Wolf
Management Report
of survey-inventory activities
1 July 2005–30 June 2008

Patricia Harper, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation

ADF&G photo by Ken Whitten

Funded through
Federal Aid in Wildlife Restoration
Grants W-33-4, W-33-5, and W-33-6, Project 14.0
2009 Set

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WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008

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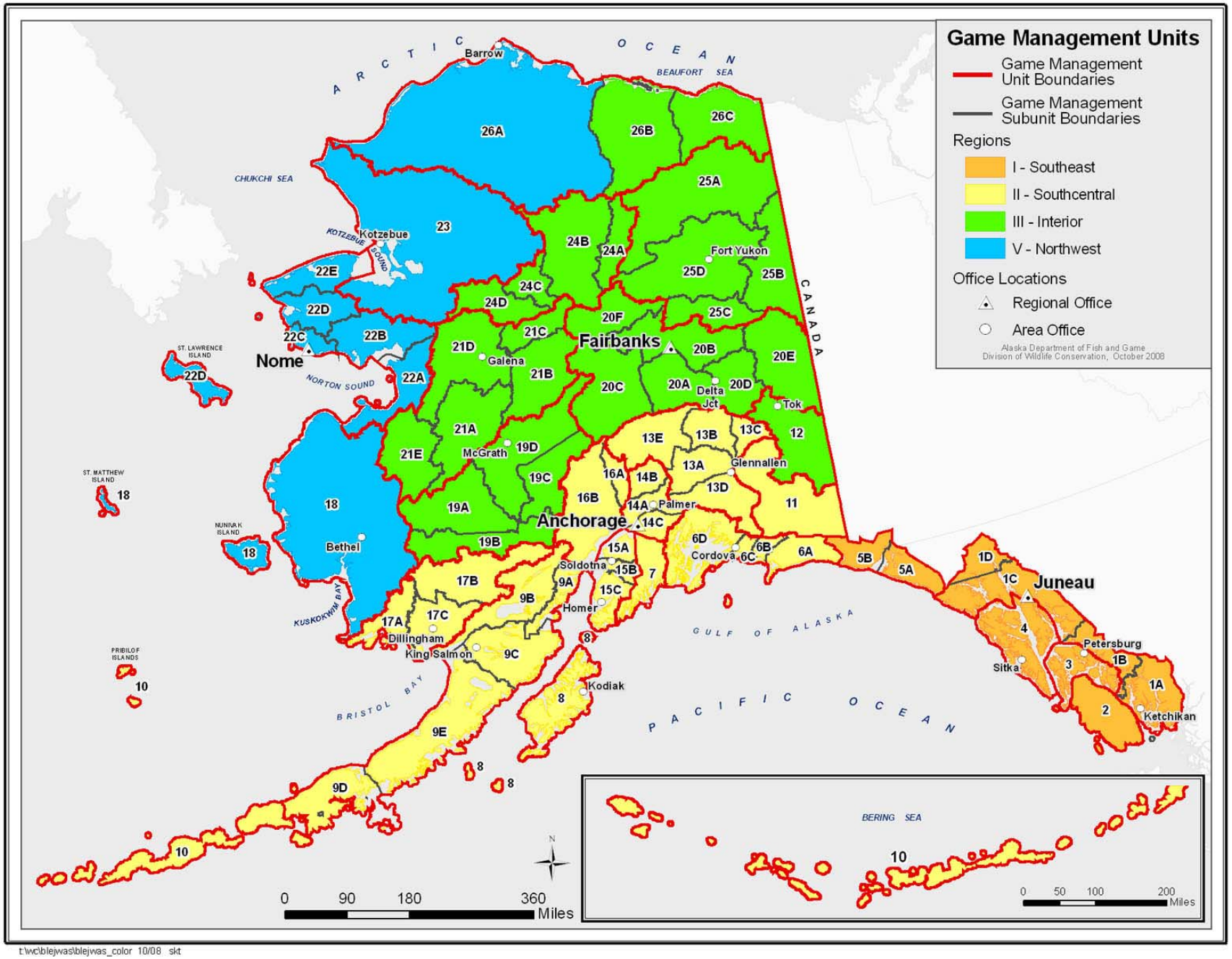

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WILDLIFE

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 2005
To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: 1A (5300 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 OBJECTIVE

- Maintain an average annual harvest of at least 40 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.

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 for wolf packs on Revillagigedo Island averaged 279 square kilometers (108 mi^2); range 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 available currently for Unit 1A wolves. However, based on the moderate harvest levels reported, staff observations, and moderate indices of abundance (I_A) reported 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	10 November–30 April

Hunter/Trapper Harvest. The Unit 1A wolf harvest during this report period was slightly higher than the previous 3-year period but lower than the long-term average. Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY06 = 1 July 2006 through 30 June 2007). Total Unit 1A harvest was 10 wolves in 2005, 26 in 2006, and 27 in 2007. The sex of the harvested wolves during this report period was slightly higher toward females, which is different than the long-term pattern of mostly male harvest. Trapping continues to be the most successful method of taking wolves (68%), followed by ground shooting (30%) (Table 1).

The 2005 harvest of only 10 wolves by 7 licensed trappers was the second lowest harvest and trapper effort on record (Porter 2003). Eleven trappers took an average of 2.3 each wolves during

2006, and 13 trappers took an average of 2.1 wolves each during 2007 (Table 4). The past 3 winters have been moderately severe in terms of snow accumulation and snow persistence. Heavy snowfall and freezing conditions may account for some of the reduced trapping effort and success and higher fuel prices have also increased the cost of running long traplines.

Similar to the long-term average, 68% of the wolves harvested during the past 3 years were trapped while the remainder was taken by ground shooting. Pelt color in Unit 1A is primarily gray (77%) and black (Table 1).

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 the majority of trappers used boats (81%) and highway vehicles (14%) (Table 2). Deep and persistent snow in many areas either prevented or discouraged hunters and trappers from pursuing wolves in Unit 1A during the past few years.

Harvest Chronology. March has historically seen the peak of the Unit 1A wolf harvest, followed by February, when pelts are most prime (Table 3).

Hunter Residency and Success. Local residents regularly account for 90–100% of hunters and trappers taking wolves in Unit 1A. Ninety-nine percent of the harvest since 1990 has been taken by local residents, with nonresidents taking most of the remainder. Numbers of local residents harvesting wolves in Unit 1A peaked in the late nineties (1999–2001) when an average of 43 wolves were taken annually by local residents. Nonlocals accounted for less than 1% during that same period. During 2005–2007, residents harvested annually 100%, 82%, and 85% of the total, respectively (Table 5). Nonresidents that harvested wolves took them incidentally during September by ground shooting while hunting other big game species.

Board of Game Actions. During the fall 2004 Board of Game meeting in Southeast Alaska, wolf hunting and trapping seasons were extended. The opening of hunting season was changed to August 1 from September 1, and the trapping season end date was changed to April 30 from March 31. These changes will provide an additional 61 days to hunt, and 30 days to trap wolves. These changes were effective 1 July 2005. An additional regulatory change was made during the fall 2006 Board of Game meeting requiring all traps and snares to be marked with either the trapper's name and address or the trapper's permanent identification number. Though not directly related to the harvest of wolves, trapping is one of two methods authorized for the harvest of wolves and wolf traps and snares will have to be marked. This change was effective 1 July 2007. 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). Two wolves were taken illegally during August 2007 from Shelter Cove on Revilla Island. Wolves are occasionally killed by automobiles near Ketchikan (Table 1).

CONCLUSIONS AND RECOMMENDATIONS

The management objective of harvesting 20 wolves per season was met in 2 out of 3 years during this report period, and we believe Unit 1A wolf numbers have remained stable. Trapping effort was low during this 3-year period, which likely relates to $3–$5 per gallon gas prices and many trappers choosing other activities during the winter months. Snow conditions and late winter weather during the past 2 seasons prevented or reduced hunting and trapping effort in southern Southeast. With the new August 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, 1990–2007

Regulatory					Method of take			Pelt color			
year	Males	Females	Unk	Total	Shot	Trapped	Unk	White	Gray	Black	Unk
1990	9	6	0	15	9	6	0	0	11	4	0
1991	15	16	0	31	12	19	0	0	29	2	0
1992	26	16	0	42	11	31	0	0	36	6	0
1993	18	14	0	32	6	26	0	0	24	7	1
1994	22	18	0	40	11	29	0	1	35	4	0
1995	24	25	0	49[a]	17	29	3	0	38	11	0
1996	5	10	0	15	3	12	0	0	12	3	0
1997	13	13	0	26[b]	8	18	0	0	21	5	0
1998	12	11	0	23	12	11	0	0	17	4	2
1999	23	23	0	46	12	33	1	0	33	10	3
2000	22	21	1	44	8	35	1	0	38	5	1
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[c]	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[d]	7	19	0	0	23	3	0
2007	10	17	0	27	7	20	0	0	14	4	9
Average	15	14	0	29	9	20	1	0	23	5	2

[a] Does not include 2 gray males killed by cars on North Tongass Highway and White River Road, Ketchikan
[b] Does not include 1 gray male killed by a car on South Tongass Highway, Ketchikan
[c] Does not include one wolf killed by a car on North Tongass Highway, Ketchikan
[d] Does not include two wolves taken illegally in Shelter Cove.

TABLE 2 Unit 1A wolf hunter/trapper transport method, 1990–2007

Regulatory Year	Air	Boat	Highway[a] vehicle	Walked	Unknown
1990	1	10	2	0	2
1991	1	24	1	5	0
1992	2	30	3	3	4
1993	1	28	2	0	1
1994	1	32	6	1	0
1995	1	33	12	2	1
1996	0	15	0	0	0
1997	0	24	2	0	0
1998	0	20	2	0	0
1999	0	39	1	0	0
2000	0	40	7	0	0
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
Average	1	24	4	1	0

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

TABLE 3 Unit 1A wolf harvest chronology, 1990–2007

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1990	0	0	2	1	4	0	2	2	0	2	2	0
1991[a]	0	0	0	4	3	2	2	4	9	6	1	0
1992	0	1	1	2	5	6	1	4	15	7	0	0
1993	0	2	0	0	0	3	6	5	13	2	1	0
1994	0	0	2	6	1	1	2	16	6	6	0	0
1995	0	2	3	2	6	5	4	8	12	6	1	0
1996	0	0	0	3	0	1	4	1	3	3	0	0
1997	0	1	0	4	0	6	3	4	6	2	0	0
1998	0	2	2	0	0	0	2	0	5	0	0	0
1999	0	1	0	0	0	0	1	8	12	7	0	0
2000	0	0	2	2	2	7	11	6	8	4	1	0
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[b]	0	0	1	2	0	5	4	8	5	1	0	0
2007	0	2[c]	3	0	1	1	2	7	6	5	0	0
Average	0	1	2	2	2	3	4	5	6	3	0	0

[a] Hunting season and bag limit changed from year-round, no limit, to 1 August–30 April, 5-wolf limit.
[b] Hunting season changed from September 1st opening to August 1st and trapping extended from March 31 to April 30.
[c] Two additional wolves taken illegally from Revilla Island.

TABLE 4 Number of license holders who killed Unit 1A wolves and average catch per trapper, 1990–2007

Regulatory year	Number of license holders harvesting wolves	Average catch/license holder
1990	13	1.1
1991	17	1.8
1992	19	2.2
1993	15	2.1
1994	17	2.3
1995	25	2.0
1996	7	2.1
1997	18	1.4
1998	16	1.4
1999	15	3.1
2000	21	2.1
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
Average	15	2.0

TABLE 5 Residency of Unit 1A wolf trappers/hunters, 1990–2007

Regulatory year	Local resident[a]	Nonlocal resident[b]	Nonresident
1990	13	0	0
1991	16	1	0
1992	19	0	0
1993	15	0	0
1994	15	1	1
1995	25	0	0
1996	7	0	0
1997	15	2	1
1998	22	1	0
1999	44	1	1
2000	42	1	1
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
Average	18	<1	1

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

WILDLIFE

MANAGEMENT REPORT

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

From: 1 July 2005
To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: Unit 1B (3000 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 viable 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., RY05 = 1 July 2005 through 30 June 2006).

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 1800 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

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

Board of Game Actions and Emergency Orders. No Board of Game actions took place, and no emergency orders were issued regarding Unit 1B wolf hunting or trapping during this report period.

Hunter/Trapper Harvest. In 2005–06 three individuals harvested 13 wolves, in 2006–07 seven individuals harvested 12 wolves, and in 2007–08 three individuals harvested 5 wolves (Table 1).

Although trapping is usually the primary method of take, in 2007–08 over half of the wolves harvested (60%) were taken with firearms. Deer and bear hunters, and occasionally moose hunters, are generally responsible for wolves that are shot incidental to hunting for these other species.

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 2005–06 December and January, in descending order, accounted for the highest percent of the harvest, followed by February and March, each with equal percentages of the overall harvest (Table 2). In 2006–07, February, April, and December, in descending order, followed by October and November with equal percentages of the overall harvest, accounted for the highest percent of the harvest. In 2007–08, September and February, each with an equal percentage of the overall harvest, and March accounted for the highest percentages 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). In both 2005–06 and 2006–07, no other methods of transportation were reported. In 2007–08, however, some hunters and/or trappers reported using snowmachines as transportation to harvest a proportion of wolves taken.

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

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TABLE 1 Unit 1B wolf harvest, 1994–2007

Regulatory year	Reported harvest				Method of take			Successful trappers/hunters
	M	F	Unk.	Total	Trap/Snare	Shot	Unk.	
1994	11	5		16	14	2		8
1995	1	3		4	3	1		4
1996	2	2		4	2	2		4
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

TABLE 2 Unit 1B wolf harvest chronology, by percent by time period, 1994–2007

Regulatory	Harvest periods												
year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	April	May	Jun	n
1994		6			6	57	19	6	6				16
1995					25	25		25	25				4
1996		25	25				25	25					4
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

TABLE 3 Unit 1B wolf harvest, by percent by transport method, 1994–2007

Regulatory year	Percent of harvest					
	Airplane	Boat	3-or 4-wheeler	Snowmachine	Other	n
1994	6	94				16
1995		100				4
1996		100				4
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

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
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JUNEAU, AK 99811-5526

WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: 1C (6500 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. There was also a single black male wolf present at the Mendenhall Lake Recreation Area during 6 consecutive winters. The presence of wolves on Douglas Island has been in question since an incident during the winter of 2001–02; seven 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. We also required hunters and trappers to leave the lower front leg bones attached to the hide for sealing. We used these bones to separate wolves into 3 age categories: juveniles (less than 1 year old), subadults, and adults. The purpose of this was to determine if we could use this

data to reliably extrapolate the age classes to the population level. However subsequent analysis of the data proved otherwise. The department asked the Board of Game to repeal the requirement to salvage wolf leg bones in Southeast Alaska; the requirement was repealed by the board during the 2004 Southeast Alaska board meeting.

The population was monitored in a general sense by whatever means available, including anecdotal reports, aerial sightings incidental to surveys of other species, discussions with hunters and trappers, and information collected from the annual statewide trapper surveys.

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. However, 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

* A regulatory year runs from 1 July to 30 June (e.g., RY 2005 ran 1 July 2005–30 June 2006).

Board of Game Actions and Emergency Orders. During the fall 2004 Board of Game meeting in Southeast Alaska, wolf hunting and trapping seasons were extended. The opening of hunting season was changed to August 1 from September 1, and the trapping season end date was changed to April 30 from March 31. These changes will provide an additional 61 days to hunt, and 30 days to trap wolves. These changes were effective 1 July 2005. An additional regulatory change was made during the fall 2006 Board of Game meeting requiring all traps and snares to be marked with either the trapper's name and address or the trapper's permanent identification number. Though not directly related to the harvest of wolves, trapping is one of two methods authorized for the harvest of wolves and wolf traps and snares will have to be marked. This change was effective 1 July 2007. No emergency orders were issued for this unit during the report period.

Hunter/Trapper Harvest. The harvest during 2005–2008 was 28 wolves, with 4 taken in 2005, 14 in 2006, and 10 in 2007. The mean annual wolf harvest for the current report period is slightly higher (9.3) than the previous period (8). Harvest methods were composed of 17 (61%) taken by firearm under authority of a trapping license or while hunting other species, 6 (21%) taken with

snares, and 5 (18%) taken with foothold traps. Pelt colors during this report period included 16 gray wolves, 8 black wolves, 2 white wolves, and 2 of unrecorded color.

During 2005, four wolves (3 males, 1 female) were harvested (Table 1), with all of them taken from different locations (Taku River, Gustavus, Excursion Inlet, and Port Houghton). In 2006, the harvest of 14 wolves (7 males, 7 females) was equivalent to the highest harvest (range 4–14) over the last 18 years. Five of the wolves were taken at Homeshore and the upper portion of Excursion Inlet, 3 from Port Houghton, 2 from Gustavus, 2 from Endicott River, and one each from Holkam Bay and Taku River. In 2007, ten wolves (5 males and 5 females) were harvested. Four wolves were taken in St. James Bay, 3 from Homeshore and the upper portion of Excursion inlet and one each from Taku Inlet, Port Snettisham, and the southern end of the Chilkat Peninsula.

Hunter/Trapper Residency and Success. During the reporting period Alaska residents took 79% (22) of the wolves harvested, and nonresidents took 18% (5) wolves; one illegally taken wolf was not included in residency calculations. Overall, Unit 1C residents took 44% of the wolves harvested, while other unit residents took the remaining 37%.

Harvest Chronology. Hunting and trapping harvests are spread throughout their respective seasons, and is not consistent from year to year (Table 2). Most recent harvest has occurred in September and March with few wolves taken in intervening months. Wolves taken in the fall are opportunistic harvests while hunters are pursuing other species. Historically, wolf trapping occurs during winter months when pelts are prime; spring provides additional daylight allowing hunters greater opportunity to work a trapline.

Transport Methods. Boats are the primary transportation mode used by wolf hunters and trappers with a few using airplanes (Table 3). Those listed as running their traplines on ski's or snowshoes almost all probably use a highway vehicle to access their traplines, but they fail to report this mode of transportation.

Other Mortality

A male wolf was illegally taken in July 2006. The carcass was found on the Juneau road system spurring concern that it was the wolf often seen at the Mendenhall Glacier. An investigation revealed the wolf was harvested on the Taku River and disposed of in Juneau.

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

BARTEN, N. L. 2009. Unit 1C wolf management report. Pages 17–23 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2005–30 June 2008. Alaska Department of Fish and Game. Project 14.0. Juneau, Alaska.

TABLE 1 Unit 1C wolf harvest chronology, 1990–2007

Regulatory year	Males	Females	Unknown	Total
1990	4	2	0	6
1991	1	4	0	5
1992	3	2	0	5
1993	3	4	0	7
1994	4	1	2	7
1995	2	3	0	5
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
Mean annual harvest	4.0	3.4	.2	7.6

TABLE 2 Unit 1C wolf harvest chronology by month, 1990–2007

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1990			1			3				1	1[a]	
1991			2							2	1[a]	
1992					1		1		2	1		
1993							2	3	1	1		
1994			2	2		1		1	1			
1995		1		1		2			1			
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[b]		5	1				1	6			
2007			5			1			3	1		
Total Monthly Harvest	1	1	22	10	2	10	26	28	27	7	2	0

[a] Season Dates: Hunting: (No Closed Season) Trapping: (Nov. 10-Apr. 30)

[b] Illegal Harvest

TABLE 3 Unit 1C wolf harvest, percent by transport method, 1990–2007

Regulatory year	Airplane	Dogsled, skis, snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway vehicle	Unknown
1990			83				17	
1991	40		60					
1992			80				20	
1993			100					
1994		14	86					
1995			20			40	40	
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					

Alaska Department of Fish and Game
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WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: 1D (2700 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. In the past we required hunters and trappers to leave the lower front leg bones attached to the hide for sealing. We used these bones to separate wolves into 3 age categories: juveniles (less than 1 year of age), subadults, and adults. Although this data did provide us with the age structure of the harvest, we were unable to relate that information to the population as a whole which was our main objective. Since our intended objective wasn't being met, we decided to forgo collecting this piece of data in the future. The department asked the Board of Game to

repeal the requirement to salvage wolf leg bones in Southeast, Alaska; the requirement was repealed by the board during the 2004 Southeast Alaska board meeting.

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 Bureau of Wildlife Enforcement staff sealed wolves in Haines. Data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY07 = 1 July 2007 through 30 June 2008).

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	10 November–30 April	No limit

Board of Game Actions and Emergency Orders. During the fall 2004 Board of Game meeting in Southeast Alaska, wolf hunting and trapping seasons were extended across the region, thus reversing the decision made in 2002 by the BOG to shorten wolf hunting and trapping seasons. The opening of hunting season was changed to 1 August from 1 September, and the trapping season end date was changed to 30 April from March 31. These changes will provide an additional 61 days to hunt, and 30 days to trap wolves. These changes were effective 1 July 2005. An additional regulatory change was made during the fall 2006 Board of Game meeting requiring all traps and snares to be marked with either the trapper's name and address or the trapper's permanent identification number; or, the trapper had the option of putting a sign with this same information within 50 yards of a set. This change was effective 1 July 2007. Both these regulatory changes were for all of Region I, including unit 1D.

Hunter/Trapper Harvest. During the report period (2005–2007) 5 wolves were taken in Unit 1D (Table 1). In 2005, two wolves of unknown sex were taken, and the 2006 harvest was 3 wolves (2 males, 1 female). No wolves were harvested in regulatory year 2007. The Unit 1D mean annual harvest during the report period was 1.7 wolves, substantially lower than the 4 wolf annual average take during the preceding 15 years. Unit residents took 4 (80%) of the wolves

harvested during the report period. A guided nonresident brown bear and mountain goat hunter took the additional wolf.

As in past years, far more wolves were taken by shooting than by trapping. Of the 5 wolves harvested, 4 (80%) were taken with firearms, and 1 (20%) was taken in a snare. Three gray and 2 black wolves were killed during this period. Three of the wolves were harvested in road-accessible areas; the remaining 2 were taken in remote locations; one accessed by boat and the other on foot. The majority of wolves harvested in unit 1D come 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 September through March; January represents 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 populations appear healthy. Little 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 taken with rifles.

During the past 4 board cycles, there have been proposals to change the wolf hunting and/or trapping seasons in Unit 1D. In 2002 the seasons were shortened, and then in 2004 they were lengthened back to the pre-2002 dates. In 2006 a proposal specific to Unit 1D was submitted to lengthen the hunting season, and in 2008 a proposal was submitted to shorten the wolf hunting season. The department has generally supported leaving the season as it is today, and as it was prior to 2002. We did not support shortening the season from this established season length, nor did we support lengthening the spring hunting season when that was proposed. The department has not supported a lengthening of the spring season because hunting would then be allowed during a period when pups rely on adults for survival.

Proposals on wolf management are likely to continue to be introduced to the board so consideration should be given to investigate wolves in the Chilkat River Valley. Wolves are valued by nonconsumptive resource users (wildlife viewers and photographers) as well as hunters and trappers. 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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Please cite any information taken from this section, and reference as:

SCOTT, R. 2009. Unit 1D wolf management report. Pages 24–30 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2005–30 June 2008. Alaska Department of Fish and Game. Project 14.0. Juneau, Alaska.

TABLE 1 Unit 1D wolf harvest, 1990–2007

Regulatory year	Males	Females	Unknown	Total
1990	0	1	0	1
1991	0	0	0	0
1992	0	3	0	3
1993	1	0	0	1
1994	1	1	0	2
1995	1	2	0	3
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
Mean Harvest	1.7	1.8	0.2	3.7

TABLE 2 Unit 1D wolf harvest chronology, 1990–2007

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1990					1							
1991												
1992						1	2					
1993				1								
1994					1				1			
1995				1					1	1		
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												
Total Monthly Harvest	NA	1	9	7	7	4	14	8	9	7	NA	NA

TABLE 3 Unit 1D wolf harvest, percent by transport method, 1990–2007[a]

Regulatory year	Airplane	Dogsled, skis, snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway vehicle	Unknown
1990							100	
1991								
1992	67						33	
1993			100					
1994							100	
1995					33		33	33
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	

[a] Percentages may not add to 100% due to reporting errors and missing information

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
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WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: 2 (3600 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 decade, 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 7% 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. Presently, that would represent a maximum harvest of about 90–95 wolves.

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 mailout survey. Anyone who purchases a trapping license in the state receives a survey. Typical response to the survey is around 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. Moderate harvests during the past 5 seasons and staff observations suggest wolves have remained abundant throughout Unit 2.

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. 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	1 November -15 March

Hunter/Trapper Harvest. The Unit 2 wolf harvest has fluctuated in recent years from a high of 132 wolves during 1996 to a low of 29 during 2003. From 2005 to 2007, the total reported annual harvests were 60, 38, and 34, respectively (Table 1). The low harvest during this reporting period is more likely a function of trapper numbers rather 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 10 wolf trappers sealed wolves during 2006 and 2007, despite good market options for wolf hides. The increasing cost of fuel and changing fur market prices 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 1999. 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 12, well below the 20-year average of 25 (range 10–42). Average wolf harvest per trapper during the last 20 years has ranged from a low of 1.1 in 1989 to a high of 5.6 during 1999 and averaged 3.2 wolves (Table 4). During this report period the average wolf harvest per trapper rose to 3.7, so although trapper numbers are declining, those who are active are having better than average success.

About 69% of the wolves harvested during the past 3 seasons were caught in traps or snares, while the other 31% were shot. This is above the 20 year average of 25% taken by ground shooting (Table 1).

The sex ratio of harvest during the past 20 years slightly favors males, with an average of 57% male and 43% female. During the current 3-year report period, males accounted for 58% of the harvest (Table 1).

Transport Methods. Highway vehicles (50%) and boats (50%) accounted for the majority of transport methods used by successful Unit 2 wolf hunters and trappers over the past 3 years (Table 2).

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 harvest has been highest during December and January. During the

past 3 years, the cumulative monthly harvest has occurred fairly evenly across every month with 20%, 20%, 28% and 22% of the harvest occurring December through March, respectively, although the pattern is normally different each year. Approximately 10% of the harvest has occurred during September–November under federal subsistence regulations (Table 3).

From 1988 to 1996 approximately 35% of the harvest has been taken by shooting (both by trappers and hunters) (Table 1). Since 1997 when season dates for hunting and trapping changed from 1 August–30 April to 1 December–31 March, shooting has accounted for only 14% of the harvest (although during the current reporting period, taking wolves by ground shooting was at 31%). We believe the reduction in the number of wolves shot is 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 is back to a 1 September–31 March season, providing local rural residents some additional wolf harvest opportunity during deer season.

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 1997, 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 1997, approximately 95% of the hunters/trappers to take wolves on POW have been local residents (Table 5).

Board of Game Actions. No Board of Game actions pertaining to wolves in Unit 2 have been adopted during this reporting period.

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 between 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

Although management objectives were not met in 2006 and 2007, we believe the Unit 2 wolf population has remained stable during this report period, although there are no quantitative data to confirm this. We are currently exploring new field methods to track wolf population changes and to better assess Unit 2 wolf harvest trends.

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 to slightly increasing during the last report period. No new regulatory changes are recommended at this time.

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TABLE 1 Unit 2 wolf harvests, 1988–2007

Regulatory					Method of take			Pelt color			
year	Males	Females	Unk	Total	Shot	Trapped	Unk	White	Gray	Black	Unk
1988	27	16	2	45	31	14	0	0	41	4	0
1989	20	11	1	32	23	8	1	0	20	9	3
1990	36	29	1	66	44	21	1	0	50	15	1
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
Average	42	32	1	73	18	54	0	0	64	7	2

TABLE 2 Unit 2 wolf hunter/trapper transport methods, 1988–2007

Regulatory year	Air	Boat	Highway[a] vehicle	Walked	Unknown
1988	2	25	15	0	3
1989	0	12	15	0	5
1990	2	15	40	1	8
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
Average	1	40	30	0	1

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

TABLE 3 Unit 2 wolf harvest chronology, 1988–2007

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1988	0	0	5	8	5	8	5	4	0	3	4	3
1989	0	2	3	3	2	5	3	2	2	2	4	4
1990	0	4	4	8	7	6	7	12	12	6	0	0
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
Average	0	1	2	3	3	15	19	17	10	2	0	0

[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 4 Numbers of trappers who caught wolves in Unit 2, and average catch per trapper, 1988–2007

Regulatory year	Number of trappers that harvested wolves	Average catch/trapper
1988	31	1.4
1989	28	1.1
1990	42	1.6
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
Average	25	3.2

TABLE 5 Residency of Unit 2 wolf trappers/hunters, 1990–2007

Regulatory year	Local resident[a]	Nonlocal resident[b]	Nonresident
1988	19	9	2
1988	12	12	5
1990	24	18	0
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
Average	18	6	1

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

WILDLIFE

MANAGEMENT REPORT

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

From: 1 July 2005
To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: Unit 3 (3000 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 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 2003–04 and 2004–05.

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 2002–03 represents the highest wolf harvest in Unit 3 since at least 1984.

From 1997 to 2002 hunters/trappers were required to leave 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 1997 and 2002 the percentage of adults in the harvest ranged from 32–58% annually, with an overall mean of 46%.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a viable 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 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. Although forelegs were collected in 2003, 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., RY05 = 1 July 2005 through 30 June 2006).

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 1800 feet in elevation, we estimate the current unitwide wolf population to be 125–235 animals in approximately 21 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

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

Board of Game Actions and Emergency Orders. No Board of Game actions took place, and no emergency orders were issued regarding Unit 3 wolf hunting or trapping during this report period.

Hunter/Trapper Harvest. In 2005–06, 27 individuals harvested 60 wolves; in 2006–07, 17 individuals harvested 44 wolves; and in 2007–08, 16 individuals harvested 21 wolves (Table 1). The harvest of 21 wolves in 2007–08 represents the second lowest wolf harvest in Unit 3 since 1990 when 19 wolves were taken. Except for the 1998–99, 2003–04, and 2007–08 seasons, trapping has been the primary method of taking wolves in Unit 3. Trapping accounted for 60% of the harvest in 2005–06, 75% in 2006–07; however, trapping accounted for only 29% of the unitwide harvest in 2007–08. Deer hunters, bear hunters, and moose hunters occasionally take wolves while hunting or pursuing other species.

Most of the wolf harvest takes 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 2005–06, January, March, and December, in descending order, accounted for the highest percentages of the harvest, followed by November and April, which had equal percentages of wolves taken. (Table 2). In 2006–07, March, February, January, and September accounted for the highest percentages of the wolf harvest. In 2007–08, April accounted for the highest percentage of the harvest, followed by September, October, January, and March, 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 (Table 3). Some trapping occurs from the road system on Mitkof and Wrangell islands and trappers/hunters using highway vehicles accounted for 12% of the harvest in 2005–06, and 5% of the harvest in both 2006–07 and 2007–08. 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 in 2005–06 and 2006–07.

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 1995 to 2004 the unit 3 wolf harvest averaged 49 wolves annually. The harvests of 60, 44, and 21 wolves in 2005–06, 2006–07 and 2007–08, respectively, were well above, slightly below, and well below, respectively, the preceding 10-year mean annual harvest. The 21 wolves harvested in 2007–08 represents the second lowest wolf harvest in the unit since 1990, when 19 wolves were taken. We do not believe the recent reductions in harvest are indicative of declining wolf populations. Several of the more prominent Unit 3 wolf trappers were known to have been inactive during the report period. Furthermore, severe winter weather, including record snowfall during winter of 2006-07 and well above average snowfall during winter of 2007-08, combined with relatively high fuel prices, probably contributed to reduced trapper effort and success.

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. Although we recommend no changes to trapping regulations at this time, increasing road densities and improved human access are giving rise to concerns about the potential for excessive wolf mortality on several Unit 3 islands.

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TABLE 1 Unit 3 wolf harvest, 1994–2007

Regulatory	Reported harvest				Method of take			Successful
year	M	F	Unk	Total	Trap/snare	Shot	Unk	trappers/hunters
1994	31	23	0	54	38	16	0	15
1995	27	13	0	40	26	13	1	20
1996	32	27	0	59	43	16	0	24
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

TABLE 2 Unit 3 wolf harvest chronology, by percent by time period, 1994–2007

Regulatory	Harvest periods													
year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Unk	n
1994	0	2	4	2	11	15	20	7	11	9	0	0	19	54
1995	0	2	5	13	8	23	12	18	15	2	2	0	0	40
1996	0	0	3	5	7	10	7	20	24	22	2	0	0	59
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

TABLE 3 Unit 3 wolf harvest, by percent by transport method, 1994–2007

Regulatory year	Percent of harvest							
	Airplane	Boat	3/4 wheeler	Snowmachine	ORV	Highway vehicle	Other	n
1994	0	89	0	4	0	5	2	54
1995	0	85	0	0	0	13	2	40
1996	1	73	0	0	19	7	0	59
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

WILDLIFE

MANAGEMENT REPORT

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

From: 1 July 2005
To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: 5 (5800 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 the wolf numbers and distribution are similar to what they were 20 and 30 years ago. Therefore, the historical perspective listed below probably provides the best insight into the wolf populations and their distribution in the unit.

In winter 1977, Yakutat Area Wildlife Biologist R. Quimby estimated a minimum of 6 wolf packs in subunit 5A: the Situk, Ahrnklin, Dangerous/Italio, Akwe, Tanis Mesa/East Alsek, and Doame/Clear packs. He estimated minimum pack sizes of 9, 7, 6, 3, 5, and 6, respectively, for a total of 36 wolves. He extrapolated this to a minimum of 45–50 animals (prepupping), estimating a density of 1 wolf/15 mi^2 (Robus 1997). However, the presence of a breeding population of wolves in Unit 5B was undetermined at that time. In winter 1979, area wildlife biologist R. Ball estimated Unit 5A and 5B minimum populations at 35 and 10 wolves, respectively. By 1980 Ball believed wolf numbers were stable or increasing in subunit 5A, with a population estimate of 50 animals. By 1982 Ball suggested there might be a minimum of 12 wolves in Unit 5B in 2 packs. In 1985 B. Dinneford reported an increased number of accounts from local residents of moose mortality in winter months. These accounts may have reflected an increasing wolf population, responding to a larger moose population. Wolves probably subsisted mostly on mountain goats and salmon before the arrival of moose in the area. Salmon are considered very important for wolf maintenance, especially as a late fall and early winter food source.

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. In the past we required hunters and trappers to leave the lower front leg bones attached to the hide for sealing. We used these bones to separate wolves into 3 age categories: juveniles (less than 1 year of age), subadults, and adults. Subsequent analysis of data provided by the leg bone was inconclusive due to the erratic nature of the wolf harvest. The department asked the Board of Game to repeal the requirement to salvage wolf leg bones in Southeast Alaska; the requirement was repealed by the board during the 2004 Southeast Alaska board meeting.

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.

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 is available, anecdotal reports and 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

A regulatory year runs from 1 July to 30 June (e.g., RY 2005 ran 1 July 2005–30 June 2006).

Board of Game Actions and Emergency Orders. During the fall 2004 Board of Game meeting in Southeast Alaska wolf hunting and trapping seasons were extended. The opening of hunting

season was changed to August 1 from September 1, and the trapping season end date was changed to April 30 from March 31. These changes will provide an additional 61 days to hunt, and 30 days to trap wolves. These changes were effective 1 July 2005. An additional regulatory change was made during the fall 2006 Board of Game meeting requiring all traps and snares to be marked with either the trapper's name and address or the trapper's permanent identification number. This change was effective 1 July 2007. No emergency orders were issued for this unit during the report period.

Hunter/Trapper Harvest. Twenty-one wolves were taken in Unit 5 during the report period. Seven wolves (3 males and 4 females) were taken in regulatory year 2005 (Table 1). In 2006, the harvest increased to 8 wolves (6 males, 2 females), and in 2007, the harvest decreased to 6 wolves (4 males and 2 females). During this report period, the mean annual harvest of 7 wolves is only slightly lower than the long-term (1990–2004) mean annual harvest of 9 wolves. The range in annual harvest over that period of 3–24 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. Eight wolves were taken in subunit 5B during the report period, 4 by nonresident hunters, and 4 by unit residents, most of which (6 of 2) were 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 2005–2007 was 21 wolves, with 4 (19%) taken in traps, 4 (19%) taken in snares, and 13 (62%) taken by shooting. Nineteen of the wolves were gray, and 2 were black. Difficult travel conditions and inconsistent weather (heavy snows often changing to rain) in the Yakutat area restrict hunting and trapping effort for wolves.

Hunter/Trapper Residency and Success. Unit 5 residents took 11 wolves (52%), other Alaska residents took 3 wolves (14%), and 7 (33%) wolves were taken by nonresident hunters. All wolves harvested by nonresidents were in fall months, by firearm, during hunting seasons for other seasons (moose and bear).

Harvest Chronology. People hunting other species shot most wolves taken during fall 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.

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. From these data sources it appears that the wolf population is stable throughout the unit. 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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Wildlife Biologist IV

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SCOTT, R. 2009. Unit 5 wolf management report. Pages 49–55 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2005–30 June 2008. Alaska Department of Fish and Game. Project 14.0. Juneau, Alaska.

TABLE 1 Unit 5 wolf harvest, 1990–2007

Regulatory year	Males	Females	Unknown	Total
1990	4	3	0	7
1991	8	3	0	11
1992	2	2	0	4
1993	6	3	0	9
1994	10	3	3	16
1995	6	3	0	9
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
Mean annual harvest	5.3	3.3	.2	8.8

TABLE 2 Unit 5 wolf harvest chronology by month, 1990–2007

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1990			1	1	1		1			1	2	
1991		2	1			1		3	3	1	2	
1992			1	1						2		
1993		1				1	2	1		4		
1994			2		1	3		3	3	2		
1995			1			1	2	1	3	1		
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					
Total Monthly Harvest	0	3	31	19	9	8	25	13	26	20	4	0

TABLE 3 Unit 5 wolf harvest, percent by transport method, 1990–2007

Regulatory year	Airplane	Dogsled, skis, snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway vehicle	Unknown
1990	43		43		14			
1991	46	8		38			8	
1992	75		25					
1993	44		22				33	
1994	25		0	25	25		25	
1995	44			11			33	11
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	67		16	17				

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WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008

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 20th 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, 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 (Burris and McKnight 1973). 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 rapidly grew 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 seen 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 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, productive habitat, good body condition, 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, three of five goat populations in Units 6B and western 6A recovered to prewolf levels (Crowley 2004). The two goat populations that did not recover despite closed hunting seasons occurred in habitat with limited or no escape terrain within the territories of two wolf packs.

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). 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 resulting from human harvest. Unit 6C 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 controlled a wolf population (Carnes 2004).

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

To 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. 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, but placed little reliance on certificates for reports of pack size. 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 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 field observations.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The wolf population was approximately 62–72 animals during the reporting period, composed of 9–11 packs and loners (Table 1). Estimated posthunt wolf density (wolves/1000km^2) in 2007 was as follows: 6A = 10, 6B = 14, and 6C = 6. Given the kill rates reported by Carnes (2004), and given current moose populations (ADF&G unpublished data), wolves had the potential to kill 7–16% of the moose in Units 6A (west) and 6B annually.

Distribution

Unit 6A had approximately 28–34 wolves in 5 packs and loners during the reporting period: Icy Bay (2–4 wolves), White River (6–8), Tsiu River (8–10), Suckling Hills (9–10), and Bering River (3–4). Unit 6B had 11–17 wolves in 2 packs andloners: Martin River (4–6), and Russian River (7–11). Unit 6C had 6–7 wolves present, probably as pairs or loners. Unit 6D had 10–13 wolves in 2 packs: Rude River (3–5), Lowe River (7–8). Pack size and distribution in Unit 6D remains speculative.

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 legal wolf kills have ever been reported from the islands.

MORTALITY

Harvest

Season and Bag Limit. The hunting season was 10 August–30 Apri with a bag limit of 5 wolves. The trapping season was 10 November–31 Marchwith 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 4–7 wolves (18 total), composed of 43–71% females (Table 2). Four wolves were trapped and 14 shot. Total estimated unreported and illegal harvest was three. Harvest levels were sustainable.

Hunter Residency and Success. The number of successful hunters and trappers totaled 6, 4, and 7 during the three years of the reporting period (Table 2). This was slightly lower than previous years.

Harvest Chronology. Most wolves were taken during the first half of the season, from August through December, during the reporting period (Table 3). This pattern was normal.

Transport Methods. Primary methods of transportation were highway vehicles and airplanes for Unit 6 wolf harvest (Table 4).

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 poor trapping conditions and access, but could have sustained the harvest of 10 wolves specified in the objective. No management changes are recommended.

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NOWLIN, R. A. 1998. Unit 6 mountain goat. Pages 47–75 *in* S. O. Morgan, editor. Annual report of survey-inventory activities. Part VII. Volume XVIII. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Project W-22-6, Job 12.0. Juneau, Alaska. 53pp

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CROWLEY, D. W. 2009. Unit 6 wolf management report. Pages 56–62 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2005–30 June 2008. Alaska Department of Fish and Game. Juneau, Alaska.

TABLE 1 Unit 6 fall wolf population estimates[a], 2003–07

Regulatory year	Population estimate	Number of packs
2003–03	43–50	9–11
2004–05	46–52	9–11
2005–06	65–69	9–11
2006–07	63–69	9–11
2007–08	62–72	9–11

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

TABLE 2 Unit 6 wolf harvest, 2003–07

Regulatory	Reported harvest				Estimated harvest		Method of take			Successful
Year	M	F	(%)	Total	Unreported	Illegal	Trap/snare	(%)	Shot	trappers/hunters
2003–04	0	0	--	0	0	1	0	--	0	0
2004–05	3	2	(40)	9 [a]	0	1	3	(33)	6	7
2005–06	4	3	(43)	7	0	1	2	(29)	5	6
2006–07	2	2	(50)	4	0	1	1	(25)	3	4
2007–08	2	5	(71)	7	0	1	1	(14)	6	7

[a] Includes harvested wolves of unknown sex

TABLE 3 Unit 6 wolf harvest chronology percent, 2003–07

Regulatory Year	Harvest periods									*n*
	August	September	October	November	December	January	February	March	April	
2003–04	0	0	0	0	0	0	0	0	0	0
2004–05	0	22	33	0	22	11	0	0	11	9
2005–06	29	29	14	0	0	0	14	14	0	7
2006–07	25	0	25	0	25	0	25	0	0	4
2007–08	0	57	14	0	0	14	14	0	0	7

TABLE 4 Unit 6 wolf harvest percent by transport method, 2003–07

Regulatory Year	Percent of harvest								*n*
	Airplane	Dogsled/ skis/ snowshoes	Boat	Snow-machine	ATV	ORV	Highway vehicle	Other	
2003–04	0	0	0	0	0	0	0	0	0
2004–05	56	11	0	0	0	0	33	0	9
2005–06	57	0	0	0	0	0	43	0	7
2006–07	50	0	0	25	0	0	25	0	4
2007–08	43	0	14	14	14	0	14	0	7

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WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008

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 20th 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 et al. 1984). The first wolf in more than 50 years was spotted in 1961 and by 1975 wolves had recolonized most available habitat throughout the Kenai Peninsula (Peterson et al. 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 prevalence of the parasite spread rapidly across the Kenai. Infested wolves are now common.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

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

METHODS

Due to budget constraints, there has been no recent attempt to accurately quantify the abundance and distribution of wolves on the Kenai. Anecdotal information on pack size and locations are 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

Peterson et al (1984) estimated the Kenai wolf population at 186. We have no current information on wolf abundance and distribution.

MORTALITY

Harvest

Season and Bag Limits. The hunting season in Units 7 and 15 has been 10 August–30 April since the 1970s. Since 1992, the bag limit has been 5 wolves, except on the Kenai National Wildlife Refuge, where the limit is two. The trapping season in Units 7 & 15 has been 10 November–31 March with no bag limit since 1997.

Board of Game Actions and Emergency Orders. There were no Board of Game actions on Kenai wolves during this reporting period.

Hunter/Trapper Harvest. The average harvest during the past 5 seasons has been 45 (Table 1).

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

CONCLUSIONS AND RECOMMENDATIONS

As outlined in the most recent previous report (Selinger 2006), the lack of surveys to assess the Kenai wolf population has greatly limited any inferences we can make about the population. The one management activity that could help influence harvest opportunities would be an expansive effort to treat wolves early in the fall with anti-helminthic medications implanted in bait in order to improve hide quality.

LITERATURE CITED

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MCDONOUGH, T. 2009. Units 7 & 15 wolf management report. Pages 63–65 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2005–30 June 2008. Alaska Department of Fish and Game. Juneau, Alaska.

TABLE 1 Wolf harvest in Units 7 and 15, 2003–2007

	Unit Harvest				Total
Regulatory year	7	15A	15B	15C	harvest
2003–04	3	16	16	10	45
2004–05	25	15	13	10	63
2005–06	5	9	10	11	35
2006–07	8	8	9	14	39
2007–08	4	11	9	17	41

TABLE 2 Harvest chronology for wolves in Units 7 and 15, 2003–2007

Regulatory	Month of Harvest									
year	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Other	Total
2003–04	6	7	0	1	1	10	15	3	2	45
2004–05	5	3	2	6	14	13	13	5	2	63
2005–06	0	4	2	1	2	4	10	11	1	35
2006–07	0	4	0	8	2	3	12	9	1	39
2007–08	1	6	1	2	3	8	10	7	3	41

WILDLIFE

MANAGEMENT REPORT

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WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008

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 low-to-moderate densities. Specific data on historic wolf abundance are lacking, but the population was 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 25 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 alternate prey 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 more than 200,000 by 1996, and declined to 35,000 by 2008. The Northern Alaska Peninsula Caribou Herd (NAPCH) increased from about 13,000 in the mid 1970s to about 20,000 in 1984. During the next 10 years, the NAPCH remained relatively stable at 15,000–20,000. During the past 15 years the NAPCH has declined, dropping to about 2,500 by 2008. Caribou numbers have decreased dramatically on Unimak Island recently. The population increased during the 1990s to approximately 1,000 caribou between 1999 and 2005 before decreasing to approximately 300-400 caribou by 2008. The Southern Alaska Peninsula Caribou Herd (SAPCH) peaked at 4,200 in 2002 before declining to approximately 700 caribou by 2008.

A wolf control project was approved by the Board of Game and initiated in 2008 with the goal of reducing wolf predation on caribou calves in the SAPCH. Twenty-eight wolves were removed from key areas during calving, and caribou calf survival was increased significantly.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

During the previous reporting period, the management objective was 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 recent study of wolf population dynamics has offered new insight into wolf densities in Unit 9. Wolves from 10 packs were captured and fitted with radio collars to investigate population demographics, monitor pack size, and measure territory size. We also monitored trends through observations 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 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 base such as the Mulchatna caribou herd's range. Although relatively few trapper questionnaires have been returned in recent years, trappers generally agree that wolf abundance has increased during this reporting period.

MORTALITY

Harvest

Season and Bag Limits. The hunting season in Unit 9 was 10 August–25 May, with a bag limit of 10 wolves; the trapping season was 1 October–30 April with no bag limit. The hunting season in Unit 10 was 10 August–30 April with a bag limit of 5 wolves, and the trapping season was 10 November–31 March with no bag limit.

Board of Game Actions and Emergency Orders. In March 2008 the board approved a predation reduction plan that allows Alaska Department of Fish and Game (ADF&G) staff and agents to

remove wolves from the calving grounds of the Southern Alaska Peninsula Caribou Herd in Game Management Unit 9D.

In March 2009 the board lengthened the hunting season in Unit 10 to May 25 and increased the bag limit to 10 wolves.

Hunter/Trapper Harvest. The wolf harvests for 2005, 2006, and 2007 were 120, 85, and 110, respectively, in Units 9 and 10 (Table 1).

Hunter Residency and Success. Furbearer harvest records from sealing certificates do not contain information on individual hunters or trappers, so no information on residency or success is available.

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

Transport Method. Inaccurate reporting of the method of transportation used for harvesting wolves hampers analysis; however, most harvesters used 4-wheelers or snowmachine (Table 3).

Other Mortality

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

A predator control plan was successfully implemented during the summer of 2008 in conjunction with a caribou calf mortality study designed to monitor calf survival and causes of death. Department staff removed 28 wolves (14 adults and 14 pups) from 2 key packs affecting caribou calf survival. Caribou calf survival was significantly improved by the wolf removal. Survival of calves to 1 month of age increased from <1% in 2007 to 57% in 2008. Similarly, the recruitment of calves to fall increased from 0.5 calves:100 cows in 2007 to 39 calves:100 cows in 2008.

HABITAT

Assessment

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

CONCLUSIONS AND RECOMMENDATIONS

The wolf harvests in Unit 9 vary widely, depending on weather conditions and the activity of several individuals who use aircraft. Travel conditions and logistics greatly limit the trapping and hunting efforts. Harvests typically occur near communities where access is easiest. The majority of the area receives very little pressure, and harvests have had little effect on the wolf populations in Units 9 and 10. 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 do not seem reliable; analyses using these data are not recommended.

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BUTLER, L. B. 2009. Unit 9 and 10 wolf management report. Pages 66–70 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2005–30 June 2008. Alaska Department of Fish and Game. Juneau, Alaska.

TABLE 1 Units 9 and 10 wolf harvest, 2003–08

Regulatory Year	Reported harvest M	F	Unk	Total	*Method of take* Trap/Snare	Shot	Unk	*Successful* Trappers/Hunters
2003–04	66	51	2	119	39	71	9	59
2004–05	32	31	1	64	33	24	7	27
2005–06	60	58	2	120	22	95	3	75
2006–07	42	25	18	85	33	52	0	27
2007–08	55	53	2	110	21	89	0	57

TABLE 2 Units 9 and 10 wolf harvest chronology percent, 2003–08

Regulatory Year	August	September	October	November	December	January	February	March	April	May	Unk	*n*
2003–04	0	12	12	2	21	27	20	5	1	0	0	119
2004–05	2	8	0	7	35	19	18	8	3	0	2	60
2005–06	0	12	23	1	7	7	13	22	3	12	0	120
2006–07	1	7	1	14	33	25	7	9	3	0	1	83
2007–08	0	6	16	1	5	29	24	10	3	6	0	110

TABLE 3 Units 9 and 10 wolf harvest percent by transport method, 2003–08

Regulatory Year	Airplane	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway Vehicle	Snowshoe Ski Foot	Unknown	*n*
2003–04	18	1	13	44	1	6	7	10	119
2004–05	6	1	20	53	2	10	3	5	64
2005–06	40	4	4	34	0	0	2	16	120
2006–07	4	15	21	54	0	5	1	0	85
2007–08	21	4	5	58	1	5	6	0	109

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
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JUNEAU, AK 99811-5526

WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008

LOCATION

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

GEOGRAPHIC DESCRIPTION: Wrangell Mountains

BACKGROUND

Wolf population estimates and trends are unavailable for Unit 11 before the 1950s. Skoog (1968) assessed wolf numbers as low from 1900 to the 1930s, then increased, according to written accounts by settlers. In 1948 the U.S. Fish & Wildlife Service initiated an extensive wolf control program that lasted until 1953. Following termination of the control program, wolf numbers increased and probably peaked during the mid 1960s. In the early 1970s, wolves were still considered relatively abundant (McIlroy 1975) with 1 wolf/80 mi^2 (4.8 wolves/1000 km^2).

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 post hunting and trapping season population of 75 wolves.
- To allow limited human harvests when they do not conflict with management goals for the unit or objectives for the population.

METHODS

We monitored the annual wolf harvest by sealing the hides of all wolves harvested in the unit. We collected information on wolf numbers and distribution from interviews with hunters and trappers when pelts were sealed and through incidental observations while conducting surveys for other species. No aerial track surveys were conducted in Unit 11 during this reporting period.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Fall wolf population estimates in Unit 11 have ranged from 78 to 122 since the mid 1990s (Table 1). For the size of the unit, this represents a very low natural 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.

For comparison sake, the most recent spring density of wolves in Unit 11 in 2008 of 2.2 wolves / 1000 km^2 was lower than in adjacent Unit 13, where prey is more abundant and a successful active wolf management plan has been in place since 2001. The 2008 spring density of 3.8 wolves/1000 km^2 in Unit 13 is not only substantially higher than Unit 11, but it falls within the population objective range for Unit 13 even during active wolf management. The difference between these areas is primarily related to the difference in prey abundance.

Distribution and Movements

Wolf numbers are generally higher in the northern portions of the unit, especially from the Dadina River northeast to the Copper River, probably because of the higher density 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. 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 open most or all of the winter,

wolf trapping effort and harvest remains low in Unit 11 (Table 2). Since 2001, the annual harvest has ranged from 15 to 26 wolves, averaging 20 wolves per year.

The harvest methods for wolves taken in Unit 11 over this reporting period are also provided in Table 2. Since 1990, trapping and snaring have been the most consistent methods for taking wolves, accounting for 90% of the harvest on average. Unreported and illegal harvests were thought to be minimal during the reporting period.

Some Unit 11 wolves along the Copper River, particularly near Chistochina, are harvested in Unit 13. This additional take, however, is minimal, and some of these wolves may have been dispersing out of Unit 11 due to the low prey availability.

Hunter/Trapper Residency and Success. During this reporting period, 4 nonresidents harvested a total of 4 wolves. Local residents harvested the majority of the wolves. During this period, 26 local hunters/trappers harvested a total of 62 wolves, for an annual average of 21 wolves and 2 wolves per person. 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 probably 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, has ranged from 0 to 4 since 1985.

Transport Methods. The method of transport used in harvesting wolves has been recorded on sealing certificates since 1985. The most commonly used method of transportation has been snowmachine, averaging 82% over this reporting period (Table 4). Though aircraft are sometimes used to locate wolf kills and to set traps or snares, only a small number of local trappers are still using aircraft in Unit 11 due to increased costs. Most of the reported recent aircraft use has been by hunters who have taken a wolf incidentally while on fly-in hunting trips for other big game.

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, or trappers. 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 Unit 13, and

more recently into Unit 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 19 to 26% of the fall population during this reporting period. At this level, almost any wolf population would be expected to increase rapidly. Big game populations in Unit 11, however, are severely depressed, particularly those of moose, caribou, and sheep in some areas. Recent moose surveys near Mount Drum indicate a density of 0.2–0.3 cow moose/mi^2, considerably less than the 0.7–0.8 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 300 caribou. This herd, once important for local subsistence, has not been hunted since 1991. Sheep have almost been eliminated from the western slopes of Mount Drum and Mount Sanford and have declined by nearly 50% in other count areas to the south.

This LDDE 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 any such active management program is highly unlikely considering the NPS policy to let nature take its course. In recent months, Ahtna Inc. has also requested increased fire protection for timber resources on their lands in Unit 11, further reducing the opportunity to get a much needed large scale burn in this remote area.

Most of the wolf harvest in Unit 11 is concentrated near access points and inhabited areas where trappers live. 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 estimates of 63 wolves in 2007 and 73 in 2008 are slightly below the management objective, although this is most likely an artifact of poor access and the subsequent lack of wolf reports.

Considering the difficulty in accessing Unit 11, and the low annual harvest of wolves from the area, any louse infection if detected, could be hard to combat. Some immediate action through treatment with the antiparasitic drug Ivermectin 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).

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TABLE 1 Unit 11 fall and spring wolf population estimates, 2003–2008

	Population estimate [a]				
Regulatory Year	Fall		Spring		Packs
2003-04	115	(110–120)	98	(90–105)	15
2004-05	122	(110–130)	107	(100–110)	20
2005-06	108	(100-120)	87	(80-90)	15
2006-07	78	(75-90)	63	(60-70)	13
2007-08	96	(85-105)	73	(65-75)	16

[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, 2003-2008

	Reported take						Method of take					
Regulatory year	M	%	F	%	Unk	Total	Trap/ Snare	%	Shot	%	Unk	Successful trappers/ hunters
2003–04	8	57%	6	43%	1	15	11	79%	3	21%	1	7
2004–05	10	67%	5	33%	0	15	12	80%	3	20%	0	10
2005-06	10	45%	12	55%	4	26	22	85%	4	15%	0	12
2006-07	10	67%	5	33%	0	15	14	93%	1	7%	0	6
2007-08	13	52%	12	48%	0	25	21	84%	4	16%	0	12

TABLE 3 Unit 11 chronology of wolf harvest by percentage, 2003–2008

Regulatory	Harvest Periods									
Year	August	September	October	November	December	January	February	March	April	*n*
2003–04	8	8	0	0	8	15	0	62	0	13
2004–05	0	20	0	7	13	33	13	13	0	15
2005-06	4	4	0	0	27	27	23	15	0	26
2006-07	0	7	0	0	13	13	13	53	0	15
2007-08	4	8	0	4	28	32	4	20	0	25

TABLE 4 Unit 11 transportation method of wolf harvest by percentage, 2003–2008

	Transportation Method							
Regulatory Year	Airplane	Dog sled skis/ snowshoes	Boat	4-wheeler	Snowmachine	ORV	Highway vehicle	*n*
2003–04	29	0	0	0	64	0	7	15
2004–05	20	0	0	0	80	0	0	15
2005-06	8	0	0	0	92	0	0	26
2006-07	40	0	0	0	60	0	0	15
2007-08	12	4	0	0	84	0	0	25

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WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008[1]

LOCATION

GAME MANAGEMENT UNIT: 12 (9978 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. 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. About 1975 the wolf population declined substantially due to prey shortages (D. Grangaard, ADF&G, personal communication). 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 rates. Few local trappers select for wolves, as most trappers concentrate on marten and lynx. During years when marten and lynx pelt price are low and wolf prices are adequate, more trappers concentrate on catching wolves. Also, when taking of wolves same-day-airborne (from aircraft or land-and-shoot) is legal, harvests have been higher.

Historically moose have been the most important species harvested for subsistence use in Unit 12 (Haynes et al. 1984; Halpin 1987), but since the mid 1970s unitwide moose densities 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

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

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 programs such as wolf control. ADF&G conducted wolf control within the northwestern portion of Unit 12 between 1981 and 1983. Wolf control resumed north of the Alaska Highway during January 2005 and was ongoing in that portion of Unit 12 through the end of this report period.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

The Unit 12 wolf management goals follow the *Wolf Conservation and Management Policy for Alaska*, adopted by the Alaska Board of Game in 1991 and revised in 1993. Those goals are 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 OBJECTIVE

- Temporarily close wolf trapping if the unit population declines below 100 wolves.

MANAGEMENT ACTIVITIES

- 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.

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]). This designation means that the board must consider intensive management if regulatory action to significantly reduce the Unit 12 moose harvest becomes necessary because the population is depleted or has reduced productivity. If unitwide wolf control becomes necessary to comply with this law in the future, changes to the Unit 12 wolf population objectives will be considered.

METHODS

Since 1980 the late winter wolf population estimates have been based on sightings of wolves and wolf tracks observed during reconnaissance style aerial surveys (Stephenson 1978; Gasaway et al. 1983). Estimates of wolf numbers were increased by 10% to account for lone wolves present but not found (Mech 1973). All wolf packs with territories that were wholly or partially in Unit 12 were included in the estimate. Many wolf packs observed in March and April were also counted the previous autumn. Overwinter changes in size of those packs were therefore known, but for other packs no previous estimate of autumn pack size was available. For those packs autumn estimates were calculated by adding the annual wolf harvest to the late winter count. Trapper and pilot reports and trapper questionnaire results were also compiled and contributed to population estimates where complete aerial surveys were not flown.

During winter 2000–2001, in cooperation with Yukon Department of Environment (formerly Yukon Department of Renewable Resources), we conducted aerial wolf surveys (Stephenson 1978) within the Chisana caribou herd's range. During winter 2002–2003 we developed a 4600-mi^2 wolf population trend area encompassing portions of Units 12, 20E, and 20D. However, this area has not been surveyed since 2004 due to the shift towards intensive predator management in the 18,750–mi^2 upper Yukon–Tanana predation control area (UYTPCA) in Unit 20E and portions of Units 12, 20B, 20D, and 25C.

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., RY05 = 1 Jul 2005 through 30 Jun 2006).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Unit 12 wolf numbers have fluctuated with prey availability and harvest rates. Gardner (2000) described wolf population trends during RY88–RY98. During RY96–RY98, the Unit 12 autumn wolf population was estimated at approximately 223–237 wolves (Table 1). From area-specific data collected in northwestern Unit 12, Gardner (2003a) estimated that the total number of wolves in the 10 packs he monitored increased from 64 to 72 (12.5%) during RY99–RY02.

In a February 2001 reconnaissance wolf survey in 7330 mi^2 (19,008 km^2) of the Chisana caribou herd's range (including Yukon, Canada), Gardner (2003b) observed 89–97 wolves in 18 packs (2–13 wolves/pack). Ten of these packs (30–36 wolves) were in the Alaska portion of the survey area. Including harvested wolves, the fall 2000 density estimate was 15.8 wolves/1000 mi^2 (6.1 wolves/1000 km^2). Similar densities were recorded in the Canadian portion of this area in 1987 (Sumanik 1987) and 1989 (Yukon Department of Environment, unpublished data). Caribou and Dall sheep numbers had declined in the Chisana area (Gardner 2002b; Gardner 2003b) and presumably the ungulate prey base was lower in 2000 compared to the 1980s; however, wolf

density did not change, suggesting that moose are the primary prey of wolves in this area and caribou and Dall sheep are alternate prey. Seip (1992) has shown how wolf predation can have large effects on caribou when moose are present and are the primary prey.

During February–April 2003 and 2004 we conducted reconnaissance wolf surveys (Stephenson 1978) within 4200 mi^2 (10,878 km^2) of a 4600 mi^2 (11,914 km^2) wolf population trend survey area which includes contiguous areas in Units 12, 20E, and 20D; about 2000 mi^2 (5180 km^2) was in Unit 12. In 2003 we observed 124–127 wolves in 18 packs ranging from 2 to 16 wolves each and 3 single wolves. Average pack size was 6.7 wolves. The minimum density, including an estimate for single wolves, was 31.3 wolves/1000 mi^2 (12.1 wolves/1000 km^2). This is an overestimate because it gave equal weight to border packs without considering the juxtaposition of their territory in relation to the survey boundaries. By removing half of the wolves in border packs from the estimate, we estimated a density of 23.1 wolves/1000 mi^2 (8.9 wolves/1000 km^2). In 2004 we again estimated 41–43 wolves in the Unit 12 portion of the 4600-mi^2 trend area (21 wolves/1000 mi^2; 8.1 wolves/1000 km^2). Of these wolves, 3 packs had their entire home range in Unit 12 and 8 packs had home ranges that included portions of Unit 20D or 20E.

In winter 2004–2005, we conducted a reconnaissance survey in the Unit 12 portion of the UYTPCA (west of the Taylor highway and north of the Alaska Highway), and estimated 59–60 wolves in this area. Five packs had home ranges entirely within Unit 12 and 5 packs ranged in portions of Unit 20E.

We continued to monitor wolf numbers through hunting and trapping reports, although no unitwide wolf surveys were conducted in Unit 12 during RY05–RY07. 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.

Despite active wolf reduction efforts in a portion of Unit 12 and in neighboring Units 13 and 20E, the minimum fall population of wolves residing entirely within Unit 12 has changed little since RY98. There is no indication that the number of packs (31) or average pack size (7.0–7.4 wolves) in Unit 12 has changed appreciably since 2003. Therefore, I estimated the population during RY05–RY07 to be 179–192 wolves (18.1–19.4 wolves/1000 mi^2; 7–7.5 wolves/1000 km^2). As many as 200–250 wolves may use territory within Unit 12, based on timing of surveys, the seasonal presence of Nelchina caribou, known packs that were reduced by predator control in the UYTPCA and Unit 13, and the inclusion of boundary packs in our population estimates. These estimates combine hunting and trapping reports with observations by ADF&G biologists and previous estimates from northwestern Unit 12, the Chisana area and the UYTPCA.

Population Composition

Data available relative to the sex composition of the wolf population were sex ratios of harvested wolves reported on sealing documents. Sex ratios in the harvest during RY05–RY07 were roughly 1:1 (63 males:55 females), and are assumed to represent overall population sex ratios (Table 2).

Distribution and Movements

Wolf distribution is determined predominately by ungulate prey abundance. Therefore, wolves in Unit 12 are mostly 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.

MORTALITY

Harvest

Season and Bag Limit (RY05–RY07).

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Unit 12		
HUNTING (RY05): 5 wolves.	10 Aug–Apr 30	10 Aug–30 Apr
HUNTING (RY06–RY07): 5 wolves.	10 Aug–May 31 15 Oct–30 Apr	10 Aug–30 Apr
TRAPPING (RY05–RY07): 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

Alaska Board of Game Actions and Emergency Orders. During the spring 1998 meeting, the Alaska Board of Game (board) designated the Unit 12 moose population as important for high levels of human consumptive use under the intensive management law (AS 16.05.255[e]–[g]). This designation means that the board must consider intensive management if regulatory action to significantly reduce moose harvest in Unit 12 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 intent of the intensive management law.

In March 2004 the board adopted a 5-year wolf control implementation plan that authorizes ADF&G to conduct a wolf population reduction or regulation program in Unit 12 north of the Alaska Highway, within the UYTPCA. This regulation allowed wolf control to begin in January 2005 in northern Unit 12 and adjacent Unit 20E within the UYTPCA and continuing through RY07. In RY05 the board eliminated the nonresident tag fee for wolves, and in RY06 the board extended the Unit 12 spring hunting season for wolves from 30 April to 31 May for Alaska residents only.

Harvest by Hunters and Trappers. The RY05–RY07 wolf harvests ranged 30–49 wolves, (Table 2). Average harvest was 39 wolves compared to 38 during RY02–RY04. In RY05–RY07, an average of 19 different hunters and trappers harvested wolves each year. This was from the same as the previous 10-year annual average of 19 successful wolf trappers and hunters.

Along the road system trapping pressure is high and 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. Harvest rates averaged 22% of the population during RY96–RY98, 20–24% during RY99–RY01, and were likely ≤22% during RY02–RY07. 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 <20% generally increase if prey are abundant. Those effects of exploitation seem to be consistent across a broad range of reported wolf densities in Alaska, Canada, Michigan, and Minnesota.

During RY05–RY07, trapping or snares were used to take 75% percent of wolves harvested in Unit 12. Moose and sheep hunters who incidentally shot wolves during August and September accounted for much of the remainder of the harvest. Four wolves were harvested in Unit 12 during the winter 2007–2008 UYTPCA wolf control program.

Harvest Chronology. Chronology of the Unit 12 wolf harvest during RY05–RY07 (Table 3) reflects a moderate incidental harvest of wolves (10%) during the August and September hunting seasons, 2% and 3% harvest during the snaring-only seasons in October and April, respectively, and the highest harvest (77%) between November and March when all harvest methods and means are allowed. The greatest harvest (40%) occurred in January and February. Wolves killed by same-day-airborne methods (i.e., in wolf control programs) accounted for 4% of the total harvest during RY05–RY07.

Transport Methods. During RY05–RY07 most successful wolf trappers used snowmachines (68%) or airplanes (17%) (Table 4). Between RY89 and RY93, 27% of successful trappers used airplanes for transportation. During RY94–RY98 this transport method declined to 7%, but increased to 18% during RY99–RY04. 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 7000–8000 mi^2 of Unit 12 is considered good wolf habitat. Wolves seldom use the remaining 2000–3000 mi^2 of glacial ice fields and high rocky terrain. 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 was a reliable food source for wolves in eastern Unit 12, but has declined since 1992, and by 2002 the herd fell below 500 animals.

Caribou from the Mentasta, Nelchina, and Macomb herds also used portions of Unit 12. During RY05–RY07, use of Unit 12 during winter by these herds, especially the Nelchina herd, has likely improved productivity of the wolf population. Caribou availability in winter in combination with high snowshoe hare numbers during 1998–2001 and 2007–2009, combined with low harvest has likely allowed the Unit 12 wolf population to increase.

More than 30 years of wildfire suppression in Unit 12 has 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 and have had a minor impact on wolf habitat.

Enhancement

A large percentage of Unit 12 has been afforded limited suppression status for wildfires in the *Fortymile Area Interagency Fire Management Plan*. This includes nearly all of the Wrangell–St. Elias National Park and Preserve and most of the Tetlin National Wildlife Refuge. Unfortunately, much of the limited suppression area is essentially unburnable due to sparse fuels, high fuel moistures, low temperatures, and lack of ignition through lightning. Much of the more fire-prone land is in state or private ownership and was afforded critical, full, or modified suppression status.

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. This fire is expected to provide high quality moose winter browse for another 20 years to the benefit of both moose and wolves. By 1997 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 2008. By 1994 at least 2 wolf packs numbering 6–11 wolves resided in the area. 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 wolf packs numbering 7–13 wolves were observed there (Gardner 2003a). During RY02–RY04 and RY05–RY07, these 3 packs used the area but were likely limited to 3–6 wolves per pack by harvest.

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 1000 acres of prime wintering area for moose. These programs are expected to benefit many species of wildlife including wolves.

NONREGULATORY MANAGEMENT PROBLEM/NEEDS

In the foreseeable future the intensive management law will most likely be used in Unit 12 to attempt to meet the intensive management objectives of 4000–6000 moose and harvest of 250–450 moose (Gardner 2002a). Past research indicates that predation by both wolves and bears was the primary factor maintaining the moose populations at low densities (0.2–1.0 moose/mi^2, Gasaway et al. 1992; U.S. Fish and Wildlife Service, unpublished data). 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 was substantially lower to 5 months, 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). Exercises using actual moose composition and predator kill rate data indicated the Unit 12 moose population continued to be limited primarily by wolves during RY05–RY07, although grizzly bears were an important predator in portions of the unit. 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. Under a 30% wolf harvest rate, the number of wolves using Unit 12 would likely stabilize at about 180 and the moose population and harvest objectives would likely not be met. Modeled wolf harvest rates greater than 35% allowed slow growth in the moose population, but random variation in other mortality factors could easily eclipse any moose population growth resulting from a 35–40% wolf harvest rate. To provide measurable increases in moose population growth and/or harvest by humans, it is likely wolves would need to be reduced by >50% during the period modeled. Based on a model that harvests >50% of the wolf population annually and reduces the population 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, which constitute a majority of Unit 12. With wolf control limited to state and private lands, the model indicates the moose population could increase 6–9% annually in affected areas.

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 landownership patterns in Unit 12, this will be the management direction taken during the next 5 years.

CONCLUSIONS AND RECOMMENDATIONS

Because the wolf population remained above 100 wolves during RY05–RY07, we did not need to temporarily close wolf trapping; therefore we met our objective. Comprehensive wolf surveys have not been conducted in Unit 12 since 2003 because funds were used predominantly in adjacent Unit 20E to monitor the wolf population within the UYTPCA. Additional surveys are recommended during the next report period to more precisely estimate the population and ensure that the Unit 12 wolf population remains above the management objective of 100 wolves. For the next report period the objective and activities will be:

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.

There is no indication that the number of packs (31) or average pack size (7.0–7.4 wolves) in Unit 12 has changed appreciably since 2003, and the population likely has changed little since RY98. Although we did not conduct a survey to obtain an equivalent estimate during RY05–RY07, surveys in northern Unit 12 and adjacent Unit 20E indicate wolf numbers have increased since RY98 in that area.

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 during October, March, and April, but only a few caribou have wintered in this area since 1997. Wolf packs in southern Unit 12 rely primarily on moose year-round.

Most area residents desire intensive management 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 UYTPCA and few wolves were taken in the Unit 12 portion of the area, the control program had little effect on reducing unitwide wolf numbers during RY05–RY07. More intense predator control activity in this area of the UYTPCA could reduce wolf numbers in portions northern Unit 12.

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TABLE 1 Unit 12 autumn[a] wolf population estimates, regulatory years 1988–1989 through 2007–2008

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

[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 unitwide survey was conducted, therefore no estimate available.
[f] Estimates based on 1998–1999 and 2002–2003 surveys.

TABLE 2 Unit 12 wolf harvest, regulatory years 1988–1989 through 2007–2008

	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
1988–1989	6	(40)	9	(60)	17	13	12	(75)	4	(25)			0	8	2.0
1989–1990	15	(83)	3	(17)	20	11	7	(78)	2	(22)			0	10	1.9
1990–1991	45	(63)	27	(37)	74	32	56	(77)	7	(10)	10	(14)	0	26	2.8
1991–1992	19	(63)	11	(37)	34	16	20	(63)	8	(25)	4	(13)	0	16	2.0
1992–1993	26	(52)	24	(48)	54	22	51	(98)	1	(2)			0	15	3.5
1993–1994	37	(57)	28	(43)	71	36	54	(76)	6	(8)	9	(13)	2	24	3.0
1994–1995	18	(58)	13	(42)	31	18	26	(84)	5	(16)	0	(0)	0	16	1.9
1995–1996	25	(69)	11	(31)	46	24	42	(91)	4	(9)	0	(0)	0	15	3.1
1996–1997	19	(63)	11	(37)	35	16	28	(80)	7	(20)	0	(0)	0	17	2.1
1997–1998	28	(67)	14	(33)	45	20	35	(78)	8	(18)	0	(0)	2	23	2.0
1998–1999	38	(58)	28	(42)	67	28	58	(87)	9	(13)	0	(0)	0	25	2.7
1999–2000	27	(51)	26	(49)	54		40	(74)	14	(26)	0	(0)	0	25	2.2
2000–2001	34	(67)	17	(33)	55		48	(87)	7	(13)	0	(0)	0	21	2.6
2001–2002	18	(43)	24	(57)	42		34	(81)	8	(19)	0	(0)	0	24	1.8
2002–2003	26	(52)	24	(48)	54	22	50	(93)	4	(7)	0	(0)	0	19	2.8
2003–2004	17	(55)	14	(45)	31		29	(94)	2	(6)	0	(0)	0	8	3.9
2004–2005	13	(46)	15	(54)	28		26	(93)	2	(7)	0	(0)	0	9	3.1
2005–2006	23	(59)	16	(41)	39		24	(62)	15	(38)	0	(0)	0	21	1.9
2006–2007	14	(47)	16	(53)	30		24	(80)	6	(20)	0	(0)	0	17	1.8
2007–2008	26	(53)	23	(47)	49	22	36	(73)	9	(18)	4	(8)	0	20	2.4

[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 1988–1989 through 2007–2008

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

[a] Includes 5 wolves taken same-day-airborne in the Unit 12 portion of the upper Yukon–Tanana predator control area.

TABLE 4 Unit 12 wolf harvest by transport method, regulatory years 1988–1989 through 2007–2008

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

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

[b] Includes 5 wolves taken same-day-airborne in the Unit 12 portion of the upper Yukon–Tanana predator control area.

WILDLIFE

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 2005
To: 30 June 2008

LOCATION

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

GEOGRAPHIC DESCRIPTION: Nelchina and Upper Susitna Rivers

BACKGROUND

Before statehood, wolves in Unit 13 were harvested under U.S. Fish and Wildlife Service (FWS) regulations that provided year-round seasons and no bag limits. Denning and aerial shooting were legal, and bounties were paid. Beginning with statehood in 1959, the wolf season was closed in Unit 13 for 5 years. In 1965, a short season was held. During the late 1960s, season dates corresponding to prime pelt quality were established with no bag limits. In 1971 mandatory sealing was established, and aerial shooting without a permit was prohibited (Harbo and Dean 1983). Since that time, many changes have been made to the regulations, and they have increased in complexity.

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 FWS 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 was adequate to allow ungulate populations to increase slowly; this wolf population level became the formal long-term objective.

Up until 1988, land-and-shoot hunting was allowed under general trapping regulations and was a common method for taking wolves in Unit 13. Land-and-shoot has only been specifically separated from ground shooting in the sealing process since 1986; therefore, the contribution of land-and-shoot was not monitored prior to 1986. When land-and-shoot hunting was discontinued in 1988, the Unit 13 wolf population increased dramatically. Only the reinitiation of land-and-

shoot between 1990 and 1991 kept the population in check. During the mid 1990s, without any form of active wolf management, the population increased rapidly. By 1999 and 2000, the Unit 13 wolf population had reached record high numbers, averaging 520 wolves in the fall.

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

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Determine wolf population estimates yearly.
- Regulate wolf harvests yearly to prevent overharvest, yet maintain adequate harvests to assure 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 (3.3–4.1 wolves/1000 km^2) in the available habitat unitwide.

METHODS

Harvests were monitored by required sealing of all wolves taken in the unit. We tracked population size and trend by conducting aerial track surveys throughout the winter to document pack sizes, colors and ranges. Trapper surveys and incidental sightings by department personnel and the public provided additional information on wolf numbers and distribution. This information was combined with sealing data to develop preharvest (fall) and postharvest (spring) population estimates.

Population estimates were monitored in relation to wolf population objectives for the unit. In the late 1990s, when the wolf population was growing and prey populations were decreasing, wolf status reports were made to the Alaska Board of Game. After assessing population trends in Unit 13, the Board of Game requested a special presentation on wolf predation for the January 2000 meeting. An overview, emphasizing wolf numbers, trends, and predictions of future trends based on predator–prey modeling, was completed. As a result of this review, the board passed a wolf control implementation plan for 13A, 13B, and a portion of 13E.

Since January 2004, active wolf management by land-and-shoot or aerial shooting has been conducted by permit through the implementation plan. Pilots and gunners must apply for permits. Permittees are selected based on flying and tracking experience and familiarity with the unit. Permittees must call in before they go into the field, and they must report all kills, woundings, and pack sightings. A federally required same-day-airborne seal is attached to control-taken wolves in the field. The wolf sighting reports by these permittees greatly increase our ability to assess population size and trend.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

When the Unit 13 fall wolf population reached a peak in 1999 and 2000 of 520 wolves (12.4 wolves/1000 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 did result in a decline in the unitwide population. By the fall of 2001 the population had declined to 480 wolves (11.4 wolves/1000 km^2) and then to 420 wolves in the fall of 2002 (10.0 wolves/1000 km^2; Table 1). 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/1000 km^2) in 2003. Same-day-airborne (SDA) efforts since 2003–04, concentrated in the remote portions of the unit, have been essential for reducing wolf density in the less accessible remote areas. The fall population has since been reduced to 254 wolves (6.3 wolves/1000 km^2) in 2007 (Table 1).

Unitwide spring population (postharvest) estimates remained relatively steady between 2001 and 2005 at about 230 wolves (5.5 wolves/1000 km^2), well above the objective of 135–165. Since spring 2006, the wolf density unitwide has been within the objective range. With reduced wolf numbers, this area, as expected, is proving to be a sink for dispersing wolves, and continued SDA effort will be necessary until the moose population can rebound sufficiently.

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 data are inferred by comparing the spring population estimate to the following fall estimate. Given the appreciable difference between spring and fall estimates during the late 1990s, productivity and summer survival were probably very high. The exceptionally 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 will likely peak in 2008-09, and are expected to decline shortly thereafter. The Nelchina herd has stabilized at moderate numbers, and will continue to provide a stable food source for wolves, particularly during the spring near the calving grounds in subunit 13A. Regardless of available food sources, as long as the SDA program is active, recruitment into the Unit 13 wolf population is expected to remain low.

Distribution and Movements

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

territory. Once SDA efforts cease, wolf packs are expected to quickly recolonize empty territories, and return to their historical patterns.

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 is relatively common as radiocollared wolves from the Kenai Peninsula, Denali National Park, and Units 20 and 12 have been observed or harvested in Unit 13.

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 1994, the trapping season started 10 November and ran through the end of March, for a total season length of 141 days. Between 1994 and 1998, the season ran through the end of April, for a total season length of 171 days. Since 1999, 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.

Between March and November of 2000, land-and-shoot taking of wolves was allowed in the wolf control implementation areas in 13A, B, and E if the hunter was at least 300 ft from the aircraft. This restrictive, short-term regulation was insufficient to effectively reduce wolf numbers. In January of 2004, land-and-shoot was reinstated (without a distance requirement) in the wolf control implementation areas in 13A, B, and E under a permit system. Since December of 2005, 13C has been included in the wolf control implementation area. Beginning in 2006-07, aerial shooting was added to the land-and-shoot provision for SDA permittees.

Board of Game Actions and Emergency Orders In March of 2005, the Board of Game added 13C to the wolf control implementation area and changed the subunit-based minimum wolf objectives to a unitwide minimum wolf population objective of 135 wolves. The implementation plan was also extended until 2010.

Hunter/Trapper Harvest Since 2000, 1,358 wolves have been taken in Unit 13 by all legal methods; 1,028 (76%) were taken by ground shooting, trapping or snaring. Hunters and trappers harvested a record number of wolves in Unit 13 when wolf numbers were exceptionally high between 1998 and 2002, averaging 206 wolves/year. Once the population started to decline, hunter and trapper take declined as well; they have averaged 81 wolves/year since 2003 (Table 2). While hunter and trapper success has been impacted by the active wolf management program, their recent take is comparable to their long-term average take of 102 wolves/year (1971–2007).

Snaring and trapping are generally the most consistent methods of taking wolves in Unit 13. Together, they account for an average of 45% of the take since 2000 (49% since 1971). Ground

shooting has been highly variable, accounting for 10–57% of the annual take since 2000. Method-of-take data are presented in Table 2.

Same Day Airborne Program In 1990–91 and 1991–92, when permitted pilots were allowed to take wolves by land-and-shoot means, 86 (61%) and 88 (77%) wolves were taken, respectively.

Since March 2000, taking wolves SDA in Unit 13 has been legal through the Board of Game initiated wolf control implementation plan. For a short period during 2000, land-and-shoot was allowed, although the shooter had to be 300 feet from the aircraft; only 14 wolves were taken. Due to political considerations, land-and-shoot was not authorized by the department again until January of 2004. The distance requirement was dropped. The program has been limited to residents of Alaska; members of the public must apply for an SDA permit. Permittees receive no monetary compensation, and commercial activity is prohibited. Permittees are experienced pilots, gunners, and wolf trackers who participate on a voluntary basis.

During the 2003–04 regulatory year, 34 pilots and 32 gunners were permitted; 125 wolves were taken land-and-shoot. During that initial year, approximately 1,950 hours were flown by SDA pilots. In 2004–05, 26 pilots and 36 gunners were permitted, 950 hours were flown, and 67 wolves were taken. The number of permitted pilots has ranged from 26 in 2004-05 to 48 in 2007–08. The number of wolves taken SDA has ranged from 125 in 2003–04 to 33 in 2006–07 and again in 2007-08 (Table 2).

In 2006–07, due to the persistence of some large productive packs in heavily forested areas, we began allowing SDA permittees to take wolves from the air in addition to land-and-shoot. This increased effort has helped maintain the spring population at objective levels in the face of higher aircraft operating costs.

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 or have stopped trying.

The cost of snowmachines, gas, traps, and other equipment has increased tremendously over the last 20 to 25 years, yet the price paid for wolf pelts has declined. Although most trappers supplement their income by taking other furbearers, unless the fur market improves, economic incentives to wolf trappers would be needed to increase trapping effort and harvests over current levels. While lynx and marten prices spiked in 2007, it was only for one year. Considering wolf prices did not increase by the same margin, many trappers shifted their efforts to higher paying furbearers.

Since 2003–04, an annual average of 40 hunters and trappers successfully harvest a wolf in Unit 13. For the same period, an annual average of 12 SDA pilots (range =9–18) have taken a wolf. With no nonresident moose or caribou hunting, the harvest of wolves by nonresidents is limited.

Harvest Chronology Harvest chronology varies annually (Table 3). During this reporting period, February had the highest reported wolf harvest. The variations in harvest chronology mostly

reflect yearly changes in snowfall and temperature. 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 is permitted, the majority of the total wolf take comes from those using aircraft. Historically, the majority of wolves taken in Unit 13 have been 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 (Table 4). This shift occurred largely due to the cessation of SDA take in the early 1990s. Aircraft use increased slightly in 2000 due to the short-lived SDA regulation, then again in 2003–04, when SDA take was again allowed. 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

During the 1980s, 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 of a Unit 13 dog louse infestation given the periodic occurrences of infections here. 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.

A female yearling was trapped along the Copper River during January 2000 that had been tagged in 1999 while being treated for lice in Unit 14. Although this wolf demonstrated clinical evidence of louse infection, individual lice were not observed. During January of 2004, two wolves from a pack of 9 were snared along the West Fork of the Gulkana River exhibiting indications of lice infestations. One of the wolves was examined, and individual lice were confirmed. Seven wolves were harvested from this pack between January and April; all exhibited signs of being infested by lice. Due to the high wolf harvest in the unit that was louse-free, it was concluded that only this one pack was infected. Given the location of the pack in a thick timbered area, the remaining wolves could not be taken under the active land and shoot program. Department permission was given to allow an SDA permittee to take the wolves by aerial shooting in early April. By that time, however, snow conditions had deteriorated to a point where tracking was extremely difficult. The remaining two pack members were not found. The following winter (2004–05), approximately 10 miles southeast of this area, 1 female wolf from a pack of approximately 6 was snared, and found to have lice. No additional lice infections have been confirmed since then from wolves taken in this area.

In 2006–07 in southwestern Unit 13, 2 wolves exhibiting signs of lice were snared in Caribou Creek. One hide could not be inspected, but lice were confirmed on the other.

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 in action 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.

The Unit 13 wolf population grew steadily through the late 1990s while the moose population was declining. The moose were faced with phenomenal predation rates during winter months because the abundance of alternate prey allowed wolf numbers to increase to a greater level than would have occurred if wolves were solely dependent on moose. The Nelchina caribou herd had reached levels well above current objectives, but the herd only spent summers in Unit 13 and was nearly absent from the unit during the winter months. Also, a 30-year peak in the hare cycle during the same period further exacerbated the predator–prey imbalance by providing for increased pup survival.

Modeling through the 1990s predicted that Unit 13 wolves could reach a population of 600 or more should harvest be insufficient to slow an increase. Though trapping seasons were liberalized in 1994 and again in 1999 and harvest pressure was considered moderate to heavy, the wolf population was still able to climb significantly. The result was a 30-year peak in wolf numbers in 1999.

With good pup production and survival, combined with immigration, the wolf population in Unit 13 has been able to consistently increase 60–120% between spring and early fall under general hunting and trapping regulations. The resilience of this population is an inherent problem when the management goal is to keep wolves at a moderately low density.

Due to the current active wolf management program, the Unit 13 wolf population has been reduced to the spring population objective of 135–165 since the spring of 2006. In response,

moose numbers in the unit have started to increase, and additional hunting opportunities will be afforded hunters beginning in 2009.

Future wolf management in Unit 13 should remain flexible. The current active wolf management program will need to continue as long as moose numbers remain below management objectives. As moose numbers increase, so will the ability of the prey population to withstand higher wolf numbers.

Small population adjustments at essential periods can help keep moose, caribou, and wolf populations in balance. This is equally true of threats to the health of the wolf population, such as louse infections. We recommend taking immediate action through culling or treatment with the antiparasitic drug Ivermectin, if lice are documented again in Unit 13.

When the Alaska Department of Fish & Game is forced to wait until a biological emergency exists, the magnitude of the necessary adjustment will inevitably be controversial, time-consuming, and expensive.

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TABLE 1 Unit 13 fall and spring wolf population estimates, 2003–2008

	Population estimate [a]				
Regulatory Year	Fall		Spring		Packs
2003-04	490	(470–510)	230	(210–250)	70
2004-05	377	(360–400)	230	(210–250)	70
2005-06	309	(290-330)	157	(145-175)	59
2006-07	280	(265-295)	160	(145-175)	54
2007-08	254	(240-270)	153	(145-175)	46

[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 13 wolf harvest, 2003-2008

	Reported take							Method of take								Successful trappers, hunters, or SDA
Regulatory year	M	%	F	%	Unk	%	Total	Trap /Snare	%	Shot	%	SDA[a]	%	Unk	%	permittees
2003–04	126	51%	119	48%	1	0%	246	70	28%	51	21%	125	51%	0	0%	73
2004–05	70	51%	64	47%	2	1%	136	37	27%	32	24%	67	49%	0	0%	54
2005-06	69	48%	75	52%	1	1%	145	61	42%	23	16%	61	42%	0	0%	57
2006-07	55	52%	49	46%	2	2%	106	47	45%	25	24%	33	31%	0	0%	50
2007-08	52	58%	38	42%	0	0%	90	48	53%	9	10%	33	37%	0	0%	27

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

TABLE 3 Unit 13 chronology of wolf harvest by percentage, 2003–2008

Regulatory Year	Harvest Periods									
	August	September	October	November	December	January	February	March	April	*n*
2003–04	1	7	1	2	13	20	34	17	5	246
2004–05	2	8	3	4	13	31	27	7	5	135
2005-06	2	1	5	3	14	20	21	23	11	145
2006-07	0	8	5	20	16	9	17	24	2	105
2007-08	0	2	2	6	21	14	37	9	9	90

TABLE 4 Unit 13 transportation method of wolf harvest by percentage, 2003–2008

Regulatory Year	Transportation Method							
	Airplane	Dog sled skis/ snowshoes	Boat	4-wheeler	Snowmachine	ORV	Highway vehicle	*n*
2003–04	59	0	1	1	29	0	9	246
2004–05	53	2	2	5	29	0	9	133
2005-06	46	1	1	2	42	1	8	144
2006-07	37	1	2	7	33	0	20	105
2007-08	45	0	1	1	46	1	6	89

WILDLIFE

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 2005
To: 30 June 2008

LOCATION

GAME MANAGEMENT UNIT: 14 (6,624 mi^2)

GEOGRAPHIC DESCRIPTION: Eastern Upper Cook Inlet

BACKGROUND

Wolf numbers in Unit 14 were probably low to moderate in the 1950s and early 1960s, primarily due to predator control efforts by the federal government (Rausch 1967). Wolf populations probably increased during the late 1960s and early 1970s after the end of predator control activities and bounty payments. 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 1989–90 and 1994–95, brought many of the local moose populations down and the wolves in the area may have prevented the moose populations from rebounding. The reported harvest has 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.

During November and December 1998 trappers caught several wolves (and coyotes) in Unit 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 Unit 14B were infested, as well as one pack in adjacent Unit 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. Lice continues to be a problem for wolves in Unit 14 (Peltier, 2006)

MANAGEMENT DIRECTION

MANAGEMENT GOALS

In Units 14A and 14B the primary goal is to provide for optimum harvest of wolves. In Unit 14C the primary goal is to provide opportunity to view, photograph, and enjoy wolves. The secondary goal for all of Unit 14 is to provide maximum opportunity to participate in hunting and trapping wolves.

MANAGEMENT OBJECTIVES

The population objective is to maintain a minimum unitwide population of 55 wolves, with 35 wolves in Units 14A and 14B (combined), and 20 wolves in Unit 14C. The human-use objective in Units 14A and 14B is to allow harvest by hunting and trapping, provided harvest does not conflict with maintaining the population objective. The human-use objective in Unit 14C 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, 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

We estimated Unit 14 contained 145–180 wolves during fall 2007 (Table 1). We believe wolf numbers had remained fairly stable based on observations of trappers and pilots.

Distribution and Movements

Wolves are distributed throughout Unit 14 outside the major population centers. Reports from the public indicate that on occasion wolves do travel on the outskirts of the large urban areas. However, outside of the Anchorage area there have been very few reports of nuisance wolves during the reporting period.

Diseases/Parasites

Despite louse control efforts in the 1990s, at least one pack remains infested in Unit 14A. Lice were discovered in Unit 14A in 2005–06 (five animals) and in 2007–08 (four animals). There were no indications that any 14B or 14C packs are currently affected, however lice reports in Unit 16A make it likely that 14B wolves are infected. 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 14 was 10 August–30 April, with a bag limit of 5 wolves. The trapping season was 10 November–31 March 31 in

Unit 14A, 10 November–30 April for 14B, and 10 November–28 February in Unit 14C. Trappers had no bag limit on wolves.

Board of Game Actions and Emergency Orders. For the 2005–06 season the Board of Game changed the ending date of the season from March 31 to April 30, and restricted trappers trapping in April from using steel traps or snares smaller than $^{3}/_{32}$ inch diameter. No other changes occurred during this reporting period.

Hunter/Trapper Harvest. Harvest averaged 21 wolves per season (range 12–37) during the reporting period (Table 2). Most of the harvest comes from Unit 14A, because it has large areas open to hunting and trapping that are highly accessible to many people. Trappers took most wolves in Unit 14 (Table 2), and most were taken by snares. The number of wolves shot has remained variable in the last 10 years, ranging from zero to 13 animals annually. Weather and trapping conditions can greatly affect the number trapped, whereas the number shot is more dependent on travel conditions.

Harvest Chronology. Most wolves were taken during midwinter (December–February), when snow conditions allowed for good trapping conditions and travel. Over the last decade the number of wolves taken during August–October (Table 3) ranged from zero to 33 percent. Hunters take a significant portion of the annual harvest of wolves incidental to hunting for other species.

Transport Methods. Most successful wolf trappers and hunters routinely used snowmachines to access their trapping/hunting areas (Table 4).

HABITAT

Assessment

Although wolf habitat in Unit 14 has changed significantly in the last 80 years, the large number of moose has undoubtedly allowed for increases in wolf numbers in the last 30 years. Beaver numbers are good and provide alternate summer prey. Salmon escapement has been decreasing but may provide an ample additional summer food source. Wolves are very adaptable and have high reproductive rates, allowing them to use areas altered by humans.

CONCLUSIONS AND RECOMMENDATIONS

Currently the wolf population is 2 to 3 times the objective in Unit 14. The decrease in available habitat in Unit 14A and 14C along with healthy moose numbers do not indicate that wolves are a problem in these units; however, moose numbers in Unit 14B may remain low quite possibly as a result of the wolf population. Hunting and trapping pressure in Unit 14B should be closely monitored and encouraged to increase in order to keep the population in check. However, no changes in seasons or bag limits are recommended.

Surveys should be conducted every 3 years to assess wolf numbers. Minimum pack sizes can best be determined by simple reconnaissance flights when tracking conditions are best, using 2–3 aircraft during a short period in January or February. This will require an additional $6,000 and some technical staff time every 3 years. Current methodology (observations by staff, trappers, and the public) should suffice for distribution information.

The spread of the nonnative louse throughout the Susitna Valley is a concern for managers. Given natural dispersal rates for wolves and current high density, it appears likely that soon lice will infest wolves in other parts of the state. This could reduce wolf harvest rates, impacting prey populations, trappers, and managers involved in intensive management programs.

Estimates of harvest rates, based on the estimated number of wolves (Table 1), have fluctuated between approximately 6 to 32% during the last three years. This is well below the 40% harvest rate considered sustainable in other areas (Ballard et al. 1987), and allows for additional dispersal of wolves, potentially accelerating the spread of lice.

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TABLE 1 Unit 14 fall (pretrapping season) wolf population estimates, 1997–2008

Year	Population estimate	Packs (nr)	Basis of estimate
1997–98	70–105	11–13	Reports from trappers, staff, public
1998–99	120–150	19–21	ADF&G staff; wolf/lice project
1999–2000	90–120	19–21	Reports from trappers, staff, public
2000–01	90–120	18–21	Reports from trappers, staff, public
2001–02	85–115	18–21	Reports from trappers, staff, public
2002–03	90–120	18–21	Reports from trappers, staff, public
2003–04	95–125	18–21	Reports from trappers, staff, public
2004–05	100–130	18–21	Reports from trappers, staff, public
2005–06	115–150	20–23	Reports from trappers, staff, public
2006–07	155–190	20–23	Reports from trappers, staff, public
2007–08	145–180	19–20	Reports from trappers, staff, public

TABLE 2 Unit 14 wolf harvest, 1997–2008

Regulatory year	Reported harvest				Method of take				Successful trapper/hunters
	M	F	Unk	Total	Shot	Trap	Snare	Unk	
Unit 14A									
1997–98	4	2	0	6	3	1	2	0	6
1998–99	6	9	1	16	4	6	6	0	10
1999–2000	5	5	0	10	3	4	2	1	8
2000–01	7	8	0	15	3	6	6	0	12
2001–02	5	3	0	8	3	2	3	0	7
2002–03	11	4	0	15	4	2	9	0	11
2003–04	7	10	0	17	3	5	9	0	9
2004–05	16	11	0	27	3	4	16	4	13
2005–06	5	6	0	11	0	2	10	0	7
2006–07	7	3	0	10	7	0	3	0	8
2007–08	10	12	0	22	7	7	8	0	12
Unit 14B									
1997–98	5	2	0	7	3	3	1	0	5
1998–99	5	6	0	11	1	7	3	0	6
1999–2000	2	4	0	6	3	1	2	0	4
2000–01	4	1	0	5	0	1	3	1	3
2001–02	8	4	1	13	1	5	6	1	6
2002–03	8	9	0	17	3	4	10	0	9
2003–04	6	4	0	10	3	5	2	0	7
2004–05	0	1	0	1	0	0	1	0	1
2005–06	1	2	0	3	0	0	3	0	2
2006–07	1	0	0	1	0	0	1	0	1
2007–08	7	4	0	11	2	5	4	0	6

TABLE 2 continued

Regulatory year	Reported harvest				Method of take				Successful trapper/hunters
	M	F	Unk	Total	Shot	Trap	Snare	Unk	
Unit 14C									
1997–98	3	0	0	3	0	0	3	0	2
1998–99	2	2	0	4	0	0	4	0	2
1999–2000	1	0	0	1	0	0	0	1	1
2000–01	1	0	0	1	1	0	0	0	1
2001–02	0	0	0	0	0	0	0	0	0
2002–03	0	0	0	0	0	0	0	0	0
2003–04	0	0	0	0	0	0	0	0	0
2004–05	0	2	0	2	0	0	1	1	2
2005–06	0	0	0	0	0	0	0	0	0
2006–07	0	1	0	1	1	0	0	0	1
2007–08	3	1	0	4	4	0	0	0	4
Unit 14 Total									
1997–98	12	4	0	16	6	4	6	0	13
1998–99	13	17	1	31	5	13	13	0	18
1999–2000	8	9	0	17	6	5	4	2	13
2000–01	12	9	0	21	4	7	9	1	16
2001–02	13	7	1	21	4	7	9	1	13
2002–03	19	13	0	32	7	6	19	0	20
2003–04	13	14	0	27	6	10	11	0	16
2004–05	16	14	0	30	3	4	18	5	16
2005–06	6	8	0	14	0	2	13	0	9
2006–07	8	4	0	12	8	0	4	0	10
2007–08	20	17	0	37	13	12	12	0	22

TABLE 3 Unit 14 wolf harvest chronology percent, 1997–2008

Regulatory year	Harvest periods							
	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*
1997–98	25	0	38	6	25	0	6	16
1998–99	10	13	3	16	42	16	0	31
1999–2000	18	12	12	0	47	6	0	17[a]
2000–01	14	5	24	19	24	14	0	21
2001–02	9	29	19	19	24	0	0	21
2002–03	16	19	9	38	6	9	3	32
2003–04	15	0	0	15	41	19	4	27[a]
2004–05	20	0	40	20	13	7	0	30
2005–06	0	7	29	14	36	14	0	14
2006–07	33	8	17	17	0	8	17	12
2007–08	19	3	27	14	14	24	0	37

[a] Includes one or more unknown dates of kill. Percentages add up to less than 100% in those instances.

TABLE 4 Unit 14 wolf harvest percent by transport method, 1994–2005

	Harvest percent									
Regulatory year	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Snowshoes	Unk.	n
1997–98	6	6	6	13	44	0	25	0	0	16
1998–99	16	3	0	13	52	0	13	3	0	31
1999–2000	6	0	0	18	41	18	6	0	12	17
2000–01	5	0	14	14	52	0	10	5	0	21
2001–02	0	5	0	5	71	5	5	0	10	21
2002–03	0	0	0	35	31	6	25	3	0	32
2003–04	7	0	0	4	78	0	0	11	0	27
2004–05	0	0	3	20	53	3	0	3	17	30
2005–06	0	0	0	0	86	0	0	14	0	14
2006–07	8	0	0	50	17	0	25	0	0	12
2007–08	0	0	3	32	43	3	16	3	0	37

WILDLIFE

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 2005
To: 30 June 2008

LOCATION

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

GEOGRAPHIC DESCRIPTION: West side of Cook Inlet

BACKGROUND

Wolf populations fluctuated with prey populations until efforts to control wolf numbers began prestatehood. After statehood wolf numbers varied with prey densities and hunting and trapping effort. Reports from trappers, pilots, and staff indicate wolf numbers began increasing in the early 1990s (Peltier, 2006). The first systematic population estimate of wolves in Unit 16 occurred 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.

Following trapper discoveries of infestations of the dog-biting louse *Trichodectes canis* in wolves in 1998, the department initiated a louse control program. Wolves were captured and treated with the antiparasitic drug ivermectin (Merck & Co. Inc) or received ivermectin through baits laced with the paste. However, wolves examined after the treatment showed that it was unsuccessful in ameliorating the infestation.

In 2003 a wolf control implementation plan was initiated in response to declining moose numbers and a high wolf population in 16B. Initially, the 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 aerial shooting.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

The goal for this area is to retain desirable predator–prey ratios, and provide a sustainable harvest of wolves.

MANAGEMENT OBJECTIVES

The population objective is to maintain a wolf population of 30–60 wolves in at least 4 packs. This should include 8–15 wolves (in 1–3 packs) in Unit 16A and 22–45 wolves (in 3–5 packs) in Unit 16B. The human-use objective is to allow maximum opportunity for harvest while maintaining 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 1998–99 numbers were estimated during our effort to control the louse infestation in the area. Estimates of the population were adjusted after that period and are currently based on a combination of that adjustment, sealing records, and observations by pilots, hunters and trappers, and staff. The annual wolf harvest was determined by sealing all wolves presented for examination.

At its March 2003 meeting the Board of Game voted to begin a predator control program with the use of snowmachines in Game Management Unit 16B. The purpose of the control program was to reduce the number of wolves in the unit and subsequently increase the number of moose calves recruited into the population. In 2004, the department developed a permit system that would allow pilot–gunner teams to land and shoot wolves (same-day-airborne or SDA control) on nonfederal lands in 16B. This was modified to include aerial control soon after the SDA program started in an attempt to increase the number of wolves taken. SDA-permitted 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

Unit 16 contained an estimated 104–130 wolves in up to 19 packs during fall 2007 (Table 1). A louse control effort in 1999 allowed us to get reliable minimum estimates of pack sizes and distribution in a large portion of Unit 16. Those numbers were substantially higher than previous estimates in those areas. This demonstrates that the “traditional” method of estimating wolf populations, mainly from incidental observations by staff, trappers, pilots, and other outdoor enthusiasts, probably results in a significant underestimation of wolf numbers. However, due to budget and time constraints, this method—with the addition of SDA pilot reports—offers the best available information to estimate the population.

The wolf population probably peaked in 2003–04 and has been reduced in part by the predator control program. SDA pilot–gunner teams took 91 animals in 2004–05. The population has remained stable for the last 3 years.

Distribution and Movements

Wolves inhabit most portions of Unit 16. 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

Of 7 packs examined in 1998 during the louse-control effort in Units 16, only one (Deshka River) was confirmed to have lice. An additional pack (Beluga River), evaluated by inspecting the hides of wolves taken by trappers or hunters, did not appear infested (Golden et al. 1999). Eleven wolves were captured and treated in the Deshka River pack, and 2 wolves each in the Kahiltna River, Alexander Creek, and Theodore River packs. Additional packs in Unit 16B were identified as lousy following implementation of SDA wolf control in 2004–2005. Wolves continue to be sealed every year throughout the unit that have lice or evidence of lice, although the infestation appears to be light.

MORTALITY

Harvest

Season and Bag Limit. The bag limit for Unit 16 was 10 wolves, with a 10 August–30 April season. The 10 November–31 March trapping season has no bag limit.

Board of Game Actions and Emergency Orders.

No Board of Game actions were taken during this reporting period.

Hunter/Trapper Harvest. Harvest averaged 22 wolves per year (range 11–38) during 2005–06 through 2007-08 (Table 2), a decrease in the overall harvest from the previous reporting period. Trappers took most wolves in Unit 16 by snares (Table 2). The number of wolves shot fluctuated annually from 28 to 70 percent. The number trapped can be greatly affected by weather and trapping conditions, whereas the number shot depends more on travel conditions. The total number of successful trappers/hunters has generally been decreasing since the start of predator control, and indicates that the program has been successful in reducing the wolf population. SDA harvest was high in the first year of the program and has remained relatively constant afterward (Table 5). Poor snow conditions during the last 2 years of the reporting period probably contributed to the lack of harvest using this method.

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 3) ranged from 14 to 47 percent. Hunters take a significant portion of the annual harvest of wolves incidental to hunting for other species.

Transport Methods. Most wolves are taken by people using snowmachines or aircraft to access their hunting or trapping areas (Table 4).

HABITAT

Assessment

Moose populations throughout Unit 16 are beginning to rebound from the lows of the late 1990s. Reports by hunters and limited survey information indicate Dall sheep and caribou numbers are declining in the Alaska Range. Summer foods, such as beaver and salmon, remain abundant. Human density has increased slightly, but generally there are large areas with few permanent residents. Recreational development continues to increase, with more seasonal-use cabins, boating, and fishing.

CONCLUSIONS AND RECOMMENDATIONS

The wolf population in Unit 16 continues to be above objective. Our wolf human-use objective has been met, and no regulatory changes are recommended. Harvest rates for hunting and trapping, which were 24–42% annually during the report period, were above rates thought to be sustainable (Ballard et al. 1987) for the 2 years prior to SDA wolf control. During 2004–2005, total mortality from hunting, trapping, and SDA take may have been as high as 62%. Since that time harvest from hunting, trapping, and SDA pilot–gunner teams has kept the population stable at between 100 and 150 animals.

To date we have not defined desirable predator–prey ratios. With the fluctuation in wolf and moose numbers, the number of moose per wolf has declined from approximately 250:1 in 1993 to possibly as few as 25:1 in 2004 and 48:1 in 2007. This trend is similar to other areas where moose populations were declining or stationary, and predation (by both wolves and bears) was the suspected major factor limiting moose population growth (Gasaway et al. 1992).

Managers must consider that Unit 16B is an “intensive management” area for moose. The Board of Game authorized a wolf predation control implementation plan in March of 2003. This action and the subsequent SDA program have resulted in a reduction in the 16B wolf population and probably will continue to reduce the population with continuation of the program. The results of this program and any changes will be reported in future reports.

It is difficult to identify population trends without regular attempts to systematically assess population size. Because of the extraordinary efforts stemming from the louse infestation, we were able to develop a good minimum population estimate to compare with our systematic survey of 1993. It appears the population at least quadrupled between 1993 and 2004 and that wolf numbers cannot be estimated accurately using only anecdotal and sealing information. Surveys should be conducted every 3 years to assess wolf numbers. Demographic and distribution information can be determined with simple reconnaissance flights when visibility and snow-tracking conditions are best, using 2–3 aircraft during a short period in early winter.

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TABLE 1 Unit 16 fall wolf population estimates[a], 1997–2008

Year	Population estimate	Packs (nr)	Basis of estimate
1997–98	75–110	12–15	Reports from trappers, staff, public
1998–99	120–140	16–19	ADF&G staff; wolf/lice project
1999–2000	140–160	16–19	Reports from trappers, staff, public
2000–01	110–150	16–21	Reports from trappers, staff, public
2001–02	160–245	25–28	Reports from trappers, staff, public, and late winter pack survey
2002–03	132–197	22–25	Reports from trappers, staff, public
2003–04	168–249	22–25	Reports from trappers, staff, public
2004–05	170–240	18–22	Reports from trappers, staff, public, and SDA pilot observations
2005–06	91–122	22–23	Reports from trappers, staff, public, and SDA pilot observations
2006–07	98–145	20–21	Reports from trappers, staff, public, and SDA pilot observations
2007–08	104–130	18–19	Reports from trappers, staff, public, and SDA pilot observations

[a] Fall estimate = pretrapping season population.

TABLE 2 Unit 16 wolf harvest, 1997–2008 (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
1997–98	8	8	1	17	5	3	9	0	17
1998–99	13	20	2	35	15	6	13	1	35
1999–2000	16	28	2	46	17	7	19	3	46
2000–01	31	30	1	62	42	6	14	0	62
2001–02	47	39	4	90	25	19	46	0	38
2002–03	22	22	3	47	25	10	12	0	27
2003–04	36	28	6	70	30	21	19	0	36
2004–05	19	17	1	37	26	8	3	0	27
2005–06	24	12	2	38	12	9	17	0	21
2006–07	5	12	0	17	9	2	6	0	12
2007–08	2	9	0	11	6	3	2	0	6

TABLE 3 Unit 16 wolf harvest chronology 1997–2008 (does not include wolves taken in control program)

Regulatory	Percent of Harvest							
year	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*
1997–98	12	6	18	18	35	6	6	17
1998–99	34	3	3	14	26	20	0	35
1999–2000	11	15	20	13	11	15	15	46
2000–01	47	5	3	18	13	5	10	62
2001–02	14	8	31	16	12	13	6	90
2002–03	28	11	9	17	2	19	15	47
2003–04	23	10	13	13	7	31	3	70
2004–05	46	5	8	11	8	11	11	37
2005–06	24	19	11	16	11	16	3	37
2006–07	29	0	6	6	47	6	6	17
2007–08	36	18	18	9	18	0	0	11

TABLE 4 Unit 16 wolf harvest percent by transport method, 1997–2008

Regulatory year	Harvest percent									*n*
	Airplane	Dogsled	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Snowshoes	Unk.	
1997–98	12	0	0	0	88	0	0	0	0	17
1998–99	34	0	9	9	37	0	3	3	6	35
1999–2000	15	0	2	0	63	0	0	7	13	46
2000–01	21	5	8	11	39	0	0	13	3	62
2001–02	18	2	2	2	70	1	0	2	2	90
2002–03	21	0	0	4	57	0	13	0	4	47
2003–04	13	0	6	3	69	1	3	4	1	70
2004–05	22	3	8	11	54	0	3	0	0	37
2005–06	19	5	0	14	54	0	5	5	0	38
2006–07	41	18	0	0	41	0	0	0	0	17
2007–08	9	0	0	28	64	0	0	0	0	11

TABLE 5 2004–08 Unit 16B SDA wolf control harvest chronology

Year	Sex	Percent of Harvest					*n*
		Dec	Jan	Feb	Mar	Apr	
2004–05	Male	18	25	32	20	5	44
	Female	19	23	45	11	2	47
2005 – 06	Male	43	43	15	0	0	7
	Female	7	7	43	29	14	14
2006–07	Male	26	26	5	42	0	19
	Female	13	0	15	67	7	15
2007–08	Male	0	23	46	8	23	13
	Female	13	38	25	13	13	8

WILDLIFE

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 2005
To: 30 June 2008

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 no 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 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 (Peltier 2004).

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. In 1988 we started sending an annual trapper questionnaire to selected trappers in the unit to quantify their observations of furbearer populations during the trapping season and to estimate trends in the populations. We also gained insight into wolf population trends and distribution while conducting moose and caribou surveys, as well as through observations from local air taxi pilots.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Trapper reports and general observations indicate the wolf population has likely increased 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 rabies epidemic 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 have been conducted in this unit. Based on observations of wolves and tracks, as well as reports from the public, the estimated 2007 fall wolf population in Unit 17A was 20–30 wolves in 6–8 packs; the Unit 17B population was 280–320 wolves in 16–22 packs; and the Unit 17C population was 150–200 wolves in 10–16 packs.

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. No Board of Game action on wolves occurred during this reporting period, and no emergency orders were issued.

Hunter/Trapper Harvest. The wolf harvest in Unit 17 fluctuates greatly from year to year and depends greatly on winter travel conditions. Over the past five years (2003–04 through 2007–08), the annual average harvest was 83 (Table 1). During 2005–06, 29 hunter/trappers reported taking 62 wolves (32 males, 24 females, 6 sex not reported), with 6 taken in Unit 17A, 23 in 17B and 33 in 17C. During 2006–07, 45 hunter/trappers reported taking 79 wolves (51 males, 27 females, 1 sex not reported). Five were taken in Unit 17A, 43 in 17B, 29 in 17C, and 2 where the subunit was not recorded. During 2007–08, 40 hunter/trappers reported taking 73 wolves (26 males, 47 females), with none reported from Unit 17A, 49 in 17B and 24 in 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 March (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 incidental to moose and caribou hunting activities during August and September was large when the Mulchatna Caribou Herd was large. 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 by moose and caribou hunters has remained relatively high, in spite of the decline of the Mulchatna herd and reduced caribou hunting activity.

Transport Methods. Before 1992, aircraft were the most common means of transport of 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. The increase during the past several years in the percentage of wolves taken by hunters using aircraft generally reflects the wolves taken during the fall by moose and caribou hunters.

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 beaver 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 cause of declines in wolf numbers in the late 1970s and late 1980s is 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 six 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 1961–62 through 1991–92, and local residents have documented extensive use of aircraft by wolf hunters back to the 1930s. Prohibition of same-day-airborne wolf shooting in 1992–93 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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TABLE 1 Unit 17 wolf harvest, 1991–92 to 2007–08

Regulatory year	Reported harvest				Method of take (%)			Successful hunter/ trappers
	Male	Female	Unk	Total	Trap/snare	Shot	Unk	
1991–92	20	9	8	37	9 (24%)	28 (76%)	0 (--)	20
1992–93	12	5	2	19	4 (21%)	15 (79%)	0 (--)	14
1993–94	29	16	10	55	0 (--)	55 (100%)	0 (--)	21
1994–95	74	37	14	125	33 (26%)	92 (74%)	0 (--)	36
1995–96	23	14	0	37	16 (43%)	21 (57%)	0 (--)	16
1996–97	35	15	3	53	9 (17%)	44 (83%)	0 (--)	24
1997–98	71	35	1	107	17 (16%)	86 (80%)	4 (4%)	39
1998–99	50	28	0	78	9 (12%)	68 (87%)	1 (1%)	39
1999–00	59	23	1	83	14 (17%)	67 (81%)	2 (2%)	34
2000–01	45	40	4	89	13 (15%)	75 (84%)	1 (1%)	41
2001–02	47	43	2	92	38 (41%)	52 (57%)	1 (1%)	35
2002–03	15	13	2	30	8 (27%)	22 (73%)	0 (--)	20
2003–04	66	74	1	141	48 (34%)	93 (66%)	0 (--)	48
2004–05	32	26	2	60	18 (30%)	42 (70%)	0 (--)	32
2005–06	32	24	6	62	22 (35%)	39 (63%)	1 (2%)	29
2006–07	51	27	1	79	15 (19%)	61 (77%)	3 (4%)	45
2007–08	26	47	0	73	8 (11%)	64 (88%)	1 (1%)	40

TABLE 2 Unit 17 wolf harvest chronology percent by time period, 1991–92 to 2007–08

Regulatory Year	Harvest period						
	December	January	February	March	April	Unknown/Other	*n*
1991–92	5%	32%	30%	22%	--	11%	37
1992–93	5%	21%	53%	11%	--	10%[a]	19
1993–94	22%	27%	16%	26%	4%	6%[b]	55
1994–95	18%	12%	39%	20%	--	27%[c]	125
1995–96	3%	22%	49%	19%	--	8%	37
1996–97	9%	43%	28%	9%	--	9%	53
1997–98	12%	27%	39%	7%	--	15%	107
1998–99	19%	32%	19%	14%	--	15%	78
1999–00	12%	11%	31%	19%	--	27%	83
2000–01	7%	11%	22%	35%	1%	24%	89
2001–02	7%	16%	41%	14%	--	22%	92
2002–03	3%	10%	--	17%	10%	60%[d]	30
2003–04	16%	28%	23%	15%	1%	18%[e]	141
2004–05	13%	12%	28%	18%	2%	27%[f]	60
2005–06	3%	6%	19%	29%	23%	20%[g]	62
2006–07	11%	24%	15%	16%	3%	29%[h]	79
2007–08	3%	27%	23%	19%	5%	22%[i]	73

[a] Includes 1 wolf (5%) harvested in August and 1 wolf (5%) harvested in October.
[b] Includes 3 wolves (6%) harvested in September.
[c] Includes 2 wolves (2%) harvested in August, 8 (7%) in September, 1 (1%) in October, 21 (17%) in November.
[d] Includes 4 wolves (13%) harvested in August, 13 (43%) in September, and 1 (3%) in October.
[e] Includes 2 wolves (1%) harvested in August, 21 (15%) in September, and 2 (1%) in October.
[f] Includes 2 wolves (3%) harvested in August, and 14 (23%) in September.
[g] Includes 3 wolves (5%) harvested in August, and 9 (15%) in September.
[h] Includes 2 wolves (3%) harvested in August , 17 (22%) in September, and 3 (4%) in November.
[i] Includes 2 wolves (3%) harvested in August , and 14(19%) in September.

TABLE 3 Unit 17 wolf harvest percent by transport method, 1991–92 to 2007–08

Regulatory Year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snow machine	ORV	Highway vehicle	Unk	*n*
1991–92	70%	--	--	--	30%	--	--	--	37
1992–93	5%	5%	--	--	84%	--	5%	--	19
1993–94	36%	2%	--	2%	58%	--	--	2%	55
1994–95	30%	--	2%	--	58%	--	--	10%	125
1995–96	41%	--	--	--	54%	--	--	2%	37
1996–97	28%	--	--	--	72%	--	--	--	53
1997–98	18%	--	--	--	74%	--	--	8%	107
1998–99	12%	1%	1%	--	83%	--	--	3%	78
1999–00	20%	1%	1%	--	74%	--	--	4%	83
2000–01	17%	1%	4%	--	73%	--	1%	3%	89
2001–02	12%	1%	--	2%	72%	--	1%	12%	92
2002–03	37%	43%	17%	--	--	--	--	3%	30
2003–04	16%	2%	1%	--	81%	--	--	1%	141
2004–05	25%	--	2%	--	73%	--	--	--	60
2005–06	16%	--	3%	2%	77%	--	--	2%	62
2006–07	22%	--	6%	1%	63%	--	1%	6%	79
2007–08	15%	--	10%	1%	73%	--	--	1%	73

WILDLIFE

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 2005
To: 30 June 2008

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. 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 fursealing requirements to Unit 18 villages and provided regular information and education articles with topics that included wolves, trapping, and regulations to a local newspaper.

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: recent trends in reported harvest (Figure 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 in 2005–2008 the population ranged from 200–300 animals in 20–30 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 and 1 to 4 packs on each of its drainages. 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 and moose that are currently expanding their range. 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 as year-round residents.

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. Several wolves were seen and at least one was harvested 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.

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 regarding wolves for Unit 18 during this reporting period.

Hunter Harvest. Sealing certificate data indicate the following wolf harvest for Unit 18: 88 during the 2005–2006 regulatory year, 31 in 2006-2007, and 76 in 2007–2008. Recent average harvests ($\bar{x}$ = 65) 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 1988-1989. Clearly, recent harvests have increased dramatically (Figure 1).

Since 1999–2000, 75% of the known harvest 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 1999, caribou were not frequent and harvest of wolves by shooting was 26% of total harvest. During 1999-2008 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 trapping activity of one particularly successful trapper, active within the drainages of the Kuskokwim River, who was responsible for 34% of the Unit 18 wolf harvest during this reporting period.

Male wolves are more vulnerable to harvest than females. During this reporting period, there were more males (n = 83) taken than females (n = 72) in Unit 18 (Table 3).

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 2001–2002, 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. Alaska residents harvested all of the wolves taken during this reporting period. No measure of success is available.

Harvest Chronology. The highest reported harvests have historically been in February; the second highest harvests have been in March. However, during this reporting period these months were reversed with the highest harvest in March followed by February (Table 4). During this reporting period there was also a high harvest in January. This pattern is explained by the timing of snow accumulation, improvement in travel conditions, and increased daylight. 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 2006–2007 harvest was 31 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. One hunter used a boat in September 2006, but this is rare.

Other Mortality

No information is available on natural mortality of wolves in Unit 18.

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 be enhanced.

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 endemic 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 in contact with foxes.

CONCLUSIONS AND RECOMMENDATIONS

Wolf numbers continued to increase in Unit 18 in response to greater availability of ungulates. 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 all the way through 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 for Unit 18 is about 200–300 wolves in 20–30 packs, including wolves that use adjacent game management units when caribou are no longer available in Unit 18. This represents very little change since the last reporting period. However, the growing ungulate population in Unit 18 is capable of supporting the larger wolf population. As caribou have declined and stabilized, the moose population has increased and it appears that more packs are becoming territorial residents based on the abundance of moose in the unit.

The reported harvest of 109 in 2001–2002 was the highest recorded for Unit 18. This is 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 reflects the efforts of one particularly accomplished trapper.

The reported harvest of 31 in 2006–2007 does not follow the trend of increasing harvests of the last decade (Figure 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 Y-K delta.

Current ungulate management strategies and planning efforts in Unit 18 are designed to increase caribou, moose, and muskox populations and one result of increasing these big game populations is increased availability of prey for wolves. Excessive human harvest is the principal factor limiting ungulate population growth in Unit 18, particularly with respect to 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 part of the problem contributing to 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. 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 using 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 they 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.

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

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TABLE 1 Unit 18 fall wolf population estimates[a], 1985–1986 through 2008–2009

Regulatory year	Population	Packs
1985–1986	25–50	5–7
1986–1987	25–50	5–7
1987–1988	25–50	5–7
1988–1989	50–75	6–7
1989–1990	50–75	6–7
1990–1991	75–100	6–7
1991–1992	75–100	6–7
1992–1993	75–100	6–7
1993–1994	75–100	6–7
1994–1995	75–100	6–7
1995–1996	75–100	8–10
1996–1997	75–100	10–15
1997–1998	100–150	12–18
1998–1999	150–200	15–20
1999–2000	200–225	18–22
2000–2001	200–275	22–27
2001–2002	250–300	25–30
2002-2203	250–300	25–30
2003-2004	250–300	25–30
2004-2005	250–300	25–30
2005-2006	250–300	25–30
2006-2007	250–300	25–30
2007-2008	250–300	25–30
2008-2009[b]	200–300	20–30

[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
1996–1997	5	24	11	40
1997–1998	6	37		43
1998–1999	13	32		45
1999–2000	10	75		85
2000–2001	3	28		31
2001–2002	20	89		109
2002-2003	5	14		19
2003-2004	27	45	11	83
2004-2005	15	40	3	58
2005-2006	5	57	26	88
2006-2007	1	29	1	31
2007-2008	25	51		76
2008-2009[a]	3	27		30

[a]After the reporting period.

TABLE 3 Unit 18 wolf harvest, 1985–1986 through 2008–2009

Regulatory Year	Reported harvest			Method of take			Total harvest
	M	F	Unknown	Trap/ Snare	Shot	Unknown	
1985–1986	1	0	6	6	1	0	7
1986–1987	2	0	2	0	2	2	4
1987–1988	4	4	3	5	5	1	11
1988–1989	11	6	0	0	0	0	17
1989–1990	2	2	0	0	0	0	4
1990–1991	1	0	0	1	0	0	1
1991–1992	2	2	0	4	0	0	4
1992–1993	0	0	7	0	0	7	7
1993–1994	0	0	6	0	0	6	6
1994–1995	3	0	3	4	2	0	6
1995–1996	6	2	6	5	1	8	14
1996–1997	9	17	14	17	11	12	40
1997–1998	29	7	7	27	11	5	43
1998–1999	24	13	8	23	22	0	45
1999–2000	52	23	10	44	41	0	85
2000–2001	17	9	5	15	13	3	31
2001–2002	54	41	14	51	52	6	109
2002-2003	10	8	1	8	11	0	19
2003-2004	47	26	10	32	50	1	83
2004-2005	31	25	2	28	28	2	58
2005-2006	27	31	30	37	23	28	88
2006-2007	13	14	4	18	13	0	31
2007-2008	43	27	6	25	46	5	76
2008-2009[a]	9	5	16	18	7	5	30
Total	397	262	160	368	339	91	829

[a]After the reporting period.

TABLE 4 Unit 18 wolf harvest chronology by time period, 1985-1986 through 2008-2009

	Reported harvest per harvest period								
Regulatory year	Sep	Nov	Dec	Jan	Feb	Mar	Apr	Unknown	*n*
1985–1986		6	1						7
1986–1987			2					2	4
1987–1988			1	5	3	2			11
1988–1989			5	1	4	7			17
1989–1990				1	1	2			4
1990–1991					1				1
1991–1992						4			4
1992–1993								7	7
1993–1994				2		2		2	6
1994–1995			4		1	1			6
1995–1996		1			6	1		6	14
1996–1997	1	2	5	4	17			11	40
1997–1998		3	1	12	20	2		5	43
1998–1999		4	6	3	5	15	10	12	45
1999–2000		2	9	30	32	12			85
2000–2001	1	1	2	11	4	6	1	5	31
2001–2002		4	4	27	43	19		12	109
2002-2003			1	5	10	2		1	19
2003-2004			9	15	31	27		4	86[b]
2004-2005			13	20	15	8	1	8	65[b]
2005-2006		3	7	13	14	11	1	39	88
2006-2007	1	0	8	4	2	6	1	9	31
2007-2008			6	7	18	30	2	13	76
2008-2009[a]		3	6	4	2	9	3	3	30
Totals	3	29	90	164	229	166	19	139	839[b]

[a] After the reporting period.

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

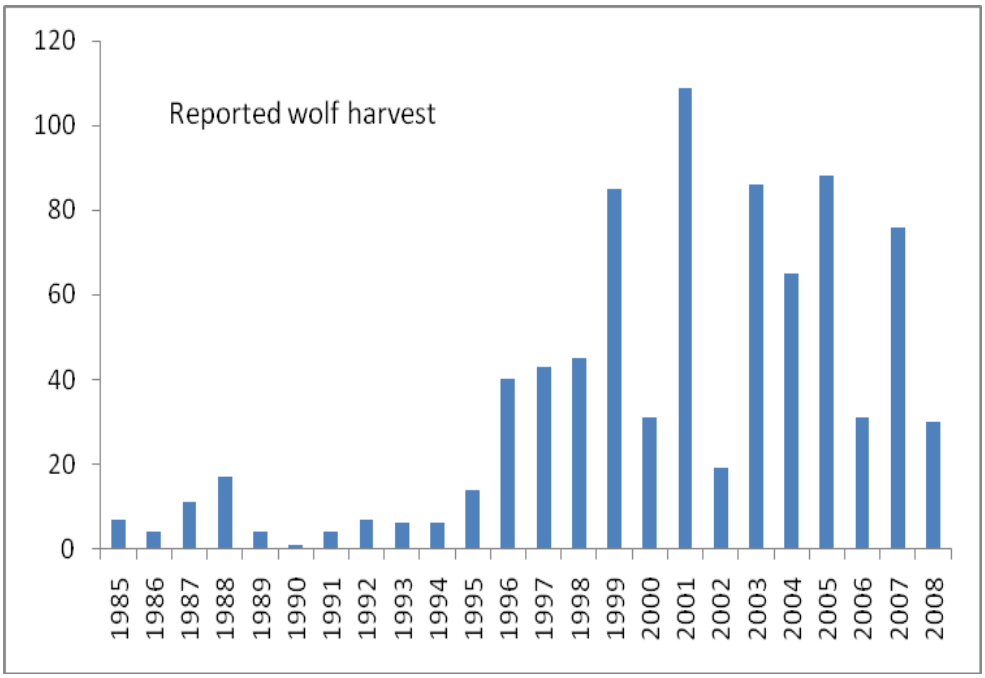

FIGURE 1 Reported wolf harvest, Unit 18, regulatory years 1985–1986 through 2008–2009.

WILDLIFE

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 2005
To: 30 June 2008[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.

Regulations that allow harvest of wolves in Unit 19 have changed frequently in response to public controversies over wolf control programs. 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 Jul through 30 Jun; e.g., RY92 = 1 Jul 1992 through 30 Jun 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 "land-and-walk" regulation beginning in late February 1997, again prohibiting all same-day-airborne shooting of wolves.

As early as 1980, biologists recognized that moose densities were low in the upper Kuskokwim drainage. At the time, the situation was characterized as a predator problem, aggravated during 1989–1995 by 4 severe winters with deep, persistent snow. In the early 1990s, residents reported declining moose numbers; and in 1994, with the aid of the Tanana Chiefs Conference, local

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

residents met with officials from ADF&G to discuss predator control options. In 1995 the Alaska Board of Game (board) adopted a *Wolf Control Implementation Plan* for eastern Unit 19D (known as Unit 19D East), which encompasses 8513 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 2006, May 2006, and March 2009.

In 2001 the Experimental Micro Management Area (EMMA), was established in a 528-mi^2 area surrounding McGrath. The EMMA encompassed the highest density of moose in Unit 19D and was established as a treatment area where predator population manipulations and other management actions could be tested.

ADF&G established wolf control areas surrounding McGrath of 1728 mi^2 (RY03, 2 weeks only), 3210 mi^2 (RY03–RY05), and 6245 mi^2 (RY06–RY08) and allowed permitted pilots to conduct aerial wolf control to reduce wolf predation within this portion of Unit 19D East (Fig. 1). None of these areas included all of the Unit 19D East predation control area.

Moose numbers in Units 19A and 19B had declined by the late 1990s and a working group was established to consider moose management in Units 19A and 19B. The Central Kuskokwim Moose Management Working Group developed the *Central Kuskokwim Moose Management Plan*. The plan was approved by the board in June 2004, and includes a wolf control implementation plan which authorized wolf control from 1 July 2004 through 30 June 2009.

Wolf predation plays a significant role in the population dynamics of moose (Gasaway et al. 1992). In Unit 19D, wolves, black bears, and grizzly bears were all identified as significant predators of moose (Keech et al. 2002; Keech 2005). This understanding has focused management on efforts to reduce predation. Unit 19 predation control programs are instrumental to moose management in the unit and are critical for compliance with intensive management statutes and regulations. Local support for these programs remains high, particularly in Units 19A and 19D where residents report seeing more moose. 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.

Management goals for wolf populations differed within Unit 19 depending on whether the population was in an area that included an active wolf predation control program. In areas with no wolf control program, including the western and northern portions of Unit 19A, all of Units 19B and 19C, and approximately half of Unit 19D, the following management goals, consistent with the Wolf Conservation and Management Policy for Alaska, adopted by the Alaska Board of Game on 30 October 1991 and revised on 29 June 1993 apply:

- 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

Management objectives for wolf populations differ within Unit 19 in the same fashion as management goals. In Units 19B and 19C, where no wolf control program existed our objective was to:

- Provide for a sustained annual harvest of up to 30% from the combined wolf population in Unit 19 except where greater harvests are mandated by approved wolf predation control implementation plans.

WOLF CONTROL OBJECTIVES

Greater harvest of wolves was mandated by the Board of Game in the following areas. The corresponding management objectives for each area are listed below.

Unit 19A

- Reduce the wolf population by 80%, but to no fewer than 30–36 wolves in Unit 19A.

Unit 19D East

- Reduce predation on moose by wolves as low as possible within the EMMA but to no fewer than 40 wolves in Unit 19D East.

MANAGEMENT ACTIVITIES

Management activities for wolf populations in Unit 19 were to:

- Conduct aerial wolf population surveys in Unit 19A and Unit 19D East.

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

- Monitor harvests through sealing records and trapper questionnaires.

- Conduct wolf predation control programs as directed by the Commissioner of ADF&G and the Alaska Board of Game.

- 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.

METHODS

In Unit 19D East we estimated wolf abundance using reconnaissance track surveys (Stephenson 1978) during 21–24 February 2001, during 17–19 March 2005 primarily in the 3210 mi^2 wolf control zone (Fig. 1), and during 14–17 March 2006. Biologist observers 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 team members discussed potential overlap among sightings to reduce the possibility of overestimating the number of packs or wolves in a pack. We combined all independent observations to determine a minimum number of wolves in the survey area. To validate the estimate, we obtained additional information about wolf pack sizes and territory boundaries from conversations with wolf hunters, trappers, and wolf control permittees.

In Unit 19A, we conducted wolf surveys, also using reconnaissance track surveys, during 23–26 January 2006 south of the Kuskokwim River, 16 March 2006 north of the Kuskokwim River, and 1–6 February 2008 throughout the unit. We used these surveys to generate an estimate of the Unit 19A wolf population, taking into account hunter–trapper harvest as well as wolves killed by wolf control permittees.

We summarized fall wolf population size estimates in the portions of Unit 19 not directly surveyed by using a combination of information from Unit 19A surveys, Unit 19D East surveys, Unit 20A wolf research data, harvest records, and hunter–trapper interviews and questionnaires.

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 documents. We assumed that nearly all of the annual wolf harvest was reported on sealing certificates because most wolves harvested from western Interior Alaska are sold rather than used locally for garments. 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.

Fur buyers are required to submit Fur Acquisition Reports whenever they purchase furs and Raw Fur Export Reports are required whenever individuals send fur outside Alaska. These requirements extend to wolf pelts, but these data were poorly tracked and were not utilized.

Wolf control pilot and gunner applicants were screened by the Department of Public Safety, Alaska Wildlife Troopers for game violations. We awarded wolf control permits 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, and other factors. Permit packets that included permits, maps,

reporting instructions, and wolf control seals were issued to permittees at selected ADF&G offices. 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 and to disseminate pertinent information regarding where other pilots were active and to help pilots maintain separation from each other and 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

During the February 2001 wolf survey within the Unit 19D East moose survey area (Fig. 1) we estimated 103 wolves in 14 packs (2 or more wolves) and an average of 6 wolves/pack. The wolf density within the 3210-mi^2 wolf control area (established in RY03) was estimated at 15 wolves/1000 mi^2 (Table 1*a*) after hunting and trapping were completed in the spring. When we corrected the survey results for reported harvest and extrapolated to all of Unit 19D East, we estimated a fall 2000 population of 198 wolves, or 23 wolves/1000 mi^2.

Using the March 2005 survey in Unit 19D East conducted primarily in the 3210-mi^2 wolf control zone (Fig. 1), we estimated 53–65 wolves in 12–13 packs (2 or more wolves) and an average of 3.5–4.8 wolves/pack. The wolf density within the 3210-mi^2 wolf control area was estimated at 3 wolves/1000 mi^2 (Table 1*a*) after wolf control, hunting, and trapping were completed in the spring. When we corrected the survey results for reported harvest and extrapolated to all of Unit 19D East, we estimated a fall 2004 population of 103 wolves, or 12 wolves/1000 mi^2.

Using the March 2006 survey in Unit 19D East conducted primarily in the 3210-mi^2 wolf control zone (Fig. 1), we estimated 82 wolves in 18 packs and an average of 4.3 wolves/pack. We estimated the wolf density within the 3210-mi^2 wolf control area to be 3 wolves/1000 mi^2 (Table 1*a*) after wolf control, hunting, and trapping were completed in the spring. When we corrected the survey results for reported harvest and extrapolated to all of Unit 19D East, we estimated a fall 2005 population of 91 wolves, or 11 wolves/1000 mi^2.

Prior to wolf control in Unit 19A, we based the fall 2004 wolf population estimate on an extrapolation from Unit 19D East. We refined this estimate after we conducted wolf surveys in 2006. This resulted in a fall 2004 estimate of 125–150 wolves in Unit 19A (12–15 wolves/1000 mi^2; Table 1*b*).

Based on the January and March 2006 surveys, we estimated a minimum of 115–122 wolves, including 8–9 singles in 28 packs and an average of 3.8–4.1 wolves/pack in Unit 19A. After we corrected the survey results for harvest, we estimated a fall population of 119–133 wolves in Unit 19A (12–13 wolves/1000 mi^2). In Unit 19A upriver of Sleetmute (a 3919-mi^2 area where wolf control has been effective), we estimated a minimum of 42–44 wolves, including 1 single in 13 packs or 3.0–3.2 wolves/pack (Table 1*b*).

Based on the February 2008 survey that encompassed all of Unit 19A, we observed a minimum of 74 wolves, including 3 singles. We estimated 17 packs occurred in the area and the average pack size (single wolves not included) was 4.2 wolves/pack. Four wolves harvested during August are not included in the fall population estimate. No other harvest occurred prior to the survey. In Unit 19A upriver of Sleetmute, we estimated a minimum of 24 wolves, comprised of 1 single wolf and 5 packs with an average pack size of 4.6 wolves (Table 1*b*).

No direct measure of wolf density has been made in Units 19B and 19C, but reports from hunters, pilots, and trappers; observations made during surveys for other species; reports provided during fur sealing; habitat considerations; prey availability; and other factors suggest that the density of wolves in these areas was slightly lower than or equal to the density of wolves in the wolf control areas prior to wolf control. Based on a density of 15–20 wolves/1000 mi^2, 116–154 wolves inhabited Unit 19B and 101–135 wolves inhabited Unit 19C during RY05–RY07.

Pack sizes in Units 19B and 19C were probably similar to the average pack size of 6 wolves observed during the 2001 survey in Unit 19D East. Assuming a pack size of 6 and the observed percentage of single wolves found during other surveys conducted in Unit 19 during 2001–2006, we estimate there were 16–24 packs in Unit 19B, and 14–21 packs in Unit 19C during this reporting period. Since RY05, wolf populations and the number of packs in Unit 19 have generally declined (Table 1*c*).

Population Composition

Five hundred wolves have been reported taken during RY03–RY07, including 268 (54%) males, 224 (45%) females, and 8 (~1%) of unknown or unrecorded sex (Table 2*a*). Wolf control permittees took 86 of the females and 90 of the males. This suggests that the overall population had a 50:50 sex ratio.

Distribution and Movements

Harvest locations, observed wolf tracks, and incidental sightings indicated that wolves were distributed throughout Unit 19. Wolf habitat is defined less by physical habitat requirements than by abundance of prey, and potential ungulate prey existed throughout Unit 19 during RY05–RY07.

Wolf control programs in Units 19A and 19D East changed wolf distribution. Wolf control take within Unit 19A was concentrated in the drainages upriver of Sleetmute, especially in the Holitna and Stony River drainages. Within these drainages, wolf numbers were reduced by an average of 73% compared to an average reduction of 53% for the entire Unit (Table 2*b*). Within the wolf control area in Unit 19D East, wolf control take was concentrated near McGrath. Wolf density within the 3210-mi^2 wolf control area near McGrath was reduced from a late winter density of 15 wolves/1000 mi^2 in 2001 prior to wolf control to a late winter post control density of about 3 wolves/1000 mi^2 in 2006. This indicates that wolves were no longer distributed in the same manner as prior to wolf control, with fewer wolves in the areas where wolf control was concentrated than would be expected in the absence of wolf control.

MORTALITY

Harvest

Season and Bag Limit.

Unit/Bag Limit/Special Restrictions	Resident and Nonresident Open Seasons
RY04–RY07	
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

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

Units 19A and 19B — A wolf control implementation plan for Units 19A and 19B was first adopted by the Board of Game in March 2004 and was approved for 5 years beginning 1 July 2004 and implemented the same regulatory year. In January 2006 the board adopted a revised implementation plan in the form of an emergency regulation in response to a lawsuit. This emergency regulation limited wolf control to Unit 19A and clarified and updated key components of the plan that included 1) wildlife population and human use information, 2) predator and prey population levels and objectives, 3) plan justifications, 4) methods and means, 5) time frame for updates and evaluations, and 6) miscellaneous specifications.

On 3 April 2006, ADF&G issued an emergency order to close wolf hunting and trapping seasons and ceased wolf control activities in Unit 19A after having achieved the wolf control implementation plan's population objective of 40–53 wolves.

In May 2006 the board further modified the January 2006 emergency regulation and adopted it as a final regulation. The board reaffirmed ADF&G's authority to issue aerial shooting or land-and-shoot permits to the public. The board also specified that the fall 2004 precontrol population level was 125–150 wolves and reduced the wolf population objective to no fewer than 30–36 wolves.

In March 2009 the board modified and reauthorized the Unit 19A predation control implementation plan for a period of 5 years beginning 1 July 2009. This plan applies aerial wolf control only within the drainages upriver of Sleetmute and defines this area as the central Kuskokwim villages moose management area (MMA; Fig. 2). Objectives of this Unit 19A plan are to reduce the precontrol wolf population by 60–80% in Unit 19A, reduce the number of wolves within the MMA to the lowest level possible, and assure that 30–36 wolves remain throughout Unit 19A.

Unit 19D — The Unit 19D East wolf predation control program began in RY03, and in January 2006 the board adopted a revised implementation plan in the form of an emergency regulation in response to a lawsuit. The emergency regulation clarified and updated key components of the implementation plan that included wildlife population and human use information, predator and prey population levels and objectives, plan justifications, methods and means, time frame for updates and evaluations, and miscellaneous specifications.

In May 2006 the board further modified the emergency regulation, added black and grizzly bear predation control implementation plans within the EMMA and extended predator control through RY08. This implementation plan also included the fall 2000 precontrol wolf population estimate of 198 derived from the late winter 2001 survey and a wolf population objective of reducing the number of wolves to as low as possible within the EMMA, but no fewer than 40 wolves in all of Unit 19D East.

In March 2009 the board reauthorized the Unit 19D East predation control implementation plan for a period of 5 years beginning 1 July 2009. This plan applies aerial wolf control only within a 4636-mi^2 area (Fig. 3), 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 wolf control area while assuring that at least 40 wolves remain throughout Unit 19D East. The board renamed the EMMA the "Unit 19D bear control area," because the experimental aspect of this management strategy had been completed.

Hunter–Trapper Harvest. During RY05–RY07, 51–139 ($\bar{x}$ = 90) wolves were reported harvested annually by hunters, trappers, and wolf control permittees in Unit 19 (Table 2*a*). Since wolf control began (RY03–RY07), 499 wolves ($\bar{x}$ = 100; range = 51–139) have been taken in Unit 19 by all methods. Control permittees took 178 wolves during that time; 112 in Unit 19A and 66 in Unit 19D East, including 1 wolf in each program that was killed but not recovered (Table 2*c*).

During RY05–RY07, hunters and trappers harvested wolves by ground shooting, trapping, and snaring with the importance of these methods varying between units. 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 snaring by trappers (Table 2*c*).

During RY05–RY07, 44 wolves were taken in Unit 19B and 34 in Unit 19C (Table 2*c*). This is an annual harvest of 10–13% and 8–11% of the estimated Unit 19B and 19C populations, respectively.

Hunter–Trapper Residency and Success. Alaska residents contributed to most of the annual wolf harvest and aerial wolf take during RY03–RY07 throughout Unit 19 (87%; Table 2*a*). The remaining 13% of the wolf harvest was by nonresidents, generally taken incidentally during other fall big game hunts.

Success rates by wolf hunters and trappers are difficult to determine because effort is not recorded when they are not successful. One indicator may be the mean number of wolves taken per successful hunter–trapper–wolf control permittee (Table 2*a*). This number was steady at 2–3

wolves during RY03–RY07. However, of the 500 wolves taken, 330 (66%) were taken by only 26 residents, 10 of whom lived outside Unit 19. Among these, the 5 most productive took 31% of the total wolf take and only one of these was not associated with a wolf control program. Because only a few people take a large portion of wolves killed by humans, the loss of those individuals would likely reduce wolf take.

Harvest Chronology. Most reported wolf harvest and wolf control take during RY03–RY07 was during February and March (Table 3*a*). Winter wolf harvests vary with travel conditions which typically improve by mid December. The low wolf take in RY06 is also due to travel conditions which remained poor throughout the season. September wolf harvests are typically incidental to other big game hunts.

February and March were the most important months for taking wolves using aerial wolf control methods (Table 3*b*). Earlier in the season, snow quality and depth for tracking and landing to retrieve wolves are not well developed and day length is shorter. By April, snow conditions begin to deteriorate.

Wolf Control Kill. Wolf control take is summarized by area in Table 2*b*, by chronology of take in Table 3*b*, and by participation in Table 3*c*. An average of 0.48 wolves were taken by each permittee. As mentioned, a few individuals contribute disproportionately to the wolf take. A number of individuals receive wolf control permits, but do not contribute to the take.

During RY05–RY07 in Unit 19D East, 11–47% of the wolves were taken within the EMMA (Table 4). During this period 71–87% ($\bar{x}$ = 74%; Table 5) of wolf take occurred within the wolf control area that will be active in RY09 (Fig. 3).

In Unit 19A, 27% of the wolf harvest during RY03 was upriver of Sleetmute (in the central Kuskokwim villages MMA; Fig. 2). During wolf control (RY04–RY07), wolves killed in the MMA made up an average of 57% of the total Unit 19A take. An average of 89% of the wolves killed in the aerial wolf control program during RY04–RY07 were taken from within the MMA (Table 6; Fig. 2) and an average of 73% of the wolves in this area were removed (Table 7).

Transport Methods. Snowmachines and aircraft were the most common methods of transportation used by hunters and trappers to harvest wolves in Unit 19 (Table 8). Other methods, which included ATVs and other or unreported methods accounted for about 7% to the harvest.

Other Mortality

On 2 occasions a wolf was killed by a wolf control permittee but due to conditions beyond their control, they were unable to recover these animals which were known or assumed to be dead. These animals are noted in Tables 2c, 3b, and 3c.

NONREGULATORY MANAGEMENT PROBLEMS, NEEDS, AND EDUCATION

Hair loss on wolves remains a problem throughout Unit 19, with genetic follicular dysplasia and lice being identified as the causes. Few cost-effective tools exist to treat this problem, so it is

likely to persist. Wolf pelts with poor hair have little value, yet hunters and trappers are still inclined to take these wolves to 1) remove louse infected individuals from the population, 2) remove the predator 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.

The wolf control programs in Units 19A and 19D East were nearly universally supported by local residents, but few individuals understood the cost associated with them. A full-time seasonal employee was hired to administer these programs, but when he was unavailable other important activities were displaced. Additionally, continual court challenges impacted our ability to manage wildlife in Unit 19.

A significant challenge was the total loss of our McGrath office due to a fire in December 2006. Nothing was salvageable and the only records recovered were those kept electronically and retrieved from the regional office and the Internet. Substantial effort is still required to fully recover.

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. This acts as an additional buffer to ensure long-term persistence of these populations. 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 of Game, Fish and Game advisory committees, and the public through media contacts and other means.

We harvested fewer than 30% of wolves from populations where no wolf control occurred. The objective of providing for harvest of up to 30% of these populations was met; however, the reported annual harvest of 10–13% and 8–11% of the estimated Unit 19B and 19C populations respectively, was well below 30%, indicating additional harvest would be sustainable.

In RY05 the objective in Unit 19A was to reduce the wolf population by 80%, while leaving at least 40–53 wolves overall. This goal was attained, wolf control was terminated for the season and an emergency order was issued to close wolf hunting and trapping for the remainder of the regulatory year. This objective was changed beginning in RY06 to reduce the wolf population by 80%, while leaving no fewer than 30–36 wolves overall. Subsequently, the objective of leaving at least 30–36 wolves was achieved, but the reduction of 80% throughout Unit 19A was not. Upriver of Sleetmute in the central Kuskokwim villages MMA (Fig. 2) however, the number of wolves was reduced from the precontrol estimate of 75–100 by at least 80% by 30 April and thus the objective was met for this area.

Within the Unit 19A drainages downriver of Sleetmute, the highest number of wolves killed annually using aerial control was 8 ($\bar{x}$ = 3). Given the wolf population, this level of take is insufficient to influence predation rates on moose. As a consequence, we will apply aerial wolf control only within the 3913-mi^2 central Kuskokwim villages MMA. However, the predation control area remains defined as all of Unit 19A for wolf population purposes.

Within Unit 19D East, harvest and wolf control take was sufficient to reduce the spring wolf density to 3 wolves/1000 mi^2 in the 3210 mi^2 wolf control zone (Table 1a). Our wolf control objective of reducing predation as low as possible within the EMMA while maintaining no fewer than 40 wolves throughout Unit 19D East was achieved. In the remainder of Unit 19D outside the wolf control zone, harvest was light.

The average number of wolves taken per wolf control permittee was 0.48 wolves (Table 3*c*). This success rate is low and can be attributed to high cost (e.g., aviation fuel in Sleetmute was $8.29/gallon); remoteness of the wolf control areas; pilot inexperience, especially during the early years of the programs; time available to fly doesn't always coincide with good weather and snow conditions needed to take wolves using aerial wolf control; and other reasons including landowner restrictions. Future wolf control programs should favor permittees with a track record of success but should be mindful of the need to recruit new participants which will be necessary for these programs to remain viable in the future.

Because of declining moose and caribou populations and user conflicts in Units 19B and 19C, moose and caribou hunting opportunities for hunters who access the units by aircraft may not remain widely available, particularly for nonresident hunters. Because incidental take of wolves accounts for approximately half of the total wolf harvest in these units, wolf harvest will likely decline as other big game hunting opportunities diminish. This may be particularly true in Unit 19B where many hunters were drawn to the area by the Mulchatna caribou herd. If this herd continues to decline or stabilizes at low levels, we expect numbers of big game hunters and the number of wolves they harvest to decline.

Fur Acquisition Reports and Raw Fur Export Reports are required to be filled out when wolf pelts are bought or exported out of Alaska. It is my belief that these requirements do not provide useful data or a worthwhile enforcement tool. Their use has been functionally discontinued, data derived from them is misleading, they impose an unnecessary burden on the public and these requirements should be eliminated.

The average age of trappers continued to increase and recruiting new wolf trappers would be desirable. One way to address the recruitment issue and to accommodate the desire in local villages to take more wolves is to offer clinics on building traps and using snares to take wolves. Whenever these have been offered, they have been well received and other potential management benefits may follow. These clinics were not offered during this reporting period, but should be offered if resources, particularly personnel, are available.

For the next reporting period, goals and objectives for Unit 19 will be as follows:

MANAGEMENT GOALS

- 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 MMA (Fig. 2) while achieving a 60–80% reduction of the precontrol Unit 19A wolf population and assuring 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 aerial wolf control area (Fig. 3) while achieving a 60–80% reduction of the precontrol Unit 19D East wolf population and assuring that no fewer than 40 wolves remain in Unit 19D East.

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

- Provide for a sustained annual harvest of up to 30% from the combined wolf population in Unit 19 except where greater harvests are mandated by approved wolf predation control implementation plans.

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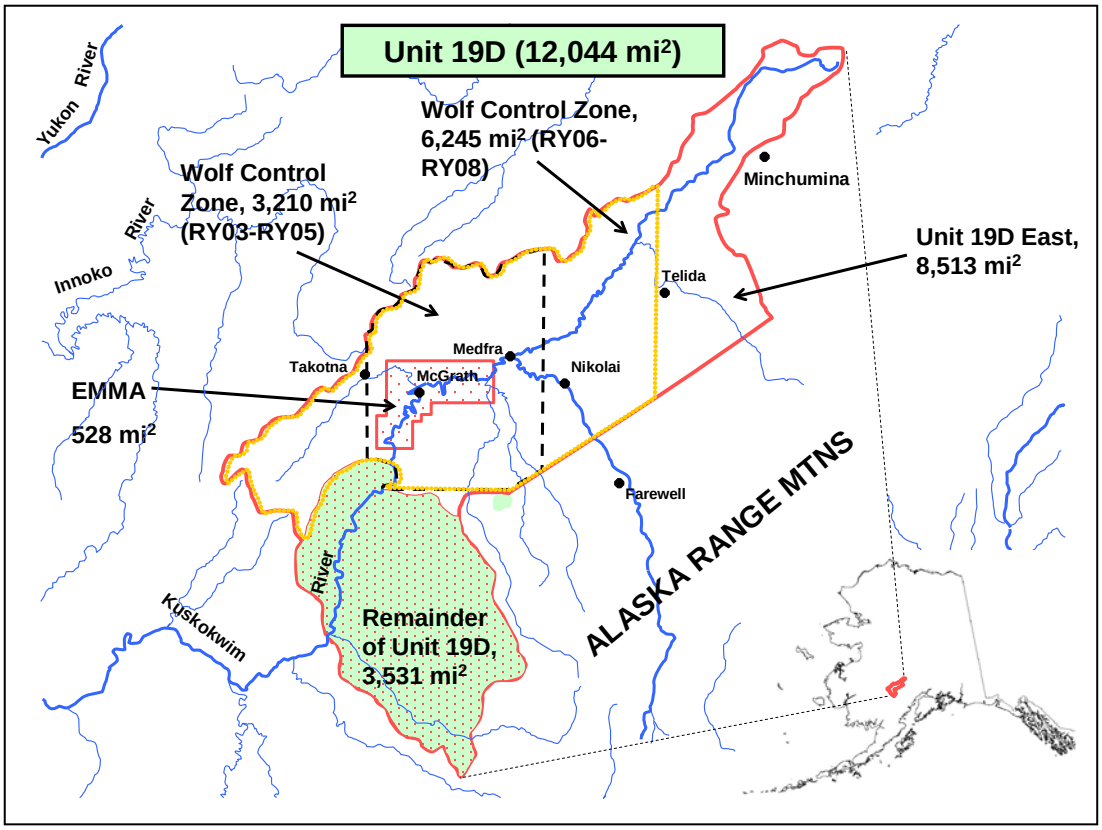

FIGURE 1 Unit 19D showing management activity areas

(*Note*: MSA = moose survey area, EMMA = Experimental Micro Management Area)

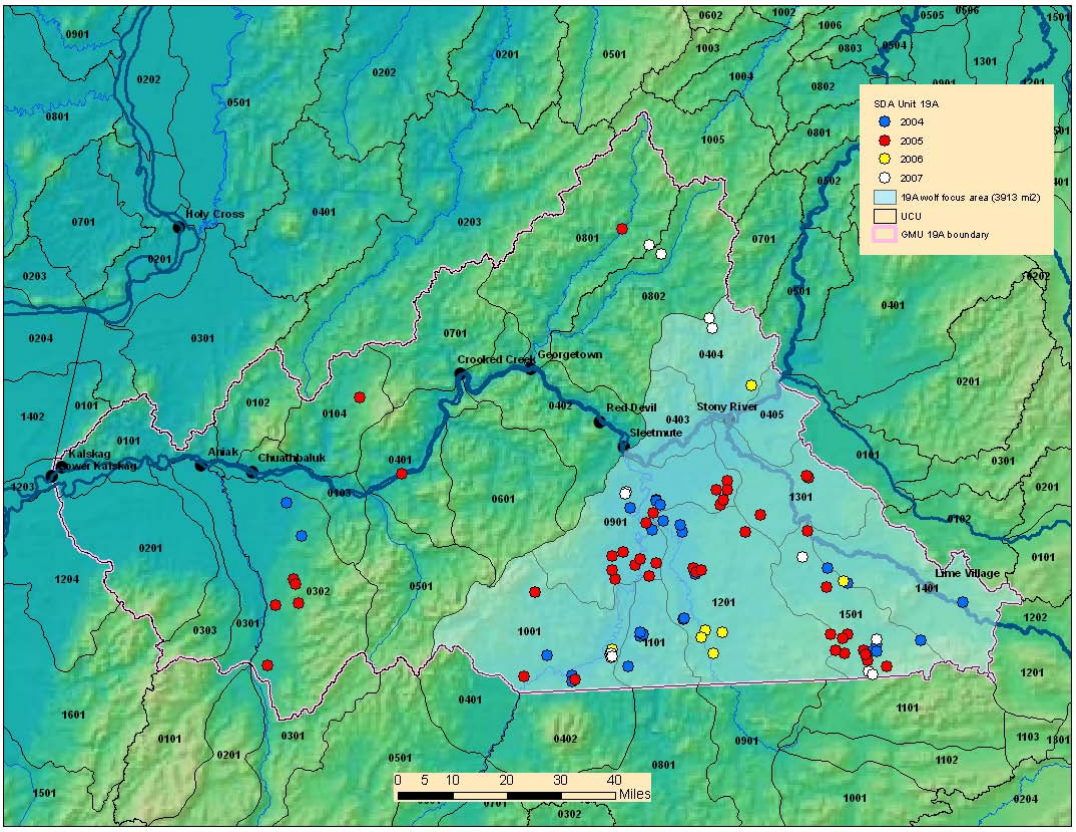

FIGURE 2 Unit 19A aerial wolf control area (central Kuskokwim villages moose management area [MMA]; 3913 mi^2) beginning 1 July 2009, including uniform coding unit (UCU) boundaries and location of aerial wolf control take during regulatory years 2004–2005 through 2007–2008.

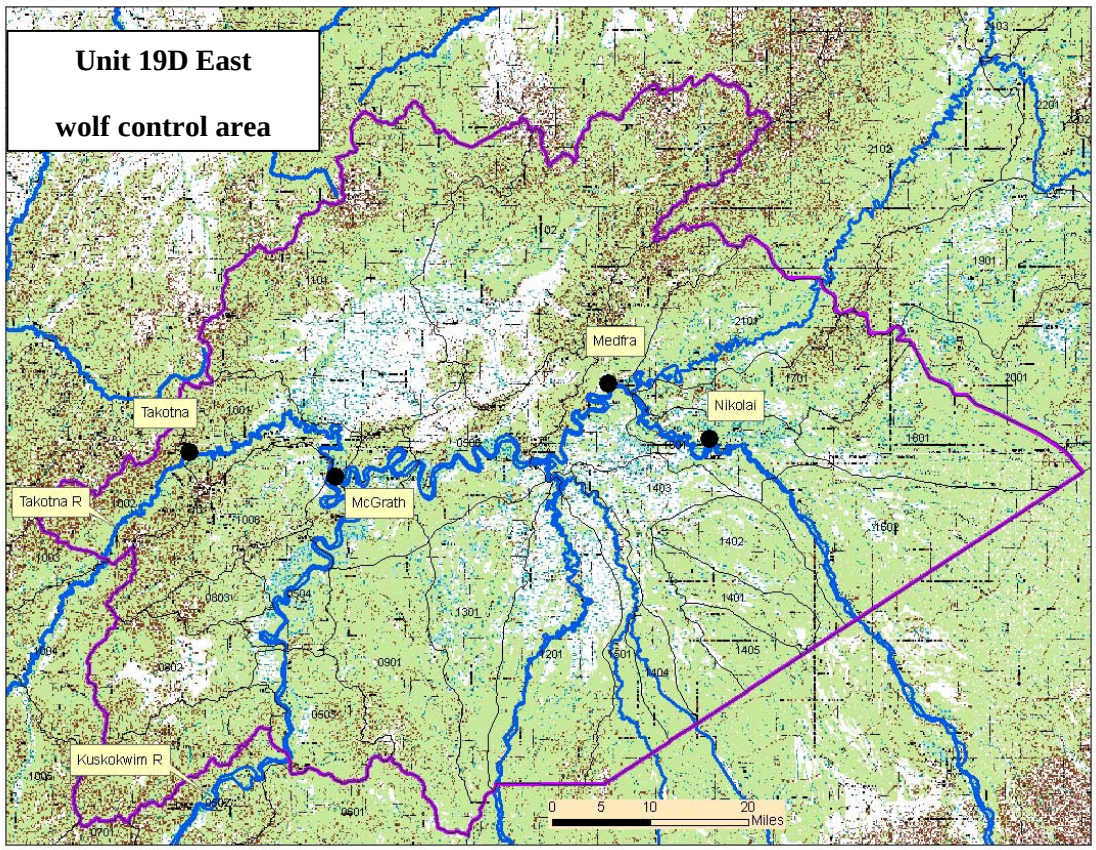

FIGURE 3 Unit 19D aerial wolf control area (4636 mi^2) beginning 1 July 2009 and uniform coding unit (UCU) boundaries

TABLE 1A Unit 19D East wolf population estimates, 2001–2006

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/1000 mi^2)	Spring wolf density estimate in 3210 mi^2 wolf control zone (wolves/1000 mi^2)
Feb 2001[b]	103	14	6	198	23	15
March 2005[c]	53–65	12–13	3.5–4.8	103	12	3
March 2006[d]	82	18	4.3	91	11	3

[a] Single wolves not included as packs.
[b] Area surveyed was the 5204-mi^2 Unit 19D East moose survey area.
[c] Area surveyed was slightly larger than Unit 19D East moose survey area.
[d] All of Unit 19D East surveyed.

TABLE 1B Unit 19A wolf population estimates, regulatory years 2004–2005 through 2007–2008

Regulatory year	Fall population estimate	No. of packs[a]	$\bar{x}$ Wolves/ pack	Upriver of Sleetmute fall population estimate	No. of packs[a]	$\bar{x}$ Wolves/ pack
2004–2005[b]	125–150			75–125		
2005–2006	119–133	28	3.8–4.1	42–44	13	3.0–3.2
2007–2008	74	17	4.2	24	5	4.6

[a] Single wolves not included as packs, 3 of 8–9 single wolves estimated upriver of Sleetmute in 2005. One single upriver of Sleetmute in regulatory year 2007–2008. 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.

TABLE 1C Total Unit 19 fall wolf population estimates, regulatory years 2003–2004 through 2007–2008

Regulatory year	Population estimate	Number of packs
2003–2004[a]		
2004–2005	450–594	69–94
2005–2006	404–478	74–90
2006–2007	365–437	60–75
2007–2008	382–454	65–80

[a] Data not available.

TABLE 2A Unit 19 wolf harvest and aerial wolf control take, regulatory years 2003–2004 through 2007–2008

Regulatory year	Reported harvest					Residency			Number of trappers/ hunters	$\bar{x}$ Wolves/ Trapper
	M	F	Unknown	% Male	Total	Nonresident	Resident	Unknown		
2003–2004	60	47	2	56	109	15	94	0	44	2.5
2004–2005	63	60	1	51	124	8	116	0	42	3.0
2005–2006	73	64	0	53	137	16	121	0	52	2.6
2006–2007	30	17	4	64	51	14	37	0	23	2.2
2007–2008	42	36	1	54	79	11	68	0	24	3.3
Total	268	224	8	54	500	64	436	0	185	$\bar{x}$ = 2.7
% of Total	54	45	~1		100	13	87			

TABLE 2B Combined wolf hunting–trapping harvest and aerial wolf control take in Unit 19A and in that portion of Unit 19A upriver of Sleetmute as a percentage of the number of wolves in each area, regulatory years 2004–2005 through 2007–2008

Regulatory year	All of Unit 19A			Unit 19A – upriver of Sleetmute		
	Fall population estimate	Total take	% of Population killed	Fall population estimate	Total take	% of Population killed
2004–2005	125–150	72	48–58	75–100	44	44–59
2005–2006	119–133	80	60–67	42–44	37	84–88
2007–2008	74	24	32	24	18–19	75–79

TABLE 2C Units 19A, 19B, 19C, and 19D wolf harvest and harvest method, regulatory years 2003–2004 through 2007–2008

Regulatory year	Unit 19A					Unit 19B				Unit 19C				Unit 19D				
	Shoot	Trap	Snare	SDA[a]	Total[b]	Shoot	Trap	Snare	Total[b]	Shoot	Trap	Snare	Total[b]	Shoot	Trap	Snare	SDA[a]	Total[b]
2003–2004	8	3	18		30	20	4	6	30	5	1	2	11	1	4	8	17	35
2004–2005	7	9	13	43	72	7	3	4	15	3	0	2	5	2	2	14	14	32
2005–2006	11	3	19	47[c]	80	18	4	4	26	7	3	8	18	1	1	9	4[c]	15
2006–2007	1	1	1	7	10	9	4	0	13	1	3	0	4	2	3	17	2	24
2007–2008	9	0	0	15	24	2	0	3	5	5	0	5	12	2	1	6	29	38
Total	36	16	51	112	216	56	15	17	89	21	7	17	50	8	11	54	66	144
% of Total[b]	17	7	24	52		63	17	19		42	14	34		6	8	38	46	

[a] SDA = same-day airborne aerial wolf control associated with programs in Units 19A and 19D East only.
[b] Total may include additional harvest where method is other/unknown/unreported and total percent may not total 100% for this reason.
[c] Includes 1 wolf killed but not recovered.

TABLE 3A Unit 19 wolf hunting and trapping percent harvest and aerial wolf control take chronology by month, regulatory years 2003–2004 through 2007–2008

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
2003–2004	3	(3)	15	(16)	2	(2)	6	(7)	8	(9)	13	(14)	15	(16)	31	(34)	7	(8)		(109)
2004–2005	3	(4)	5	(6)	2	(3)	9	(11)	2	(3)	26	(32)	21	(26)	26	(32)	6	(7)		(124)
2005–2006	1	(1)	11	(15)	5	(7)	1	(2)	4	(6)	9	(12)	36	(50)	27	(37)	5	(7)		(137)
2006–2007	2	(1)	14	(7)			14	(7)	14	(7)	6	(3)	4	(2)	33	(17)	12	(6)	2 (1)	(51)
2007–2008	8	(6)	9	(7)			6	(5)	4	(3)	6	(5)	41	(32)	24	(19)	3	(2)		(79)
Total		(15)		(51)		(12)		(32)		(28)		(66)		(126)		(139)		(30)	(1)	(500)
% of Total	3		10		2		6		6		13		25		28		6		<1	100

TABLE 3B Units 19A and 19D East percent wolf control chronology by month, using aerial wolf control methods, regulatory years 2003–2004 through 2007–2008

Regulatory year	Percent wolf control take chronology by month (*n*)																		Total take
	Aug		Sep		Oct		Nov		Dec		Jan		Feb		Mar		Apr		Unk
2003–2004													18	(3)	82	(14)			17
2004–2005							4	(2)	4	(2)	2	(13)	30	(17)	33	(19)	7	(4)	57
											3								
2005–2006													59	(30)	41	(21)[a]			51
2006–2007															100	(9)			9
2007–2008											7	(3)	64	(28)	30	(13)			44
Total								(2)		(2)		(16)		(78)		(76)		(4)	178
% of Total							1		1		9		44		43		2		100

[a] Includes 2 wolves killed by not recovered.

TABLE 3C 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 2007–2008

Regulatory year	Unit 19A		Unit 19D East		Both areas		
	Pilots	Gunners	Pilots	Gunners	Total permits	Wolves taken	Wolves per permit
2003–2004	n/a	n/a	8	12	20	17	0.85
2004–2005	35	85	6	11	137	57	0.42
2005–2006	30	52	3	3	88	51[a]	0.58
2006–2007	18	23	6	3	50	9	0.18
2007–2008	19	34	9	17	79	44	0.56
Total	102	194	32	46	374	178	0.48
Average	26	49	6	9	75	36	0.48

[a] Includes 2 wolves killed but not recovered.

TABLE 4 Wolves killed by all methods in Unit 19D, in Unit 19D East (within Unit 19D) and the experimental micro-management area (EMMA) (within Unit 19D East), regulatory years 2000–2001 through 2007–2008

Regulatory year	Wolf kill			% Unit 19D East take in EMMA
	Unit 19D[a]	Unit 19D East	EMMA	
2000–2001	37	36	17	47
2001–2002	30	24	7	29
2002–2003	44	39	22	56
2003–2004	35 (17)	27	7	26
2004–2005	32 (14)	29	15	52
2005–2006	15 (4)	15	7	47
2006–2007	24 (2)	21	5	24
2007–2008	38 (29)	37	4	11
Total	255 (66)	228	84	37
8-year $\bar{x}$	32 (8)	29	11	

[a] Number in parentheses is the number of wolves taken by aerial wolf control.

TABLE 5 Wolves killed by all methods during regulatory years 2003–2004 through 2007–2008 in Unit 19D, and within the portion of Unit 19D that will make up the 4636-mi^2 aerial wolf control area (WCA) that will become effective in regulatory year 2009–2010

Regulatory year	Wolf kill		% Unit 19D take
	Unit 19D[a]	WCA[b]	in WCA
2003–2004	35 (17)	27	77
2004–2005	32 (14)	28	88
2005–2006	15 (4)	13	87
2006–2007	24 (2)	17	71
2007–2008	38 (29)	27	71
Total	144 (66)	112	78

[a] Number in parentheses is the number of wolves taken by aerial wolf control.
[b] Wolf control area will be in effect beginning in regulatory year 2009–2010.

TABLE 6 Wolves killed by all methods during regulatory years 2003–2004 through 2007–2008 in Unit 19A, and within a 3913-mi^2 portion of Unit 19A that will become the central Kuskokwim villages moose management area (MMA) on 1 July 2009

Regulatory year	Wolf kill		% Unit 19A take
	Unit 19A[a]	MMA[a,b]	in MMA[a,b]
2003–2004	30 (n/a)	8	27
2004–2005	72 (43)	44 (41)	61 (95)
2005–2006	80 (47)	37 (39)	46 (83)
2006–2007	10 (7)	7 (7)	70 (100)
2007–2008	24 (15)	18 (13)	75 (87)
Total	216 (112)	114 (100)	53 (89)

[a] Number in parentheses is the number of wolves taken by aerial wolf control.
[b] Moose management area will be in effect beginning in regulatory year 2009–2010.

TABLE 7 Fall population estimates and wolf kill for Unit 19A and the portion of Unit 19A upriver of Sleetmute, regulatory years 2004–2005 through 2007–2008

Regulatory year	Unit 19A fall estimate	Total kill	% of Population killed in Unit 19A	Fall estimate in Unit 19A upriver from Sleetmute	Kill upriver from Sleetmute	% of Population killed in Unit 19A upriver from Sleetmute
2004–2005	125–150	72	48–58	75–100	44	44–59
2005–2006	119–133	80	60–67	42–44	37	84–88
2007–2008	74	24	32	24	18–19	75–79

TABLE 8 Unit 19 hunting and trapping harvest by transport method, regulatory years 2003–2004 through 2007–2008

Regulatory year	Percent harvest by transport method (*n*)				Total (*n*)
	Aircraft	Snowmobile	Skis–Snowshoe	Other[a]	
2003–2004	40 (37)	45 (41)	4 (4)	11 (10)	92
2004–2005	33 (22)	49 (33)	7 (5)	10 (7)	67
2005–2006	31 (27)	53 (47)	11 (10)	5 (4)	88
2006–2007	40 (17)	45 (19)	14 (6)		42
2007–2008	51 (18)	29 (10)	11 (4)	9 (3)	35
Total (*n*)	(121)	(150)	(29)	(24)	324
% of Total	37	46	9	7	

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

WILDLIFE

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 2005
To: 30 June 2008[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. 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 Fairbanks 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 Oct 1993–Nov 1994) and 20B (autumn 1979–spring 1986). The most recent program in 1993–1994 was implemented to reverse a caribou population decline associated with a density dependent response to unfavorable weather.

Because of the interest in consumptive use, ADF&G staff continue intensive investigations on predator–prey relationships, especially in Unit 20A (Gasaway et al. 1983; Boertje et al. 1996). Within Denali National Park and Preserve (DNP&P) in adjacent 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). 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:

1. Manage for fall density ≥11 wolves/1000 mi^2.

Management activities during this reporting period were to:

1. Monitor harvest through sealing certificates.

2. 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., RY05 = 1 Jul 2005 through 30 Jun 2006). We collected miscellaneous observations and reports for all areas. We also collected additional information for Unit 20A while conducting wolf research, moose surveys, and other reconnaissance flights. We conducted a reconnaissance survey of wolf numbers and packs in the Tanana Flats portion of Unit 20A in spring 2006 (RY05). No other wolf surveys were conducted RY05–RY07 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 (Adams et al. 1995; National Park Service, unpublished report 2008).

DOG LOUSE INFESTATION

In 2005, ADF&G proposed a pilot study to investigate the course of the recent dog louse (*Trichodectes canis*) infestation identified in Unit 20A and to evaluate the feasibility of managing the disease. The objective is to evaluate the efficacy of treatment with Ivermectin (Ivomec®, Merial Limited, Iselin, New Jersey, USA) by direct injection and treatment of wolf dens with

treated baits to control the incidence of the dog louse in a population of wolves in Interior Alaska. A secondary objective is to identify factors which affect the severity of symptoms resulting from a louse infection in wolves. Factors which may affect efficacy of treatment and severity of symptoms include age of the wolf, pack size, pack location, climatic factors, geographic distribution, and presence of secondary bacterial or yeast infections.

ADF&G will describe the course of this parasitic infection in known infected wild wolves after treatment with Ivermectin and provide recommendations for a longer term study of this disease in Interior Alaska wolves. We will develop and describe a method for delivering treated baits from aircraft to den sites, and describe the efficacy of that method in reducing louse infestations in packs that are treated by den baiting only. We will monitor and report the spread of the louse infection in Unit 20A if it occurs.

In March 2006, 14 wolves in 10 packs were captured and radiocollared. By visual inspection, 2 of these packs were suspected of being infected by lice. Skin samples were taken and sent to a pathology lab for verification. The study objective is to maintain 1–2 radiocollars on these 10 packs and possibly on 5 additional packs in Unit 20A. In RY07, 1–2 wolves in 5 packs in Unit 20C will be captured to use as a control. These packs will not be treated even if infected with lice. The efficacy of den and rendezvous site treatment in eliminating lice by capturing and collecting one pup wolf from each pack and purchasing hides of known wolves from trappers will be evaluated. Radiocollared wolves will be monitored and the life history of the wolves with lice will be compared with wolves without lice. Distribution and spread of lice will be monitored using radiocollared packs, visual inspection of packs observed during wolf surveys, and from inspection of wolf hides brought in by area trappers.

HARVEST

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.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

For all units combined, we estimated approximately 600–900 wolves in 90–130 packs in fall 2005–2007. The ranges represent the combined minimum and maximum estimates for each unit (Table 1). This estimate results in an estimated wolf density of 15–23 wolves/1000 mi^2 (6–9 wolves/1000 km^2).

The wolf population trend in Unit 20A has differed substantially from that in Unit 20C since the mid 1990s. Wolf numbers in Unit 20A increased after wolf control was suspended in 1994 and approached precontrol levels by 1998 (Table 1). 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), and then increased between 1999 and 2001. It appears that as a result of high harvests, wolf densities in Unit 20A are now below theoretical densities that could be supported by current moose densities. By contrast, researchers in DNP&P documented a sharp decline in the wolf population in southern Unit 20C during 1992–1995. The wolf population then fluctuated around that lower level during 1995–2001, likely due to the continued decline of the Denali caribou herd and relatively low snowfall during most years (L. A. Adams, USGS–Biological Resources Division, personal communication). Lower population estimates for Unit 20C reflect those observations.

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 would 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. Preliminary findings are presented in Gardner and Beckmen (2008).

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		
RY05		
HUNTING: 5 wolves. No wolf hunting same day airborne.	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit. A wolf may be shot same day airborne if caught in a trap or snare.	1 Nov–30 Apr	1 Nov–30 Apr
RY06		
HUNTING: 5 wolves. No wolf hunting same day airborne. In areas designated for active wolf management a wolf may be shot same day airborne or from a moving snowmachine.	10 Aug–30 Apr	10 Aug–30 Apr

Units and Bag Limits	Resident/Subsistence Open Seasons	Nonresident Open Seasons
TRAPPING: No limit. A wolf may be shot same day airborne if caught in a trap or snare.	1 Nov–30 Apr	1 Nov–30 Apr
RY07		
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–30 Apr	10 Aug–30 Apr
TRAPPING: No limit. A wolf may be shot same day airborne if caught in a trap or snare.	1 Nov–30 Apr	1 Nov–30 Apr

Alaska Board of Game Actions and Emergency Orders.

March 2006 — The Alaska Board of Game extended the wolf hunting season in Units 20A, 20B, 20C, 20F, and 25C through May. Beginning in RY06 the wolf hunting season was 10 August–31 May. The board also authorized wolf control in portions of Units 20B and 25C as part of the Upper Yukon–Tanana wolf predation control area to improve calf survival and recruitment of the Fortymile caribou herd.

Harvest by Hunters and Trappers. Areawide wolf harvest, in general, increased between RY96–RY98 (annual mean = 186 wolves) and RY99–RY01 (annual mean = 228 wolves), but declined through RY02–RY04 (annual mean = 187 wolves) and RY05–RY07 (annual mean = 150 wolves; Table 2). This was the case for all units, but not all years.

Wolf harvest varied considerably across years. Excluding years in which wolf control was conducted (i.e., 1993 and 1994), 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 and RY01 (244 and 249 wolves, respectively) and again fell to a record lows of 136 wolves in RY05. This general pattern was apparent in nearly all units. These oscillations were not likely related as much 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, unpublished data).

Areawide, the number of successful wolf hunters–trappers increased at an average rate of about 14% annually between RY97 and RY00, then declined between RY00 and RY04 (Table 2). The number of successful hunters–trappers appeared to increase again from 78 in RY05 to 92 in RY07. The number of wolves taken per successful hunter–trapper declined each year from RY01 through RY04, but remained relatively stable during RY05–RY07 (Table 2).

Portions of Units 20B and 25C were in the Upper Yukon–Tanana Wolf Predation Control area for the Fortymile caribou herd. During RY06–RY07, a total of 10 wolves were reported taken by aerial wolf control in this area.

Harvest Chronology. Areawide, most wolves were harvested during the periods November–December and January–February (Table 3). Most of the remainder of the harvest was fairly evenly distributed between the September–October and March periods. The August and April periods 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 popular type of transportation (Table 4). Generally, these trends were apparent for all units.

CONCLUSIONS AND RECOMMENDATIONS

The estimated wolf density was 15–23 wolves/1000 mi^2 during RY05–RY07. This met the objective to manage for a fall density of ≥11 wolves/1000 mi^2.

Wolf research in Unit 20A should be recognized as 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, the current success in moose management may be short-lived. 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. High wolf harvest could potentially regulate the wolf population at a level that allows high 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). Forming a viable management strategy hinges on a thorough understanding of wolf predation, weather, and competition for food among moose.

I recommend maintaining Unit 20A seasons and bag limits to evaluate harvest trends under current regulations and trapping effort. Similarly, there seems 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.

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TABLE 1 Units 20A, 20B, 20C, 20F, and 25C fall wolf population estimates, 2003–2007

Unit	Year	Population estimate[a]	Number of packs	Basis of estimate
20A	2003	200–250[b]	20–25	Extrapolation from 2000 density estimate (mountains)[c]; aerial survey, harvest reports (Tanana Flats)[d]
	2004	200–250[b]	20–25	Extrapolation from 2000 density estimate (mountains)[c]; aerial survey, harvest reports (Tanana Flats)[d]
	2005	216–226	29	Radiotelemetry and aerial surveys (plus additional 10% for singles); harvest reports
	2006	200–250	25-30	Extrapolation from 2005
	2007	200–250	25-30	Extrapolation from 2005
20B	2003	150–225	20–30	Extrapolation from 1989 and Unit 20B West (1990)
	2004	150–225	20–30	Extrapolation from 1989 and Unit 20B West (1990)
	2005	150–225	20–30	Extrapolation from 1989 and Unit 20B West (1990)
	2006	150–225	20–30	Extrapolation from 1989 and Unit 20B West (1990)
	2007	150–225	20–30	Extrapolation from 1989 and Unit 20B West (1990)
20C	2003	150–200	25–35	Extrapolation from Denali National Park data (1994)
	2004	157	26	Extrapolation from Denali National Park data (2005)
	2005	222	25–35	Extrapolation from Denali National Park data (2006)
	2006	183	25–35	Extrapolation from Denali National Park data (2007)
	2007	207	32	Extrapolation from Denali National Park data (2008)
20F	2003	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2004	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2005	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2006	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2007	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
25C	2003	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2004	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2005	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2006	75–125	10–20	Density extrapolation from Units 20C (1989) and 20B (1990)
	2007	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] Estimate based on assumption that all wolves in research study area were accounted for, therefore the estimate does not include the standard additional 10% to account for wolves not in packs).

[c] Mountains: 11.7 wolves/1000 km^2 × 10,775 km^2 = 126 wolves ; M. E. McNay, Alaska Department of Fish and Game, unpublished data.

[d] Tanana Flats: Aerial reconnaissance survey (2 Feb 2002) resulted in minimum estimate of 59–68 wolves, plus a harvest of 21 wolves Sep 2001 through Jan 2002 results in fall minimum estimate of 80–89 wolves.

TABLE 2 Units 20A, 20B, 20C, 20F, and 25C wolf harvest, regulatory years 2003–2004 through 2007–2008

		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	2003–2004	35	25 (42)	1	61	80	32 (59)	20 (37)	2 (4)	1	26	2.3
	2004–2005	23	28 (55)	3	54	66	21 (40)	23 (44)	8 (15)	2	24	2.3
	2005–2006	19	14 (42)	0	33	49	10 (30)	18 (55)	5 (15)	0	18	1.8
	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
20B	2003–2004	39	40 (51)	1	80	81	16 (20)	55 (69)	9 (11)	0	32	2.5
	2004–2005	21	33 (61)	0	54	69	18 (33)	26 (48)	10 (19)	0	30	1.8
	2005–2006	32	37 (54)	1	70	68	12 (20)	35 (59)	12 (20)	0	39	1.8
	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
20C	2003–2004	20	14 (41)	0	34	27	9 (26)	13 (38)	12 (35)	0	19	1.8
	2004–2005	4	13 (76)	0	17	27	7 (54)	2 (15)	4 (31)	4	10	1.7
	2005–2006	4	8 (67)	2	14	22	5 (36)	7 (50)	2 (14)	0	9	1.6
	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
20F	2003–2004	9	3 (25)	0	12	18	7 (58)	3 (25)	2 (17)	0	9	1.3
	2004–2005	6	2 (25)	0	8	9	1 (13)	4 (50)	3 (38)	0	6	1.3
	2005–2006	5	2 (29)	0	7	9	2 (29)	5 (71)	0 (0)	0	3	2.3
	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
25C	2003–2004	4	5 (56)	0	9	13	0 (0)	6 (67)	3 (33)	0	7	1.3
	2004–2005	7	11 (61)	0	18	16	8 (44)	9 (50)	1 (6)	0	9	2.0
	2005–2006	5	7 (58)	0	12	13	7 (64)	1 (9)	3 (27)	1	9	1.3
	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
Combined	2003–2004	107	87 (45)	2	196	220	64 (34)	97 (51)	28 (15)	1	93	2.1
	2004–2005	61	87 (59)	3	151	187	55 (38)	64 (44)	26 (18)	6	79	1.9
	2005–2006	65	68 (51)	3	136	161	36 (29)	66 (53)	22 (18)	1	78	1.7
	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)	11	92	1.7

[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 2003–2004 through 2007–2008

Unit	Regulatory year	Harvest periods[a] Aug (%)	Sep–Oct (%)	Nov–Dec (%)	Jan–Feb (%)	Mar (%)	Apr (%)	Unk	*n*
20A	2003–2004	0 (0)	2 (3)	15 (25)	32 (52)	11 (18)	1 (2)	0	61
	2004–2005	0 (0)	6 (11)	15 (28)	16 (30)	14 (26)	3 (6)	0	54
	2005–2006	1 (3)	3 (9)	8 (24)	13 (39)	5 (15)	3 (9)	0	33
	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
20B	2003–2004	0 (0)	6 (8)	17 (22)	30 (38)	25 (32)	0 (0)	2	80
	2004–2005	0 (0)	6 (11)	16 (30)	19 (36)	10 (19)	2 (4)	0	54
	2005–2006	0 (0)	7 (10)	14 (21)	34 (50)	9 (13)	4 (6)	2	70
	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
20C	2003–2004	0 (0)	4 (12)	6 (18)	17 (50)	3 (9)	4 (12)	0	34
	2004–2005	0 (0)	3 (18)	3 (18)	10 (59)	0 (0)	1 (6)	0	17
	2005–2006	0 (0)	1 (7)	5 (36)	4 (29)	3 (21)	1 (7)	0	14
	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
20F	2003–2004	0 (0)	1 (8)	3 (25)	4 (33)	3 (25)	1 (8)	0	12
	2004–2005	0 (0)	3 (38)	4 (50)	1 (13)	0 (0)	0 (0)	0	8
	2005–2006	0 (0)	0 (0)	3 (43)	4 (57)	0 (0)	0 (0)	0	7
	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
25C	2003–2004	1 (11)	2 (22)	0 (0)	5 (56)	1 (11)	0 (0)	0	9
	2004–2005	1 (6)	0 (0)	2 (11)	8 (44)	7 (39)	0 (0)	0	18
	2005–2006	0 (0)	1 (9)	2 (18)	5 (45)	2 (18)	1 (9)	1	12
	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
20A, 20B, 20C, 20F, and 25C	2005–2006 thru 2007–2008	8 (2)	52 (12)	103 (23)	204 (46)	58 (13)	19 (4)	6	450

[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 2003–2004 through 2007–2008

		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	2003–2004	2 (4)	0 (0)	0 (0)	2 (4)	50 (93)	0 (0)	0 (0)	7	61
	2004–2005	3 (6)	2 (4)	0 (0)	4 (8)	43 (83)	0 (0)	0 (0)	2	54
	2005–2006	1 (3)	1 (3)	0 (0)	0 (0)	23 (77)	4 (13)	1 (3)	3	33
	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
20B	2003–2004	17 (21)	3 (4)	0 (0)	3 (4)	51 (64)	1 (1)	5 (6)	0	80
	2004–2005	4 (8)	1 (2)	4 (8)	4 (8)	34 (64)	0 (0)	6 (11)	0	53
	2005–2006	0 (0)	1 (1)	3 (4)	2 (3)	58 (83)	0 (0)	6 (9)	0	70
	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
20C	2003–2004	7 (21)	7 (21)	1 (3)	1 (3)	17 (50)	0 (0)	1 (3)	0	34
	2004–2005	1 (8)	1 (8)	1 (8)	0 (0)	10 (77)	0 (0)	0 (0)	4	17
	2005–2006	1 (7)	5 (36)	0 (0)	0 (0)	8 (57)	0 (0)	0 (0)	0	14
	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
20F	2003–2004	0 (0)	2 (17)	0 (0)	0 (0)	10 (83)	0 (0)	0 (0)	0	12
	2004–2005	0 (0)	0 (0)	0 (0)	2 (25)	5 (63)	0 (0)	1 (13)	0	8
	2005–2006	0 (0)	0 (0)	0 (0)	0 (0)	7 (100)	0 (0)	0 (0)	0	7
	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
25C	2003–2004	2 (22)	0 (0)	0 (0)	2 (22)	5 (56)	0 (0)	0 (0)	0	9
	2004–2005	2 (11)	0 (0)	0 (0)	1 (6)	15 (83)	0 (0)	0 (0)	0	18
	2005–2006	0 (0)	0 (0)	1 (9)	1 (9)	9 (82)	0 (0)	0 (0)	1	12
	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
20A, 20B, 20C, 20F, and 25C	2005–2006 through 2007–2008	31 (7)	24 (5)	6 (1)	22 (5)	313 (71)	8 (2)	35 (8)	11	450

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

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
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Juneau, AK 99811-5526

WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008[1]

LOCATION

GAME MANAGEMENT UNIT: 20D (5637 mi^2; 14,596 km^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 at that time (35.5–44.3 wolves/1000 mi^2 or 13.7–17.1 wolves/1000 km^2). 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 removed 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. Since the wolf reduction program ended in spring 1983, all wolf harvest has been by hunting or trapping. In March 1995 the Alaska Board of Game adopted an intensive management program for Unit 20D and determined that the preferred use of moose and caribou in Unit 20D was for human consumption. As a result, the board adopted a 5-year wolf control implementation plan that authorized the commissioner of the department 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. The program became effective 1 July 1997 and expired 30 June 2002 without any wolf reduction program specifically targeting Unit 20D, although wolves were reduced in portions of northern Unit 20D as part of the Fortymile Nonlethal Predation Control Program.

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,

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

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. The domestication of wolves for personal use or for commercial purposes is generally considered incompatible with department management policies.

Management may include 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. Management will focus on providing sustained, diverse human uses of wolf populations consistent with goals listed in the *Wolf Conservation and Management Policy for Alaska*, adopted by the Alaska Board of Game 30 October 1991 and revised 29 June 1993. Those goals are:

- 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 reduction programs as directed by the commissioner and the Board of Game.
- Provide trapper education programs to improve trapper skills, ethics, and regulatory compliance.
- Model the potential effects of wolf predation on ungulates within Unit 20D.

METHODS

We estimated fall wolf population size using aerial surveys; interviews with local trappers, hunters, and pilots; and information about pack size recorded on fur sealing certificates. Aerial surveys were conducted from February–April by flying major rivers, creeks, exposed ridges, and other locations and searching for wolf tracks from a Piper PA–18 Super Cub. When tracks were located, the number of wolves and their direction of travel were determined. Survey information was recorded on topographic maps. Information from interviews with knowledgeable local pilots, hunters, and trappers was also used to determine pack size. Wolves harvested during the winter 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.

Trapper reports of pack size were used in some cases, if we deemed the observation to be accurate. After all pack counts were tallied, the population estimate was increased by 10% to account for lone wolves not associated with a pack. Unit 20D was subdivided into 2 areas, north and south of the Tanana River for calculating population estimates. Harvested wolves were sealed with locking tags and we recorded date of kill, name of trapper or hunter, kill 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., RY05 = 1 July 2005 through 30 June 2006).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

RY05. An aerial wolf survey was flown in Unit 20D during 1–12 March 2006 for 40.2 hours of flight time resulting in a search intensity of 0.5 min/mi^2 of wolf habitat (4800 mi^2).

In southern Unit 20D I estimated 17–18 wolves in 4 packs during spring surveys. An additional 26 wolves were reported killed by trappers and hunters during RY05. Therefore, a minimum of 43–44 wolves were present within southern Unit 20D during fall 2005 (Table 1).

The spring 2006 northern Unit 20D aerial survey resulted in an estimate of 39–44 wolves. Trappers reported taking 24 wolves during RY05, resulting in a fall 2005 population estimate of 63–68 wolves (Table 1).

The Unit 20D RY05 fall population contained at least 113–123 wolves after including an estimate of an additional 10% for single wolves (Table 1). The population estimate results in a density estimate of 23.5–25.6 wolves/1000 mi^2 (4800 mi^2 wolf habitat) or 9.1–9.9 wolves/1000 km^2 (12,435 km^2 wolf habitat; Table 1) and meets the population objective.

RY06. An aerial wolf survey was flown in Unit 20D on 13 February–28 March 2007 for 57.0 hours of flight time resulting in a search intensity of 0.7 min/mi^2 of wolf habitat (4800 mi^2).

The spring southern Unit 20D fall population estimate was 15–21 wolves in 4 packs. Trappers and hunters killed 28 wolves in southern Unit 20D, resulting in a fall estimate of 43–49 wolves (Table 1).

The spring northern Unit 20D survey resulted in 43–51 wolves observed in 8 packs. Trappers and hunters reported killing 25 wolves resulting in a fall 2006 population estimate of 68–76 wolves.

The Unit 20D RY06 fall population contained at least 123–138 wolves after including an estimate of an additional 10% for single wolves (Table 1). The population estimate results in a density estimate of 25.4–28.8 wolves/1000 mi^2 (4800 mi^2 wolf habitat) or 9.8–11.1 wolves/1000 km^2 (12,435 km^2 wolf habitat; Table 1) and meets the population objective.

RY07. Aerial wolf surveys were flown in Unit 20D on 27 February–28 March 2008 for 44.6 hours resulting in a search intensity of 0.6 min/mi^2 of wolf habitat (4800 mi^2). However, survey conditions were poor in much of southern and northern Unit 20D.

The southern Unit 20D spring population estimate was incomplete due to poor snow conditions east of the Gerstle River. The Jarvis Creek pack was the only pack for which a spring population estimate was achieved, with 4–6 wolves estimated in the pack. Trappers and hunters reported killing 13 wolves in southern Unit 20D, resulting in a minimum fall 2007 estimate of 17–19 wolves (Table 1).

The northern Unit 20D spring population estimate was 52–60 wolves in 9 packs, however, no surveys were flown in the Shaw Creek drainage due to poor snow conditions. Nine wolves were reported killed by trappers and hunters, resulting in a minimum fall estimate of 61–69 wolves (Table 1).

The Unit 20D RY07 incomplete population estimate of 86–97 wolves including an additional 10% for single wolves, met the population objective (Table 1). No wolf density estimates were calculated because of the incomplete estimate.

Distribution and Movements

No additional distribution or movement data was collected.

MORTALITY

Harvest

Season and Bag Limit.

Unit/Bag Limit/ Special Restrictions	Resident Open Seasons	Nonresident Open Seasons
Unit 20D		
HUNTING:		
RY05		
5 wolves. No wolf hunting same day airborne.	10 Aug–30 Apr	10 Aug–30 Apr
RY06–RY07		
5 wolves. No wolf hunting same day airborne	10 Aug–31 May	10 Aug–31 May
TRAPPING:		
RY05–RY07		
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. The Alaska Board of Game authorized the Upper Yukon–Tanana Wolf Control Area, which included portions of northern Unit 20D, for RY06 and RY07.

At the March 2006 Board of Game meeting, the board failed to adopt proposal 119 to implement active wolf control in northern Unit 20D and proposal 130 to allow the use of bait for hunting wolves in Unit 20. However, the board expanded wolf control in the Upper Yukon–Tanana Predation Control Area in 5 AAC 92.1259 (b) to include the portions of Unit 20D in the Goodpaster River drainage upstream from and including the South Fork Goodpaster River drainage, the Healy River, Billy Creek, and Sand Creek drainages. This change was intended to expand wolf control to initiate an increase in the Fortymile caribou herd.

Harvest by Hunters and Trappers. Hunters and trappers reported taking 50 wolves in RY05, 53 in RY06, and 22 in RY07 (Table 2). During RY05–RY07, 47% of harvested wolves with known sex were male and 53% were female (Table 2).

Wolf harvest rate was calculated for RY05 and RY06 when population estimates were calculated for the entire unit. In RY05, trappers and hunters took 50 wolves which was approximately 42% of the estimated fall population. In RY06, trappers and hunters took 53 wolves, an estimated 41% of the estimated fall population. The RY07 harvest was lower than RY05–RY06, however I did not calculate the harvest rate due to the incomplete population estimate. The National Research Council (1997) reported that determining sustainable levels of wolf harvest is difficult, but estimates of sustainable rates of harvest vary from less than 30% up to 40% of early winter populations. Therefore, Unit 20D wolf harvest may have exceeded sustainable levels during RY05–RY06, but was probably below sustainable levels in RY07 unless the population declined from previous years.

Most wolves were taken each year by trapping and snaring. Ninety percent of all wolves taken during RY05–RY07 were killed in traps or snares (Table 2).

Trappers and hunters continued the previous pattern of taking more wolves from southern than from northern Unit 20D during RY05–RY07 (Table 3). Among wolves with known harvest locations, 67% were taken in southern Unit 20D, probably because road and trail access is better in the southern part of the unit.

During RY06 and RY07 the Upper Yukon–Tanana Wolf Control Area included portions of northern Unit 20D including that portion of 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 2 years, only 1 wolf was killed as part of the control effort. This wolf was taken during RY06 in the Billy Creek drainage.

Harvest Chronology. There were no significant changes in wolf harvest chronology during RY05–RY07. Most wolves were harvested during November–January (Table 4).

Transport Methods. Snowmachines and highway vehicles were the most common modes of transportation used by trappers and hunters who harvested wolves (Table 5). Snowmachines were

used to take 70% of the wolves during RY05–RY07, and highway vehicles were used to take 15%.

CONCLUSIONS AND RECOMMENDATIONS

During RY05–RY07 the Unit 20D wolf management objective to maintain a population of 15–125 wolves was met. Harvest rates exceeded sustainable levels in RY05–RY06, however, because current intensive management objectives for both moose and caribou are for high population levels, no regulatory changes are recommended for Unit 20D wolf management at this time.

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TABLE 1 Unit 20D fall wolf population estimate, regulatory years 2003–2004 through 2007–2008

Area	Regulatory year (1 Jul–30 Jun)				
	2003–2004	2004–2005	2005–2006	2006–2007	2007–2008
Southern Unit 20D[a]	56–59	43–45	43–44	43–49	17–19[b]
Northern Unit 20D[c]	n/a	48–52	63–68	68–76	61–69[b]
Unit 20D subtotal	n/a	91–97	106–112	111–125	78–88[b]
Estimate 10% single wolves	n/a	9–10	10–11	11–13	8–9[b]
Unit 20D total	n/a	100–107	116–123	122–138	86–97[b]
Estimated wolves/1000 mi^2	n/a	17.7–18.9	23.5–25.6	25.4–28.8	n/a
Estimated wolves/1000 km^2	n/a	6.9–7.3	9.1–9.9	9.8–11.1	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 1985–1986 through 2007–2008

Regulatory	Reported harvest			Estimated harvest		Method of take				
year	M	F	Unk	Unreported	Illegal	Trap/snare	Shot	SDA[a]	Unk	Total
1985–1986	17	10	1	0	0	19	0	9	0	28
1986–1987	11	7	0	0	0	18	0	0	0	18
1987–1988	5	7	0	0	0	11	1	0	0	12
1988–1989	5	12	4	0	0	20	1	0	0	21
1989–1990	2	4	0	0	0	4	2	0	0	6
1990–1991	8	13	2	0	0	6	4	13	0	23
1991–1992	4	3	2	0	0	3	5	1	0	9
1992–1993	8	9	5	0	0	16	6	0	0	22
1993–1994	17	27	4	0	0	37	10	0	1	48
1994–1995	16	9	0	0	0	24	1	0	0	25
1995–1996	16	24	1	0	0	39	1	0	1	41
1996–1997	17	10	1	0	0	22	6	0	0	28[b]
1997–1998	22	15	4	0	0	37	3	0	1	41[c]
1998–1999	14	9	2	0	0	24	1	0	0	25[d]
1999–2000	19	19	4	0	0	34	8	0	0	42
2000–2001	21	16	4	0	0	33	8	0	0	41
2001–2002	27	22	1	0	0	49	1	0	0	50
2002–2003	16	8	1	0	0	18	6	0	1	25
2003–2004	20	14	0	0	0	30	4	0	0	34
2004–2005	10	18	1	0	0	20	6	0	3	29
2005–2006	19	30	1	0	0	43	5	0	2	50
2006–2007	25	27	1	0	0	48	3	1	1	53
2007–2008	13	7	2	0	0	22	0	0	0	22

[a] SDA refers to animals taken by hunters the same day hunters were airborne.
[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 1996–1997 through 2007–2008

Regulatory year	North of Tanana River	South of Tanana River	Unknown
1996–1997	10	18	0
1997–1998	17	24	0
1998–1999	12	13	0
1999–2000	13	28	1
2000–2001	12	29	0
2001–2002	18	32	0
2002–2003	9	16	0
2003–2004	5	29	0
2004–2005	16	13	0
2005–2006	24	26	0
2006–2007	25	28	0
2007–2008	9	13	0

TABLE 4 Unit 20D wolf harvest chronology, regulatory years 1985–1986 through 2007–2008

Regulatory year	Harvest chronology											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	*n*
1985–1986		0	0	0	4	3	4	5	8	2	2	28
1986–1987		0	0	0	0	2	8	2	6	0	0	18
1987–1988		1	0	0	4	0	1	6	0	0	0	12
1988–1989		0	0	0	0	5	5	10	0	1	0	21
1989–1990		0	1	0	0	3	0	0	2	0	0	6
1990–1991		0	0	2	2	0	0	3	16	0	0	23
1991–1992		0	2	0	0	2	1	1	3	0	0	9
1992–1993		1	1	0	2	8	0	4	3	2	1	22
1993–1994		0	5	0	6	11	6	4	16	0	0	48
1994–1995		0	1	0	0	3	6	8	6	1	0	25
1995–1996		0	0	0	9	7	8	7	9	1	0	41
1996–1997	0	2	2	1	6	4	4	7	1	0	1	27
1997–1998	1	0	1	0	9	9	8	3	9	1	0	41
1998–1999	0	0	0	0	6	8	4	5	2	0	0	25
1999–2000	0	0	2	0	5	7	9	6	11	2	0	42
2000–2001	0	1	3	1	9	6	5	7	6	3	0	41
2001–2002	0	0	0	0	15	12	6	11	4	1	1	50
2002–2003	0	0	6	0	1	3	7	2	4	2	0	25
2003–2004	0	1	1	0	4	11	6	6	5	0	0	34
2004–2005	0	1	3	0	6	3	5	5	3	0	3	29
2005–2006	0	1	3	1	12	10	14	6	3	0	0	50
2006–2007	0	0	2	1	18	10	9	4	8	1	0	53
2007–2008	0	0	0	0	4	6	3	6	3	0	0	22

TABLE 5 Unit 20D wolf harvest by transport method, regulatory years 1985–1986 through 2007–2008

Regulatory year	Harvest by transport method									
	Airplane	Dogsled/ Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Ski/ Walk	Unk	*n*
1985–1986	10	0	0	0	16	0	1		1	28
1986–1987	1	1	0	0	16	0	0		0	18
1987–1988	1	5	0	0	4	0	1		1	12
1988–1989	0	0	0	0	21	0	0		0	21
1989–1990	0	0	0	0	4	1	0		1	6
1990–1991	15	0	0	0	4	1	3		0	23
1991–1992	1	0	0	0	6	0	2		0	9
1992–1993	10	0	0	1	8	1	0		2	22
1993–1994	7	0	0	0	34	0	5		2	48
1994–1995	0	1	0	0	17	0	6		1	25
1995–1996	1	2	0	2	22	1	13		0	41
1996–1997	1	2	0	1	13	1	8		1	27
1997–1998	0	4	0	0	22	0	6	9	0	41
1998–1999	0	3	0	1	11	0	10	0	0	25
1999–2000	0	0	1	2	26	2	7	4	0	42
2000–2001	1	0	1	1	27	1	8	2	0	41
2001–2002	0	0	0	0	40	0	9	1	0	50
2002–2003	3	2	0	1	14	0	3	2	0	25
2003–2004	0	0	0	1	24	1	8	0	0	34
2004–2005	3	0	0	2	19	0	2	3	0	29
2005–2006	4	0	0	0	30	1	10	5	0	50
2006–2007	4	0	0	0	39	1	9	0	0	53
2007–2008	1	0	0	0	18	0	0	3	0	22

WILDLIFE

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 2005
To: 30 June 2008[1]

LOCATION

GAME MANAGEMENT UNIT: 20E (10,680 mi^2)

GEOGRAPHIC DESCRIPTION: Fortymile, Ladue, and Charley River drainages

BACKGROUND

Since the 1940s, wolf numbers in Unit 20E have fluctuated due to federal and state wolf control programs, harvest pressure, and ungulate densities. 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 1981, the wolf population was stable at relatively low densities and was food-limited (Gasaway et al. 1992). The population was lightly harvested ($\bar{x}$ = 11% annual harvest rate). During 1981–1983 the Alaska Department of Fish and Game (ADF&G) conducted a wolf control program in a 6000-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 1986. Wolf productivity increased following control efforts (Gasaway et al. 1992), and during the late 1980s the wolf population increased by approximately 17% annually, reaching an estimated 230 wolves in 1990. Between 1990 and 1995 wolf numbers fluctuated but remained stable overall.

Between 1997 and 2001, the size of 15 wolf packs within and adjacent to western Unit 20E were reduced to the dominant pair under the Fortymile nonlethal wolf control program. ADF&G accomplished this by sterilizing the dominant pair and translocating remaining wolves.

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

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 primarily affected 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.

During 1995 and 1996, wolf harvest was high due to a privately funded wolf harvest incentive program designed to increase wolf harvest within the summer and winter ranges of the Fortymile caribou herd. Under this program, trapper harvest reduced the wolf population in portions of the herd's range.

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 also recognize the aesthetic value of being aware of or observing 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 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 consistent with goals listed in the *Wolf Conservation and Management Policy for Alaska*, adopted by the Alaska Board of Game 30 October 1991 and revised 29 June 1993. Those goals are 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 that 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

- Reduce the fall population to no less than 60 wolves.

MANAGEMENT ACTIVITIES

- Monitor harvest through sealing records and trapper questionnaires.

- Conduct aerial surveys in southern 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

During February and March 2006–2008 we conducted aerial wolf reconnaissance surveys (Stephenson 1978; Gasaway et al. 1983; M. McNay, ADF&G, personal communication) in the 8300-mi^2 portion of Unit 20E outside of Yukon–Charley National Preserve. We estimated the unitwide fall wolf population size using PredPrey (McNay and DeLong 1998) modeling software with inputs from the literature and data gathered from aerial reconnaissance surveys (Stephenson 1978; Gasaway et al. 1983; M. McNay, ADF&G, personal communication); radiotelemetry data from wolves with ADF&G and National Park Service radiocollars within Unit 20E; wolf observations by wolf control permittees, area pilots and trappers; and harvest data from sealing certificates (Table 1). Population data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY05 = 1 Jul 2005 through 30 Jun 2006).

HARVEST MONITORING

Harvest data were summarized by regulatory year. We determined harvest statistics from sealing documents and fur acquisition reports. An official seal must be attached to all wolves harvested in Alaska. During the sealing process, information is 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 2000–2004 are found in Gross (2006). During RY05–RY07 the population in Unit 20E was reduced (Table 1) primarily due to increased harvest mortality by aerial wolf control permittees under the upper Yukon–Tanana predation control program in addition to harvest by several trappers from Tok and Chicken who used highway vehicles and airplanes as well as snowmachines.

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–RY04. During RY05–RY07 the Fortymile caribou herd (approximately 39,000–42,000 caribou) spent 8–10 months annually in Unit 20E and 15,000–30,000 Nelchina caribou occupied the southern portion of the unit during

November–April each year. In addition, the high and increasing snowshoe hare population and the low density moose and Dall sheep populations provided additional prey for wolves.

RY05. Survey conditions were poor during the February–March 2006 wolf reconnaissance surveys, primarily due to lack of adequate snow cover and prevalence of caribou tracks. However, based upon this survey we estimated the fall 2005 population to be 172–191 wolves in 29–35 packs (pack = 2 or more wolves), including 17–19 (10%) single wolves not associated with packs.

RY06. Survey conditions were poor during the February–March 2007 wolf reconnaissance surveys, primarily due to lack of adequate snow cover and prevalence of caribou tracks. However, based upon modeling and this survey we estimated the fall 2006 population to be 172–201 wolves in 29–37 packs, with 10% of this estimate made up of single wolves not associated with packs.

RY07. Survey conditions were poor during the February–March 2008 wolf reconnaissance surveys, primarily due to lack of adequate snow cover and prevalence of caribou tracks. However, based upon modeling and this survey we estimated the fall 2006 population to be 184–198 wolves in 30–36 packs, with 10% of this estimate made up of single wolves that were not associated with packs.

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–RY07.		
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 meeting, the board designated the Unit 20E moose population within the Fortymile and Ladue River drainages and the Fortymile caribou herd as important for high levels of human consumptive use under the intensive management law (AS 16.05.255[e]–[g]). This designation

means 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 intent of the intensive management law.

During the spring 2004 meeting, the board approved the upper Yukon–Tanana predator control plan, which allows ADF&G to conduct a wolf population reduction or regulation program for up to 5 years, beginning 1 January 2005 in the upper Yukon–Tanana wolf control area in portions of Units 12 and 20E.

In spring 2005, the board extended the closing date of the Unit 20E wolf hunting season from 30 April to 31 May.

During the May portion of the spring 2006 meeting, in response to lack of Fortymile caribou herd population growth after the population peaked at approximately 44,100 animals in 2003, the board expanded the wolf control portion of the upper Yukon–Tanana predation control area (5 AAC 92.125[b]) from 6,600 m^2 to 18,750 m^2 to include most of the FCH range. This change was intended to expand wolf control to initiate an increase in the FCH and aid in achieving the population objective of 50,000–100,000 caribou and harvest objective of 1,000–15,000 caribou under intensive management regulations.

Hunter–Trapper Harvest. During RY05–RY07, 32–54 wolves were reported as harvested annually in Unit 20E by hunters and trappers (Table 2). This harvest is comparable to that reported during RY04, when harvest by hunter–trappers was 47 wolves (Table 2). The RY04 harvest combined with the 58 wolves killed during the predation control program exceeded the maximum sustainable harvest rate of 25–30% for the first time since RY95. Estimated annual harvest rates in RY05–RY07 by all methods of take (hunting, trapping, and predator control) continued to be above the estimated maximum sustainable harvest rate of 25–30% of the total population (range 27–37%, Table 2). Snares and traps continued to be the primary methods to catch wolves in Unit 20E, although 7–20% annually were shot (Table 2), likely incidental to fall moose or caribou hunting.

Harvest Chronology. During RY05–RY07, 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 RY05–RY07 (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 upper Yukon–Tanana wolf control program to reduce wolf predation on moose and caribou in order to make progress toward intensive management objectives for those species. In RY05–RY07, 16–18 wolves were killed annually in Unit 20E by these permittees (same-day-airborne; Table 2). Additional information about the upper Yukon–

Tanana predation control program during RY05–RY07, can be found in the 2006–2008 annual upper Yukon–Tanana predation control program reports to the Board of Game (unpublished reports, ADF&G, Tok).

CONCLUSIONS AND RECOMMENDATIONS

Our management objective to reduce the fall population to no less than 60 wolves was met during RY05–RY07. During the next reporting period we will continue efforts to reduce the wolf population through aerial wolf control combined with hunting and trapping. Most of the management activities were completed during RY05–RY07. Sealing records and trapper questionnaires were completed each year. Aerial surveys were conducted annually, although poor snow conditions and many caribou tracks in portions of the unit made tracking wolves difficult. However, by combining data gathered from aerial reconnaissance surveys, radiotelemetry flights, sealing certificates, literature, observations by pilots and trappers, and using the modeling program PredPrey (McNay and DeLong 1998), we determined 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 over 5000 people in Alaska and Canada.

During RY05–RY07, the wolf population in Unit 20E remained stable at lower levels than previous years primarily due to high take by wolf control permittees under the upper Yukon–Tanana predation control program (active during RY04–RY07) and harvest by local trappers. Wolf harvest in RY04–RY07 exceeded maximum sustainable levels in portions of Unit 20E, 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 our minimum population objective of 60 wolves.

The management objective during the next report period will be to reduce the fall population to as low as possible, but to no less than 60 wolves. This objective parallels the wolf population objective approved by the Board of Game for ongoing predator control programs in the upper Yukon–Tanana predation control area. This wolf control program calls for a 75% reduction in the wolf population, but requires maintaining a late-winter wolf population of 88–103 wolves in the entire upper Yukon–Tanana wolf control area, including Unit 20E. Management activities will also remain the same during the next report period.

During the next report period, the upper Yukon–Tanana predation control program is due to expire. Prior to expiration, we will analyze results of the upper Yukon–Tanana predation control program and recommend to the Board of Game whether the program should continue. No other regulatory changes are recommended at this time.

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TABLE 1 Unit 20E fall wolf population estimates[a], regulatory years 1990–1991 through 2007–2008[b]

Regulatory year	Population estimate[c]	Number of packs	Mean pack size[d]	Basis of estimate
1990–1991	231	33	6.3	Aerial survey, observations, reports
1991–1992	169–184	31	5.1	Aerial survey, observations, reports, radiocollars
1992–1993	194–214	32	5.7	Aerial survey, observations, reports, radiocollars
1993–1994	200–224	34	5.7	Aerial survey, observations, reports, radiocollars
1994–1995	192–204	34	5.3	Aerial survey, observations, reports, radiocollars
1995–1996	227–238	34	6.2	Aerial survey, observations, reports, radiocollars
1996–1997	220–230	34	6.0	Aerial survey, observations, reports, radiocollars
1997–1998	221–236	34	6.0	Aerial survey, observations, reports, radiocollars
1998–1999	195–225	34	5.6	Aerial survey, observations, reports, radiocollars
1999–2000	—	—	—	Population was not estimated
2000–2001	—	—	—	Population was not estimated
2001–2002	—	—	—	Population was not estimated
2002–2003	245–260	34	7.4	Aerial survey, observations, reports, radiocollars
2003–2004	234–265	24–36	6.6–11.0	Aerial survey, observations, reports, radiocollars
2004–2005	252–313	26–42	6.0–12.1	Aerial survey, observations, reports, radiocollars
2005–2006	172–191	29–35	4.9–6.6	Aerial survey, observations, reports, radiocollars
2006–2007	172–201	29–37	4.7–6.9	PredPrey model[e]
2007–2008	184–198	30–36	5.1–6.6	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 radiocollars 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 1990–1991 through 2007–2008

Regulatory year	Reported harvest						Method of take				Successful	
	M	(%)	F	(%)	Total[a]	% Autumn population[b]	Trap or snare	(%)	Shot	(%)	SDA[c,d]	(%)	Unk	Trappers, hunters and wolf control permittees	Wolves/ person
1990–1991	15	(63)	9	(37)	24	10	12	(52)	5	(22)	6	(26)	1	13	1.8
1991–1992	13	(68)	6	(32)	19	11	14	(78)	1	(6)	3	(17)	1	10	1.9
1992–1993	28	(50)	28	(50)	57	28	52	(95)	3	(5)	0	(0)	2	21	2.7
1993–1994	34	(57)	26	(43)	68	32	55	(90)	6	(10)	0	(0)	7	21	3.2
1994–1995	24	(63)	14	(37)	39	20	29	(74)	8	(21)	2	(5)	0	16	2.4
1995–1996	37	(49)	39	(51)	84	37	80	(95)	3	(4)	1	(1)	0	18	4.6
1996–1997	24	(51)	23	(49)	54	24	48	(89)	6	(11)	0	(0)	0	15	3.6
1997–1998	16	(44)	20	(56)	36[e]	16	32	(91)	3	(9)	0	(0)	0	10	3.5
1998–1999	9	(60)	6	(40)	17	8	12	(71)	5	(29)	0	(0)	0	9	1.9
1999–2000	18	(62)	11	(38)	31	–[f]	27	(96)	1	(4)	0	(0)	3	21	1.5
2000–2001	27	(57)	20	(54)	50	–[f]	44	(88)	6	(12)	0	(0)	0	12	4.2
2001–2002	20	(65)	11	(35)	32	–[f]	29	(91)	3	(9)	0	(0)	0	10	3.1
2002–2003	15	(56)	12	(44)	28	11[g]	23	(85)	4	(15)	0	(0)	1	14	2.0
2003–2004	22	(55)	18	(45)	40	16[g]	34	(85)	6	(15)	0	(0)	0	17	2.4
2004–2005	58	(57)	44	(43)	105	37[g]	28	(27)	19	(18)	58	(55)	0	27	3.9
2005–2006	25	(52)	23	(48)	49	27[g]	26	(53)	6	(12)	17	(35)	0	12	4.1
2006–2007	45	(63)	26	(37)	72	37[g]	48	(68)	5	(7)	18	(25)	1	19	3.8
2007–2008	31	(58)	22	(42)	56	29[g]	29	(52)	11	(20)	16	(29)	0	20	2.8

[a] Total harvest includes animals of undetermined sex.

[b] Proportion of the estimated fall population harvested by the end of the season in Apr. 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.

[d] 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.

[e] One wolf was accidentally killed during a capture operation; it was only included in the total take.

[f] Population was not estimated, therefore percent autumn population was not calculated.

[g] Midpoint population estimate used in calculation.

TABLE 3 Unit 20E wolf harvest chronology by month, regulatory years 1990–1991 through 2007–2008

Regulatory year	Harvest chronology by month																		
	Aug	(%)	Sep	(%)	Oct	(%)	Nov	(%)	Dec	(%)	Jan	(%)	Feb	(%)	Mar	(%)	Apr	(%)	*n*[a]
1990–1991	3	(15)	2	(10)	0	(0)	0	(0)	2	(10)	4	(20)	3	(15)	2	(10)	4	(20)	24
1991–1992	0	(0)	1	(6)	1	(6)	2	(11)	4	(22)	4	(22)	5	(28)	1	(6)	0	(0)	19
1992–1993	0	(0)	3	(5)	1	(2)	1	(2)	6	(11)	13	(23)	18	(32)	10	(18)	5	(9)	57
1993–1994	2	(3)	3	(5)	4	(6)	8	(13)	18	(29)	8	(13)	12	(19)	6	(10)	1	(2)	68
1994–1995	3	(8)	2	(5)	3	(8)	3	(8)	7	(18)	5	(13)	9	(23)	7	(18)	0	(0)	39
1995–1996	1	(1)	1	(1)	4	(5)	12	(14)	11	(13)	10	(12)	24	(29)	15	(18)	5	(6)	84
1996–1997	0	(0)	4	(7)	0	(0)	1	(2)	15	(28)	14	(26)	4	(7)	13	(24)	3	(6)	54
1997–1998	0	(0)	2	(6)	0	(0)	3	(8)	8	(23)	14	(40)	3	(9)	5	(14)	0	(0)	37
1998–1999	0	(0)	4	(24)	0	(0)	0	(0)	2	(12)	4	(24)	3	(18)	4	(24)	0	(0)	17
1999–2000	0	(0)	2	(6)	0	(0)	1	(3)	5	(16)	7	(23)	5	(16)	0	(0)	11	(35)	31
2000–2001	0	(0)	4	(8)	0	(0)	2	(4)	7	(14)	13	(26)	15	(30)	5	(10)	4	(8)	50
2001–2002	0	(0)	2	(6)	0	(0)	2	(6)	12	(38)	6	(19)	6	(19)	4	(13)	0	(0)	32
2002–2003	2	(7)	2	(7)	0	(0)	1	(4)	4	(14)	12	(43)	1	(4)	1	(4)	5	(18)	28
2003–2004	0	(0)	4	(10)	2	(5)	1	(3)	1	(3)	4	(10)	18	(45)	10	(25)	0	(0)	40
2004–2005	1	(1)	18	(17)	0	(0)	1	(1)	4	(4)	5	(5)	46	(44)	21	(20)	9	(9)	105
2005–2006	0	(0)	1	(2)	0	(0)	9	(18)	4	(8)	6	(12)	9	(18)	8	(16)	12	(25)	49
2006–2007	0	(0)	4	(6)	2	(3)	9	(13)	9	(13)	12	(17)	9	(13)	17	(24)	10	(14)	72
2007–2008	2	(4)	8	(14)	0	(0)	8	(14)	3	(5)	9	(16)	4	(7)	16	(29)	6	(11)	56

[a] Total includes wolves for which date of take was unknown.

TABLE 4 Unit 20E wolf harvest by transport method, regulatory years 1990–1991 through 2007–2008[a]

Regulatory year	Harvest by transport method								
	Airplane (%)	Dogsled, skis, or snowshoes (%)	Boat (%)	3- or 4-Wheeler (%)	Snowmachine (%)	ORV (%)	Highway vehicle (%)	Unk	*n*
1990–1991	8 (35)	1 (4)	0 (0)	2 (9)	10 (43)	0 (0)	2 (9)	1	24
1991–1992	4 (24)	1 (6)	0 (0)	1 (6)	10 (59)	0 (0)	1 (6)	2	19
1992–1993	6 (11)	6 (11)	0 (0)	0 (0)	41 (72)	0 (0)	4 (7)	0	57
1993–1994	16 (24)	0 (0)	0 (0)	1 (1)	31 (46)	0 (0)	19 (28)	1	68
1994–1995	14 (36)	0 (0)	0 (0)	0 (0)	23 (59)	0 (0)	2 (5)	0	39
1995–1996	11 (13)	3 (4)	0 (0)	1 (1)	67 (80)	0 (0)	2 (2)	0	84
1996–1997	5 (10)	0 (0)	1 (2)	1 (2)	43 (83)	1 (2)	1 (2)	2	54
1997–1998	1 (3)	0 (0)	0 (0)	1 (3)	22 (63)	0 (0)	11 (31)	0	35
1998–1999	2 (12)	0 (0)	0 (0)	1 (6)	6 (35)	0 (0)	8 (47)	0	17
1999–2000	11 (35)	0 (0)	0 (0)	0 (0)	18 (58)	0 (0)	2 (6)	0	31
2000–2001	10 (20)	1 (2)	0 (0)	1 (2)	30 (60)	0 (0)	8 (16)	0	50
2001–2002	8 (25)	0 (0)	0 (0)	1 (3)	21 (66)	0 (0)	2 (6)	0	32
2002–2003	2 (7)	3 (11)	0 (0)	3 (11)	11 (39)	0 (0)	9 (32)	0	28
2003–2004	7 (18)	2 (5)	1 (3)	1 (3)	28 (70)	0 (0)	1 (3)	0	40
2004–2005	71 (68)	4 (4)	0 (0)	2 (2)	24 (23)	0 (0)	3 (3)	1	105
2005–2006	17 (35)	0 (0)	1 (2)	1 (2)	22 (45)	0 (0)	8 (16)	0	49
2006–2007	21 (29)	2 (3)	1 (1)	8 (11)	29 (40)	0 (0)	10 (14)	1	72
2007–2008	20 (36)	0 (0)	0 (0)	6 (11)	24 (43)	0 (0)	6 (11)	0	56

[a] Unknown transport not used to calculate harvest.

WILDLIFE

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 2005
To: 30 June 2008[1]

LOCATION

GAME MANAGEMENT UNITS: 21A and 21E (18,792 mi^2)*

* Does not include the upper Nowitna River drainage, which was excluded from Unit 21A beginning 1 July 2006.

GEOGRAPHIC DESCRIPTION: Drainages of the Yukon River from Paimiut upstream to, but not including, the Blackburn Creek drainage; and the Innoko River drainage

BACKGROUND

The dominant human uses of wolves in Units 21A and 21E are for commercial sale and personal use. Hunters also consider wolves a trophy big game animal and many Unit 21A and 21E residents consider wolves to be a competitor for moose. This was 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 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 remains too low to change natural predation rates.

To facilitate moose management within the Nowitna River drainage, 4476 mi^2 of Unit 21A within the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna rivers became part of Unit 21B beginning 1 July 2006. This is the first Unit 21A and 21E wolf management report that does not include data from the Nowitna River drainage.

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

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- 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

- Maintain a viable wolf population of at least 100 wolves.
- Maintain a 3-year average harvest of at least 25% of the estimated wolf population in Units 21A and 21E combined.

MANAGEMENT ACTIVITIES

- Refine annual wolf population estimates based on incidental sightings, hunter interviews, trapper questionnaires, and evaluation of sealing documents.
- Monitor harvests through sealing records and trapper questionnaires.
- 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. This includes addressing wolf predation consistent with the YIMMP.

METHODS

During RY05–RY07 we estimated areawide wolf population size (Table 1) using a combination of data from similar areas (Unit 19D East surveys, Unit 20A wolf research data), harvest records, 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 3600-mi^2 area of Unit 21E. Within the area surveyed 1900 mi^2 have high quality moose habitat and therefore high wolf densities, and 1700 mi^2 are low quality moose habitat with low wolf densities. We extrapolated the resulting densities to all of Unit 21E (2400 mi^2 of high quality moose habitat and 5600 mi^2 of low quality moose habitat). Average wolf harvest during RY98–RY07 was used to adjust this estimate upward to arrive at a fall 2008 wolf population estimate.

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., RY07 = 1 Jul 2007 through 30 Jun 2008).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size and Density

Sealing records and our observations support trapper reports that wolves were abundant and the population was stable across Units 21A and 21E. We estimated that the wolf population was stable during RY03–RY07 with 240–460 wolves in 35–66 packs in Unit 21A (corrected for the new smaller unit size) and 180–240 wolves in 25–35 packs in Unit 21E.

Using the March 2009 wolf reconnaissance survey we estimated the RY08 wolf population in Unit 21E was 146–156 wolves (18–20 wolves/1000 mi^2) in 19–25 packs. We found 9–10 packs and 3 singles during the survey with 63–70 total wolves (average pack size of 6.3–7.8 wolves). We directly observed or accounted for tracks of 38–45 wolves in 1900 mi^2 of high quality moose habitat with high wolf densities (20–24 wolves/1000 mi^2) and 25 wolves in 1700 mi^2 of low quality moose habitat with lower wolf densities (14 wolves/1000 mi^2). We extrapolated to all of Unit 21E (approximately 2400 mi^2 of high quality moose habitat and 5600 mi^2 of low quality moose habitat) to obtain an estimate of 126–136 wolves. We further refined this estimate by adding 20 wolves (the number we approximate is taken annually based upon a 10-year average harvest during RY98–RY07, declining trends in harvest, and estimated unreported take of wolves) to determine a fall population estimate of 146–156 wolves (18–20 wolves/1000 mi^2) in 19–25 packs in Unit 21E.

The apparent reduction in the number of wolves in Unit 21E from 180–240 wolves in 25–35 packs to 146–156 wolves in 19–25 packs is more likely a result of improvements in our estimate than a real reduction in the wolf population. The trend in the wolf population is still considered stable, despite this lower estimate (Table 1).

The March 2009 moose population survey in Unit 21E just prior to the wolf survey resulted in a population estimate of 6218 observable moose ±17% (5147–7288) at 90% CI. This results in a wolf:moose ratio of 1:33–1:50. A large component of the moose that winter in Unit 21E is likely transient, so this low ratio is valid only during winter, assuming a resident wolf population.

Population Composition

The only data available relative to the sex composition of the wolf population were sex ratios of harvested wolves reported on sealing documents. Ratios in the harvest during RY03–RY07 were roughly 1:1 (57 males:54 females with 1 unknown), and are assumed to represent overall population sex ratios (Table 2).

Distribution and Movements

Harvest locations, observed wolf tracks, and incidental sightings indicated the wolf population was well distributed throughout both units. Wolf habitat is defined largely by abundance of prey, and potential ungulate prey existed throughout the management area during RY05–RY07. During March 2009 wolf surveys in Unit 21E, we found high quality moose wintering habitat with correspondingly high wolf densities in the flats between and adjacent to the Yukon and Innoko rivers. We judged the remainder of Unit 21E to be of poorer quality moose habitat with lower wolf densities.

MORTALITY

Harvest

Season and Bag Limit. The wolf hunting and trapping seasons and bag limits became less restrictive in Units 21A and 21E during RY05–RY07 as shown below.

Bag Limit	Resident/Nonresident Open Seasons
RY05 – Units 21A and 21E	
HUNTING: 5 wolves.	10 Aug–30 Apr
TRAPPING: No limit.	1 Nov–30 Apr
RY06–RY07 – Unit 21A	
HUNTING: 10 wolves.	10 Aug–30 Apr
TRAPPING: No limit.	1 Oct–30 Apr
RY06–RY07 – Unit 21E	
HUNTING: 10 wolves.	10 Aug–30 Apr
TRAPPING: No limit.	1 Nov–30 Apr

Alaska Board of Game Actions, Emergency Orders, and Legislative Actions. In RY06 the Alaska Board of Game lengthened the Unit 21A trapping season by 1 month to begin 1 October; and increased the bag limit for wolf hunting in Unit 21 to 10 wolves.

Beginning in RY06, legal methods for taking wolves in Unit 21 included using a snowmachine to position a hunter to select an individual wolf for harvest during hunting and trapping seasons provided that wolves are not shot from a moving snowmachine.

During the January 2006 Board of Game meeting the boundaries of Unit 21A were changed so that the entire Nowitna River drainage is excluded from Unit 21A. This change subtracted 4476 mi^2 from Unit 21A and included this area in Unit 21B beginning 1 July 2006.

Harvest by Hunters and Trappers. During RY05–RY07, 12–25 wolves were reported harvested annually in Units 21A and 21E (Tables 2–6). In Unit 21A, most wolves (59%) were snared, while in Unit 21E method of take was evenly divided between shooting (32%), trapping (33%)

and snaring (35%) during RY03–RY07 (Table 3). Harvest methods during RY85–RY04 are described in Seavoy (2006).

Hunter Residency and Success. During RY05–RY07, nonresidents took 1–6 wolves (Table 4) each year. Nearly all were taken by shooting during September, which is typical for wolves harvested incidentally to other big game. One other wolf was snared by a nonresident during December 2007.

Alaska residents took the balance of the wolf harvest during RY05–RY07, and 6–23 wolves were taken each year by residents in Units 21A and 21E. Overall, local residents (residents of Units 21A, 21E, and 19D) accounted for 72% of the total harvest during RY05–RY07.

Successful hunters and trappers averaged 2 wolves per year during RY03–RY07 (Table 4). The highest number of wolves taken by an individual was 10 and the most wolves reported shot by an individual was 3. 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 RY05–RY07 occurred during January–March (Table 5). September harvest was generally low and incidental to big game hunts for other species.

Transport Methods. During RY05–RY07, 76% of the wolves harvested were taken by trappers who used snowmachines. Aircraft and boats were used by all but 2 of the remainder of successful trappers. One trapper reported using a horse or dog team and one reported using skis–snowshoes (Table 6).

Other Mortality

No other wolf mortality data are available for RY05–RY07.

NONREGULATORY MANAGEMENT PROBLEMS, NEEDS, AND EDUCATION

Yukon-Innoko Moose Management Plan

The YIMMP (ADF&G 2006) was intended to establish a proactive management program to help maintain an abundant moose population in Units 21A and 21E to provide for high levels of human consumptive uses and to help prevent a decline in the moose population to a low level that would be very difficult to reverse. This plan includes recommendations to increase harvest of wolves through hunting and trapping.

The YIMMP was developed through a cooperative effort involving a citizens' advisory group called the Yukon–Innoko Moose Management Working Group (Working Group). ADF&G staff participated in the project as technical advisors. The Working Group included representatives of the Grayling–Anvik–Shageluk–Holy Cross and lower Yukon Fish and Game advisory committees, the western Interior and Yukon–Kuskokwim Delta regional advisory councils, nonlocal hunters, and representatives of commercial interests and others interested in hunting in the region.

The Y IMMP addresses the predominant cause of moose mortality, which is thought to be predation by wolves, black bears, and brown bears. Recommendations in the plan for managing predation on moose are divided into 2 types of strategies. The first strategy recommends reducing predation on moose through wolf and bear hunting, wolf trapping, and public education. The second strategy applies active management of predation through state intensive management laws. This strategy includes consideration of an aerial wolf predation control program.

Goals, objectives, strategies, and recommendations of the Y IMMP that pertain to wolf management in Units 21A and 21E are listed below, as well as Board of Game actions pertaining to those recommendations.

Goal 2: Manage the effects of predation on moose to maintain an abundant moose population that can provide for high levels of human consumptive uses consistent with the intensive management population and harvest objectives.

Objective 2 A: Reduce the effects of predation on moose so there are no fewer than 20% short-yearlings (calves from the previous year) in the moose population in late winter surveys.

Strategy 2A: Manage the level of predation on moose by harvesting enough wolves, black bears, and grizzly bears under state and federal hunting and trapping regulations to reduce the level of predation on moose so that the moose population remains stable or increases.

Recommendation 2.2: Authorize use of snowmachines for taking wolves in Unit 21E.

Board of Game Action Taken: In 2006 the board authorized use of snowmachines to position hunters to take wolves in Unit 21 (including Units 21A and 21E) and Unit 24. Using a snowmachine to take wolves is not allowed on National Park Service or National Wildlife Refuge lands unless approved by the federal agencies.

Recommendation 2.3: Increase the bag limit for wolves under hunting regulations to 10 wolves per day in Unit 21E.

Board of Game Action Taken: The board increased the hunting bag limit for wolves in Units 21A and 21E to 10 wolves and extended the wolf trapping season in Unit 21A to 1 October–30 April.

Recommendation 2.4: Use public information and education to inform local residents and other hunters about the effects of bear and wolf predation on moose and to encourage increased predator harvest. ADF&G should also produce public informational materials to help educate urban Alaska residents, nonhunters and residents of other states about the effects of predation on moose populations and the importance of moose for the livelihood of subsistence hunters.

Recommendation 2.5: State and federal agencies should work with village councils to conduct wolf snaring and trapping clinics in communities in Unit 21E on a periodic basis, according to local interest and the resources available.

Strategy 2 B: Utilize intensive management techniques to achieve the intensive management population and harvest objectives through active management of predators and/or habitat.

Recommendation 2.6: Prepare an intensive management plan for consideration by the board at their March 2006 meeting. The plan should include a wolf predation control implementation plan.

Board of Game Action Taken: The board endorsed the *Yukon–Innoko Moose Management Plan* during the March 2006 meeting and directed ADF&G to proceed with the development of a predation control implementation plan. We prepared implementation plans for the March 2008 and 2009 Board of Game meetings, but the board deferred the proposals.

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, coincident with experienced pilot–observer teams positioned to begin surveys when these conditions occur, and sufficient personnel and funding.

Hunting and trapping of wolves in Units 21A and 21E has not regulated the wolf population as may have been the case prior to restrictions placed on the use of aircraft in the early 1990s. As more local people realized that predator control actions by ADF&G are constrained politically, interest in trapping clinics and trapping incentive programs increased. However, achieving wolf harvest under hunting and trapping regulations sufficient to increase moose survival has not happened. Furthermore, such harvest is unlikely due to current high fuel prices, low fur prices, and the small number of active wolf trappers.

CONCLUSIONS AND RECOMMENDATIONS

The objective to maintain a viable wolf population of at least 100 wolves was met. Our estimate of a total wolf population of at least 420 wolves in Units 21A and 21E exceeds that amount. 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 RY05–RY07 the average harvest of 4% of the population was well below the objective.

We accomplished most management activities as intended during RY05–RY07. We refined annual wolf population estimates, monitored harvest, and cooperated with other agencies to conduct wolf studies. Although the Board of Game did not authorize ADF&G to conduct a predation control program, we prepared a predation control implementation plan as requested by the Board of Game. This plan will again be considered at the 2010 Board of Game meeting.

Providing wolf trapping clinics within area villages is part of the YIMMP, but we did not provide any during RY05–RY07 because funding and personnel were not available.

The March 2009 wolf population survey improved our wolf population estimate in Unit 21E. We plan to conduct wolf reconnaissance population estimation surveys in Unit 21E at 3-year intervals in conjunction with moose population estimation surveys in Unit 21E. 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.

Management goals for the next report period will be:

- Ensure the long-term conservation of wolves throughout their historic range in Units 21A and 21E in relation to their prey and habitat.

- 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 for the next report period will be:

- Maintain a viable wolf population of at least 100 wolves, unless directed otherwise by the commissioner and the Board of Game 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 for the next report period will be:

- 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 the Board of Game.

- Conduct wolf reconnaissance population estimation survey 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.

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TABLE 1 Units 21A and 21E wolf population estimates, regulatory years 2003–2004 through 2008–2009

Regulatory year	Unit	Population estimate Min	Population estimate Max	Number of packs	Trend
2003–2004	21A	340	460	49–66	stable
	21E	180	240	25–35	stable
2004–2005	21A	340	460	49–66	stable
	21E	180	240	25–35	stable
2005–2006	21A	340	460	49–66	stable
	21E	180	240	25–35	stable
2006–2007	21A	240[a]	320[a]	35–46	stable
	21E	180	240	25–35	stable
2007–2008	21A	240	320	35–46	stable
	21E	180	240	25–35	stable
2008–2009	21A	240	320	35–46	stable
	21E	146[b]	156[b]	19–25	stable
	Total	386	476	54–71	stable

[a] Unit 21A was reduced in size by 30% beginning in regulatory year 2006–2007. This smaller population estimate reflects the change in Unit 21A size.

[b] The apparent reduction in the number of wolves in Unit 21E is a result of improvements in our estimate. The trend in the wolf population is still considered stable.

TABLE 2 Units 21A and 21E wolf harvest by sex, regulatory years 2003–2004 through 2007–2008

Regulatory year	Unit	Wolf harvest by sex Male	Female	Unk	Total
2003–2004	21A	6	5		11
	21E	6	8		14
2004–2005	21A	1	3		4
	21E	16	9		25
2005–2006	21A	3	2		5
	21E	10	10		20
2006–2007	21A	4	3	1	8
	21E	5	8		13
2007–2008	21A	3	3		6
	21E	3	3		6
	Total	57	54	1	112

TABLE 3 Units 21A and 21E wolf harvest and harvest method, regulatory years 2003–2004 through 2007–2008

Regulatory year	Unit 21A					Unit 21E				
	Shoot	Trap	Snare	Other/ Unk	Total	Shoot	Trap	Snare	Other/ Unk	Total
2003–2004	2	2	7	0	11	9	4	1	0	14
2004–2005	3	0	1	0	4	2	6	17	0	25
2005–2006	1	1	3	0	5	4	14	2	0	20
2006–2007	1	2	5	0	8	7	2	4	0	13
2007–2008	2	0	4	0	6	3	0	3	0	6
Total	9	5	20	0	34	25	26	27	0	78
% of Total	26	15	59	0	100	32	33	35	0	100
5-year $\bar{x}$	2	1	4	0	7	5	5	5	0	16

TABLE 4 Units 21A and 21E wolf harvest by residency, regulatory years 2003–2004 through 2007–2008

Regulatory year	Unit	Harvest by residency					Total take
		Resident hunters	Resident take	Nonresident hunters	Nonresident take	Unk	
2003–2004	21A	1	9	2	2	0	11
	21E	11	14	0	0	0	14
2004–2005	21A	2	3	1	1	0	4
	21E	7	25	0	0	0	25
2005–2006	21A	1	4	1	1	0	5
	21E	8	19	1	1	0	20
2006–2007	21A	5	7	1	1	0	8
	21E	7	13	0	0	0	13
2007–2008	21A	1	3	3	3	0	6
	21E	1	3	3	3	0	6
	Total	44	100	12	12	0	112

TABLE 5 Units 21A and 21E wolf percent harvest chronology by month, regulatory years 2003–2004 through 2007–2008

Regulatory year	Percent harvest chronology by month (*n*)									Total harvest (*n*)
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
2003–2004	0 (0)	12 (3)	0 (0)	20 (5)	24 (6)	16 (4)	12 (3)	12 (3)	4 (1)	(25)
2004–2005	0 (0)	10 (3)	0 (0)	4 (1)	0 (0)	24 (7)	17 (5)	35 (10)	10 (3)	(29)
2005–2006	0 (0)	12 (3)	0 (0)	4 (1)	4 (1)	16 (4)	44 (11)	16 (4)	4 (1)	(25)
2006–2007	0 (0)	19 (4)	9 (2)	5 (1)	0 (0)	29 (6)	24 (5)	9 (2)	5 (1)	(21)
2007–2008	0 (0)	42 (5)	25 (3)	0 (0)	8 (1)	25 (3)	0 (0)	0 (0)	0 (0)	(12)
Total (*n*)	(0)	(18)	(5)	(8)	(8)	(24)	(24)	(19)	(6)	(112)
% of Total	0	16	4	7	7	22	22	17	5	100

TABLE 6 Units 21A and 21E wolf percent harvest by transport method, regulatory years 2003–2004 through 2007–2008

Regulatory year	Percent harvest by transport method (*n*)				
	Aircraft	Boat	Snowmobile	Other/Unk	Total (*n*)
2003–2004	8 (2)	4 (1)	88 (22)	0 (0)	(25)
2004–2005	3 (1)	7 (2)	90 (26)	0 (0)	(29)
2005–2006	4 (1)	8 (2)	84 (21)	4 (1)	(25)
2006–2007	0	19 (4)	76 (16)	5 (1)	(21)
2007–2008	42 (5)	0 (0)	58 (7)	0 (0)	(12)

WILDLIFE

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 2005
To: 30 June 2008[1]

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 were present when humans first settled the area and are an important part of the local culture. They occur throughout Unit 21 in all habitat types, even near human settlements. Wolf populations have fluctuated depending upon the availability of prey and harvest by humans.

Unit 21D and the lowlands of Unit 21B have more wolves than Unit 21C. 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 historic levels, especially in Unit 21D. However, current wolf populations in Units 21B and 21C may be lower than in the early 1900s due to lower densities of moose in those areas.

Each year many wolves taken for personal use are not sealed; therefore, actual harvest is probably 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, many local residents make a conscious effort to increase their wolf harvest when moose are scarce because they feel wolves are competitors for moose meat.

In the previous Unit 21B, 21C and 21D wolf management report, Unit 21B did not include the portion of the Nowitna River drainage upstream of the Little Mud River. Beginning 1 July 2006,

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

Unit 21B includes all of the Nowitna River drainage and the size of Unit 21B increased from 4871 mi^2 to 9311 mi^2.

MANAGEMENT DIRECTION

Wolf populations are managed to provide for human uses and to ensure that wolves remain an integral part of Units 21B, 21C and 21D ecosystems. 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/1000 mi^2 (7–9 wolves/1000 km^2).
- Provide for a total annual harvest of 85–105 wolves.
- Increase trapper participation in 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

We worked cooperatively with the U.S. Fish and Wildlife Service to estimate the late winter wolf population and pack size using aerial surveys. In a portion of Unit 21B, a Sample

Unit Probability Estimator (SUPE) survey was completed in the 4871-mi^2 area of the original management area during 15–17 March 1996 to estimate the size of the wolf population (Becker et al. 1998). Of the 307 sample units, 59% of the high, 30% of the medium, and 15% of the low stratum were flown and searched for tracks. During April 2001 we conducted a wolf reconnaissance survey in the same 4871-mi^2 area of Unit 21B conducted in 1996, using SUPE methodology. We were unable to satisfy assumptions required for application of the SUPE technique because of poor snow conditions. Therefore, a minimum population estimate for the area was developed from the data (ADF&G files, Galena, 26 April 2001).

In March 1994 we conducted a SUPE survey in Unit 21D (12,113 mi^2). The unit was divided into 760 sample units of 16 mi^2 each, and each sample unit was classified into 1 of 3 density strata; high, medium, or low. We flew 66.6% of the high (n = 144), 33% of the medium (n = 259), and 14% of the low strata (n = 357) and searched for wolf tracks (Becker et al. 1998). We conducted a wolf reconnaissance survey in northern Unit 21D in March 1999 using SUPE methodology. However, we were unable to satisfy assumptions required for application of the SUPE technique because of poor snow conditions. Therefore, a minimum population estimate for the area was developed from the data (ADF&G files, Galena, 7 May 1999).

We conducted a SUPE survey in Unit 24 during March 2000 primarily within a 4175-mi^2 survey area that shares a common boundary with Unit 21D (ADF&G files, Galena, 5 May 2000) and therefore contains data relevant to this report.

In order 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. Trapper interviews were also used to monitor harvest. Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY05 = 1 Jul 2005 through 30 Jun 2006).

We conducted wolf snaring and trapper education courses during RY05–RY07 in local villages to improve trapper skills and knowledge of wildlife management issues.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Wolf population estimates increased during RY98–RY00 but stabilized by RY01 (Table 1). Some of the increase can be attributed to better survey information and extrapolation of density estimates from surveyed areas to unsurveyed areas. Using all data sources, estimates indicate the population likely remained stable during RY02–RY07 with 427–771 wolves in 52–80 packs during the report period (Table 1).

The Unit 21B population estimate from the 15–17 March 1996 SUPE survey was 56–80 wolves ($\bar{x}$ = 68; 80% CI ± 17.8%), with a density of 11.4–17.4 wolves/1000 mi^2 (4.4–

6.7 wolves/1000 km^2; $\bar{x}$ = 5.4). During the April 2001 wolf reconnaissance survey in Unit 21B we observed 7 wolves with an additional 40 wolves identified by distinct tracks (minimum estimate of 11 packs including singles). Location of tracks and pack size was similar to pack locations from the previous survey and radiotelemetry work, which provided confidence in our estimates. Minimum pack density was estimated to be 9.6 wolves/1000 mi^2 (3.7 wolves/1000 km^2) for the 4871-mi^2 (12,616-km^2) survey area. To calculate wolf population estimates for Unit 21B during RY05–RY07, I used survey data obtained from adjacent Unit 21D (ADF&G files, Galena, 26 April 2001) which has similar wolf habitat, data from the 1996 SUPE survey, and the 2001 reconnaissance data. By using that information, I estimated the Unit 21B population was stable at 56–96 wolves ($\bar{x}$ = 76 wolves) in 9–15 packs during RY05–RY07.

Unit 21C has not been surveyed since the mid 1990s, when the fall density was 12.9–18.1 wolves/1000 mi^2 (5–7 wolves/1000 km^2) (Woolington 1997) and prey densities and wolf harvest has changed relatively little since that time. Based on this information, I believe the wolf population has remained stable since the mid 1990s and I therefore estimated the Unit 21C late winter population was 48–66 wolves in 6–10 packs during RY05–RY07.

In Unit 21D we observed 173 wolves (or distinct tracks) during the March 1994 SUPE survey. We estimated the Unit 21D population was 220–292 wolves ($\bar{x}$ = 256; 80% CI ± 14.2%) with a density of 18.1–24.3 wolves/1000 mi^2 (7.0–9.4 wolves/1000 km^2; $\bar{x}$ = 21.2 wolves/1000 mi^2 or $\bar{x}$ = 8.2 wolves/1000 km^2). Additionally, we estimated that single wolves made up 6.5% of the total and there were 49.3 ± 6.1 packs (Becker et al. 1998). During the March 1999 aerial reconnaissance survey in northern Unit 21D, we observed 87 wolves and distinct tracks of 39 additional wolves, indicating 126 wolves in 20 packs with a density of 32.1 wolves/1000 mi^2 (12.4 wolves/1000 km^2). From the overlapping SUPE survey in Unit 24 during March 2000, we estimated the wolf population at 147.8 wolves (± 32.2; 90% CI) over the 4175-mi^2 survey area for a density of 35.5 wolves/1000 mi^2 (13.7 wolves/1000 km^2). Using data from both Unit 21D and the adjacent portion of Unit 24, I estimated the wolf population in all of Unit 21D was 309–445 wolves ($\bar{x}$ = 377) in 37–55 packs (25.4–36.8 wolves/1000 mi^2; 9.8–14.2 wolves/1000 km^2) during RY05–RY07.

Distribution and Movements

Telemetry data showed that most packs within Unit 21 occupied territories of 250–500 mi^2 (Katnik 1997). Some packs vacated their initial home ranges and moved to adjacent areas, but were not monitored long enough to see if they returned to their initial ranges. Several wolves that were pack members or were alone when collared, moved large distances during the study. One wolf moved south 40 miles and then returned north.

Katnik (1997) evaluated wolf distribution with respect to moose distribution and riparian habitat. Not surprisingly, he found that wolf packs spent disproportionately greater time in both riparian and nonriparian area that had high moose densities. Additionally, they spent disproportionately less time in nonriparian areas with medium or low moose densities. However, wolf packs did not necessarily spend more time in the high-density moose areas of their established territories (Katnik and Spindler 1998), possibly be cause of required movements to maintain territory boundaries. Rivers and small drainages apparently provided important travel routes throughout

wolf territories, but low sample sizes precluded definitive evaluation of wolf distribution relative to habitat.

MORTALITY

Harvest

Seasons and Bag Limits during RY05.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Units 21B, 21C, and 21D		
Hunting: 5 wolves.	10 Aug–30 Apr	10 Aug–30 Apr
Trapping: No limit.	1 Nov–30 Apr	1 Nov–30 Apr

Seasons and Bag Limits during RY06–RY07.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Units 21B, 21C, and 21D		
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. In RY94 the Alaska Board of Game continued the ban on same-day-airborne hunting but allowed taking wolves the same day airborne under trapping regulations if the trapper moved 300 feet from the aircraft before taking a free-ranging wolf. However, in RY97 the provision of same-day-airborne harvest was eliminated in the trapping regulations as well. Beginning RY95 the trapping season was extended through April. No changes were adopted during RY98–RY05. In RY06 the board amended the hunting regulations to allow for 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 4412 mi^2 to the report area.

Hunter–Trapper Harvest. Hunters and trappers reported harvesting 45, 34, and 28 wolves during RY05, RY06, and RY07 (Table 2). Compared to the early 2000s, harvest was low due to declining trapper participation and reduced effort among the remaining trappers. High fuel prices were the most commonly cited factor influencing trapper effort. Most of the 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. I estimated the unreported harvest averaged approximately 20 wolves/year. Information gathered through personal interviews improved the estimate of the number of unreported wolves harvested beginning in RY00.

In RY07, ADF&G conducted a wolf snaring clinic in Nulato in Unit 21D. Snaring techniques, snare building instruction, leghold trapping techniques and fur handling were presented. Supplies

were available for snare construction, and participants built and took home wolf snares. Participants were sent follow-up mailings regarding sources of trapping and snaring supplies and were registered for the statewide trapper questionnaire.

Harvest Chronology. Most wolves were harvested in December, January, and February, during RY02–RY04, however, fall incidental harvest was increasingly more significant as trapper participation declined (Table 3). Beginning in RY97 the proportion of wolves harvested in the fall increased substantially and remained high through RY02–RY07, while the proportion of wolves harvested during winter decreased.

Transport Methods. Most wolves were taken by people who used snowmachines or airplanes for transportation during RY05–RY07 (Table 4). Boats were the only other mode of transportation commonly used by successful wolf hunters and trappers.

CONCLUSIONS AND RECOMMENDATIONS

Overall the wolf population in the reporting area remained stable during RY05–RY07. We did not conduct a wolf population survey during that period, but incidental observations, trapper and most hunter reports indicated no substantial changes. There were some reports of smaller pack sizes early in the reporting period (RY05–RY07), but no explanations for those observations were identified.

The first management objective, to maintain a fall density of 18–23 wolves/1000 mi^2 (7–9 wolves/1000 km^2), was probably not met during the reporting period. The fall estimate for the area (20.7–37.3 wolves/1000 mi^2; 8.0–14.4 wolves/1000 km^2) indicated the population was high relative to the objective. Total harvest in all 3 units during RY05–RY07 averaged 57 wolves/year, an estimated 7–13% of the autumn population. Activities to promote increased hunting and trapping pressure should continue to be a priority in order to achieve the objective. However, with high fuel prices and low demand for wolf pelts, harvest may continue to decline. The second objective, to provide for a total annual harvest of 85–105 wolves, was met because the population could provide for an annual harvest of at least 124 wolves, assuming a 30% harvest rate. The third objective, to increase trapper participation in the statewide trapper survey by at least 1% annually, was achieved with an increase in participation in the Trapper Questionnaire of 7% in RY05, 7% in RY06, 9% in RY07. Overall, in combination with Unit 24, trapper response to the questionnaire increased 25% from the end of the previous report period (RY04, $n = 28$) to the end of this report period (RY07, $n = 35$).

Although no surveys were conducted during RY05–RY07, the other management activities were accomplished during RY05–RY07. Harvest monitoring was an important part of the wolf management program. It included the statewide sealing system, trapper questionnaires, and trapper interviews. Trapper education courses were effectively utilized.

I recommend continued trapper education programs to improve harvest reporting and to increase trapper skills, ethics, and knowledge. I also recommend more radiotelemetry studies and continued spring population estimation surveys 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.

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TABLE 1 Units 21B, 21C, and 21D fall wolf population estimates[a,b], regulatory years 1991–1992 through 2007–2008

Regulatory year	Population estimate	Number of packs
1991–1992	285–340	50–53
1992–1993	295–365	50–53
1993–1994	395–505	49–57
1994–1995	339–432	49–57
1995–1996	311–425	52–62
1996–1997	345–524	52–68
1997–1998	379–623	52–74
1998–1999	413–722	52–80
1999–2000	427–746	52–80
2000–2001	442–771	52–80
2001–2002	442–771	52–80
2002–2003	427–746	52–80
2003–2004	442–771	52–80
2004–2005	442–771	52–80
2005–2006	442–771	52–80
2006–2007	442–771	52–80
2007–2008	442–771	52–80

[a] Fall estimate = pretrapping season population.

[b] Based on Alaska Department of Fish and Game–US Fish and Wildlife Service sample unit probability estimator surveys, wolf reconnaissance aerial surveys, hunter–trapper reports, sealing records, incidental observations and assumed density of 12.9–18.1 wolves/1000 mi^2 (5–7 wolves/1000 km^2) in unsurveyed areas.

TABLE 2 Units 21B, 21C, 21D wolf harvest, regulatory years 1991–1992 through 2007–2008

Regulatory year	Reported harvest				Estimated unreported harvest	Total estimated harvest	Method of take			
	M	F	Unk	Total			Trap/snare	Shot	SDA[a]	Unk
1991–1992	22	14	4	40	20	60	19	18	1	2
1992–1993	20	11	4	35	20	55	15	16	0	4
1993–1994	31	23	1	55	20	75	38	16	0	1
1994–1995	17	11	7	35	20	55	11	18	6	0
1995–1996	16	28	3	47	20	67	29	18	0	0
1996–1997	16	18	2	36	20	56	27	9	0	0
1997–1998	12	19	0	31	20	51	19	12	0	0
1998–1999	38	21	1	60	20	80	35	25	0	0
1999–2000	31	23	0	54	20	74	30	24	0	0
2000–2001	55	32	0	87	35	122	53	31	0	3
2001–2002	27	32	24	83	25	108	43	29	0	11
2002–2003	54	34	3	91	25	116	49	39	0	3
2003–2004	24	19	4	47	25	72	25	21	0	1
2004–2005	36	14	2	52	25	77	21	31	0	0
2005–2006	21	21	3	45	25	70	32	13	0	0
2006–2007	20	14	0	34	20	54	26	4	0	4
2007–2008	14	14	0	28	20	48	14	14	0	0

[a] Wolves taken by hunters the same day they were airborne. In regulatory years 1994–1995 through 1996–1997 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 1994–1995 through 2007–2008

Regulatory year	Percent harvest chronology by time period							n[a]
	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	
1994–1995	8	14	6	8	17	44	3	36
1995–1996	6	3	9	17	11	43	11	35
1996–1997	9	18	9	15	24	26	0	36
1997–1998	21	3	7	17	28	24	0	29
1998–1999	13	3	10	19	29	22	4	69
1999–2000	19	2	26	2	33	15	4	54
2000–2001	10	0	6	21	15	31	16	86
2001–2002	19	3	11	9	19	33	6	83
2002–2003	22	6	12	11	18	24	8	91
2003–2004	26	0	4	11	34	17	9	47
2004–2005	19	4	10	10	21	33	4	52
2005–2006	14	2	27	18	16	11	11	44
2006–2007	3	7	14	31	28	17	0	29
2007–2008	36	0	7	7	21	18	11	28

[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 1994–1995 through 2007–2008

Regulatory year	Percent harvest by transport method								
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	n[a]
1994–1995	19	3	5	0	49	0	0	24	37
1995–1996	0	3	6	0	91	0	0	0	35
1996–1997	0	3	6	0	88	0	3	3	34
1997–1998	0	19	16	0	61	0	0	3	31
1998–1999	2	2	10	0	85	0	0	2	60
1999–2000	19	4	9	0	69	0	0	0	54
2000–2001	3	0	9	1	85	0	0	1	87
2001–2002	16	1	11	0	55	0	0	17	83
2002–2003	18	0	20	1	58	0	2	1	91
2003–2004	30	0	21	2	47	0	0	0	47
2004–2005	21	2	12	0	60	0	0	6	52
2005–2006	46	0	7	0	46	0	0	0	43
2006–2007	21	3	3	0	69	0	3	0	29
2007–2008	25	0	32	0	43	0	0	0	28

[a] Includes harvest from records received after total harvest was calculated.

WILDLIFE

MANAGEMENT REPORT

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

From: 1 July 2005
To: 30 June 2008

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 in 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. Wolves are generally most abundant in Units 22A and 22B, where caribou from the Western Arctic herd (WAH) frequently winter. Since 1996 a portion of the WAH has wintered on the Seward Peninsula, and wolves followed into areas of Units 22D and 22E. Wolf distribution and abundance varies 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 big game harvest surveys 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, village harvest surveys, and observations by staff and the public.
- Cooperate with reindeer herders to evaluate methods for reducing adverse interactions between wolves and reindeer.

METHODS

Surveys or research have seldom been conducted in Unit 22 to assess wolf distribution and population trends. Estimates of wolf distribution and population trend, as well as harvest and human use data, are obtained annually from sealing certificates and observations by staff, reindeer herders, and other local residents.

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. A track survey was completed in February 2006 to assess population status of wolves in the central portion of Unit 22A, where moose numbers are critically low. Nine wolves were found during the survey and there were no signs of caribou in the area. Wolf abundance depends on the presence of Western Arctic caribou in Unit 22, and increases during winter months (October–April), when caribou were present.

Unit 22 participated in the statewide trapper survey program during the reporting period. Questionnaires were sent to hunters and trappers who harvested furs in Unit 22 to better assess harvest and abundance of wolves and other furbearers. Respondents throughout Unit 22 reported that wolves were common and numbers are increasing.

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 Western Arctic caribou 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 Unit 22B, and wolf harvest and observations in those areas have also increased (Table 2). The dispersal of wolves into Unit 22 has also been en

demonstrated by finding radiocollared wolves in Unit 22 that were originally collared in other areas of Alaska.

MORTALITY

Harvest

Season and Bag Limits. The season and bag limits were the same for all regulatory years in the reporting period. A regulatory year (RY) begins 1 July and ends 30 June (e.g., RY05 = 1 July 2005 through 30 June 2006).

2005–2006 to 2007–2008 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 – 5 wolves	10 Aug–30 Apr	10 Aug–30 Apr

Board of Game Actions and Emergency Orders. New regulations for the 2006 regulatory year allow harvest through use of snowmachine to position hunters to select wolves for harvest and shoot wolves from a stationary snowmachine. The November 2007 Board of Game adopted two changes, one being to open the hunting of wolves 1 August and the second change to increase the bag limit to 20 wolves, both effective in the 2008 regulatory year.

Hunter/Trapper Harvest. The annual reported harvest during the reporting period ranged from 27 to 37 wolves (Table 1). Sex composition of the reported harvest during the 3–year reporting period was: 54 males, 38 females, and 2 sex unknown (n = 94). The majority of wolves were harvested in Units 22B and 22D. In previous years, Unit 22A had one of the highest harvest rates; however, harvest has increased in other units on the Seward Peninsula when winter caribou distribution on the peninsula increased wolf numbers in those areas (Table 2).

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. 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 subunits A, B, D,E conducted by Kawerak Inc indicates 37.7 wolves were harvested in 2005-2006 (Ahmasuk and Trigg 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 98% of the wolves taken during the reporting period. Residents from Unit 22A harvested 15% of the wolves, Unit 22B residents harvested 46% of the harvest, Unit 22C residents took 5% and Unit 22D took 24%, and 22E residents harvested 9% of the wolves. One nonresident harvested 1 wolf.

Harvest Chronology. Wolf harvest in Unit 22 occurs primarily in the winter months when snowmachines can be used for transportation, pelts are in prime condition, and wolves are most abundant due to the presence of the Western Arctic caribou herd.

Harvest Methods. During the reporting period, 83% of the wolves harvested in Unit 22 were shot by subsistence or sport hunters, or shot opportunistically by local residents engaged in other activities. The few serious trappers in Unit 22 trapped or snared11% of the wolves. The method of harvest for the remaining 6% is unknown (Table 1).

Transport Methods. Hunters/trappers using snowmachines harvested 89% of the wolves during the reporting period. Individuals using boat, skies, off-road vehicles or unknown means of transportation harvested 11% of the wolves.

Other Mortality

We observed no other mortality factors affecting wolves in Unit 22 during the reporting period.

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 may increasingly become a factor in moose management.

CONCLUSIONS AND RECOMMENDATIONS

Quantitative data on wolf populations of Unit 22 are lacking. It would be beneficial to initiate wolf surveys in the unit to improve our understanding of wolf population dynamics and the effects of wolf predation on local ungulate populations, particularly in Unit 22A, where moose numbers are critically low.

Wolf densities are increasing throughout Unit 22. The expansion of Western Arctic caribou winter range on the Seward Peninsula is causing increased wolf abundance in Unit 22D and Unit 22E. If this trend continues, wolf predation may increasingly affect moose management throughout Unit 22.

Participation in the statewide Trapper Questionnaire program provided impressions about abundance of wolves and other furbearers from numerous hunters/trappers throughout the unit. Big game harvest surveys also proved to be an effective method of gathering more accurate harvest information from selected villages and should be continued.

Unit 22 hunting and trapping regulations for wolves are liberal, and to encourage increased harvest in Unit 22, beginning in 2008 the hunting season dates will be extended to 1 August–30

April and the bag limit will increase to 20 wolves. No additional regulatory changes are recommended at this time. Future management projects should include collecting quantitative data on wolf populations and improving distribution of educational and informative materials that describe furbearer and wolf-sealing requirements.

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TABLE 1 Reported Unit 22 wolf harvest for regulatory years 1990–1991 through 2007–2008

Regulatory Year	Reported harvest				Method of take			Total successful trapper / hunters
	M	F	Unk.	Total	Trap / Snare	Shot	Unk.	
1990–1991	14	11	6	31	5	26	0	11
1991–1992	21	13	20	54	3	51	0	18
1992–1993	14	7	6	27	4	17	6	11
1993–1994	24	8	2	34	2	24	8	16
1994–1995	15	2	7	24	1	23	0	16
1995–1996	19	8	5	32	0	29	3	16
1996–1997	19	4	2	25	3	21	1	18
1997–1998	16	11	2	29	7	16	6	14
1998–1999	33	12	6	51	6	42	3	30
1999–2000	37	19	7	63	5	44	14	38
2000–2001	34	23	8	65	4	55	6	34
2001–2002	26	16	0	42	3	38	1	28
2002–2003	25	19	3	47	6	33	8	28
2003–2004	14	8	0	22	1	21	0	12
2004–2005	22	14	3	39	4	34	1	26
2005-2006	22	14	1	37	7	28	2	21
2006-2007	20	10	0	30	3	24	3	16
2007-2008	12	14	1	27	0	26	1	18

TABLE 2 Reported wolf harvest by unit, 1990–91 through 2007–2008

Regulatory year	Harvest Unit 22A	Harvest Unit 22B	Harvest Unit 22C	Harvest Unit 22D	Harvest Unit 22E	Harvest Unknown
1990–1991	21	8	0	2	0	0
1991–1992	43	9	0	2	0	0
1992–1993	13	11	2	1	0	0
1993–1994	23	11	0	0	0	0
1994–1995	13	9	2	0	0	0
1995–1996	15	16	1	0	0	0
1996–1997	15	10	0	0	0	0
1997–1998	19	9	1	0	0	0
1998–1999	25	18	2	2	4	0
1999–2000	18	32	0	3	10	0
2000–2001	24	33	0	7	0	1
2001-2002	10	24	2	4	0	2
2003-2004	11	6	4	1	0	0
2004-2005	12	9	0	13	5	0
2005-2006	11	12	1	13	0	0
2006-2007	3	16	1	6	4	0
2007-2008	1	15	3	4	4	0

WILDLIFE

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 2005
To: 30 June 2008

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 accorded high esteem for taking wolves and wolverines. This is an important social aspect of taking wolves that is little influenced by fur prices or the availability of wolves.

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 Kiana (2006), Noatak (2007), and Selawik (2006). 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=580–1169 wolves). This unitwide extrapolation was a crude approximation of actual abundance that is now obsolete.

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. The wolf hunting season was changed in the 2007 Board of Game meeting from a 10 August start date to 1 August starting the following regulatory year (2008). A regulatory year (RY) begins on July 1, i.e., RY08 begins 1 July 2008 and ends 30 June 2009.

Regulatory years 2005–06, 2006–07, 2007–08 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	10 Aug–30 Apr (*2005–06, 2006–07)*	10 Aug–30 Apr (*2005–06, 2006–07)*
20 wolf limit	1 Aug–30 Apr (*2007–08)*	1 Aug–30 Apr (*2007–08)*

Board of Game Actions and Emergency Orders. In November 2007 the Board of Game increased the Unit 23 wolf season by 10 days by starting the season 1 August rather than 10 August. This change went into effect 1 July 2008. No emergency orders were issued that affected wolf hunting or trapping during this reporting period.

Hunter/Trapper Harvest. Harvest levels and the number of male to female 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 2004–2005 of 139 wolves. This may have been related to the efforts of one hunter/trapper that was responsible for more than one-third of the harvest. There was a subsequent crash in the number of pelts sealed in 2007–2008. The number will likely increase as additional sealing forms are submitted. However, the number is expected to remain low and may be due in a large part to the dramatic increase in fuel prices experienced during that regulatory year.

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 = 11) yields an annual mean harvest of 17.3 wolves/community (SD = 17.3; note that this excludes Kotzebue). Combining annual reported harvests from sealing data for these same communities (n = 23) during 2005–2006 through 2007–2008 yields an annual mean wolf harvest of 1.4 wolves/community (SD = 2.7). 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 1999–2000 Trooper J. Rodgers visited a number of communities in Unit 23 and offered to seal furs. As a result, 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.

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 1 wolf during 2005–06, 2 during 2006–07, and 2 during 2007–08 (2%, 4% and 11% of the total harvest, respectively). During those same years nonresidents took 4, 2, and 2 wolves, respectively (10%, 4% and 11% of the total harvest). 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 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, individual hunters). As in the past, most wolves harvested in Unit 23 were shot rather than trapped during this reporting period (Table 6). 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 (0.1–0.6 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 have reduced 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 Reported wolf harvest from sealing certificates for Unit 23, 1988–1989 through 2007–2008

Regulatory year	Males	Females	Unknown	Total
1988–1989	42	36	6	84
1989–1990	27	26	4	57
1990–1991	22	16	8	46
1991–1992	30	25	7	62
1992–1993	28	31	9	68
1993–1994	30	16	2	48
1994–1995	23	21	11	55
1995–1996	41	24	12	77
1996–1997	31	18	15	64
1997–1998	8	10	5	23
1998–1999	12	10	10	32
1999–2000	69	41	2	112
2000–2001	39	14	15	68
2001–2002	30	18	5	53
2002-2003	34	24	12	70
2003–2004	28	17	0	45
2004–2005	68	57	14	139
2005–2006	18	19	4	41
2006-2007	26	26	2	54
2007-2008	12	5	1	18

TABLE 2 Comparison of wolf harvests from community harvest assessments and fur sealing documents in selected communities within Unit 23, 2005–2006 through 2007–2008

		Fur Sealing Data		
Community	Harvest Estimate	2005–2006	2006–2007	2007–2008
Ambler	19 (2003)	0	8	0
Buckland	49 (2003)	1	11	4
Kiana	17 (1999) 1 (2006)	1	2	1
Kivalina	23 (2007)	0	0	0
Noatak	15 (1999) 3 (2001) 2 (2007)	0	0	0
Noorvik	52 (2002)	3	1	0
Selawik	2 (1999) 18 (2006)	0	0	0
Shungnak	7 (2002)	2	0	0

TABLE 3 Wolf harvest by drainage in Unit 23, 1988–1989 through 2007–2008

Regulatory year	Kivalina -Wulik	Noatak	Kobuk	Selawik	N. Seward	Unknown	Total
1988–1989	1	13	29	40	1	0	84
1989–1990	4	9	25	2	14	3	57
1990–1991	0	6	17	15	3	5	46
1991–1992	4	9	30	11	8	0	62
1992–1993	4	9	30	20	5	0	68
1993–1994	0	15	28	3	2	0	48
1994–1995	1	13	27	7	7	0	55
1995–1996	0	12	26	19	10	10	77
1996–1997	6	8	28	13	7	2	64
1997–1998	0	2	17	0	0	1	20
1998–1999	1	5	12	1	11	2	32
1999–2000	0	8	60	13	31	0	112
2000–2001	0	8	34	10	11	5	68
2001–2002	3	7	30	3	4	6	53
2002–2003	0	19	18	8	23	2	70
2003–2004	0	6	29	1	9	0	45
2004-2005	0	63	58	1	14	3	139
2005-2006	0	15	21	1	4	0	41
2006-2007	3	16	32	1	2	0	54
2007–2008	0	3	7	1	6	1	18

TABLE 4 Number of harvesters and method of transport to harvest wolves in Unit 23, 1988–1989 through 2007–2008

Regulatory year	Hunters/ trappers	Airplane	Snow-machine	Boat	Dog team	3 or 4 Wheeler	Skis/ Snowshoe	Unknown	Total harvest
1988–1989	30	11	66	0	1	0	0	6	84
1989–1990	22	11	33	2	0	0	0	11	57
1990–1991	18	4	34	0	1	0	1	6	46
1991–1992	26	4	53	0	0	0	0	5	62
1992–1993	24	2	64	0	0	0	0	2	68
1993–1994	21	1	37	0	1	2	0	7	48
1994–1995	22	0	53	0	1	0	1	0	55
1995–1996	24	3	61	0	0	0	0	13	77
1996–1997	22	4	45	3	5	0	1	6	64
1997–1998	9	1	17	0	0	1	0	1	20
1998–1999	12	2	28	0	0	0	0	2	32
1999–2000	22	3	93	0	0	0	4	12	112
2000–2001	21	3	59	0	0	0	0	6	68
2001–2002	24	4	33	3	0	0	1	12	53
2002–2003	28	5	59	4	0	0	0	2	70
2003–2004	18	3	32	4	0	0	0	6	45
2004–2005	25	3	120	2	0	1	0	13	139
2005–2006	17	4	33	0	0	0	0	4	41
2006–2007	16	2	40	0	0	0	1	11	54
2007–2008	11	4	14	0	0	0	0	0	18

TABLE 5 Chronology of wolf harvest for Unit 23 from 1988-1989 through 2007–2008

Regulatory year	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unknown	Total
1988–1989	0	2	0	1	18	13	12	29	8	1	84
1989–1990	0	4	0	10	13	4	2	15	3	6	57
1990–1991	0	3	0	2	5	4	18	6	1	7	46
1991–1992	1	6	2	1	5	6	7	23	7	4	62
1992–1993	0	2	4	3	1	3	18	31	6	0	68
1993–1994	1	2	0	3	12	6	4	6	9	5	48
1994–1995	0	1	0	11	3	9	7	14	10	0	55
1995–1996	0	2	0	6	5	3	4	39	8	10	77
1996–1997	0	2	2	4	14	8	13	13	0	8	64
1997–1998	0	1	0	0	5	0	5	5	3	1	20
1998–1999	0	2	0	1	5	6	7	7	1	3	32
1999–2000	1	2	0	4	8	31	5	36	15	10	112
2000–2001	0	3	0	1	6	4	19	19	7	9	68
2001–2002	5	9	0	1	3	5	13	15	1	1	53
2002–2003	0	9	0	1	9	3	9	31	7	1	70
2003–2004	0	7	0	0	1	17	7	11	2	0	45
2004–2005	1	5	0	2	4	25	26	41	34	1	139
2005–2006	0	3	1	0	8	3	5	6	11	4	41
2006–2007	0	2	0	3	2	3	15	15	6	8	54
2007–2008	1	3	0	3	0	3	2	5	0	1	18

TABLE 6 Methods of harvesting wolves in Unit 23, 1988–1989 through 2007-2008

Regulatory year	Shot	Trapped	Snared	Unknown	Total harvest
1988–1989	74	9	0	1	84
1989–1990	46	8	0	3	57
1990–1991	34	3	3	6	46
1991–1992	47	9	0	6	62
1992–1993	66	1	0	1	68
1993–1994	43	3	0	2	48
1994–1995	43	12	0	0	55
1995–1996	41	19	1	16	77
1996–1997	46	12	0	6	64
1997–1998	10	9	0	1	20
1998–1999	21	8	0	3	32
1999–2000	79	22	1	10	112
2000–2001	54	8	0	6	68
2001–2002	34	14	0	5	53
2002–2003	57	12	0	1	70
2003–2004	30	9	0	6	45
2004–2005	83	46	0	10	139
2005-2006	30	7	0	4	41
2006-2007	27	15	1	11	54
2007-2008	17	1	0	0	18

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
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Juneau, AK 99811-5526

WOLF MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2008[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. Historically, wolf abundance in Unit 24 has fluctuated in response to prey availability. Numbers were low in the Brooks Range during the late 1800s because densities of moose, caribou, and Dall sheep were low (Campbell 1974). Prey populations increased during the early 1900s, leading to increases in wolf numbers. Currently, wolves are more numerous than in the 1970s but probably not as abundant as during the 1940–1950s (Woolington 1997).

Prior to 1945, moose were uncommon and caribou numbers fluctuated in Unit 24. 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. Presently, wolf numbers are probably as high in southern Unit 24 as at any time known.

Reported wolf harvests during regulatory year (RY) 1991 through RY07 (RY = 1 Jul through 30 Jun, e.g., RY07 = 1 Jul 2007–30 Jun 2008) were 23–119 wolves per year and averaged 68 wolves annually. The local demand for wolf pelts used as parka ruffs and gifts at funeral potlatches has traditionally been high. 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.

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

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

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. The domestication of wolves for personal use or for commercial purposes is generally considered incompatible with department management policies. The management goals, objectives, and activities for this reporting period were:

- 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/1000 mi^2 (5–9 wolves/1000 km^2).
- Provide for a total annual harvest of 112–162 wolves.
- Increase trapper participation in 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 to estimate the late winter wolf population and pack size using aerial surveys. In March 2000 a Sample Unit Probability Estimator (SUPE) survey (Becker et al. 1998) was conducted in southern Unit 24.

In RY95 the estimated Unit 24 fall population was derived by plotting known pack locations and by assuming a density of 16–21 wolves/1000 mi^2 (6–8 wolves/1000 km^2) for unknown areas (Table 1; Stout 2003). A wolf reconnaissance survey was flown in a limited area of Unit 24 and

northern Unit 21D in March 1999 using SUPE methodology. However, we were unable to satisfy assumptions required for application of the technique because of poor snow conditions. Therefore, a minimum estimate for the area was developed from that survey (ADF&G files, Galena, 7 May 1999). We conducted a SUPE survey in southern Unit 24 during March 2000 primarily over a 4175-mi^2 survey area in Unit 24, but along the common boundary with Unit 21D (ADF&G files, Galena, 5 May 2000).

Wolves harvested by trappers and hunters were sealed to monitor harvest. 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. Trapper interviews were also used to monitor harvest. Data were summarized by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Wolves are found throughout the unit 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 and northern Unit 24 than in the central portion of the unit, which has lower moose densities and more sporadic movements of caribou.

A series of geographically overlapping surveys completed during late winters 1994 through 2000 indicated the wolf population may have increased in southern Unit 24 and adjacent northern Unit 21D. The 2000 SUPE survey in southern Unit 24 indicated there were 148 wolves (±32, 90% CI) in the 4175-mi^2 survey area, a density of 36 wolves/1000 mi^2 (14 wolves/1000 km^2). The reconnaissance survey completed in March 1999 in southern Unit 24 and adjacent Unit 21D indicated a density of 32 wolves/1000 mi^2 (12 wolves/1000 km^2). A 1994 survey in adjacent Unit 21D indicated a density of 23 wolves/1000 mi^2 (9 wolves/1000 km^2; Becker et al. 1998) and we assume densities in southern Unit 24 were similar to this area at that time.

No surveys were conducted during the reporting period RY05–RY07; however, because little change in prey densities or harvest of wolves occurred since surveys were conducted, the unitwide fall population probably did not change detectably from previous estimates (Stout 2003). By plotting known pack locations and by assuming a density of 15–21 wolves/1000 mi^2 we estimate 155–206 wolves occur in northern Unit 24. Using the same methodology we estimate 103–155 wolves occur in central Unit 24, a density of 10–15 wolves/1000 mi^2. In southern Unit 24 the 2000 SUPE indicated 116–180 wolves, a density of 36 wolves/1000 mi^2, and we assume little change since that survey. Therefore, the estimated fall population for the entire unit was 374–541 during RY05–RY07.

DISTRIBUTION AND MOVEMENTS

Radiotelemetry of wolves in the Kanuti National Wildlife Refuge indicated that 85–100 wolves in 9–11 packs used the refuge during fall (Zirkle 1995). In that study, packs roamed over 2556–

4059 mi^2, and the average pack size of radiocollared packs was 4 wolves. All wolves that were pups or yearlings when collared dispersed from the area and were not followed.

Packs are known to migrate into Unit 24 with the Western Arctic caribou herd during the winter. These wolves are mostly found in Gates of the Arctic National Park and Preserve and in the upper Huslia and Hogatza rivers (D. James, ADF&G, personal communication). Unpredictability of these migrations is responsible for most of the variation of the wolf population estimates for the portion of Unit 24 in Gates of the Arctic National Park and Preserve.

MORTALITY

Harvest

Seasons and Bag Limits during RY05.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Unit 24		
Hunting: 5 wolves	10 Aug–30 Apr	10 Aug–30 Apr
Trapping: No limit	1 Nov–30 Apr	1 Nov–30 Apr

Seasons and Bag Limits during RY06–RY07.

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. At the 1993 meeting, the Alaska Board of Game continued the ban on same day hunting of wolves, but allowed taking wolves the same day airborne under trapping regulations, provided the trapper moved 300 feet from the aircraft before taking a free-ranging wolf. In RY95 the trapping season was extended through April. Beginning in RY97 same-day-airborne harvest was eliminated in the trapping regulations as well. No new regulations were adopted during RY98–RY05, however, the Alaska Board of Game changed the hunting bag limit to 10 wolves at the 2006 meeting.

Hunter–Trapper Harvest. Hunters and trappers reported harvesting 23–39 wolves during RY05–RY07 (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 RY05–RY07, travel conditions and fuel prices probably contributed to reduced effort, and thus reduced reported and unreported harvest.

ADF&G conducted wolf snaring clinics at Huslia and Allakaket in February 2005. Snaring techniques, snare building instruction, leghold trapping techniques and fur handling were

presented. Supplies were available for snare construction, and participants built and took home wolf snares. Participants were sent follow-up mailings regarding sources of trapping and snaring supplies and were registered for the statewide trapper questionnaire.

One trapper interviewed from northern Unit 24 reported fewer wolves in that area during the later part of the reporting period (RY05–RY07), and suggested fewer caribou visits and lower moose numbers as a possible explanation.

Harvest Chronology. Wolves were generally taken in December–March during RY94–RY07, and the highest harvest was typically in February (Table 3). Like nearby Unit 21D, incidental harvest in the fall continued to be high during RY05–RY07, possibly due to increased sightings during the fall moose hunting season.

Transport Methods. Most wolves were taken using snowmachines for transportation during RY94–RY07 (Table 4). No other trends in transportation methods were apparent.

CONCLUSIONS AND RECOMMENDATIONS

Although no wolf population surveys were conducted during RY05–RY07, the unitwide wolf population was probably stable and has changed little since RY93, with some localized annual fluctuations. Wolf numbers were highest (23–28 wolves/1000 mi^2; 9–11 wolves/1000 km^2) and probably increased in the southern portion of the unit (south of Hughes). There were moderate, stable numbers (10–16 wolves/1000 mi^2; 4–6 wolves/1000 km^2) in central Unit 24 (Bettles to Hughes), and variable numbers (16–21 wolves/1000 mi^2; 6–8 wolves/1000 km^2) with some possible declines in the north (north of Bettles) according to trapper interviews.

Management objectives were met during RY05–RY07. With respect to the first objective, to maintain a fall density of 13–23 wolves/1000 mi^2 (5–9 wolves/1000 km^2), the fall wolf population was stable with an estimated 14.4–24.5 wolves/1000 mi^2 (5.5–8.0 wolves/1000 km^2). With an estimated population of 374–541 wolves at a harvest rate of 35%, this provided for a harvest opportunity of at least 130–190 wolves, which met the second objective, to provide for a total annual harvest of 112–162 wolves. The third objective, to increase trapper participation in the statewide trapper survey by at least 1% annually, was achieved with an increase in participation in the Trapper Questionnaire of 7% in RY05, 7% in RY06, and 9% in RY07. Overall, in combination with Units 21B, 21C, and 21D, trapper response to the questionnaire increased 25% from the end of the previous report period (RY04, $n = 28$) to the end of this report period (RY07, $n = 35$).

Harvest monitoring was an important part of the wolf management program. Monitoring included the statewide sealing system, trapper questionnaires, and trapper interviews. Trapper education courses conducted during RY05 proved effective in teaching new techniques and ways to avoid accidentally snaring moose. Such education courses should continue, as they seem to encourage more trappers to attempt to take wolves.

I recommend an aerial survey be conducted to determine wolf densities in central Unit 24. I also recommend we reinitiate the joint effort with Kanuti National Wildlife Refuge to radiocollar and

monitor wolf packs in the Kanuti area to improve population estimates and to provide information on predation rates. Additionally, I recommend federal and state biologists work closely with local residents to improve harvest reporting compliance.

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TABLE 1 Unit 24 fall wolf population estimates[a], regulatory years 1991–1992 through 2007–2008

Regulatory year	Population estimate[b]	Number of packs
1991–1992	420–450	68–70
1992–1993	388–415	51–55
1993–1994	405–540	58–66
1994–1995	405–540	58–66
1995–1996	405–540	58–66
1996–1997	374–541	58–66
1997–1998	374–541	58–66
1998–1999	374–541	58–66
1999–2000	374–541	58–66
2000–2001	374–541	57–68
2001–2002	374–541	57–68
2002–2003	374–541	57–68
2003–2004	374–541	57–68
2004–2005	374–541	57–68
2005–2006	374–541	57–68
2006–2007	374–541	57–68
2007–2008	374–541	57–68

[a] Fall estimate = pretrapping season population.
[b] Basis of estimate: Alaska Department of Fish and Game, National Park Service, and U.S. Fish and Wildlife Service aerial surveys, hunter–trapper reports, sealing records, and incidental observations.

TABLE 2 Unit 24 wolf harvest, regulatory years 1991–1992 through 2007–2008

Regulatory year	Reported harvest				Estimated unreported harvest	Total estimated harvest	Method of take			
	M	F	Unk	Total			Trap/snare	Shot	SDA[a]	Unk
1991–1992	42	39	4	85	55	140	70	15	0	0
1992–1993	41	32	6	79	80	159	43	35	1	0
1993–1994	48	37	4	89	60	149	62	27	0	0
1994–1995	52	28	9	89	60	149	68	14	6	1
1995–1996	52	55	12	119	60	179	88	29	2	0
1996–1997	45	38	5	88	60	148	73	13	0	2
1997–1998	32	20	4	56	50	106	46	9	0	1
1998–1999	19	12	5	36	50	86	31	5	0	0
1999–2000	50	32	9	91	50	141	70	14	0	7
2000–2001	36	31	15	82	50	131	57	21	0	4
2001–2002	33	36	4	73	50	123	51	22	0	0
2002–2003	37	26	3	66	50	116	46	12	0	8
2003–2004	13	20	4	37	50	87	29	8	0	0
2004–2005	26	32	3	61	50	111	41	17	0	3
2005–2006	12	11	0	23	30	53	21	2	0	0
2006–2007	18	19	0	37	30	67	25	11	0	1
2007–2008	22	17	0	39	30	69	28	11	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 1994–1995 through 2007–2008

Regulatory year	Percent harvest chronology by month							n[a]
	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	
1994–1995	7	6	8	18	33	27	1	83
1995–1996	7	13	21	13	25	8	13	107
1996–1997	8	10	15	22	30	16	0	88
1997–1998	9	15	35	15	20	7	0	55
1998–1999	6	11	17	22	22	22	0	36
1999–2000	8	19	33	8	10	18	4	84
2000–2001	16	6	10	22	30	13	3	77
2001–2002	10	7	12	10	28	32	2	73
2002–2003	19	11	26	24	15	5	0	66
2003–2004	11	0	5	11	33	35	3	37
2004–2005	19	2	16	19	33	9	3	61
2005–2006	9	30	13	26	22	0	0	23
2006–2007	16	11	11	16	22	24	0	37
2007–2008	10	18	28	5	31	8	0	39

[a] Includes harvest records received after total harvest was calculated.

TABLE 4 Unit 24 wolf percent harvest by transport method, regulatory years 1994–1995 through 2007–2008

Regulatory year	Percent harvest by transport method								
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway Vehicle	Unk	n[a]
1994–1995	16	0	6	1	73	0	3	1	88
1995–1996	3	7	2	2	69	3	4	10	107
1996–1997	3	0	3	0	90	0	1	2	88
1997–1998	4	5	2	0	86	0	2	2	56
1998–1999	0	3	6	3	72	0	17	0	36
1999–2000	4	1	2	1	66	0	16	10	91
2000–2001	1	10	9	1	70	0	6	5	82
2001–2002	1	4	6	0	68	0	6	16	73
2002–2003	2	2	9	0	67	0	8	14	66
2003–2004	5	0	5	0	81	0	8	0	37
2004–2005	11	0	8	0	52	0	23	6	61
2005–2006	0	4	4	0	70	0	22	0	23
2006–2007	3	3	11	0	70	0	11	3	37
2007–2008	5	18	3	3	28	0	41	3	39

[a] Includes harvest records received after total harvest was calculated.

WILDLIFE

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 2005
To: 30 June 2008[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 found throughout this management area. They are well adapted to living in the Interior boreal forests, the mountains of the Brooks Range, and the tundra of the Arctic slope. Wolves are generally less abundant than in other parts of the Interior because populations of resident prey such as moose are scarce in many areas.

Detailed information about wolf populations and their influence on ungulate populations in northeastern Alaska is limited. U.S. Fish and Wildlife Service (USFWS) biologists studied the movements and denning habits of 11 wolf packs in the northern Arctic National Wildlife Refuge (ANWR) in Unit 26C in 1984 and 1985 (Garner and Reynolds 1986). Subsequent aerial surveys and incidental observations documented the widespread presence of wolves within ANWR and to the west in Unit 26B. ADF&G conducted aerial wolf population surveys in western Unit 25D in March 1983 and 1984 (Nowlin 1985). Wolf surveys covering portions of Unit 25D were completed in March 1992, 1997, 1999, and 2009 and in eastern Unit 25D and part of Unit 25B in 2000, 2001, and 2006. The results of a telemetry study of wolves in southern Unit 25B are described by Burch (2002). No systematic surveys have been conducted in Unit 25A.

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. The aesthetic value of being aware of or observing

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

wolves in natural interactions within their environment is also recognized as an important human use of wolves. The domestication of wolves for personal or commercial purposes is generally considered incompatible with department management policies.

Management may include manipulation of wolf population size and total protection of wolves from human influence. All human uses might not occur in all areas or at all times; management will focus on providing sustained, diverse human uses of wolf populations consistent with goals listed in the Wolf Conservation and Management Policy for Alaska, adopted by the Alaska Board of Game 30 October 1991 and revised 29 June 1993. These 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.
- 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 OBJECTIVE

The Alaska Board of Game (board) has not adopted an implementation plan for control of wolf predation in any of these units. However, the *Yukon Flats Cooperative Moose Management Plan* (ADF&G 2002) was completed and endorsed by the board in 2002. It outlines strategies to increase moose numbers, including increasing the harvest of bears and wolves. In March 2006 the board requested that ADF&G develop an intensive management (IM) plan for moose in the Yukon Flats in response to public proposals that requested predator control of wolves and bears in Unit 25D to reduce predation on moose. In March 2008 ADF&G presented IM options to the board that explored a wide spectrum of management options to increase moose abundance in the Yukon Flats. The presentation acknowledged the difficulty of implementing broad scale predator control on USFWS lands which make up about 51% of Unit 25D. Therefore, we focused on the feasibility of increased wolf and bear harvest on smaller private and state lands surrounding villages. Many of the recommendations in our IM plan mirrored those previously identified in the *Yukon Flats Cooperative Moose Management Plan*.

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.
- Continue to evaluate the effects of wolf predation on moose in Unit 25D using computer modeling.
- Monitor wolf numbers and population characteristics outside survey areas through interviews with trappers, hunters, and pilots and by evaluation of sealing documents.
- Participate in trapper education to enhance trapper skills and ethics and improve compliance with regulations.
- Conduct periodic wolf population surveys in Unit 25B, eastern Unit 25D, and western Unit 25D.

METHODS

Population estimates in Unit 25D and parts of Unit 25B were based on aerial track–reconnaissance survey techniques described by Stephenson (1978). These surveys were conducted in late winter 1983, 1984, 1992, 1996, 1998, 2000, 2001, 2006 and 2009. Population estimates in much of Units 25A, 25B, 26B and 26C were based on earlier surveys, incidental observations of wolves by agency personnel and the public, and extrapolation of population estimates from surveys in similar habitat elsewhere.

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. Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY04 = 1 Jul 2004 through 30 Jun 2005).

In fall 2008 we entered into a cooperative study with the USFWS to estimate kill rates of wolf packs on moose in western Unit 25D including per wolf consumption or kill rates. Secondary objectives include estimates of seasonal distribution, home range, sex and age composition, and wolf mortality. Kill rates of 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 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 are 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 fall 1992, our estimates from surveys indicated there were 72–93 wolf packs including 520–630 wolves in Units 25A, 25B, and 25D and 150–215 wolves in 22–32 packs in Units 26B and 26C. These estimates are still considered representative of current populations, based in part on the results of more recent surveys in portions of Unit 25 and little change in harvest or prey availability. Fall wolf population density is estimated at 5.7–8.3 wolves/1000 mi^2 (2.2–3.2/1000 km^2) in Units 26B and 26C. Resident packs are rare on the coastal plain in the northern portion of these units (Garner and Reynolds 1986). Wolf population density in western Unit 25D was estimated at 7.3–9.1 wolves/1000 mi^2 (2.8–3.5/1000 km^2) based on aerial surveys in 1983 and 1984 (Nowlin 1985). A 1992 aerial survey encompassing most of Unit 25D indicated wolf density averaged 8.8–10.6 wolves/1000 mi^2 (3.4–4.1/1000 km^2). Aerial surveys in 1997 and 1999 resulted in estimates of 12.2–14.5 wolves/1000 mi^2 (4.7–5.6/1000 km^2) in western Unit 25D, and 9.6–11.1 wolves/1000 mi^2 (3.7–4.3/1000 km^2) in western and central Unit 25D. Average pack size was 5–7 wolves in most of the survey area.

In March 2000 we conducted an aerial survey in eastern Unit 25D and central Unit 25B. The survey area was 13,800 mi^2 (35,740 km^2) and included the Porcupine River drainage downstream of Graphite Lake; the lower drainages of the Sheenjek, Christian, Chandalar, and Hadweenzic rivers; the Yukon River and adjacent flats from Circle to Birch Creek; the lower drainages of Preacher and Beaver Creeks; and most drainages of the Little Black, Black, and Salmon rivers. The survey estimated 125–133 wolves or a density of 9.1–9.8 wolves/1000 mi^2 (3.5–3.8/1000 km^2). Pack size ranged 2–13 wolves and averaged 5.3 (n = 23) (observations or tracks of single wolves are excluded from pack size estimates but are included in population size estimates). During the survey, biologists observed 65 wolves (26 black and 39 gray or white) and the apparent wolf kill sites of 34 moose and 1 caribou.

In April 2001 we conducted an aerial survey in most of Unit 25D and a portion of central Unit 25B. The survey area was 16,600 mi^2 (42,990 km^2) and included all drainages in Unit 25D flowing north to the Yukon River; the Yukon River and adjacent flats from Circle to the Dalton Highway bridge; most of the Dall and Hodzana River drainages; the lower Hadweenzic, Chandalar, and Christian River drainages; the Porcupine River downstream of Graphite Lake; and the lower drainages of the Little Black, Black, and Salmon rivers. The survey estimated 181–204 wolves or a density of 10.9–12.3 wolves/1000 mi^2 (4.2–4.7/1000 km^2). Pack size ranged 2–12 wolves and averaged 4.5 (n = 38) (observations or tracks of single wolves are excluded from pack size estimates but are included in population size estimates). During the survey, biologists observed 98 wolves (34 black and 64 gray) and the apparent wolf kill sites of 29 moose. No surveys were completed during 2002–2005 because of lack of suitable snow conditions or funding.

In March 2006 we surveyed Unit 25D, except a small area near Circle and the upper Hadweenzic River. We also surveyed a small portion of the upper Hodzana River in Unit 25A; central Unit 25B including the lower Little Black, Black, and Salmon rivers; and the foothills along the northern edge of Unit 25C. This survey area was 18,850 mi^2 (48,820 km^2) and we estimated 216–229 wolves or a density of 11.5–12.2 wolves/1000 mi^2 (4.4–4.7/1000 km^2). Pack size ranged 2–12 wolves and averaged 4.6 wolves (observations or tracks of single wolves are excluded from pack size estimates but included in population size estimates). We observed 107 wolves, including 52 black and 55 gray, blue, or white wolves. We located 32 apparent wolf kill sites of moose and documented 3 relatively long successful chases of 6.5, 10, and 19 miles. Adding 10% to account for lone wolves not detected increases the maximum estimate to 252 wolves or a density of 13.3 wolves/1000 mi^2 (5.2/1000 km^2).

In March 2009 we surveyed 8580 mi^2 (22,220 km^2) in western Unit 25D. 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. We tracked and/or observed 23 packs of 2 or more 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/1000 mi^2 (4.4–5.3/1000 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 underestimate their presence and therefore underestimated population size. In addition, a 400-mi^2 area north of Stevens Village was not adequately surveyed due to strong wind and blowing snow. This area likely contains one pack.

Based on a 9-year radiotelemetry study of an average of 10 packs annually, Burch (2002) reported that wolf population density averaged 10.6 wolves/1000 mi^2 (4.1/1000 km^2) in Yukon–Charley Rivers National Preserve, including part of Unit 25B. Fall pack size averaged 7.2 wolves, ranged 4.3–9.1 wolves, but appeared to have increased over the course of the study as a result of growth of the Fortymile caribou herd.

We conducted an aerial wolf survey in a 5232-mi^2 (13,550-km^2) area in the foothills and mountains in Unit 26B, from the Itkillik River to the Canning River in April 2003. We documented 20 wolves from tracks and/or observations, including 5 packs of 2 or more wolves and 1 single wolf. We estimated there were 25 wolves in the area, or a density of 4.8 wolves/1000 mi^2 (1.8/1000 km^2).

Distribution and Movements

In the early 1980s, wolves were radiocollared in northern ANWR by USFWS. They included members of packs in the Canning, Sadlerochit, Aichilik, Kongakut, Hulahula, Egaksrak, Drain, and Malcom drainages (Garner and Reynolds 1986). Several lone wolves were also radiocollared. Radiocollar locations indicated wolves did not follow caribou south to their winter ranges but generally remained within the same pack territories all year. Wolves preyed primarily

on caribou from spring to fall and switched to Dall sheep, moose, and small game in winter when caribou were not present. Several wolves dispersed as far as 500 miles from their home range (Garner and Reynolds 1986). Burch (2002) reported an average home range of 886 mi^2 (2295 km^2) for wolf packs in Yukon–Charley Rivers National Preserve, and that 28% of 91 radiocollared wolves dispersed 18–292 miles (30–470 km).

MORTALITY

Harvest

Season and Bag Limit. Same-day-airborne hunting of wolves was prohibited during RY05–RY07. In accordance with trapping regulations, wolves caught in traps or snares could be taken by shooting the same day a trapper was airborne. The hunting and trapping seasons in Units 25 and 26 were:

Units/Bag Limits/Special Restrictions	Resident/Subsistence Open Season	Nonresident Open Season
RY05		
Units 25A, 25B, 25D, 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
RY06–RY07		
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. In March 2002 the Alaska Board of Game increased the bag limit from 5 wolves to 10 wolves for the hunting season in Units 25A, 25B, and 25D beginning in RY02. In March 2006 the board extended the wolf trapping season to 1 October–30 April, and allowed the use of snowmachines to position hunters to select wolves for harvest in Unit 25D. This regulation took effect in RY06.

Hunter–Trapper Harvest. For all units, the reported 3-year average harvest during RY05–RY07 was 80 wolves (range 51–106; Table 1) and was higher than the previous 2 reporting periods (RY02–RY04, $\bar{x}$ = 53, and RY99–RY01, $\bar{x}$ = 66). During RY05–RY07, 25% of the harvest occurred in Unit 25A, 12% in Unit 25B, 36% in Unit 25D, 25% in Unit 26B, and 1% in Unit 26C. Harvest increased in Units 25D and 26B during RY05–RY07 compared to the previous 2 report periods and remained relatively stable in Units 25A, 25B, and 26C. Increased harvest in Unit 25D during RY05–RY07 was probably the result of increased trapping effort

from local residents in the Yukon Flats and by trappers from Fairbanks who used airplanes. In RY06 and RY07, trappers from the village of Beaver made a concerted effort with pilot–trappers from Fairbanks to increase wolf harvest.

Wolves were reported taken across most of Unit 25A including the Middle and North Fork Chandalar, upper Hodzana, Porcupine, Junjik, and Sheenjek 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. Take of wolves in Unit 26C was limited to the Canning River drainage.

Harvest Chronology and Method of Take. Harvest chronology varied across the reporting area (Table 2). Reported harvest during the wolf hunting season in August and September made up 24–40% of the harvest in Unit 25A and 25–40% in Unit 25B. This can probably be attributed to opportunistic take by hunters who were targeting moose, sheep, and caribou. The remaining harvest (60–75%) occurred during November–March when wolf trapping and hunting seasons overlap. In Unit 25D, all harvest occurred during November–April and most wolves harvested were trapped (63–95%). In Unit 26B, 28–43% of the harvest occurred during August–October and 57–72% occurred during February–April. Most wolves harvested (77–86%) in Unit 26B were shot and are probably attributable to opportunistic take by hunters pursuing caribou and sheep in the fall or active wolf hunting in the spring. Few wolves were trapped in Unit 26B due to its remoteness, few local communities, and a lack of daylight during winter. Only 3 wolves were reported harvested in Unit 26C during RY05–RY07 and were the result of opportunistic take by big game hunters during 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. 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 larger packs 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) by other wolves is probably the major cause of natural mortality among adult wolves in northeastern Alaska. Along the 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 RY05–RY07, reported harvest accounted for a maximum of 8–20% of the estimated population in Unit 25D and 5–10% in Units 25A, 25B, 26B, and 26C. Harvests were well below the maximum sustainable level of 30–35% generally reported for wolf populations. However, where ungulate populations are low, as in Units 25 and 26, the sustainable harvest rate can be lower. Wolf population density continues to be relatively low compared to areas where prey is more abundant. We recommend periodic monitoring of wolf populations, particularly in the most important moose hunting areas in Units 25B and 25D.

People throughout the study area and especially in Units 26B and 26C should be reminded of the requirement to seal wolf pelts. We should continue efforts to develop and maintain fur sealing officers in communities in the area.

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 appeared to have increased during RY06 and RY07, the increase 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 (ADF&G 2002). Previous research of moose mortality (Bertram and Vivion 2002) and an ongoing study of wolf predation (Lake et al. 2009) in Unit 25D suggest that wolf predation on moose is a significant limiting factor on that population. Other studies of low density moose populations have shown predation significant in limiting moose (Gasaway et al. 1992).

The Alaska Board of Game has designated the moose population in Unit 25D as important for providing high levels of human consumptive use. Under the state's intensive management law (Alaska Statute 16.05.255), the board must consider intensive management if regulatory action to significantly reduce moose harvest becomes necessary because of a decline in numbers or productivity. Therefore, ADF&G will continue to work with the board, Yukon Flats Advisory Committee and residents, and the USFWS to develop and implement management strategies to increase wolf harvest.

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TABLE 1 Units 25A, 25B, 25D, 26B, and 26C wolf harvest, regulatory years 1996–1997 through 2007–2008

Regulatory year	Reported harvest				Method of take		
	M	F	Unk	Total	Trap/snare	Shot	Unk
Unit 25A							
1996–1997	9	8	0	17	17	0	0
1997–1998	5	11	0	16	13	3	0
1998–1999	11	6	1	18	15	3	0
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
Unit 25B							
1996–1997	5	5	0	10	9	1	0
1997–1998	8	9	0	17	17	0	0
1998–1999	5	2	1	8	7	1	0
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[a]	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
Unit 25D							
1996–1997	12	6	1	19	16	3	0
1997–1998	8	1	1	10	6	4	0
1998–1999	1	1	2	4	3	1	0
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

Regulatory year	Reported harvest				Method of take		
	M	F	Unk	Total	Trap/snare	Shot	Unk
Unit 26B							
1996–1997	14	10	0	24	4	15	5
1997–1998	3	2	0	5	0	5	0
1998–1999	8	7	2	17	1	16	0
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
Unit 26C							
1996–1997	1	0	0	1	1	0	0
1997–1998	2	0	0	2	1	1	0
1998–1999	6	5	0	11	2	9	0
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[a]	0	0	0	0	0	0	0
2004–2005[a]	0	0	0	0	0	0	0
2005–2006[a]	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

[a] No harvest reported.

TABLE 2 Units 25A , 25B , 25D , 26B , a nd 26C wolf percent harvest c hronology by month, regulatory years 1996–1997 through 2007–2008

Regulatory year	Percent harvest chronology by month										
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	*n*
Unit 25A											
1996–1997	0	0	0	0	6	18	12	35	29	0	17
1997–1998	0	19	0	0	12	6	0	62	0	0	16
1998–1999	0	11	0	0	28	22	5	33	0	0	18
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
Unit 25B											
1996–1997	0	10	0	0	30	20	30	10	0	0	10
1997–1998	0	0	0	24	11	6	41	18	0	0	17
1998–1999	0	0	0	0	75	0	13	13	0	0	8
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
Unit 25D											
1996–1997	0	0	0	16	32	26	10	5	10	0	19
1997–1998	0	20	0	0	40	0	20	0	20	0	10
1998–1999	0	0	0	0	0	0	75	25	0	0	4
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

Regulatory year	Percent harvest chronology by month										
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	*n*
Unit 26B											
1996–1997	0	4	0	0	17	13	13	46	8	0	24
1997–1998	60	0	0	20	0	0	20	0	0	0	5
1998–1999	6	0	0	0	0	6	18	47	24	0	17
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
Unit 26C											
1996–1997	100	0	0	0	0	0	0	0	0	0	1
1997–1998	0	0	0	0	0	0	0	50	50	0	2
1998–1999	9	0	0	0	0	0	0	36	55	0	11
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[a]	0	0	0	0	0	0	0	0	0	0	0
2004–2005[a]	0	0	0	0	0	0	0	0	0	0	0
2005–2006[a]	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

[a] No harvest reported.

TABLE 3 Units 25A, 25B, 25D, 26B, and 26C percent harvest by transport method, regulatory years 1996–1997 through 2007–2008

Regulatory year	Percent harvest by transport method								
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	*n*
Unit 25A									
1996–1997	0	0	0	0	100	0	0	0	17
1997–1998	12	19	0	0	69	0	0	0	16
1998–1999	11	0	0	0	89	0	0	0	18
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
Unit 25B									
1996–1997	0	10	10	0	80	0	0	0	10
1997–1998	0	47	0	0	53	0	0	0	17
1998–1999	13	13	0	0	63	0	0	13	8
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[a]	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

Regulatory year	Percent harvest by transport method								
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	*n*
Unit 25D									
1996–1997	5	0	0	0	95	0	0	0	19
1997–1998	40	0	0	0	60	0	0	0	10
1998–1999	0	0	0	0	100	0	0	0	4
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
Unit 26B									
1996–1997	0	17	0	0	37	0	25	21	24
1997–1998	60	0	0	0	0	0	40	0	5
1998–1999	6	0	0	0	35	0	24	35	17
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

Regulatory year	Percent harvest by transport method								
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	*n*
Unit 26C									
1996–1997	100	0	0	0	0	0	0	0	1
1997–1998	0	0	0	0	100	0	0	0	2
1998–1999	9	0	0	0	91	0	0	0	11
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[a]	0	0	0	0	0	0	0	0	0
2004–2005[a]	0	0	0	0	0	0	0	0	0
2005–2006[a]	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

[a] No harvest reported.

WILDLIFE

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 2005
To: 30 June 2008

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 because of 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 increased during the early 1990s to a peak of 60 animals in 1993–1994, but has gradually decreased since then and only 5 wolves were reported harvested in each of 2002–2003 and 2004–2005. 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 considerably 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.

Trent (1988) used a Traditional Track Count (TTC) method to survey a 16,848 km^2 (6480 mi^2) area around Umiat and estimated density in 1986 at 2.6 wolves/1000 km^2 and 2.7–3.2 wolves/1000 km^2 in 1987. In 1992 two surveys were flown: 1) a Track Intercept Probability (TIP) survey of 10,343 km^2 (3994 mi^2) area around Umiat which produced an estimate of 4.0-6.2 wolves/1000 km^2, and 2) a TTC survey of 23,293 km^2 (8955 mi^2), which contained the same area around Umiat plus more coastal plain area to the north, and resulted in an estimate of 2.9-4.2 wolves/1000 km^2 (Carroll 1994). A Sample Unit Probability Estimator (SUPE) was used in 1994 to count wolves in the 10,343 km^2 (3994 mi^2) study area around Umiat, and the density was estimated at 4.1-4.3 wolves/1000 km^2. A SUPE survey was completed in 1998 in the same area, and a density estimate of 1-2.2.wolves/1000 km^2 was generated. The 1998

survey was incomplete because of poor conditions, but it was apparent that the wolf population had declined (Carroll 2000). The TIP and SUPE methods were developed by Becker (1991; Becker and Gardner 1990; Becker et al. 1998).

Stephenson and James (1982) estimated the wolf population size for Unit 26A at 144–310 wolves in 1982. In 1993 it was estimated that there were 240–390 wolves (1.8–2.9 wolves/1000 km^2) in 32 to 53 packs in Unit 26A (Carroll 1997).

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

We attempted to conduct wolf counts using the Sample Unit Probability Estimator (SUPE) survey technique (Becker et al. 1998) periodically between 1998 and 2006, but we were unsuccessful in these attempts due to very low numbers of wolves and/or unfavorable weather conditions (Carroll 2006). We estimated wolf abundance during 7–10 April 2008 using a reconnaissance track survey (Stephenson 1978). This technique can also be referred to as a Traditional Track Survey (TTS). The survey was conducted in Unit 26A in a 17,800 km^2 area 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, Marty Webb and Paul Zaczkowski, who piloted of PA-18 aircraft. Surveys were flown in conjunction with moose counts on 7–9 April and all river drainages in the count area were flown. Weather conditions were clear and calm during this period. Fresh snow had fallen

on April 6 and tracking conditions were excellent. 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 had made the tracks. 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. All wolf and track sightings were analyzed by time, location, and wolf color patterns to prevent double counting.

In addition to the wolf survey in 2008 we recorded the number of wolves counted while conducting moose surveys each year.

We collected harvest data from sealing certificate records, informal discussions with knowledgeable village residents, and through the NSB Harvest Documentation Program, which monitors harvests in North Slope villages. In past years the department collected composition data from wolf carcasses collected by hunters at Anaktuvuk Pass.

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/1000 km^2 for wolves that were seen during the survey and 4.4 wolves/1000 km^2 for all wolves that were accounted for during the survey (Figure 1). This compares to densities of 1–2.2 wolves/1000 km^2, 4.1–4.3 wolves/1000 km^2, and 4.0–6.2 wolves/1000 km^2 obtained from surveys in 1998, 1994, and 1992 using TIP and SUPE techniques in roughly the same area as the 2008 survey (Table 1).

The number of wolves seen during moose surveys has also increased substantially in recent years. During the spring 1991 moose census, 29 wolf sightings were recorded in 39 hours of flight in Unit 26A. During the 1995 census, 16 wolves were observed during 35 hours of flight. We did not see any wolves during the moose census in 1999 and saw only 4 wolves in the 2002 census (Carroll 2003). During the 2005 census, we spotted 16 wolves in 2 packs during 36 hours of flight (Carroll 2006). In 2008 we counted 68 wolves in 15 packs during 38 hours of flight during the spring census.

Wolves per hour seen during moose surveys:

Year	1991	1995	1999	2002	2005	2008
Wolves/hour	0.74	0.46	0	0.13	0.44	1.78

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 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 recent increase in wolves is probably due to an increase in the number of caribou wintering in the area in recent years, relatively high numbers of moose, and a substantial arctic hare population.

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/1000 km^2) in 32 to 53 packs were resident in Unit 26A. 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. Previously, National Park Service and department staff collected necropsy data on wolves harvested at Anaktuvuk Pass from the winters of 1985–1986 to 1992–1993. Out of 110 wolf carcasses examined at Anaktuvuk Pass during 1990–91, 73 were from wolves harvested in Unit 26A. Forty-six (42%) were males, 52 (47%) were females, and 12 (11%) were unknown. Of 82 carcasses that were aged, 37 (45%) were adults and 45 (55%) were pups. Ninety-three (85%) of the wolves were gray or white, and 17 (15%) were black. Sixty-seven (61%) of these wolves were shot, and 43 (39%) were trapped. Fifteen were caught during December, 23 during January, 23 during February, and 44 during March; the harvest timing of 5 was unknown.

Of 52 carcasses examined during 1991–1992, 35 were from wolves harvested in Unit 26A. Twenty-eight were males, 23 were females, and 1 was unknown. Twenty-three were pups, 15 were adults, and 4 were of unknown age. Eight animals were black, 43 were gray, and 1 was unknown. Twenty (38%) were shot and 32 (62%) were trapped.

Of the 48 carcasses examined at Anaktuvuk Pass during 1992–1993, 21 were taken in Unit 26A. Ten were males, 2 were females, and 9 were of unknown sex. Twelve (57%) were shot, and 9 (43%) were trapped. All were gray.

No composition data were available from Anaktuvuk Pass after 1993. Composition of the harvest probably does not reflect accurate age composition because pups are more susceptible to harvest than adults. Composition data from sources other than hunter harvest are not available at this time.

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

Regulatory years 2005–06, 2006–07, 2007–08 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. The Board of Game had made same-day-airborne shooting of wolves legal under trapping regulations, if the wolf is either caught in a trap or snare or is over 300 feet from the airplane at the time of taking. In 1999 a citizen referendum made same-day-airborne wolf hunting illegal.

Hunter/Trapper Harvest. During the 2005–2006 season, 12 wolves were sealed; during 2006–2007, 9 wolves were sealed; and during 2007–2008, 9 wolves were sealed. 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. The NSB found during 1994–1995 that at least 59 wolves were harvested in Anaktuvuk Pass while 17 were sealed. Eighteen were harvested in Nuiqsut, 2 in Atqasuk, and 8 in Kaktovik, while none were sealed in any of those villages (Brower and Opie 1996, 1997; Hepa, et al. 1997).

Permit Hunts. There were no permit hunts for wolves in Unit 26A during the reporting period.

Hunter Residency and Success. In 2005–06, 5 North Slope residents harvested 8 wolves, a nonlocal resident harvested 3 wolves, and 1 wolf was harvested by a nonresident hunter. During 2006–07, 2 North Slope residents harvested 8 wolves and a nonresident harvested 1 wolf. In 2007–08, 4 North Slope residents harvested 7 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 transportation, and chronology of harvest are summarized in Tables 3 and 4.

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 370,000 animals, seasonally occupies parts of Unit 26A, and a portion of this herd remains throughout the winter. The TCH numbers aproximately 64,000 animals and most of this herd remains year-round in the unit during most years.

The Colville River moose population numbered approximately 1600 by 1991, but declined by 75% between 1992 and 1996; increased gradually to about 1200 moose by 2007, but currently appears to be declining again. Dall sheep are preyed upon in mountainous regions. Snowshoe hares moved into the Colville River system during the 1990s and increased dramatically, 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 results of wolf population surveys and the number of wolves counted during moose surveys indicate that the density of wolves in the southeast corner of the Unit 26A increased from 1986 to 1994, declined and remained low through 2006, and has increased in recent years. In 2008 we estimated 4.4 wolves/1000 km^2 in a reconnaissance track survey in our study area and counted 68 wolves in 15 packs during moose surveys.

An increased prey base is probably the major reason that wolf numbers in the study area have recently increased. Caribou have been wintering in the count area in recent years. Thousands of caribou from the TCH and WAH wintered in the area between Umiat and Anaktuvuk Pass during the winter of 2007–2008 and there was a corresponding increase in number of wolves in the area. The Colville River moose population had also increased to about 1200 animals by 2008. In addition, snowshoe hares were plentiful, providing another source of prey.

Because many North Slope residents tan their wolf pelts at home and do not have them sealed, the department's wolf sealing program does not provide accurate harvest information. The

NSB Department of Wildlife Management has developed a harvest documentation system that is more acceptable to local residents. Harvest monitors have been hired in each village and are collecting harvest information for several species. During 1994–1995 the NSB found that at least 59 wolves were harvested in Anaktuvuk Pass, while 17 were sealed, and that 18 were harvested in Nuiqsut, while none were sealed. We will have more accurate harvest information if the NSB program continues and becomes established in more North Slope villages.

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. We have no current information on sheep predation. Wolf predation was also one of several factors involved in a 75% decline of the North Slope moose population between 1992 and 1996. Between 1997 and 2007 the moose population increased while the density of wolves was low. Currently, wolf numbers are relatively high and the moose population is declining. We have no numbers on wolf predation on caribou on the North Slope, but predation is probably substantial when caribou winter in areas of relatively high wolf density. We have not yet seen wolf predation 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. If wolf numbers continue to be relatively high, hunting and trapping effort may increase. Because of its remoteness and because aerial and land-and-shoot hunting are currently not allowed, extensive areas in Unit 26A receive little wolf hunting and trapping pressure, so overharvest is unlikely.

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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, 1989–2005

Regulatory year	Sex			Color			Estimated unreported harvest	Total reported harvest
	% Male	% Females	% Unknown	% Gray	% Black	% White		
1988–1989	38	62		100	0	0		13
1989–1990	71	29		64	29	7	48	14
1990–1991	66	34		83	13	3	82	30
1991–1992	67	28	5	72	22	6	37	18
1992–1993	59	30	11	79	17	3	42	29
1993–1994	65	32	3	72	17	11	37	60
1994–1995	73	27	0	89	6	5	32	47
1995–1996	42	58	0	85	9	6	41	19
1996–1997	57	43	0	81	14	5	40	21
1997–1998	75	25		69	31	0	30	16
1998–1999	60	33	7	67	13	20	28	15
1999–2000	50	13	37	37	50	13	25	8
2000–2001	83	14	3	76	21	3	32	29
2001–2002	75	25		88	6	6	30	16
2002–2003	40	60		80	20		20	5
2003–2004	62	38		77	15	8	20	13
2004–2005	60	40		80	20		20	5
2005-2006	67	33		67	25	8	30	12
2006-2007	67	33		67	22	11	25	9
2007-2008	56	44		100			25	9

TABLE 3 Method and transportation percent of reported wolf harvest, Unit 26A, 1988–2005

Regulatory	Method of take (%)				Transportation method (%)				Total reported
Year	Trap	Rifle	Snare	Unknown	Aircraft	Snowmachine	ORV	Boat/Skis	harvest
1988–1989	15	85				100			13
1989–1990	64	36			15	85			14
1990–1991	20	80			3	90	7		30
1991–1992	39	61			6	94			18
1992–1993	30	63		7	7	89	4		29
1993–1994	33	66	1		8	85	0	7	60
1994–1995	7	90	3		28	72			47
1995–1996	21	74	5			95		5	19
1996–1997	71	29			5	95			21
1997–1998	0	100			0	100			16
1998–1999	0	100	0		13	87			15
1999–2000	0	63		37	80	20			8
2000–2001	4	96	0		7	86		7	29
2001–2002	0	100	0		0	100			16
2002–2003		100			40	60			5
2003–2004		85	15		23	77			13
2004–2005	40	60				100			5
2005-2006	8	92			8	92			12
2006-2007		100			11	89			9
2007-2008	11	89			22	78			9

TABLE 4 Chronology for reported wolf harvest in Unit 26A, 1988–2005

Regulatory year	Month											
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Unknown	Total
1988–1989	1				1		2	9				13
1989–1990		2		1	2	2	2	5				14
1990–1991		1			3			22	4			30
1991–1992		1				2	1	11	3			18
1992–1993		2		2	2			18	4		1	29
1993–1994	2	5		1	4	2	5	29	12			60
1994–1995	2	2		3	5	2	10	13	10			47
1995–1996		1		3				11	1	3		19
1996–1997	1		1		1	4	11	3				21
1997–1998				2	5	3	1	5				16
1998–1999	1	1				1	4	5	3			15
1999–2000		1		2			3				2	8
2000–2001	2		3		2	1	9	8	4			29
2001–2002			2		3		7	4				16
2002–2003	1	1						1	2			5
2003–2004			1		2		6	4				13
2004–2005							2	3				5
2005-2006	1						3	5	3			12
2006-2007	1					1		6				9
2007-2008	2	1		2				4				9

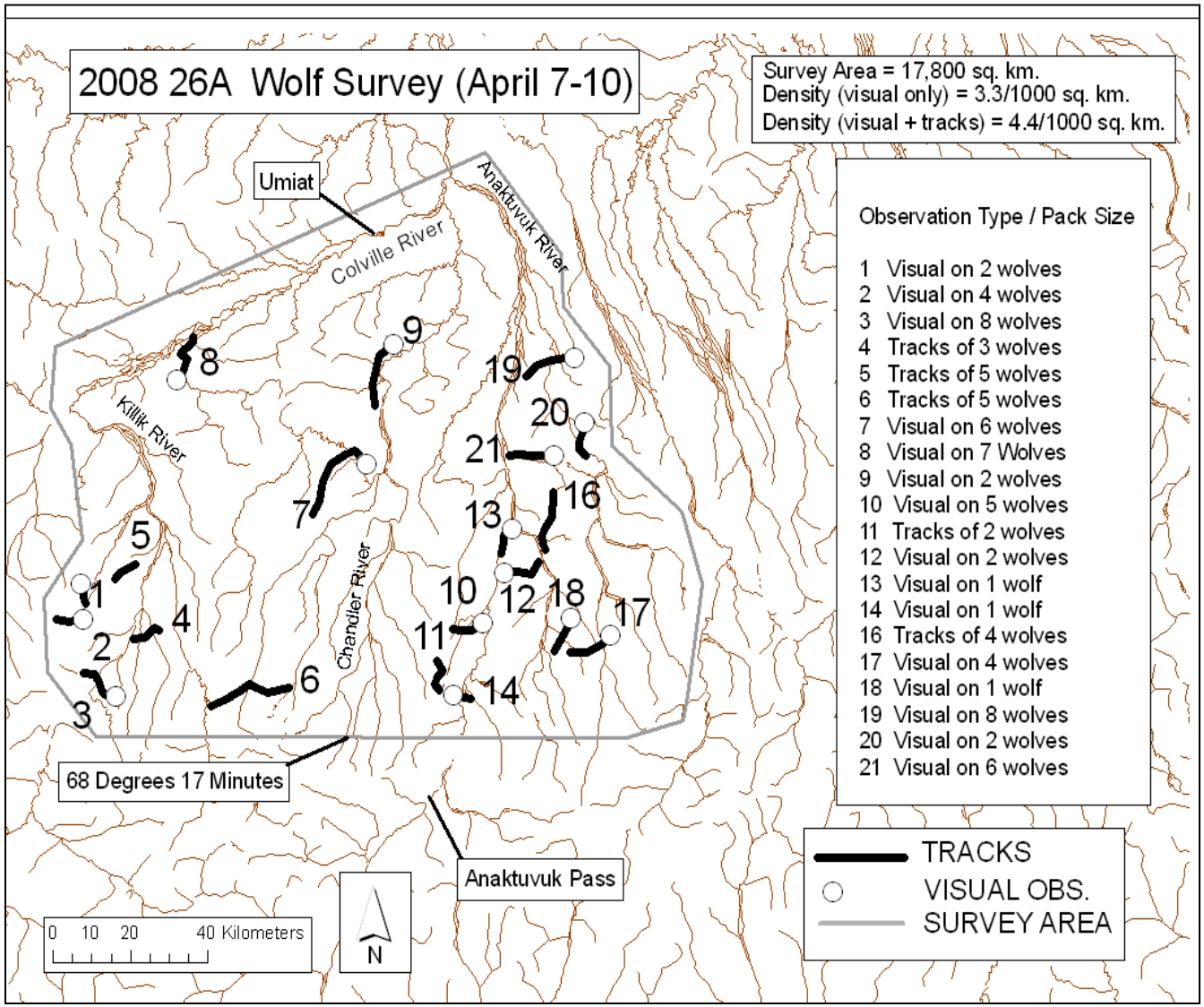

FIGURE 1 Location and numbers of wolf packs observed in Unit 26A wolf count study area 7–10 April 2008

The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sales of handguns, sporting rifles, shotguns, ammunition, and archery equipment. The Federal Aid program allots funds back to states through a formula based on each state's geographic area and number of paid hunting license holders. Alaska receives a maximum 5% of revenues collected each year. The Alaska Department of Fish and Game uses federal aid funds to help restore, conserve and manage wild birds and mammals to benefit the public. These funds are also used to educate hunters to develop the skills, knowledge and attitudes for responsible hunting.

ADF&G photo by Ken Whitten