Number of trappers that harvested wolves	Average catch/trapper
1991	37	2.3
1992	35	3.0
1993	30	3.4
1994	37	2.3
1995	38	2.7
1996	36	3.7
1997	21	3.8
1998	19	4.8
1999	17	5.6
2000	19	3.8
2001	16	3.6
2002	18	3.4
2003	11	2.6
2004	26	3.0
2005	16	3.8
2006	10	3.8
2007	10	3.4
2008	7	3.4
2009	6	4.0
2010	10	2.0
Average	21	3.3

Table 3. Unit 2 wolf hunter/trapper transport methods, RY91–RY10.

Regulatory year	Air	Boat	Highway[a] vehicle	Walked	Unknown
1991	2	53	31	0	0
1992	1	68	32	0	4
1993	1	59	42	0	1
1994	1	57	25	2	0
1995	3	60	39	0	1
1996	0	44	86	1	1
1997	0	51	29	0	0
1998	1	41	47	0	0
1999	0	64	30	0	0
2000	0	45	28	0	0
2001	0	33	25	0	0
2002	2	46	13	0	0
2003	0	22	7	0	0
2004	0	45	32	0	0
2005	0	33	27	0	0
2006	0	14	22	0	2
2007	0	18	16	0	0
2008	0	6	18	0	0
2009	0	6	18	0	0
2010	1	5	14	0	0
Average	0.6	38.5	29.1	0.2	0.5

[a] Includes 3 or 4 wheelers and other off-road vehicles.

Table 4. Unit 2 wolf harvest chronology, RY91–RY10.

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1991	1	2	7	1	8	20	18	7	7	11	2	2
1992[a]	0	1	3	8	10	19	15	16	28	4	1	0
1993	0	1	2	6	11	24	33	16	8	2	0	0
1994	0	1	2	4	4	22	18	19	12	3	0	0
1995	0	2	8	8	1	15	22	19	27	1	0	0
1996[b]	0	3	7	7	2	12	26	51	21	3	0	0
1997	0	0	0	0	0	20	27	30	3	0	0	0
1998	0	0	0	0	0	32	26	17	16	0	0	0
1999	0	0	0	0	1	28	26	34	0	0	0	0
2000	0	0	0	0	0	12	28	19	14	0	0	0
2001	0	0	0	0	0	14	24	14	7	0	0	0
2002	0	0	0	0	2	5	34	19	1	0	0	0
2003	0	0	0	0	1	2	5	10	11	0	0	0
2004[c]	0	0	0	0	0	23	32	12	10	0	0	0
2005[d]	0	0	0	1	1	18	9	15	16	0	0	0
2006	0	0	2	0	1	2	4	16	13	0	0	0
2007	0	0	0	4	4	7	13	3	0	0	0	0
2008	0	0	0	0	0	2	2	9	11	0	0	0
2009	0	0	0	1	0	5	8	5	4	1	0	0
2010	0	0	0	0	0	2	10	2	6	0	0	0
Average	0	0.5	1.6	2.0	2.3	14.2	19.0	16.7	10.8	1.3	0.2	0.1

[a] Hunting season changed from year-round, no limit, to 1 August–30 April, 5 wolf limit.
[b] Hunting and trapping seasons changed from 1 August–30 April to 1 December–31 March.
[c] Federal subsistence hunting season changed from 15 November–31 March to 1 August–30 April.
[d] Federal subsistence hunting season changed to 1 September–31March.

Table 5. Residency of Unit 2 wolf trappers/hunters, RY91–RY10.

Regulatory year	Local resident[a]	Nonlocal resident[b]	Nonresident
1991	19	15	3
1992	18	16	1
1993	24	6	0
1994	24	11	2
1995	18	20	0
1996	30	5	1
1997	18	3	0
1998	19	0	0
1999	17	0	1
2000	19	0	1
2001	16	0	0
2002	17	0	1
2003	9	2	0
2004	26	0	0
2005	14	1	1
2006	9	1	0
2007	10	0	0
2008	6	1	0
2009	4	2	0
2010	6	4	0
Average	16.2	4.4	0.6

[a] Local residents reside within the boundaries of Unit 2.
[b] Nonlocal residents are Alaskans residing outside of Unit 2.

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: Unit 3 (3,000 mi^2)

GEOGRAPHIC DESCRIPTION: Islands of the Petersburg, Wrangell, and Kake area

BACKGROUND

Wolves inhabit Unit 3 islands where they immigrated following postglacial immigration and establishment of Sitka black-tailed deer populations. Deer are the primary food source for wolves in Southeast Alaska, with moose important in some areas. Moose are probably an important food source for wolves on some Unit 3 islands. Because of the relatively short water crossings between many Unit 3 islands and the mainland, population interchange between the 1B mainland and adjacent Unit 3 islands probably occurs on a regular basis. Wolf densities are higher in Unit 3 than in interior regions of Alaska, but due to the dense forest cover, viewing opportunities are limited.

Government wolf control programs and bounties were maintained into the 1970s in an effort to increase deer numbers. Today a few recreational trappers and opportunistic hunters harvest wolves. In recent years, there has been growing interest in wolf hunting by nonresident hunters, and some big game guides now offer wolf hunts in Unit 3.

In 1994, the Alaska State Legislature enacted AS 16.05.255, the "Intensive Management Law." The law requires the board to designate intensive management populations, for which human consumptive use is the highest priority use, and to set population and harvest objectives for those areas. If designated moose, caribou or deer populations or harvest fail to meet management objectives, the board must consider and evaluate intensive management actions (including predator control) as a means of attaining the objectives. In 2000 the board designated Unit 3 deer an intensive management population and established unitwide population and harvest objectives of 15,000 and 900 deer, respectively.

In fall 2002, due to concerns about early and late season pelt quality and harvesting of wolves during the denning period, the Board of Game shortened the Region 1 wolf hunting season by closing the months of August and April to wolf hunting. The board also shortened the wolf

trapping season by closing the month of April. These actions are primarily responsible for the reduced wolf harvest in Unit 3 during RY03 and RY04.

In fall 2004 the board, made up of new appointees, rescinded the previous board's decision to shorten the wolf hunting season and restored the 1 August–30 April wolf hunting season throughout Region 1. The board also restored the month of April to the wolf trapping season and eliminated the requirement that the left foreleg of any wolf taken in Units 1–5 remain naturally attached to the hide until sealed.

The harvest of 71 wolves by 41 individuals in RY02 represents the highest wolf harvest in Unit 3 since at least 1984.

From RY07–RY02 hunters/trappers were required to leave the left foreleg naturally attached to the hide of any wolf taken in Units 1–5 until the time of sealing. During the sealing process, the foreleg bone was removed and submitted for use in evaluating the percentage of adults and subadults in the unitwide annual harvest. Between RY97 and RY02 the percentage of adults in the harvest ranged 32–58% annually, with an overall mean of 46%.

In most years trapping is the primary method of taking wolves in Unit 3. During three of the last 10 years, however, the number of wolves taken with the use of firearms has exceeded those taken by conventional trapping methods. In general, these reversals in trend result from decreases in the number of wolves taken by conventional trapping methods rather than significant increase in the number of wolves taken annually with the use of firearms. Most of the wolves taken by hunters are harvested opportunistically during hunts for other species. Nonresident hunters, however, consider wolves a highly sought-after trophy animal, and some big game guides offer guided wolf hunts in the unit. Trapping effort and success fluctuates annually in response to fuel prices and winter weather conditions. Wolf hides from Southeast Alaska are considered to be of relatively poor quality by fur buyers, and there is little financial incentive to harvest wolves. Most wolf hunting and trapping that occurs in the unit is recreational and is viewed by many as simply a means of controlling wolf populations to improve deer and moose populations. Much of Unit 3 is not hunted or trapped.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a sustainable population in all areas of historic wolf range.

METHODS

We monitored the wolf harvest through a mandatory pelt-sealing program. We collected data on the number of wolves killed, sex, date of take, method of take, method of transportation used from home to the field, and when possible, an estimate of the number of wolves accompanying those killed. From RY97 through RY02 we collected the left foreleg from each sealed wolf for age determination and opportunistically collected tissue samples for genetic analysis. Although

forelegs were collected in RY03, they were not used for age determination, but were used for DNA analysis.

We recorded observations of wolves made by Alaska Department of Fish and Game and U.S. Forest Service biologists, trappers, hunters, and other members of the public. An annual statewide trapper survey supplied additional information, including each trapper's subjective assessment of the population status of wolves in Unit 3.

Data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY09 = 1 July 2009 through 30 June 2010).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Sealing records provide insufficient data to make a meaningful estimate of wolf populations. Current estimates of the Unit 3 wolf population are based on average territory and pack size derived from extensive wolf research conducted in similar habitat on Prince of Wales Island (Person et al. 1996). Based on the amount of suitable habitat below 1,800 feet in elevation, we estimate the current unitwide wolf population to be 125–385 animals in approximately 23 packs. Conversations with trappers, hunters, pilots, and other biologists, along with information from trapper questionnaires, indicated the wolf population increased during the 1990s in response to increased deer numbers. More recently, increases in moose distribution and abundance have probably helped to sustain relatively high wolf numbers in Unit 3.

MORTALITY

Harvest

RY 2008 and 2009

Season and Bag Limit	Residents and Nonresidents
Trapping: No limit	10 November–30 April
Hunting: 5 wolves	1 August–30 April

RY 2010

Season and Bag Limit	Residents and Nonresidents
Trapping: No limit	10 November–30 April
Hunting: 5 wolves	1 August–31 May

Board of Game Actions and Emergency Orders. In fall 2010, based on concerns about low deer numbers, the Board of Game extended the wolf hunting season in Unit 3 to May 31. At the request of the department, the regulation change was expedited and the wolf season extension took effect on 1 May 2011. While the department had opposed previous attempts to extend the wolf hunting season to the end of May, in this instance concerns about low deer numbers prompted the department to support extending the wolf season in Unit 3. It was hoped that the wolf harvest could be increased by affording the annual influx of nonresident black bear hunters the opportunity to take wolves incidental to spring bear hunting.

No emergency orders were issued regarding Unit 3 wolf hunting or trapping during this report period.

Hunter/Trapper Harvest. In RY08, 26 individuals harvested 55 wolves; in RY09, 26 individuals harvested 42 wolves; and in RY10, 26 individuals harvested 54 wolves (Table 1). The average harvest of 50 wolves annually during the current report period is slightly above the preceding 10-year average of 47 wolves per year. Except for the RY98, RY03, and RY07 seasons, trapping has been the primary method of taking wolves in Unit 3. Trapping accounted for 56% of the unitwide harvest in RY08, 60% in RY09, and 54% in RY10. Deer hunters, bear hunters, and moose hunters occasionally take wolves while hunting or pursuing other species.

While the Board of Game extended the RY10 wolf hunting season in Unit 3 until the end of May, only 2 additional wolves were harvested as a result of the season extension. The low May harvest was likely due to the relatively short advanced notice regarding the season extension, and the fact that it was not possible to include change in the RY10 regulation booklet. Most of the wolf harvest took place near local communities. The majority of Unit 3 is not exposed to trapping pressure on wolves.

Harvest Chronology. On average, most Unit 3 wolves are taken during January, February, March and April in descending order. In RY08, April, December, February and March, in descending order, accounted for the highest percentages of the harvest (Table 2). In RY09, February, December, March, and September accounted for the highest percentages of the wolf harvest. In RY10 January accounted for the highest percentage of the harvest, followed by February, and then November, December and April, each with an equal percentage of wolves taken. Wolves harvested in August, September, and October are usually taken incidentally to other hunting activities.

Transport Methods. As is typically the case, during the report period, trappers/hunters using boats harvested the majority of wolves taken (Table 3). Some trapping occurs from the road system on Mitkof and Wrangell islands and trappers/hunters using highway vehicles accounted for 11% of the harvest in RY08, 10% RY09, and 11% in RY10. Other forms of transportation are rarely used; however, a small number of wolves were harvested by trappers/hunters using 3- and 4-wheelers and/or ORVs during the report period. In RY10, however, a relatively high percentage (7%) of the wolves taken was harvested by trappers/hunters using aircraft as their transport method.

Other Mortality

The reported wolf harvest probably underrepresents the actual take of wolves during the report period. We suspect that some poaching of wolves is occurring and that each year some wolves are shot and left to lie, or otherwise go unsealed. Wolves are difficult animals to bring down and it is not unreasonable to assume that some mortality is occurring as a result of wounding loss. Some wolves caught in traps that are not checked regularly, particularly intertidal drowning sets, are occasionally scavenged by other animals, and the hides are so damaged that they are frequently discarded in the field with the harvest going unreported.

CONCLUSIONS AND RECOMMENDATIONS

Although the wolf harvest typically fluctuates from year to year, from RY98 to RY07 the unit 3 wolf harvest averaged 47 wolves annually. The harvests of 55, 42, and 54 wolves in RY08, RY09, and RY10 respectively, were above, slightly below, and above the preceding 10-year mean annual harvest.

The Unit 3 deer harvest has failed to achieve the specified objectives for population size or harvest as identified by the Board of Game under the Intensive Management Law since 2004, and at its fall 2010 meeting, the board urged the department to consider actions necessary to increase the Unit 3 deer population and harvest. In response to the board's recommendation, the department is currently evaluating the feasibility of hiring 1 or 2 trappers to reduce wolf numbers within a 1,680 km^2 (648 mi^2) area that includes Mitkof Island, Woewodski Island, and the Lindenberg Peninsula on Kupreanof Island. The feasibility analysis will be presented to the board in January 2013.

We recommend no additional changes to the Unit 3 wolf hunting or trapping regulations at this time.

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Table 1. Unit 3 wolf harvest, regulatory years 1997 through 2010.

Regulatory	Reported harvest				Method of take			Successful
year	M	F	Unk	Total	Trap/snare	Shot	Unk	trappers/hunters
1997	25	16	2	43	29	14	0	23
1998	16	18	0	34	16	18	0	22
1999	29	28	0	57	34	23	0	28
2000	33	25	1	59	38	20	1	35
2001	26	25	0	51	32	17	2	29
2002	34	37	0	71	42	29	0	41
2003	23	12	1	36	16	20	0	20
2004	26	14	1	41	30	11	0	20
2005	32	28	0	60	36	24	0	27
2006	23	19	2	44	33	11	0	17
2007	11	10	0	21	6	15	0	16
2008	31	24	0	55	30	24	1	26
2009	21	18	3	42	25	17	0	26
2010	26	26	2	54	29	25	0	26

Table 2. Unit 3 wolf harvest chronology, by percent by time period, regulatory years 1997 through 2010.

Regulatory	Harvest periods													
year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Unk	*n*
1997	0	0	7	9	9	7	19	26	9	14	0	0	0	43
1998	0	0	6	18	9	3	12	8	18	26	0	0	0	34
1999	0	3	1	16	5	1	18	22	18	16	0	0	0	57
2000	0	2	8	5	3	17	14	27	10	14	0	0	0	59
2001	0	2	12	6	2	6	21	21	16	12	2	0	0	51
2002	0	0	4	14	7	12	14	18	8	15	8	0	0	71
2003	0	0	11	22	14	11	22	11	6	0	3	0	0	36
2004	0	0	5	10	12	16	10	27	20	0	0	0	0	41
2005	0	7	3	7	10	13	27	5	18	10	0	0	0	60
2006	0	5	11	2	0	5	20	23	30	5	0	0	0	44
2007	0	5	14	14	5	5	14	5	14	24	0	0	0	21
2008	0	0	9	9	5	20	2	18	11	25	0	0	0	55
2009	0	2	12	7	2	21	10	24	14	7	0	0	0	42
2010	0	4	7	4	13	13	17	15	11	13	4	0	0	54

Table 3. Unit 3 wolf harvest, by percent by transport method, regulatory years 1997 through 2010.

Regulatory year	Percent of harvest							
	Airplane	Boat	3/4 wheeler	Snowmachine	ORV	Highway vehicle	Other	*n*
1997	2	85	2	0	2	9	0	43
1998	6	74	0	0	0	20	0	34
1999	4	68	0	0	5	23	0	57
2000	3	71	5	0	2	17	2	59
2001	0	73	0	0	0	25	2	51
2002	0	72	0	0	3	20	5	71
2003	0	47	3	0	0	50	0	36
2004	0	73	0	0	0	27	0	41
2005	0	78	5	0	3	12	2	60
2006	0	93	2	0	0	5	0	44
2007	0	86	0	0	5	5	5	21
2008	0	71	4	0	0	11	15	55
2009	2	76	2	0	2	10	7	42
2010	7	56	2	2	0	11	22	54

SPECIES

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 5 (5,800 mi^2)

GEOGRAPHIC DESCRIPTION: Cape Fairweather to Icy Bay, eastern Gulf of Alaska coast

BACKGROUND

There has never been a scientific study conducted on wolves in Unit 5. However, wolf harvest data, along with anecdotal information, suggest wolf numbers and distribution are similar to what they have been over the last three decades. Wolf numbers may fluctuate with increasing and decreasing moose numbers; however, wolves probably subsisted mostly on mountain goats and salmon before the arrival of moose in the area (ca. 1920s and 1930s) (Alaska Department of Fish and Game, 1989). Salmon are considered very important for wolf population maintenance, especially as a late fall and early winter food source, suggesting varying moose densities may have little long-term effect on wolf numbers. Anecdotal evidence from discussions with local hunters and trappers, hunting guides, pilots, and local Alaska Department of Fish and Game (ADF&G) personnel suggests that wolves remain common throughout Unit 5. ADF&G personnel routinely see wolves during aerial moose surveys in both subunits 5A and 5B.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

No formal management goals have been established for wolves in this unit; however, general management objectives are to regulate seasons and bag limits to maintain populations of wolves for viewing and harvest.

METHODS

Through the mandatory sealing of wolves taken by successful hunters and trappers, we collected the following data: date and method of take, sex, transportation mode, and number of animals in the pack. ADF&G staff in Yakutat sealed wolves.

The Unit 5 wolf population was monitored by whatever means available, including anecdotal reports, aerial sightings during surveys for other species, discussions with hunters and trappers, and information collected from annual statewide trapper surveys.

Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 July 2008–30 June 2009).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

There were no attempts during the report period or in recent years to quantify wolf numbers in Unit 5. The data we collected while sealing wolves were insufficient to meaningfully estimate wolf populations within the unit. Although no quantitative data are available, the RY08 Trapper Report and Questionnaire (Schumacher 2010) reported trappers felt wolves were common in Unit 5 and were increasing. Discussions with local hunters, trappers, and pilots suggest that wolves are widely distributed and commonly seen throughout subunits 5A and 5B.

MORTALITY

Harvest

Seasons and Bag Limits. Seasons and bag limits are the same for residents and nonresidents.

	Season	*Bag limit*
Hunting:	1 August–30 April 30	5 wolves
Trapping:	10 November–30 April	No limit

Board of Game Actions and Emergency Orders. The Alaska Board of Game adopted a proposal to prohibit trapping in areas near Yakutat proper and along some roads and trails, during their November 2010 meeting. The intent of the proposal was to protect domestic pets from being trapped. The impact to wolf harvest due to these changes will likely be low. No emergency orders were issued to close wolf trapping or hunting season during the report period.

Hunter/Trapper Harvest. Twenty-one wolves were taken in Unit 5 during the report period. Six wolves (4 males and 2 females) were taken in RY08 (Table 1). In RY09, the harvest increased to 9 wolves (4 males and 5 females), and in RY10, the harvest decreased to 6 wolves (3 males and 3 females). During this report period, the mean annual harvest of 7 wolves is only slightly lower than the long-term (RY98–RY07) mean annual harvest of 8 wolves. The range in annual harvest over that period of 3–13 animals probably reflects the effect of snowfall on many factors that influence trapper success, including trapper mobility, trapping effort, and the distribution of wolves. Harvest locations within subunit 5A were widely distributed. This is due to relatively easy access (highway, airstrips, and rivers), which resulted in subunit 5A receiving the majority of wolf hunting and trapping pressure in Unit 5. Three wolves were taken in subunit 5B during the report period, all by nonresident hunters. All three wolves were likely taken in combination with fall moose or bear hunts.

In the past, trapping and snaring were the primary methods of take. The combined harvest for RY08–RY10 was 21 wolves, with 12 (57%) taken by ground shooting, 7 (33%) taken in snares, and 2 (10%) taken in traps. Nine of the wolves were gray, 8 were black, and 3 were white (pelt

color was not recorded for one wolf). Difficult travel conditions and inconsistent weather (heavy snows often changing to rain) in the Yakutat area restricted hunting and trapping effort for wolves.

Hunter/Trapper Residency and Success. Unit 5 residents took 15 wolves (71%) during the report period, and the demographic groups of other Alaska residents and nonresidents each took 3 wolves (14%). All wolves harvested by nonresidents were in fall months, by firearm, during hunting seasons for other species (moose and bear).

Harvest Chronology. People hunting other species shot most wolves taken during fall and early spring months (Table 2). During the late winter and spring, however, the wolf harvest was mostly limited to trappers.

Transport Methods. During the report period, successful trappers and hunters used varied transport modes, showing little consistency from year to year (Table 3). Because of the small harvest, 1 or 2 serious trappers using consistent transport methods dominate this category. Highway vehicles, boats, and aircraft are the primary forms of transportation used by wolf hunters and trappers in Unit 5.

Other Mortality

No other non-sport-related wolf mortality was recorded during the reporting period. In the past, wolves believed to be aggressive and that were observed near homes and the community were pursued with limited success. This type of behavior suggests wolves have access to human food, and were either food-conditioned or becoming so. Wolves were observed multiple times at the Yakutat landfill by ADF&G personnel during the reporting period.

CONCLUSIONS AND RECOMMENDATIONS

Our knowledge of Unit 5 wolf populations is limited to information provided by hunters, trappers, local pilots, trapper surveys, and incidental observations by department staff. Based on these data sources we do not believe there have been significant changes to the Unit 5 wolf population since the previous report, and that the population remains stable. Moose populations are doing well and mountain goats are available, and with the abundant beaver and salmon in the area, along with some deer, wolves do not lack for prey resources. Because of difficult access and inclement weather throughout the unit, hunting and trapping pressure on wolves will probably remain low. No changes in seasons or bag limits are recommended at this time.

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Table 1. Unit 5 wolf harvest, regulatory years 1996 through 2010.

Regulatory Year	Males	Females	Unknown	Total
1996	16	8	0	24
1997	3	1	0	4
1998	4	3	0	7
1999	1	2	0	3
2000	4	7	0	11
2001	4	2	0	6
2002	6	7	0	13
2003	2	3	0	5
2004	6	2	0	8
2005	3	4	0	7
2006	6	2	0	8
2007	4	2	0	6
2008	4	2	0	6
2009	4	5	0	9
2010	3	3	0	6
Mean annual harvest	4.7	3.5	0	8.2

Table 2. Unit 5 wolf harvest chronology by month, regulatory years 1996 through 2010.

Reg. Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1996			3	2	2		4	1	11	1		
1997			1	1		1						
1998			2	3						2		
1999			1	1	1							
2000			2	1			2	1	2	3		
2001			3						2	1		
2002			1	2	1		5	2		2		
2003			2	1			1		1			
2004			1	2			5					
2005			3	2	2							
2006			3		1	1	1	1	1			
2007			3	1			2					
2008			3	1	1	1						
2009			2		2	1	1		1	2		
2010						1	1		1	3		

Table 3. Unit 5 wolf harvest, percent by transport method, regulatory years 1996 through 2010.

Regulatory year	Airplane	Dogsled, skis, snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway vehicle
1996	25			75			
1997	67		33				
1998	86		14				
1999	67						33
2000	37	18		27			18
2001	67		33				
2002	15		8	15			62
2003	20		40	20			20
2004	37	13					50
2005	28		43				29
2006	14			29	43		14
2007	66		17	17			
2008	66			17			17
2009	11		22	11	11		45
2010	33		33	17			17

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 6 (10,140 mi^2)

GEOGRAPHIC DESCRIPTION: Prince William Sound and North Gulf Coast

BACKGROUND

Gray wolves are endemic to the mainland areas of Unit 6. During the early twentieth century, wolves occurred at low densities (Nelson 1934) with unknown distribution. Heller (1910) reported tracks in Nelson Bay in eastern Unit 6D, and locals indicated wolves were present east of Nelson Bay in Unit 6C. Railroad, oil, and coal development projects on the Copper and Bering River deltas during the early 1900s may have reduced or eliminated wolves as human access into these areas increased. Mountain goats were the only ungulate prey available during this period. However, coastal wolves supplement their diet with salmon, beaver, marine mammals (Watts et al. (2010) and other seasonally abundant prey. Carnes (2004) observed that wolves in Unit 6 ate "everything from voles to gray whales."

The successful introductions of Sitka black-tailed deer and moose brought additional ungulate prey to Unit 6 during the mid-1900s (Paul 2009). Deer were introduced during 1916–1923 to islands of Prince William Sound and subsequently established populations on the mainland of eastern Unit 6D (Nelson 1932). Moose calves were released on the west Copper River Delta in Unit 6C during 1949–1958. The moose herd grew rapidly and expanded eastward into Units 6B and 6A toward Cape Yakataga, creating ideal conditions for wolf colonization. Wolves, however, remained rare to nonexistent in Unit 6 through the 1950s and 1960s (Robards 1955); (Reynolds 1973). Federal predator control on interior wolf populations probably contributed to the delay in colonizing Unit 6, as did formidable geographic barriers between interior and coastal wolf habitat (Carnes 2004); (Peterson et al. 1984). The first pack was observed in 1972–73 in northwestern Unit 6B, indicating that the Copper River was the most probable dispersal corridor (Reynolds 1973). Wolves began to increase and disperse during the 1970s in areas of Unit 6 where moose were established. Wolf numbers apparently peaked in the late 1980s (Griese 1990), then declined and stabilized at a lower density during the 1990s (Carnes 2004; Nowlin 1997).

Carnes (2004) reported that moose were the most important prey species in Unit 6, making up 57% of prey biomass during summer and 67% during winter. Moose kill rates were low

compared to kill rates found in other wolf populations. Carnes (2004) attributed low moose kill rates to low moose density and good body condition resulting from productive habitat and mild winters. Readily available nonungulate prey also contributed to reduced vulnerability of moose to predation. Beaver, salmon and waterfowl were the most important nonungulate prey in the diet of Unit 6 wolves (Carnes 2004).

Reports and opinions of wolf predation on mountain goats have undergone considerable change from the 1970s, when wolves first arrived, to the 1990s. Reynolds (1979) reported that predation by wolves caused mountain goats to decline by 50% between 1970 and 1978 in the mountains of Units 6B and western 6A. Nowlin (1998) suspected wolf predation contributed to goat declines during the early 1990s. Carnes (2004), who collected and analyzed wolf scat during the 1990s, argued that goats were a minor proportion (<2% of prey biomass) of wolf diet in Unit 6, and proposed that hunter harvest alone caused downward goat trends. I suspect wolf predation on goats was higher upon initial colonization during the 1970s and 1980s. In the decades-long absence of wolves, goats probably occupied atypical habitat that lacked escape terrain, predisposing themselves to predation by colonizing wolves. Prior to the late 1980s, hunter harvest undoubtedly contributed to declining populations until deficiencies in goat management were recognized and revised (Griese 1988). Under a much more conservative management strategy during the 1990s, 3 of 5 goat populations in Units 6B and western 6A recovered to prewolf levels (Crowley 2004). Despite closed hunting seasons, 2 goat populations occupying primarily rolling hills with little or no escape terrain did not recover to prewolf levels.

Average annual wolf harvest in Unit 6 during the past 30 years was 4.4 wolves. Highest reported harvests occurred in 1996–97 (12 wolves) and 2000–01 (13 wolves). Wolf harvest was sustainable, although Carnes (2004) reported that during the 1990s the wolf population in Unit 6C was reduced to a nonbreeding sink population as a result of human harvest. Unit 6C hunters and trappers had easy access to a geographically limited wolf range (approximately 1,025 km^2), creating a rare situation in which sport harvest and recreational trapping reduced and to date control a wolf population (Carnes 2004). As a result, the moose population in Unit 6C must be controlled with human harvest, in contrast to moose in Units 6A and 6B, which are limited by predation.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a wolf population in a minimum of 5 packs that will sustain an annual harvest of 10 wolves.

METHODS

We collected harvest data by sealing hides of wolves taken by trappers and hunters. We recorded location and date of harvest, method of take, transportation mode, sex, and observed pack size. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends June 30 (e.g., RY08 = 1 July 2008–30 June 2009). I estimated population size of wolves using incidental observations in which there was high probability of seeing the entire pack. These usually

occurred during moose surveys or were reported by reliable guides. I used sealing certificates to track distribution and estimates of pack size reported by guides and experienced pilots. I assumed that pack distribution remained similar to that described by Carnes (2004). I used deterministic modeling to make a best guess at sizes for those packs not observed for several years, but where harvest has occurred. My model assumptions, based on Carnes (2004), varied by pack: 0–2.5 pups recruited per year per pack (4–5 pups per litter with survival varying) and combined rate of 10–15% for adult nonhunting mortality and dispersal. I added hunting mortality to models as it was reported. I occasionally adjusted pack models to fit actual field observations of pack size by adding, for example, additional mortality or reducing productivity for a season.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The wolf population was approximately 57–68 animals during the reporting period, composed of 9–11 packs and loners (Table 1). Estimated posthunt wolf density (wolves/1,000km^2) in RY10 was as follows: 6A = 10, 6B = 11, and 6C = 5. Given kill rates reported by Carnes (2004) wolves had the potential to kill 11–17% of the moose in Units 6A and 6B annually. The Lowe River pack in Unit 6D near Valdez increased in size to 7–8 wolves by 2008 and subsequently may have been eliminated when 7 wolves were killed during RY10. The pack was accessible from Valdez by road and snowmachine and many hunters and trappers were aware of the pack, a situation similar to Cordova and 6C wolves.

Distribution

Unit 6A had approximately 24–32 wolves in 5 packs and loners during the reporting period: Icy Bay (4–6 wolves), White River (6–7), Tsiu River (4–7), Suckling Hills (7–8), and Bering River (3–4). Unit 6B had 9–11 wolves in 2 packs and loners: Martin River (1–2), and Russian River (8–9). Unit 6C had 3–6 wolves present, probably as pairs or loners. Unit 6D had 11–13 wolves in 2 packs until prehunt RY10.

Wolves have not become established on major islands in Unit 6D. Deer would be adequate prey for wolves, as they are in Southeast Alaska. I occasionally receive reliable reports of wolves or wolf sign on Hawkins and Hinchinbrook Islands, both of which are readily accessible from the Copper River Delta by crossing mudflats and swimming channels at low tide. Both islands have permanent and seasonal human residents and receive heavy deer hunting pressure from local residents, most of whom would not favor wolf colonization of the islands. However no wolf kills, legal or rumored, have ever been reported from the islands.

MORTALITY

Harvest

Season and Bag Limit. The hunting season was 10 August–30 April with a bag limit of 5 wolves. The trapping season was 10 November–31 March with no bag limit.

Board of Game Actions and Emergency Orders. The Board of Game took no actions, and no emergency orders were issued during this reporting period.

Hunter/Trapper Harvest. Reported annual harvest during this reporting period was 4–10 wolves (22 total), composed of 38–75% females (Table 2). The harvest of 7 wolves in Unit 6D was the highest ever reported. Half the harvest was trapped and half shot. Total estimated unreported and illegal harvest was 3. With the exception of the Lowe River pack, harvest levels were sustainable.

Hunter Residency and Success. The number of successful hunters and trappers totaled 7, 3, and 6 during the 3 years of the reporting period, respectively (Table 2). Seventeen of 22 wolves were taken by residents. This was similar to previous years.

Harvest Chronology. There was a shift toward later season harvest during the reporting period. By RY10 most wolves were taken during the second half of the season (Table 3).

Transport Methods. Primary methods of transportation were snowmachines, highway vehicles and airplanes for Unit 6 wolf harvest (Table 4). Snow machines increased in importance because of the increased harvest near Valdez.

CONCLUSIONS AND RECOMMENDATIONS

The population objective was achieved and the number of packs exceeded the minimum of five. The wolf population was lightly harvested because of remoteness of most packs, but could have sustained the harvest of 10 wolves specified in the objective. No management changes are recommended.

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Crowley, D. W. 2012. Unit 6 wolf management report. Pages 53–60 [*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, Alaska.

Table 1. Unit 6 fall wolf population estimates[a], regulatory years 2006–2010.

Regulatory year	Population estimate	Number of packs
2006	63–69	9–11
2007	62–72	9–11
2008	57–68	9–11
2009	55–64	9–11
2010	57–67	9–11

[a] Pretrapping season. Estimates are based on incidental observations, harvest locations, and deterministic modeling.

Table 2. Unit 6 wolf harvest, regulatory years 2006–2010.

Regulatory	Reported harvest				Estimated harvest		Method of take			Successful
Year	M	F	(%)	Total	Unreported	Illegal	Trap/snare	(%)	Shot	trappers/hunters
2006	2	2	(50)	4	0	1	1	(25)	3	4
2007	2	5	(71)	7	0	1	1	(14)	6	7
2008	5	3	(38)	8	0	1	3	(38)	5	7
2009	1	3	(75)	4	0	1	3	(75)	1	3
2010	6	4	(40)	10	0	1	5	(50)	5	6

[a] Includes harvested wolves of unknown sex

Table 3. Unit 6 wolf harvest chronology percent, regulatory years 2006–2010.

Regulatory Year	Harvest periods									
	August	September	October	November	December	January	February	March	April	*n*
2006	25	0	25	0	25	0	25	0	0	4
2007	0	57	14	0	0	14	14	0	0	7
2008	0	50	0	0	13	0	25	13	0	8
2009	0	25	0	0	25	0	0	50	0	4
2010	0	20	0	10	10	10	10	20	20	10

Table 4. Unit 6 wolf harvest percent by transport method, 2006–2010.

Regulatory Year	Percent of harvest								
	Airplane	Dogsled/ skis/ snowshoes	Boat	Snow-machine	ATV	ORV	Highway vehicle	Other	*n*
2006	50	0	0	25	0	0	25	0	4
2007	43	0	14	14	14	0	14	0	7
2008	50	0	0	38	0	0	13	0	8
2009	0	0	25	75	0	0	0	0	4
2010	10	0	10	50	0	0	30	0	10

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNITS: 7 and 15 (8,400 mi^2)

GEOGRAPHIC DESCRIPTION: Kenai Peninsula

BACKGROUND

Wolves were extirpated from the Kenai Peninsula shortly after the turn of the twentieth century, likely due to large fires that impacted their prey base and the use of poison by trappers (Peterson and Woolington 1984). Bounties and an extensive predator control program in southcentral Alaska 1915–1960 likely prevented recolonization of wolves back to the Kenai Peninsula (Peterson and Woolington 1984). The first wolf in over 50 years was spotted in 1961 and by 1975 wolves had recolonized most available habitat throughout the Kenai Peninsula (Peterson and Woolington 1984).

During the 50-year extirpation of wolves on the Kenai, the trapping and hunting seasons remained open with no closed season and no bag limit. After the first sighting in 1961, both the trapping and hunting seasons were closed. The first harvest was allowed in 1974.

An infestation of dog louse (*Trichodectes canis*) was first identified on the Kenai in 1982. Attempts to stop the spread of the infestation were unsuccessful and the prevalence of the parasite spread rapidly across the Kenai. Infested wolves are now common.

Other factors that have had an impact on wolf harvests include prohibition of land and shoot taking of wolves in1984, a required 7-day trap check implemented on the Kenai National Wildlife Refuge (KNWR) in 1985, a new requirement in 1988 for a 4-day check on leg-hold traps, and in 1989 adoption of a mandatory trapper education class for anyone trapping on the refuge. The initial impact of these actions was a decrease in harvest until the 1990s, but then harvests generally increased until 2005 and have leveled off at moderate numbers.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Survey all areas outside Kenai Fjords National Park at least once every 5 years.
- Maintain a population of wolves on the Kenai Peninsula that allows for multiple uses (consumptive and nonconsumptive) of the resource.

METHODS

During 11–12 March 2010 we completed a survey for wolves occupying Unit 15A. We used 2 Super Cub aircraft piloted by individuals (Chuck McMahan and Dave Filkill) with considerable experience tracking wolves. One aircraft (piloted by Dave Filkill) had an observer (Jeff Selinger), while the other aircraft did not. The entire unit was covered during the survey. During 17–21 November 2011 we completed a wolf survey in Units 15A, 15B, and 15C. All of Unit 15 was surveyed with the exception of the upper Killey River and Upper Indian Creek in 15B and the portions of 15C south of Kachemak Bay. Anecdotal information on pack size and locations are also gained opportunistically from trappers and incidental observations. We monitored harvest by sealing the pelts of harvested wolves.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Other than anecdotal information from members of the public or incidental observations we have no current information on wolf abundance and distribution in Unit 7.

The survey flights conducted in Unit 15A during 11–12 March 2010 produced a minimum count of 41–45 wolves in 5 packs (3–15 wolves per pack), 4 pairs or single wolves. Overall, survey conditions were good with fresh snow, but deep shadows made it difficult to track wolves in timbered areas.

The surveys flown throughout most of Unit 15 during 17–21 November produced minimum counts of 60–62 wolves in Unit 15A, 40–46 wolves in Unit 15B, and 43–50 wolves in Unit 15C, for a Unit 15 total of 143–158 wolves. Wolves in Unit 15A included 7 packs (3–12 wolves per pack), 7–8 pairs, or single wolves, while Unit 15B included 7 packs (3–10 wolves per pack) and 2 pairs of wolves. Unit 15C (north of Kachemak Bay) had 6–7 packs (3–8 wolves per pack) and 7–8 pairs or single wolves. Overall survey conditions were poor due to high winds the day before the survey started and during portions of the survey. We had up to 12 inches of fresh snow just prior to the survey, but high winds (exceeding 40 mph) blew the snow off of the lakes in all units and portions of the higher elevations in Unit15C, and compacted the snow in many areas, resulting in poor tracking conditions. Turbulent conditions during the survey also prevented pilots from surveying some of the mountainous portions of Unit 15B.

Peterson and Woolington (1984) estimated the Unit 7 and 15 wolf population at 186. Since that time the population has been considered stable at 200 animals (Spraker 1997, Selinger 2003, Selinger 2006). It appears from the above survey information that the population continues to remain relatively stable.

MORTALITY

Harvest

Season and Bag Limits. The hunting season in Units 7 and 15 has been 10 August–30 April since the 1970s. From 1992 to 2011 the bag limit was 5 wolves, except on the Kenai National Wildlife Refuge, where the limit is 2. Beginning in 2011 the bag limit for hunting was 5 wolves

throughout the Kenai where hunting is allowed. The trapping season in Units 7 and 15 has been 10 November–31 March with no bag limit since 1997.

Board of Game Actions and Emergency Orders. At its March 2011 meeting, the Board of Game increased the hunting bag limit on the Kenai National Wildlife Refuge to 5 wolves (the previous limit was 2).

Hunter/Trapper Harvest. The average harvest during the past 5 seasons has been 39 wolves (Table 1). Approximately 10–20 percent of the harvest has been taken by hunters.

Harvest Chronology. The chronology of the harvest varies according to weather and trapper effort (Table 2).

CONCLUSIONS AND RECOMMENDATIONS

The current wolf population in Unit 15 seems to be consistent with what was observed in the 1980s and 1990s when wolves were surveyed more frequently. I believe it is important to continue flying these surveys and with recent funding received it is our intent to do so. I also believe that we need to complete a survey in Unit 7 since the last comprehensive survey of that unit was done in the 1980s. In the long term, Unit 15 should take priority over Unit 7, since Unit 15 has been identified for intensive management.

The department will continue to work with trappers to supply them with road-killed or other moose/caribou meat that is unfit for human consumption, so they can use it for bait.

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Table 1. Wolf harvest in Units 7 and 15, regulatory years 2006–2010.

Regulatory year	Unit Harvest				Total harvest
	7	15A	15B	15C	
2006	8	8	9	14	39
2007	4	11	10	17	42
2008	5	8	16	13	42
2009	0	7	9	17	33
2010	11	15	2	12	40

Table 2. Harvest chronology for wolves in Units 7 and 15, regulatory years 2006–2010.

Regulatory year	Month of Harvest									
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Other	Total
2006	0	4	0	8	2	3	12	9	1	39
2007	1	6	1	2	3	9	10	7	3	42
2008	3	2	0	4	6	5	15	6	1	42
2009	1	2	0	0	8	7	7	7	1	33
2010	1	2	1	0	5	9	14	5	3	40

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNITS: 9 (33,638 mi^2) and 10 (1,586 mi^2)
GEOGRAPHIC DESCRIPTION: Alaska Peninsula and Unimak Island

BACKGROUND

Wolves are found throughout the Alaska Peninsula (Unit 9) and on Unimak Island (Unit 10) in moderate densities. Specific data on historic wolf abundance are lacking, but the population was likely reduced by wolf control work during the 1950s. After the end of the federal wolf control program, wolves increased and thereafter were primarily affected by prey abundance and periodic outbreaks of rabies. Conditions favorable for land-and-shoot hunting and ground-based trapping have been rare over the past 30 years, so harvests have had relatively little influence on wolf numbers.

Prey abundance has varied during the past 50 years. The availability of terrestrial mammals is currently low due to declines in moose and caribou populations throughout the area. Salmon and marine mammals are utilized as alternative food sources on a seasonal basis. Moose densities increased during the 1950s and 1960s and then decreased during the 1970s in all areas north of Port Moller. Moose numbers have been relatively stable at low densities for the past 30 years. The Mulchatna caribou herd increased from about 14,000 in 1974 to over 200,000 by 1996, and declined to 30,000 by 2008. The Northern Alaska Peninsula Caribou Herd (NAP) increased from about 13,000 in the 1970s to about 20,000 in 1984. During the next 10 years, the NAP remained relatively stable at 15,000–20,000. From 1994 to approximately 2008 the NAP declined, dropping to about 2,500 animals. Since then, the herd appears to have stabilized at low numbers. Caribou numbers have decreased dramatically on Unimak Island recently. The population increased during the 1990s to a herd size of approximately 1,000 caribou between 1999 and 2005 before decreasing to approximately 200 caribou by 2011. The Southern Alaska Peninsula Caribou Herd (SAP) peaked at 4,200 in 2002 before declining to approximately 600 caribou by 2007. Following implementation of a wolf removal program from 2008 through 2010, the herd increased to 1,200 caribou. Thirty-eight wolves were removed from key areas during 3calving seasons, and caribou calf survival increased significantly.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

During previous reporting periods, the management objective has been to maintain a wolf population that will sustain a 3-year-average annual harvest of at least 50 wolves. Given the limitations imposed by climate and budget, it is impractical to set a management goal based on a desired wolf density or total population; there is no feasible way to annually measure whether we are meeting the objective throughout the area.

METHODS

A study of wolf population dynamics has offered insight into wolf densities in Unit 9. Radio collars have been maintained on wolves from 10 packs to monitor pack size, measure territory size, and investigate wolf ecology on the Alaska Peninsula. The department also monitored trends through observations made during other fieldwork, reports from hunters and guides, and responses to the annual trapper questionnaire. Harvest is monitored through mandatory pelt-sealing reports.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Using observations of wolf pack size and territory size of collared wolf packs, we estimate Units 9 and 10 combined contain approximately 350 to 550 wolves. This is a conservative estimate, but it cannot be refined without considerable expense, combined with abnormally good snow and flying conditions.

Wolf numbers appear to have increased throughout Unit 9 since the 1990s, despite the decline of the caribou herds. Several possible explanations for this include the abundance of alternate prey (marine mammal carcasses, salmon, snowshoe hares, etc.), population rebound following a period of high wolf mortality due to rabies, and immigration from surrounding areas with higher prey bases such as the Mulchatna Caribou herd's range. Although relatively few trapper questionnaires have been returned in recent years, trappers generally agree that wolf numbers are stable in Unit 9 and that wolves are common on the landscape.

MORTALITY

Harvest

Season and Bag Limits. The hunting season in Unit 9 was 10 August–25 May with a bag limit of 10 wolves per day, and the trapping season was 1 October–30 April with no bag limit. The hunting season in Unit 10 was 10 August–25 May with a bag limit of 10 wolves per day, and the trapping season was 10 November–31 March, with no bag limit.

Board of Game Actions and Emergency Order. In March 2009 the board extended the wolf hunting season in Unit 10 to close on 25 May.

In March 2010 the board authorized an intensive management plan for the Unimak Wolf Management Area to allow wolf removal in areas actively used by caribou for calving, but the plan was not implemented because of restrictions imposed by federal land managers. The board also authorized an intensive management plan to reduce wolf predation on the NAP caribou herd, but the plan was not implemented due to the significant amount of federal lands contained within the predation control area.

In March 2011 the board lengthened the hunting season in Units 9 and 10 to 30 June. The trapping season in Unit 9 was extended to run from 10 August–30 June. The trapping season in Unit 10 was lengthened to 30 June.

Hunter/Trapper Harvest. Harvest data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 July 2008 through 30 June 2009). Since RY00, annual harvest has averaged 78 wolves in Unit 9 and 2 wolves in Unit 10. During RY08, RY09, and RY10, wolf harvests were 58, 70, and 43, respectively, in Units 9 and 10 (Table 1). Harvest data are an inadequate index of population trends and the below average harvests reported in RY08 and RY10 are attributed to factors including winter weather conditions and hunter/trapper effort.

Hunter Residency and Success. During this reporting period, most wolves were harvested by Alaska residents in Unit 9 (75%) and by nonresidents in Unit 10 (100%). Because furbearer harvest records do not include information from unsuccessful hunters and trappers, no information on success rates is available.

Harvest Chronology. The harvest continues to peak December–February (Table 2).

Transport Method. Most hunters and trappers reported harvesting wolves accessed by airplane, 4-wheeler, and snowmachine during this reporting period (Table 3). Transportation by 4-wheeler or snowmachine is favored by locals, while transportation by airplane spikes in odd-numbered regulatory years when brown bear hunters are present in Unit 9.

Wolf Control Program. The intensive management plan implemented in Unit 9D in the summer of 2008 to benefit the SAPCH remained active in 2009 and 2010. Wolves were removed by department staff over a limited area during the calving season, significantly increasing calf survival. During RY08 and RY09 the department removed 8 and 2 wolves, respectively, from SAPCH calving grounds. The program was inactive in RY10 due to the greatly increased calf survival achieved during the 3 previous calving seasons.

Wolf Trapping Clinics. At the request of local residents concerned over the number of wolves in the area, the department hosted wolf trapping clinics in December 2010 and January 2011 in the villages of Naknek, Nondalton, and Port Heiden. The clinics were well-attended and participants received instruction in leghold trapping techniques, snaring techniques, and snare-building.

Other Mortality

Following a human fatality involving wolves near the village of Chignik Lake, department personnel and Alaska State Troopers removed 8 wolves from the area in RY09 (Butler et al. 2011). Department staff removed 12 wolves from the vicinity of Port Heiden in RY10 due to public safety concerns arising from wolves spending time in town and following residents on the road.

No significant outbreaks of rabies have occurred on the Alaska Peninsula since 1998.

HABITAT

Assessment

No significant alteration to habitats occurred in Units 9 and 10 during this report period.

CONCLUSIONS AND RECOMMENDATIONS

Wolf harvests in Unit 9 vary depending on multiple factors. Winter weather conditions, local hunter and trapper effort, and the influx of brown bear hunters in alternating regulatory years all influence wolf harvest. Harvests generally increase in good snow years and in odd-numbered regulatory years when the brown bear hunt is open. Travel conditions and logistics greatly limit trapping and hunting efforts by Unit 9 residents. Harvests are typically concentrated near communities where access is easiest. The majority of the area receives very little pressure, and harvest has had minimal effect on wolf populations in Unit 9. Likewise, wolf harvests in Unit 10 are consistently low and have little effect on the Unimak Island wolf population. Due to practical and budgetary limitations, it is unlikely that more accurate estimates of population size will be possible. Sealing data on sex composition of harvest and methods of take and transportation can be unreliable and analyses using these data are not recommended.

LITERATURE CITED

Butler, L., B. Dale, K. Beckmen, and S. Farley. 2011. Finding related to the March 2010 fatal wolf attack near Chignik Lake, Alaska. Alaska Department of Fish and Game, Wildlife Special Publication, ADF&G/DWC/WSP-2011-2, Palmer, Alaska.

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Riley, M. D. 2012. Unit 9 and 10 wolf management report. Pages 66–70 *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.

Table 1. Units 9 and 10 wolf harvest, regulatory years 2006 through 2010.

Regulatory	Reported harvest				Method of take				Successful
Year	M	F	Unk	Total	Trap/Snare	Shot	Wolf Control	Unk	Trappers/Hunters
2006	42	26	18	86	33	53	0	0	27
2007	62	61	16	139	21	90	28	0	59
2008	24	28	6	58	21	29	8	0	26
2009	36	28	6	70	16	42	2	10[a]	44
2010	29	11	3	43	36	6	0	1	22

[a] The State removed 8 wolves from the area surrounding Chignik Lake following a human fatality.

Table 2. Units 9 and 10 wolf harvest chronology percent, regulatory years 2006 through 2010.

Regulatory Year	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Unk	*n*
2006	1	7	2	14	32	25	7	8	2	0	0	2	86
2007	0	5	12	0	5	23	19	8	2	6	20	0	139
2008	0	3	0	7	16	17	22	7	9	0	14	5	58
2009	0	13	13	1	16	6	9	7	3	21	3	8	70
2010	0	2	2	10	19	21	37	7	2	0	0	0	43

Table 3. Units 9 and 10 wolf harvest percent by transport method, regulatory years 2006 through 2010.

Regulatory Year	Airplane	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway Vehicle	Snowshoe Ski Foot	Unknown	*n*
2006	5	15	21	53	0	5	1	0	86
2007	38	4	4	45	0	4	5	0	139
2008	19	0	24	48	0	2	7	0	58
2009	53	7	19	4	1	3	6	7	70
2010	7	0	44	16	12	2	14	5	43

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 11 (12,784 mi^2)

GEOGRAPHIC DESCRIPTION: Wrangell Mountains

BACKGROUND

Most of Unit 11 was included in Wrangell–Saint Elias National Monument in December 1978. In 1980 monument status was changed to park/preserve with passage of the Alaska National Interest Lands Conservation Act. Land management changes by the National Park Service (NPS) included restrictions on the use of aircraft for hunting in the park, which led to substantial changes in the predator-prey dynamic of the area.

Unitwide wolf population estimates were initiated in 1985, the same year the NPS prohibited the land-and-shoot taking of wolves on park lands. Due to limited access, aircraft had been the most commonly used method of transportation for wolf hunters and trappers prior to this change. The fall population through the late 1980s averaged 150 wolves. During that time period, Unit 11 experienced extremely deep snowfall, and moose, caribou, and sheep numbers declined dramatically. Wolf numbers slowly followed; predator and prey numbers in Unit 11 have remained relatively low ever since. The fall wolf population has averaged just over 100 wolves since the mid-1990s.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- To maintain a minimum spring population of 75 wolves.

METHODS

All wolves taken in Unit 11 must be sealed. Population size and trend was monitored by documenting pack sizes, colors, and ranges throughout the winter using a variety of sources. Trapper surveys, sightings by department personnel, and public reports provide substantial information on wolf numbers and distribution. This information was combined with sealing data to develop preharvest (fall) and postharvest (spring) population estimates.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Fall wolf population estimates in Unit 11 have been relatively stable, ranging from 78 to 122 since the early 1990s. During this reporting period, the fall estimate averaged 119 (7.9 wolves/1,000 km^2), and the spring estimate averaged 102 (6.8 wolves/1,000 km^2). These estimated densities are based on available wolf habitat. When calculated for the entire unit, the wolf densities are much lower. Unit 11 has a naturally low to moderate density of wolves. This stable low density pattern is due to the low-density dynamic equilibrium (LDDE) predator/prey situation among wolves, moose, caribou, and sheep in the area.

Distribution and Movements

Wolf numbers are generally higher in the northern portions of the unit, particularly from the Dadina River northeast to Tanada Lake, due to higher densities of caribou and sheep in this area. Telemetry data during the winter of 1996–97 showed some wolves used higher elevations, indicating they likely were preying on wintering caribou and sheep. Recent anecdotal reports indicate some of these wolves move out of northern Unit 11 into Unit 12 for the winter, following large numbers of migrating Nelchina caribou.

Wolf numbers in the Chitina River valley remain lower than in the northern portion of the unit because caribou are absent, and moose and sheep are less abundant. Though wolves rely heavily on both sheep and mountain goats in the Chitina River valley, the smaller body size of the prey and the steep terrain where they are found naturally keep wolf numbers at lower densities.

MORTALITY

Harvest

Season and Bag Limit. The wolf seasons in Unit 11 have not changed since they were restricted in 1981 following establishment of the Wrangell–St. Elias National Park and Preserve. The hunting season in Unit 11 runs 10 August–30 April with a bag limit of 5 wolves. Trapping season runs 10 November–31 March with no bag limit.

Board of Game Actions and Emergency Orders. There were no Board of Game actions or emergency orders during this reporting period.

Hunter/Trapper Harvest. Given difficult access, the increased awareness of Ahtna private land issues, and warmer winters which have kept the Copper River from freezing consistently, wolf trapping effort and harvest remains low in Unit 11 (Table 2). During this reporting period, harvest was variable, with the regulatory year (RY) 2010 (RY10 = 1 July 2010 through 30 June 2011) harvest of 8 wolves being the lowest harvest since RY89.

Harvest methods are provided in Table 2. Trapping and snaring have been the most consistent methods for taking wolves in Unit 11, accounting for an average of 74% of the total take this reporting period. The number of wolves shot by hunters was unusually high in RY09, but declined in RY10. Unreported and illegal harvests were thought to be minimal during the reporting period.

Wolves from Unit 11 packs are sometimes harvested in Unit 13 along the Copper River, particularly near Chistochina. This additional take however, is minimal. The Copper River serves as a travel corridor for wolves, and often multiple packs can be found in close proximity to each other in this area.

Hunter/Trapper Residency and Success. During this reporting period, 5 nonresidents harvested a total of 8 wolves. Local residents harvested the majority of wolves taken. During this period, an average of 12 wolves were taken by an average of 6 local hunters/trappers per year. Local residents not only make up the majority of successful hunters and trappers, they also put in the majority of the effort. Given the lack of access, the rural nature of the unit, and NPS regulations, Unit 11 is not heavily used for winter recreation in comparison to adjacent units.

Harvest Chronology. Table 3 presents the harvest chronology for wolves. The proportion of the harvest by month has varied annually, but the majority of the harvest occurs throughout the winter months. The annual harvest chronology for trapped wolves likely reflected conditions for snowmachine travel (snow depth, river ice, and weather conditions), rather than any pattern of trapper effort or success. The number of wolves taken during the fall, presumably as trophy animals by big game hunters, ranged from zero to 8 during this reporting period.

Transport Methods. The most commonly used method of transportation for successful wolf hunters and trappers has been snowmachine, averaging 55% over this reporting period (Table 4). Aircraft are also used in Unit 11 by a small number of local trappers to locate wolf kills and to set traps or snares. Wolves in this area are also taken incidentally by hunters in the fall while on fly-in hunting trips for other big game. During this reporting period an average of 28% of wolves harvested were taken with the use of an airplane.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The wolf population is difficult to assess in Unit 11. Wolf estimates for the unit are based on limited pack or track sightings by department staff, hunters, trappers, and other members of the public. Track surveys have been done periodically and in different locations since 1978. Given the large home ranges of wolves in such a low density prey area, multiple tracking flights are necessary to adequately assess the population. High winds in Unit 11 often obscure tracks or blow snow to the extent that systematic surveys are not feasible. The use of radiocollared wolves would help provide more accurate information on wolf numbers, wolf movements, and prey selection in this unit.

Perhaps the most important problem facing wolf management in Unit 11 is the possibility of lousy wolves moving into the area. Given the high lice infection rate of wolves in Units 14, 15, and 16, coupled with the observed dispersal of wolves from these units into adjacent Units 13 and 20A, it is likely that lousy wolves will continue to move throughout Interior and Southcentral Alaska.

CONCLUSIONS AND RECOMMENDATIONS

Annual wolf harvests in Unit 11 are low and ranged from 8% to 16% of the fall population during this reporting period. At this level, wolf populations would typically be increasing. Big game populations in Unit 11, however, are low density, particularly those of moose, caribou, and

sheep. Recent moose surveys near Mount Drum indicate a density of 0.2–0.5 cow moose/mi^2, considerably less than the 0.7–1.0 cow moose/mi^2 in adjacent Unit 13, an area managed for a high sustained yield of moose. The Mentasta caribou herd, which resides in northwestern Unit 11, has fallen from 2,500–3,000 during the mid-1980s to fewer than 500 caribou. This herd, once important for local subsistence, has not been hunted since 1991. Sheep numbers have also declined significantly over the same period, particularly along the western slopes of Mount Drum and Mount Sanford and around to the southwestern portion of the Wrangell Mountains.

This low density predatory/prey situation is not expected to change unless some active management is undertaken, or a large-scale natural burn occurs. Given the large percentage of the unit that is covered by national park and preserve lands, the possibility of a successful active management program in Unit 11 is highly unlikely considering the NPS policy to manage for natural ecosystems.

Most of the wolf harvest in Unit 11 is concentrated near access points and inhabited areas where trappers reside. In vast portions of the unit, however, wolves are not hunted or trapped due to the lack of access or other regulatory issues. The post-hunting and trapping season population estimates of 63 wolves in RY06 and 73 in RY07 were slightly below the management objective, although this was most likely an artifact of poor access and the subsequent lack of wolf reports. Estimates increased during this reporting period to an average of 102 wolves in the spring.

Considering the difficulty in accessing Unit 11 and the low annual harvest of wolves from the area, any louse infection, if detected, could be difficult to control. However, some immediate treatment should be undertaken if lice are ever documented in Unit 11. Research is currently being done by department staff to assess methods by which louse infections in wolves can be controlled (Gardner and Beckmen 2008).

Unit 11 is bordered on the east, west, and north sides by good wolf habitat; immigration is only limited by the central Wrangell–St. Elias Mountains along the Alaska–Canada border. Due to the remote nature, the private and federal land ownership patterns, and limited human influence in Unit 11, the management objective could be changed from a spring minimum number, to a more meaningful objective, such as maintaining access for wolf hunters and trappers.

LITERATURE CITED

Gardner, C.L. and K.B. Beckmen. 2008. Evaluating methods to control an infestation by the dog louse in gray wolves. 1 July 2007 – 30 June 2008. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Research Annual Performance Report, Grant W-33-6; Project 14.25. Juneau, Alaska. 6pp.

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Schwanke, R.A. 2012. Unit 11 wolf management report. Pages 71–77 [*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.

Table 1. Unit 11 fall and spring wolf population estimates, regulatory years 2006 through 2010.

Regulatory	Population estimate [a]				
Year	Fall		Spring		Packs
2006	78	(75-90)	63	(60-70)	13
2007	96	(85-105)	73	(65-75)	16
2008	114	(110–120)	96	(90–100)	19
2009	143	(110–120)	119	(90–100)	25
2010	100	(90–110)	92	(80–95)	18

[a] Fall estimate = pretrapping season population; spring estimate = post-trapping season population. Estimates are based on aerial track surveys, incidental observations, reports from the public, and sealing records.

Table 2. Unit 11 wolf harvest, regulatory years 2006 through 2010.

	Reported take						Method of take					
Regulatory year	M	%	F	%	Unk	Total	Trap/ Snare	%	Shot	%	Unk	Successful trappers/ hunters
2006	10	67%	5	33%	0	15	14	93%	1	7%	0	6
2007	13	52%	12	48%	0	25	21	84%	4	16%	0	12
2008	3	18%	14	82%	1	18	17	94%	1	6%	0	9
2009	12	52%	11	48%	0	23	13	57%	10	43%	0	14
2010	4	50%	4	50%	0	8	5	71%	2	29%	1	7

Table 3. Unit 11 chronology of wolf harvest by percentage, regulatory years 2006 through 2010.

Regulatory	Harvest Periods									
Year	August	September	October	November	December	January	February	March	April	*n*
2006	0	7	0	0	13	13	13	53	0	15
2007	4	8	0	4	28	32	4	20	0	25
2008	6	0	0	33	22	17	11	11	0	18
2009	9	26	0	4	0	17	35	9	0	23
2010	13	13	0	0	0	50	0	25	0	8

Table 4. Unit 11wolf harvest by percent transportation method, regulatory years 2006 through 2010.

	Transportation Method							
Regulatory Year	Airplane	Dog sled skis/ snowshoes	Boat	4-wheeler	Snowmachine	ORV	Highway vehicle	*n*
2006	40	0	0	0	60	0	0	15
2007	12	4	0	0	84	0	0	25
2008	11	6	0	0	83	0	0	18
2009	48	9	0	0	43	0	0	23
2010	25	0	0	0	38	0	38	8

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011[1]

LOCATION

GAME MANAGEMENT UNIT: 12 (9,978 mi^2)

GEOGRAPHIC DESCRIPTION: Upper Tanana and White River drainages; includes the North Wrangell, Nutzotin, and Mentasta Mountains and the eastern Alaska Range

BACKGROUND

Historically, the Unit 12 wolf population fluctuated dramatically in response to federal and state predator control programs, ungulate prey abundance, and harvest. During the 1940s, wolves were abundant but numbers were reduced by a federal control program conducted between 1948 and 1960 (Gasaway et al. 1992). Also, prior to 1960, local residents commonly killed wolf pups at dens, which maintained wolf populations at low levels near human settlements. After 1960 the wolf population increased rapidly and remained high until the mid 1970s. During 1975–1980, the wolf population declined, likely due to prey shortages. Since 1975 the moose and wolf populations in Unit 12 have remained at a low-density equilibrium (Gasaway et al. 1992).

During most years since 1960, the Unit 12 wolf population has been lightly harvested. Rarely has annual harvest approached or exceeded sustainable rate (≥25%; Gasaway et al. 1992). Few local trappers select for wolves, as most trappers concentrate on marten and lynx. During years when marten and lynx pelt prices are low and wolf prices are adequate, more trappers concentrate on catching wolves. Also, when it was legal to take wolves same-day-airborne (from aircraft or land-and-shoot), annual harvests were usually higher but still at sustainable levels.

Historically moose has been the most important species harvested for subsistence use in Unit 12 (Haynes et al. 1984; Halpin 1987), but since the mid-1970s moose densities throughout most of the unit have been low. Throughout the 1980s, local residents requested that the Board of Game authorize the Alaska Department of Fish and Game (ADF&G) to conduct wolf control in an attempt to benefit the depressed moose population. However, about 65% of the Unit 12 wolf habitat is included in Wrangell–St. Elias National Park and Preserve and the Tetlin National Wildlife Refuge. Federal policy on these lands prohibits intensive predator management

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

programs. ADF&G conducted wolf control in northwestern Unit 12, outside federal lands, during 1981–1983. The program was terminated before desired reductions were achieved (Boertje and Gardner 2000). In 1998 the moose population in Unit 12 was designated by the Board of Game to be important for high levels of human consumptive use under the intensive management law (AS 16.05.255[e]–[g]), but neither the moose population nor harvest objectives were being met. Therefore, the portion of Unit 12 north of the Alaska Highway and west of the Taylor Highway was included in the Upper Yukon–Tanana Predation Control (UYTPC) area established in 2004 and wolf control resumed in January 2005. In fall 2006 the UYTPC area was expanded to include all of Unit 12 north of the Alaska Highway. Wolf control has been ongoing in that area to the present.

Unit 12 wolf numbers have fluctuated with prey availability and harvest rates. Gardner (2000) described wolf population trends during 1988–1998. From fall 1996 through spring 1999, the Unit 12 autumn wolf population was estimated at approximately 223–237 wolves (Table 1). During winter 2000–2001 Gardner (2003b) estimated 15.8 wolves/1,000 mi^2 (6.1 wolves/1,000 km^2) within the Chisana caribou herd's range in Alaska. From area-specific data collected in northwestern Unit 12, Gardner (2003a) estimated that the number of wolves in the 10 packs he monitored increased from 64 to 72 (12.5%) during fall 1999–spring 2003. In 2004 a 4,600 mi^2 wolf population trend area encompassing portions of Units 12, 20E, and 20D produced an estimate of 41–43 wolves in northwestern Unit 12 (21 wolves/1,000 mi^2; 8.1 wolves/1,000 km^2; Hollis 2006).

MANAGEMENT DIRECTION

MANAGEMENT GOALS

The Unit 12 wolf management goals are as follows:

- Ensure the long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.
- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.
- Increase public awareness and understanding of the uses, conservation, and management of wolves, their prey, and habitat in Alaska.

MANAGEMENT OBJECTIVE

- Maintain a population of at least 100 wolves in Unit 12.

MANAGEMENT ACTIVITIES

- Temporarily close wolf trapping if the population declines below 100 wolves.
- Monitor harvest through sealing records and trapper questionnaires.
- Estimate wolf pack sizes and number of packs in selected areas within Unit 12.

- Cooperate with any ongoing wolf studies conducted by the U.S. Fish and Wildlife Service in Tetlin National Wildlife Refuge.

METHODS

Since 1980 the late winter wolf population estimates have been based on a combination of harvest data and sightings of wolves and wolf tracks observed during reconnaissance style aerial surveys involving multiple searches of the same areas over a period of several weeks to several months (Stephenson 1978; Gasaway et al. 1983; Becker et al. 2004). Aerial surveys were conducted following fresh snow when survey conditions were adequate to allow survey teams to follow tracks and avoid double counting (Becker et al. 2004). All wolf packs with territories that were wholly or partially in Unit 12 were included in estimates. Autumn estimates were calculated by adding the annual wolf harvest to the late winter count. Estimates of wolf numbers were increased by 10% to account for lone or dispersing wolves present but not found (Mech 1973). Although the actual number of lone or dispersing wolves varies throughout the year (Adams et al. 2008), this correction factor has been used as an estimate of the number of lone or dispersing wolves in a population at a given time. Trapper and pilot reports and trapper questionnaire results were also compiled and contributed to population estimates where complete aerial surveys were not flown.

Wolves taken in Alaska must be sealed by an ADF&G representative or appointed fur sealer. During the sealing process, information is obtained on the date and specific location of take, sex, color of pelt, estimated size of the wolf pack, method of take, and access used. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 July 2008 through 30 June 2009).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

No wolf surveys have been conducted in Unit 12 since spring 2003. Results of this survey are described in Bentzen (2009). In spring 2008 we estimated the Unit 12 wolf population to be 179–192 wolves (18.1–19.4 wolves/1,000 mi^2; 7–7.5 wolves/1,000 km^2) in 31 packs. This estimate was based on a combination of hunting and trapping harvest reports; observations by ADF&G biologists; previous estimates for northwestern Unit 12 (Gardner 2003a), the Chisana area (Hollis 2006), and the UYTPC area (Gross 2009); and includes an estimate of an additional 10% for single and dispersing wolves. There is little indication that the number of packs or average fall pack size (7.0–7.4 wolves) in Unit 12 have changed appreciably since 2003.

We predict that wolf numbers, particularly in northern Unit 12, have benefited from high numbers of caribou since 1997 and possibly from the snowshoe hare cycle highs in 1998–2001 and 2007–2009. During portions of the year, the Unit 12 wolf population likely numbers 200–250 wolves; fluctuations reflect the seasonal presence of Nelchina caribou, which brings in more boundary packs, and the success of predation control in reducing wolf numbers in packs whose territories include predation control areas in northwestern Unit 12, adjacent northern Unit 20D, Unit 20E, or Unit 13.

Population Composition

Data available relative to the sex composition of the wolf population were sex ratios of harvested wolves derived from sex of harvested wolves reported on sealing documents. The sex ratio of wolves harvested during RY08–RY10 was roughly 1:1 (46 males:40 females), which is assumed to represent the overall population sex ratio (Table 2).

Distribution and Movements

Wolf distribution is determined predominately by ungulate prey abundance. Therefore, wolves in Unit 12 are found mostly below 6,000 feet elevation. Moose are available throughout the unit and are the primary prey species. There is a small resident caribou herd in the southeastern portion of the unit and since 1997 most of the Nelchina and Mentasta caribou herds have been present in Unit 12 during their winter migration. Dall sheep are also preyed on by wolves along the foothills of the Wrangell, Mentasta, and Nutzotin Mountains and the eastern Alaska Range.

MORTALITY

Harvest

Season and Bag Limit (RY08–RY10).

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Unit 12		
HUNTING: 5 wolves.	10 Aug–May 31	10 Aug–May 31
TRAPPING: No limit. No trapping with a steel trap or a snare smaller than 3/32 inch in diameter during April or October.	15 Oct–30 Apr	15 Oct–30 Apr

Alaska Board of Game Actions and Emergency Orders. At the March 2009 meeting, the Board of Game renewed the UYTPC program for 5 years (1 July 2009 through 30 June 2014) largely to benefit the Fortymile caribou herd. No emergency orders were issued during RY08–RY10.

In RY05 the board eliminated the nonresident tag fee for wolves. In RY06 the board extended the Unit 12 spring hunting season from 30 April to 31 May and enlarged the UYTPC area to 18,750 mi^2, including all of Unit 12 north of the Alaska Highway as well as most of the Fortymile caribou herd's annual range in Units 20E, 20B, 20D, and 25C, and reauthorized same-day-airborne wolf control in the entire area.

Harvest by Hunters and Trappers. The RY08–RY10 wolf harvest averaged 31 wolves (range 21–39; Table 2) compared to an average of 38 during RY02–RY04 and 39 during RY05–RY07. In RY08–RY10, an average of 17 different hunters and trappers harvested wolves each year. This was a slight decrease from the RY05–RY07 average of 19 successful wolf trappers and hunters.

Because no population estimate is available for RY08–RY10, a specific harvest rate could not be calculated. However, harvest rates were likely $\leq$22% of the wolf population during RY02–RY10. Harvest rates averaged 22% of the population during RY96–RY98 and 20–24% during RY99–

RY01. Trapping pressure varies throughout Unit 12 and is high along roads, where it regulates wolves at lower numbers, especially around communities. Harvest rates in remote areas tend to be lower and depend more on fur price and weather conditions.

Annual harvest rates >30% are likely needed to preclude wolf population growth in response to moose and caribou availability in Unit 12. Response of the Unit 12 wolf population to harvest by hunters and trappers is similar to that documented in other wolf populations. Stable wolf populations throughout North America have sustained harvests of up to 20–40% (Keith 1983). Harvests >40% generally result in declining wolf populations, and populations harvested at <29% generally increase if prey are abundant (Adams et al. 2008). Those effects of exploitation seem to be consistent across a broad range of reported wolf densities in Alaska, Canada, Michigan, and Minnesota (Ballard et al. 1987, Adams et al. 2008).

Method of Take. During RY08–RY10, traps or snares were used to take 64% of wolves harvested in Unit 12. Moose and sheep hunters who incidentally shot wolves during August and September accounted for 16% of the harvest. Under the UYTPC program 1 wolf was harvested in Unit 12 during RY08 and 2 were harvested in RY10.

Harvest Chronology. Chronology of the Unit 12 wolf harvest during RY08–RY10 (Table 3) reflects a moderate incidental harvest of wolves (14%) during the August and September hunting seasons, 1% harvest during the snaring-only seasons in October and April, and the highest harvest (80%) during November–March when all harvest methods and means were allowed. The greatest harvest (44%) occurred in January and February. Wolves killed by same-day-airborne methods in wolf control programs accounted for 3% of the total harvest during RY08–RY10.

Transport Methods. During RY08–RY10 most successful wolf trappers used snowmachines (57%) or airplanes (26%; Table 4). Between RY89 and RY93, 66% of successful trappers used snowmachines and 28% used airplanes for transportation. During RY94–RY98 aircraft use declined to 7%, but increased to 14% during RY99–RY03. Snowmachine use totaled 72% during RY99–RY03. Wolf harvest by trappers who use airplanes is expected to remain low because of the high cost of using an airplane for trapping and the relatively low market value for wolf pelts.

HABITAT

Assessment

Only 7,000–8,000 mi^2 of Unit 12 are wolf habitat. Wolves seldom use the remaining 2,000–3,000 mi^2 of glacial ice fields and high rocky terrain above 6,000 feet elevation. Good wolf habitat is determined predominately by ungulate prey abundance rather than by vegetative characteristics. Using this criterion, the most productive wolf habitat in Unit 12 is found along the foothills of the Wrangell, Mentasta, and Nutzotin Mountains and the eastern Alaska Range where either resident or migratory moose are available to wolves year-round. Even though mountainous areas support dense populations of Dall sheep, wolves appear unable to thrive on sheep as primary prey (Sumanik 1987). The nonmigratory Chisana caribou herd has been a reliable food source for wolves in eastern Unit 12, but has remained ≤1,000 caribou since 1992. Caribou from the Mentasta, Nelchina, and Macomb herds also use portions of Unit 12. During RY08–RY10, use of Unit 12 during winter by these herds, especially the Nelchina herd, has likely improved productivity of the wolf population (Mech et al. 1998). Caribou availability in

winter, in combination with high snowshoe hare numbers during 1998–2001 and 2007–2009, has likely benefited productivity and survival. However, since these prey sources are temporary they probably have not caused a substantial increase in the Unit 12 wolf population.

Wildfire suppression in Unit 12 during 1980–2012 resulted in less diverse and productive wildlife habitats than would have occurred under natural conditions. Human developments and disruption of wildlife habitat are largely restricted to the immediate vicinities of existing communities in Unit 12 and have had a minor impact on wolf habitat.

Enhancement

Approximately 80% of Unit 12 has been afforded limited suppression status for wildfires in the *Alaska Interagency Wildland Fire Management Plan* (Alaska Wildland Fire Coordinating Group 2010). This includes nearly all of Wrangell–St. Elias National Park and Preserve and most of Tetlin National Wildlife Refuge.

During June–September 1990 a wildfire burned approximately 97,000 acres of primarily decadent black spruce muskeg in the Tetlin Hills and the adjacent Tok River lowlands. By RY93 at least 2 packs of 6–11 wolves resided in the area. By RY97 moose densities in this area increased from 0.2 to 1.0 moose/mi^2 and have remained at about 1.0 moose/mi^2 through 2010. Moose composition surveys indicate the primary cause of the moose population increase was elevated productivity and survival, not immigration. By RY99 there were 1.1 moose/mi^2 in this area, and 3 different packs of 7–13 wolves were observed (Gardner 2003a). During RY02–RY10, these 3 packs used the area but were likely limited by harvest to 3–6 wolves per pack. This burned area is expected to provide high quality moose winter browse through at least 2020 to the benefit of moose and wolves.

Habitat enhancement programs in the Tok River valley have used mechanical crushing and different logging techniques to improve more than 130 acres since 2007. Eventually the program will treat over 1,000 acres of prime wintering area for moose. These programs are expected to benefit many species of wildlife including wolves.

NONREGULATORY MANAGEMENT PROBLEM/NEEDS

The Unit 12 intensive management harvest objective of 250–450 moose per year is currently not being met. Predation by both wolves and bears was the primary factor maintaining moose populations at low densities (0.2–1.0 moose/mi^2, Gasaway et al. 1992) although the effects of wolves and bears vary between areas within Unit 12. In the Northway and Tetlin Flats, both calf mortality and predation rate studies indicated that wolves were the primary predator on calves and adult moose throughout the year. However, along the Nutzotin Mountains, calf recruitment to 5 months was substantially lower, indicative of substantial grizzly bear predation.

In an attempt to better predict the outcome of wolf management on the moose population in Unit 12, the current population status and trend data for moose and their predators was modeled using the software program PredPrey (McNay and DeLong 1998). Model applications using moose composition and predator kill rate data indicated the Unit 12 moose population continued to be limited primarily by wolves during RY08–RY10, although grizzly bears were an important predator in portions of the unit, as was the case. The model also predicts that under the present

management scheme, the Unit 12 moose population will remain at low density for an extended time with little opportunity for increased harvest by humans.

Assuming grizzly bear predation rates remain relatively constant during the next 5 years, the model predicts that the Unit 12 moose population will remain relatively stable if 30% of the wolves are harvested annually. With a 30% wolf harvest rate, the moose harvest objectives will likely not be met. Modeled wolf harvest rates >35% will likely allow slow growth in the moose population, but random variation in other mortality factors could easily eclipse any moose population growth. To provide measurable increases in moose population growth and/or harvest by humans, wolves in Unit 12 would likely need to be reduced by >50%.

If the Unit 12 wolf population is reduced to 80% of its current level, the moose population could increase 8–14% annually. This level of wolf population reduction has allowed moose and caribou population increases in other areas of Alaska and Yukon (Boertje et al. 1996). However, wolf control is prohibited on most federal lands in Unit 12, which constitute about 65% of the available wolf habitat in the unit. With wolf control limited to state and private lands, our model indicates the Unit 12 moose population could increase 6–9% annually if wolf numbers in areas accessible to control efforts are reduced by 80% and maintained at low levels for ≥5 years. Currently, wolf control conducted by the public has not been successful in reducing wolves by 80% in the portion of Unit 12 north of the Alaska Highway. If wolf control is to be successful, other methods will have to be considered, likely including killing wolves from helicopters by ADF&G staff.

Based on the response of the moose population affected by the combination of the 1990 Tok wildfire and intense public hunting and trapping of wolves, it appears local moose population increases could occur in Unit 12 without government wolf control. Any moose population increases will likely be moderate and will be eventually limited by predation. However, the increases should be enough to satisfy the intensive management moose population and harvest objectives as long as the number of moose hunters does not substantially increase. Because of land ownership patterns in Unit 12, this will be the management direction taken during RY11–RY15.

CONCLUSIONS AND RECOMMENDATIONS

The Unit 12 wolf population objective was met during RY08–RY10 based on extrapolations of past surveys, harvest, and incidental observations. Comprehensive wolf surveys have not been conducted in Unit 12 since 2003. During RY11–RY13 I recommend completing a wolf survey in northwestern Unit 12, (which includes most state and private lands) to monitor the status of the population. Surveys in the UYTPC area indicate wolf numbers have been stable in Unit 12 since 2003. Although moose currently are the only ungulate prey available for much of the Unit 12 wolf population during late April–mid October, caribou provide a substantial source of alternate prey in some areas. Since 1998, northern Unit 12 wolf packs have had access to thousands of Nelchina herd caribou during winter. In central Unit 12, wolves have access to thousands of Nelchina caribou especially during October, March, and April. Wolf packs in southern Unit 12 rely primarily on moose year-round.

Most area residents desire intensive management, especially predator control, to benefit Unit 12 moose. Local residents support management that incorporates a combination of area-specific

wolf reduction conducted by the public and habitat enhancement conducted by agencies. Modeling predicts this management regime could cause a low to moderate increase in the moose population, but will not result in a high-density moose population. This management is feasible because the areas intensively trapped for wolves are also the areas most hunted for moose. Because only a small portion of Unit 12 is within the UYTPC area and few wolves were taken in Unit 12 as part of the UYTPC program, it had little effect on reducing Unit 12 wolf numbers during RY08–RY10.

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Table 1. Unit 12 autumn[a] wolf population estimates, regulatory years 1988 through 2010.

Regulatory year	Population estimate[b,c]	Number of packs	$\bar{x}$ Pack size[d]	Basis of estimate
1988	136	21	5.8	Spring survey, reports, observations, sealing records
1989	172–188	27	6.0	Spring survey, reports, observations, sealing records
1990	220–236	29	7.1	Spring survey, reports, observations, sealing records
1991	198–239	29	6.8	Spring survey, reports, observations, sealing records
1992	230–243	29	7.4	Spring survey, reports, observations, sealing records
1993	180–216	29	6.2	Reports, observations, sealing records
1994	159–183	29	5.4	Reports, observations, sealing records
1995	183–206	29	6.1	Reports, observations, sealing records
1996	217–229	28	7.2	Reports, observations, sealing records
1997	211–236	29	6.9	Reports, observations, sealing records
1998	231–243	31	6.9	Spring survey, reports, observations, sealing records
1999[e]				
2000[e]				
2001[e]				
2002	240–255	31	7.0–7.4	Spring survey, reports, observations, sealing records, modeling
2003[e]				
2004[e]				
2005[e]				
2006[e]				
2007[f]	200–250	31	5.8–7.3	Reports, observations, sealing records
2008[e]				
2009[e]				
2010[e]				

[a] Autumn estimate = pretrapping season population.
[b] Includes 10% estimated number of single wolves present.
[c] Estimate includes border packs from Units 11, 13, 20D, and 20E.
[d] Calculated using mean population estimate × 0.9 divided by number of packs.
[e] No survey was conducted, therefore no estimate is available.
[f] Estimates based on 1998–1999 and 2002–2003 surveys.

Table 2. Unit 12 wolf harvest, regulatory years 1988 through 2010.

	Reported harvest						Method of take							Successful	
Regulatory year	M	(%)	F	(%)	Total[a]	% Autumn population[b]	Trap or snare	(%)	Shot	(%)	SDA[c]	(%)	Unk	Trappers and hunters	Wolves/ person
1988	6	(40)	9	(60)	17	13	12	(75)	4	(25)			0	8	2.0
1989	15	(83)	3	(17)	20	11	7	(78)	2	(22)			0	10	1.9
1990	45	(63)	27	(37)	74	32	56	(77)	7	(10)	10	(14)	0	26	2.8
1991	19	(63)	11	(37)	34	16	20	(63)	8	(25)	4	(13)	0	16	2.0
1992	26	(52)	24	(48)	54	22	51	(98)	1	(2)			0	15	3.5
1993	37	(57)	28	(43)	71	36	54	(76)	6	(8)	9	(13)	2	24	3.0
1994	18	(58)	13	(42)	31	18	26	(84)	5	(16)	0	(0)	0	16	1.9
1995	25	(69)	11	(31)	46	24	42	(91)	4	(9)	0	(0)	0	15	3.1
1996	19	(63)	11	(37)	35	16	28	(80)	7	(20)	0	(0)	0	17	2.1
1997	28	(67)	14	(33)	45	20	35	(78)	8	(18)	0	(0)	2	23	2.0
1998	38	(58)	28	(42)	67	28	58	(87)	9	(13)	0	(0)	0	25	2.7
1999	27	(51)	26	(49)	54		40	(74)	14	(26)	0	(0)	0	25	2.2
2000	34	(67)	17	(33)	55		48	(87)	7	(13)	0	(0)	0	21	2.6
2001	18	(43)	24	(57)	42		34	(81)	8	(19)	0	(0)	0	24	1.8
2002	26	(52)	24	(48)	54	22	50	(93)	4	(7)	0	(0)	0	19	2.8
2003	17	(55)	14	(45)	31		29	(94)	2	(6)	0	(0)	0	8	3.9
2004	13	(46)	15	(54)	28		26	(93)	2	(7)	0	(0)	0	9	3.1
2005	23	(59)	16	(41)	39		24	(62)	15	(38)	0	(0)	0	21	1.9
2006	14	(47)	16	(53)	30		24	(80)	6	(20)	0	(0)	0	17	1.8
2007	26	(53)	23	(47)	49	22	36	(73)	9	(18)	4	(8)	0	20	2.4
2008	20	(51)	19	(49)	39		29	(74)	7	(18)	1	(3)	2	18	2.2
2009	12	(71)	5	(29)	21		9	(43)	12	(57)	0	(0)	0	14	1.5
2010	14	(47)	16	(53)	34		23	(68)	8	(24)	2	(6)	1	20	1.7

[a] Total harvest includes animals of undetermined sex.

[b] Proportion of the estimated autumn population harvested by the end of the season in Apr. If a range estimate was given in Table 1 the proportion taken is given as the harvest divided by the mean estimate.-

[c] Wolves taken by same-day-airborne methods prior to 2004 by hunters, trappers, and after 2003 by wolf control permittees.

Table 3. Unit 12 wolf harvest chronology by month, regulatory years 1988 through 2010.

Regulatory year	Harvest chronology by month																				Unk	*n*
	Aug	(%)	Sep	(%)	Oct	(%)	Nov	(%)	Dec	(%)	Jan	(%)	Feb	(%)	Mar	(%)	Apr	(%)	May	(%)		
1988	1	(6)	0	(0)	0	(0)	3	(19)	3	(19)	3	(19)	3	(19)	1	(6)	2	(13)	0	(0)	0	16
1989	1	(5)	0	(0)	0	(0)	1	(5)	7	(37)	3	(16)	3	(16)	4	(21)	0	(0)	0	(0)	0	19
1990	3	(4)	1	(1)	0	(0)	1	(1)	6	(8)	15	(21)	27	(37)	16	(22)	4	(5)	0	(0)	0	73
1991	1	(3)	3	(10)	0	(0)	2	(7)	4	(13)	3	(10)	7	(23)	4	(13)	6	(20)	0	(0)	2	32
1992	1	(2)	0	(0)	0	(0)	3	(6)	13	(25)	14	(27)	2	(4)	15	(29)	4	(8)	0	(0)	0	52
1993	1	(2)	3	(4)	1	(2)	5	(7)	16	(24)	8	(12)	15	(22)	14	(21)	4	(6)	0	(0)	4	71
1994	0	(0)	1	(3)	2	(6)	1	(3)	9	(29)	9	(29)	4	(13)	5	(16)	0	(0)	0	(0)	0	31
1995	0	(0)	3	(7)	1	(2)	3	(7)	5	(12)	14	(33)	12	(29)	4	(10)	0	(0)	0	(0)	4	46
1996	1	(3)	2	(6)	0	(0)	1	(3)	5	(15)	7	(21)	7	(21)	5	(15)	5	(15)	0	(0)	2	35
1997	3	(7)	2	(4)	0	(0)	2	(4)	12	(27)	8	(18)	12	(27)	6	(13)	0	(0)	0	(0)	0	45
1998	3	(4)	4	(6)	1	(1)	5	(7)	9	(13)	21	(31)	13	(19)	10	(15)	1	(1)	0	(0)	0	67
1999	5	(9)	6	(11)	0	(0)	0	(0)	7	(13)	8	(15)	14	(26)	10	(19)	3	(6)	1	(2)	0	54
2000	0	(0)	2	(4)	0	(0)	2	(4)	10	(18)	15	(27)	21	(38)	4	(7)	1	(2)	0	(0)	0	55
2001	0	(0)	2	(5)	2	(5)	5	(12)	8	(19)	12	(29)	11	(26)	2	(5)	0	(0)	0	(0)	0	42
2002	0	(0)	2	(4)	0	(0)	2	(4)	5	(9)	15	(28)	22	(41)	7	(13)	1	(2)	0	(0)	0	54
2003	0	(0)	1	(3)	1	(3)	1	(3)	6	(19)	4	(13)	9	(29)	4	(13)	5	(16)	0	(0)	0	31
2004	0	(0)	0	(0)	0	(0)	1	(4)	7	(25)	4	(14)	4	(14)	10	(36)	2	(7)	0	(0)	0	28
2005	2	(5)	3	(8)	2	(5)	5	(13)	4	(10)	7	(18)	11	(28)	4	(10)	1	(3)	0	(0)	0	39
2006	0	(0)	2	(7)	0	(0)	5	(17)	5	(17)	4	(13)	8	(27)	3	(10)	1	(3)	2	(7)	0	30
2007	2	(4)	3	(6)	0	(0)	1	(2)	8	(16)	9	(18)	8	(16)	9	(18)	9[a]	(18)	0	(0)	0	49[a]
2008	2	(5)	1	(3)	0	(0)	5[a]	(14)	9	(24)	8	(22)	8	(22)	4	(11)	0	(0)	0	(0)	2	39[a]
2009	1	(5)	5	(24)	0	(0)	0	(0)	5	(24)	2	(10)	2	(10)	4	(19)	0	(0)	2	(10)	0	21
2010	1	(3)	3	(9)	0	(0)	2	(6)	4	(12)	9	(26)	11[a]	(32)	2	(6)	1	(3)	1	(3)	0	34[a]

[a] Includes wolves taken same-day-airborne in the Unit 12 portion of the Upper Yukon–Tanana Predation Control Area.

Table 4. Unit 12 wolf harvest by transport method, regulatory years 1988 through 2010.

Regulatory year	Harvest by transport method								
	Airplane (%)	Dogsled, skis, or snowshoes (%)	Boat (%)	3- or 4-Wheeler (%)	Snowmachine (%)	ORV[a] (%)	Highway vehicle (%)	Unk	*n*
1988	1 (6)	0 (0)	0 (0)	0 (0)	13 (81)	0 (0)	2 (13)	0	16
1989	5 (26)	0 (0)	0 (0)	0 (0)	13 (68)	1 (5)	0 (0)	0	19
1990	14 (20)	4 (6)	0 (0)	1 (1)	48 (69)	0 (0)	3 (4)	3	73
1991	6 (24)	0 (0)	0 (0)	0 (0)	19 (76)	0 (0)	0 (0)	7	32
1992	14 (27)	0 (0)	0 (0)	0 (0)	38 (73)	0 (0)	0 (0)	0	52
1993	27 (39)	3 (4)	0 (0)	1 (1)	30 (43)	0 (0)	8 (12)	2	71
1994	2 (6)	0 (0)	0 (0)	0 (0)	27 (87)	0 (0)	2 (6)	0	31
1995	4 (10)	0 (0)	0 (0)	0 (0)	38 (90)	0 (0)	0 (0)	0	42
1996	2 (6)	2 (6)	0 (0)	0 (0)	29 (83)	0 (0)	2 (6)	0	35
1997	4 (9)	3 (7)	1 (2)	0 (0)	33 (77)	0 (0)	2 (5)	2	45
1998	3 (5)	6 (9)	0 (0)	2 (3)	54 (83)	0 (0)	0 (0)	2	67
1999	5 (9)	4 (7)	0 (0)	2 (4)	39 (72)	0 (0)	4 (7)	0	54
2000	9 (16)	1 (2)	0 (0)	0 (0)	44 (80)	0 (0)	1 (2)	0	55
2001	5 (12)	3 (7)	0 (0)	2 (5)	28 (67)	0 (0)	4 (10)	0	42
2002	8 (15)	1 (2)	0 (0)	1 (2)	39 (72)	0 (0)	5 (9)	0	54
2003	6 (19)	2 (7)	0 (0)	0 (0)	22 (71)	0 (0)	1 (3)	0	31
2004	11 (39)	0 (0)	0 (0)	0 (0)	16 (57)	0 (0)	1 (4)	0	28
2005	4 (11)	2 (5)	1 (3)	1 (3)	29 (78)	0 (0)	0 (0)	2	39
2006	3 (10)	2 (7)	1 (3)	1 (3)	22 (73)	0 (0)	1 (3)	0	30
2007	13[b] (27)	3 (6)	0 (0)	0 (0)	29 (59)	0 (0)	4 (8)	0	49
2008	14[b] (39)	0 (0)	0 (0)	1 (3)	20 (56)	0 (0)	1 (3)	3	39
2009	2 (10)	0 (0)	0 (0)	2 (10)	12 (57)	3 (14)	2 (9)	0	21
2010	8[b] (23)	2 (6)	0 (0)	1 (3)	20 (59)	1 (3)	2 (6)	0	34

[a] Other than snowmachine and 3- or 4-wheeler.

[b] Includes wolves taken same-day-airborne in the Unit 12 portion of the upper Yukon–Tanana predator control area.

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 13 (23,368 mi^2)

GEOGRAPHIC DESCRIPTION: Nelchina and Upper Susitna Rivers

BACKGROUND

Wolf numbers in Unit 13 were low from about 1900 until the early 1930s, reflecting correspondingly low prey densities (Skoog 1968). Wolf numbers increased after this period, and by the mid-1940s, wolves were considered common (Ballard et al. 1987). As a result of predator control by the Fish and Wildlife Service between 1948 and 1953, wolf numbers declined dramatically. Based on estimates in Rausch (1967), as few as 12 wolves may have remained in the unit in 1954. Following cessation of federal wolf control in 1959, wolf numbers increased rapidly. A population of 350–450 wolves was estimated in 1965, and fall population estimates in subsequent years exceeded 300 wolves through the early 1970s (Ballard et al. 1987). Increased harvest pressure reduced the population through the mid-1970s to an average of 275 wolves during the fall, where the population remained for more than a decade. The wolf density during this period of time was adequate to allow ungulate populations to increase slowly; this wolf population level became the formal long-term objective.

Up until regulatory year (RY) 1988 (RY88 = 1 July 1988 through 30 June 1989) land-and-shoot was allowed under general trapping regulations and was a common method for taking wolves in Unit 13. Land-and-shoot has been specifically separated from ground shooting in the sealing process only since RY86; therefore, the specific impacts of the land-and-shoot method were not monitored prior to RY86. When land-and-shoot was discontinued in RY88, the Unit 13 wolf population increased dramatically. The reinstatement of land-and-shoot in RY90 and RY91 by permit slowed the population growth. During the mid-1990s the wolf population increased rapidly. By RY99, the Unit 13 wolf population had reached record high numbers, with 520 wolves in the fall.

In January 2000, a wolf control implementation plan was initiated, though land-and-shoot control was not allowed until January 2004. The Unit 13 wolf population has since been effectively reduced, and has been held at or near objective levels since the spring of 2006.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Determine wolf population estimates yearly.
- Maintain adequate harvests to ensure that management objectives for wolves in Unit 13 are met.

MANAGEMENT OBJECTIVES

- Achieve and maintain a post-hunting and trapping season population of 135–165 wolves (3.2–3.9 wolves/1,000 km^2) in the available habitat unitwide.

METHODS

All wolves taken in Unit 13 must be sealed. Population size and trend was monitored by documenting pack sizes, colors, and ranges throughout the winter using a variety of sources. Trapper surveys, sightings by department personnel, and public reports provide substantial information on wolf numbers and distribution. This information was combined with sealing data to develop preharvest (fall) and postharvest (spring) population estimates. The population was monitored on a subunit basis and in relation to wolf population objectives for the unit.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

When the Unit 13 fall wolf population reached its peak in 1999 and again in 2000 of 520 wolves (12.4 wolves/1,000 km^2), wolf hunters and trappers from surrounding areas began to increase their efforts in Unit 13. This increased harvest pressure was concentrated in the easily accessible high country and near waterways, instead of along established traplines. This increased pressure resulted in an initial decline in the unitwide population. By the fall of 2001 the population had declined to 480 wolves (11.4 wolves/1,000 km^2) and then to 420 wolves in the fall of 2002 (10.0 wolves/1,000 km^2). Unusually warm temperatures during the 2002–03 winter resulted in reduced hunter and trapper success, and the fall population increased to 490 wolves (11.7 wolves/1,000 km^2) in 2003. Same Day Airborne (SDA) wolf control efforts since RY03, concentrated in the remote portions of the unit, have been essential for reducing wolf density in difficult to access remote areas. Unitwide fall population estimates declined slowly through RY06. A limited number of wolves were taken in RY09 due to a lack of snow, which allowed the population to increase slightly the following year. During this reporting period, the fall wolf estimate averaged 283 wolves (6.7 wolves/1,000 km^2; Table 1).

Unitwide spring population (postharvest) estimates remained relatively steady between RY00 and R04 at about 230 wolves (5.5 wolves/1,000 km^2), well above the objective of 135–165. Since RY05, the wolf density unitwide has been within the objective range with the exception of RY09, when the population could only be reduced to 180 wolves (4.3 wolves/1,000 km^2).

While the wolf population objective refers to all of Unit 13, the wolf control implementation plan covers only Subunits 13A, 13B, 13C, and a portion of 13E. Subunit 13D is outside of the plan

area. By subunit, the RY10 spring population estimates were 29 (3.3/1,000 km^2) in Subunit 13A, 37 (5.2/1,000 km^2) in Subunit 13B, 29 (7.3/1,000 km^2) in Subunit 13C, 28 (3.0/1,000 km^2) in Subunit 13D, and 29 (2.3/1,000 km^2) in Subunit 13E. There are likely more wolves in Subunit 13E than presented here, as wolf numbers are not tracked or estimated west of the Parks Highway. Unitwide, the average spring density of 3.6 wolves/1,000 km^2 is within the management objective range.

Subunit 13D has never been included in the plan area due to the difficult terrain, thick vegetation, and competing predation effects of brown and black bears on moose. However, it should be noted that the natural density of wolves in the subunit has always been relatively low.

Population Composition

Based on the large number of wolves harvested each year, the sex ratio of the wolf population is probably near 50–50. Age composition has historically been inferred by comparing the spring population estimate to the following fall estimate. Productivity and summer survival were high during the late 1990s, leading to appreciable differences between spring and subsequent fall estimates. The average increase between spring and fall each year 1998-2001 was 94%.

The high snowshoe hare population as well as the large number of Nelchina caribou available through the late 1990s helped support this increased production and survival. Hares peaked again in 2010 at an extraordinarily high level, and have just recently started to decline. The Nelchina herd has stabilized at moderate numbers, though will continue to provide a stable food source for wolves, particularly during the spring near the calving grounds in Subunit 13A. While there are a wide variety of food resources to support pup production across Unit 13, the active management program has kept wolf survival low enough to keep the population from growing, despite continued immigration. The annual increase between spring and fall estimates since 2001, have ranged from 34-96%, averaging 73%.

Distribution and Movements

Distribution and movement patterns of wolves in Unit 13 have changed somewhat over time due to active management efforts. The alpine tundra areas where pilots can effectively track and take wolves tend to have frequent immigration of moderately-sized packs, while lower timbered areas tend to have persistent small- to moderately-sized wolf packs. Ballard et al. (1987) showed that wolves in Unit 13 have historically been dependent on prey availability, and that wolf territory and size, as well as productivity, have primarily been functions of moose densities. Historical data from radiocollared wolves in the unit have also shown that wolves do not generally follow caribou migrating out of their territory.

With an artificially low wolf population and increasing moose numbers across most of Unit 13, wolves from adjacent areas have moved into Unit 13 each year. Anecdotal information suggests that entire packs have moved in from the lower Matanuska River, the Yanert River, and the Tok River, areas where moose numbers and wolf numbers are moderately high. Singles and small groups have also moved in from additional adjacent areas where moose numbers are lower, through natural dispersal.

As in other areas in Alaska, a certain percentage of Unit 13 wolves are observed as singles and may be dispersers. Immigration into Unit 13 has been relatively common over the years as radiocollared wolves from the Kenai Peninsula, Denali National Park, and Units 12 and 20 have been observed or harvested in Unit 13.

If control efforts were to cease, wolf packs would be expected to quickly recolonize empty territories, pup recruitment would increase, and wolves in Unit 13 would begin to return to their historical patterns. As moose numbers continue to increase, the ability of Unit 13 to support additional wolves also increases.

MORTALITY

Harvest

Season and Bag Limit Wolves in Unit 13 are harvested annually under hunting and trapping regulations, as well as through a closely monitored predation control program. The trapping season dates have continually been liberalized over the years to provide additional opportunity to take wolves. Prior to RY94, the trapping season started 10 November and ran through the end of March, for a total season length of 141 days. Between RY94 and RY98, the season ran through the end of April, for a total season length of 171 days. Since RY99, the season has opened 15 October and run through the end of April, for a total season length of 197 days. Steel traps and snares smaller than $^{3}/_{32}$-inch diameter may not be used from 15 October–9 November, or in April. The wolf hunting season has remained consistent, running 10 August–30 April with a bag limit of 10 wolves per day.

Predation control permits were issued to pilots and gunners in November or December each year depending on snow conditions and completion of annual moose surveys by department staff. There were no bag limits. The program has run each year through 30 April.

Board of Game Actions and Emergency Orders In October of 2010, the Board of Game re-authorized the wolf control implementation plan through RY15. No other changes were made to wolf regulations in Unit 13 during this reporting period.

Hunter/Trapper Harvest Since and including RY06, 540 wolves have been taken in Unit 13 by all legal methods; 290 (54%) were taken by ground shooting, trapping or snaring (Table 2).

Snaring and trapping have generally been the most consistent methods of taking wolves in Unit 13, accounting for 48% of the annual take since 1971. Due to the current active management program and reduced wolf numbers, snaring and trapping accounted for only 35% of the take during this reporting period (RY08–RY10). While ground shooting success can be highly variable year to year, the percent of wolves shot during this reporting period averaged only 15% per year.

Same Day Airborne Program In January 2000 the Alaska Board of Game passed a wolf control implementation plan for Subunits 13A, 13B, and a portion of 13E. Beginning in January 2004, active wolf management using SDA methods has been conducted by permit. Initially, permittees could only use land-and-shoot SDA methods.

Public pilots and gunners applied for permits annually and to date have conducted all SDA activities in Unit 13. Permittees were selected based on flying and tracking experience and familiarity with the unit. Permittees were required to call in before they could go into the field, and they were required to report all kills, woundings, and pack sightings (pack sizes, pelt colors, locations, etc.). Federally-required same-day-airborne seals were attached to SDA-taken wolves in the field.

In 2006, Subunit 13C was added to the plan and aerial shooting was allowed in addition to land-and-shoot methods. Minimal changes to the plan area have been made since 2006. During this reporting period an average of 39 pilots were permitted for SDA activities in Unit 13. On average, 12 permittees have been successful in taking wolves SDA.

Hunter/Trapper Residency and Success Wolf hunting and trapping is very difficult, often opportunistic, and requires skill and determination. For every hunter or trapper who successfully harvested a wolf there could have been up to a dozen more that were unsuccessful.

The cost of snowmachines, gas, traps, and other equipment has increased tremendously over the years, yet the price paid for wolf pelts has remained relatively low. Most trappers derive the majority of their trapping income by targeting furbearers other than wolves. With lynx starting to decline, trappers may be more interested in pursuing wolves in coming years. Fur prices have started to rebound, and may help provide the necessary incentive to keep trappers in the field.

During this reporting period, an average of 46 hunters, trappers, and SDA permittees successfully harvested one or more wolves in Unit 13. With limited nonresident moose hunting and no nonresident caribou hunting, the harvest of wolves by nonresidents is limited. Nonresidents harvested an average of 3 wolves per year during this reporting period.

Harvest Chronology Wolf harvest chronology can be highly variable and largely depends on winter snow conditions (Table 3). February often has the highest harvest; however, in RY10 January had the highest harvest. The ground trapper is influenced by open water, deep snow, and freeze/thaw events, as well as increased recreational snowmachine traffic during late winter. The SDA permittees are mostly influenced by the amount of daylight and snow conditions, which affect tracking and the ability to land.

Transport Methods When SDA take has been permitted, the majority of the total wolf take has come from those using aircraft (Table 4). Historically, the majority of wolves taken in Unit 13 have been taken with the use of aircraft, reflecting the remote nature of much of the unit and the importance of SDA methods. In the last decade, the use of snowmachines has increased tremendously. This shift occurred largely due to the cessation of SDA take in the early 1990s. Aircraft use increased slightly in RY00 due to a short-lived SDA regulation (gunner had to be 300 feet from the aircraft), then again in RY03, when SDA take was again allowed with no distance requirement. Though improvements in snowmachines have increased their utility dramatically, there is no alternative to using aircraft to take wolves consistently from the interior portion of Unit 13.

Other Mortality

Ballard et al. (1987) estimated natural mortality rates for radiocollared wolves in a portion of Unit 13. They attributed 11% of annual mortality to intraspecific strife and an additional 9% to accidents, injuries, starvation, and drowning. Ballard attributed the remaining 80% to human harvest. In years of high human harvest, additional natural mortality is minimized, as some deaths are compensatory. Field observations in recent years indicate the illegal wolf harvest in Unit 13 is minimal.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

For many years there have been concerns that wolves in Unit 13 could become infested with dog louse. The persistent louse infestation problem in the Kenai area has had a detrimental effect on wolf hide quality, and subsequent wolf trapping efforts in that area. Efforts should be made to ensure this does not occur in Unit 13.

The most recent confirmed case of dog louse in Unit 13 wolves was in RY06, when a trapper harvested a lousy wolf in Caribou Creek in Subunit 13A. Since that time, a few wolves have been taken that were suspected to have lice, though the department was not able to confirm the presence of lice.

Given the high louse infection rate of wolves in Units 7, 14, 15, and 16, coupled with the observed dispersal of wolves from these units into Unit 13, and more recently into Unit 20A, it is likely that lousy wolves will continue to move throughout Interior and Southcentral Alaska. Considering domestic dogs in this area have periodically been diagnosed as having lice, this may also be another possible source of infection. While Unit 13 does not appear to have a louse infestation problem, the presence of a few lousy wolves on an annual basis is of tremendous concern. Should a persistent problem develop, the public would undoubtedly reduce their efforts to take wolves, and the department would have very little control over resultant predator/prey dynamics. Research is currently being done by department staff to assess methods by which louse infections in wolves can be controlled (Gardner and Beckmen 2008).

CONCLUSIONS AND RECOMMENDATIONS

Wolves, being a dominant year-round predator, are the most significant source of mortality to non-neonate moose and caribou in Unit 13. Considering wolf populations are not naturally regulated by the density of their prey until prey densities become very low, the end result of management inaction is indefinitely low density equilibrium among predators and their prey (Gasaway et al. 1983). This is not a viable option for Unit 13 under the intensive management law, where the harvest of moose and caribou has priority.

With good pup production and survival, combined with immigration, the wolf population in Unit 13 has been able to consistently increase by nearly 100% or more between spring and early fall. This resiliency will continue to be an influential factor as long as we are managing for sustainably high moose numbers.

Aided by the current active wolf management program, the Unit 13 wolf population has been reduced to the spring population objective of 135–165 for 5 of the last 6 years. In response to

mild winters and reduced predation, moose numbers in the unit have increased steadily, and additional hunting opportunities have been offered.

Future wolf management in Unit 13 should remain flexible. Active wolf management will be necessary in some form to keep moose numbers and harvests elevated. Small population adjustments at essential periods can help keep moose, caribou, and wolf populations in balance. Responsible management ensures that no biological emergencies ever occur.

This is equally true of threats to the health of the wolf population, such as louse infections. By taking immediate action through culling or biological treatment if lice are documented again in Unit 13, we can reduce the long-term threat of dog louse to wolves in this area.

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Schwanke, R. A. 2012. Unit 13 wolf management report. Pages 92–100 [*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.

Table 1. Unit 13 fall and spring wolf population estimates, regulatory years 2006 through 2010.

Regulatory	Population estimate [a]				
Year	Fall		Spring		Packs
2006	280	(265-295)	160	(145-175)	54
2007	254	(240-270)	153	(145-175)	46
2008	273	(260-280)	144	(135-160)	49
2009	272	(260-280)	180	(165-190)	54
2010	303	(290-315)	152	(145-175)	55

[a] Fall estimate = pretrapping season population; spring estimate = post-trapping season population.

Table 2. Unit 13 wolf harvest, regulatory years 2006 through 2010.

	Reported take						Method of take							Successful trappers, hunters, or SDA
Regulatory year	M	%	F	%	Unk	Total	Trap/ Snare	%	Shot	%	SDA[a]	%	Unk	permittees
2006	55	53%	49	47%	2	106	47	45%	25	24%	33	31%	0	50
2007	52	58%	38	42%	0	90	48	53%	9	10%	33	37%	0	30
2008	59	49%	61	51%	1	121	38	32%	26	22%	55	46%	2	54
2009	51	64%	29	36%	1	81	40	50%	18	22%	23	28%	0	40
2010	76	55%	63	45%	3	142	31	22%	8	5%	103	73%	0	43

[a] Same Day Airborne (SDA) refers to land-and-shoot or aerial shooting.

Table 3. Unit 13 wolf harvest chronology by percent month, regulatory years 2006 through 2010.

Regulatory	Harvest Periods									
Year	August	September	October	November	December	January	February	March	April	*n*
2006	0	8	5	20	16	8	17	24	2	105
2007	0	2	2	6	21	14	37	9	9	90
2008	1	8	4	10	26	7	35	6	3	121
2009	0	6	1	6	5	17	36	26	3	81
2010	0	3	2	1	15	44	19	12	4	142

Table 4. Unit 13 wolf harvest by percent transportation method, regulatory years 2006 through 2010.

	Transportation Method							
Regulatory Year	Airplane	Dog sled skis/ snowshoes	Boat	4-wheeler	Snowmachine	ORV	Highway vehicle	*n*
2006	37	1	2	7	33	0	20	105
2007	45	0	1	1	46	1	6	90
2008	54	3	2	3	28	0	10	121
2009	28	3	0	1	59	0	9	81
2010	76	1	0	2	19	1	1	142

SPECIES

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO BOX 115526
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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 14A and 14B (4,713 mi^2)

GEOGRAPHIC DESCRIPTION: Eastern Upper Cook Inlet

BACKGROUND

Wolf numbers in Unit 14 were most likely kept relatively low in the 1950s and early 1960s, primarily due to predator control efforts by the federal government (Rausch 1967). Wolf populations increased during the late 1960s and early 1970s after the end of predator control activities and bounty payments. However, wolf numbers remained low in the Matanuska-Susitna region near human settlements through the 1970s. Additional increases in human population in this area and associated increases in hunting and trapping pressure further reduced wolf numbers until the mid to late 1980s. During the early 1990s wolf populations increased, in part because of high prey densities. Excessive winter moose mortality, caused by deep snows during the winters of 1989–1990 and 1994–1995, brought many of the local moose populations down and, in Unit 14B at least, the wolves in the area may have prevented the moose populations from rebounding. The reported harvest had also increased, coincident with high wolf densities. Recently harvests have declined somewhat but this is probably due to a decrease in trapping effort and not associated with wolf numbers. Several factors determine the amount of trapping pressure wolves receive, including the cost of fuel and the price of wolf pelts.

During November and December 1998 trappers caught several wolves (and coyotes) in Subunit 14B that were infested with the dog-biting louse *Trichodectes canis*. This was the first time lice had been confirmed in Alaska wolves beyond the Kenai Peninsula, where louse-infested wolves were first seen in 1981. The source of the Unit 14 infestation was unknown, but we suspect interactions between feral dogs or wolf-hybrids and wild wolves. During January 1999 we mounted an effort to evaluate the extent of infestation and treat infested wolves in the Susitna Valley to prevent the spread of lice to other areas of the state. Our efforts revealed two packs in Subunit 14B were infested, as well as one pack in adjacent Subunit 16A. We attempted to capture and treat all members of infested packs with the antiparasitic drug ivermectin (Merck & Co, Inc.). We also distributed approximately 1,200 medicated baits, aimed at coyotes, dogs and lone wolves. However, several louse-infested wolves were caught the following winter, indicating we were unsuccessful in eliminating lice from area wolves.

Previous versions of the Unit 14 Wolf Management Report included all the Subunits of Unit 14 (Subunits 14A, 14B, and 14C). During this reporting period the wolf report for Unit 14 was split

into 2 separate reports because of differences in management strategies between Subunit 14C and Subunits 14A and 14B.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

In Subunits 14A and 14B the primary goal is to provide for optimum harvest of wolves and to provide maximum opportunity to participate in hunting and trapping wolves.

MANAGEMENT OBJECTIVES

- The population objective is to maintain a minimum population of 35 wolves in Subunits 14A and 14B combined.

- The human-use objective in Subunits 14A and 14B is to allow harvest by hunting and trapping, provided harvest does not conflict with maintaining the population objective.

METHODS

Most reports of wolf distribution and pack size come from incidental observations by staff and the public, from sealing certificates, and from interviews with wolf hunters and trappers. We collected harvest data when wolf hides were presented for sealing. All trappers who sealed fur in Unit 14 were queried, through our trapper questionnaire, regarding trends in wolf abundance.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

There have been no attempts to estimate wolf numbers in Subunits 14A and 14B using a systematic survey technique. Observations by staff, trappers, and the public suggest that the wolf population in these Subunits is well above the management objective, with more than 35 wolves in Subunit 14A alone, the subunit with the most human development activity and likely the lowest wolf density. Many more are known to occupy Subunit 14B, which has less human disturbance, but the number of wolves in Subunit 14B has not been quantified.

Distribution and Movements

Wolves are distributed throughout Unit 14 outside the major human population centers. Reports from the public indicate that on occasion wolves do travel on the outskirts of the large urban areas.

Diseases/Parasites

There were no trapper reports or evidence of lice during the reporting period. This is the first time since the 1990s that lice were not reported in at least one pack. During the previous reporting period there was one pack in Subunit 14A that was known to have lice, and lice were suspected to be present in Subunit 14B. Because other canids are known to harbor lice, it is unlikely that lice will ever be completely eliminated from this area.

The spread of the nonnative louse throughout the Susitna Valley is a concern for managers. Given natural dispersal rates for wolves, it is possible that lice in Unit 14 will spread to wolves in other parts of the state.

MORTALITY

Harvest

Season and Bag Limit. During the report period the hunting season for Unit 14 was 10 August–30 April, with a bag limit of 5 wolves. The trapping season was 10 November–31 March in Unit 14A, 10 November–30 April for 14B. Trappers had no bag limit on wolves.

Board of Game Actions and Emergency Orders. No changes occurred during this reporting period.

Hunter/Trapper Harvest. Wolf harvests averaged 12 wolves per season (range 7–20) during this reporting period, a decrease from 19 wolves during regulatory years (RY) 2005 (RY05 = 1 July 2005 through 30 June 2006) through RY07 (Table 1). Most of the harvest comes from Subunit 14A, where there are large areas open to hunting and trapping and highly accessible to many people. Trappers took the majority of the wolves harvested (Table 1). The number of wolves shot has varied over the past 10 years, ranging from zero to 7 animals annually. Weather and trapping conditions can greatly affect the number trapped, whereas the number shot is probably more dependent on opportunistic harvest.

Harvest Chronology. Most wolves were taken during the winter (December–February) by trappers and opportunistic hunters, when snow conditions allowed for good trapping conditions and travel (Table 2). Over the last decade the number of wolves taken during the fall (August–October) by hunters ranged from zero to 4 wolves annually.

Transport Methods. Most successful wolf trappers and hunters routinely used snowmachines to access their trapping/hunting areas (Table 3).

CONCLUSIONS AND RECOMMENDATIONS

Currently the wolf populations in Subunits 14A and 14B are believed to be above the population objective based on observations by staff, trappers, and the public. Wolf numbers in Subunit 14A have likely been reduced by human development over time, but wolves continue to occupy undeveloped areas, outside of the major human population center. Wolf numbers in Subunit 14B are believed to be largely unaffected by human harvests or development. Wolf predation may be contributing to the lack of moose recovery in this subunit, where moose numbers remain low. However, no changes in seasons or bag limits are recommended at this time.

Surveys should be conducted every 3 years to assess wolf numbers. Current methodology (observations by staff, trappers, and the public) should suffice for distribution information; however, without basic population information, assessments of pack size, distribution, and population trends are problematic.

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Table 1. Subunits 14A and 14B wolf harvest, regulatory years 2001 through 2010.

Regulatory	Reported harvest				Method of take				Successful
Year	M	F	Unk	Total	Shot	Trap	Snare	Unk	trapper/hunters
Subunit 14A									
2001	5	3	0	8	3	2	3	0	7
2002	11	4	0	15	4	2	9	0	11
2003	7	10	0	17	3	5	9	0	9
2004	16	11	0	27	3	4	16	4	13
2005	5	6	0	11	0	2	9	0	7
2006	7	3	0	10	7	0	3	0	8
2007	10	12	0	22	7	7	8	0	12
2008	4	2	0	6	0	3	3	0	3
2009	8	4	0	12	2	8	2	0	5
2010	2	5	0	7	2	1	4	0	5
Subunit 14B									
2001	8	4	1	13	1	5	6	1	6
2002	8	9	0	17	3	4	10	0	9
2003	6	4	0	10	3	5	2	0	7
2004	0	1	0	1	0	0	1	0	1
2005	1	2	0	3	0	0	3	0	2
2006	1	0	0	1	0	0	1	0	1
2007	7	4	0	11	2	5	4	0	6
2008	1	0	0	1	0	1	0	0	1
2009	4	3	1	8	3	2	3	0	4
2010	0	2	0	2	1	1	0	0	2
Combined Areas									
2001	13	7	1	21	4	7	9	1	13
2002	19	13	0	32	7	6	19	0	20
2003	13	14	0	27	6	10	11	0	16
2004	16	12	0	28	3	4	17	4	14
2005	6	8	0	14	0	2	12	0	9
2006	8	3	0	11	7	0	4	0	9
2007	17	16	0	33	9	12	12	0	18
2008	5	2	0	7	0	4	3	0	4
2009	12	7	1	20	5	10	5	0	9
2010	2	7	0	9	3	2	4	0	7

Table 2. Subunits 14A and 14B wolf harvest chronology percent, regulatory years 2001 through regulatory years 2010.

Regulatory	Harvest periods							
Year	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*
2001	5	30	20	20	25	0	0	20
2002	16	19	9	38	6	9	3	32
2003	16	0	0	16	44	20	4	25
2004	18	0	43	21	11	7	0	28
2005	0	7	29	14	36	14	0	14
2006	37	9	18	9	0	9	18	11
2007	18	0	28	15	15	24	0	33
2008	0	29	14	14	14	29	0	7
2009	15	20	15	10	20	20	0	20
2010	30	0	10	0	60	0	0	9

Table 3. Subunits 14A and 14B wolf harvest percent by transport method, regulatory years 2001–2010.

	Harvest percent									
Regulatory Year	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Snowshoes	Unk.	n
2001	0	5	0	5	70	5	5	0	10	21
2002	0	0	0	35	31	6	25	3	0	32
2003	7	0	0	4	78	0	0	11	0	27
2004	0	0	4	21	57	4	0	0	14	28
2005	0	0	0	0	86	0	0	14	0	14
2006	9	0	0	55	9	0	27	0	0	11
2007	0	0	0	36	49	3	9	3	0	33
2008	43	0	0	14	43	0	0	0	0	7
2009	0	0	0	15	65	10	10	0	0	20
2010	0	0	0	22	67	11	0	0	0	9

SPECIES

MANAGEMENT REPORT

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

WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 14C (1,961 mi^2)

GEOGRAPHIC DESCRIPTION: Eastern Upper Cook Inlet

BACKGROUND

Wolf numbers in Unit 14C were probably low to moderate in the 1950s and early 1960s, primarily due to predator control efforts by the federal government (Rausch 1967). As predator control ceased, wolves recovered during the 1970s. During the early 1990s, wolf populations increased, in part because of high prey densities. Excessive winter moose mortality, caused by deep snows during the winters of 1989–90 and 1994–95, helped sustain wolf packs in the area. The last extensive aerial wolf survey conducted in Unit 14C was in 1995. This survey found four packs using 14C; a fifth pack is believed to have formed shortly after the survey was flown (Sinnott 1996). Currently, it is estimated that there are still 4 or 5 packs using the area.

In recent years, individual wolves in the vicinity of Joint Base Elmendorf-Richardson (JBER), Eagle River, and Birchwood have displayed increasingly habituated and aggressive behavior toward humans and pets. Occasional negative human/wolf encounters have been reported since at least 1995, but have increased since 2007. Since the winter of 2007–08, several dogs have been killed or injured by wolves in this area. In May 2010, 2 female runners were pursued until forced to climb a tree by 2 wolves on Artillery Road on JBER. The runners were accompanied by a dog, but these 2 wolves reportedly ignored the dog and focused their attention on the humans. Although wolf attacks on humans are rare, previous wolf attacks in Alaska by individual wolves which exhibited similar habituated and aggressive behaviors have occurred (McNay 2002, Butler et al, 2011).

MANAGEMENT DIRECTION

MANAGEMENT GOALS

The primary management goal in Unit 14C is to provide an opportunity to view, photograph, and enjoy the presence of wolves. The secondary goal for Unit 14C is to provide maximum opportunity to participate in hunting and trapping wolves. It should be mentioned that, in light of recent negative encounters between humans and wolves in Unit 14C, particularly in the area of JBER and Eagle River, there is an increasing need to be vigilant in efforts to prevent wolves from becoming habituated.

MANAGEMENT OBJECTIVES

The population objective is to maintain a minimum population of 20 wolves in Unit 14C. The human-use objective is to provide for nonconsumptive uses, such as viewing, photography, listening, and having the knowledge that wolves are present.

METHODS

Most reports of wolf distribution and pack size come from incidental observations by staff and the public. Harvest data were collected when wolf hides were presented for sealing. Results are reported by regulatory year (RY), which runs from 1 July through 30 June (e.g., RY08 = 1 July 2008–30 June 2009).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Based on observations of pilots, outdoor recreationists, and ADF&G biologists, we estimate that Unit 14C contains 4 packs, all of which fluctuate in size.

Distribution and Movements

Wolves are distributed throughout Unit 14C, and reports from the public and from staff indicate that wolves do travel on the outskirts of the large urban areas, including Anchorage and Eagle River. Camera traps set by JBER Conservation staff indicate that at least one, possibly 2, packs utilize the military base, and often travel in close proximity to neighborhoods from Muldoon to North Eagle River. Information gained from camera traps indicate that after the JBER Public Safety Action in the winter of 2010–-11, during which a total of 9 wolves were removed from the military base, it is possible that pack boundaries and movements on JBER were substantially altered. Another pack is found in the Twentymile River valley, and one pack is found north of Eagle River.

Diseases/Parasites

Despite louse control efforts in the 1990s, at least one pack remains infested in adjacent Unit 14A. Lice were discovered in Unit 14A in 2005–06 (5animals) and in 2007–08 (4 animals). Thus far, there have been no indications that any 14C packs are currently infected with lice. Because coyotes and domestic/feral dogs are known to harbor lice, it will be very difficult to totally remove lice from the area.

MORTALITY

Harvest

Season and Bag Limit. During the report period, the hunting season for Unit 14C was 10 August–30 April, with a bag limit of 5 wolves. The trapping season was 10 November–28 February. Trappers had no bag limit on wolves. Hunting and trapping are limited to "the remainder of 14C," outside special management areas.

Board of Game Actions and Emergency Orders. There were no Board of Game actions or emergency orders during the reporting period.

Hunter/Trapper Harvest. The only areas in Unit 14C open to wolf hunting or trapping are those that lie in the "remainder of 14C," outside special management areas. During the reporting period, there were no wolves reported harvested by hunters or trappers.

Harvest Chronology. There were no wolves reported harvested by hunters or trappers during the reporting period.

Additional Mortality. During regulatory year 2008, at least one wolf was killed by a highway vehicle on the Glenn Highway. During regulatory year 2009, at least 5 wolves were killed by vehicles at the same location. All of these wolves were killed between the Muldoon exit and the Hiland Road exit, near the municipal landfill.

Nine wolves were removed from JBER by ADF&G and JBER Conservation staff during the winter of 2010-11. Wolves on JBER had exhibited increasingly aggressive behavior, first toward pets, then toward humans. This culminated in an incident in May 2010 during which 2 female runners were "treed" for 45 minutes by 2 wolves on Artillery Road. The wolves were considered a significant threat to public safety on the military installation and in surrounding residential areas. Therefore, during the winter of 2010-11 ADF&G biologists, working in cooperation with military personnel, removed 9 wolves from JBER via trapping and ground-based shooting efforts. The operation was deemed to be successful, due to the removal of specific wolves thought to be involved in aggressive incidents and the reduction of wolf numbers in the area. Since this public safety operation, no incidents involving aggression toward humans and pets have been reported.

HABITAT

Assessment

Although wolf habitat in Unit 14C has changed significantly in the last 80 years, the large number of moose in the unit has undoubtedly allowed for increases in wolf numbers in the last 30 years. Beaver numbers are good and provide alternate summer prey. Wolves are very adaptable and have high reproductive rates, allowing them to use areas altered by humans.

CONCLUSIONS AND RECOMMENDATIONS

The decrease in available habitat in Unit 14C, along with healthy moose numbers, do not indicate that wolf predation is a problem in this unit. No changes in seasons or bag limits are recommended. Given the difficulty in managing hunting and trapping within the populated portions of GMU 14C it would be difficult to open additional areas to the take of wolves, but it is possible that a restricted weapons season could be opened on JBER. Considering the weapons restrictions on base, the most practical scenario may be a muzzleloader hunt in the portion of JBER north of Eagle River.

Conflicts between humans and wolves have increased in recent years, likely as a result of frequent encounters. The public safety action on JBER appears to have been successful in removing aggressive individuals and reducing conflicts. However, due to the intersections of wolf habitat with residential and recreational areas in Unit 14C, it is likely that more wolves could become aggressive or habituated in the future. To prevent future problems, educational

efforts to advise area residents of precautions to take to avoid encouraging aggressive or habituated behavior in wolves should be implemented.

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

Battle, D. 2012. Unit 14C wolf management report. Pages 107–114 [*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.

Table 1. Unit 14C fall (pretrapping season) wolf population estimates, regulatory years 2000-2010.

Year	Population estimate	Packs (nr)	Basis of estimate
2000	20-30	4-5	Reports from staff, public
2001	20-30	4-5	Reports from staff, public
2002	20-30	4-5	Reports from staff, public
2003	20-30	4-5	Reports from staff, public
2004	20-30	4-5	Reports from staff, public
2005	20-30	4-5	Reports from staff, public
2006	20-30	4-5	Reports from staff, public
2007	20-30	4-5	Reports from staff, public
2008	20-30	4-5	Reports from staff, public
2009	20-30	4-5	Reports from staff, public
2010	20-30	4-5	Reports from staff, public

Table 2. Unit 14C wolf harvest, regulatory years 2000–2010.

Regulatory	Reported harvest				Method of take				Successful
year	M	F	Unk	Total	Shot	Trap	Snare	Unk	trapper/hunters
Unit 14C									
2000	1	0	0	1	1	0	0	0	1
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	0	1	0	1	0	0	1	0	1
2005	0	0	0	0	0	0	0	0	0
2006	0	1	0	1	1	0	0	0	1
2007	3	1	0	4	4	0	0	0	4
2008*	0	0	0	0	0	0	0	0	0
2009**	0	0	0	0	0	0	0	0	0
2010***	0	0	0	0	0	0	0	0	0

*During regulatory year 2008-09, at least one wolf was killed by a highway vehicle on the Glenn Highway.

**During regulatory year 2009-10, at least three wolves were killed by highway vehicles on the Glenn Highway.

*** During regulatory year 2010-11, nine wolves were removed from JBER by ADF&G personnel as part of a public safety action, and one wolf was killed by a highway vehicle on the Glenn Highway.

Table 3. Unit 14C wolf harvest chronology percent, regulatory years 2000–2010.

Regulatory year	Harvest periods							
	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*
2000	100	0	0	0	0	0	0	1
2001	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	0	0	0	0	100	0	0	1
2005	0	0	0	0	0	0	0	0
2006	0	0	0	100	0	0	0	1
2007	25	25	25	0	0	25	0	4
2008*	0	0	0	0	0	0	0	0
2009**	0	0	0	0	0	0	0	0
2010***	0	0	0	0	0	0	0	0

*During regulatory year 2008-09, at least one wolf was killed by a highway vehicle on the Glenn Highway.

**During regulatory year 2009-10, at least three wolves were killed by highway vehicles on the Glenn Highway.

*** During regulatory year 2010-11, nine wolves were removed from JBER by ADF&G personnel as part of a public safety action, and one wolf was killed by a highway vehicle on the Glenn Highway.

Table 4. Unit 14C wolf harvest percent by transport method, regulatory years 2000–2010.

	Harvest percent									
Regulatory year	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Snowshoes	Unk.	*n*
2000	0	0	100	0	0	0	0	0	0	1
2001	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	100	0	1
2005	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	100	0	0	0	0	1
2007	0	0	25	0	0	0	75	0	0	4
2008	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0

Alaska Department of Fish and Game
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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 16 (12,300 mi^2)

GEOGRAPHIC DESCRIPTION: West side of Cook Inlet

BACKGROUND

The wolf population in Unit 16 has varied in size in response to changes in prey density and human activities, including hunting and trapping efforts and predator control programs. The first systematic population survey of wolves in Unit 16 was conducted in March 1993, during the development of the Sample Unit Probability Estimator (Becker et al. 1998). At that time we estimated there were 48–62 wolves, in 8–10 packs, in this area.

After trappers discovered dog-biting louse *Trichodectes canis* on wolves (and coyotes) in 1998, the department initiated a louse control program in Unit 16. Wolves were captured and treated with the antiparasitic drug ivermectin (Merck & Co. Inc), or received ivermectin through baits laced with the paste (Golden et al. 1999). However, wolves examined after the treatment showed that it was unsuccessful in ameliorating the infestation. As a byproduct of this work, a new wolf population estimate was produced for Unit 16, which included 120–140 wolves in 16–19 packs.

In 2004 a wolf control plan was implemented to reduce predation on the declining moose population in Subunit 16B. Initially, implementation of the plan included the use of snowmachines to take wolves. Land-and-shoot wolf control began in December 2004 and was amended in February 2005 to include same day aerial (SDA) shooting.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

The management goal is to reduce wolf predation on moose.

MANAGEMENT OBJECTIVES

The population objective is to maintain a wolf population of 30–60 wolves in at least 4 packs. This objective should include 8–15 wolves (in 1–3 packs) in Subunit 16A and 22–45 wolves (in

3–5 packs) in Subunit 16B. The human-use objective is to allow maximum opportunity for harvest while exceeding the minimum wolf population objectives.

METHODS

We estimated wolf numbers, distribution, and population trends based on observations by staff, trappers, hunters, and pilots, and interviews with trappers and hunters sealing fur from Unit 16. During the winter of 1998–1999, a minimum wolf count was derived during our effort to control the louse infestation in the area. Estimates of the population's size were adjusted after that period and are now based primarily on observations by pilots, hunters and trappers, and staff. The annual wolf harvest was determined by sealing all wolves presented for examination.

All SDA pilots are required to report to the department before they participate in the program and are encouraged to call after they have flown to let us know what they see. These pilot–gunner teams report movements and pack locations throughout the winter. The wolf track and sighting reports from these individuals provided valuable information that increased our ability to assess population size and trend.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The louse control effort in 1999 produced a minimum count of 120–140 wolves in Unit 16 and provided insight into the number of packs and pack distribution. Those numbers were substantially higher than previous estimates that were based on incidental observations by staff, trappers, and pilots. This finding demonstrated that estimating wolf numbers based on incidental observations can result in a significant underestimation of wolf numbers. However, due to budget and time constraints, incidental observations are often the only information available to estimate the population.

Reports indicate that wolf population was reduced after the winter of 2003–2004 by the predator control program. SDA pilot–gunner teams took 91 animals during regulatory year (RY) 2004 (RY04 = 1 July 2004 through 30 June 2005). Incidental observations and pilot reports suggest that the wolf population has been relatively stable at the reduced level since that time.

Distribution and Movements

Wolves inhabit most portions of Unit 16, and several packs use portions of other units. Territory boundaries can be very fluid over time, depending on factors such as wolf and prey density (Mech et al. 1998)

Diseases/Parasites

No wolves were found to have lice in the past 3 years.

MORTALITY

Harvest

Season and Bag Limit. The hunting season in Unit 16 was 10 August–30 April with a bag limit of 10 wolves. The trapping season was 10 November–30 April in RY08 and 15 October–30 April in RY09 and RY10 with no bag limit. SDA participants in the predator control program are also allowed to harvest wolves from airplanes during the months of December through April.

Board of Game Actions and Emergency Orders. In 2009 the Board of Game increased the length of the wolf trapping season by extending the start date from November 10 to October 15.

Hunter/Trapper Harvest. The harvest by hunters and trappers averaged 12 wolves per year (range 6–23) during RY08–RY10 (Table 1). This was a decrease from the previous reporting period, when an average of 22 wolves were harvested per year (range 11–38). Most of the wolves taken during the reporting period were shot (Table 1). The total number of successful trappers/hunters has generally been decreasing since the start of predator control, which is probably a consequence of the reduced the wolf population.

Harvest Chronology. Most wolves were taken during midwinter (December–March), when snow conditions allowed for good trapping conditions and travel. The number of wolves taken during August–October (Table 2) ranged from 13 to 22 percent. Hunters take a significant portion of the annual harvest of wolves incidental to hunting for other species.

Transport Methods. Most wolves were taken by people who used snowmachines or aircraft to access their hunting or trapping areas (Table 3).

Predator Control. SDA harvest was highest during the first year of the program and remained relatively constant RY05–RY08 (Table 4). Poor snow conditions during this reporting period may have contributed to the lack of harvest using this method, but the reduced harvest is also a reflection of the reduced wolf population.

CONCLUSIONS AND RECOMMENDATIONS

The wolf control program, initiated in 2004 to reduce wolf predation in Unit 16, was successful in reducing the wolf population and had a positive effect on overwinter moose survival. The wolf population is thought to be within management objectives, and harvests are regulating the population at the current level. Trapping effort has decreased, and interest in the control program is waning based on the number of days SDA pilot flew each year and the increasing number of permittees that do not participate in the program. This reduction in harvest effort is mostly a byproduct of the reduced wolf population size and lower success rates, but may also be partially attributed to increased fuel costs and poor weather. Systematic surveys should be conducted to monitor the wolf population size and trends to keep the population within the management objectives.

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Table 1. Unit 16 wolf harvest, regulatory years 2001 through 2010 (does not include wolves taken in control program).

Regulatory	Reported Harvest				Method of take				Successful
Year	M	F	Unk	Total	Shot	Trap	Snare	Unk	Trappers/hunters
2001	47	39	4	90	25	19	46	0	38
2002	22	22	3	47	25	10	12	0	27
2003	36	28	6	70	30	21	19	0	36
2004	19	17	1	37	26	8	3	0	27
2005	24	12	2	38	12	9	17	0	21
2006	5	12	0	17	9	2	6	0	12
2007	2	9	0	11	6	3	2	0	6
2008	11	12	0	23	8	5	10	0	13
2009	2	4	0	6	5	1	0	0	6
2010	2	6	0	8	4	0	4	0	5

Table 2. Unit 16 wolf harvest chronology, regulatory years 2001 through 2011 (does not include wolves taken in control program).

Regulatory	Percent of Harvest							
Year	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*
2001	14	8	31	16	12	13	6	90
2002	28	11	9	17	2	19	15	47
2003	23	10	13	13	7	31	3	70
2004	46	5	8	11	8	11	11	37
2005	24	19	11	16	11	16	3	37
2006	29	0	6	6	47	6	6	17
2007	36	18	18	9	18	0	0	11
2008	22	13	17	30	0	5	13	23
2009	17	0	17	0	17	0	50	6
2010	13	25	62	0	0	0	0	8

Table 3. Unit 16 wolf harvest by transport method, regulatory years 2001 through 2010 (does not include wolves taken in control program).

Regulatory Year	Harvest percent									*n*
	Airplane	Dogsled	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Snowshoes	Unk.	
2001	18	2	2	2	70	1	0	2	2	90
2002	21	0	0	4	57	0	13	0	4	47
2003	13	0	6	3	69	1	3	4	1	70
2004	22	3	8	11	54	0	3	0	0	37
2005	19	5	0	14	54	0	5	5	0	38
2006	41	18	0	0	41	0	0	0	0	17
2007	9	0	0	28	64	0	0	0	0	11
2008	57	0	0	4	35	0	0	4	0	23
2009	17	0	0	17	50	0	0	17	0	6
2010	50	13	0	0	25	0	0	13	0	8

Table 4. Wolf harvest chronology in the Unit 16 Wolf Control Program, regulatory years 2004 through 2010.

Regulatory Year	Percent of Harvest					*n*
	Dec	Jan	Feb	Mar	Apr	
2004	19	24	39	15	3	91
2005	25	25	29	14	7	21
2006	19	13	10	55	3	34
2007	6	30	36	10	18	21
2008	29	4	38	19	10	21
2009	100	0	0	0	0	2
2010	21	0	47	0	32	9

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 17 A, B, and C (18,800 mi^2)

GEOGRAPHIC DESCRIPTION: Northern Bristol Bay

BACKGROUND

Wolves are common throughout the northern Bristol Bay area; however, we have little objective data on the historic or current abundance of wolves in this area. Harvest data from 1962 to the present provide some indication of wolf distribution and relative abundance, but these data are inconsistent. Bounty records also give us a partial record of harvest from 1962 through 1971. Mandatory sealing records from 1972 to the present provide greater accuracy in harvest reporting. In 1988 the department implemented a trapper questionnaire program to collect information on relative abundance of furbearers, including wolves.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a wolf population that will sustain an annual harvest of at least 25 wolves.

METHODS

We collected harvest data from trappers when they brought their wolf pelts in for sealing. We also send annual trapper questionnaires to selected trappers in the unit to quantify their observations of furbearer populations during the trapping season and to estimate trends in the populations.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Trapper reports and general observations indicate the wolf population has likely continued to increase during this reporting period. Wolf density peaked in Unit 17 from 1974 to 1977 but declined sharply by 1980. Rabies may have been a contributing factor. Densities seemed to increase again until 1989 when another epizootic (likely rabies or distemper) again affected canid populations in the unit. Wolf populations began to increase again in 1992 and are now reported as abundant throughout the game management unit.

Population Size

No population estimation surveys for wolves were conducted in this unit during this reporting period.

Distribution and Movements

Wolves are present throughout the unit. There is no evidence of transitory packs following the Mulchatna caribou herd, although wolves are occasionally seen with the herd as it moves throughout the region. Packs are more likely to have established territories and to take advantage of caribou when they move through those territories.

MORTALITY

Harvest

Season and Bag Limit

Hunting:	Unit 17	10 wolves/day	10 August–30 April
Trapping:	Unit 17	No Limit	10 November–30 April

Board of Game Actions and Emergency Orders. During the spring 2011 Board of Game meeting, the Mulchatna Caribou Herd Predation Management Area (5 AAC 92.111) was established. The action allows the commissioner to conduct wolf population reduction or regulation in the range of the Mulchatna caribou herd. No emergency orders were issued for wolves during this period.

Hunter/Trapper Harvest. The wolf harvest in Unit 17 fluctuates greatly from year to year and depends greatly on winter travel conditions. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 July 2008–30 June 2009). Over the past 5 years (RY06–RY10), the annual average harvest was 68 (Table 1). During RY08, 34 hunter/trappers reported taking 68 wolves (38 males, 30 females). Four were taken in Unit 17A, 31 in Subunit 17B and 33 in Subunit17C. During RY09, 20 hunter/trappers reported taking 46 wolves (21 males, 24 females, 1 sex not reported). One was taken in Subunit 17A, 13 in Subunit 17B, 32 in Subunit 17C. During RY10, 26 hunter/trappers reported taking 72 wolves (32 males, 38 females, and 2 sex not reported). Two were taken reported from Subunit 17A, 30 in Subunit 17B and 40 in Subunit 17C. Most were taken with firearms (Table 1).

Harvest Chronology. Harvest chronology has been quite variable. Generally, a large proportion of the wolves killed in Unit 17 are taken January through April (Table 2). In most years, harvest chronology reflects the suitability of snow conditions for tracking and travel by snowmachine rather than the availability of wolves. Harvest of wolves occurred incidental to moose and caribou hunting activities during August and September when the Mulchatna caribou herd was large with substantial caribou hunting activity in the area. This was due to the increased interest by moose and caribou hunters in taking wolves, as well as the availability of wolves in the area. Incidental take of wolves during the fall by moose and caribou hunters declined during this reporting period, likely a result of the decline of the Mulchatna herd and reduced caribou hunting activity.

Transport Methods. Before RY92, aircraft was the most common means of transport used by wolf hunter/trappers in Unit 17 (Table 3). With the prohibition of same-day-airborne taking, most wolves have been harvested by hunter/trappers using snowmachines for transportation. The advent of larger, more reliable snowmachines has contributed greatly to the use of these machines when hunting and trapping wolves.

CONCLUSIONS AND RECOMMENDATIONS

Few objective data are available to interpret the status of the wolf population in Unit 17. General observations and public contacts suggest the wolf population is healthy, that it rebounded from an apparent decline in the late 1980s, and that wolves are abundant throughout the game management unit. Moose and caribou are probably the primary prey for most packs in the unit, though beavers are abundant and widespread. Although no packs are known to follow the Mulchatna caribou herd movements throughout its range, wolves in this unit appeared to take advantage of this herd as it increased through the mid-1990s. It is logical to expect that wolf populations increased along with the prey densities.

The causes of declines in wolf numbers in the late 1970s and late 1980s were unknown, but rabies was suspected. There is no evidence that human-induced mortality was the cause of these declines. Rabies is endemic to fox populations in southwestern Alaska, and red fox populations are greatly influenced by periodic epidemics. One rabid wolf was confirmed from the unit in 1981. Samples from 6 wolves trapped in Unit 17 area in 1991–92 were sent to the Alaska State Virology Laboratory for rabies tests. All were negative. However, the tests could not determine if the wolves had been exposed to rabies at one time and survived.

Same-day-airborne shooting of wolves was historically a common and effective method of harvesting wolves in Unit 17. Department records confirm this from RY61 through RY91, and local residents have documented extensive use of aircraft by wolf hunters back to the 1930s. Prohibition of same-day-airborne wolf shooting in RY92 resulted in a shift to using snowmachines for transportation while hunting and trapping wolves.

Aerial surveys of Unit 17 are needed to better quantify population density. Nearly constant winds cause fresh snow to drift rapidly, however, and good survey conditions seldom last more than a day. Survey efforts should be coordinated with department personnel in Units 9 and 19 to maximize the area surveyed while good conditions last.

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Woolington, J. D. 2012. Unit 17 wolf management report. Pages 121–126 [*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.

Table 1.Unit 17 wolf harvest, regulatory years 1991 through 2010.

Regulatory year	Reported harvest				Method of take (%)			Successful hunter/ trappers
	Male	Female	Unk	Total	Trap/snare	Shot	Unk	
1991	20	9	8	37	9 (24%)	28 (76%)	0 (--)	20
1992	12	5	2	19	4 (21%)	15 (79%)	0 (--)	14
1993	29	16	10	55	0 (--)	55 (100%)	0 (--)	21
1994	74	37	14	125	33 (26%)	92 (74%)	0 (--)	36
1995	23	14	0	37	16 (43%)	21 (57%)	0 (--)	16
1996	35	15	3	53	9 (17%)	44 (83%)	0 (--)	24
1997	71	35	1	107	17 (16%)	86 (80%)	4 (4%)	39
1998	50	28	0	78	9 (12%)	68 (87%)	1 (1%)	39
1999	59	23	1	83	14 (17%)	67 (81%)	2 (2%)	34
2000	45	40	4	89	13 (15%)	75 (84%)	1 (1%)	41
2001	47	43	2	92	38 (41%)	52 (57%)	1 (1%)	35
2002	15	13	2	30	8 (27%)	22 (73%)	0 (--)	20
2003	66	74	1	141	48 (34%)	93 (66%)	0 (--)	48
2004	32	26	2	60	18 (30%)	42 (70%)	0 (--)	32
2005	32	24	6	62	22 (35%)	39 (63%)	1 (2%)	29
2006	51	27	1	79	15 (19%)	61 (77%)	3 (4%)	45
2007	26	47	0	73	8 (11%)	64 (88%)	1 (1%)	40
2008	38	30	0	68	13 (19%)	52 (76%)	3 (4%)	34
2009	21	24	1	46	18 (39%)	28 (61%)	0 (--)	20
2010	32	38	2	72	15 (21%)	45 (63%)	12 (17%)	26

Table 2. Unit 17 wolf harvest chronology percent by month, regulatory years 1991 through 2010.

Regulatory Year	Harvest period								
	September	November	December	January	February	March	April	Unknown/Other	*n*
1991	--	--	5%	32%	30%	22%	--	11%	37
1992	--	--	5%	21%	53%	11%	--	10%[a]	19
1993	6%	--	22%	27%	16%	26%	4%	--	55
1994	6%	17%	14%	10%	31%	16%	--	6%[b]	125
1995	--	--	3%	22%	49%	19%	--	8%	37
1996	--	--	9%	43%	28%	9%	--	9%	53
1997	--	--	12%	27%	39%	7%	--	15%	107
1998	--	--	19%	32%	19%	14%	--	15%	78
1999	--	--	12%	11%	31%	19%	--	27%	83
2000	--	--	7%	11%	22%	35%	1%	24%	89
2001	--	--	7%	16%	41%	14%	--	22%	92
2002	43%	--	3%	10%	--	17%	10%	17%[c]	30
2003	15%	--	16%	28%	23%	15%	1%	3%[d]	141
2004	23%	--	13%	12%	28%	18%	2%	3%[e]	60
2005	15%	--	3%	6%	19%	29%	23%	5%[f]	62
2006	22%	4%	11%	24%	15%	16%	3%	3%[g]	79
2007	19%	--	3%	27%	23%	19%	5%	3%[h]	73
2008	9%	--	10%	4%	18%	44%	15%	--	68
2009	4%	--	4%	9%	20%	41%	20%	2%[i]	46
2010	6%	--	7%	29%	39%	10%	6%	4%[j]	72

[a] Includes 1 wolf (5%) harvested in August.
[b] Includes 2 wolves (2%) harvested in Aug, 1 (1%) in October, and 4 (3%) unknown.
[c] Includes 4 wolves (13%) harvested in August, and 1 (3%) in October.
[d] Includes 2 wolves (1%) harvested in August, and 2 (1%) in October.
[e] Includes 2 wolves (3%) harvested in August.
[f] Includes 3 wolves (5%) harvested in August.
[g] Includes 2 wolves (3%) harvested in August.
[h] Includes 2 wolves (3%) harvested in August.
[i] Includes 1 wolf (2%) month unknown.
[j] Includes 1 wolf (1%) harvested in August , and 2 (3%) month unknown.

Table 3. Unit 17 wolf harvest percent by transport method, regulatory years 1991 through 2010.

	Percent of harvest								
Regulatory Year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snow machine	ORV	Highway vehicle	Unk	*n*
1991	70%	--	--	--	30%	--	--	--	37
1992	5%	5%	--	--	84%	--	5%	--	19
1993	36%	2%	--	2%	58%	--	--	2%	55
1994	30%	--	2%	--	58%	--	--	10%	125
1995	41%	--	--	--	54%	--	--	2%	37
1996	28%	--	--	--	72%	--	--	--	53
1997	18%	--	--	--	74%	--	--	8%	107
1998	12%	1%	1%	--	83%	--	--	3%	78
1999	20%	1%	1%	--	74%	--	--	4%	83
2000	17%	1%	4%	--	73%	--	1%	3%	89
2001	12%	1%	--	2%	72%	--	1%	12%	92
2002	37%	43%	17%	--	--	--	--	3%	30
2003	16%	2%	1%	--	81%	--	--	1%	141
2004	25%	--	2%	--	73%	--	--	--	60
2005	16%	--	3%	2%	77%	--	--	2%	62
2006	22%	--	6%	1%	63%	--	1%	6%	79
2007	15%	--	10%	1%	73%	--	--	1%	73
2008	10%	--	--	--	84%	--	1%	4%	68
2009	11%	--	--	--	86%	3%	--	--	46
2010	3%	--	3%	--	75%	--	--	18%	72

Alaska Department of Fish and Game
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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 18 (41,159 mi^2)

GEOGRAPHIC DESCRIPTION: Yukon–Kuskokwim Delta

BACKGROUND

Wolf numbers were low throughout Unit 18 from the demise of reindeer herding in the 1930s (Calista 1984) until the late 1980s, when moose populations became established. Observations from trappers, hunters, fur buyers, and agency biologists indicated that wolf numbers have increased in Unit 18, particularly along the main stem of the Yukon River and in the Kilbuck Mountains east of Bethel. More recently, there have been increased populations along the Kuskokwim River and its tributaries from Kalskag to Bethel. The distribution and abundance of wolves in Unit 18 reflects the expanding distribution and increased abundance of moose at a time when presence of caribou has been stable to declining throughout the last decade. The reported wolf harvest has remained consistent during this reporting period.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain viable wolf populations in Unit 18.
- Minimize adverse interactions between wolves and the public.
- Develop updated population management objectives for Unit 18.

MANAGEMENT OBJECTIVES

- Monitor wolf population status through contacts with the public, annual trapper questionnaires, and field observations.
- Monitor harvests through the sealing program and public contacts.
- Explain regulations to local hunters and trappers and promote compliance with them.
- Provide general wolf information and education to the public.

- Consult with the public and other agencies regarding updated wolf population management objectives.

METHODS

We observed wolves and wolf tracks during aerial surveys for other species and sent a questionnaire that included questions regarding wolves to area trappers. We also discussed wolves with other agency personnel, fur buyers, trappers, hunters, local pilots and other residents. Contacts with experienced wolf trappers were used to gain additional information for Unit 18. One particularly successful wolf trapper provided many valuable insights.

We collected harvest information from sealing records and increased our support for license vendors and fur sealers in Unit 18. We sent public notices with information regarding fur sealing requirements to Unit 18 villages and provided regular information and education articles with topics that included wolves, trapping, and regulations to a local newspaper. We also helped host a wolf trapping clinic in Bethel with the Bethel chapter of the Alaska Trappers Association.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

We did not conduct surveys to determine the status of wolves in Unit 18. Our population size estimate (Table 1) is based on the following: recent trends in reported harvest (Fig. 1); trapper questionnaire data; observations of animals, tracks, concentrations of activity; reported sightings; other reports by the public; and anecdotal information.

Trapper questionnaire respondents indicated that wolves were common and increasing during this reporting period. We agree with this assessment and have inferred that during the 1 July 2008–30 June 2011 reporting period the population ranged 200–350 animals in 20–32 packs with numerous single wolves.

Population Composition

We have no survey data or other information to determine the composition of the wolf population in Unit 18.

Distribution and Movements

During the previous reporting period, we reported wolves present along the entire length of the Yukon River upstream of the delta. Packs are now established within the Yukon Delta and throughout the Yukon River riparian corridor. There are at least 5 resident packs along the Kuskokwim River upriver of Bethel with one pack just below Bethel and 1 to 4 packs on each of its drainages for a total of 10 packs. The distribution of these packs follows the distribution, population growth, and range expansion of moose in Unit 18, as well as the seasonal movements of Mulchatna caribou.

Wolves occupy the Kilbuck Mountains from the area near Whitefish Lake to the southernmost tip of Unit 18 near Cape Newenham. These wolves prey predominantly on caribou that are shifting their range and on moose that are currently expanding their range into Unit 18. Wolf

distribution probably changes in response to availability of caribou. Some resident wolf packs remain throughout the year; however, when caribou depart to calve in Unit 17, it is unclear what proportion of the wolf population follows the caribou compared to the portion that remains in Unit 18 year-round.

We occasionally encounter wolves on the tundra between the riparian corridors of the Kuskokwim and Yukon rivers, but these wolves are probably transient and do not represent established packs in this area. Two wolves have been seen repeatedly and have taken up residency on Nelson Island. Wolves in this area most likely followed moose that moved west along drainages and riparian corridors that flow into Baird Inlet. Some of these drainages are nearly connected to drainages of the Yukon River and both moose and wolves are likely to have arrived from the Yukon River populations.

MORTALITY

Harvest

Season and Bag Limit. A regulatory year (RY) begins on 1 July and ends on 30 June (e g. RY08 = 1 July 2008–30 June 2009).

Regulatory year RY08, RY09, RY10 Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 18 RESIDENTS & NONRESIDENTS:		
Trapping - no limit	10 Nov–31 Mar	10 Nov–31 Mar
Hunting - 5 wolves	10 Aug–30 Apr	10 Aug–30 Apr

Board of Game Actions and Emergency Orders. There were no Board of Game actions or emergency orders regarding wolves for Unit 18 during this reporting period.

Hunter Harvest. Sealing certificate data indicate the following wolf harvest for Unit 18: 30 during RY08, 21 in RY09, and 72 in RY10 (Table 2). Recent average harvests ($\bar{x}$ = 41) have increased dramatically compared to the decade beginning in 1985, when the average annual harvest was 7 wolves and the highest harvest was 17 wolves in RY88.

These higher harvests reflect a combination of circumstances. More wolves are available for harvest in the unit as they pursue a wider ungulate food base than existed in the 1980s; there are more moose and Mulchatna caribou have been spending more time in the unit. The higher harvests also correlate with good travel conditions, which increase hunter success. Travel conditions are affected by total snow accumulation and the timing of snow in winter. The amount of time travel conditions are adequate for hunters and trappers varies dramatically from one winter season to the next.

Since RY99, 75% of the known harvest has occurred in the Kuskokwim River drainage (Table 2). This reflects the distribution of caribou and caribou hunters who opportunistically shot wolves while hunting caribou. Prior to RY99, caribou were not frequently present and harvest of wolves by shooting was 26% of total harvest. During RY01 caribou were more abundant and take of wolves by shooting increased to 47% of total harvest (Table 3). The high Kuskokwim harvest also reflects the high level of trapping activity within the drainages of the Kuskokwim River, in contrast to relatively few trappers targeting wolves in the Yukon River portion of Unit 18.

Harvest data are derived from sealing certificates and represent a minimum estimate of wolf harvest. Many wolves caught in Unit 18 are neither sold nor sealed. Wolf ruffs are highly prized as parka trim, and the local domestic demand for wolf pelts is very high. Local residents generally prefer stiffer home-tanned wolf pelts for parka ruffs. In RY01, a local Fish and Wildlife Protection officer sealed 16 of the 24 wolves taken by Quinhagak residents. Many of these wolves would not have been reported had the officer not made an extraordinary effort. This supports our prediction that many wolf pelts are habitually not sealed.

Permit Hunts. There were no permit hunts for wolves in Unit 18 during this reporting period.

Hunter Residency and Success. Two wolves were harvested by nonresidents and 121 wolves were harvested by Alaska residents. No measure of success is available.

Harvest Chronology. The highest reported harvests have historically been in February and March (Table 4). During this reporting period there was also a high harvest in January. This pattern is explained by the timing of snow accumulation, improving travel conditions for hunter/trappers, the onset of wolf breeding season, and increasing day-length. Trapping is hampered by low snow, alternating freezing and thawing temperatures, and few hours of daylight. The intensity of caribou hunting and the subsequent incidental harvest of wolves are also dependent upon travel conditions. By January and through February, travel conditions usually improve. In response to these conditions and factors, more effort is concentrated by people during February–March.

The reported RY09 harvest was 21 wolves, the lowest during this reporting period. Travel conditions unitwide remained poor through most of the season, which explains the lower harvest.

Transport Methods. Hunters and trappers typically use snowmachines to harvest wolves. Three hunters were dropped off by airplane in RY10, but this is rare.

Other Mortality

No information is available on natural mortality of wolves in Unit 18. Though, in the summer of 2011, wolves on the Kuskokwim had a large morality event, presumably the result of rabies or distemper, but we have no evidence to support the cause. In the following winter (2011–2012) there were fewer packs and group sizes of resident packs were smaller. This was true for all packs present on the Kuskokwim River and all tributaries except the Eek River drainage. A large number of fox did test positive for rabies in this area throughout the previous 2010–2011 winter.

HABITAT

Assessment

Extensive riparian, upland, and tundra habitats are available in Unit 18 to support much larger populations of moose, caribou, and muskoxen. Increased numbers of moose and stable numbers of caribou and muskox in the Yukon and Kuskokwim drainages have already resulted in an increase in the number of wolves in Unit 18 compared to the 1990s. However, there are still large areas of vacant habitat suitable for moose, caribou, and muskoxen. As these habitats are utilized by ungulates, wolf populations will benefit.

Enhancement

There were no direct habitat enhancement activities for wolves in Unit 18 during the reporting period. However, we have made progress toward improving moose populations through two separate public planning processes. As moose populations increase, wolf numbers will increase.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

In 2007 a rabid wolf was shot in a Yukon River village after it reportedly had contact with several dogs. In the fall of 2008 a moose hunter was attacked and bitten by a rabid wolf in Unit 19, just upriver of Kalskag. With increased wolf populations, human interactions have started to raise concerns about the number of wolves in Unit 18. While such interactions are unfortunate and unpredictable, it does not appear that Unit 18 has a high density of wolves because predation of moose and caribou appears to be quite low. Likely, the cause of wolf incidents is related to rapidly increasing moose populations along the main stems of the Yukon and Kuskokwim rivers where villages, moose, and wolves are in close proximity to each other. Rabies is an enzootic disease in Unit 18 and is observed most prevalently in foxes. Since foxes are abundant to overly-abundant throughout the unit, it is extremely likely that wolves receive the rabies virus by coming into contact with foxes.

CONCLUSIONS AND RECOMMENDATIONS

Wolf numbers continued to increase in Unit 18 in response to greater availability of ungulate prey. Moose along the Yukon River have increased in numbers and range to the point that wolf packs are established from the Unit 18 boundary at Paimiut to throughout the Yukon River Delta. Wolves have also increased in the Kilbuck Mountains in response to a seasonal influx of caribou and an expanding moose population. Some resident wolf packs have become established in the Kilbuck Mountains. We surmise that a large portion of the wolves that use the eastern portion of Unit 18 are transient packs and leave the unit as caribou leave. It appears that there is substantial seasonal movement between units in March, probably in response to mating season.

The current population estimate for Unit 18 is 150–250 wolves in 15–25 packs, and includes wolves that use adjacent game management units at times when caribou are no longer available in Unit 18. This decline since the last reporting period probably resulted from a natural mortality event of wolves on the Kuskokwim during the summer of 2011. The growing ungulate population in Unit 18 is capable of supporting a larger wolf population. As caribou have declined and stabilized, the moose population has increased and it appears that more packs are becoming resident in the unit in response to the abundance of moose in the unit. The nonmigratory nature

of moose give wolves a pray item that is available year round. This has allowed wolves to set up territories that they can maintain on a year-round basis.

The reported harvest of 109 in RY01 was the highest recorded for Unit 18. This was due to a growing wolf population, good snow conditions allowing easy snowmachine travel, caribou being available to a large number of Kuskokwim River residents, and better harvest reporting. It also reflected the efforts of one particularly accomplished trapper.

The reported harvest of 21 in RY09 does not follow the trend of increasing harvests of the last decade (Fig. 1). This lower harvest reflects poor travel conditions and illustrates the impact of poor weather on harvest in combination with increasing gas prices in the Yukon-Kuskokwim delta.

Current ungulate management strategies and planning efforts in Unit 18 are designed to increase caribou, moose, and muskox populations, resulting in increased availability of prey for wolves. Excessive human harvest is the principal factor limiting ungulate population growth in Unit 18, particularly for muskoxen colonizing the mainland. For these ungulate populations to grow and become established, residents must be willing to accept hunting restrictions. However, residents also point to wolves as contributors to the problem of low ungulate populations. For our public planning efforts to be accepted, wolves may need to be harvested at sufficiently high levels to assure minimal impacts from predation on ungulates. Currently, seasonal harvest levels range from 10% to 30% of the population despite poor understanding of wolf hunting regulations by many hunters, particularly those who take wolves opportunistically and those who use snowmachines to take wolves illegally. Wolf pelts are frequently presented for sealing after the sealing deadline has passed, and many of these are sealed by someone other than the hunter or trapper. Typically, these pelts are given as gifts to skin sewers, frequently elderly women, who discover the need to seal pelts when pelts are presented for tanning. We routinely seal these furs as requested and use this as an opportunity to educate the public about the sealing regulations. We have asked the fur sealers to direct people with illegal pelts to us so we have the opportunity for education and can get harvest data. We recommend continuing this practice.

LITERATURE CITED

Calista Professional Services and Orutsararmuit Native Council. 1984. Prospects for reviving the reindeer industry in the Yukon–Kuskokwim region. 178pp.

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Jones, P. 2012. Unit 18 wolf. Pages 127–137 *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.

Table 1. Unit 18 fall wolf population estimates[a], RY85 through RY11.

Regulatory year	Population	Packs
RY85	25–50	5–7
RY86	25–50	5–7
RY87	25–50	5–7
RY88	50–75	6–7
RY89	50–75	6–7
RY90	75–100	6–7
RY91	75–100	6–7
RY92	75–100	6–7
RY93	75–100	6–7
RY94	75–100	6–7
RY95	75–100	8–10
RY96	75–100	10–15
RY97	100–150	12–18
RY98	150–200	15–20
RY99	200–225	18–22
RY00	200–275	22–27
RY01	250–300	25–30
RY02	250–300	25–30
RY03	250–300	25–30
RY04	250–300	25–30
RY05	250–300	25–30
RY06	250–300	25–30
RY07	250–300	25–30
RY08	200–300	20–30
RY09	250–300	25–30
RY10	250–350	25–32
RY11[b]	150–200	15–20

[a]The basis for this estimate comes from incidental observations, reports from the public, sealing records, and trapper questionnaire results.

[b]After the reporting period.

Table 2. Unit 18 wolf harvest, Yukon vs. Kuskokwim drainages.

Regulatory year	Yukon	Kuskokwim	Unknown	Total
RY96	5	24	11	40
RY97	6	37		43
RY98	13	32	10	55
RY99	10	75		85
RY00	3	28		31
RY01	20	89		109
RY02	5	14		19
RY03	27	45	11	83
RY04	15	40	3	58
RY05	5	57	26	88
RY06	1	29	1	31
RY07	25	51		76
RY08	25	5		30
RY09	12	9	1	21
RY10	53	17	2	72

Table 3. Unit 18 wolf harvest, RY85 through RY10.

Regulatory year	Reported harvest			Method of take			Total harvest
	M	F	Unknown	Trap/ Snare	Shot	Unknown	
RY85	1	0	6	6	1	0	7
RY86	2	0	2	0	2	2	4
RY87	4	4	3	5	5	1	11
RY88	11	6	0	0	0	0	17
RY89	2	2	0	0	0	0	4
RY90	1	0	0	1	0	0	1
RY91	2	2	0	4	0	0	4
RY92	0	0	7	0	0	7	7
RY93	0	0	6	0	0	6	6
RY94	3	0	3	4	2	0	6
RY95	6	2	6	5	1	8	14
RY96	9	17	14	17	11	12	40
RY97	29	7	7	27	11	5	43
RY98	24	13	8	23	22	0	45
RY99	52	23	10	44	41	0	85
RY00	17	9	5	15	13	3	31
RY01	54	41	14	51	52	6	109
RY02	10	8	1	8	11	0	19
RY03	47	26	10	32	50	1	83
RY04	31	25	2	28	28	2	58
RY05	27	31	30	37	23	28	88
RY06	13	14	4	18	13	0	31
RY07	43	27	6	25	46	5	76
RY08	9	6	15	19	9	2	30
RY09	11	10	0	11	16	0	21
RY10	19	21	32	34	36	2	72
Total	427	294	191	414	393	90	912

Table 4. Unit 18 wolf harvest chronology by time period, RY86 through RY11.

	Reported harvest per harvest period								
RY	Sep	Nov	Dec	Jan	Feb	Mar	Apr	Unk	*n*
RY86			2					2	4
RY87			1	5	3	2			11
RY88			5	1	4	7			17
RY89				1	1	2			4
RY90					1				1
RY91						4			4
RY92								7	7
RY93				2		2		2	6
RY94			4		1	1			6
RY95		1			6	1		6	14
RY96	1	2	5	4	17			11	40
RY97		3	1	12	20	2		5	43
RY98		4	6	3	5	15	10	12	55[a]
RY99		2	9	30	32	12			85
RY00	1	1	2	11	4	6	1	5	31
RY01		4	4	27	43	19		12	109
RY02			1	5	10	2		1	19
RY03			9	15	31	27		4	86[a]
RY04			13	20	15	8	1	8	65[a]
RY05		3	7	13	14	11	1	39	88
RY06	1	0	8	4	2	6	1	9	31
RY07			6	7	18	30	2	13	76
RY08		3	6	4	1	11	3	2	30
RY09		1	3	2	7	8			21
RY10	2	2	12	16	13	18	4	1	68[a]
RY11		1	6	2	8	7			24[b]
Total	5	27	110	184	256	201	23	139	945[a]

[a] These numbers vary from those listed elsewhere in this report due to reporting and database query inconsistencies.
[b] After the reporting period.

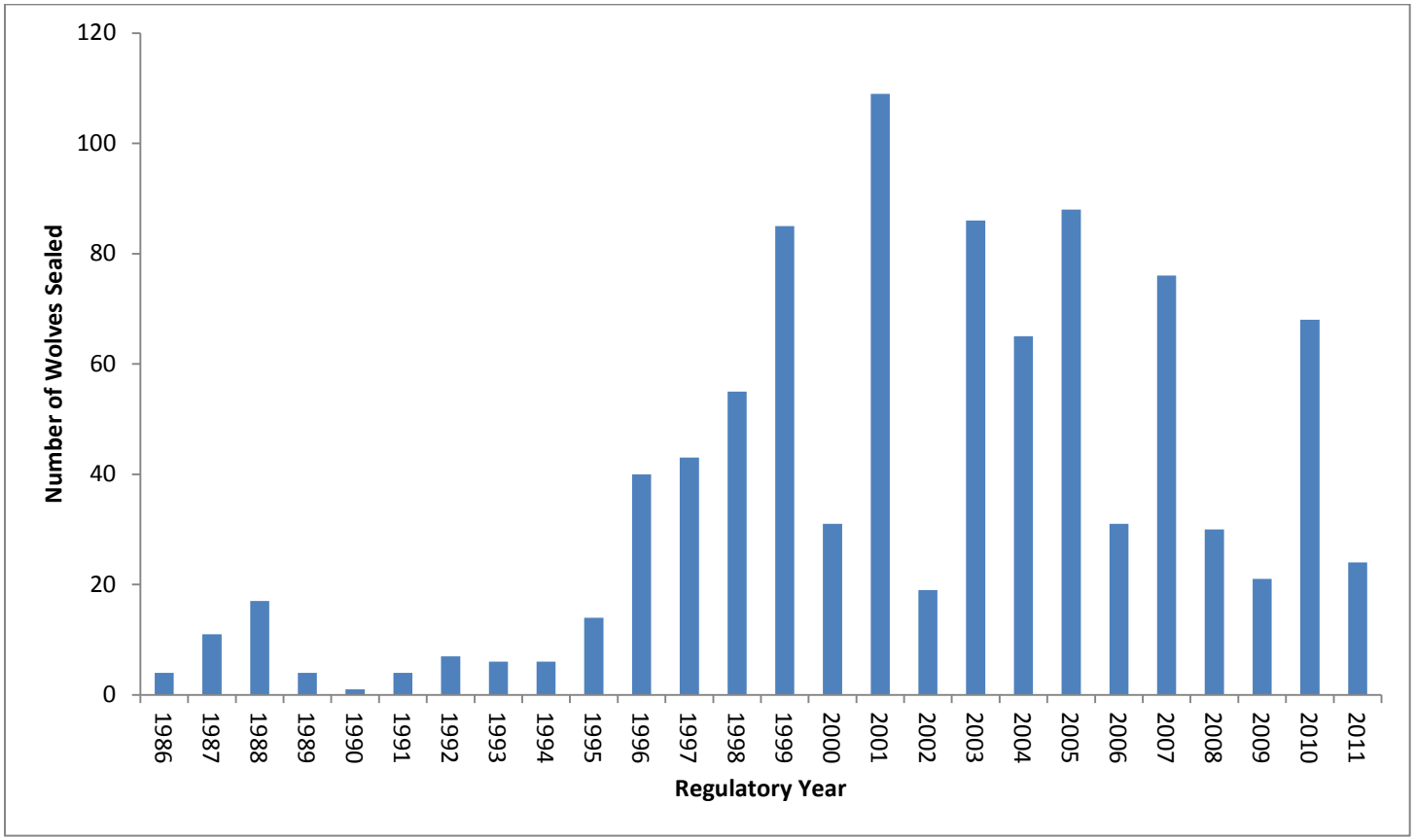

Figure 1. Number of wolves sealed in Unit 18, RY85 through RY11.

SPECIES

MANAGEMENT REPORT

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

WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011[1]

LOCATION

GAME MANAGEMENT UNITS: 19A, 19B, 19C, and 19D (36,486 mi^2)

GEOGRAPHIC DESCRIPTION: Drainages of the Kuskokwim River upstream from the village of Lower Kalskag

BACKGROUND

Wolves play multiple roles in the economy and ecology of the upper Kuskokwim River drainage. Trappers seek wolf pelts for both personal use and commercial sale. Hunters consider wolves both trophy big game animals and competitors for moose. Wolves are an important predator of moose and caribou and can regulate populations to a low density equilibrium (Gasaway 1992, Boertje et al. 1996, Hayes et al. 2003).

Wolf harvest regulations in Unit 19 have changed frequently in response to public controversies. Wolf harvest declined after cessation of bounties in 1967 and after the Federal Airborne Hunting Act of 1972 eliminated the common practice of shooting wolves from airplanes. However, the Alaska Department of Fish and Game (ADF&G) issued aerial shooting permits to members of the public until 1983 as part of specific management programs. Hunting of wolves using land-and-shoot methods continued as a legal means of hunting until regulatory year (RY) 1992 (RY = 1 July through 30 June; e.g., RY92 = 1 July 1992 through 30 June 1993) when all same-day-airborne hunting was prohibited. Beginning in RY94, same-day-airborne taking of wolves was permitted for holders of a trapping license if trappers landed and moved more than 300 ft from the aircraft before shooting a wolf. A public ballot initiative in November 1996 repealed that regulation beginning in late February 1997, again prohibiting all same-day-airborne shooting of wolves.

During 1980–1995, area biologists and residents recognized that moose densities were low in the upper Kuskokwim drainage. The primary limiting factor was believed to be predation aggravated during 1989–1995 by 4 severe winters with deep, persistent snow. In Unit 19D, an intensive research project (2003–2010) identified that wolves, black bears, and grizzly bears were

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

significant predators of moose (Keech et al. 2011). This understanding has focused management on efforts to reduce predation in Unit 19.

In the early 1990s, local residents attempted to convince the state to initiate a management program to aid the moose population and in 1994, with the aid of the Tanana Chiefs Conference, met with officials from ADF&G to discuss predation control options. In 1995 the Alaska Board of Game (Board) adopted a *Wolf Control Implementation Plan* (Title 5 of the Alaska Administrative Code, regulation 92.125 [5 AAC 92.125]) for eastern Unit 19D (known as Unit 19D East), which encompasses 8,513 mi^2 of Unit 19D upriver of, but not including, the Black and Selatna River drainages (Fig. 1). The board reauthorized and updated this plan in January 2000, March 2001, March 2003, January and May 2006, and March 2009. The recent update continues this plan through June 30, 2014.

In 2001 the Experimental Micro Management Area (EMMA), was established. This 528 mi^2 area, renamed the Bear Control Area (BCA) in 2009, encompasses the highest density of moose in Unit 19D East and was established as a treatment area to test and implement predator population manipulations and other management actions (Fig. 1).

ADF&G established aerial wolf control focus areas (WCFAs) surrounding McGrath of 1,728 mi^2 (RY03, 2 weeks only), 3,210 mi^2 (remainder of RY03–RY05), 6,245 mi^2 (RY06–RY08), and 4,484 mi^2 (RY09–RY11) and allowed permitted pilots to conduct aerial wolf control to reduce wolf predation only within this portion of Unit 19D East (Fig. 1). None of the WCFAs included all of Unit 19D East.

In Units 19A and 19B moose numbers had declined by the late 1990s and a working group was established to consider moose management there. The Central Kuskokwim Moose Management Working Group developed the *Central Kuskokwim Moose Management Plan* (Alaska Department of Fish and Game 2004). The plan was approved by the board in June 2004, and includes a wolf control implementation plan (5 AAC 92.125) which authorized wolf control in Unit 19A during RY04–RY09. Unit 19B was not included in this wolf control implementation plan.

Predation control programs in Unit 19 are instrumental in moose management and are critical if ADF&G is to comply with intensive management statutes and regulations. Local support for these programs remains high, particularly in Units 19A and 19D. Statewide, however, wolf control programs remain controversial.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Wolf populations are managed to provide for human uses and to ensure that wolves remain an integral part of Interior Alaska's ecosystems. Compatible human uses include hunting and trapping, photography, viewing, listening, and scientific and educational purposes. Other aesthetic values of wolves are also recognized.

During RY08–RY10, our wolf management goals were to:

- Ensure the long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.

- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.

- Increase public awareness and understanding of the uses, conservation, and management of wolves, their prey, and habitat in Alaska.

MANAGEMENT OBJECTIVES

Unit 19A

- Reduce the number of wolves to the lowest level possible within the central Kuskokwim Villages Moose Management Area (Fig. 2) while achieving a 60–80% reduction of the precontrol Unit 19A wolf population and ensuring that no fewer than 30–36 wolves remain in Unit 19A.

Unit 19D East

- Reduce the number of wolves to the lowest level possible within the WCFA while achieving a 60–80% reduction of the precontrol Unit 19D East wolf population and ensuring that no fewer than 40 wolves remain in Unit 19D East (Fig. 1).

Units 19B, 19C, and the remainder of Unit 19D

- Provide for a sustained annual harvest of up to 30% from the combined wolf population.

MANAGEMENT ACTIVITIES

Management activities for wolf populations in Unit 19 were to:

- Conduct aerial wolf population surveys within the WCFAs in Units 19A and 19D East every 3 years.

- Continue to refine annual wolf population estimates, based on wolf survey results, incidental sightings, hunter interviews, trapper questionnaires, and evaluation of sealing documents.

- Monitor harvests and trapper effort through sealing records and trapper questionnaires.

- Conduct wolf predation control programs as directed by the Commissioner and the board.

- Conduct wolf trapping and snaring clinics in communities that have expressed interest in the program.

- Cooperate with other agencies conducting wolf studies within the management area, and incorporate local knowledge and assistance in management strategies for wolves when appropriate.

METHODS

POPULATION STATUS AND TREND

Assessing Population Size and Density

Unit 19D. Keech (2011) estimated wolf abundance in Unit 19D East, using reconnaissance track surveys (Stephenson 1978) during 21–24 February 2001, and a combination of minimum wolf counts and detailed observations by department-designated wolf control pilots during 17–19 March 2005, 14–17 March 2006, and 18–20 March 2009. Survey areas differed among years. During the 2005 and 2006 surveys, we censused wolves in the WCFA by increasing the survey intensity (Gasaway et al. 1992). The 5,204 mi^2 moose survey area (Fig. 3) was surveyed during 2001, 2005, and 2006 and the 6,245 mi^2 WCFA that was in place during RY06–RY08 was surveyed during 2009. All surveys focused on the 3,210 mi^2 WCFA used during RY03–RY05 and densities were extrapolated to estimate wolf numbers in the WCFA in place during RY09–RY11.

Survey teams in fixed-wing aircraft made direct observations of wolves and counted tracks in assigned areas. We mapped wolf observations (packs, pairs, and singles), tracks, and kill sites, and discussed potential overlap among sightings to reduce the possibility of overestimating the number of packs or wolves in a pack. To supplement the estimate, we obtained additional information about wolf pack sizes and territory boundaries from conversations with wolf hunters, trappers, and wolf control permittees. We combined all independent observations to determine the number of wolves in the survey area.

Unit 19A. We conducted wolf surveys in Unit 19A during 23–26 January 2006 south of the Kuskokwim River (census), 16 March 2006 north of the Kuskokwim River (census), 1–6 February 2008 throughout Unit 19 (estimate), and 12–13 February 2011 within the Unit 19A WCFA (minimum count). Survey conditions were not adequate during the 2011 survey so we interviewed active wolf control permittees and combined our findings with theirs. We used these surveys to generate estimates of the Unit 19A wolf population, taking into account hunter–trapper harvest and wolves killed by wolf control permittees.

Units 19B and 19C. We estimated fall wolf population size in the portions of Unit 19 not directly surveyed by using a combination of information from Unit 19A and Unit 19D survey areas, Unit 20A wolf research data, harvest records, and hunter–trapper interviews and questionnaires.

HARVEST

Hunter–Trapper Harvest

Sealing by an ADF&G representative or an appointed fur sealer is required for wolves taken in Alaska; we obtained harvest statistics primarily from these sealing certificates. During the sealing process, information was collected on specific location and method of take, date, sex, color of pelt, estimated size of the wolf pack, and method of transportation. Population and harvest data were summarized by regulatory year.

Wolf Control Program Take

Wolves taken by wolf control permittees were also sealed and these harvest statistics were recorded on sealing certificates and summarized along with hunter–trapper harvest data by regulatory year.

Method of take was recorded as same-day-airborne. We awarded wolf control permits to Alaska residents based on piloting experience, wolf harvest experience, and experience with low level flying to track wildlife (especially flights to track and capture wolves), knowledge of the terrain in the wolf control area, previous wolf control experience, a history of successfully taking wolves in Unit 19 control programs, and the ability to pass a background check. Permit packets that included permits, maps, reporting instructions, and wolf control seals were issued to permittees at selected ADF&G offices. Wolf control pilot and gunner applicants were screened by the Department of Public Safety, Alaska Wildlife Troopers for game violations. Permittees were required to check in with McGrath ADF&G personnel prior to entering the field and after returning. This check-in/check-out procedure allowed us to assist pilot communication to maintain safety by disseminating pertinent information regarding where other pilots were active as well as ADF&G survey aircraft. This procedure also facilitated timely reporting of wolves taken in the wolf control programs.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size and Density

Unit 19D. During 21–24 February 2001, we estimated wolf numbers in a 5,204 mi^2 portion of Unit 19D East (Fig. 3). Survey conditions were adequate during the first 2 days, with 3 inches of 6-day-old snow on a 19-inch base, but deteriorated during the third day and were marginal during the fourth day. Survey intensity was less than 0.9 min/mi^2 due to deteriorating conditions. We found 103 wolves associated with 13 packs ($\geq$2 wolves) and 5 singles within the core area. Pack size ranged 2–10 wolves ($\bar{x}$ = 6 wolves/pack). Using these results in combination with reported harvest, we estimated 103 wolves in 14 packs ($\bar{x}$ = 6 wolves/pack) after hunting and trapping were completed in the spring (Table 1). The estimated density was 15 wolves/1,000 mi^2 (6 wolves/1,000 km^2) in the 3,210 mi^2 WCFA (Table 1). We combined survey results with harvest data and published estimates for pup production and survival to obtain a precontrol fall 2000 estimate of wolves that reside within the WCFA and also those that move between the WCFA and surrounding areas (superpopulation) of 198 wolves in all of Unit 19D East and a precontrol estimate of 103 wolves in the 4,484 mi^2 Unit 19D East WCFA.

The objectives of the March 2005 survey were to verify that the minimum number of wolves remained in Unit 19D East following control activities, and to census the number of wolves and packs within the 3,210 mi^2 WCFA (Fig. 1). Survey conditions were adequate to meet those objectives with old crusted snow overlain by approximately 1–2 inches of fresh snow that had fallen on 15–16 March. Conditions remained adequate throughout the survey. Overall search intensity was ~0.5 min/mi^2 but was higher in the 3,210 mi^2 WCFA. During the survey we found 53–65 wolves (including 7 singles) in 12–13 packs of $\geq$2 wolves ($\bar{x}$ = 3.5–4.8 wolves/pack (Table 1) and 9 of these wolves used the 3,210 mi^2 WCFA. When we combined survey results with reported harvest our extrapolated Unit 19D East fall 2004 superpopulation estimate was 103 wolves.

Similar to 2005, the intent of the March 2006 survey in Unit 19D East was to verify a minimum count of wolves and to census wolves within the 3,210 mi^2 WCFA (Fig. 1). Survey conditions were adequate to meet these objectives. Snow conditions consisted of an accumulation of ~20 inches of snow, overlain by a complete 8–12 inch layer of snow that had fallen during 4–10

March. Because of windy conditions during 10–17 March, this fresh layer of snow was windblown in many places. These snow conditions remained the same for the length of the survey. Search intensity was about 0.4 min/mi^2 but was higher in the 3,210 mi^2 WCFA. During the survey we found 82 wolves (including 4 singles) in 18 packs ($\bar{x}$ = 4.3 wolves/pack; Table 1) and 13 of these wolves used the 3,210 mi^2 WCFA. When we combined survey results with reported harvest, our extrapolated Unit 19D East fall superpopulation estimate was 91 wolves.

During 18–20 March 2009 we surveyed wolf numbers in the 6,245 mi^2 WCFA active during RY06–RY08 (Fig. 1). Our objective was to verify a minimum count of wolves and to census wolves within the 3,210 mi^2 WCFA (Fig. 1). Snow conditions consisted of the winter's accumulation of ~36 inches of snow, overlain by an approximately 4-inch layer of snow that had fallen 12 March. Because of windy conditions during 12–20 March, this fresh layer of snow was windblown in many places, particularly in open areas. Weather and snow conditions remained generally the same for the length of the survey. We found 38–40 wolves in 10 packs and 4 singles. Pack size ranged 2–9 ($\bar{x}$ = 3.4 –3.6 wolves/pack; Table 1). Within the 3,210 mi^2 WCFA, we found 23–25 wolves (including 2 singles) in 6 packs ($\bar{x}$ = 3.5–3.8 wolves/pack) When survey results were combined with detailed observations from department-designated wolf control pilots, and harvest locations obtained through trapper interviews, the extrapolated Unit 19D East fall superpopulation estimate was 71 wolves.

Unit 19A. We did not estimate wolf numbers in Unit 19A prior to wolf control in 2004. We based our precontrol fall 2004 estimate on results from the 2001 wolf surveys conducted in Unit 19D East and refined this estimate after we conducted wolf surveys in 2006. The 2006 survey was a census with a survey intensity of 0.9 min/mi^2. To estimate density, we followed the pack inclusion rule outlined in Becker et al. (1998). After incorporating the 2006 data, our Unit 19A precontrol fall 2004 estimate was 125–150 wolves (12–15 wolves/1,000 mi^2; 5–6 wolves/ 1,000 km^2), including 75–100 wolves in the WCFA (Table 2).

The 2006 Unit 19A spring wolf estimate (after 1.5 seasons of wolf control) was 115–122 (including 8–9 single wolves) in 28 packs ($\bar{x}$ = 3.8–4.1 wolves/pack). After we combined survey results with reported harvest, we estimated the fall 2005 population as 119–133 wolves (12–13 wolves/1,000 mi^2; 5 wolves/1,000 km^2). In the Unit 19A WCFA, we estimated a minimum of 42–44 wolves, including 1 single in 13 packs or 3.0–3.2 wolves/pack (Table 2).

During the February 2008 survey in all of Unit 19A we observed 74 wolves in 17 packs and 3 singles. The survey was conducted 3–4 days after multiple light snowfall events and tracking conditions were very good to excellent throughout the area during the first 2 days of the survey, except in the Oskawalik and Holokuk River drainages where winds obscured tracks on the higher ridges. During the 3rd day, winds prevented any flights and on the 4th day, tracking conditions were fair north of the Kuskokwim River along the ridges, and very good in the river bottoms. Surface temperatures ranged from –5 to –35 F. Survey intensity was 0.4 min/mi^2 and pack size ranged 2–14 ($\bar{x}$ = 4.2 wolves/pack). Because no harvest occurred prior to the February survey we estimated the fall 2007 population to be comparable to our spring survey results assuming that the natural mortality rate during September–February was minimal (Adams et al. 2008). In the Unit 19A WCFA, we found 24 wolves in 5 packs (x = 4.6) plus 1 single wolf (Table 2).

Based on our February 2011 minimum wolf count survey and wolf control permittee interviews, we estimated 23 wolves in 6 packs of ≥2 wolves in the Unit 19A WCFA. After adding known harvest, the fall 2010 estimate in the WCFA was 30 wolves in 6 packs ($\bar{x}$ = 4.7 wolves/pack). Previously, in 2008, 50 wolves in 11 packs were found outside the WCFA and the overall Unit 19A estimate was 80 wolves in 17 packs (Table 2).

Units 19B and 19C. We did not conduct wolf surveys in Units 19B and 19C. Our estimates are based on survey data collected in Units 19A and 19D as well as reports from hunters, pilots, and trappers; observations made during surveys for other species; reports provided during fur sealing; habitat considerations; and prey availability. Using these factors, we predict that 110–160 wolves inhabited Unit 19B and 100–140 wolves inhabited Unit 19C during RY08–RY10. The wolf population trend for both units is likely stable based on harvest rates and stable ungulate populations (Table 3).

Population Composition

During RY08–RY10, the total reported take was 167 wolves, including 87 (52%) males, 75 (45%) females, and 5 (3%) of unknown or unrecorded sex (Table 4). Of these, wolf control permittees took 17 males and 17 females.

Distribution and Movements

Survey data, harvest locations, and incidental sightings indicated that wolves were distributed throughout Unit 19 except that there are periodic local vacancies due to wolf control and harvest. Survey and harvest data verify that these vacancies fill in rapidly.

MORTALITY

Harvest

Season and Bag Limit.

Unit, Bag Limit, and Special Restrictions	*Resident and Nonresident Open Seasons*
RY09–RY11	
Units 19A, 19B, and 19C.	
HUNTING: 10 wolves per day.	1 Aug–31 May
TRAPPING: No limit.	1 Nov–30 Apr
Unit 19D.	
HUNTING: 10 wolves per day.	1 Aug–31 May
TRAPPING: No limit.	1 Oct–30 Apr

In addition to hunting and trapping seasons, wolf control pilot and gunner permittees were allowed to take wolves in the WCFAs in Units 19A and 19D during 1 November–30 April during RY08–RY10.

Alaska Board of Game Actions, Emergency Orders, and Legislative Actions.

Units 19A — In March 2009 the Board modified and reauthorized the Unit 19A predation control implementation plan for 5 years beginning 1 July 2009. This plan applies aerial wolf control only within the 3,913 mi^2 WCFA defined as the drainages upriver of Sleetmute, and established the Central Kuskokwim Villages Moose Management Area (CKVMMA) in this area (Fig. 2). Objectives of this plan are to reduce the precontrol wolf population by 60–80% in Unit 19A, reduce the number of wolves within the WCFA to the lowest level possible, and ensure that at least 30–36 wolves remain throughout Unit 19A. The wolves remaining in Unit 19A would be expected to be found in that portion of Unit 19A outside the WCFA.

Unit 19D — In March 2009 the board reauthorized the Unit 19D East predation control implementation plan for 5 years beginning 1 July 2009. This plan restricts aerial wolf control to the 4,484 mi^2 WCFA (Fig. 1), specifies an overall objective to reduce the number of wolves in Unit 19D East to 60–80% of precontrol levels and to the lowest level possible within the WCFA while ensuring that at least 40 wolves remain throughout Unit 19D East.

Hunter–Trapper Harvest and Wolf Control Permittee Take. During RY08–RY10, 36–81 wolves ($\bar{x}$ = 56) were reported harvested by hunters, trappers, and wolf control permittees annually in Unit 19 (Table 4). Of these, control permittees took 68 wolves; 32 in Unit 19A and 36 in Unit 19D East (Table 7a).

During RY08–RY10, in Units 19B and 19C, shooting by hunters and trappers was the most important method of take, while in Units 19A and 19D the most important method of take was shooting from aircraft by wolf control permittees followed by shooting in Unit 19A and snaring in Unit 19D (Table 7b).

During RY08–RY10, hunters and trappers harvested 19 wolves in Unit 19B and 22 in Unit 19C (Table 7b). Even with unreported harvest, the annual harvest rate is likely <10% and has no limiting effect on the population (Adams et al. 2008)

Wolf Control Kill. Wolf control take is summarized by area in tables 5, 6, 7a and 7b. In RY10, the control take of wolves in Unit 19A reduced the number of wolves within the Unit 19A WCFA by 75–81% of the precontrol population (Table 5). In RY08, the control take of wolves and wolf harvest in Unit 19D East reduced the number of wolves within the Unit 19D WCFA by 89% (Table 6). An average of 0.5 wolf was taken by each permittee (Table 8).

Hunter–Trapper Residency and Success. Alaska residents contributed 90% of the annual wolf harvest by hunters and trappers, and all of the aerial wolf take during RY08–RY10 throughout Unit 19 (Table 4). Nonresident harvest of wolves generally occurred during the fall incidental to other big game hunts.

The average number of wolves taken per successful hunter–trapper–wolf control permittee was 2.4 wolves during RY06–RY10 (range = 1.7–3.1) and 2.2 during RY08–RY10 (Table 4).

However, of the 302 wolves taken during RY06–RY10, 134 (44%) were taken by only 5 residents.

Harvest Chronology. During RY08–RY10, 49 percent of the reported wolf harvest and aerial wolf take occurred during February and March (Table 9) and these months contributed 78% of the wolves taken using aerial wolf control methods (Table 10). Winter wolf harvests and take by aerial control are dependent on adequate snow cover which typically improves by mid-December. Furthermore, adequate sunlight, which is best during late January through March, is necessary to efficiently track wolves. Even though wolf season and control activities can occur through April, few trappers and control permittees participate because of deteriorating snow conditions and wolf pelt quality. The low wolf take in RY06 and RY09 is likely due to travel conditions which remained poor throughout the season due to low snow. August and September wolf harvests are typically incidental to other big game hunts.

Transport Methods. During RY08–RY10, snowmachines (46%) and aircraft (34%) were the most common methods of transportation used by hunters and trappers to harvest wolves in Unit 19 (Table 11).

NONREGULATORY MANAGEMENT PROBLEMS, NEEDS, AND EDUCATION

Hair loss on wolves is a problem throughout Unit 19, with genetic follicular dysplasia and lice identified as causes. No cost-effective tools exist to treat these problems, so they are likely to persist. Wolf pelts with poor hair have little value, but during RY08–RY10 hunters and trappers were still inclined to take these wolves to 1) remove louse infected individuals from the population, 2) remove predators from the population in the belief that a public service is being rendered, and 3) take advantage of whatever value such wolves might have. Depending on the degree of hair loss, some wolf hides may still have some fur value, and most wolf skulls also have some monetary value.

CONCLUSIONS AND RECOMMENDATIONS

Throughout Unit 19, we ensured the long-term conservation of wolves, provided for a broad range of human uses and values, and increased public awareness and understanding of wolf conservation and management. Even within those areas where wolf control took place, at least 30–36 wolves in Unit 19A and 40 wolves in Unit 19D East remained each year after wolf control programs concluded. Largely because of these wolf control programs, wolves had a sufficiently high profile such that education regarding wolves and their prey gained the attention of the Board, Fish and Game advisory committees, and the public through media contacts and other means.

During RY08–RY10 we met the Unit 19A management objective to reduce wolf numbers to the lowest level possible within the central Kuskokwim villages Moose Management Area. We reduced the wolf population ≥60% from precontrol levels in this area in RY10. We also probably achieved this objective during RY08 and RY09 based on the combined number wolves killed by control activities and by hunters and trappers (Table 7). We did not achieve our objective to achieve 60–80% wolf reduction in the remainder of Unit 19A (Table 5) because aerial methods are not used there due to land owner restrictions, topography, and vegetation. Further, this

portion of Unit 19A is instrumental in ensuring our objective that 30–36 wolves remain, which was achieved.

Within Unit 19D East, we achieved our objective to reduce wolf numbers to the lowest level possible within the WCFA. The combination of control and harvest reduced the population by an estimated 89% during RY08 compared to precontrol levels of 103 wolves during 2001. We probably also met this objective during RY09 and RY10, based on interviews with wolf control permittees and hunters and trappers. A 60% or greater reduction was also achieved in the entirety of Unit 19D East during RY08. During RY09–RY10, we are uncertain whether this level of reduction was achieved because surveys were not conducted (Table 6).

We harvested fewer than 30% of wolves from Units 19B, 19C, and the remainder of Unit 19D. The objective was met to provide for harvest of up to 30% of the wolf populations from these areas. Based on the reported annual harvests, the estimated annual harvest rate in these areas was <10%, meeting that objective; additional harvest also would be sustainable.

In the WCFAs, the average wolf control permittee took 0.5 wolves (Table 8). This success rate was due primarily to 1) poor participation attributed to high cost (e.g., aviation fuel in McGrath was $8.25/gallon); 2) remoteness of the wolf control areas to large population centers; 3) time available to fly did not always coincide with good weather and snow conditions needed to take wolves using aerial methods; and 4) other reasons including landowner restrictions. Future wolf control programs should favor permittees with a track record of participation and success but should be mindful of the need to recruit new participants who will be necessary for these programs to remain viable in the future.

Because of lower moose and caribou populations and user conflicts in Units 19B and 19C, moose and caribou hunting opportunities for hunters using aircraft were not as widely available as during the 1990s, particularly for nonresident hunters. Because incidental take of wolves accounts for much of the total wolf harvest in these units, wolf harvest will likely remain low.

Recruiting new wolf trappers would be desirable. One way to do this and to accommodate the desire in local villages to take more wolves is to offer clinics on building traps and snares and using them to take wolves. Whenever these have been offered, they have been well received and other potential management benefits may follow. Therefore, we recommend conducting these clinics as resources allow. However, increased wolf harvest has not occurred following these clinics so additional motivation may be needed. Wolf control programs are designed to help achieve moose population and harvest objectives. In Units 19A and 19D East, all moose population and harvest objectives have not been met, so we recommend maintaining these control programs and our current wolf management goals for Unit 19.

The following objectives will be in place for the next reporting period:

Unit 19A

- Reduce the number of wolves to the lowest level possible within the Unit 19A WCFA.
- Ensure that no fewer than 30–36 wolves remain in Unit 19A.

The previous objectives included reducing the number of wolves by 60–80% in Unit 19A, but this is redundant because leaving at least 30–36 wolves is based on an 80% reduction from precontrol levels.

Unit 19D East

- Reduce the number of wolves to the lowest level possible within the Unit 19D WCFA.
- Ensure that no fewer than 40 wolves remain in Unit 19D East.

The previous objectives included reducing the number of wolves by 60–80% in Unit 19D East, but this is redundant because leaving at least 40 wolves in Unit 19D East is based on an 80% reduction from precontrol levels.

Units 19B, 19C, and the remainder of Unit 19D

- Provide for an annual harvest of up to 29% from the combined wolf population.

Adams, et al. (2008) found that harvests of less than 29% did not impact wolf numbers. Because of this, a 29% threshold is favored over the previous 30% threshold.

In addition, the following wolf management activities will be in place for the next report period:

- Conduct aerial wolf population censuses, estimates, or minimum count surveys within the WCFAs in Units 19A and 19D East every 3 years.

This change recognizes that surveys may vary in intensity and that comparisons among surveys should take these differences into account. When possible, we will conduct censuses, but may be unable to do so for reasons such as weather, pilot availability, or lack of other resources that may be beyond our control. Estimates or minimum count surveys will be attempted when censuses are not possible.

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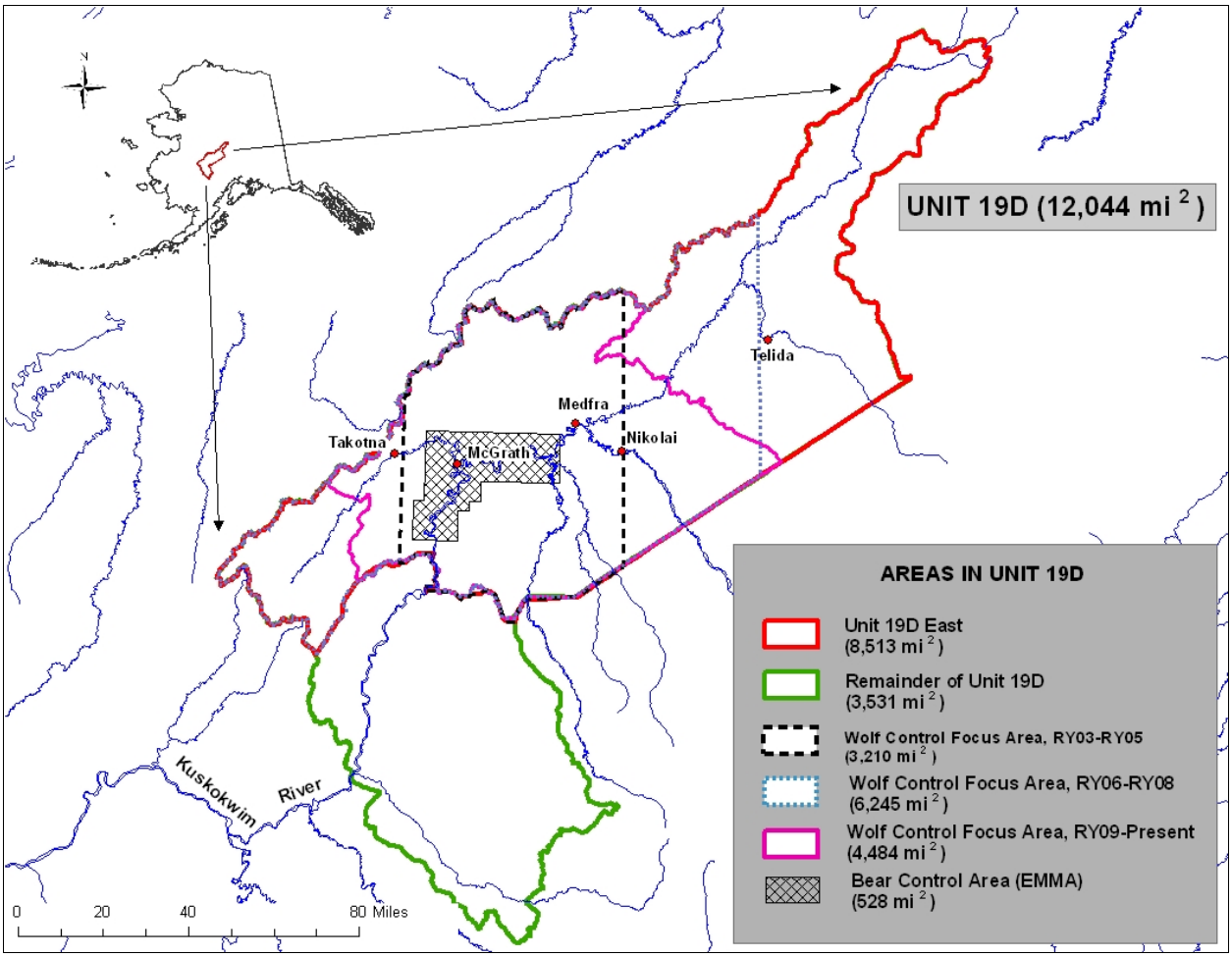

Figure 1. Unit 19D showing management activity areas.

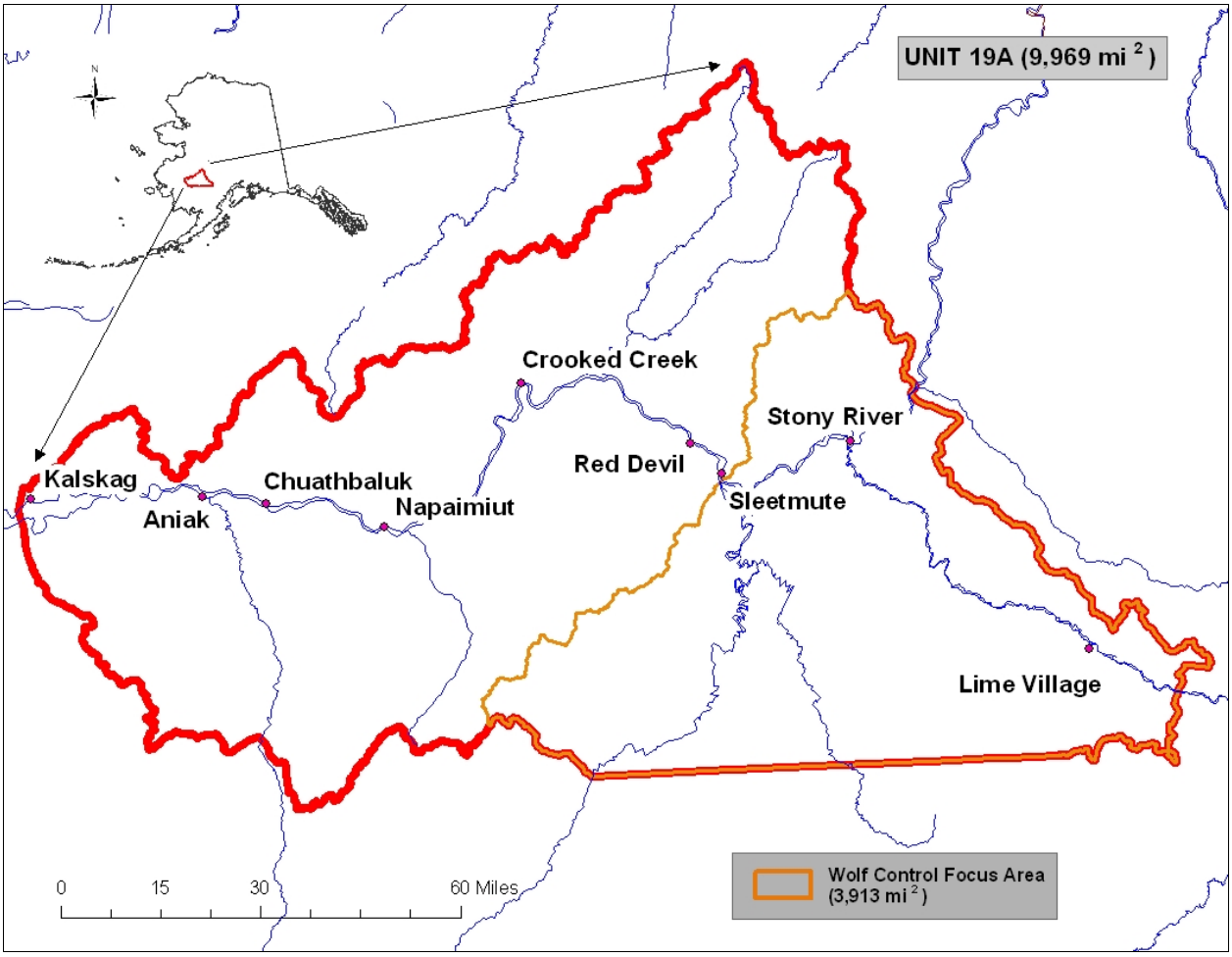

Figure 2. Unit 19A aerial wolf control area permitted throughout Unit 19A during regulatory years 2004–2005 through 2008–2009. Beginning in regulatory year 2009–2010, aerial wolf control was limited to the WCFA. The WCFA and the Central Kuskokwim Village Moose Management area have the same boundaries.

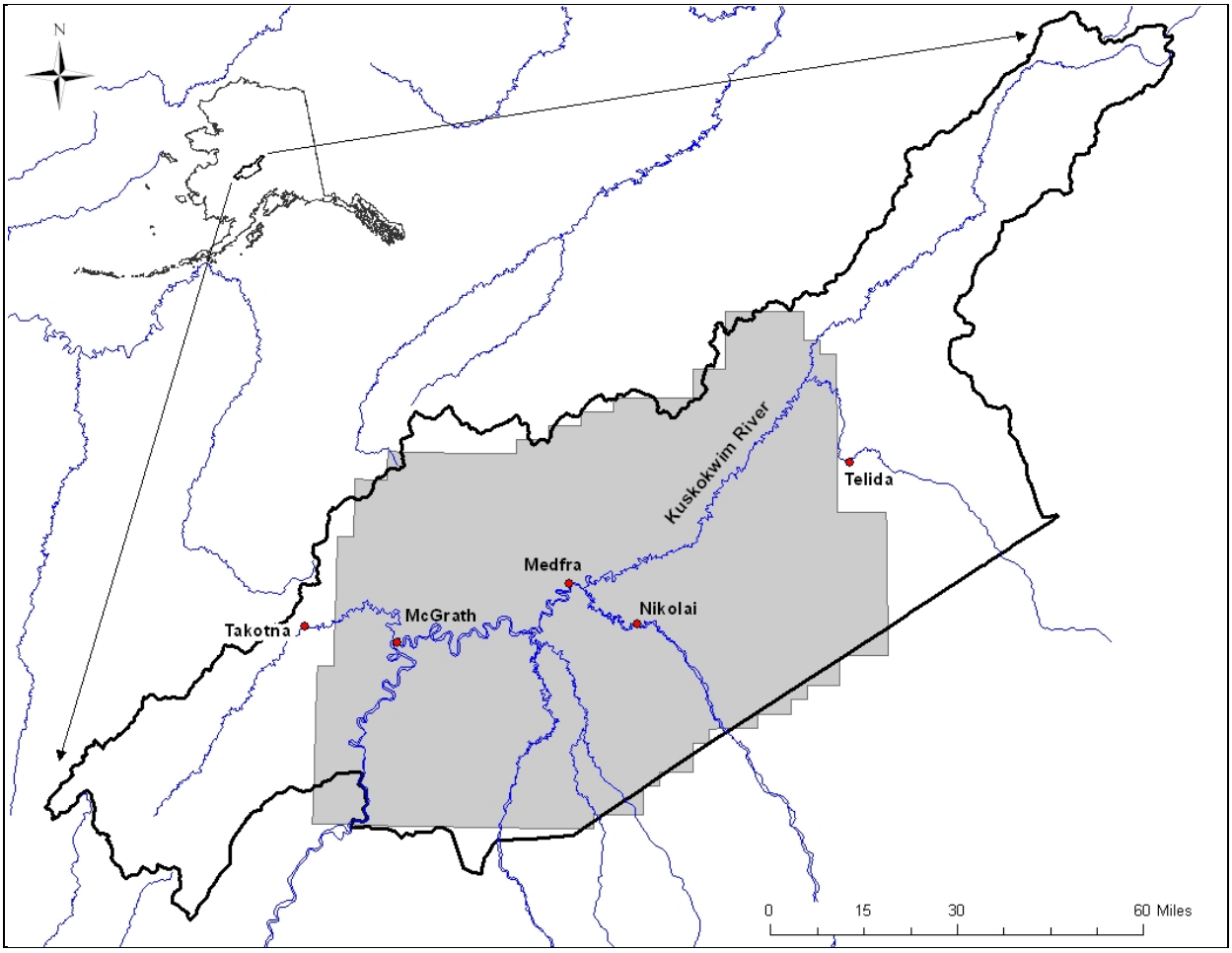

Figure 3. 5,204 mi^2 moose survey area in Unit 19D where wolf surveys were conducted during 2001, 2005, and 2006.

Table 1. Unit 19D East wolf population estimates, 2001–2009.

Survey date	Survey area estimate	No. of packs[a]	$\bar{x}$ wolves/ pack	Unit 19D East fall estimate	Unit 19D East fall wolf density estimate (wolves/1,000 mi^2)	Spring wolf density estimate in 3,210 mi^2 WCFA[b] (wolves/1,000 mi^2)
February 2001[c]	103	14	6	198	23	15
March 2005[d]	53–65	12–13	3.5–4.8	103	12	3
March 2006[e]	82	18	4.3	91	11	3
March 2009[f]	38–40	10	3.4–3.6	71	8	5

[a] Single wolves not included as packs.
[b] 3,210 mi^2 WCFA is the wolf control focus area current during regulatory years 2003–2004 through 2005–2006.
[c] Area surveyed was the 5,204 mi^2 Unit 19D East moose survey area.
[d] Area surveyed was slightly larger than Unit 19D East moose survey area.
[e] All of Unit 19D East surveyed.
[f] Area surveyed was the 6,245 mi^2 WCFA current during regulatory years 2006–2007 through 2008–2009. A portion of this area was unsurveyed and this estimate may be biased low.

Table 2. Unit 19A wolf population estimates, regulatory years 2004 through 2010.

Regulatory year	Fall population estimate	No. of packs[a]	$\bar{x}$ Wolves/ pack	WCFA fall population estimate	No. of packs[a]	$\bar{x}$ Wolves/ pack
2004[b]	125–150	--	--	75–125	--	--
2005	119–133	28	3.8–4.1	42–44	13	3.0–3.2
2007	74	17	4.2	24	5	4.6
2010[c]	80	17	4.5	30	6	4.7

[a] Single wolves not included as packs. Pack size calculated at time of survey.
[b] The 2004–2005 estimate was based on extrapolation of data from Unit 19D and reconstruction following the regulatory year 2005–2006 wolf and moose surveys in Unit 19A which indicated that the previous estimate of 180–240 was too high.
[c] The 2010–2011 estimate for the unsurveyed portion of Unit 19A is based on 50 wolves in 11 packs and 2 singles which is similar to 2008 survey data for this area.

Table 3. Total Unit 19 fall wolf population estimates, regulatory years 2006 through 2010.

Regulatory year	Population estimate	Number of packs
2006	365–437	60–75
2007	382–454	65–80
2008	388–460	58–69
2009	390–462	59–69
2010	386–458	58–69

Table 4. Unit 19 composition and residency of wolf harvest and aerial wolf control take, regulatory years 2006–2007 through 2010–2011.

Regulatory year	Reported harvest					Residency of person taking each wolf			Number of trappers/ hunters/ permittees	$\bar{x}$ wolves/ trappers
	M	F	Unknown	% Male	Total	Nonresident	Resident	Unknown		
2006	30	17	4	64	51	14	37	0	23	2.2
2007	45	38	1	54	84	12	72	0	27	3.1
2008	44	37	0	54	81	4	77	0	31	2.6
2009	21	14	1	60	36	8	28	0	21	1.7
2010	22	24	4	48	50	5	45	0	22	2.3
Total	162	130	10	55	302	43	259	0	124	
% of Total	54	43	3		100	14	86			$\bar{x}$ = 2.4

Table 5. Fall and spring wolf population estimates, wolf harvest and aerial wolf control take, and percent reduction from precontrol wolf estimates (Fall 2004) in Unit 19A and in the Wolf Control Focus Area (WCFA), regulatory years 2004–2005 through 2010–2011.

Regulatory year	Unit 19A				Unit 19A WCFA			
	Fall population estimate	Take	Spring population estimate	% reduction from precontrol population estimate of 125–150	Fall population estimate	Take	Spring population estimate	% reduction from precontrol population estimate of 75–100
2004	125–150	72	55–78	37–63	75–100	44	31–34	55–69
2005	119–133	80	39–53	55–71	42–44	37	5–7	91–95
2006[a]	--	10	--	--	--	7	--	--
2007	74	25	49	61–67	24	15	9	88–91
2008[a]	--	31	--	--	--	19	--	--
2009[a]	--	12	--	--	--	3	--	--
2010	80	14	66	47–56	30	11	19	75–81

[a] No survey

Table 6. Fall and spring wolf population estimates, wolf harvest and aerial wolf control take, and percent reduction from precontrol wolf estimates (Fall 2001) in Unit 19D East and in the Wolf Control Focus Area (WCFA), regulatory years 2004–2005 through 2010–2011. Wolf estimates in the 4,484 mi^2 19D East WCFA are extrapolated from spring survey estimates within the 3,210 mi^2 WCFA in effect during regulatory years 2003–2004 through 2005–2006.

	Unit 19D East				Unit 19D East WCFA			
Regulatory year	Fall population estimate	Take	Spring population estimate	% reduction from precontrol population estimate of 198	Fall population estimate	Take	Spring population estimate	% reduction from precontrol population estimate of 103
2004	103	28	75	62	41	28	13	87
2005	91	14	77	61	26	13	13	87
2006[a]	--	21	--	--	--	17	--	--
2007[a]	--	37	--	--	--	29	--	--
2008	71	28	43	78	48	26	22	89
2009[a]	--	17	--	--	--	15	--	--
2010[a]	--	23	--	--	--	19	--	--

[a]No Survey

Table 7a. Units 19A and 19D wolf harvest and take method, regulatory years 2006–2007 through 2010–2011.

Regulatory year	Unit 19A					Unit 19D				
	Shoot	Trap	Snare	SDA[a]	Total	Shoot	Trap	Snare	SDA[a]	Total
2006	1	1	1	7	10	2	3	17	2	24
2007	10	0	0	15	25	2	1	6	29	38
2008	6	0	5	20	31	3	2	5	19	29
2009	7	3	0	2	12	6	0	7	4	17
2010	2	1	1	10	14	3	4	3	13	23
Total	26	5	7	54	92	16	10	38	67	131
% of Total	28	5	8	59		12	8	29	51	

[a] SDA = same-day airborne aerial wolf control method associated with programs in Units 19A and 19D East.

Table 7b. Units 19B and 19C wolf harvest method, regulatory years 2006–2007 through 2010–2011.

Regulatory year	Unit 19B				Unit 19C				
	Shoot	Trap	Snare	Total	Shoot	Trap	Snare	Other/ Unknown	Total
2006	9	4	0	13	1	3	0	0	4
2007	4	0	3	7	5	0	5	2	12
2008	8	0	0	8	5	0	8	0	13
2009	3	0	0	3	4	0	0	0	4
2010	4	4	0	8	5	0	0	0	5
Total	28	8	3	39	20	3	13	2	38
% of Total	72	21	8		53	8	34	5	

Table 8. Units 19A and 19D East number of permitted wolf control pilots and gunners, wolves taken, and wolves taken per permit using aerial wolf control methods, regulatory years 2003–2004 through 2010–2011.

Regulatory Year	Unit 19A		Unit 19D East		Both areas		
	Pilots	Gunners	Pilots	Gunners	Total permits	Wolves taken	Wolves per permit
2003	--	--	8	12	20	17	0.8
2004	35	85	6	11	137	57	0.4
2005	30	52	3	3	88	51[a]	0.6
2006	18	23	6	3	50	9	0.2
2007	19	34	9	17	79	44	0.6
2008	16	25	7	7	55	39	0.7
2009	12	13	7	9	41	6	0.1
2010	12	23	5	5	45	23	0.5
Total	142	255	51	67	515	246	0.5
Average	20	36	6	8	64	31	0.5

[a] Includes 2 wolves killed but not recovered.

Table 9. Unit 19 wolf hunting and trapping and aerial wolf control take percent harvest chronology by month, regulatory years 2006–2007 through 2010–2011.

Regulatory year	Percent harvest and aerial wolf control take chronology by month (*n*)										Total harvest
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk/ other	
2006	2 (1)	14 (7)	0 (0)	14 (7)	14 (7)	6 (3)	4 (2)	33 (17)	12 (6)	2 (1)	(51)
2007	7 (6)	8 (7)	0 (0)	6 (5)	4 (3)	11 (9)	38 (32)	23 (19)	4 (3)	0 (0)	(84)
2008	4 (3)	7 (6)	1 (1)	2 (2)	10 (8)	11 (9)	16 (13)	35 (28)	12 (10)	1 (1)	(81)
2009	11 (4)	22 (8)	0 (0)	3 (1)	11 (4)	8 (3)	6 (2)	28 (10)	8 (3)	3 (1)	(36)
2010	0 (0)	8 (4)	2 (1)	2 (1)	4 (2)	26 (13)	42 (21)	14 (7)	0 (0)	2 (1)	(50)
Total *n*	(14)	(32)	(2)	(16)	(24)	(37)	(70)	(81)	(22)	(4)	(302)
% of Total	5	11	1	5	8	12	23	27	7	1	100

Table 10. Units 19A and 19D East percent wolf control chronology by month, using aerial wolf control methods, regulatory years 2006–2007 through 2010–2011.

Regulatory	Percent wolf control take chronology by month (*n*)										Total
year	Jan		Feb		Mar		Apr		Unk		take
2006	0	(0)	0	(0)	100	(9)	0	(0)	0		9
2007	7	(3)	64	(28)	30	(13)	9	(0)	0		44
2008	15	(6)	28	(11)	41	(16)	15	(6)	0		39
2009	0	(0)	0	(0)	67	(4)	33	(2)	0		6
2010	4	(1)	83	(19)	13	(3)	0	(0)	0		23
Total *n*		(10)		(58)		(45)		(8)			121
% of Total	8		48		37		7				100

Table 11. Unit 19 hunting and trapping harvest by transport method, regulatory years 2006–2007 through 2010–2011.

Regulatory	Percent harvest by transport method (*n*)								
Year	Aircraft		Snowmobile		Skis–Snowshoe		Other[a]		Total
2006	40	(17)	45	(19)	14	(6)	0	(0)	42
2007	50	(19)	39	(15)	11	(4)	0	(0)	38
2008	48	(21)	41	(18)	5	(2)	7	(3)	44
2009	23	(6)	58	(15)	8	(2)	12	(3)	26
2010	22	(6)	44	(12)	26	(7)	7	(2)	27
Total *n*		(69)		(79)		(21)		(8)	177
% of Total	39		45		12		5		

[a] "Other" includes: boats, 3- and 4-wheelers, off-road vehicles, highway vehicles, and other–unreported methods.

SPECIES

MANAGEMENT REPORT

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

WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011[1]

LOCATION

GAME MANAGEMENT UNITS: 20A, 20B, 20C, 20F, and 25C (39,228 mi^2)

GEOGRAPHIC DESCRIPTION: Lower Tanana Valley, Central Yukon Valley

BACKGROUND

Wolf population size and harvest have varied considerably, both spatially and temporally, within this management area (Gasaway et al. 1983, Boertje et al. 1996, Young 2009). Wolf numbers are primarily regulated by prey availability, but wolf control and harvest have periodically reduced wolf populations in portions of the management area. The annual wolf harvest is influenced by wolf numbers and hunter–trapper access.

Human consumptive use of caribou, moose, and sheep has been a dominant interest among Alaska residents. To enhance the harvestable surplus of ungulates, the Alaska Department of Fish and Game (ADF&G) conducted wolf predation control programs in Units 20A (autumn 1975–spring 1982 and October 1993–November 1994) and 20B (autumn 1979–spring 1986). The program in 1993–1994 in Unit 20A was implemented to reverse a caribou population decline associated with a density dependent response to 4 consecutive winters (i.e., 1989–1990 through 1992–1993) with above average snowfall. The most recent program (2006–2011) in eastern Units 20B and 25C was implemented to increase Fortymile caribou herd numbers.

Because of interest in wolves as a valuable resource and as a predator, ADF&G staff continue intensive investigations of wolf ecology and predator–prey relationships, especially in Unit 20A (Gasaway et al. 1983, Boertje et al. 1996, McNay 2002, Gardner et al. in press). Within Denali National Park and Preserve (DNP&P) in Unit 20C, a nearly 20-year wolf study continues because of interest in the wolf as a predator, wilderness symbol, and fundamental component of a naturally regulated system (Adams et al. 1995; Mech et al. 1995; Meier et al. 1995, Meier 2011). In addition, trappers continue the long tradition of harvesting this economically and culturally significant furbearer.

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

MANAGEMENT DIRECTION

MANAGEMENT GOALS

ADF&G will manage wolf populations to provide for human uses and to ensure that wolves remain an integral part of Interior Alaska's ecosystems. Compatible human uses include hunting and trapping (both for personal use and commercial sale of furs), photography, viewing, listening, and scientific and educational purposes. We recognize the aesthetic value of observing wolves in their natural environment as an important human use of wolves.

We also recognize that integral to wolf management is the premise that wolf populations are renewable resources that can be harvested and manipulated to enhance human uses of other resources. Management may include both the manipulation of wolf population size and total protection of wolves from human influence.

MANAGEMENT OBJECTIVE AND ACTIVITIES

The objective during this reporting period was to:

- Manage for fall density ≥11 wolves/1,000 mi^2.

Management activities during this reporting period were to:

- Monitor harvest through sealing certificates.
- Conduct aerial surveys in Units 20A, 20B, 20C, 20F, and 25C.

METHODS

POPULATION SIZE

Wolf population information is recorded by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 July 2008 through 30 June 2009). Population estimates during RY08–RY10 were based on observations made during ongoing wolf research studies, incidental sighting by department personnel of wolves during moose surveys, and on results of a reconnaissance survey (Stephenson 1978, Gasaway et al. 1983) of wolf numbers and packs in Unit 20A during spring 2009 (RY08). We also collected first hand observations of wolves from pilots and trappers. No other wolf surveys were conducted during RY08–RY10 due to poor survey conditions and funding constraints (i.e., for Units 20C [outside DNP&P], 20F, and 25C). Therefore, extrapolations from earlier or adjacent surveys provided the primary basis for estimates. We used data from radiotelemetry surveys in DNP&P to estimate wolf numbers in Unit 20C (Meier 2011). We conducted a wolf population census in northeastern Unit 20C during spring 2012 following the sampling assumptions described in Becker et al. (1998, 2004) and Patterson et al. (2004): 1) all wolves in the study area move and leave tracks; 2) fresh wolf tracks are not missed; 3) tracks can be followed forward and backward; 4) number of wolves in a pack are correctly enumerated; 5) no packs are doubled counted; 6) there is a 1:1 relationship between packs and tracks counted; and 7) the probability of observing any wolf pack in the study area is >0. To meet these assumptions, we designed the census to be surveyed at an intensity of ≥0.8 minute/mi^2 (0.3 min/km^2; Becker et al. 1998). Survey time includes all time spent within the survey area either on transects or tracking wolves (Appendix). The fall 2011 population estimate

for all of Unit 20C is preliminary (Table 1) because harvest information for RY11–RY12 is not yet complete.

DOG LOUSE INFESTATION

During 2005–2010, ADF&G conducted a study to investigate the extent of dog lice (*Trichodectes canis*) infestation on wolves within the Tanana Flats and develop a management program that limited further transmission (Gardner et al. in press). The treatment method consisted of multiple applications of oral antiparasitic ivermectin-injected (Ivomec®, Merial Limited, Duluth, GA, USA) baits aerially distributed at den and rendezvous sites during mid-May through August.

HARVEST

Wolf harvest is monitored through a mandatory sealing program. We used wolf sealing certificate data to determine annual harvests. During the sealing process, information was collected on specific location and method of take, date, sex, color of pelt, estimated size of the wolf pack, and transportation. Harvest data were summarized by regulatory year.

WEATHER

We evaluated winter weather patterns relative to how snowfall and temperature may affect wolf predation rates on ungulates (Mech et al. 1998: pages 168–170) using National Weather Service records and personal observations.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

For all units combined, we estimated approximately 689–880 wolves in 83–124 packs in fall 2008–2010. The ranges represent the combined minimum and maximum estimates for each unit (Table 1). This estimate results in an estimated wolf density of 18–22 wolves/1,000 mi^2 (7–9 wolves/1,000 km^2).

The wolf population trend differs between these units. For example, since the mid-1990s wolf population trends in Unit 20A have differed substantially from trends in Unit 20C. Wolf numbers in Unit 20A increased after wolf control was suspended in 1994 and approached precontrol levels by 1998. Wolf numbers declined sharply in 1999, most likely due to the synergistic effects of high harvest and large take of alpha animals (M. E. McNay, ADF&G, personal communication, Fairbanks, 2000), and then increased between 1999 (152 wolves) and 2008 (224–229 wolves). Wolf numbers have not continued to increase and remain below theoretical densities that could be supported by current moose densities (McNay 2002; Fuller 1989). It appears that a combination of harvest, natural mortality, and emigration (Adams et al. 2008) limit wolf densities (~35 wolves/1,000 mi^2; ~14 wolves/1,000 km^2) in Unit 20A. By contrast, researchers in DNP&P documented a sharp decline in the wolf population in southern Unit 20C during 1991–1994 (137 to 72 wolves; Meier 2011), likely due to the decline of the Denali caribou herd (L. A. Adams, USGS Biological Resources Division, personal communication, 2003). The wolf population then fluctuated at that lower level between 75 and 112 wolves (15–20 wolves/1,000 mi^2; 6–8 wolves/1,000 km^2) during 1995–2006. The 2012 wolf census results in

northeastern Unit 20C also reflect low wolf numbers (10.7 wolves/1,000 mi^2; 4.1 wolves/1,000 km^2).

DOG LOUSE INFESTATION

The dog louse was diagnosed in wolves north of the Alaska Range (Unit 20A) in 2004. Infestation by this parasite often results in loss of hair, but the severity of hair loss appears to be variable among individuals. The louse infestation could affect management of wolf–moose systems because poor pelt quality could reduce the incentive for people to take wolves. To formulate management strategies to reduce the negative consequences of this disease to both wolves and to human use of wolves, there is a need to document and understand the course of this disease in Interior wolf populations. Results from the 5-year study developing and testing a method to manage dog lice infestations of wolves are presented in Gardner et al. (In press).

MORTALITY

Harvest

Season and Bag Limit. The hunting and trapping regulations for Units 20A, 20B, 20C, 20F, and 25C during this reporting period were:

Units and Bag Limits	Resident/Subsistence Open Seasons	Nonresident Open Seasons
Units 20A, 20B, 20C, 20F, and 25C		
RY08		
HUNTING: 5 wolves. No wolf hunting same day airborne. In areas designated for active wolf management a wolf may be shot from a moving snowmachine.	10 Aug–31 May	10 Aug–31 May
TRAPPING: No limit. A wolf may be shot same day airborne if caught in a trap or snare. In Unit 25C an ATV may be used to position trappers to take wolves during trapping seasons provided the animals are not shot from a moving ATV.	1 Nov–30 Apr	1 Nov–30 Apr
RY09		
HUNTING: 5 wolves. No wolf hunting same day airborne. In areas designated for active wolf management a wolf may be shot from a moving snowmachine.	10 Aug–31 May	10 Aug–31 May
TRAPPING: No limit. A wolf may be shot same day airborne if		

Units and Bag Limits	Resident/Subsistence Open Seasons	Nonresident Open Seasons
caught in a trap or snare. Unit 25C: snowmachines and ATV's may be used to position trappers to take wolves during trapping seasons provided the animals are not shot from moving snowmachines or ATVs.	1 Nov–30 Apr	1 Nov–30 Apr
RY10		
HUNTING: 5 wolves. No wolf hunting same day airborne. In areas designated for active wolf management a wolf may be shot from a moving snowmachine.	10 Aug–31 May	10 Aug–31 May
TRAPPING: No limit. A wolf may be shot same day airborne if caught in a trap or snare. Unit 25C: snowmachines and ATV's may be used to position trappers to take wolves during trapping seasons provided the animals are not shot from moving snowmachines or ATV's.	1 Nov–30 Apr	1 Nov–30 Apr

Alaska Board of Game Actions and Emergency Orders.

March 2010 — The board eliminated the Stampede and Nenana Canyon Closed Areas (i.e., allowed wolf hunting and trapping in these previously closed portions of Units 20A and 20C).

Harvest by Hunters and Trappers. During RY08–RY10, areawide average annual wolf harvest was 178 wolves ranging from 213 wolves in RY08 to 146 wolves in RY10 (Table 2). Annual wolf harvests varied among years. Excluding years in which wolf control was conducted (i.e., 1993–1994, 2007–2011), areawide wolf harvest increased in RY96 to its highest level (209 wolves) since RY85, fell in RY97 to its lowest level (146 wolves) since RY89, then increased again to record highs in RY00–RY02 (244, 249, and 214 wolves, respectively), and again fell to a record low of 136 wolves in RY05. This general pattern was apparent in nearly all units. These oscillations were not likely related to fluctuations in wolf numbers, but rather to other unidentified factors (e.g., weather, snow conditions, trapping pressure). For instance, in Unit 20A the percentage of the estimated fall wolf population harvested by hunters and trappers fell from 33% in RY95 and RY96 to 20% in RY97, despite an apparent increase in the wolf population during that period (M. E. McNay, ADF&G retired, unpublished data, Fairbanks). This trend has continued as the wolf population remains high but trapping harvest remains low (Table 2).

Areawide, the number of successful hunters–trappers ranged from 108 in RY08 to 77 in RY10. The number of wolves taken per successful hunter–trapper declined each year from RY01 through RY05, but remained relatively stable at this lower level during RY05–RY10 (Table 2, Young 2009).

Other Mortality. Portions of Units 20B and 25C were in the Upper Yukon–Tanana Wolf Predation Control Area for the Fortymile caribou herd. During RY08–RY10, 34 (12 by ADF&G), 7 (5 by ADF&G) and 6 (0 by ADF&G) wolves, respectively, were reported taken by aerial wolf control in this area.

Harvest Chronology. Areawide, most wolves were harvested during November–March (Table 3). Most of the remainder of the harvest was fairly evenly distributed between the September–October and April periods. August accounted for only a small portion of the harvest. Although these trends were apparent in all units, the more remote units (i.e., Units 20C, 20F and 25C) exhibited greater annual variability, probably because of smaller sample sizes.

Method of Take and Transport Methods. Areawide, snaring continued as the leading method of take, followed closely by trapping (Table 2). The snowmachine has been by far the most successful type of transportation used to take wolves (Table 4). Generally, these trends were apparent for all units.

CONCLUSIONS AND RECOMMENDATIONS

The estimated wolf density was 18–22 wolves/1,000 mi^2 (7–9 wolves/1,000 km^2) during RY08–RY10. This met the objective to manage for a fall density of ≥11 wolves/1,000 mi^2 (≥4 wolves/1,000 km^2).

Wolf research in Unit 20A is important to intensive management statewide. We do not know whether the wolf population will reach the theoretical density that the number of prey can support. If the wolf population does reach its potential and moose remain the primary prey, the current success in moose management may end. If the wolf population does not reach its potential, we can continue to recommend increased ungulate harvests, particularly of cows and calves. However, in that scenario we still must determine what factors regulate the wolf population in order to maintain that regulation (i.e., whether harvest or emigration is the primary limiting factor). Research has shown that wolf harvests around 40% can potentially regulate the wolf population at a level that allows for higher moose harvests (Gasaway et al. 1992). To gain public support for more aggressive harvest of these enhanced moose populations (i.e., intensive management), we need a clear strategy for management of enhanced predator–prey systems (Young et al. 2006; Boertje et al. 2009) if necessary. Forming a viable management strategy hinges on a thorough understanding of wolf predation, weather, and moose habitat quality.

I recommend maintaining Unit 20A wolf seasons and bag limits to further evaluate harvest trends and trapping effort. Similarly, there seems to be little need to recommend changes for other units. However, regarding the trapping season that extends through April and hunting season that extends through May, concerns over fur quality and the pregnancy status of adult females will probably continue to generate public proposals. Because trappers take so few wolves in April and hunters even fewer wolves in May, little biological rationale exists for or against these late seasons. Similarly, there was no biological rationale for the wolf buffer in the

Stampede area (i.e., Wolf Townships) in Unit 20C, which the Board of Game eliminated in March 2012. However, the social controversy surrounding this issue (i.e., consumptive vs. nonconsumptive use) of wolves within the area continues to exist and likely will be the impetus for future proposals.

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Table 1. Units 20A, 20B, 20C, 20F, and 25C fall wolf population estimates, 2007–2011.

Unit	Year	Population estimate[a]	Number of packs	Basis of estimate
20A	2007	200–250	25–30	Extrapolation from 2005
	2008	224–229	25–27	Reconnaissance survey, radio-collared packs, and harvest reports
	2009	224–229	25–27	Extrapolation from 2008
	2010	224–229	25–27	Extrapolation from 2008
	2011	224–229	25–27	Extrapolation from 2008
20B	2007	150–225	20–30	Extrapolation from 1989 and Unit 20B West (1990)
	2008	150–225	20–30	Extrapolation from 1989 and Unit 20B West (1990)
	2009	150–225	20–30	Extrapolation from 1989 and Unit 20B West (1990)
	2010	150–225	20–30	Extrapolation from 1989 and Unit 20B West (1990)
	2011	150–225	20–30	Extrapolation from 1989 and Unit 20B West (1990)
20C	2007	281	34	Density/mean pack size extrapolation from DNP&P (Meier 2011)
	2008	175	26	Density/mean pack size extrapolation from DNP&P (Meier 2011)
	2009	176	27	Density/mean pack size extrapolation from DNP&P (Meier 2011)
	2010	165	18	Density/mean pack size extrapolation from DNP&P (Meier 2011)
	2011[b]	165	21–35	DNP&P data (2012); Census northeastern Unit 20C (Appendix), extrapolation to remainder of Unit 20C; mean annual harvest RY08–RY10
20F	2007	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2008	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2009	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2010	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2011	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
25C	2007	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2008	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2009	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2010	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2011	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)

[a] Includes an additional 10% to account for wolves not in packs.
[b] Preliminary.

Table 2. Units 20A, 20B, 20C, 20F, and 25C wolf harvest, regulatory years 2006–2007 through 2010–2011.

		Reported harvest[a]						Method of take[b]							Successful	
Unit	Regulatory year	M	F	%	Unk	Total	3-Year mean	Trap	%	Snare	%	Shot	%	Unk/ Other	Trappers/ hunters	Wolves/ person
20A	2006–2007	36	31	***46***	0	67	51	31	***47***	24	***36***	11	***17***	1	29	2.3
	2007–2008	18	24	***57***	0	42	47	11	***28***	15	***38***	13	***33***	3	24	1.8
	2008–2009	30	26	***46***	0	56	55	20	***37***	18	***33***	16	***30***	2	33	1.7
	2009–2010	27	20	***43***	0	47	48	18	***38***	20	***43***	9	***19***	0	27	1.7
	2010–2011	19	13	***41***	0	32	45	15	***47***	10	***31***	7	***22***	0	19	1.7
20B	2006–2007	26	17	***40***	5	48	57	12	***26***	25	***54***	9	***20***	2	31	1.5
	2007–2008	38	20	***34***	1	59	59	18	***32***	27	***48***	11	***20***	3	36	1.6
	2008–2009	58	37	***39***	0	95	67	18	***22***	58	***70***	7	***8***	12	47	2.0
	2009–2010	43	25	***37***	0	68	74	29	***43***	36	***53***	3	***4***	0	33	2.1
	2010–2011	26	32	***55***	0	58	74	26	***46***	24	***43***	6	***11***	2	26	2.2
20C	2006–2007	5	13	***72***	1	19	17	8	***44***	9	***50***	1	***6***	1	12	1.6
	2007–2008	11	26	***70***	0	37	23	13	***37***	16	***46***	6	***17***	2	16	2.3
	2008–2009	12	15	***56***	0	27	28	12	***44***	13	***48***	2	***7***	0	13	2.1
	2009–2010	17	11	***39***	0	28	31	9	***32***	15	***54***	4	***14***	0	16	1.8
	2010–2011	14	15	***52***	0	29	28	11	***38***	15	***52***	3	***10***	0	16	1.8
20F	2006–2007	4	4	***50***	0	8	8	0	***0***	7	***88***	1	***13***	0	4	2.0
	2007–2008	5	1	***17***	0	6	7	1	***17***	2	***33***	3	***50***	0	6	1.0
	2008–2009	1	2	***67***	0	3	6	1	***33***	1	***33***	1	***33***	0	3	1.0
	2009–2010	7	6	***46***	0	13	7	5	***38***	6	***46***	2	***15***	0	7	1.9
	2010–2011	3	2	***40***	0	5	7	2	***40***	1	***20***	2	***40***	0	5	1.0
25C	2006–2007	5	8	***62***	0	13	14	4	***33***	7	***58***	1	***8***	1	7	1.9
	2007–2008	5	10	***67***	0	15	13	4	***36***	5	***45***	2	***18***	4	10	1.5
	2008–2009	15	17	***53***	0	32	20	4	***40***	1	***10***	5	***50***	22	12	2.7
	2009–2010	10	8	***44***	0	18	22	4	***36***	5	***45***	2	***18***	7	8	2.3
	2010–2011	12	10	***45***	0	22	24	0	***0***	14	***78***	4	***22***	4	11	2.0
Combined	2006–2007	76	73	***49***	6	155	147	55	***37***	72	***48***	23	***15***	5	83	1.9
	2007–2008	77	81	***51***	1	159	150	47	***32***	65	***44***	35	***24***	12	92	1.7
	2008–2009	116	97	***46***	0	213	176	55	***31***	91	***51***	31	***18***	36	108	2.0
	2009–2010	104	70	***40***	0	174	182	65	***39***	82	***49***	20	***12***	7	91	1.9
	2010–2011	74	72	***49***	0	146	178	54	***39***	64	***46***	22	***16***	6	77	1.9

[a] Unknown sex not used to calculate harvest percent.
[b] Unknown method of take not used to calculate harvest percent.

Table 3. Units 20A, 20B, 20C, 20F, and 25C wolf harvest chronology, regulatory years 2006–2007 through 2010–2011.

Unit	Regulatory year	Harvest periods[a] Aug	%	Sep–Oct	%	Nov–Dec	%	Jan–Feb	%	Mar	%	Apr	%	Unk	*n*
20A	2006–2007	4	***6***	6	***9***	17	***25***	33	***49***	7	***10***	0	***0***	0	67
	2007–2008	0	***0***	11	***26***	4	***10***	25	***60***	2	***5***	0	***0***	0	42
	2008–2009	3	***6***	10	***19***	20	***38***	15	***28***	3	***6***	2	***4***	3	56
	2009–2010	2	***5***	3	***7***	9	***21***	27	***63***	2	***5***	0	***0***	4	47
	2010–2011	1	***3***	2	***6***	3	***9***	13	***41***	12	***38***	1	***3***	0	32
20B	2006–2007	2	***4***	6	***13***	6	***13***	20	***43***	6	***13***	7	***15***	1	48
	2007–2008	0	***0***	8	***14***	14	***24***	25	***42***	12	***20***	0	***0***	0	59
	2008–2009	0	***0***	3	***3***	27	***29***	37	***39***	21	***22***	6	***6***	1	95
	2009–2010	0	***0***	3	***4***	25	***37***	31	***46***	6	***9***	3	***4***	0	68
	2010–2011	1	***2***	6	***10***	20	***34***	15	***26***	14	***24***	2	***3***	0	58
20C	2006–2007	0	***0***	1	***6***	5	***28***	10	***56***	2	***11***	0	***0***	1	19
	2007–2008	0	***0***	3	***8***	15	***41***	15	***41***	3	***8***	1	***3***	0	37
	2008–2009	0	***0***	0	***0***	8	***30***	12	***44***	4	***15***	3	***11***	0	27
	2009–2010	0	***0***	0	***0***	11	***39***	12	***43***	2	***7***	3	***11***	0	28
	2010–2011	0	***0***	2	***7***	6	***21***	7	***25***	11	***39***	2	***7***	1	29
20F	2006–2007	0	***0***	1	***13***	3	***38***	3	***38***	0	***0***	1	***13***	0	8
	2007–2008	0	***0***	3	***50***	2	***33***	1	***17***	0	***0***	0	***0***	0	6
	2008–2009	0	***0***	1	***33***	0	***0***	0	***0***	1	***33***	1	***33***	0	3
	2009–2010	0	***0***	0	***0***	3	***23***	10	***77***	0	***0***	0	***0***	0	13
	2010–2011	0	***0***	1	***20***	3	***60***	0	***0***	1	***20***	0	***0***	0	5
25C	2006–2007	0	***0***	1	***8***	3	***23***	3	***23***	6	***46***	0	***0***	0	13
	2007–2008	1	***7***	0	***0***	2	***14***	9	***64***	1	***7***	1	***7***	1	15
	2008–2009	0	***0***	3	***9***	5	***16***	5	***16***	11	***34***	8	***25***	0	32
	2009–2010	1	***6***	1	***6***	0	***0***	8	***44***	8	***44***	0	***0***	0	18
	2010–2011	2	***9***	1	***5***	2	***9***	6	***27***	2	***9***	9	***41***	0	22
20A, 20B, 20C, 20F, and 25C	2008–2009 thru 2010–2011	10	***2***	36	***7***	142	***27***	198	***38***	98	***19***	40	***8***	9	533

[a] Unknown harvest period not used to calculate harvest percent.

Table 4. Units 20A, 20B, 20C, 20F, and 25C wolf harvest by transport method, regulatory years 2006–2007 through 2010–2011.

		Harvest by transport method[a]															
Unit	Regulatory year	Airplane	%	Dog sled, skis, snowshoe, or horse	%	Boat	%	3- or 4-wheeler	%	Snowmachine	%	ORV	%	Highway vehicle	%	Unk	*n*
20A	2006–2007	7	***11***	2	***3***	0	***0***	0	***0***	55	***83***	1	***2***	1	***2***	1	67
	2007–2008	6	***15***	3	***8***	0	***0***	3	***8***	27	***69***	0	***0***	0	***0***	3	42
	2008–2009	20	***36***	2	***4***	0	***0***	0	***0***	32	***57***	0	***0***	2	***4***	0	56
	2009–2010	10	***21***	2	***4***	0	***0***	2	***4***	32	***68***	0	***0***	1	***2***	0	47
	2010–2011	3	***9***	3	***9***	0	***0***	1	***3***	24	***75***	1	***3***	0	***0***	0	32
20B	2006–2007	2	***4***	0	***0***	0	***0***	3	***6***	35	***73***	1	***2***	7	***15***	0	48
	2007–2008	4	***7***	2	***3***	0	***0***	2	***3***	39	***66***	0	***0***	12	***20***	0	59
	2008–2009	34	***36***	2	***2***	1	***1***	1	***1***	53	***56***	1	***1***	3	***3***	0	95
	2009–2010	7	***10***	1	***1***	0	***0***	0	***0***	50	***74***	0	***0***	10	***15***	0	68
	2010–2011	4	***7***	1	***2***	1	***2***	2	***3***	47	***81***	0	***0***	3	***5***	0	58
20C	2006–2007	2	***11***	2	***11***	0	***0***	1	***6***	13	***72***	0	***0***	0	***0***	1	19
	2007–2008	2	***6***	5	***14***	0	***0***	7	***20***	15	***43***	1	***3***	5	***14***	2	37
	2008–2009	4	***15***	4	***15***	0	***0***	0	***0***	19	***70***	0	***0***	0	***0***	0	27
	2009–2010	2	***7***	4	***14***	0	***0***	1	***4***	20	***71***	0	***0***	1	***4***	0	28
	2010–2011	13	***45***	1	***3***	0	***0***	0	***0***	14	***48***	0	***0***	1	***3***	0	29
20F	2006–2007	0	***0***	3	***38***	0	***0***	1	***13***	3	***38***	0	***0***	1	***13***	0	8
	2007–2008	0	***0***	0	***0***	0	***0***	1	***17***	2	***33***	1	***17***	2	***33***	0	6
	2008–2009	0	***0***	0	***0***	1	***33***	0	***0***	0	***0***	0	***0***	2	***67***	0	3
	2009–2010	0	***0***	0	***0***	0	***0***	0	***0***	12	***92***	0	***0***	1	***8***	0	13
	2010–2011	0	***0***	1	***20***	1	***20***	0	***0***	3	***60***	0	***0***	0	***0***	0	5
25C	2006–2007	1	***8***	0	***0***	1	***8***	0	***0***	11	***85***	0	***0***	0	***0***	0	13
	2007–2008	5	***33***	0	***0***	1	***7***	1	***7***	8	***53***	0	***0***	0	***0***	0	15
	2008–2009	22	***69***	0	***0***	2	***6***	1	***3***	5	***16***	0	***0***	2	***6***	0	32
	2009–2010	9	***50***	0	***0***	0	***0***	0	***0***	9	***50***	0	***0***	0	***0***	0	18
	2010–2011	10	***45***	1	***5***	0	***0***	1	***5***	10	***45***	0	***0***	0	***0***	0	22
20A, 20B, 20C, 20F, and 25C	2008–2009 through 2010–2011	138	***26***	22	***4***	6	***1***	9	***2***	330	***62***	2	***0***	26	***5***	0	533

[a] Unknown transport not used to calculate harvest percent.

APPENDIX

STATE OF ALASKA

Sean Parnell, GOVERNOR

DEPARTMENT OF FISH AND GAME

1300 College Road

Fairbanks, AK 99701-1599

DIVISION OF WILDLIFE CONSERVATION

PHONE: (907) 459-7213

FAX: (907) 452-6410

MEMORANDUM

TO: Distribution DATE: April 17, 2012

THRU: *TELEPHONE*: 459-7329
FAX: 459-73320

FROM: Craig Gardner and Nate Pamperin *SUBJECT*: Unit 20C wolf census

Division of Wildlife Conservation
Fairbanks

During 11-13 March 2012, we completed a wolf census in a 4,656 mi^2 (12,059 km^2) portion of Unit 20C (Figure 1). Survey timing coincided to the time of year when packs approach their lowest numbers (Burch et al. 2005). Our objective was to determine the number of wolves and packs to aid future management decisions. We followed the sampling assumptions described in Becker et al. (1998, 2004) and Patterson et al. (2004): 1) all wolves in the study area move and leave tracks; 2) fresh wolf tracks are not missed; 3) tracks can be followed forward and backward; 4) number of wolves in a pack are correctly enumerated; 5) no packs are doubled counted; 6) there is a 1:1 relationship between packs and tracks counted; and 7) the probability of observing any wolf pack in the study area is > 0. To meet these assumptions, we designed the census to be surveyed at an

intensity of ≥ 0.8 minute/mi^2 (0.3 min/km^2; Becker et al. 1998). Survey time includes all time spent within the survey area either on transects or tracking wolves.

We subdivided the census area into 14 sample units ranging from 320-352 mi^2. We further subdivided the survey units into 20-22 16mi^2 sample blocks to assist survey crews in assessing their area coverage. Prior to the survey, we explained to each survey crew the required sampling intensity and that transects were probably necessary in most areas to ensure adequate coverage. Following the first 2 days of surveying, we identified any sample blocks or portions of blocks that were missed due to localized inclement weather or because the crew tracked wolves through a portion of the area but did not return to complete the unit. We returned on day 3 to complete these areas.

Results: We initiated the census 5 days after a 6-12" snowfall and 2 days after a ≥ 25 mph (40 km) windstorm. Snow conditions were excellent. The superpopulation was 54 wolves, 4 of which were singles. We found 2 other singles but additional track information collected on subsequent days verified these were members of known packs. The observation rate was 59.3%. We found 12 individual packs with an average pack size of 4.2 wolves (range = 2-10; SD = 2.94 wolves); 6 of the packs were pairs. Following the pack inclusion rule outlined in Becker et al. (1998), the estimated density was 4.1 wolves/1000 km^2 (10.7/1000 mi^2). Our density estimate does not include single wolves because the number of lone, transient wolves may vary widely throughout the year due to dispersal (Adams et al. 2008) and because ungulate kill rates by lone wolves compared to packs is much lower (Hayes 1977). Furthermore, the number of lone wolves is often higher during February and March when most young wolves are dispersing (Adams et al. 2008, Gardner et al. in press).

Survey intensity averaged 0.91 min/mi^2 (0.4 min/km^2, Table 1). Sampling intensities varied due to habitat type and the presence of wolves. Some sampling units consisted primarily of burned timber/shrubs due to the 2010 wildfires and could be surveyed from a higher altitude requiring fewer transects. Two – 4 transects were completed in each sample block except for 1 block located within the Clear Air Force restricted airspace (Figure 2). Also, more survey lines were completed in the southwest portion of the study area than mapped due to a malfunctioning GPS.

Local survey conditions varied during the 3 day survey. During day 1, survey conditions were excellent throughout the area, during day 2 the southern portion had varying but adequate light conditions and some wind in the higher terrain, and during day 3, light conditions were good but high winds were a factor. The survey was primarily completed during the first 2 days and on day 3, most or our effort was directed to check small areas that had received inadequate sampling. Overall, we rank the survey conditions as good. Cost to complete the census was about 20k.

Table 1. Survey intensity used to census wolves in a 4,656 mi^2 (12,059 km^2) portion of Unit 20C in Interior Alaska during 11-13 March 2012.

Area	Size (mi2)	Time (min)	Intensity	Tracks (Y/N)	# Packs	Pack Size	singles
E1	352	360	1.02	y	1	2	1
E2	336	350	1.04	y	1	2	1
E3	336	215	0.64	y	1	2	
E4	336	215	0.64	y	0	0	
E5	336	384	1.14	y	1	7	

E6	352	328	0.93	y	1	4	2
E7	336	392	1.17	y	2	2,7	
W1	320	267	0.83	y	1	5	
W2	320	236	0.74	n	0	0	
W3	320	345	1.08	y	1	5	
W4	352	436	1.24	y	1	2	
W5	320	239	0.75	y	1	10	
W6	320	201	0.63	y	1	2	
W7	320	295	0.92	n	0	0	
Totals	4656	4263	0.91		12	50	4

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Distribution:
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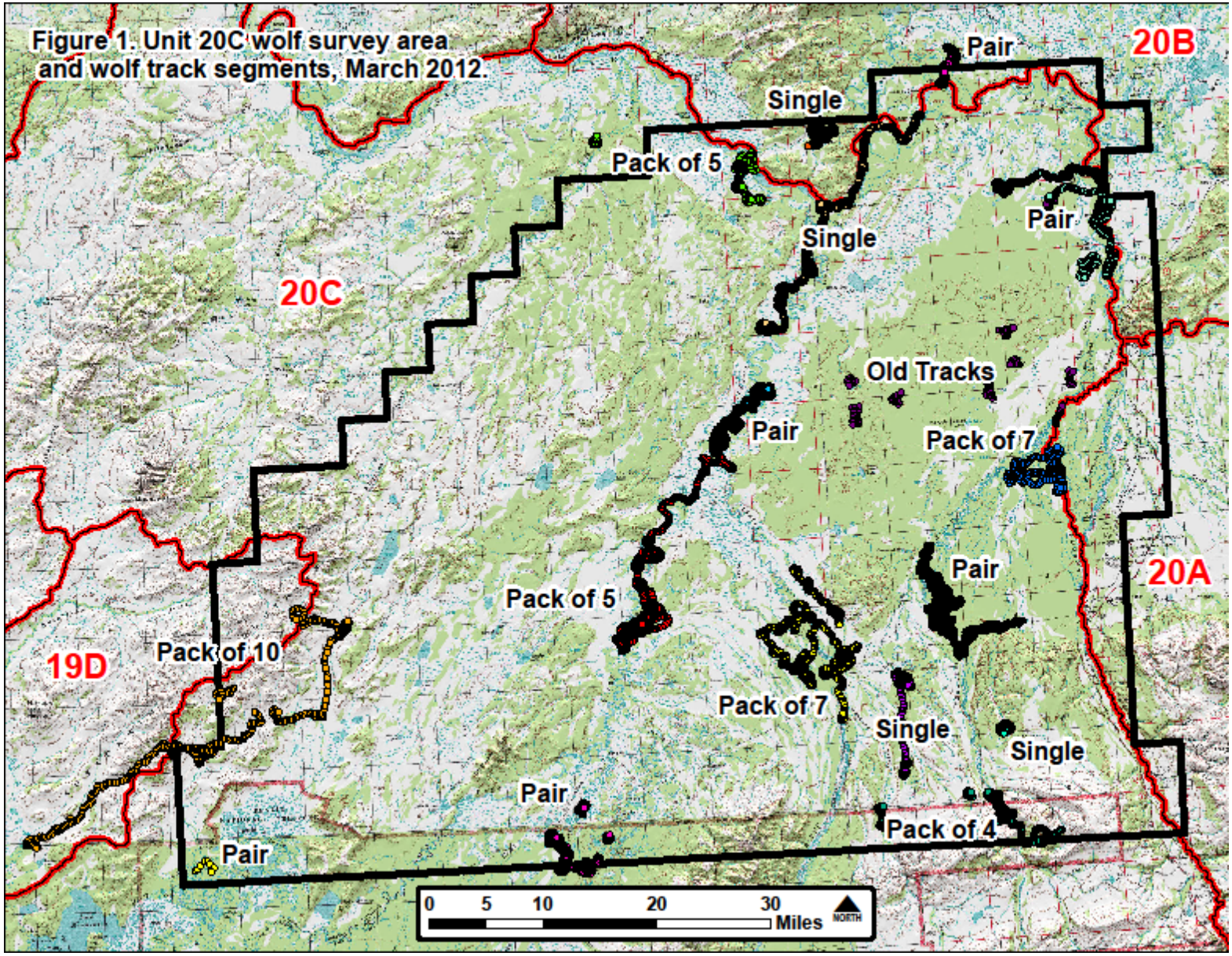
Figure 1. Unit 20C wolf survey area and wolf track segments, March 2012.
20B
20C
20A
19D
Pair
Single
Pack of 5
Single
Pair
Old Tracks
Pair
Pack of 7
Pair
Pack of 5
Pack of 10
Pack of 7
Single
Single
Pair
Pack of 4
Pair
0 5 10 20 30
Miles
NORTH

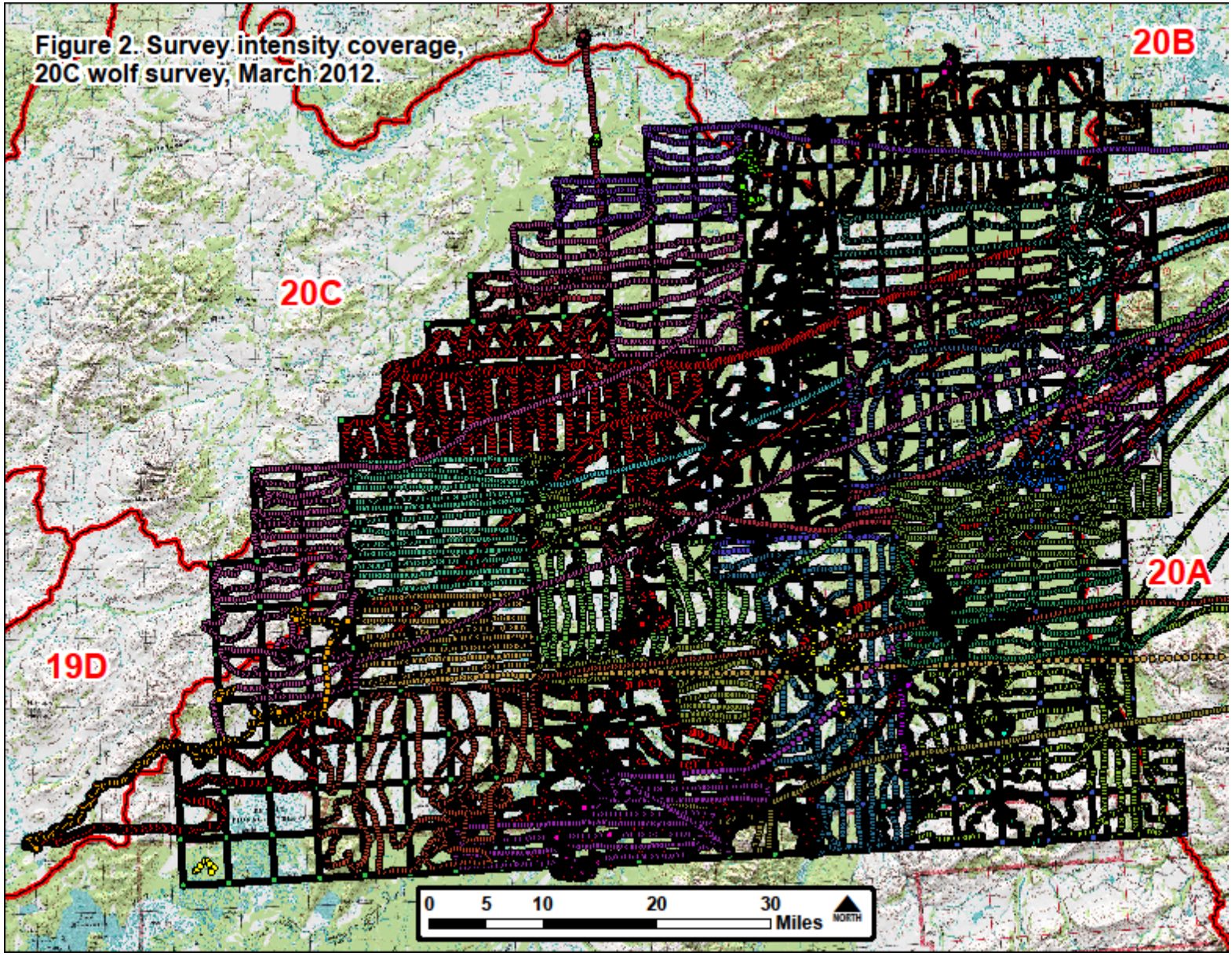
Figure 2. Survey intensity coverage,
20C wolf survey, March 2012.
20B
20C
20A
19D
0 5 10 20 30
Miles
NORTH

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

WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011[1]

LOCATION

GAME MANAGEMENT UNIT: 20D (5,637 mi^2)

GEOGRAPHIC DESCRIPTION: Central Tanana Valley near Delta Junction

BACKGROUND

Wolves are present throughout Unit 20D, where their primary prey are moose, caribou, and Dall sheep. Wolf and prey numbers were high in Unit 20D during the 1960s. The population was an estimated 200–250 wolves (35.5–44.3 wolves/1,000 mi^2; 13.7–17.1 wolves/1,000 km^2) at that time. Moose populations began to decline in the mid-1960s, and a wolf reduction program was authorized in 1979 to increase moose numbers. That program included aerial shooting permits issued to the public. From fall 1979 to spring 1983, 105 wolves were killed by trappers, Alaska Department of Fish and Game (ADF&G) staff, and hunters with permits for aerial shooting. Most wolves were taken in southern and eastern Unit 20D. The wolf control program was terminated in November 1983 due to public demand (Crain 1985).

During 1983–2005, wolves continued to be harvested by hunters and trappers, but no wolf reduction programs occurred in Unit 20D. In 1995, the Board of Game (Board) determined that the preferred use of moose and caribou in Unit 20D was for human consumption and found these populations to be below population and harvest objectives. In response, the Board adopted a 5-year wolf control implementation plan. Although this plan authorized ADF&G to conduct a wolf population reduction or regulation program in Unit 20D except on Fort Greely Military Reservation and within the Fortymile Nonlethal Predation Control Area during 1 July 1997–30 June 2002, the program was not conducted and no wolves were taken. However, 2 wolf packs in northeastern Unit 20D were reduced to 2 sterilized wolves during 1996–2001 as part of the Fortymile Nonlethal Predation Control Program (Boertje and Gardner 2003).

Wolf population reduction and regulation in northern Unit 20D was reinitiated in 2004 with adoption of the Upper Yukon–Tanana Predation Control Area (UYTPCA, Gross 2006). The objective was to increase the Fortymile caribou herd and the Unit 20E moose population. In Unit 20D, the UYTPCA encompasses the portion of Unit 20D in the Goodpaster River drainage upstream from and including the South Fork Goodpaster River drainage, and within the Healy River, Billy Creek, and Sand Creek drainages. The wolf predation control program within the UYTPCA was authorized by the Board in 2004. This program is currently ongoing and is

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

conducted by permitted private citizens in coordination with and augmented by ADF&G (Alaska Department of Fish and Game 2009).

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Wolf populations will be managed to provide for human uses and to ensure that wolves remain an integral part of Interior Alaska's ecosystems, and to manipulate their role in predation on declining moose and caribou populations. Human uses of wolves include hunting and trapping (both for personal use and commercial sale of furs), photography, viewing, listening, and scientific and educational purposes. The aesthetic value of being aware of or observing wolves in natural interactions with their environment is also recognized as an important human use of wolves.

Management goals for the wolf species in Unit 20D are as follows:

- Ensure the long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.
- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.
- Increase public awareness and understanding of the uses, conservation, and management of wolves, their prey, and habitat in Alaska.

MANAGEMENT OBJECTIVE

- Manage harvest to maintain a population of between 15 and 125 wolves.

MANAGEMENT ACTIVITIES

- Conduct wolf predation control programs as directed by the commissioner and the Board of Game.
- Monitor wolf population trends and annual harvest.

METHODS

We estimated wolf population size using aerial surveys; interviews with local trappers, hunters, and pilots; and information about pack size recorded on fur sealing certificates. Unit 20D was subdivided into 2 areas, north and south of the Tanana River for calculating population estimates. Aerial surveys were conducted during February–April by flying and systematically searching for wolf tracks from a Piper PA–18 Super Cub. When tracks were located, they were followed until the wolves were observed or until the number of wolves in the pack could be determined. Survey information was recorded on topographic maps. We supplemented survey data with information from interviews with knowledgeable local pilots, hunters, and trappers to determine pack size. Wolves harvested during the winter prior to a spring survey were added to spring pack size, if known, to estimate fall pack size prior to hunting and trapping season. In some cases, fall pack size was known for packs observed during that time period. After all pack counts were tallied,

the population estimate was increased by 10% to account for lone wolves not associated with a pack.

Wolf harvest is monitored through a mandatory sealing program. All wolves harvested in Alaska must be presented to ADF&G or to a department designee to be sealed with a locking tag. Harvest information collected include date of kill, name of trapper or hunter, kill location (Unit and specific location), method of take and transportation, sex of the wolf, pelt color, and estimated pack size. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY09 = 1 July 2009–30 June 2010).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

RY08. An aerial wolf survey was flown in Unit 20D during 22 February–19 March 2009 for 56.7 hours of flight time, resulting in a search intensity of 0.7 min/mi^2 within 4,800 mi^2 of wolf habitat. In southern Unit 20D, we found 21 wolves in 4 packs. An additional 10 wolves were reported killed by trappers and hunters during RY08 before the survey. Therefore, a minimum of 31 wolves were present within southern Unit 20D during fall 2008 (Table 1).
In northern Unit 20D we found 47–53 wolves in 11 packs during the aerial survey. Prior to the February–March survey, reported take by trappers, hunters, and aerial wolf control conducted by ADF&G staff totaled 43 wolves, resulting in a fall 2008 northern population estimate of 90–96 wolves (Table 1).

The unitwide RY08 fall wolf population (the superpopulation) numbered at least 133–140 wolves after including an estimate of an additional 10% for single wolves (Table 1). This results in a density estimate of 27.7–29.2 wolves/1,000 mi^2 (10.7–11.3 wolves/1,000 km^2) within 4,800 mi^2 (12,432 km^2) of wolf habitat (Table 1) and meets the population objective.

RY09. We flew an aerial wolf survey on 26 February–20 March 2010 for 57.0 hours of flight time, resulting in a search intensity of 0.7 min/mi^2 of wolf habitat (4,800 mi^2). We found 79–87 wolves in 14 packs and 2 singles.

The spring 2010 southern Unit 20D population estimate was 19–23 wolves in 5 packs. Trappers and hunters killed 28 wolves in southern Unit 20D, resulting in a fall 2009 estimate of 47–51 wolves (Table 1). The spring survey in northern Unit 20D survey resulted in 60–64 wolves observed in 9 packs. Trappers reported killing 12 wolves resulting in a fall 2009 population estimate of 72–76 wolves.

The Unit 20D RY09 fall population numbered at least 131–140 wolves (Table 1), resulting in a density estimate of 27.3–29.2 wolves/1,000 mi^2 (10.5–11.3 wolves/1,000 km^2) within the 4,800 mi^2 (12,432 km^2) of wolf habitat (Table 1); this met the population objective.

RY10. Aerial wolf surveys were flown in Unit 20D during 28 February–16 April 2011 for 45.0 hours, resulting in a search intensity of 0.6 min/mi^2 within 4,476 mi^2 of wolf habitat. Our search area was smaller compared to the past 2 years because of inadequate tracking conditions

in the lower Shaw Creek drainage in northern Unit 20D. We found 53–60 wolves in 12 packs plus 3 singles.

The spring southern Unit 20D population estimate was 18 wolves in 4 packs. Trappers and hunters killed 32 wolves in southern Unit 20D, resulting in a fall 2010 estimate of 50 wolves (Table 1).

In northern Unit 20D, we found 40–47 wolves in 8 packs and 3 singles. No surveys were flown in the lower Shaw Creek drainage due to poor snow conditions. Seven wolves were reported killed by trappers and hunters, resulting in a minimum fall estimate of 47–54 wolves (Table 1).

The RY10 minimum Unit 20D total population estimate of 107–114 wolves met the population objective (Table 1). No wolf density estimates were calculated because of the incomplete survey.

Distribution and Movements

No additional distribution or movement data was collected during RY08–RY10.

MORTALITY

Harvest

Season and Bag Limit.

Unit/Bag Limit/ Special Restrictions	Resident Open Seasons	Nonresident Open Seasons
HUNTING:		
5 wolves. No wolf hunting same day airborne.	10 Aug–31 May	10 Aug–31 May
TRAPPING:		
No limit. No same-day-airborne shooting of wolves, except wolves caught in a trap or snare. No trapping with a steel trap or with a snare smaller than 3/32" in diameter during April or October	15 Oct–30 Apr	15 Oct–30 Apr

Alaska Board of Game Actions and Emergency Orders. At its spring 2009 meeting, the board reauthorized the UYTPCA for 5 years, including portions of northern Unit 20D.

Harvest by Hunters and Trappers. Reported take was 53 wolves in RY08 (including 25 killed from helicopters by ADF&G staff in the UYTPCA), 40 in RY09, and 39 in RY10 (Table 2). No wolves were taken by ADF&G-designated wolf control permittees during RY08–RY10 (Table 2).

The estimated wolf harvest rates (including wolves killed during wolf control) for RY08 and RY09 were approximately 39% and 33% of the estimated fall population, respectively. The National Research Council (1997) reported that determining sustainable levels of wolf harvest is

difficult; estimates of sustainable rates of harvest vary from 29% (Adams et al. 2008) to 40% (Ballard et al. 1987) of early winter populations. Based on our survey results, this harvest level appeared to have reduced the wolf population from 2008 to 2009. The majority of the population decline occurred in northern Unit 20D following wolf control activities in spring 2009.

During RY08–RY10, 65% of the wolves taken under trapping and hunting regulations were killed in traps or snares. Trappers and hunters reported taking more wolves in southern than northern Unit 20D during RY08–RY10 (Table 3).

Take Under Predation Control Regulations. During RY08–RY10 the UYTPCA included the portion of (northern) Unit 20D within the Goodpaster River drainage upstream from and including the South Fork Goodpaster drainage, and within the Healy River, and Billy and Sand Creek drainages. During these 3 years, 25 wolves were killed as part of predation control efforts.

All wolves were taken during RY08 in the Billy Creek, Glacier Creek, Tibbs Creek, Sand Creek, and Goodpaster River drainages by ADF&G staff in helicopters. Wolf control by ADF&G accounted for 47% of the total wolves taken in RY08 (Table 2). Total take was greater in northern Unit 20D in RY08 because of wolf control conducted by ADF&G staff in the UYTPCA (Table 3).

Harvest Chronology. There were no significant changes in wolf harvest chronology during RY08–RY10. Most wolves were harvested during November–February (Table 4)
Transport Methods. Snowmachine was the most common mode of transportation used by trappers and hunters who harvested wolves in Unit 20D (Table 5). Snowmachines were used to take 52% of the wolves during RY08–RY10.

CONCLUSIONS AND RECOMMENDATIONS

During RY08–RY10 the Unit 20D wolf management objective to maintain a population of 15–125 wolves was met. Removal rates did not exceed sustainable levels in northern Unit 20D and possibly throughout Unit 20D during RY08, even with the additional take of 25 wolves by ADF&G staff in the predation control program. No wolves were killed by wolf control permittees in northern Unit 20D. Because current intensive management objectives for both moose and caribou have not been met, no regulatory changes are recommended for Unit 20D wolf management. I recommend continuing the evaluation of harvest trends under current regulations and take effort, and refining management goals to include maintenance of a viable wolf superpopulation in Unit 20D while managing wolves to aid in achievement of caribou and moose population and harvest objectives.

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Table 1. Unit 20D fall wolf population estimate, regulatory years 2003 through 2010.

Area	Regulatory year (1 July–30 June)							
	2003	2004	2005	2006	2007	2008	2009	2010
Southern Unit 20D[a]	56–59	43–45	43–44	43–49	17–19[b]	31	47–51	50
Northern Unit 20D[c]	n/a	48–52	63–68	68–76	61–69[b]	90–96	72–76	47–54[b]
Unit 20D subtotal	n/a	91–97	106–112	111–125	78–88[b]	121–127	119–127	97–104[b]
Estimate 10% single wolves	n/a	9–10	10–11	11–13	8–9[b]	12–13	11–12	8–9[b]
Unit 20D total	n/a	100–107	116–123	122–138	86–97[b]	133–140	131–140	107–114[b]
Estimated wolves/1,000 mi^2	n/a	17.7–18.9	23.5–25.6	25.4–28.8	n/a	27.7–29.2	24.5–26.4	n/a

[a] Unit 20D south of the Tanana River.
[b] Incomplete survey.
[c] Unit 20D north of the Tanana River.

Table 2. Unit 20D wolf harvest, regulatory years 1985 through 2010.

Regulatory	Reported harvest			Estimated harvest		Method of take				
Year	M	F	Unk	Unreported	Illegal	Trap/snare	Shot	SDA[a]	Unk	Total
1985	17	10	1	0	0	19	0	9	0	28
1986	11	7	0	0	0	18	0	0	0	18
1987	5	7	0	0	0	11	1	0	0	12
1988	5	12	4	0	0	20	1	0	0	21
1989	2	4	0	0	0	4	2	0	0	6
1990	8	13	2	0	0	6	4	13	0	23
1991	4	3	2	0	0	3	5	1	0	9
1992	8	9	5	0	0	16	6	0	0	22
1993	17	27	4	0	0	37	10	0	1	48
1994	16	9	0	0	0	24	1	0	0	25
1995	16	24	1	0	0	39	1	0	1	41
1996	17	10	1	0	0	22	6	0	0	28[b]
1997	22	15	4	0	0	37	3	0	1	41[c]
1998	14	9	2	0	0	24	1	0	0	25[d]
1999	19	19	4	0	0	34	8	0	0	42
2000	21	16	4	0	0	33	8	0	0	41
2001	27	22	1	0	0	49	1	0	0	50
2002	16	8	1	0	0	18	6	0	1	25
2003	20	14	0	0	0	30	4	0	0	34
2004	10	18	1	0	0	20	6	0	3	29
2005	19	30	1	0	0	43	5	0	2	50
2006	25	27	1	0	0	48	3	1	1	53
2007	13	7	2	0	0	22	0	0	0	22
2008	30	23	0	0	0	26	2	25	0	53
2009	17	18	5	0	0	29	11	0	0	40
2010	23	15	1	0	0	31	8	0	0	39

[a] SDA refers to same-day-airborne take. These are wolves taken from aircraft by permitted pilots or by ADF&G staff.
[b] An additional 4 wolves were relocated from northern Unit 20D to another area.
[c] An additional 6 wolves were relocated from northern Unit 20D to another area.
[d] An additional wolf was relocated from northern Unit 20D to another area.

Table 3. Unit 20D wolf harvest by location, regulatory years 1996 through 2010.

Regulatory Year	North of Tanana River	South of Tanana River	Unknown
1996	10	18	0
1997	17	24	0
1998	12	13	0
1999	13	28	1
2000	12	29	0
2001	18	32	0
2002	9	16	0
2003	5	29	0
2004	16	13	0
2005	24	26	0
2006	25	28	0
2007	9	13	0
2008	43	10	0
2009	12	28	0
2010	7	32	0

Table 4. Unit 20D wolf harvest chronology, regulatory years 1985 through 2010.

Regulatory year	Harvest chronology												
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May[a]	Unk	*n*
1985		0	0	0	4	3	4	5	8	2		2	28
1986		0	0	0	0	2	8	2	6	0		0	18
1987		1	0	0	4	0	1	6	0	0		0	12
1988		0	0	0	0	5	5	10	0	1		0	21
1989		0	1	0	0	3	0	0	2	0		0	6
1990		0	0	2	2	0	0	3	16	0		0	23
1991		0	2	0	0	2	1	1	3	0		0	9
1992		1	1	0	2	8	0	4	3	2		1	22
1993		0	5	0	6	11	6	4	16	0		0	48
1994		0	1	0	0	3	6	8	6	1		0	25
1995		0	0	0	9	7	8	7	9	1		0	41
1996	0	2	2	1	6	4	4	7	1	0		1	27
1997	1	0	1	0	9	9	8	3	9	1		0	41
1998	0	0	0	0	6	8	4	5	2	0		0	25
1999	0	0	2	0	5	7	9	6	11	2		0	42
2000	0	1	3	1	9	6	5	7	6	3		0	41
2001	0	0	0	0	15	12	6	11	4	1		1	50
2002	0	0	6	0	1	3	7	2	4	2		0	25
2003	0	1	1	0	4	11	6	6	5	0		0	34
2004	0	1	3	0	6	3	5	5	3	0		3	29
2005	0	1	3	1	12	10	14	6	3	0		0	50
2006	0	0	2	1	18	10	9	4	8	1	0	0	53
2007	0	0	0	0	4	6	3	6	3	0	0	0	22
2008	0	0	1	0	2	2	2	21	25[b]	0	0	0	53
2009	0	6	3	1	3	8	3	12	4	0	0	0	40
2010	0	1	3	1	9	10	8	4	2	0	1	0	39

[a] The month of May was not within the Unit 20D wolf hunting season until regulatory year 2006–2007.
[b] Wolves taken from helicopters by ADF&G staff in the aerial wolf control program in the Upper Yukon–Tanana Predation Control Area.

Table 5. Unit 20D wolf harvest by transport method, regulatory years 1985 through 2010.

Regulatory year	Harvest by transport method									*n*
	Airplane	Dogsled/ Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway Vehicle	Ski/ Walk	Unk	
1985	10	0	0	0	16	0	1		1	28
1986	1	1	0	0	16	0	0		0	18
1987	1	5	0	0	4	0	1		1	12
1988	0	0	0	0	21	0	0		0	21
1989	0	0	0	0	4	1	0		1	6
1990	15	0	0	0	4	1	3		0	23
1991	1	0	0	0	6	0	2		0	9
1992	10	0	0	1	8	1	0		2	22
1993	7	0	0	0	34	0	5		2	48
1994	0	1	0	0	17	0	6		1	25
1995	1	2	0	2	22	1	13		0	41
1996	1	2	0	1	13	1	8		1	27
1997	0	4	0	0	22	0	6	9	0	41
1998	0	3	0	1	11	0	10	0	0	25
1999	0	0	1	2	26	2	7	4	0	42
2000	1	0	1	1	27	1	8	2	0	41
2001	0	0	0	0	40	0	9	1	0	50
2002	3	2	0	1	14	0	3	2	0	25
2003	0	0	0	1	24	1	8	0	0	34
2004	3	0	0	2	19	0	2	3	0	29
2005	4	0	0	0	30	1	10	5	0	50
2006	4	0	0	0	39	1	9	0	0	53
2007	1	0	0	0	18	0	0	3	0	22
2008	26[a]	2	1	0	21	0	3	0	0	53
2009	4	1	0	2	21	0	1	11	0	40
2010	0	1	1	2	26	0	2	7	0	39

[a] Includes 25 wolves taken from helicopters by ADF&G staff in the aerial wolf control program in the Upper Yukon–Tanana Predation Control Area.

SPECIES

MANAGEMENT REPORT

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

WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011[1]

LOCATION

GAME MANAGEMENT UNIT: 20E (10,680 mi^2)

GEOGRAPHIC DESCRIPTION: Fortymile, Ladue, and Charley River drainages

BACKGROUND

From the 1940s through 1975, wolf numbers in Unit 20E fluctuated due to federal and state wolf control programs, harvest pressure, and ungulate densities (Gasaway et al. 1992). Murie (1944) reported that wolves were abundant in the region during the 1940s. Their numbers were rapidly reduced by a federal predator reduction program during 1948–1960 (Gasaway et al. 1992). Wolves were killed by poison, cyanide guns, disrupting dens, year-round trapping, and aerial shooting. Once these control programs ceased in 1960, wolves in Unit 20E rapidly increased and were abundant by the mid-1960s. The wolf population declined during the mid-1970s due to reduced moose and caribou populations (Gasaway et al. 1992).

Between 1975 and 1990, the Unit 20E wolf population remained low due to food limitations, wolf control and harvest (Gasaway et al. 1992). During 1975–1980, the population was lightly harvested ($\bar{x}$ = 11% annual harvest rate) and was food limited. During 1981–1983, the Alaska Department of Fish and Game (ADF&G) conducted a wolf control program in a 6,000 mi^2 area located primarily in Unit 20E. The combination of wolf control and public trapping reduced the wolf population by 73% by spring 1983. Subsequent harvest by hunters and trappers maintained the population below precontrol size through 1988. Wolf productivity increased following control efforts, indicating that wolves were nutritionally stressed when ungulate populations were at their lowest (Gasaway et al. 1992). During the late 1980s the wolf population increased by approximately 17% annually, reaching an estimated 230 wolves in 1990 (Gardner 1994).

During 1990–2007, wolf numbers were managed more intensively due to changing management objectives for the Fortymile caribou herd (FCH) and the Unit 20E moose population. During 1990–1995 our management intent was for public harvest to maintain or reduce wolf numbers and the population remained stable. In 1995 and 1996, wolf harvest increased in portions of Unit 20E due to a privately funded incentive program designed to increase wolf harvest within the summer and winter ranges of the FCH. Under this program, trapper harvest reduced wolf numbers in several areas of the FCH range. Following this program, during 1997–2001, the size of each of 15 wolf

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

packs within and adjacent to western Unit 20E was reduced to the dominant pair, under the Fortymile nonlethal wolf control program. ADF&G accomplished this by translocating all wolves in each pack except the dominant pair, which we sterilized. These dominant pairs maintained their territories and the program reduced the wolf population within the 15 pack territories by 75–80% (Boertje and Gardner 2000).

Historically, wolf harvest by trapping and hunting had little effect on the wolf population trend in Unit 20E. However, during some years, moderate to high harvests caused population declines in accessible areas. Wolf trapping intensity is affected primarily by the fur market, and also by trapping methods. When marten and lynx fur prices are high, most area trappers spend less time trapping wolves; however, more trappers are in the field, which likely results in some increase in incidental wolf take.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

ADF&G manages wolf populations to provide for human uses and to ensure that wolves remain an integral part of Interior Alaska's ecosystems. Compatible human uses include hunting and trapping (both for personal use and commercial sale of furs), photography, viewing, listening, and scientific and educational purposes. We also recognize the aesthetic value of being aware of wolves in natural interactions with their environment as an important human use of wolves.

Wolf populations are a renewable resource that can be harvested and manipulated to enhance human uses of wolves and other wildlife resources. Wolf management may include both manipulation of wolf population size and total protection of wolves from human influence. Not all human uses will be allowed in all areas or at all times. Our management will focus on providing sustained, diverse human uses of wolf populations. Those goals are as follows:

- Ensure the long-term conservation of wolves throughout their historic range in relation to their prey and habitat.
- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and that reflect the public's interest.
- Increase public awareness and understanding of the uses, conservation, and management of wolves, their prey, and habitat.

MANAGEMENT OBJECTIVE

The management objective for wolves in Unit 20E was developed to align with the wolf population objectives for the Upper Yukon–Tanana Predator Control (UYTPC) program, which encompasses Unit 20E.

- Reduce the fall population to no less than 60 wolves.

MANAGEMENT ACTIVITIES

- Monitor harvest through sealing records and trapper questionnaires.

- Conduct aerial and public wolf surveys in Unit 20E, to determine wolf density, number of packs, pack size, and population characteristics.

- Temporarily close aerial wolf control and wolf trapping and hunting if the unit population declines below 60 wolves.

- Increase public awareness of wolf population trends, effects on moose and caribou populations, and management directions.

METHODS

WOLF POPULATION SIZE AND CHARACTERISTICS

Population Size

During February and March in 2009–2011 we attempted annual aerial wolf surveys using reconnaissance style survey techniques (Stephenson 1978; Gasaway et al. 1983; M. McNay, ADF&G, personal communication) within the 8,300 mi^2 portion of Unit 20E outside of Yukon–Charley National Preserve. Population data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 July 2008 through 30 June 2009). However, due to poor tracking conditions in various portions of the unit, resulting from minimal snow cover and heavy caribou tracking, surveys were not conducted in the entire 8,300 mi^2 area in any of these years. Surveys followed assumptions outlined by Becker et al. (1998). If assumptions were not met during a particular year, these counts no longer represented a census but were a minimum count of wolves in the survey area. During reconnaissance surveys, survey teams in fixed-wing aircraft made direct observations of wolves and counted tracks in assigned areas.

Lone Wolves. Lone (single) wolves are generally individuals dispersing from packs rather than wolves living a long-term solitary existence (Ballard 1987, Adams et al. 2008). The number of lone wolves varies throughout the year. In Unit 20E, lone wolves are most common during February–May when most young wolves disperse (Adams et al. 2008; C. Gardner ADF&G, unpublished Unit 20A data, Fairbanks).

This transient component of the population is of particular importance to include in the Unit 20E estimate because availability of open territories is higher in this unit due to removal of packs under the ongoing UYTPC program, which encompasses all of Unit 20E. Based on results from other wolf control programs (Hayes et al. 2003), these transient wolves will settle all open areas in the unit and must be considered to develop annual fall wolf kill objectives, evaluate annual control efforts and because the Unit 20E spring population objective of at least 60 wolves includes lone wolves.

To estimate fall and spring wolf populations during RY08–RY10, within the UTYPC area, we increased wolf population estimates by 10% to account for lone wolves. Although estimating lone wolves is difficult and shortcomings with doing so are identified by Burch et al. (2005) and Adams et al. (2008), I continued to use this estimate to develop the Unit 20E wolf population estimates in order to compare them with the UYTPC program estimates. See the Division of Wildlife Conservation's 2008–2011 Upper Yukon–Tanana intensive management annual activity reports to the to the Alaska Board of Game for further details (March 2008, March 2009, March 2010 and March 2011. These reports are available on the department's website:

http://www.adfg.alaska.gov/index.cfm?adfg=intensivemanagement.unit_12_20b_20d_20e_25c#anchor.

RY08–RY09 Estimates. Reconnaissance surveys were conducted primarily during wolf control efforts conducted by ADF&G in March 2009 and 2010. Surveys were conducted in approximately a 7,350 mi^2 portion of Unit 20E in both years. This included all of Unit 20E, except the 2,823 mi^2 portion within the Yukon–Charley Rivers National Preserve (where control efforts are not allowed) and approximately 500 mi^2 in southeast Unit 20E. Between 1 and 7 Super Cubs, and 1 Robinson R-44 helicopter, were used on each day during the 10 days of effort in RY08 and 5 days of effort in RY09. A total of 376.7 and 175.6 hours were flown by these aircraft during RY08 and RY09, respectively. However, not all of this time was spent searching for wolves, as the primary purpose of these efforts was to remove wolves from the control area. Therefore, much of this flight time was spent on logistical support (transporting fuel, supplies, wolves, etc.), circling packs while waiting for the helicopter to arrive to remove wolves, climbing to altitude to communicate with other aircraft, removing wolves, etc. Total hours spent searching for wolves was not tracked, but in general, the majority of total time flown during each year was dedicated to searching for wolves.

To estimate wolf numbers in areas where aerial surveys were not completed, and to supplement aerial survey results, we obtained information about wolf pack sizes and territory boundaries from conversations with wolf hunters, trappers, and wolf control permittees. We mapped all individual wolf observations (packs of 2 or more wolves and singles), tracks, and kill sites, and analyzed potential overlap among sightings to reduce the possibility of overestimating the number of packs or wolves in a pack. We combined all information on the map to estimate the number of wolves in the survey area during RY08–RY09. For further detail on survey efforts in RY08 – RY09, see RY08 and RY09 Final Summary of Upper Yukon–Tanana Predator Control Program reports and survey maps (J. Gross ADF&G, unpublished reports and maps, Tok).

RY10 Estimate. Due to poor snow conditions throughout Unit 20E, we did not conduct aerial wolf surveys or perform wolf control in RY10. We developed wolf population estimates in RY10 using PredPrey (McNay and DeLong 1998) modeling software with inputs from the literature (if we did not have necessary data); radio telemetry data from wolves within Unit 20E that were radiocollared by National Park Service; wolf observations by wolf control permittees, area pilots and trappers; and harvest data from sealing certificates (Table 1). All inputs were evaluated relative to published literature to help determine validity.

To develop fall population estimates necessary for determining fall kill objectives for the UYTPC program, we modeled the unitwide fall wolf population size using PredPrey (McNay and DeLong 1998) modeling software with inputs from the literature (if we did not have necessary data); survey data; radio telemetry data from wolves within Unit 20E that were radiocollared by ADF&G and National Park Service; wolf observations by wolf control permittees, area pilots, and trappers; and harvest data from sealing certificates (Table 1). All inputs were evaluated relative to published literature to help determine validity.

HARVEST MONITORING

Harvest data were summarized by regulatory year. We determined harvest statistics from sealing documents. An official seal must be attached to all wolves harvested in Alaska. During the sealing

process, information was collected on specific location and method of take and transportation, date, sex, color of pelt, and estimated size of the wolf pack.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Wolf population trends in Unit 20E during the 1990s are discussed by Gardner (2003) and trends during 2000–2007 are found in Gross (2006) and Gross (2009).

During RY08–RY10 the population in Unit 20E was reduced (Table 1) primarily due to removal by aerial wolf control permittees under the UYTPC program and by trapper harvest.

Wolf productivity and natural mortality likely remained stable as a result of a large prey base and reduced wolf densities in portions of Unit 20E during RY97–RY07. During RY08–RY11 a portion of the FCH (approximately 47,000–52,000 caribou) spent 8–10 months annually in Unit 20E and 15,000–30,000 Nelchina caribou occupied southern Unit 20E during November–April each year. In addition, the snowshoe hare population was high during RY08–RY09 (by RY10 the hare population had declined to low levels) and the low density moose and Dall sheep populations provided additional prey for wolves.

RY08–RY09. All survey assumptions (Becker et al. 1998) were met for the areas surveyed. The wolf population estimate in areas surveyed was based on hundreds of survey hours throughout much of Unit 20E in each of these years; however, area specific survey conditions and efforts were not recorded.

During the February–March 2009 wolf survey in RY08, survey conditions were excellent, generally, except in areas with a prevalence of caribou tracks. Based on results from this survey, and supplemental information from ADF&G staff and area pilot/trapper observations, harvest reports, and NPS radio collar data, we estimated the fall 2008 population to be 252–265 wolves in 41–43 packs (pack = 2 or more wolves), including 23–24 (10%) single wolves not associated with packs.

Generally, survey conditions were fair to good during the February–March 2010 wolf survey in RY09, except in areas with a prevalence of caribou tracks. Based on results from this survey, and supplemental information from ADF&G staff and area pilot/trapper observations, harvest reports, and NPS radio collar data, we estimated the fall 2009 population to be 173–190 wolves in 30 packs, including 16–17 (10%) single wolves not associated with packs.

RY10. A survey was not conducted in RY10 due to poor survey conditions, resulting from lack of adequate snow cover and prevalence of caribou tracks. Based on modeling data we estimated the fall 2010 population to be 191–218 wolves in 29 packs, with 10% of this estimate made up of single wolves not associated with packs (18–20 wolves).

MORTALITY

Harvest

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Unit 20E		
RY05.		
HUNTING: 5 wolves. No wolf hunting same-day-airborne.	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit. No trapping with a steel trap or a snare smaller than 3/32 inch in diameter during April or October.	15 Oct–30 Apr	15 Oct–30 Apr
RY06–RY11.		
HUNTING: 5 wolves. No wolf hunting same-day-airborne.	10 Aug–31 May	10 Aug–31 May
TRAPPING: No limit. No trapping with a steel trap or a snare smaller than 3/32 inch in diameter during April or October.	15 Oct–30 Apr	15 Oct–30 Apr

Alaska Board of Game Actions and Emergency Orders. During the spring 1998 Alaska Board of Game (Board) meeting, the board designated the Unit 20E moose population within the Fortymile and Ladue River drainages and the FCH as important for high levels of human consumptive use under the intensive management law (AS 16.05.255[e]–[g]). The board must consider intensive management if regulatory action to significantly reduce moose or caribou harvest in Unit 20E becomes necessary because the population is depleted or has reduced productivity. Wolf control has been identified by the legislature as an important management tool consistent with the intensive management law.

During the spring 2004 meeting, the Board approved the UYTPC plan, which allowed ADF&G to conduct a wolf control (population reduction or regulation) program for 5 years, beginning 1 January 2005 in the UYTPC area in portions of Units 12 and 20E.

During the spring 2006 meeting, in response to lack of FCH population growth since 2003, the Board expanded the wolf control portion of the UYTPC area (5 AAC 92.125[b]) from 6,600 m^2 to 18,750 m^2 to include most of the FCH range. This was intended to aid in achieving the FCH population objective of 50,000–100,000 caribou and harvest objective of 1,000–15,000 caribou under intensive management regulations.

During the March 2009 meeting, the board reauthorized the UYTPC program for 5 years beginning 1 January 2009. To improve the effectiveness of the program the board also authorized ADF&G to use helicopters to remove wolves from areas where the public is unsuccessful at reducing the wolf population through other means.

Hunter–Trapper Harvest. During RY08–RY10, an average of 31 wolves (range 28–35) were reported harvested annually in Unit 20E by hunters and trappers (Table 2). This is lower than reported harvest during the first 4 years of the UYTPC program (RY04–RY07), when harvest by hunter–trappers averaged 43 (range 32–53) wolves (Table 2). Beginning in RY04 harvest combined with wolves killed under the UYTPC program (105 wolves; 37% removal rate) exceeded the maximum sustainable harvest rate (25–30%; Gasaway et al. 1992, Adams et al. 2008) for the first time since RY95. In RY05–RY09, estimated annual harvest rates (by all methods of take; i.e., hunting, trapping, and predator control) continued at or above the estimated maximum sustainable harvest rate (range 25–42%, Table 2). In RY10, wolf take was below sustainable levels (22%) due to poor snow conditions for tracking wolves. Snares and traps continued to be the primary trapping methods used to catch wolves in Unit 20E, although 4%–20% annually were shot (Table 2), likely incidental to fall moose or caribou hunting. Trapper harvest continued to be important in reaching wolf removal goals. In most years, trapper harvest exceeded take by aerial control permittees.

Harvest Chronology. During RY08–RY10, most wolves were harvested during November–March (Table 3), similar to previous years.

Transport Methods. Snowmachines, ATVs and highway vehicles were the most common sources of transportation used by trappers and hunters during RY08–RY10 (Table 4). Airplanes were used mostly by wolf control permittees and by a few trappers who accessed areas not trapped by others.

Other Mortality

Beginning in RY04, ADF&G issued permits (MW303) to pilots and gunners to shoot wolves from fixed-wing aircraft in the UYTPC program to reduce wolf predation on moose and caribou in order to make progress toward intensive management objectives for those species. In RY08–RY10, 8–24 wolves were killed annually in Unit 20E by these permittees (Table 2; SDA MW303). Beginning in RY08, ADF&G staff was authorized to shoot wolves from helicopters to improve effectiveness of the UYTPC program. In RY08–RY10, 0–59 wolves were shot annually from helicopters in Unit 20E by ADF&G staff (Table 2; SDA ADF&G). Additional information about the UYTPC program during RY08–RY10 is included in the 2009–2011 annual UYTPC program reports to the board (ADF&G March 2009, March 2010, and March 2011), which are available on the department's website.

CONCLUSIONS AND RECOMMENDATIONS

Our management objective to reduce the fall population to no less than 60 wolves was met during RY08–RY10, based on the fall population estimate minus annual harvest during each of these years. We are less confident in the overall population estimates for RY10 when aerial surveys were not completed. However, wolf sightings during RY10 indicate the population exceeded the minimum population objective. During the next reporting period we will continue efforts to reduce the wolf population through aerial wolf control combined with hunting and trapping.

Most management activities were completed during RY08–RY10. Sealing records and trapper questionnaires were completed each year. Aerial surveys were attempted annually; however,

poor snow conditions and high caribou concentrations in portions of the unit made tracking wolves difficult. Surveys were not completed in RY10 due to poor conditions. However, by combining data gathered from past aerial reconnaissance surveys, radiotelemetry flights, sealing certificates, literature, observations by pilots and trappers, and using the modeling program PredPrey (McNay and DeLong 1998), we estimated unitwide wolf densities, number of packs, pack size and population characteristics. Status of the wolf population in Unit 20E, the effects of wolf control, and trends of moose and caribou in relation to wolf predation were tracked and reported in annual reports to the Board of Game. Management and research efforts were presented in "The Comeback Trail," a newsletter sent to more than 5,000 people in Alaska and Canada. We will continue to publish this newsletter annually.

During RY08–RY10, the wolf population in Unit 20E was reduced from precontrol (fall RY04) through harvest by wolf control permittees, ADF&G staff, and local trappers. Unitwide wolf numbers were estimated to be stable during RY09 and RY10 because wolf take declined to near sustainable levels. Wolf removal exceeded maximum sustainable levels in portions of Unit 20E during RY04–RY10, primarily due to aerial wolf control and increased harvest by several area trappers. Trappers and hunters continued to play a significant role in reducing the Unit 20E wolf population. However, the wolf population remains well above the minimum population objective of 60 wolves.

Management objective and activities during the next report period will remain the same to maintain alignment with the ongoing UYTPC program's wolf population objectives. We will continue to evaluate the UYTPC program annually and report results of these evaluations and make necessary recommendations to the Board of Game through annual reports. No regulatory changes are recommended at this time.

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Table 1. Unit 20E fall wolf population estimates[a], regulatory years 1990 through 2010[b].

Regulatory year	Population estimate[c]	Number of packs	Mean pack size[d]	Basis of estimate
1990	231	33	6.3	Aerial survey, observations, reports
1991	169–184	31	5.1	Aerial survey, observations, reports, radio collars
1992	194–214	32	5.7	Aerial survey, observations, reports, radio collars
1993	200–224	34	5.7	Aerial survey, observations, reports, radio collars
1994	192–204	34	5.3	Aerial survey, observations, reports, radio collars
1995	227–238	34	6.2	Aerial survey, observations, reports, radio collars
1996	220–230	34	6.0	Aerial survey, observations, reports, radio collars
1997	221–236	34	6.0	Aerial survey, observations, reports, radio collars
1998	195–225	34	5.6	Aerial survey, observations, reports, radio collars
1999	---	---	---	Population was not estimated
2000	---	---	---	Population was not estimated
2001	---	---	---	Population was not estimated
2002	245–260	34	7.4	Aerial survey, observations, reports, radio collars
2003	234–265	24–36	6.6–11.0	Aerial survey, observations, reports, radio collars
2004	252–313	26–42	6.0–12.1	Aerial survey, observations, reports, radio collars
2005	172–191	29–35	4.9–6.6	Aerial survey, observations, reports, radio collars
2006	172–201	29–37	4.7–6.9	PredPrey model[e]
2007	184–198	30–36	5.1–6.6	PredPrey model[e]
2008	252–265	41–43	5.9–6.5	Aerial survey, observations, reports, radio collars
2009	173–190	30	5.8–6.3	Aerial survey, observations, reports, radio collars
2010	191–218	29	6.6–7.5	PredPrey model[e]

[a] Fall estimate = pretrapping season population.
[b] No unitwide surveys were conducted during regulatory years 1999–2001, therefore no estimates are available.
[c] Includes 10% estimated number of single wolves present.
[d] Calculated using mean population estimate × 0.9 divided by number of packs.
[e] With inputs from the literature and data gathered from aerial reconnaissance surveys; radiotelemetry data from wolves with Alaska Department of Fish and Game or National Park Service radio collars within Unit 20E; wolf observations by upper Yukon–Tanana predation control program permittees, area pilots, and trappers; and data from sealing certificates.

Table 2. Unit 20E wolf harvest, regulatory years 1990 through 2010.

	Reported harvest							Method of take								Successful	
Regulatory year	M	(%)	F	(%)	Unk	Total[a]	% Autumn population[b]	Trap or snare	(%)	Shot	(%)	SDA[c] MW303	(%)	SDA[c] ADF&G	(%)	Unk	Trappers, hunters and wolf control permittees[d]	Wolves/ Person[e]
1990	15	(63)	9	(38)	0	24	10	12	(52)	5	(22)	6	(26)	0	(0)	1	13	1.8
1991	13	(68)	6	(32)	0	19	11	14	(78)	1	(6)	3	(17)	0	(0)	1	10	1.9
1992	28	(50)	28	(50)	1	57	28	52	(95)	3	(5)	0	(0)	0	(0)	2	21	2.7
1993	34	(57)	26	(43)	8	68	32	55	(90)	6	(10)	0	(0)	0	(0)	7	21	3.2
1994	24	(63)	14	(37)	1	39	20	29	(74)	8	(21)	2	(5)	0	(0)	0	16	2.4
1995	37	(49)	39	(51)	8	84	37	80	(95)	3	(4)	1	(1)	0	(0)	0	18	4.6
1996	24	(51)	23	(49)	7	54	24	48	(89)	6	(11)	0	(0)	0	(0)	0	15	3.6
1997	16	(44)	20	(56)	0	36[f]	16	32	(91)	3	(9)	0	(0)	0	(0)	0	10	3.5
1998	9	(60)	6	(40)	2	17	8	12	(71)	5	(29)	0	(0)	0	(0)	0	9	1.9
1999	18	(62)	11	(38)	2	31	–[g]	27	(96)	1	(4)	0	(0)	0	(0)	3	21	1.5
2000	27	(57)	20	(43)	3	50	–[g]	44	(88)	6	(12)	0	(0)	0	(0)	0	12	4.2
2001	20	(65)	11	(35)	1	32	–[g]	29	(91)	3	(9)	0	(0)	0	(0)	0	10	3.1
2002	15	(56)	12	(44)	1	28	11	23	(85)	4	(15)	0	(0)	0	(0)	1	14	2.0
2003	22	(55)	18	(45)	0	40	16	34	(85)	6	(15)	0	(0)	0	(0)	0	17	2.4
2004	58	(57)	44	(43)	3	105	37	28	(27)	19	(18)	58	(55)	0	(0)	0	27	3.9
2005	25	(52)	23	(48)	1	49	27	26	(53)	6	(12)	17	(35)	0	(0)	0	12	4.1
2006	45	(63)	26	(37)	1	72	39	48	(68)	5	(7)	18	(25)	0	(0)	1	19	3.8
2007	31	(58)	22	(42)	3	56	29	29	(52)	11	(20)	16	(29)	0	(0)	0	20	2.8
2008	59	(55)	48	(45)	1	108	42	32	(30)	5	(5)	24	(22)	47	(44)	0	16	3.8
2009	15	(38)	24	(62)	6	45	25	25	(44)	2	(4)	8	(18)	22	(22)	0	11	3.2
2010	26	(59)	18	(41)	2	46	22	20	(43)	9	(20)	17	(37)	0	(0)	0	18	2.6

[a] Total harvest includes animals of undetermined sex.

[b] Proportion of the estimated fall population harvested by the end of the season in April. If a range was given for the fall estimate, the proportion taken is given as the harvest divided by the mean estimate.

[c] Same-day-airborne (SDA) taking prohibited during regulatory years 1997–2003, SDA wolf control was allowed to be conducted by wolf control permittees only during regulatory years 2004–2005 to 2007–2008 within the upper Yukon–Tanana wolf control area and SDA wolf control was allowed to be conducted by wolf control permittees and ADF&G staff from helicopters only during regulatory years 2008–2009 to 2010–2011 within the upper Yukon–Tanana wolf control area.

[d] Permitted ADF&G staff not included.

[e] Permitted ADF&G staff and wolves killed by ADF&G not included.

[f] One wolf was accidentally killed during a capture operation; it was only included in the total take.

[g] Population was not estimated, therefore percent autumn population was not calculated.

Table 3. Unit 20E wolf harvest and percent by month, regulatory years 1990 through 2010 [a].

Regulatory	Harvest chronology by month																			
year	Aug	(%)	Sep	(%)	Oct	(%)	Nov	(%)	Dec	(%)	Jan	(%)	Feb	(%)	Mar	(%)	Apr	(%)	Unk	*n*
1990	3	(15)	2	(10)	0	(0)	0	(0)	2	(10)	4	(20)	3	(15)	2	(10)	4	(20)	4	20
1991	0	(0)	1	(6)	1	(6)	2	(11)	4	(22)	4	(22)	5	(28)	1	(6)	0	(0)	1	18
1992	0	(0)	3	(5)	1	(2)	1	(2)	6	(11)	13	(23)	18	(32)	10	(18)	5	(9)	0	57
1993	2	(3)	3	(5)	4	(6)	8	(13)	18	(29)	8	(13)	12	(19)	6	(10)	1	(2)	6	62
1994	3	(8)	2	(5)	3	(8)	3	(8)	7	(18)	5	(13)	9	(23)	7	(18)	0	(0)	0	39
1995	1	(1)	1	(1)	4	(5)	12	(14)	11	(13)	10	(12)	24	(29)	15	(18)	5	(6)	1	83
1996	0	(0)	4	(7)	0	(0)	1	(2)	15	(28)	14	(26)	4	(7)	13	(24)	3	(6)	0	54
1997	0	(0)	2	(6)	0	(0)	3	(9)	8	(23)	14	(40)	3	(9)	5	(14)	0	(0)	2	35
1998	0	(0)	4	(24)	0	(0)	0	(0)	2	(12)	4	(24)	3	(18)	4	(24)	0	(0)	0	17
1999	0	(0)	2	(6)	0	(0)	1	(3)	5	(16)	7	(23)	5	(16)	0	(0)	11	(35)	0	31
2000	0	(0)	4	(8)	0	(0)	2	(4)	7	(14)	13	(26)	15	(30)	5	(10)	4	(8)	0	50
2001	0	(0)	2	(6)	0	(0)	2	(6)	12	(38)	6	(19)	6	(19)	4	(13)	0	(0)	0	32
2002	2	(7)	2	(7)	0	(0)	1	(4)	4	(14)	12	(43)	1	(4)	1	(4)	5	(18)	0	28
2003	0	(0)	4	(10)	2	(5)	1	(3)	1	(3)	4	(10)	18	(45)	10	(25)	0	(0)	0	40
2004	1	(1)	18	(17)	0	(0)	1	(1)	4	(4)	5	(5)	46	(44)	21	(20)	9	(9)	0	105
2005	0	(0)	1	(2)	0	(0)	9	(18)	4	(8)	6	(12)	9	(18)	8	(16)	12	(24)	0	49
2006	0	(0)	4	(6)	2	(3)	9	(13)	9	(13)	12	(17)	9	(13)	17	(24)	10	(14)	0	72
2007	2	(4)	8	(14)	0	(0)	8	(14)	3	(5)	9	(16)	4	(7)	16	(29)	6	(11)	0	56
2008	1	(1)	3	(3)	11	(11)	16	(16)	7	(7)	8	(8)	2	(2)	50	(51)	0	(0)	1	98[b]
2009	0	(0)	0	(0)	0	(0)	5	(11)	13	(28)	15	(32)	1	(2)	13	(28)	0	(0)	0	47
2010	0	(0)	4	(9)	0	(0)	6	(13)	1	(2)	5	(11)	23	(49)	3	(6)	5	(11)	0	47

[a] Unknown transport not used to calculate harvest.

[b] Includes one wolf illegally killed in July.

Table 4. Unit 20E wolf harvest and percent by transport method, regulatory years 1990 through 2010[a].

Regulatory year	Harvest by transport method																	
	Helicopter	(%)	Airplane	(%)	Dogsled, skis, or snowshoes	(%)	Boat	(%)	3- or 4-Wheeler	(%)	Snowmachine	(%)	ORV	(%)	Highway vehicle	(%)	Unk	*n*
1990	0	(0)	8	(35)	1	(4)	0	(0)	2	(9)	10	(43)	0	(0)	2	(9)	1	24
1991	0	(0)	4	(24)	1	(6)	0	(0)	1	(6)	10	(59)	0	(0)	1	(6)	2	19
1992	0	(0)	6	(11)	6	(11)	0	(0)	0	(0)	41	(72)	0	(0)	4	(7)	0	57
1993	0	(0)	16	(24)	0	(0)	0	(0)	1	(1)	31	(46)	0	(0)	19	(28)	1	68
1994	0	(0)	14	(36)	0	(0)	0	(0)	0	(0)	23	(59)	0	(0)	2	(5)	0	39
1995	0	(0)	11	(13)	3	(4)	0	(0)	1	(1)	67	(80)	0	(0)	2	(2)	0	84
1996	0	(0)	5	(10)	0	(0)	1	(2)	1	(2)	43	(83)	1	(2)	1	(2)	2	54
1997	0	(0)	1	(3)	0	(0)	0	(0)	1	(3)	22	(63)	0	(0)	11	(31)	0	35
1998	0	(0)	2	(12)	0	(0)	0	(0)	1	(6)	6	(35)	0	(0)	8	(47)	0	17
1999	0	(0)	11	(35)	0	(0)	0	(0)	0	(0)	18	(58)	0	(0)	2	(6)	0	31
2000	0	(0)	10	(20)	1	(2)	0	(0)	1	(2)	30	(60)	0	(0)	8	(16)	0	50
2001	0	(0)	8	(25)	0	(0)	0	(0)	1	(3)	21	(66)	0	(0)	2	(6)	0	32
2002	0	(0)	2	(7)	3	(11)	0	(0)	3	(11)	11	(39)	0	(0)	9	(32)	0	28
2003	0	(0)	7	(18)	2	(5)	1	(3)	1	(3)	28	(70)	0	(0)	1	(3)	0	40
2004	0	(0)	71	(68)	4	(4)	0	(0)	2	(2)	24	(23)	0	(0)	3	(3)	1	105
2005	0	(0)	17	(35)	0	(0)	1	(2)	1	(2)	22	(45)	0	(0)	8	(16)	0	49
2006	0	(0)	21	(29)	2	(3)	1	(1)	8	(11)	29	(40)	0	(0)	10	(14)	1	72
2007	0	(0)	20	(36)	0	(0)	0	(0)	6	(11)	24	(43)	0	(0)	6	(11)	0	56
2008	38	(38)	37	(37)	3	(3)	0	(0)	2	(2)	17	(17)	0	(0)	2	(2)	0	99
2009	10	(21)	10	(21)	2	(4)	0	(0)	1	(2)	18	(38)	0	(0)	6	(13)	0	47
2010	0	(0)	19	(40)	0	(0)	1	(2)	3	(6)	20	(43)	1	(2)	3	(6)	0	47

[a] Unknown transport not used to calculate harvest.

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011[1]

LOCATION

GAME MANAGEMENT UNITS: 21A and 21E (18,792 mi^2)

GEOGRAPHIC DESCRIPTION: Drainages of the Yukon River from Paimiut upstream to, but not including, the Blackburn Creek drainage; and the Innoko River drainage

BACKGROUND

In Units 21A and 21E, most residents consider wolves to be a competitor for moose and yet most local, state resident, and nonresident hunters also consider wolves a trophy big game animal. These views were clearly expressed during an extensive public planning process during 2005 that resulted in the *Yukon–Innoko Moose Management Plan* (YIMMP; ADF&G 2006). This document, endorsed by the Alaska Board of Game (board) and the Federal Subsistence Board, directs the Alaska Department of Fish and Game (ADF&G) to manage wolves in this area so that they do not depress moose populations.

Wolf predation plays a significant role in the population dynamics of moose (Gasaway et al. 1992) and there is considerable interest in wolf control among residents of Unit 21E. However, wolf harvest in this area is historically low and inadequate to regulate wolf numbers and cause reduced predation rates.

In July 2006, to facilitate moose management, a 4,476 mi^2 portion of Unit 21A within the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna rivers became part of Unit 21B. Comparisons of information in this report with older reports should take this change into account.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Ensure the long-term conservation of wolves throughout their historic range in Units 21A and 21E in relation to their prey and habitat.

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

- Provide for a broad range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.

MANAGEMENT OBJECTIVES

- Maintain a viable wolf population of at least 100 wolves, unless directed otherwise by the commissioner and the board as part of a predation control program.

- Maintain a 3-year average harvest of at least 25% of the estimated wolf population in Units 21A and 21E combined.

MANAGEMENT ACTIVITIES

- Continue to refine annual wolf population estimates in the area, based on aerial surveys, incidental sightings, hunter interviews, trapper questionnaires, and evaluation of sealing documents.

- Conduct wolf predation control programs as directed by the commissioner and board.

- Conduct wolf reconnaissance population estimation surveys in Unit 21E at 3-year intervals in conjunction with moose population estimation surveys in Unit 21E.

- Conduct wolf trapping and snaring clinics as agreed to in the YIMMP in communities that have expressed interest in the program.

METHODS

During RY08–RY10 we estimated Unit 21A and 21E wolf population size (Table 1) using a combination of data sources including wolf population data from similar areas (Unit 19D East surveys, Unit 20A wolf research data), harvest records, wolf observations made during surveys for other species, previous estimates, and hunter–trapper interviews and questionnaires.

We conducted an aerial wolf reconnaissance track survey (Stephenson 1978) in March 2009 in a 3,600 mi^2 area of Unit 21E between the Innoko and Yukon Rivers from Grayling, south to the confluence of the Innoko and Yukon rivers and approximately 15 miles west of the Yukon River between the Anvik and Bonasila rivers using 3 fixed-wing aircraft (PA-18 Super Cub or similar aircraft) and 5 hours of survey time per aircraft. Prior knowledge of wolf locations was available because this wolf survey immediately followed moose surveys. Within the area surveyed, 1,900 mi^2 have high quality moose habitat based on moose survey stratification and therefore high wolf densities, and 1,700 mi^2 are low quality moose habitat with low wolf densities. Snow had fallen 2 days prior to the wolf survey and light conditions were excellent. However, weather only allowed 1 survey day. No estimate of precision was made and ranges in our estimates are a result of uncertainty in what we observed. We extrapolated the resulting densities to all of Unit 21E (2,400 mi^2 of high quality moose habitat and 5,600 mi^2 of low quality moose habitat).

Sealing by an ADF&G representative or an appointed fur sealer is required for wolves taken in Alaska and we obtained harvest statistics primarily from these sealing certificates. We assumed that >90% of the annual wolf harvest was reported on sealing certificates because most wolf hides from western Interior Alaska are sold. During the sealing process, information was collected

on specific location and method of take, date, sex, color of pelt, estimated size of the wolf pack, and method of transportation. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY10 = 1 July 2010 through 30 June 2011).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size and Density

Unit 21A. Sealing records and our incidental wolf observations support trapper reports that wolves were abundant. Harvest and ungulate levels during RY08–RY10 suggest that the population was stable during this time. No wolf population estimation surveys have been conducted in Unit 21A but we believe there are 240–320 wolves in 35–46 packs (Table 1).

Unit 21E. During the March 2009 wolf reconnaissance survey, we found 60–67 wolves associated with 9–10 packs (average pack size = 6.0–7.4 wolves) and 3 singles. We directly observed or accounted for tracks of 38–45 wolves in 1,900 mi^2 of high quality moose habitat (20–24 wolves/1,000 mi^2; 7.7–9.3 wolves/1,000 km^2) and 25 wolves in 1,700 mi^2 (2,736 km^2) of low quality moose habitat (14 wolves/1,000 mi^2; 5.4 wolves/1,000 km^2). This survey represents a minimum count because we were unable to complete it due to unsuitable weather after the first day. Therefore, it also contains uncertainty regarding pack identity for some wolves and underestimates single wolves. However, no other data are available so we used these data to guide our minimum wolf population estimate. The habitat and moose densities in the remainder of Unit 21E are similar to the survey area and we predict that wolf densities are comparable. Therefore, our minimum estimated Unit 21E wolf density is about 16 wolves/1,000 mi^2 (6.2/1,000 km^2).

Based on information above, we believe that the Unit 21E wolf population is stable at 150–200 wolves in 20–30 packs (Table 1). However, interpretation of this estimate should include the knowledge that it is based on data from the March 2009 partial survey with no estimate of precision; crude estimates of habitat were used to extrapolate these data to unsurveyed portions of the unit; and ranges in our estimates imply uncertainty in what was observed.

The March 2009 moose population survey in Unit 21E just prior to the 2009 wolf survey resulted in a population estimate of 6,218 observable moose ±17% (5,147–7,288; 90% CI) in 5,070 mi^2 of Unit 21E and a density at the midpoint of 1.2 moose/mi^2. This results in a ratio of 1 wolf:55 moose. This ratio is valid only during winter because we do not know the movement patterns of moose in this area.

Distribution and Movements

Harvest locations, observed wolf tracks, and incidental sightings indicated the wolf population was distributed throughout both units.

MORTALITY

Harvest

Season and Bag Limit. The wolf hunting and trapping seasons and bag limits remained unchanged in Units 21A and 21E during RY08–RY10 as shown below.

Bag Limit	Resident/Nonresident Open Seasons
Unit 21A	
HUNTING: 10 wolves.	10 Aug–30 Apr
TRAPPING: No limit.	1 Oct–30 Apr
Unit 21E	
HUNTING: 10 wolves.	10 Aug–30 Apr
TRAPPING: No limit.	1 Nov–30 Apr

Alaska Board of Game (BOG) Actions, Emergency Orders, and Legislative Actions. During RY08–RY10, no changes were made to wolf hunting or trapping regulations. In 2010 the board adopted intensive management for the Unit 21E moose population. Future changes in wolf management direction and regulations may occur if the moose population or harvest declines below 1.0 observable moose/mi^2.

Harvest by Hunters and Trappers. During RY08–RY10, 8 and 40 wolves were reported harvested in Units 21A and 21E, respectively. Snare was the primary method of take in Unit 21A and shooting was most common in Unit 21E (Table 2).

Hunter Residency and Success. During RY08–RY10, 18 resident hunters harvested 47 wolves, and 1 wolf was taken by a nonresident (Table 3). Overall, local residents (residents of Units 21A, 21E, and 19D) accounted for 88% (n = 42) of the total harvest during RY08–RY10.

During RY06–RY10, 5–8 resident hunters and trappers took 10–26 wolves per year and averaged 1.3–5.2 wolves per successful trapper (Table 3). The highest number of wolves taken by an individual during any year was 21 and the most wolves reported to have been shot by 1 person was 8. People who killed 5–10 wolves typically did so with snares and/or traps.

Harvest Chronology. Approximately two-thirds of the reported wolf harvest during RY08–RY10 occurred during January–March (Table 4). September harvest was generally lower and incidental to big game hunts for other species. The 1 wolf harvested by a nonresident was taken during September.

Transport Methods. During RY08–RY10, snowmachine was the primary mode of transportation of successful hunters and trappers (Table 5).

Other Mortality

No other wolf mortality data are available for RY08–RY10.

NONREGULATORY MANAGEMENT PROBLEMS, NEEDS, AND EDUCATION

Yukon-Innoko Moose Management Plan

The YIMMP (ADF&G 2006) guides wolf and moose management in Units 21A and 21E (Seavoy 2009). The plan's management objective is to prevent a moose population decline from which recovery would be difficult, by being proactive. This objective was the guiding principle for the BOG in adopting a predation control implementation plan for Units 21A and 21E in 2010. This plan allows wolf control if moose population estimates fall below threshold levels.

Other Nonregulatory Management Problems, Needs, and Education

Collecting survey and inventory information on wolf populations is a challenge faced by wildlife managers, particularly in remote areas of Alaska such as Units 21A and 21E. Population estimates are especially difficult to obtain because they require adequate search conditions, which occur infrequently and for short duration in Units 21A and 21E, and the meeting of the logistical challenges of having experienced pilot–observer teams positioned to begin surveys when these conditions occur.

Hunting and trapping of wolves in Units 21A and 21E has not regulated the wolf population as they may have been prior to restrictions placed on the use of aircraft. As more local people realized that predator control actions by ADF&G are constrained politically, interest in trapping clinics and trapping incentive programs increased. We partnered with U.S. Fish and Wildlife Service staff to hold a trapping clinic in Shageluk in February 2011 to provide trapping education and promote additional wolf harvest. However, achieving wolf harvest under hunting and trapping regulations sufficient to increase moose survival has not occurred.

CONCLUSIONS AND RECOMMENDATIONS

The objective to maintain a viable wolf population of at least 100 wolves was met. The objective to maintain a 3-year average harvest of at least 25% of the estimated wolf population in Units 21A and 21E was not met. During RY08–RY10 the average harvest was 9–12% of the estimated population.

We accomplished most management activities as intended during RY08–RY10. Using the best data available, we estimated annual wolf numbers, monitored harvest, and cooperated with other agencies to conduct wolf studies and a trapping clinic. We also presented a predation control implementation plan to the Board of Game that was adopted during the March 2010 meeting.

Providing wolf trapping clinics within area villages is part of the YIMMP. The trapping clinic held in Shageluk in February 2011 was well received and provided public education benefits, but it remains to be seen whether it will help us achieve our harvest objectives. We recommend continuing these clinics as resources allow.

The March 2009 wolf population survey improved our understanding of wolves in Unit 21E. We recommend conducting these surveys in Unit 21E at 3-year intervals if resources are available. These surveys will help us refine our wolf population and trend estimates. Further, they can provide data for wolf population reduction objectives if the board directs us to conduct a wolf control program.

We recommend no changes to wolf management goals for the next report period.

We will change the management objectives for the next report period to:

- Maintain at least 100 wolves in Units 21A and 21E, unless directed otherwise by the commissioner and the Board of Game as part of a predation control program.

- Harvest a minimum of 29% of the estimated wolf population.

Raising the harvest objective from 25% to 29% is based on research in the Brooks Range (Adams et al. 2008) where it was determined that removing wolves through hunting and trapping at rates less than 29% of the population did not impact wolf numbers. Although we have not achieved this level of harvest, reducing wolf numbers through hunting and trapping is consistent with the Yukon–Innoko Management Plan.

We will change the management activities for the next reporting period to:

- Continue to refine annual wolf population estimates in the area based on aerial surveys or censuses when conditions permit, incidental sightings, hunter interviews, trapper questionnaires, and evaluation of sealing documents.

- Conduct wolf predation control programs as directed by the commissioner and board.

- Encourage increased wolf harvest through wolf trapping and snaring clinics as agreed to in the YIMMP in communities that have expressed interest in the program.

This change uncouples wolf surveys from moose surveys, which may improve the likelihood that a complete wolf survey can be accomplished.

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Table 1. Units 21A and 21E wolf population estimates, regulatory years 2006 through 2010.

Regulatory year	Unit	Population estimate Min	Population estimate Max	Number of packs	Trend
2006	21A	240	320	35–46	stable
	21E	180	240	25–35	stable
2007	21A	240	320	35–46	stable
	21E	180	240	25–35	stable
2008	21A	240	320	35–46	stable
	21E	150	200	20–30	stable
2009	21A	240	320	35–46	stable
	21E	150	200	20–30	stable
2010	21A	240	320	35–46	stable
	21E	150	200	20–30	stable

Table 2. Units 21A and 21E wolf harvest and harvest method, regulatory years 2006 through 2010.

Regulatory year	Unit 21A					Unit 21E				
	Shoot	Trap	Snare	Other/ Unk	Total	Shoot	Trap	Snare	Other/ Unk	Total
2006	1	2	5	0	8	7	2	4	0	13
2007	2	0	4	0	6	3	0	3	0	6
2008	0	0	1	0	1	12	13	0	0	25
2009	0	1	2	0	3	4	2	1	0	7
2010	1	0	3	0	4	4	4	0	0	8
Total	4	3	15	0	22	30	21	8	0	59
% of Total	18	14	68	0	100	51	36	14	0	101
5-year $\bar{x}$	1	1	3	0	4	6	4	2	0	12

Table 3. Units 21A and 21E wolf harvest by residency, regulatory years 2006 through 2010.

Regulatory year	Unit	Harvest by residency					Total take
		Number Residents	Resident take	Number Nonresidents	Nonresident take	Unk	
2006	21A	5	7	1	1	0	8
	21E	7	13	0	0	0	13
2007	21A	1	3	3	3	0	6
	21E	1	3	3	3	0	6
2008	21A	1	1	0	0	0	1
	21E	4	25	0	0	0	25
2009	21A	2	3	0	0	0	3
	21E	6	7	0	0	0	7
2010	21A	1	3	1	1	0	4
	21E	4	8	0	0	0	8
	Total	32	73	8	8	0	81

Table 4. Units 21A and 21E wolf percent harvest chronology by month, regulatory years 2006 through 2010.

Regulatory year	Percent harvest chronology by month (*n*)									Total harvest (*n*)
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
2006	0 (0)	19 (4)	9 (2)	5 (1)	0 (0)	29 (6)	24 (5)	9 (2)	5 (1)	(21)
2007	0 (0)	42 (5)	25 (3)	0 (0)	8 (1)	25 (3)	0 (0)	0 (0)	0 (0)	(12)
2008	0 (0)	8 (2)	0 (0)	12 (3)	0 (0)	27 (7)	0 (0)	54 (14)	0 (0)	(26)
2009	0 (0)	10 (1)	0 (0)	0 (0)	10 (1)	10 (1)	40 (4)	30 (3)	0 (0)	(10)
2010	0 (0)	8 (1)	8 (1)	0 (0)	0 (0)	50 (6)	25 (3)	8 (1)	0 (0)	(12)
Total (*n*)	(0)	(13)	(6)	(4)	(2)	(23)	(12)	(20)	(1)	(81)
% of Total	0	16	7	5	3	28	15	25	1	

Table 5. Units 21A and 21E wolf percent harvest by transport method, regulatory years 2006 through 2010.

Regulatory year	Percent harvest by transport method (*n*)				
	Aircraft	Boat	Snowmobile	Other/Unk	Total (*n*)
2006	0 (0)	19 (4)	76 (16)	5 (1)	(21)
2007	42 (5)	0 (0)	58 (7)	0 (0)	(12)
2008	0 (0)	8 (2)	92 (24)	0 (0)	(26)
2009	10 (1)	10 (1)	80 (8)	0 (0)	(10)
2010	0 (0)	8 (1)	83 (10)	8 (1)	(12)

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNITS: 21B, 21C, and 21D (25,067 mi^2)

GEOGRAPHIC DESCRIPTION: Yukon River drainage above Paimiut to Tozitna River, including Koyukuk River up to Dulbi Slough and Nowitna River drainage

BACKGROUND

Wolves occur throughout Units 21B, 21C, and 21D in all habitat types, even near human settlements. Primary prey species in this area are moose and caribou. In Unit 21D prior to 1945 moose were uncommon and caribou numbers fluctuated. Moose rapidly increased in the 1940s and 1950s coincident with federal wolf control. In the mid-1950s, moose densities were thought to be similar to current estimates (3–9 moose/mi^2) in the Koyukuk lowlands near Three Day Slough. Subsequently, wolf numbers increased as a result of the increase in numbers of moose and the end of federal wolf control of the mid-1950s. Local residents believe wolf numbers are presently higher than historical levels, especially in Unit 21D.

Wolves are an important furbearer and big game species in Unit 21. Not all harvest is accounted for each year as some wolves are taken for personal use and not sealed; therefore, actual harvest is likely higher than reported on sealing certificates or on export and acquisition documents. Personal use includes, among other things, making wolf parka ruffs that local families present to others as gifts at traditional potlatches. Additionally, local trappers and hunters make a conscious effort to increase their wolf harvest when moose are scarce because they believe wolves are competitors for moose meat.

In Unit 21B, 21C and 21D wolf management reports prior to 2006, Unit 21B did not include the portion of the Nowitna River drainage upstream of the Little Mud River. Beginning 1 July 2006, Unit 21B includes all of the Nowitna River drainage and the size of Unit 21B increased from 4,871 mi^2 to 9,311 mi^2.

MANAGEMENT DIRECTION

Wolf populations are managed to provide for human uses and to ensure that wolves remain an integral part of the ecosystems of Units 21B, 21C and 21D. Management may include manipulation of wolf population size or total protection of wolves from human influence. Not all human uses are allowed in all areas or at all times; management focuses on providing sustained, diverse human uses of wolf populations.

MANAGEMENT GOALS

- Ensure long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.
- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and reflect the public's interest.
- Increase public awareness and understanding of uses, conservation and management of wolves, their prey, and habitat in Alaska.

MANAGEMENT OBJECTIVES

- Maintain a fall density of 18–23 wolves/1,000 mi^2 (7–9 wolves/1,000 km^2).
- Provide for a total annual harvest of 85–105 wolves.
- Increase trapper participation in the statewide trapper survey by at least 1% annually.

MANAGEMENT ACTIVITIES

- Conduct surveys to estimate population size and density.
- Model the potential effects of wolf predation on ungulates in each unit.
- Monitor harvest through sealing records and trapper questionnaires.
- Monitor wolf numbers and population characteristics through interviews with trappers, hunters, pilots, and by evaluation of sealing documents.
- Conduct trapper education clinics.

METHODS

During 2008–2011, wolf surveys were not conducted in Units 21B, 21C, or 21D. Survey methodology for previous Sample Unit Probability Estimator (SUPE) and minimum count aerial wolf surveys are described in Stout (2009). These include SUPE surveys conducted in Unit 21D in 1994 and in Unit 21B in 1996, and minimum count aerial surveys of northern Unit 21D in 1999 and of Unit 21B in 2001.

To monitor harvest, wolves taken by trappers and hunters were required to be sealed by the Alaska Department of Fish and Game (ADF&G) or a designated representative. Information recorded for each wolf included date of kill, name of trapper or hunter, location of kill, method of take and transportation, sex of the wolf, color of the pelt, and the number of other wolves thought to be in the pack. Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY09 = 1 July 2009 through 30 June 2010).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Aerial surveys have not been conducted in Unit 21B since 2001 or Unit 21D since 1999. Unit 21C has never been surveyed (Table 1). Because of inadequate survey conditions during the 1999 survey of northern 21D and 2001 survey of 21B (Stout 2009), we were not able to conduct a SUPE or a wolf census. We were able to survey portions of the area and obtain a minimum count of wolves to gain some insight of the range of pack sizes in the area. These results are not adequate as a population estimate or a basis for extrapolation to the greater area. Therefore no population estimates are reported for 21B, 21C or 21D for RY08–RY10 in this report.

Distribution and Movements

No data were gathered on wolf distribution and movements during RY08–RY10, but see Katnik (1997) and Katnik and Spindler (1998) for results of telemetry studies conducted previously on wolves in Unit 21. These results are discussed in Stout (2009).

MORTALITY

Harvest

Seasons and Bag Limits during RY08–RY10.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Units 21B, 21C, and 21D		
Hunting: 10 wolves. A snowmachine may be used to position hunters to select individual wolves for harvest, and wolves may be shot from a stationary snowmachine.	10 Aug–30 Apr	10 Aug–30 Apr
Trapping: No limit. Snowmachines may be used to position trappers to take wolves during trapping seasons provided the animals are not shot from a moving snowmachine.	1 Nov–30 Apr	1 Nov–30 Apr

Alaska Board of Game Actions and Emergency Orders. No Board of Game actions were adopted during RY08–RY10 and no emergency orders were issued. In RY06 the board amended the hunting regulations to allow a bag limit of 10 wolves. At the January 2006 board meeting, Unit 21B was expanded to include the upper Nowitna River drainage, which added 4,412 mi^2 to the report area.

Hunter–Trapper Harvest. Hunters and trappers reported harvesting 40, 53, and 36 wolves during RY08, RY09, and RY10 (Table 2), comparable to the past 16 years except during RY00–RY02

when harvest was noticeably higher. Differences in wolf harvest between years do not appear to be related to harvest regulations. Most ($\bar{x}$=87%, RY08–RY10) wolves were taken in Unit 21D. The actual number harvested was higher because some village residents seal only those wolf pelts sent to a commercial tannery or sold to a fur buyer. We estimated the unreported harvest averaged approximately 20 wolves per year, based on information gathered through personal interviews with local hunters and trappers beginning in RY00.

Harvest Chronology. Wolves were harvested throughout the open season during RY08–RY10, with the majority of harvest in December and March (Table 3). Beginning in RY97 the proportion of wolves harvested by hunters in the fall increased substantially and remained high through RY07, while the proportion of wolves harvested by trappers during winter decreased.

Transport Methods. Most wolves were taken by people who used snowmachines or airplanes for transportation during RY08–RY10 (Table 4). Boats were the only other mode of transportation commonly used by successful wolf hunters and trappers.

CONCLUSIONS AND RECOMMENDATIONS

The first management objective, to maintain a fall density of 18–23 wolves/1,000 mi^2 (7–9 wolves/1,000 km^2), could not be evaluated because no surveys were conducted to estimate population levels. The second objective, to provide for a total annual harvest of 85–105 wolves, was not met with respect to reported harvest and available harvest was not known due to a lack of population estimates. Total harvest in all 3 units during RY08–RY10 averaged 43 wolves per year. Activities to promote increased hunting and trapping pressure should continue to be a priority in order to achieve the harvest objective. The third management objective, to increase trapper participation in the statewide trapper survey by at least 1% annually, could not be evaluated because results from these surveys have not yet been summarized for data statewide.

While no surveys, trapper clinics, or modeling were conducted during RY08–RY10, the other management activities were accomplished. Harvest monitoring was an important part of the wolf management program. It included the statewide sealing system and trapper interviews.

We recommend spring population estimation surveys be conducted in Units 21B and 21D during RY11–RY13 as funds allow. We also recommend future radiotelemetry studies to improve our understanding of wolf populations. Within the Koyukuk–Nowitna National Wildlife Refuge in Units 21B and 21D, previous radiotelemetry studies improved wolf population estimates and increased our information about wolf predation on moose.

For the next reporting period, the management objectives and activities will be modified to the following in order to more accurately represent current management direction.

MANAGEMENT OBJECTIVES

- Maintain a combined average annual harvest of at least 40 wolves from Units 21B, 21C, and 21D

MANAGEMENT ACTIVITIES

- Conduct surveys to estimate population size and density.

- Monitor harvest through sealing records.
- Monitor wolf numbers and population characteristics through interviews with trappers, hunters, pilots, and by evaluation of sealing documents.
- Conduct trapper education clinics.

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Pamperin, N. J. 2012. 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.

Table 1. Units 21B and 21D wolf population survey estimates[a], regulatory years 1994 through 2001.

Regulatory year	Area	Survey type	Population estimate	Number of packs
1994	21D	SUPE	220–292	49–55
1996	21B[b]	SUPE	56-80	---
1999	Northern 21D	minimum count	126	20
2001	21B[b]	minimum count	47	11

[a] Based on Alaska Department of Fish and Game–US Fish and Wildlife Service sample unit probability estimator surveys (SUPE) and minimum count aerial wolf surveys.
[b] Area surveyed was original (pre–2006) Unit 21B (4,871 mi^2).

Table 2. Units 21B, 21C, 21D wolf harvest, regulatory years 1991 through 2010.

Regulatory year	Reported harvest				Estimated unreported harvest	Total estimated harvest	Method of take			
	M	F	Unk	Total			Trap/snare	Shot	SDA[a]	Unk
1991	22	14	4	40	20	60	19	18	1	2
1992	20	11	4	35	20	55	15	16	0	4
1993	31	23	1	55	20	75	38	16	0	1
1994	17	11	7	35	20	55	11	18	6	0
1995	16	28	3	47	20	67	29	18	0	0
1996	16	18	2	36	20	56	27	9	0	0
1997	12	19	0	31	20	51	19	12	0	0
1998	38	21	1	60	20	80	35	25	0	0
1999	31	23	0	54	20	74	30	24	0	0
2000	55	32	0	87	35	122	53	31	0	3
2001	27	32	24	83	25	108	43	29	0	11
2002	54	34	3	91	25	116	49	39	0	3
2003	24	19	4	47	25	72	25	21	0	1
2004	36	14	2	52	25	77	21	31	0	0
2005	21	21	3	45	25	70	32	13	0	0
2006	20	14	0	34	20	54	26	4	0	4
2007	14	14	0	28	20	48	14	14	0	0
2008	23	16	1	40	20	60	24	16	0	0
2009	21	20	12	53	20	73	37	8	0	8
2010	21	15	0	36	20	56	27	9	0	0

[a] Wolves taken by hunters the same day they were airborne. In regulatory years 1994 through 1996 this included wolves taken by trappers using aircraft for transportation.

Table 3. Units 21B, 21C, and 21D wolf percent harvest chronology by time period, regulatory years 1994 through 2010.

Regulatory	Percent harvest chronology by time period							
year	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	n[a]
1994	8	14	6	8	17	44	3	36
1995	6	3	9	17	11	43	11	35
1996	9	18	9	15	24	26	0	36
1997	21	3	7	17	28	24	0	29
1998	13	3	10	19	29	22	4	69
1999	19	2	26	2	33	15	4	54
2000	10	0	6	21	15	31	16	86
2001	19	3	11	9	19	33	6	83
2002	22	6	12	11	18	24	8	91
2003	26	0	4	11	34	17	9	47
2004	19	4	10	10	21	33	4	52
2005	14	2	27	18	16	11	11	44
2006	3	7	14	31	28	17	0	29
2007	36	0	7	7	21	18	11	28
2008	15	10	31	3	0	31	10	39
2009	11	18	18	7	7	22	18	45
2010	8	6	25	14	17	25	6	36

[a] Includes harvest from records received after total harvest was calculated.

Table 4. Units 21B, 21C, 21D wolf percent harvest by transport method, regulatory years 1994 through 2010.

Regulatory year	Percent harvest by transport method								
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	n[a]
1994	19	3	5	0	49	0	0	24	37
1995	0	3	6	0	91	0	0	0	35
1996	0	3	6	0	88	0	3	3	34
1997	0	19	16	0	61	0	0	3	31
1998	2	2	10	0	85	0	0	2	60
1999	19	4	9	0	69	0	0	0	54
2000	3	0	9	1	85	0	0	1	87
2001	16	1	11	0	55	0	0	17	83
2002	18	0	20	1	58	0	2	1	91
2003	30	0	21	2	47	0	0	0	47
2004	21	2	12	0	60	0	0	6	52
2005	46	0	7	0	46	0	0	0	43
2006	21	3	3	0	69	0	3	0	29
2007	25	0	32	0	43	0	0	0	28
2008	20	0	5	0	75	0	0	0	40
2009	43	2	4	0	32	0	0	19	53
2010	25	0	8	0	67	0	0	0	36

[a] Includes harvest from records received after total harvest was calculated.

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 22 (25,230 mi^2)

GEOGRAPHIC DESCRIPTION: Seward Peninsula and the adjacent mainland drained by all streams flowing into Norton Sound.

BACKGROUND

Wolves were scarce throughout Unit 22 for most of the past century. From the late 1890s, when reindeer herding was introduced to the Seward Peninsula, until statehood in 1959, wolf numbers were actively suppressed by predator control programs and bounties intended to protect reindeer. In the 1960s, after government-sponsored predator control ended, wolf numbers in Unit 22 gradually increased, and wolves expanded their range westward across the Seward Peninsula (Pegau 1971; Grauvogel 1979). By 1980, wolf sign was reported in all major drainages of Unit 22, but reported sightings were generally of individual animals or small groups of 2 to 3 wolves; the Unit 22 wolf population was estimated at fewer than 100 wolves (Grauvogel 1980). Observations and data from sealing certificates indicate wolf numbers and pack sizes have gradually increased across the Seward Peninsula over the years. Prior to 1996, wolves were most abundant in Units 22A and 22B where the Western Arctic caribou herd (WAH) frequently wintered (Persons 2006). Since 1996, wolves have expanded their range into Units 22D and 22E where a portion of the WAH have overwintered (Persons 2006). Anecdotal reports and staff observations suggest wolves have expanded into Unit 22C. Wolf distribution and abundance vary greatly from year to year, depending on location and abundance of caribou.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain viable wolf populations in Unit 22.
- Minimize adverse interactions between wolves and the public.

MANAGEMENT OBJECTIVES

- Maintain license vendors and fur sealers in all Unit 22 villages.
- Monitor wolf harvest through the fur sealing program, annual hunter/trapper questionnaires, and community-based harvest assessments conducted annually in selected Unit 22 villages.

- Improve compliance with current sealing requirements through public communication and education.
- Assess population status and trends using sealing records, hunter/trapper interviews and questionnaires, community-based harvest assessments, and observations by staff and the public.
- Cooperate with reindeer herders to evaluate methods for reducing adverse interactions between wolves and reindeer.

METHODS

Wolf track surveys have been completed in the past, following Unit 22 spring moose surveys. Wolf sightings and tracks are recorded using lat/long coordinates collected during Unit 22 wildlife aerial surveys. Estimates of wolf distribution and population trend, as well as harvest and human-use, are obtained annually from sealing certificates and observations by staff, reindeer herders, and local residents. Community-based harvest assessments via household surveys) were conducted in Elim, Golovin, Koyuk, Shaktoolik, Shishmaref, Wales, and White Mountain by department staff from the Division of Subsistence during this reporting period. Samples of whiskers and guard hair were voluntarily collected from harvested wolves in winter 2012 during the sealing process for a United States Fish and Wildlife Service (USFWS) statewide wolf stable isotope diet study. Unless noted, results are reported by regulatory year (RY) which covers the period 1 July through the following 30 June (e g. RY10 = 1 July 2010 to 30 June 2011).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

There is very little survey data or information to determine the wolf population in Unit 22. Previously, 9 wolves were found on a track survey completed in February 2006 to assess population status of wolves in the central portion of Unit 22A, where moose numbers were critically low and moose hunting was closed from RY05 to RY07 (Gorn 2010). During this survey in 2006 there were no signs of caribou in the area; the lack of caribou likely contributed to low numbers of wolves. Observer notes from spring moose surveys completed in Unit 22A Central in 2008 and 2012 show signs of wolf in the area by tracks or direct wolf sightings. In both survey years caribou were present in the northern portion on the Unalakleet River drainage and north of Shaktoolik. Wolf abundance is influenced by the presence of the Western Arctic caribou herd (WAH) in Unit 22, and increases in wolf numbers are likely expected during winter months (October–April) when caribou were present on winter range (Persons 2006).

Unit 22 participated in the RY08 statewide trapper survey program during the reporting period. Replies indicate that Unit 22 respondents think wolves are common and the relative abundance or numbers are increasing (ADF&G 2010) which is consistent with the RY02–RY05 and RY05–RY08 reporting periods.

Population Composition

We have no survey data or information to determine the composition of the wolf population in Unit 22.

Distribution and Movements

Seasonal movements of the WAH influence wolf distribution in Unit 22. Due to the occurrence of regular caribou winter range in eastern Unit 22, wolf abundance has historically been higher in Units 22A and 22B. However, since 1996 varying numbers of caribou have wintered in Units 22D, 22E, and western portions of Unit 22B; wolf harvest and observations in those areas have also increased (Table 2). The dispersal of wolves into Unit 22 was documented from a radiocollared wolf in 1999 in Denali National Park that traveled approximately 350 miles to the Koyuk River in Unit 22B. The wolf was harvested by a Koyuk resident in 2000 (Persons 2006; L. G. Adams, unpublished data).

MORTALITY

Harvest

Season and Bag Limits. The seasons and bag limits were the same for all three regulatory years in the reporting period.

Regulatory year RY08, RY09, RY10 Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 22		
Residents and Nonresidents:		
Trapping – no limit	1 Nov–30 Apr	1 Nov–30 Apr
Hunting – 20 wolves	1 Aug–30 Apr	1 Aug–30 Apr

Board of Game Actions and Emergency Orders. The November 2007 Board of Game adopted two changes effective in RY08. The first change extended the hunting season 9 days by changing the 10 August season opening date to 1 August, and the second change increased the bag limit from 5 to 20 wolves.

The November 2011 Board of Game adopted an amount necessary for subsistence (ANS) for Unit 22 wolves to include an ANS range of 5–20 wolves to coincide with the previously established positive customary and traditional (C&T) use finding. The new ANS will go into effect in RY12.

Hunter/Trapper Harvest. The annual reported harvest during the reporting period ranged from 26 to 52 wolves (Table 1). Sex composition of reported harvest during the 3–year reporting period was 61% males and 39% females (n = 98). During RY08–RY11, 90% of the Unit 22 reported wolf harvest came from Units 22A, 22B, and 22D. From RY90 through RY98, an average of 23 wolves per year were reported taken from Unit 22A, which was the highest reported harvest in Unit 22 during that time period; however, during RY99–RY11, Unit 22B reported an average of 19 wolves per regulatory year, which was the highest reported Unit 22 wolf harvest during that time period. Harvest has increased in other units on the Seward Peninsula when winter caribou

distribution has attracted wolf numbers to those areas (Table 2). Despite anecdotal reports of increased wolf observations in Unit 22C, wolf harvest continues to average 2 wolves per regulatory year (range 0–4, RY92–RY11).

The magnitude of unreported wolf harvest each year in Unit 22 is thought to be substantial, and fur-sealing data provide only a minimum estimate of harvest. Although fur-sealing agents are available in all Unit 22 villages, often hunters and trappers seal only those pelts that will be commercially tanned or sold to fur buyers. Unit 22 community-based harvest assessments conducted during the reporting period show wolves are used as a resource (Braem 2012a *in prep*, 2012b *in prep*, 2012c *in prep*); many wolf hides are home tanned and used locally, and people see no reason to seal them. A Bering Strait Region Local Traditional Knowledge survey for Units 22A, 22B, 22D, 22E conducted by Kawerak, Inc. indicated 38 wolves were harvested in RY05 (Ahmasuk, 2007).

Permit Hunts. There were no permit hunts for wolves in Unit 22 during the reporting period.

Hunter Residency and Success. Sealing certificate data indicate that residents of Unit 22 harvested 85% of the wolves taken during the reporting period. Of this total, residents from Unit 22A harvested 28%, Unit 22B and 22C residents harvested 43%, Unit 22D took 22%, and 22E residents harvested 7% of the wolves. Community-based harvest assessments indicate residents in Units 22A, 22B, and 22E attempted to harvest wolves (Braem 2012a *in prep*, 2012b *in prep*, 2012c *in prep*). Four nonresident hunters harvested wolves in Units 22A and 22B during the reporting period.

Harvest Chronology. Wolf harvest in Unit 22 occurs primarily in the late winter and early spring months (Fig. 1) when snowmachines are used for transportation, pelts are in prime condition, and wolves are abundant due to the presence of the WAH. During RY90–RY10, February and March had the highest harvest with 23% (n=187) and 28% (n=225), respectively. Sealing certificates during this reporting period show March and April being the high months for wolf harvest.

Harvest Methods. During the reporting period, 84% of the wolves harvested in Unit 22 were shot by hunters or shot opportunistically by local residents engaged in other activities. The few serious trappers in Unit 22 trapped or snared 13% of the wolves. The method of harvest for the remaining 3% is unknown (Table 1).

Transport Methods. Hunters/trappers using snowmachines harvested 85% of the wolves during the reporting period. Individuals using boat, skis, off road vehicles or unknown means of transportation harvested 15% of the wolves.

Other Mortality In the summer of July 2009, a young male wolf was taken in Defense of Life or Property (DLP) in Unit 22C for getting into a resident dog lot. The head was sent into the State Virology Lab where it was tested for rabies; the test result came back negative.

HABITAT

Assessment and Enhancement

There were no habitat assessment activities or habitat enhancement projects for wolves in Unit 22 during the reporting period

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

As wolf numbers and pack sizes increase throughout Unit 22 in response to increased presence of caribou during the winter months, wolf predation on moose or muskox may increasingly become a factor in ungulate management.

CONCLUSIONS AND RECOMMENDATIONS

Quantitative data on wolf populations in Unit 22 are lacking. It would be beneficial to continue wolf track surveys in the unit, particularly in areas where the WAH winters, to help understand trends in wolf numbers, pack size, wolf distribution, and the potential effects of wolf predation on local ungulate populations.

Through harvest sealing records and observations, wolf numbers have gradually increased across the Seward Peninsula, and wolves have expanded their range into Units 22D and 22E where a portion of the WAH have overwintered. The increased expansion of wolves throughout the Seward Peninsula may increasingly affect moose or muskox management throughout Unit 22. It is important to continue working with local villages and hunters around the Seward Peninsula to gain better knowledge of wolf behavior, habitat, and predation. Additional effort should be made to record and map sightings through anecdotal reports or during other game aerial surveys. This information may serve as an important tool when discussing wolf management with reindeer herders and local advisory committees.

Participation in the statewide Trapper Questionnaire program provided impressions about abundance of wolves and other furbearers from numerous hunters & trappers throughout the unit. We should continue to strive for annual reports and develop a Unit 22 wolf questionnaire to either be included in the Trapper Questionnaire, or mailed out separately to Unit 22 residents and reindeer herders. Community-based harvest assessments by Division of Subsistence should be continued as they are effective methods of gathering more accurate harvest information from selected villages. We should continue to work with the Unit 22 reindeer herders to respond to their concerns and provide updated harvest information or observations to the annual Reindeer Herders Association meetings.

Maintaining fur sealers and sport license vendors in rural Alaska is a challenge due to constant turnover or lack of interest of dealing with paperwork. It's imperative to continue working with current Unit 22 sealers and vendors, designating new village vendors when needed, and work with the ADF&G Licensing Department in Juneau to keep all parties updated. Providing sealer and vendor service in Unit 22 will help reduce unreported wolf harvest, achieve better sealing compliance, and contribute to more knowledge of wolves on the Seward Peninsula.

Unit 22 hunting and trapping regulations for wolves are liberal and provide 9 months of hunting opportunity with a bag limit of 20 wolves or no bag limit when trapping, yielding ample opportunity for harvesting a wolf. However, the harvest of wolves by hunting methods in Unit 22 is considered opportunistic. There are only a handful of serious wolf trappers in the unit, and providing a trapping clinic to orient hunters and trappers on the use of traps and snares may provide additional wolf harvest by introducing trapping to youth and other new trappers.

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Table 1. Reported Unit 22 wolf harvest from sealing records for RY90 through RY10.

	Reported harvest				Method of take			Total successful
RY	M	F	Unk.	Total	Trap / Snare	Shot	Unk.	trapper / hunters
RY90	14	11	6	31	5	26	0	11
RY91	21	13	20	54	3	51	0	18
RY92	14	7	6	27	4	17	6	11
RY93	24	8	2	34	2	24	8	16
RY94	15	2	7	24	1	23	0	16
RY95	19	8	5	32	0	29	3	16
RY96	19	4	2	25	3	21	1	18
RY97	16	11	2	29	7	16	6	14
RY98	33	12	6	51	6	42	3	30
RY99	37	19	7	63	5	44	14	38
RY00	34	23	8	65	4	55	6	34
RY01	26	16	0	42	3	38	1	28
RY02	25	19	3	47	6	33	8	28
RY03	14	8	0	22	1	21	0	12
RY04	22	14	3	39	4	34	1	26
RY05	22	14	1	37	7	28	2	21
RY06	20	10	0	30	3	24	3	16
RY07	12	14	1	27	0	26	1	18
RY08	16	9	1	26	6	17	3	16
RY09	21	20	11	52	6	46	0	25
RY10	23	9	0	32	2	29	1	17

Table 2. Reported wolf harvest from sealing records by unit, RY90 through RY10.

RY	Harvest Unit 22A	Harvest Unit 22B	Harvest Unit 22C	Harvest Unit 22D	Harvest Unit 22E	Harvest Unknown
RY90	21	8	0	2	0	0
RY91	43	9	0	2	0	0
RY92	13	11	2	1	0	0
RY93	23	11	0	0	0	0
RY94	13	9	2	0	0	0
RY95	15	16	1	0	0	0
RY96	15	10	0	0	0	0
RY97	19	9	1	0	0	0
RY98	25	18	2	2	4	0
RY99	18	32	0	3	10	0
RY00	24	33	0	7	0	1
RY01	10	24	2	4	0	2
RY02	19	49	1	1	4	5
RY03	11	6	4	1	0	0
RY04	12	9	0	13	5	0
RY05	11	12	1	13	0	0
RY06	3	16	1	6	4	0
RY07	1	15	3	4	4	0
RY08	6	13	3	0	4	0
RY09	15	18	1	18	0	0
RY10	8	14	0	7	3	0

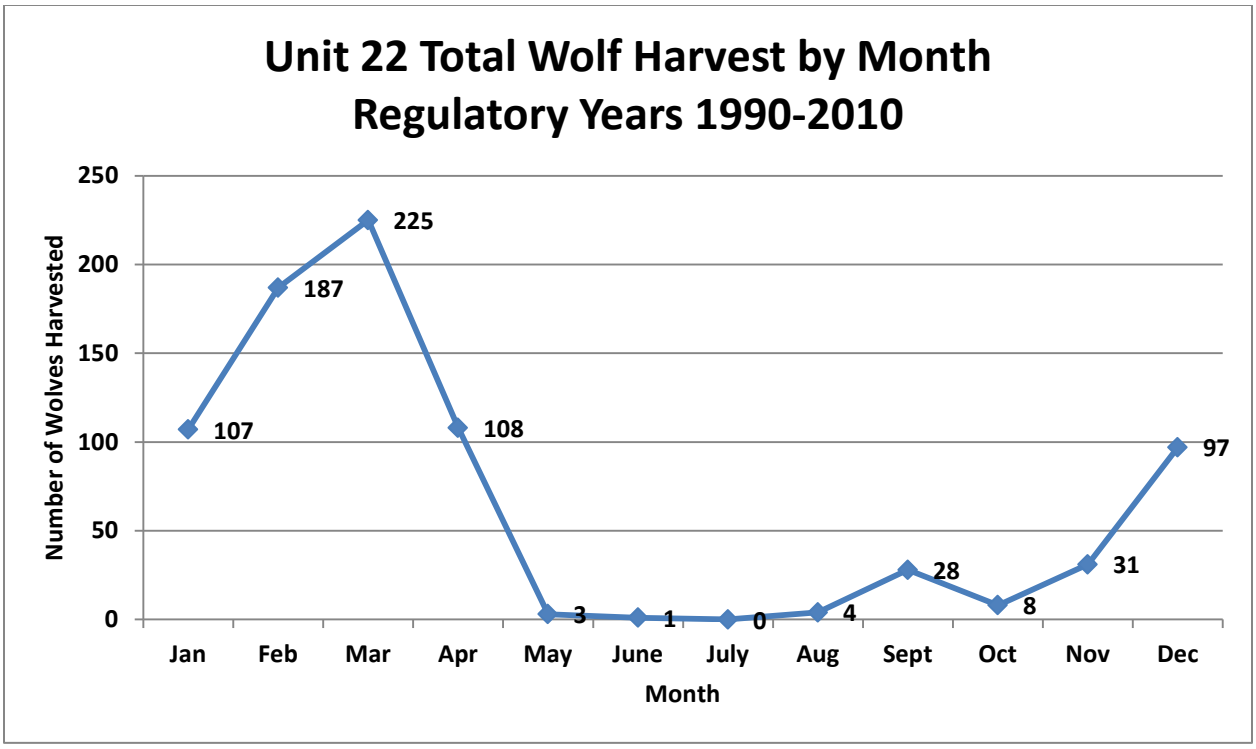

Figure 1. Unit 22 total wolf harvest by month, RY90 through RY10.

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: 23 (43,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Western Brooks Range and Kotzebue Sound

BACKGROUND

Wolves are indigenous to northwest Alaska. Prior to statehood in 1959, bounties were paid for wolves, and predator control programs were implemented to protect reindeer and caribou (McKnight 1973). After statehood, liberal hunting and trapping regulations that allowed aerial shooting and same-day-airborne hunting replaced government wolf control programs. High fur prices in the mid-1970s attracted nonlocal hunters to Unit 23 and stimulated local hunters and trappers to take wolves. As a result, wolf harvests were high when snow conditions were favorable for aircraft and snowmachines. During the 1980s, regulatory restrictions on the use of aircraft and low fur prices reduced the harvest of wolves. Today, use of aircraft for hunting is prohibited throughout Unit 23. Local residents using snowmachines now harvest most wolves in Unit 23. Wolves are highly valued by consumptive and nonconsumptive users who live outside Unit 23. They are also highly valued by local residents as a source of fur for parka ruffs. Additionally, local hunters are revered for taking wolves and wolverines. This is an important social aspect of taking wolves that is insensitive to fur prices or wolf availability.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Management goals are to maintain viable populations of wolves in Unit 23, provide hunting and viewing opportunities, and minimize adverse interactions between wolves and people.

MANAGEMENT OBJECTIVES

Management objectives are to maintain the furbearer-sealing program and explore alternative harvest reporting systems. Additionally, we strive to get more rural sealing agents and continue to improve communication between harvesters and ADF&G.

METHODS

No quantitative wolf population data were collected during this reporting period. We collected incidental observations of wolves from staff and local residents. Additionally, the statewide trapper questionnaire was mailed to a sample of unit residents. We estimated harvests from fur-sealing certificates and community harvest assessments. During this reporting period, community assessments were conducted in Noorvik (2008), Shungnak (2008), Ambler (2010), Buckland

(2009), Kiana (2010), Kobuk (2009), Kivalina (2010), and Noatak (2010). The department (Division of Wildlife Conservation and Division of Subsistence) and Maniilaq Association funded and conducted the community harvest surveys.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Ballard (1993) estimated a density of 1 wolf/50 mi^2 (80% CI=1 wolf/37–74 mi^2) in the middle Kobuk River during May 1990 using a line-intercept, track-sampling technique. Extrapolating this density to all of Unit 23 yielded a population estimate of 869 wolves (80% CI=580–1,169 wolves). This unitwide extrapolation yielding a crude approximation of actual abundance is now considered obsolete due to varied habitat used by wolves and changes in prey populations that have occurred since that time.

Reports from local residents of Unit 23 and some commercial operators, as well as our opportunistic observations, indicate wolf numbers varied substantially among drainages, and over the course of this reporting period.

Population Composition

We have no survey data or information to determine the composition of the wolf population in Unit 23.

Distribution and Movements

Wolves occur throughout Unit 23. Local residents report that the abundance, movements, and distribution of wolves are influenced to some degree by caribou, especially during winter (see also Ballard 1993). Expansion of the Western Arctic caribou herd onto the central portion of the Seward Peninsula beginning in the fall of 1996 probably facilitated reestablishment of breeding packs in this area. Of course, wolves also prey on moose, sheep, beavers, and small game. The availability of alternative prey allows wolves to persist in areas temporarily devoid of caribou.

MORTALITY

Harvest

Season and Bag Limit. A regulatory year (RY) begins on 1 July and ends on 30 June (e g. RY08 = 1 July 2008–30 June 2009).

Regulatory years *RY08, RY09, RY10* Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 23		
Residents and Nonresidents:		
Trapping - no limit	1 Nov–15 Apr	1 Nov–15 Apr
Hunting - 20 wolf limit	1 Aug–30 Apr	1 Aug–30 Apr

Board of Game Actions and Emergency Orders. The Board of Game made no changes to the Unit 23 wolf seasons or bag limits at its meetings in 2009 or 2011. No emergency orders were issued that affected wolf hunting or trapping during this reporting period.

Hunter/Trapper Harvest. Harvest levels and the percentage of male wolves harvested during each year of this reporting period have varied considerably during the last 20 years (Table 1). There was a peak in wolf harvest in RY04 of 139 wolves. This may have been related to the efforts of one hunter/trapper who was responsible for more than one-third of the harvest. Since that time, annual reported harvest has returned to more typical levels.

Few residents of Unit 23 seal their wolves. Georgette (1999) reported that <10% of the actual harvest is reported through the sealing program. Combining all community harvest assessments that have been conducted in Unit 23 since 1999 (Table 2, n=18) yields an annual mean harvest of 15.4 wolves/community (SD=14.4; note that this excludes Kotzebue). Combining annual reported harvests from sealing data for these same communities (n=26) during RY08 through RY10 yields an annual mean wolf harvest of 2.4 wolves/community (SD=4.0). Standard deviation reflects the effect one person can have on harvest numbers in sealing records and/or if that person is surveyed in a community harvest assessment. These figures are not directly comparable because they use data from different regulatory years; however, the comparison is consistent with Georgette's 1999 report of low compliance with sealing requirements.

Harvest levels reported through the fur sealing program are strongly affected by the amount of effort fur sealers spend to get hunters and trappers to seal their furs. For example, in RY99 Trooper J. Rodgers visited a number of communities in Unit 23 and offered to seal furs. As a result of this additional sealing effort, reported harvest that year was high.

Users continued to harvest wolves most heavily in the Kobuk River drainage during this reporting period (Table 3). This is probably because more people reside in this drainage than in any other in Unit 23. In 2010, one hunter spent considerable time hunting wolves on the Noatak and is largely responsible for the spike in harvest there.

Permit Hunts. There were no permit hunts for wolves in Unit 23 during the reporting period.

Hunter Residency and Success. The annual number of individuals having wolves sealed varies greatly from year to year but the average is about 20 hunters/trappers (Table 4). Residents of Unit 23 took most of the total harvest. Residents who live outside Unit 23 took 5 wolves during RY08, 6 during RY09, and 10 during RY10 (11%, 13%, and 14% of the total harvest, respectively). During those same years nonresidents took 7 wolves during RY08, 3 during RY09, and 11 during RY10 (16%, 6% and 16% of the total harvest, respectively). Nonresident compliance with sealing requirements is believed to be near 100%.

Harvest Chronology. Most wolves taken during this reporting period were harvested between December and April with March as the peak month in most years (Table 5). This temporal harvest pattern was consistent with previous years.

Take and Transport Methods. Most hunters used snowmachines to harvest wolves during this reporting period (Table 4). Some individuals used aircraft to access hunting areas and opportunistically shot wolves while hunting other species (personal communication). As in the

past, most wolves harvested in Unit 23 were shot rather than trapped during this reporting period (Table 1). Snares are occasionally reported but are not a common method of take. Few trappers use snares to harvest wolves in Unit 23.

Other Mortality

There were no reports of wolf mortality from causes other than hunting or trapping. We suspect rabies and canine distemper kill wolves but only rarely are able to document these outbreaks. Intraspecific conflict among packs is probably a major source of mortality as well. Given the high cost of gasoline and its effect on reducing hunting and trapping in recent years, especially in remote portions of the unit, natural mortality may now be influencing the abundance of wolves in Unit 23 more than harvests.

HABITAT

Assessment and Enhancement

There were no habitat assessment activities or habitat enhancement projects for wolves in Unit 23 during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Moose numbers are at low levels in large portions of Unit 23 (0.03–0.59 adult moose/mi^2). Although predation by black and brown bears, especially on moose calves, and by wolves has probably contributed to these low levels, predation is not the only factor affecting moose numbers here. Moose in Unit 23 already occur in the margins of their range; therefore, they are especially vulnerable to severe winters and other habitat related limitations. Although habitat may be adequate to support higher numbers of moose, snow conditions may prevent access to this food. Meanwhile, wolf numbers and brown bear numbers appear to have remained stable or slowly increased. All of these factors may depress moose numbers in Unit 23.

The predator control component of "intensive management" would probably be ineffective for increasing moose numbers in Unit 23 because >60% of the unit is federal public land. Therefore, since the early 1990s the state has incrementally liberalized brown bear and wolf hunting regulations to afford the public greater opportunity to harvest these species, in part to reduce predation on moose and sheep.

CONCLUSIONS AND RECOMMENDATIONS

Harvest data should be interpreted cautiously given the generally poor and inconsistent compliance with fur-sealing requirements throughout Unit 23. The unitwide estimate of wolf density reported by Ballard (1993) is now obsolete. The department should continue to conduct community harvest assessments in selected communities within Unit 23. In addition, hunters and trappers should be encouraged to seal their furs.

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Table 1. Sex and take of reported wolf harvest from sealing certificates for Unit 23, RY91 through RY10.

	Sex of Harvest			Take				
Regulatory year	Female	Male	Unknown	Shot	Trapped	Snared	Unknown	Total Harvest
RY91	25	30	7	47	9	0	6	62
RY92	31	28	9	66	1	0	1	68
RY93	16	30	2	43	3	0	2	48
RY94	21	23	11	43	12	0	0	55
RY95	24	41	12	41	19	1	16	77
RY96	18	31	15	46	12	0	6	64
RY97	10	8	2	10	9	0	1	20
RY98	10	12	10	21	8	0	3	32
RY99	41	69	3	79	22	1	11	113
RY00	14	39	15	54	8	0	6	68
RY01	18	30	5	34	14	0	5	53
RY02	24	34	12	57	12	0	1	70
RY03	17	28	0	30	9	0	6	45
RY04	57	68	14	83	46	0	10	139
RY05	19	19	4	31	7	0	4	42
RY06	26	26	2	27	15	1	11	54
RY07	9	19	1	25	4	0	0	29
RY08	14	24	7	34	3	0	8	45
RY09	14	21	13	41	6	1	0	48
RY10	25	44	1	58	9	0	3	70

Table 2. Comparison of wolf harvests from community harvest assessments and fur sealing documents in selected communities within Unit 23, RY08 through RY10.

		Fur Sealing Data		
Community	Harvest Estimate	RY08	RY09	RY10
Ambler	19 (2003) 12 (2010)	0	1	0
Buckland	49 (2003) 21 (2009)	2	12	5
Kiana	17 (1999) 1 (2006) 2 (2010)	5	0	2
Kivalina	23 (2007) 26 (2010)	0	0	0
Kobuk	4 (2009)	0	2	0
Noatak	15 (1999) 3 (2001) 2 (2007) 6 (2010)	0	0	0
Noorvik	52 (2002) 11 (2008)	12	8	12
Selawik	2 (1999) 18 (2006)	0	0	0
Shungnak	7 (2002) 17 (2008)	3	0	0

Table 3. Wolf harvest by drainage in Unit 23, RY91 through RY10.

Regulatory year	Kivalina -Wulik	Noatak	Kobuk	Selawik	N. Seward	Unknown	Total
RY91	4	9	30	11	8	0	62
RY92	4	9	30	20	5	0	68
RY93	0	15	28	3	2	0	48
RY94	2	12	27	7	7	0	55
RY95	0	12	26	19	10	10	77
RY96	6	8	28	13	7	2	64
RY97	0	2	17	0	0	1	20
RY98	1	5	12	1	11	2	32
RY99	0	8	61	13	31	0	113
RY00	0	8	34	10	11	5	68
RY01	3	7	30	3	4	6	53
RY02	0	19	18	8	23	2	70
RY03	3	3	29	1	9	0	45
RY04	9	54	58	1	14	3	139
RY05	0	16	21	1	4	0	42
RY06	3	16	32	1	2	0	54
RY07	0	3	10	1	14	1	29
RY08	1	7	30	3	3	1	45
RY09	7	2	18	2	10	9	48
RY10	3	33	21	5	2	6	70

Table 4. Number of harvesters and method of transport to harvest wolves in Unit 23, RY91 through RY10.

Regulatory year	Hunters/ trappers	Airplane	Snow-machine	Boat	Dog team	3 or 4 Wheeler	Skis/ Snowshoe	Unknown	Total harvest
RY91	27	7	53	0	1	0	0	1	62
RY92	24	2	64	0	0	0	0	2	68
RY93	22	1	37	0	1	2	0	7	48
RY94	22	0	53	0	1	0	1	0	55
RY95	24	3	61	0	0	0	0	13	77
RY96	24	4	45	3	5	0	1	6	64
RY97	11	1	17	0	0	1	0	1	20
RY98	14	2	28	0	0	0	0	2	32
RY99	23	3	93	0	0	0	4	12	113
RY00	23	3	59	0	0	0	0	6	68
RY01	25	4	33	3	0	0	1	12	53
RY02	29	5	59	4	0	0	0	2	70
RY03	19	3	32	4	0	0	0	6	45
RY04	28	3	120	2	0	1	0	13	139
RY05	19	4	34	0	0	0	0	4	42
RY06	18	2	40	0	0	0	1	11	54
RY07	15	4	25	0	0	0	0	0	29
RY08	25	11	25	0	0	1	0	8	45
RY09	18	10	37	1	0	0	0	0	48
RY10	35	17	52	1	0	0	0	3	73

Table 5. Chronology of wolf harvest by percentages for Unit 23 from RY91 through RY10.[a]

Regulatory year	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unknown
RY91	2	10	3	2	8	10	11	37	11	6
RY92	0	3	6	4	1	4	26	46	9	0
RY93	2	4	0	6	25	13	8	13	19	10
RY94	0	2	0	20	5	16	13	25	18	0
RY95	0	3	0	8	6	4	5	51	10	13
RY96	0	3	3	6	22	13	20	20	0	13
RY97	0	5	0	0	25	0	25	25	15	5
RY98	0	6	0	3	16	19	22	22	9	3
RY99	1	2	0	4	7	27	4	32	13	10
RY00	0	4	0	1	9	6	28	28	10	13
RY01	9	17	0	2	6	9	25	28	2	2
RY02	0	13	0	1	13	4	13	44	10	1
RY03	0	16	0	0	2	38	16	24	4	0
RY04	1	4	0	1	3	18	19	29	24	1
RY05	0	7	2	0	19	7	14	14	26	10
RY06	0	4	0	6	4	6	28	28	11	15
RY07	3	10	0	14	3	24	14	28	0	3
RY08	2	27	0	0	4	9	4	22	16	16
RY09	4	6	0	10	8	19	19	21	13	0
RY10	3	19	0	4	7	0	6	27	34	0

[a] Row totals may not equal 100% due to rounding error.

SPECIES

MANAGEMENT REPORT

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

WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011[1]

LOCATION

GAME MANAGEMENT UNIT: 24 (26,055 mi^2)

GEOGRAPHIC DESCRIPTION: Koyukuk River drainage above Dulbi River

BACKGROUND

Wolves are present throughout Unit 24 but population size has fluctuated historically due to prey availability and wolf control activities. In the Brooks Range of northern Unit 24A and 24B, wolf abundance was low during the late 1800s because densities of moose, caribou, and Dall sheep were low (Campbell 1974). Throughout Unit 24, prey populations increased during the early 1900s, leading to increases in wolf numbers. Moose rapidly increased in the 1940s and 1950s coincident with federal wolf control. When wolf control ceased in the late 1950s, the abundance of moose allowed wolf numbers to increase (Woolington 1997). Demand for wolf hides was high in the late 1970s and 1980s, and regulations allowed land-and-shoot hunting of wolves, which resulted in high levels of wolf harvest. Moose densities increased throughout Unit 24 in the late 1970s and 1980s when demand for wolf pelts was high, but likely exhibited declining trends, similar to those observed throughout other regions in Alaska following the repeal of land-and-shoot wolf hunting regulations in 1991 (Regelin et al. 2005).

Adams et al. (2008) presented wolf population dynamics and harvest patterns in the Central Brooks Range of northern Unit 24A and 24B during 1987–1991. They found that autumn wolf densities averaged 17.1 wolves/1,000 mi^2 (6.6/1,000 km^2) and harvest removed an estimated 12% of the population annually. In that study, the wolf population compensated for human harvest of ≤29% primarily by adjustments in dispersal.

Historically, the primary human use of wolves in Unit 24 has been for pelts. Local resident demand for wolf pelts for garment sewing and sharing at ceremonial potlatches has traditionally been high (Nelson 1982). Additionally, local residents perceive wolves as direct competitors for moose and often make a conscious effort to increase the wolf harvest when moose seem scarce.

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

MANAGEMENT DIRECTION

Wolf populations will be managed to provide for human uses and to ensure that wolves remain an integral part of Interior Alaska's ecosystems. Compatible human uses include hunting and trapping (both for personal use and commercial sale of furs), photography, viewing, listening, and scientific and educational uses. The aesthetic value of being aware of or observing wolves in natural interactions with their environment is also recognized as an important human use of wolves. Domestication of wolves for personal use or for commercial purposes is generally considered incompatible with department management policies.

MANAGEMENT GOALS

- Ensure long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.
- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.
- Increase public awareness and understanding of uses, conservation and management of wolves, their prey, and habitat in Alaska.

MANAGEMENT OBJECTIVES

- Maintain a fall density of 13–23 wolves/1,000 mi^2 (5–9 wolves/1,000 km^2).
- Provide for a total annual harvest of 112–162 wolves.
- Increase trapper participation in the statewide trapper survey by at least 1% annually.

MANAGEMENT ACTIVITIES

- Conduct surveys to estimate population size and density.
- Model the potential effects of wolf predation on ungulates in each unit (McNay and DeLong 1998).
- Monitor harvest through sealing records and trapper questionnaires.
- Monitor wolf numbers and population characteristics through interviews with trappers, hunters, pilots, and by evaluation of sealing documents.
- Conduct trapper education clinics.

METHODS

We worked cooperatively with the U.S. Fish and Wildlife Service (FWS) to estimate the late winter wolf population and pack size using aerial surveys in 1999 and 2000. Survey assumptions are described in Becker et al. (1998, 2004) and Patterson et al. (2004): 1) all wolves in the study area move and leave tracks; 2) fresh wolf tracks are not missed; 3) tracks can be followed forward and backward; 4) number of wolves in a pack are correctly enumerated; 5) no packs are

doubled counted; 6) there is a 1:1 relationship between packs and tracks counted; and 7) the probability of observing any wolf pack in the study area is >0. During years we did not survey, wolf population size was estimated using a combination of past survey data and harvest information.

In March 1999, we attempted a wolf census survey in a limited area of Unit 24D and northern Unit 21D using SUPE methodology (Becker et al. 1998, 2004). However, we were unable to satisfy survey assumptions because of poor snow conditions. Therefore, a minimum estimate for the area was developed using information from that survey, incidental wolf sightings by department personnel, and harvest information (ADF&G files, Galena, 7 May 1999). During March 2000, we conducted a SUPE survey in approximately the same area as the 1999 survey, primarily in a 4,175 mi^2 survey area (G. Stout, ADF&G, memo to the regional management coordinator, 5 May 2000, Galena). Survey conditions were excellent and assumptions were met.

During 2005, 2006, and 2008 FWS Kanuti National Wildlife Refuge (NWR) staff conducted aerial wolf census surveys on the Kanuti NWR within Unit 24B using SUPE methodology. The 23–27 March 2005 survey covered a 2,848 mi^2 area (Kanuti NWR files, Fairbanks, 20 April 2005). The 14–18 March 2006 survey was in a 2,764 mi^2 area overlapping the 2005 survey area (Kanuti NWR files, Fairbanks, September 2006), and the 18–22 March 2008 survey was in a 2,844 mi^2 area overlapping the 2 previous surveys (Kanuti NWR files, Fairbanks, 25 September 2008). Survey assumptions were not met in any of these years due to snow conditions. Therefore, these results represent minimum counts of wolves for the Kanuti NWR.

During 12–14 March 2011 and 22–26 March 2012 we attempted to complete aerial wolf census surveys following the survey assumptions of the SUPE technique. Using SUPE methodology in 2011, we surveyed a 4,368 mi^2 area of Unit 24B that included the Kanuti NWR and an area northwest of the NWR that was identified as a potential intensive management area (T. Hollis, ADF&G, memo to the regional management coordinator, 22 March 2011, Fairbanks). We did not satisfy survey assumptions during 2011 because of poor snow conditions and the extended period of time between snow accumulation and when the survey was conducted. Therefore, 2011 data were used as a minimum wolf count for the area. In 2012 we surveyed a 4,752 mi^2 area of Unit 24B that overlapped the 2011 survey area (G. Stout, ADF&G, memo, 22 May 2012, Fairbanks). During 2012, survey conditions were adequate in this 4,752 km^2 portion of Unit 24B to satisfy SUPE survey assumptions and we completed a census. The 2012 survey was complete coverage of the survey block, and we were confident in our ability to detect small packs and pairs of wolves. I estimate that gaps in flight paths were not more than approximately 25 mi^2. We used census results from this portion of the survey area to estimate wolf numbers in the remainder of Unit 24B. Therefore population estimates were developed using extrapolation of the minimum population estimates from the 2005, 2006, 2008, and 2011 surveys, the population estimate from the 2012 census, and literature values (Adams et al. 2008).

Wolf pack distribution in Unit 24B was evaluated using telemetry data from wolves radiocollared on two studies on the Kanuti NWR (Zirkle 1995; Kanuti NWR files). Wolf pack distribution in the Gates of the Arctic National Park and Preserve (GAAR) portion of Unit 24B was evaluated using telemetry data from wolves radiocollared on a study conducted there (Adams et al. 2008).

Wolves harvested by trappers and hunters were sealed to monitor harvest. Harvest is reported by regulatory year (RY = 1 July through 30 June, e.g., RY10 = 1 July 2010–30 June 2011). Information recorded for each wolf included date of kill, name of trapper or hunter, specific location of kill, method of take and transportation, sex of the wolf, color of the pelt, and the number of other wolves thought to be in the pack. Trapper interviews were also used to monitor harvest.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Wolves are found throughout Unit 24 in all habitat types and often near human settlements. The number of wolves varies, depending on availability of prey, and there are more wolves in southern (Unit 24D) and northern Unit 24 (Brooks Range portion of Units 24A and 24B) than in central Unit 24 (remainder), which has low moose densities and more sporadic movements of caribou.

Results of the 1999 survey in Unit 24D were reported in Stout (2003). The 2000 SUPE survey in Unit 24D indicated there were 148 wolves (±32, 90% CI) in the 4,175 mi^2 survey area, a density of 36 wolves/1,000 mi^2 (14 wolves/1,000 km^2). This estimate was higher than expected and included several packs that were on the perimeter of the survey area that probably biased the estimate. Results were variable for the 5 surveys conducted in Unit 24B during 2005–2012 due to variability in the area surveyed and conditions (Table 1).

The estimated fall population for all of Unit 24 was 374–541 wolves in 58–66 packs during RY08–RY10, and has probably changed little since RY96–RY97 (see Stout 2003). Radiotelemetry of wolves in a study conducted in a 9,537 mi^2 portion of the GAAR indicated that wolf density averaged 17.1 wolves/1,000 mi^2 (6.6 wolves/1,000 km^2) in the spring and 11.7 wolves/1,000 mi^2 (4.5 wolves/1,000 km^2) in the fall (Adams et al. 2008). By plotting known pack locations from that study and by assuming a density of 15–21 wolves/1,000 mi^2 (6–8 wolves/1,000 km^2) for the remainder of the area that was not part of that study, we estimate 155–206 wolves occur in northern Unit 24 (Brooks Range portion of Units 24A and 24B). Using the 2012 census and the minimum estimates from the 4 surveys on the Kanuti NWR during 2005–2011 and extrapolating densities of similar habitats to the areas that were not surveyed, we estimate 103–155 wolves occur in central Unit 24 (10–15 wolves/1,000 mi^2; 4–6 wolves/1,000 km^2). In Unit 24D the 2000 SUPE indicated 116–180 wolves (36 wolves/1,000 mi^2; 14 wolves/1,000 km^2), and we assume little change since that survey.

DISTRIBUTION AND MOVEMENTS

Radiotelemetry of wolves in the Kanuti NWR indicated that 85–100 wolves in 9–11 packs used the refuge during fall (Zirkle 1995). In that study, packs roamed over 2,556–4,059 mi^2, and the average size of radiocollared packs was 4 wolves. All wolves that were pups or yearlings when collared dispersed from the area and were not followed. In the GAAR study, pack size ranged 4.3–7.1 wolves/pack in the spring and 6.7–9.3 wolves/pack in the fall (Adams et al. 2008). Home ranges of radiocollared wolf packs in that study were 138–894 mi^2 (358–2,315 km^2).

Wolves are known to migrate into Unit 24 with the Western Arctic caribou herd during winter. These wolves are mostly found in GAAR and the upper Huslia and Hogatza Rivers (D. James, ADF&G, personal communication, 2000). Unpredictability of these migrations is responsible for most of the variation of the wolf population estimates for the portion of Unit 24 in GAAR (Adams et al., 2008).

MORTALITY

Harvest

Seasons and Bag Limits during RY08–RY10.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Unit 24		
Hunting: 10 wolves	10 Aug–30 Apr	10 Aug–30 Apr
Trapping: No limit	1 Nov–30 Apr	1 Nov–30 Apr

Alaska Board of Game Actions and Emergency Orders. No changes were adopted and no emergency orders were issued during the RY08–RY10 reporting period. In RY10, we presented to the Board of Game (Board) an intensive management feasibility assessment, evaluating a wolf control program that could potentially increase moose calf and yearling survival in a 1,360 mi^2 portion of 24B around the villages of Alatna and Allakaket. The Alaska Legislature approved funding for that intensive management program in RY11. The board adopted an intensive management plan at its March 2012 meeting and the program, which will consist of aerial wolf control conducted by department personnel, will begin in RY12.

Hunter–Trapper Harvest. Hunters and trappers reported harvesting 21–49 wolves during RY08–RY10 (Table 2). The actual number harvested was probably higher because most village residents seal only those wolf pelts sent to a commercial tannery or sold to a fur buyer. Hunting and trapping conditions vary from year to year, which affects harvests. The estimated unreported harvest can be up to 80 wolves/year under good trapping conditions, and 50 wolves/year under poor conditions (Woolington 1997). During RY08–RY10, difficult travel conditions due to deep snow and cold temperatures and high fuel prices probably contributed to reduced effort, and thus reduced reported and unreported harvest.

Harvest Chronology. Prior to RY00, wolves were generally taken in December–March and the highest harvest was typically in February (Table 3). Like nearby Unit 21D, incidental harvest in the fall increased and continued to be high during RY08–RY10, possibly due to increased sightings during the fall moose hunting season.

Transport Methods. Most wolves were taken using snowmachines for transportation during RY96–RY10 (Table 4). However, because of the overall harvest declines among village trappers and hunters who did not use the road system, this resulted in an apparent shift in the percentage of wolves taken by highway vehicles in Unit 24, even though the total number of wolves taken by highway vehicles along Dalton Highway did not increase markedly.

CONCLUSIONS AND RECOMMENDATIONS

The Unit 24 wolf population was probably stable during RY08–RY10 and has changed little since RY93, with some localized annual fluctuations. Wolf numbers were highest (23–28 wolves/1,000 mi^2; 9–11 wolves/1,000 km^2) and probably stable in southern Unit 24 (Unit 24D). Wolf populations were moderate in northern Unit 24 (Brooks Range portion of Units 24A and 24B; 15–21 wolves/1,000 mi^2; 6–8 wolves/1,000 km^2). Wolf populations were lowest in central Unit 24 (remainder area; 10–16 wolves/1,000 mi^2; 4–6 wolves/1,000 km^2)

Based on population estimates, the population size and harvest objective were met. Adams et al. (2008) reported that harvest was moderate in northern Unit 24 and was not limiting the population. Harvest declined throughout Unit 24 during RY08–RY10, as a result of decreased demand but not due to population reductions. Harvest monitoring was an important part of the wolf management program. Monitoring included the statewide sealing system and trapper interviews. The third objective, to increase trapper participation in the statewide trapper survey by at least 1% annually, could not be determined. The RY08 Trapper Questionnaire Report was completed, but the RY09 and RY10 reports were not available when this report was written. Information on trapper participation specific to Unit 24 trappers was not available in the RY08 report. Due to changes in the analysis format for the Trapper Questionnaire Reports, this management objective will be deleted for the next reporting period. Therefore, during the next reporting period, management objectives will be to:

- Maintain a fall density of 13–23 wolves/1,000 mi^2 (5–9 wolves/1,000 km^2).

- Provide for a total annual harvest of 112–162 wolves.

I recommend continued aerial surveys to determine wolf densities in central Unit 24 prior to, during, and after wolf control. We plan to begin wolf control in RY12. I also recommend we reinitiate the joint effort with Kanuti NWR to radiocollar and monitor wolf packs in the Kanuti area to improve population estimates, to provide information on predation rates, and understand wolf pack spatial land use patterns. Additionally, I recommend federal and state biologists work closely with local residents to improve harvest reporting compliance.

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Table 1. Unit 24B late winter aerial wolf census results, 2005 through 2012.

Survey Dates	Minimum Count	Number of packs	Area Surveyed	Search Intensity (min./mi^2)	Density (wolves/1,000mi^2)
23–27 March 2005[a]	58	13	2,848	0.63	20.4
14–18 March 2006[a]	78	19	2,764	0.66	28.2
18–22 March 2008[a]	51	n/a	2,844	0.64	17.9
12–14 March 2011	69	19	4,368	0.55	15.8
22–26 March 2012	67	17	4,752	0.65	14.1

[a] Data from U.S. Fish and Wildlife Service/Kanuti National Wildlife Refuge.

Table 2. Unit 24 wolf harvest, regulatory years 1996 through 2010.

Regulatory year	Reported harvest				Estimated unreported harvest	Total estimated harvest	Method of take			
	M	F	Unk	Total			Trap/snare	Shot	SDA[a]	Unk
1996	45	38	5	88	60	148	73	13	0	2
1997	32	20	4	56	50	106	46	9	0	1
1998	19	12	5	36	50	86	31	5	0	0
1999	50	32	9	91	50	141	70	14	0	7
2000	36	31	15	82	50	132	57	21	0	4
2001	33	36	4	73	50	123	51	22	0	0
2002	37	26	3	66	50	116	46	12	0	8
2003	13	20	4	37	50	87	29	8	0	0
2004	26	32	3	61	50	111	41	17	0	3
2005	12	11	0	23	30	53	21	2	0	0
2006	18	19	0	37	30	67	25	11	0	1
2007	22	17	0	39	30	69	28	11	0	0
2008	14	6	1	21	30	51	14	7	0	0
2009	29	18	2	49	30	79	39	8	0	2
2010	16	9	2	27	30	57	19	8	0	0

[a] Animals taken by hunters the same day hunters or trappers were airborne.

Table 3. Unit 24 wolf percent harvest chronology by month, regulatory years 1996 through 2010.

Regulatory	Percent harvest chronology by month							
year	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	n[a]
1996	8	10	15	22	30	16	0	88
1997	9	15	35	15	20	7	0	55
1998	6	11	17	22	22	22	0	36
1999	8	19	33	8	10	18	4	84
2000	16	6	10	22	30	13	3	77
2001	10	7	12	10	28	32	2	73
2002	19	11	26	24	15	5	0	66
2003	11	0	5	11	33	35	3	37
2004	19	2	16	19	33	9	3	61
2005	9	30	13	26	22	0	0	23
2006	16	11	11	16	22	24	0	37
2007	10	18	28	5	31	8	0	39
2008	19	14	5	10	43	10	0	21
2009	14	4	14	33	20	14	0	49
2010	30	0	22	15	19	15	0	27

[a] Some reports did not report month of harvest.

Table 4. Unit 24 wolf percent harvest by transport method, regulatory years 1996 through 2010.

Regulatory year	Percent harvest by transport method								
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway Vehicle	Unk	*n*
1996	3	0	3	0	90	0	1	2	88
1997	4	5	2	0	86	0	2	2	56
1998	0	3	6	3	72	0	17	0	36
1999	4	1	2	1	66	0	16	10	91
2000	1	10	9	1	70	0	6	5	82
2001	1	4	6	0	68	0	6	16	73
2002	2	2	9	0	67	0	8	14	66
2003	5	0	5	0	81	0	8	0	37
2004	11	0	8	0	52	0	23	6	61
2005	0	4	4	0	70	0	22	0	23
2006	3	3	11	0	70	0	11	3	37
2007	5	18	3	3	28	0	41	3	39
2008	10	5	5	0	33	0	43	5	21
2009	4	4	8	2	49	0	31	2	49
2010	7	19	15	0	33	0	19	7	27

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WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011[1]

LOCATION

GAME MANAGEMENT UNITS: 25A, 25B, 25D, 26B, and 26C (73,756 mi^2)

GEOGRAPHIC DESCRIPTION: Eastern Interior, Eastern Brooks Range, and Central and Eastern Arctic Slope

BACKGROUND

Wolves are present throughout this management area, utilizing boreal forest, the Brooks Range mountains, and Arctic Slope tundra habitats. Primary prey are moose, caribou, and Dall sheep. Wolves are generally less abundant compared to other parts of Alaska because resident populations of prey such as moose occur at low abundance in most areas and large migratory caribou herds may only be seasonably available to wolves.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Wolf populations will be managed to provide for human uses and to ensure that wolves remain an integral part of Interior Alaska's ecosystems. Compatible human uses include hunting and trapping (both for personal use and commercial sale of furs), photography, viewing, listening, and scientific and educational purposes.

We also recognize that integral to wolf management is the premise that wolf populations are renewable resources that can be harvested and manipulated to enhance human uses of other resources. Management may include both the manipulation of wolf population size and total protection of wolves from human influence. Goals are listed below:

- Ensure the long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.

- Provide for the broadest possible range of human uses and values of wolves and their prey populations, consistent with wildlife conservation principles and the public interest.

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

- Increase public awareness and understanding of the conservation and management of wolves, their prey, and habitat in Alaska.

- Provide maximum opportunity to participate in hunting and trapping wolves in Unit 25D.

MANAGEMENT OBJECTIVES AND ACTIVITIES

Management Objectives

- Provide for a sustained annual harvest rate of no more than 30% of the total combined wolf population in Units 25A and 25B; and no more than 30% of the combined wolf population of Units 26B and 26C.

- Manage for a temporary reduction in wolf numbers and predation on moose in Unit 25D. After moose populations increase to desired levels, manage for a sustained annual harvest of no more than 30% annually.

Management Activities

- Use sealing records and trapper questionnaires to monitor harvest.

- Conduct periodic wolf population surveys in Unit 25B, eastern Unit 25D, and western Unit 25D.

METHODS

During March 2009, a population estimation survey was completed in western Unit 25D using the aerial track–reconnaissance survey technique described by Stephenson (1978) and Gasaway et al. (1983) and survey assumptions described by Becker et al. 1998). To estimate density, we divided the total number of wolves observed in packs (superpopulation) by the area encompassed by the boundary of the survey area. Because a superpopulation includes wolves that reside entirely in the survey area as well as those that spend an unknown percent of time outside the area, the density estimate is likely biased high. Packs were defined as 2 or more wolves and observations of single wolves were excluded from the density estimate.

Previous population estimates based on the aerial track–reconnaissance survey technique were conducted in portions of Units 25D and 25B in 1983, 1984, 1992, 1996, 2000, 2001, and 2006. Methods, survey areas, and results for those surveys are described by Nowlin (1985), Stephenson (2006) and Caikoski (2009). During July 1, 2008 through June 30, 2011, population estimates in much of Units 25A, 25B, 26B and 26C were based on results from wolf research studies and earlier surveys, incidental observations of wolves by agency personnel and the public, extrapolation of population estimates from surveys in similar habitat elsewhere, and harvest and prey population trends.

Wolves harvested by hunters and trappers were sealed to monitor harvest. Information recorded for each wolf included date and location of kill, name of trapper or hunter, method of take and transportation, sex of the wolf, color of the pelt, and the number of other wolves thought to be in the pack. In addition to sealed wolves, additional unreported harvest occurred by local residents

primarily residing in Unit 25D. Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY08 = 1 Jul 2008 through 30 Jun 2009).

In fall 2008 we began a cooperative study with the US Fish and Wildlife Service to estimate kill rates by wolf packs on moose in western Unit 25D including per wolf consumption or kill rates. Secondary objectives include estimating seasonal distribution, home range, sex and age composition, and wolf mortality. Kill rates by wolves on moose are poorly described in areas of low moose density with little alternative ungulate prey. This study will provide managers valuable information to assess the effects of wolves on low density moose populations. Results are being analyzed and will be available for the next reporting period.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population density is low relative to other parts of Interior Alaska where prey is more abundant. Wolf populations in Units 25A, 25B, 25D, 26B, and 26C appeared to be stable, but data on population trends are limited, except in Unit 25D.

Population Size

In March 2009 we surveyed 8,580 mi^2 (22,220 km^2) in western Unit 25D using the aerial track–reconnaissance method (Stephenson 1979, Gasaway et al. 1983). The survey area included the Yukon River and adjacent Yukon Flats from Fort Yukon to Stevens Village and was bounded to the north by the Hodzana and Hadweenzic hills and included lower portions of the Chandalar and Christian rivers. The southern boundary followed the northern foothills of the White Mountains from Alfred Creek to Victoria Creek and included the West Crazy Mountains and Little Crazy Mountains. Survey conditions were good for an 8,180 mi^2 portion of the study area and poor for a 400 mi^2 area north of Stevens Village due to strong winds. All survey assumptions (Becker et al. 1998) were met in the 8,180 mi^2 area.

We tracked and/or observed 23 packs of 2 or more wolves and 2 single wolves. Pack size ranged 2–10 wolves and averaged 4.6 wolves (observations or tracks of single wolves are excluded from pack size estimates but included in population size estimates). The survey indicated a population of 98–120 wolves or a density of 11.4–13.9 wolves/1,000 mi^2 (4.4–5.3/1,000 km^2). Although single wolves observed during the survey are included in the population estimate, single wolves are more difficult to detect than packs, so we likely underestimated their presence and therefore underestimated population size. In addition, based on trapping records and results of prior surveys (Caikoski 2009), we estimated that 1 pack existed in the 400 mi^2 area north of Stevens Village that was not adequately surveyed.

No other population surveys were conducted in the report area during RY08–RY10. We predict that wolf population trend in the remainder of the report area was stable and numbers are comparable to results found during regularly conducted population surveys in Unit 25D and portions of Unit 25B during the late 1990s to 2003. We base our assumptions on no changes in habitat quality, prey availability, or harvest, which are the primary limiting factors to wolves. Our estimated population trends and densities in these units was stable at 9.1–13.9 wolves/1,000 mi^2 (3.5–5.4 wolves/1,000 km^2; Caikoski 2009).

In Unit 26B we estimated 4.8 wolves/1,000 mi^2 (1.9 wolves/1,000 km^2; Caikoski 2009) from the most recent (2003) survey. Unit 26C has not been surveyed since the 1980s, but Garner and Reynolds (1986) reported a density of 5.7–8.3 wolves/1,000 mi^2 (2.2–3.2 wolves/1,000 km^2) at that time. We predict that wolf population trend is stable as there were no notable changes in habitat quality, prey availability, harvest, or prevalence of rabies.

MORTALITY

Harvest

Season and Bag Limit. The hunting and trapping seasons in Units 25A, 25B, 25D and 26B, and 26C during RY08–RY10 were:

Units/Bag Limits/Special Restrictions	Resident/Subsistence Open Season	Nonresident Open Season
Units 25A, 25B, 26B, and 26C		
HUNTING: 10 wolves	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit	1 Nov–30 Apr	1 Nov–30 Apr
Unit 25D		
HUNTING: 10 wolves	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit	1 Oct–30 Apr	1 Oct–30 Apr

Alaska Board of Game Actions and Emergency Orders. No regulatory changes for wolves occurred during RY08–RY10.

Hunter–Trapper Harvest. For all units, the reported 3-year average harvest during RY08–RY10 was 76 wolves (range = 53–93; Table 1) and was similar to the previous report period (RY05–RY07; $\bar{x}$ = 80). During RY08–RY10, 26% of the harvest occurred in Unit 25A, 12% in Unit 25B, 39% in Unit 25D, 22% in Unit 26B, and 1% in Unit 26C. Distribution of harvest among units in RY08–RY10 was consistent with RY05–RY07. Wolf harvest in Unit 25D removed 9–21% of the wolf population and was not sufficient to cause a wolf population decline.

Wolves were reported taken across most of Unit 25A, including the Middle and North Fork Chandalar, upper Hodzana, Junjik, Sheenjek, and Coleen river drainages. Reported harvest in Unit 25B occurred mostly in the Porcupine, Little Black, Black, Nation, Kandik, and Yukon river drainages. In Unit 25D, reported harvest occurred along Beaver Creek, and the Hodzana, Porcupine, Sheenjek, Black, and Yukon river drainages. Most harvest in Unit 26B occurred in the Sagavanirktok River drainage, with lesser numbers of wolves taken in the Kuparuk and Itkillik River drainages. The few wolves harvested in Unit 26C were taken throughout the unit.

Harvest Chronology and Method of Take. Harvest chronology varied across the reporting area (Table 2). Reported harvest in RY08–RY10 during the wolf hunting season in August and September made up 24–46% of the harvest in Unit 25A, 14–30% in Unit 25B, and 31–53% in Unit 26B. These wolves were taken by hunters who were also hunting moose, sheep, and caribou. The remaining harvest for those units occurred during November–April when wolf trapping and hunting seasons overlap; however, most wolves taken during that time period were

trapped. In Unit 25D, 90–100% of wolf harvest occurred during November–March and most wolves harvested were trapped (83–95%). Only 3 wolves were reported harvested in Unit 26C during RY08–RY11, and these were harvested by big game hunters during the fall. Overall, harvest chronology and method of take were similar to prior report periods for all units.

Transport Methods. Over most of the reporting area, snowmachines were the most common method of access followed by aircraft (Table 3). In Unit 26B most hunters and trappers used highway vehicles via the Dalton Highway.

Natural Mortality

Sources and extent of natural mortality have been largely unstudied across the reporting area. However, small packs, small litters, and low pup survival are characteristic of wolf populations in areas where prey are relatively scarce (Mech et al. 1998). Garner and Reynolds (1986) reported that 8 of 11 packs studied in ANWR included 5 or fewer wolves, with low pup production and survival. Summer pup survival rates for packs of <5 wolves were 23–25%, while packs with ≥5wolves had nearly 100% pup survival. Burch (2002) reported that packs in the Yukon–Charley Rivers National Preserve produced an average of 3.7 pups (range = 1.4–4.9) annually. Intra-specific strife (Adams et al. 2008) is probably the major cause of natural mortality among adult wolves in northeastern Alaska. Along coastal areas in Unit 26B and 26C, rabies provides an additional source of natural mortality (Zarnke and Ballard 1987).

CONCLUSIONS AND RECOMMENDATIONS

Wolves continue to be widely distributed in northeastern Alaska, and the number of wolves harvested was low relative to population size. During RY08–RY10, reported harvest accounted for a maximum of 9–21% of the estimated population in Unit 25D and 5–10% in Units 25A, 25B, 26B, and 26C, based on extrapolated population estimates from the most recent surveys that occurred in those units. Harvests were well below the maximum sustainable level of 29% reported for wolf populations in northern Alaska (Adams et al. 2008). However, where ungulate populations are low, as in Units 25 and 26, the sustainable harvest rate may be lower. Wolf population density continues to be relatively low compared to other areas in Interior Alaska where prey is more abundant. We recommend periodic monitoring of wolf populations with the greater emphasis in Units 25B and 25D in the most important moose hunting and wolf trapping areas.

Wolf management goals were generally met. We met our first objective of providing for a sustained annual harvest rate of no more than 30% from the combined wolf population in Units 25A and 25B, and the wolf population in Units 26B and 26C. Although wolf harvest in Unit 25D was the highest among all units, the harvest level was not sufficient to meet the second objective of temporarily reducing wolf numbers to a level that would result in growth of the moose population.

The wolf management objective for Unit 25D supports the goals of the *Yukon Flats Cooperative Moose Management Plan,* which outlines management strategies to increase moose numbers, including a reduction in predation by grizzly bears, black bears, and wolves (Alaska Department of Fish and Game 2002). Previous research of moose mortality (Bertram and Vivion 2002) and wolf predation rates (Lake et al. 2009) in Unit 25D suggest that wolf predation is a significant

limiting factor on that moose population. Other studies of low density moose populations have shown predation by wolves was significant in limiting moose (Gasaway et al. 1992).

The following management goals, objectives, and activities will be in place during the next report period:

Management Goals:

- Provide for the broadest possible range of human uses and values of wolves and their prey populations, consistent with wildlife conservation principles and the public interest.

- Provide maximum opportunity to participate in hunting and trapping wolves in Unit 25D.

Management Objectives:

- Provide for a sustained annual harvest rate of no more than 30% of the total combined wolf population in Units 25A and 25B; and no more than 30% of the combined wolf population of Units 26B and 26C.

- Manage for a temporary reduction in wolf numbers to reduce predation on moose in Unit 25D. After moose populations increase to desired levels, manage for a sustained annual harvest of no more than 30% annually.

Management Activities:

- Use sealing records and trapper questionnaires to monitor harvest.

- Conduct periodic wolf population surveys in Unit 25B, eastern Unit 25D, and western Unit 25D.

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Table 1. Units 25A, 25B, 25D, 26B, and 26C wolf harvest, regulatory years 1999–2000 through 2010–2011.

Regulatory	Reported harvest				Method of take		
year	M	F	Unk	Total	Trap/snare	Shot	Unk
Unit 25A							
1999–2000	7	7	1	15	8	7	0
2000–2001	18	7	0	25	13	12	0
2001–2002	6	7	0	13	5	8	0
2002–2003	5	7	0	12	9	3	0
2003–2004	11	7	0	18	12	6	0
2004–2005	8	6	1	15	12	3	0
2005–2006	10	6	5	21	14	6	1
2006–2007	19	5	0	24	14	10	0
2007–2008	7	8	0	15	7	8	0
2008–2009	10	11	1	22	12	9	1
2009–2010	10	13	1	24	17	5	2
2010–2011	6	6	1	13	4	9	0
Unit 25B							
1999–2000	11	7	1	19	18	0	1
2000–2001	3	5	0	8	7	1	0
2001–2002	3	5	0	8	7	1	0
2002–2003	2	3	0	5	5	0	0
2003–2004	5	2	0	7	7	0	0
2004–2005	0	0	0	0	0	0	0
2005–2006	3	1	0	4	3	1	0
2006–2007	11	6	1	18	18	0	0
2007–2008	1	3	1	5	3	2	0
2008–2009	5	5	0	10	7	0	3
2009–2010	5	5	0	10	8	2	0
2010–2011	4	3	0	7	6	1	0
Unit 25D							
1999–2000	4	2	1	7	6	0	1
2000–2001	6	2	3	11	9	1	1
2001–2002	4	13	2	19	18	1	0
2002–2003	9	4	0	13	9	4	0
2003–2004	13	12	3	28	23	5	0
2004–2005	17	11	4	32	26	4	2
2005–2006	7	4	5	16	10	2	4
2006–2007	11	9	11	31	28	3	0
2007–2008	16	16	9	41	39	2	0
2008–2009	17	21	4	42	37	2	3
2009–2010	12	16	1	29	23	3	3
2010–2011	4	7	7	18	15	1	2

Regulatory year	Reported harvest				Method of take		
	M	F	Unk	Total	Trap/snare	Shot	Unk
Unit 26B							
1999–2000	14	10	0	24	12	12	0
2000–2001	9	7	0	16	2	13	1
2001–2002	5	2	0	7	4	3	0
2002–2003	5	3	0	8	4	4	0
2003–2004	3	7	6	16	10	6	0
2004–2005	4	1	0	5	0	4	1
2005–2006	4	3	0	7	0	6	1
2006–2007	15	17	0	32	6	26	0
2007–2008	8	14	0	22	5	17	0
2008–2009	10	9	0	19	4	14	1
2009–2010	10	6	0	16	4	12	0
2010–2011	5	10	0	15	3	12	0
Unit 26C							
1999–2000	2	1	0	3	1	0	2
2000–2001	7	9	3	19	14	5	0
2001–2002	3	1	0	4	1	3	0
2002–2003	1	0	0	1	0	1	0
2003–2004	0	0	0	0	0	0	0
2004–2005	0	0	0	0	0	0	0
2005–2006	0	0	0	0	0	0	0
2006–2007	0	1	0	1	0	1	0
2007–2008	1	1	0	2	0	2	0
2008–2009	1	0	0	1	0	1	0
2009–2010	2	0	0	2	0	2	0
2010–2011	0	0	0	0	0	0	0

Table 2. Units 25A, 25B, 25D, 26B, and 26C wolf percent harvest chronology by month, regulatory years 1999–2000 through 2010–2011.

Regulatory year	Percent harvest chronology by month										
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	*n*
Unit 25A											
1999–2000	0	20	0	7	0	27	13	27	7	0	15
2000–2001	4	12	0	4	8	20	40	12	0	0	25
2001–2002	0	38	0	0	15	0	31	15	0	0	13
2002–2003	8	16	0	16	50	0	8	0	0	0	12
2003–2004	6	17	0	0	11	44	22	0	0	0	18
2004–2005	13	7	0	13	7	27	13	7	13	0	15
2005–2006	10	14	0	0	29	10	10	29	0	0	21
2006–2007	13	25	0	4	0	13	21	25	0	0	24
2007–2008	20	20	0	7	7	20	13	13	0	0	15
2008–2009	10	14	0	0	5	33	10	29	0	0	21
2009–2010	25	8	13	4	4	4	13	25	0	4	24
2010–2011	23	23	23	15	0	0	0	8	8	0	13
Unit 25B											
1999–2000	0	0	0	0	5	68	21	5	0	0	19
2000–2001	0	0	0	13	38	0	38	13	0	0	8
2001–2002	0	13	0	25	13	25	0	13	13	0	8
2002–2003	0	0	0	0	20	80	0	0	0	0	5
2003–2004	0	0	0	0	0	57	0	43	0	0	7
2004–2005[a]	0	0	0	0	0	0	0	0	0	0	0
2005–2006	0	25	0	25	0	0	0	50	0	0	4
2006–2007	0	0	0	0	11	39	0	0	17	33	18
2007–2008	0	40	0	0	0	0	20	40	0	0	5
2008–2009	0	30	0	0	20	30	20	0	0	0	10
2009–2010	0	10	0	0	0	50	20	10	0	10	10
2010–2011	14	0	0	43	0	14	29	0	0	0	7
Unit 25D											
1999–2000	0	0	0	0	29	43	0	14	0	14	7
2000–2001	0	9	0	0	0	36	18	27	0	9	11
2001–2002	0	0	0	16	32	11	10	11	10	11	19
2002–2003	0	0	0	0	8	15	31	38	0	8	13
2003–2004	0	0	0	11	25	14	4	32	14	0	28
2004–2005	0	0	0	3	3	21	38	24	6	3	32
2005–2006	0	0	0	0	19	0	44	13	0	25	16
2006–2007	0	0	0	0	29	23	32	13	3	0	31
2007–2008	0	0	0	7	15	17	15	44	2	0	41
2008–2009	0	5	0	3	26	40	21	5	0	0	42
2009–2010	0	10	0	7	17	21	45	0	0	0	29
2010–2011	0	0	0	11	6	39	22	6	0	17	18

Regulatory year	Percent harvest chronology by month										
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	*n*
Unit 26B											
1999–2000	4	0	0	0	4	4	25	42	21	0	24
2000–2001	13	6	0	0	0	6	6	31	38	0	16
2001–2002	0	0	0	0	14	29	43	14	0	0	7
2002–2003	0	0	0	0	0	25	50	12	12	0	8
2003–2004	0	0	0	0	25	0	38	38	0	0	16
2004–2005	60	0	0	0	0	0	20	0	20	0	5
2005–2006	0	43	0	0	0	0	0	57	0	0	7
2006–2007	16	9	3	0	0	0	28	31	13	0	32
2007–2008	5	18	5	0	0	5	14	36	18	0	22
2008–2009	32	11	0	11	0	0	11	37	0	0	19
2009–2010	25	6	6	13	0	6	13	19	13	0	16
2010–2011	53	0	0	7	0	0	7	27	7	0	15
Unit 26C											
1999–2000	0	0	0	0	0	0	0	100	0	0	3
2000–2001	10	0	0	0	0	0	16	58	16	0	19
2001–2002	75	0	0	0	0	0	0	25	0	0	4
2002–2003	100	0	0	0	0	0	0	0	0	0	1
2003–2004	0	0	0	0	0	0	0	0	0	0	0
2004–2005	0	0	0	0	0	0	0	0	0	0	0
2005–2006	0	0	0	0	0	0	0	0	0	0	0
2006–2007	100	0	0	0	0	0	0	0	0	0	1
2007–2008	100	0	0	0	0	0	0	0	0	0	2
2008–2009	100	0	0	0	0	0	0	0	0	0	1
2009–2010	100	0	0	0	0	0	0	0	0	0	2
2010–2011	0	0	0	0	0	0	0	0	0	0	0

Table 3. Units 25A, 25B, 25D, 26B, and 26C percent harvest by transport method, regulatory years 1999–2000 through 2010–2011.

Regulatory year	Percent harvest by transport method								*n*
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	
Unit 25A									
1999–2000	7	7	7	0	80	0	0	0	15
2000–2001	20	4	0	0	76	0	0	0	25
2001–2002	38	8	0	0	54	0	0	0	13
2002–2003	17	0	0	0	75	0	0	8	12
2003–2004	22	61	0	0	11	0	0	6	18
2004–2005	33	0	0	0	67	0	0	0	15
2005–2006	48	14	5	0	29	0	0	5	21
2006–2007	21	42	13	4	21	0	0	0	24
2007–2008	40	7	0	0	53	0	0	0	15
2008–2009	29	5	0	0	62	0	5	0	21
2009–2010	21	33	4	0	25	0	8	8	24
2010–2011	31	38	0	0	15	0	15	0	13
Unit 25B									
1999–2000	0	37	0	0	63	0	0	0	19
2000–2001	0	0	0	0	100	0	0	0	8
2001–2002	38	13	13	0	13	0	25	0	8
2002–2003	0	20	0	0	80	0	0	0	5
2003–2004	86	0	0	0	14	0	0	0	7
2004–2005	0	0	0	0	0	0	0	0	0
2005–2006	0	25	25	0	50	0	0	0	4
2006–2007	17	17	0	0	33	0	0	33	18
2007–2008	0	20	40	0	20	0	20	0	5
2008–2009	0	0	0	0	70	0	0	30	10
2009–2010	0	10	20	0	70	0	0	0	10
2010–2011	14	29	0	0	57	0	0	0	7

Regulatory year	Percent harvest by transport method								*n*
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	
Unit 25D									
1999–2000	14	0	0	0	71	0	0	14	7
2000–2001	0	0	9	0	73	0	9	9	11
2001–2002	16	0	0	0	68	0	0	16	19
2002–2003	0	0	0	0	92	0	0	8	13
2003–2004	18	0	0	4	71	0	4	4	28
2004–2005	28	0	0	6	38	0	0	28	32
2005–2006	6	0	0	6	63	0	0	25	16
2006–2007	32	0	0	3	61	0	3	0	31
2007–2008	29	2	0	0	68	0	0	0	41
2008–2009	5	12	0	5	69	0	0	10	42
2009–2010	21	14	10	0	45	0	0	10	29
2010–2011	21	14	10	0	45	0	0	10	29
Unit 26B									
1999–2000	0	4	0	0	67	0	29	0	24
2000–2001	0	19	13	0	56	0	13	0	16
2001–2002	0	0	0	0	71	0	29	0	7
2002–2003	0	0	0	0	25	0	75	0	8
2003–2004	0	0	0	0	31	0	69	0	16
2004–2005	20	0	0	0	0	0	40	40	5
2005–2006	86	0	0	14	0	0	0	0	7
2006–2007	16	0	6	0	47	0	31	0	32
2007–2008	5	18	0	0	36	0	41	0	22
2008–2009	32	0	5	0	42	0	21	0	19
2009–2010	25	13	0	0	31	0	31	0	16
2010–2011	40	13	7	0	0	0	13	27	15

Regulatory year	Percent harvest by transport method								*n*
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	
Unit 26C									
1999–2000	0	0	0	0	33	0	0	67	3
2000–2001	79	5	0	0	16	0	0	0	19
2001–2002	25	25	0	0	25	0	0	25	4
2002–2003	0	0	0	0	0	0	0	100	1
2003–2004	0	0	0	0	0	0	0	0	0
2004–2005	0	0	0	0	0	0	0	0	0
2005–2006	0	0	0	0	0	0	0	0	0
2006–2007	100	0	0	0	0	0	0	0	1
2007–2008	100	0	0	0	0	0	0	0	2
2008–2009	100	0	0	0	0	0	0	0	1
2009–2010	100	0	0	0	0	0	0	0	2
2010–2011	0	0	0	0	0	0	0	0	0

SPECIES

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
907-465-4190 PO BOX 115526
JUNEAU, AK 99811-5526

WOLF MANAGEMENT REPORT

From: 1 July 2008
To: 30 June 2011

LOCATION

GAME MANAGEMENT UNIT: Unit 26A (56,000 mi^2)

GEOGRAPHIC DESCRIPTION: Western North Slope

BACKGROUND

Wolf numbers in Unit 26 have fluctuated widely since the turn of the century. During the early 1900s, caribou, moose, and wolves were less abundant than they are today. Caribou and moose numbers increased after 1930, and by the 1940s wolves were abundant. Wolf numbers were greatly reduced by federal wolf control during the 1950s and by public aerial hunting during the 1960s. Following the ban on aerial wolf hunting in 1970 and land-and-shoot aircraft hunting of wolves in 1982, wolf populations increased, especially in the mountains and foothills of the Brooks Range. Wolves are thought to be less abundant on the coastal plain due to the seasonal scarcity of caribou, outbreaks of rabies, and their vulnerability to hunters in the open country (Trent 1988).

The reported annual harvest of wolves by regulatory year (RY), which covers the period 1 July to 30 June (e.g., RY08 = 1 July 2008–30 June 2009), increased during the early 1990s to a peak of 60 animals in RY93, but has gradually decreased since then and remained low with only 9 wolves reported harvested in RY06 and RY07. The harvest declined due to lower wolf numbers and hunting effort. The pelts of most wolves harvested in Unit 26A are used locally for the manufacture of parka ruffs or handicrafts and often are not sealed, so actual harvest is greater than reported harvest. The harvest of wolves is greatest in the southeastern part of Unit 26A, where residents of Anaktuvuk Pass and Nuiqsut hunt and trap wolves throughout the winter and residents of Barrow travel for spring hunts.

Wolf surveys and the number of wolves seen during moose surveys have indicated that the number of wolves increased between 1986 and 1992, remained high until 1994, declined by 1998, remained low through the early 2000s, and then increased by 2008. Wolf Surveys have been conducted using one of three survey techniques: Traditional Track Count (TTC), Track Intercept Probability (TIP), or Sample Unit Probability Estimator (SUPE). The TIP and SUPE methods are summarized in Becker (1991); Becker and Gardner (1990); Gardner C., and E. F. Becker 1991, and Becker et al. (1998). Wolf survey results indicated that wolf numbers increased from 2.7–3.2 wolves/1,000 km^2 to 4.0–6.2 wolves/1,000 km^2 between 1986 and 1992 and remained fairly high at 4.1–4.3 wolves/1,000 km^2 through 1994. They then declined to 1.0-2.2 wolves/1,000 km^2 in 1998. During moose surveys we saw zero wolves/hr in 1999, 0.13 wolves/hr in 2002, 0.44 wolves/hr in 2005, and 1.78 wolves/hr in 2008.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain viable wolf populations in Unit 26A.
- Assess the impact of wolves on Unit 26A moose and caribou.
- Involve the public in developing a management plan and in making future management decisions concerning wolves.

MANAGEMENT ACTIVITIES

- Monitor the population density of wolves in the trend area bordered by the Colville, Killik, and Itkillik Rivers, and Gunsight Mountain once every 3 years or when weather conditions allow.
- Monitor harvest through the statewide sealing program, by interviewing knowledgeable people in the villages, and by using the North Slope Borough's (NSB) village-based harvest monitoring program.
- Interview hunters, guides, and pilots to collect harvest and population status information.
- Record wolf observations during moose counts and compare to observations made during past counts.

METHODS

Wolf surveys were flown in April each year in conjunction with moose surveys. If conditions were good enough (fresh snow, total snow cover, and adequate lighting for good tracking conditions over the entire survey area) we conducted a reconnaissance track survey (Stephenson 1978). This technique can also be referred to as a Traditional Track Survey (TTS). The survey area was 17,800 km^2 extending to and including the Killik River drainage to the west, the Anaktuvuk River drainage to the east, the Colville River drainage between the mouths of the Killik and Anaktuvuk Rivers to the north, and 68°17' to the south (Fig. 1). We employed 2 expert wolf trackers, piloting PA-18 aircraft, and searched everywhere where we might find wolves. When wolf tracks were detected we followed them until the wolf pack was found or we lost the tracks. We recorded the location, number, and color of individuals for each pack. If wolves were not found on a set of tracks, our pilots estimated the number of wolves that made the tracks. All wolf and track sightings were analyzed by time, location, and wolf color patterns to prevent double counting.

If conditions were not adequate over the entire survey area, we adjusted our effort and recorded the number of wolves and wolf tracks that we saw during our moose surveys. Whenever we found a set of wolf tracks during the moose survey we employed the same technique outlined above for a TTS survey. We used this information to calculate the number of wolves seen per hour. We were able to complete a full survey in 2008, and recorded wolves per hour during moose surveys in 2009, 2010, and 2011.

In 2008 surveys were flown in conjunction with moose counts on 7–9 April and all river drainages in the count area were flown. On April 10 we surveyed the areas between the river systems and any other areas we had missed within the survey area during the previous 3 days.

We collected harvest data from sealing certificate records, informal discussions with knowledgeable village residents, and through the North Slope Borough (NSB) Harvest Documentation Program, which monitors harvests in North Slope villages.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

During the 2008 reconnaissance track survey we found 12 packs of wolves that ranged in size from 2 to 8 wolves and saw 3 individuals for a total of 59 wolves. We also found the tracks of 5 more packs but did not see the wolves. These packs ranged from 3 to 5 wolves and totaled 19 wolves, so we accounted for a total of 78 wolves in the survey area. The calculated density of wolves in the 17,800 km^2 area was 3.3 wolves/1,000 km^2 for wolves that were seen during the survey and 4.4 wolves/1,000 km^2 for all wolves that were accounted for during the survey (Fig. 1). This compares to densities of 1–2.2 wolves/1,000 km^2, 4.1–4.3 wolves/1,000 km^2, and 4.0–6.2 wolves/1,000 km^2 obtained from surveys in 1998, 1994, and 1992 using TIP and SUPE techniques (Carroll 1994, 1997, 2000).

The number of wolves seen during moose surveys increased substantially from 0.13 wolves/hr in 2002 to a peak of 3.1 wolves/hr in 2009. In 2010 we counted 1.66 wolves/hr and in 2011 the number had declined to 0.45 wolves/hr.

Wolves per hour seen during moose surveys:

Year	1991	1995	1999	2002	2005	2008	2009	2010	2011
Wolves/hr	0.74	0.46	0	0.13	0.44	1.78	3.10	1.66	0.45

Wolf numbers in the study area decreased during the late 1990s, probably due to a reduced prey base. The Unit 26A moose population declined by 75% between 1992 and 1996 and relatively few caribou from either the Teshekpuk caribou herd (TCH) or the Western Arctic caribou herd (WAH) wintered in the area between Umiat and Anaktuvuk Pass during those years. It is also possible that disease could have been a factor in the decline in wolf numbers. The increase in wolves from 2002 to 2009 was probably due to an increase in the number of caribou wintering in the area in some years, relatively high numbers of moose, and a substantial snowshoe hare (*Lepus americanus*) population. The recent down-turn in the wolf population is at least partially due to successful trapping and hunting by local residents.

The most recent estimate for the total number of wolves in Unit 26A was made in 1993. Assuming that most of the coastal plain has a lower wolf density than the foothill region where we surveyed, we estimated that 240–390 wolves (1.8–2.9 wolves/1,000 km^2) in 32 to 53 packs were resident in Unit 26A (Carroll, 1994). If wolf densities within the typical wolf survey area

are correlated with densities on the coastal plain, the total number of wolves in 26A is probably similar to what it was in 1993.

Population Composition

No population composition data were collected in Unit 26A during the reporting period.

Distribution and Movements

Most wolves are in the southern portion of Unit 26A in the Brooks Mountain Range and foothills and along the Colville River system. However, residents have seen wolves in increasing numbers on the coastal plain during recent years. Wolves often move toward areas of high caribou concentration.

MORTALITY

Harvest

Season and Bag Limit. The season and bag limits were the same for all three regulatory years in the reporting period.

Regulatory years RY08, RY09, RY10 Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 26A		
Trapping - no limit	1 Nov–30 Apr	1 Nov–30 Apr
Hunting - 20 wolves	10 Aug–30 Apr	10 Aug–30 Apr

Board of Game Actions and Emergency Orders. There were no Board of Game actions or emergency orders related to wolves in Unit 26A during the reporting period.

Hunter/Trapper Harvest. During RY08, 26 wolves were sealed; during RY09, 17 wolves were sealed; and during RY10, 37 wolves were sealed. This is a substantial increase in the number of wolves sealed since RY01 and was a result of an increase in the wolf population and increased hunter effort. For percentages of males and females and colors of wolves, see Table 2.

Previous harvests have been documented by the NSB Department of Wildlife Management Harvest Documentation Project. (Brower and Opie, 1996; 1997; Hepa et al., 1997; Bacon et al., 2009). They were not able to do surveys in all villages during all years, so they split their effort among villages. Their results are compiled and reported in Table 3.

Permit Hunts. There were no permit hunts for wolves in Unit 26A during the reporting period.

Hunter Residency and Success. In RY08, 6 North Slope residents harvested 24 wolves, a nonlocal resident harvested 1 wolf, and 1 wolf was harvested by a nonresident hunter. During RY09, 3 North Slope residents harvested 16 wolves and a nonresident harvested 1 wolf. In

RY10, 12 North Slope residents harvested 33 wolves, a nonlocal resident harvested 2 wolves, and 2 nonresidents harvested 2 wolves. There is no information on the number of unsuccessful hunters.

Method of Take, Transportation, and Chronology. The method of take, mode of transport, and chronology of harvest are summarized in Tables 4 and 5.

Other Mortality

We have no information to report on other sources of mortality.

HABITAT

Assessment

Unit 26A contains extensive open habitat and a large seasonal prey base available to wolves. The WAH, which numbers approximately 325,000 animals, seasonally occupies parts of Unit 26A, and a portion of this herd remains throughout the winter. The TCH numbers approximately 55,000 animals and most of this herd remains year-round in the unit during most years.

The Colville River moose population currently numbers about 600 animals. Dall sheep are preyed upon in mountainous regions. Snowshoe hares moved into the Colville River system during the 1980s and spread throughout the river system, providing another food source for wolves.

Petroleum exploration and development may affect some wolf habitat. Hunters and trappers have reported that wolves move out of areas of Unit 26A when seismic exploration is taking place.

Enhancement

There were no habitat enhancement activities for wolves in Unit 26A during the reporting period.

CONCLUSIONS AND RECOMMENDATIONS

The number of wolves counted during moose surveys indicate that the density of wolves in the southeast corner of the Unit 26A was low through 2005 when 0.44 wolves/hr were seen and then increased to 1.78 wolves/hr in 2008 and 3.10 in 2009. In 2010 the wolf number was still high at 1.66 wolves/hr, but had begun to drop off, and then declined to 0.45 wolves/hr in 2011. In 2008 we counted 78 wolves in 17 packs and estimated 4.4 wolves/1,000 km^2 in a reconnaissance track survey in our study area.

An increased prey base was probably the major reason that wolf numbers in the study area increased from 2007 to 2009. Caribou wintered in the count area and there was a corresponding increase in number of wolves in the area. The Colville River moose population also increased to about 1200 animals by 2008. In addition, snowshoe hares were plentiful, providing another source of prey. The reduction in the number of wolves counted during moose surveys in 2010 and 2011 may be attributed to successful harvest in the area by local wolf hunters and trappers.

The department does not have fur sealers in most of the villages and many North Slope residents tan their wolf pelts at home and do not have them sealed, so the department's wolf sealing program does not provide accurate harvest information. The NSB Department of Wildlife

Management has developed a harvest documentation system with people hired in villages to collect harvest information. Their results indicate that an approximate average of at least 52 wolves per year were reported harvested in the villages during the RY94 to RY03 seasons. During those same years an average of 19 wolves were sealed by the department.

Wolf predation can be a factor for sheep, moose, and caribou populations in Unit 26A. Dall sheep populations declined throughout the Brooks Range in the early to mid-1990s, and hunters reported finding the remains of many sheep that apparently were killed by wolves in the mountains. Wolf predation has also been a factor in North Slope moose population numbers. Between 1997 and 2007 the moose population increased while the density of wolves was low. The number of wolves counted during moose surveys increased from 0.44 wolves per hour in 2005 to 3.10 per hour in 2009 and the moose population declined by about 50%, with only 2% recruitment recorded in 2008 and 2009. In 2011 the number of wolves seen per hour decreased to 0.45, moose recruitment increased to 18%, and the moose population number seems to have stabilized. Wolf predation on caribou on the North Slope is probably substantial when caribou winter in areas of relatively high wolf density. Wolf predation appears to be very low in the calving area of the TCH in Unit 26A. We will continue to conduct wolf and moose surveys and look for wolves during caribou surveys to monitor the impact of hunters on wolves and the combined impact of hunters, bears, and wolves on moose and caribou.

I recommend no changes in wolf bag limits or seasons at this time. The wolf population could sustain more harvest, but trapping regulations are already quite liberal. Overharvest is unlikely because Unit 26A is remote and because aerial and land-and-shoot hunting are currently not allowed, so extensive areas in Unit 26A receive little wolf hunting and trapping pressure.

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Table 1. Wolf density and population estimates for Unit 26A and the Colville River study area, 1982–2008.

	Colville River Study Area[a]		Unit 26A		
Year	Wolves per 1000 km^2	Number of packs	Population estimate	Number of packs	Basis of estimate
1982			144–310		TTC survey[b] and extrapolation to rest of unit.
1986	2.6	2			TTC survey[b]
1987	2.7–3.2	4–5			TTC survey[b]
1990			145–350	14–30	Past surveys and interviews with pilots and hunters.
1992	2.9–4.2	4–8			TTC survey[b]
1992	4.0–6.2	5–8			TIP survey[c]
1993			240–390	32–53	1992 surveys and interviews with pilots and hunters.
1994	4.1–4.3	8–10			SUPE survey[d]
1998[e]	1–2.2	2			SUPE survey[d]
2008	3.3-4.4	12-17			TTC survey[b]

[a] Colville Study Area - southeast portion of Unit 26A bordered by the Colville, Killik, and Itkillik Rivers and the Brooks Range.
[b] Traditional Track Count survey.
[c] Track Intercept Probability survey.
[d] Sample Unit Probability Estimator survey.
[e] Incomplete survey due to poor snow cover.

Table 2. Sex and color of wolves from reported harvests and estimated unreported harvest, Unit 26A, RY88 through RY10.

	Sex			Color			Estimated	Total
RY	% Male	% Females	No. Unknown	% Gray	% Black	% White	unreported harvest	reported harvest
RY88	38	62		100	0	0		13
RY89	71	29		64	29	7	48	14
RY90	66	34		83	13	3	82	30
RY91	71	29	1	72	22	6	37	18
RY92	66	34	3	79	17	3	42	29
RY93	67	33	2	72	17	11	37	60
RY94	73	27	0	89	6	5	32	47
RY95	42	58	0	85	9	6	41	19
RY96	57	43	0	81	14	5	40	21
RY97	75	25		69	31	0	30	16
RY98	65	35	1	67	13	20	28	15
RY99	79	21	3	37	50	13	25	8
RY00	86	14	1	76	21	3	32	29
RY01	75	25		88	6	6	33	16
RY02	40	60		80	20		33	5
RY03	62	38		77	15	8	33	13
RY04	60	40		80	20		33	5
RY05	67	33		67	25	8	33	12
RY06	67	33		67	22	11	15	9
RY07	56	44		100			15	9
RY08	59	41	2	65	27	8	20	26
RY09	59	41		76	24	0	22	17
RY10	53	47	1	86	3	11	20	37

Table 3. Harvested wolves reported by the North Slope Borough Department of Wildlife Management Harvest Documentation Project[a], calculated average for each village, and a total of the average number per RY for Unit 26A villages (Anaktuvuk Pass = AKP, Atqasuk = ATQ, Barrow = BRW, Nuiqsut = NUI, Point Lay = PTL, and Wainwright = WW)

Village	AKP	ATQ	BRW	NUI	PTL	WW	Total
RY94	59	2		18	3		82
RY95				6			6
RY96	17	13	7				37
RY97		1					1
RY98	33						33
RY99	3						3
RY00			4	5			9
RY01	28		9				37
RY02	6				1	2	9
RY03			14				14
Average	24	5	8	10	2	2	51

Note: Wainwright residents stated that the reported harvest is too low and probably averages at least 10 per year.

[a] Brower and Opie, 1996; 1997; Hepa, et al., 1997; Bacon et al., 2009.

Table 4. Method and transportation percent of reported wolf harvest, Unit 26A, RY88 through RY10.

	Method of take (%)				Transportation method (%)				Total reported
RY	Trap	Rifle	Snare	Unknown	Aircraft	Snowmachine	ORV	Boat/Skis	harvest
RY88	15	85				100			13
RY89	64	36			15	85			14
RY90	20	80			3	90	7		30
RY91	39	61			6	94			18
RY92	30	63		7	7	89	4		29
RY93	33	66	1		8	85	0	7	60
RY94	7	90	3		28	72			47
RY95	21	74	5			95		5	19
RY96	71	29			5	95			21
RY97	0	100			0	100			16
RY98	0	100	0		13	87			15
RY99	0	63		37	80	20			8
RY00	4	96	0		7	86		7	29
RY01	0	100	0		0	100			16
RY02		100			40	60			5
RY03		85	15		23	77			13
RY04	40	60				100			5
RY05	8	92			8	92			12
RY06		100			11	89			9
RY07	11	89			22	78			9
RY08	4	96			8	92			26
RY09	59	41			6	94			17
RY10	3	97			5	95			37

Table 5. Chronology for reported wolf harvest in Unit 26A, RY88 through RY10.

	Month											
RY	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Unknown	Total
RY88	1				1		2	9				13
RY89		2		1	2	2	2	5				14
RY90		1			3			22	4			30
RY91		1				2	1	11	3			18
RY92		2		2	2			18	4		1	29
RY93	2	5		1	4	2	5	29	12			60
RY94	2	2		3	5	2	10	13	10			47
RY95		1		3				11	1	3		19
RY96	1		1		1	4	11	3				21
RY97				2	5	3	1	5				16
RY98	1	1				1	4	5	3			15
RY99		1		2			3				2	8
RY00	2		3		2	1	9	8	4			29
RY01			2		3		7	4				16
RY02	1	1						1	2			5
RY03			1		2		6	4				13
RY04							2	3				5
RY05	1						3	5	3			12
RY06	1					1		6				9
RY07	2	1		2				4				9
RY08	2						2	8	14			26
RY09		1			6		4	6				17
RY10	2					2	3	29	1			37

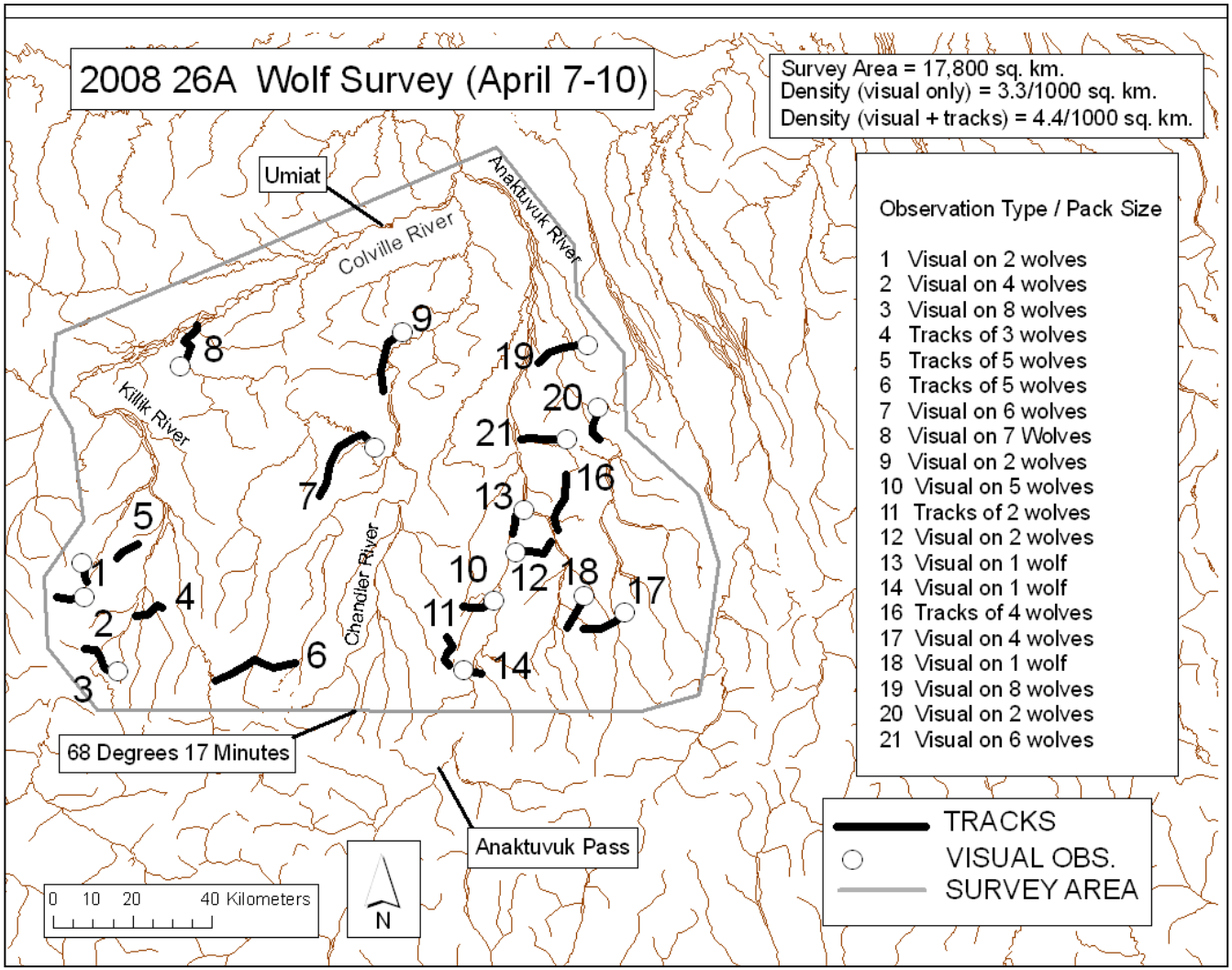

Figure 1. Location and numbers of wolf packs observed in Unit 26A wolf count study area 7–10 April 2008.


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