Wolf
Management Report
of survey-inventory activities
1 July 2002–30 June 2005

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

ADF&G

Funded through
Federal Aid in Wildlife Restoration
Grants W-33-1. 2, and 3, Project 14.0
December 2006

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Please note that population and harvest data in this report are estimates and may be refined at a later date.

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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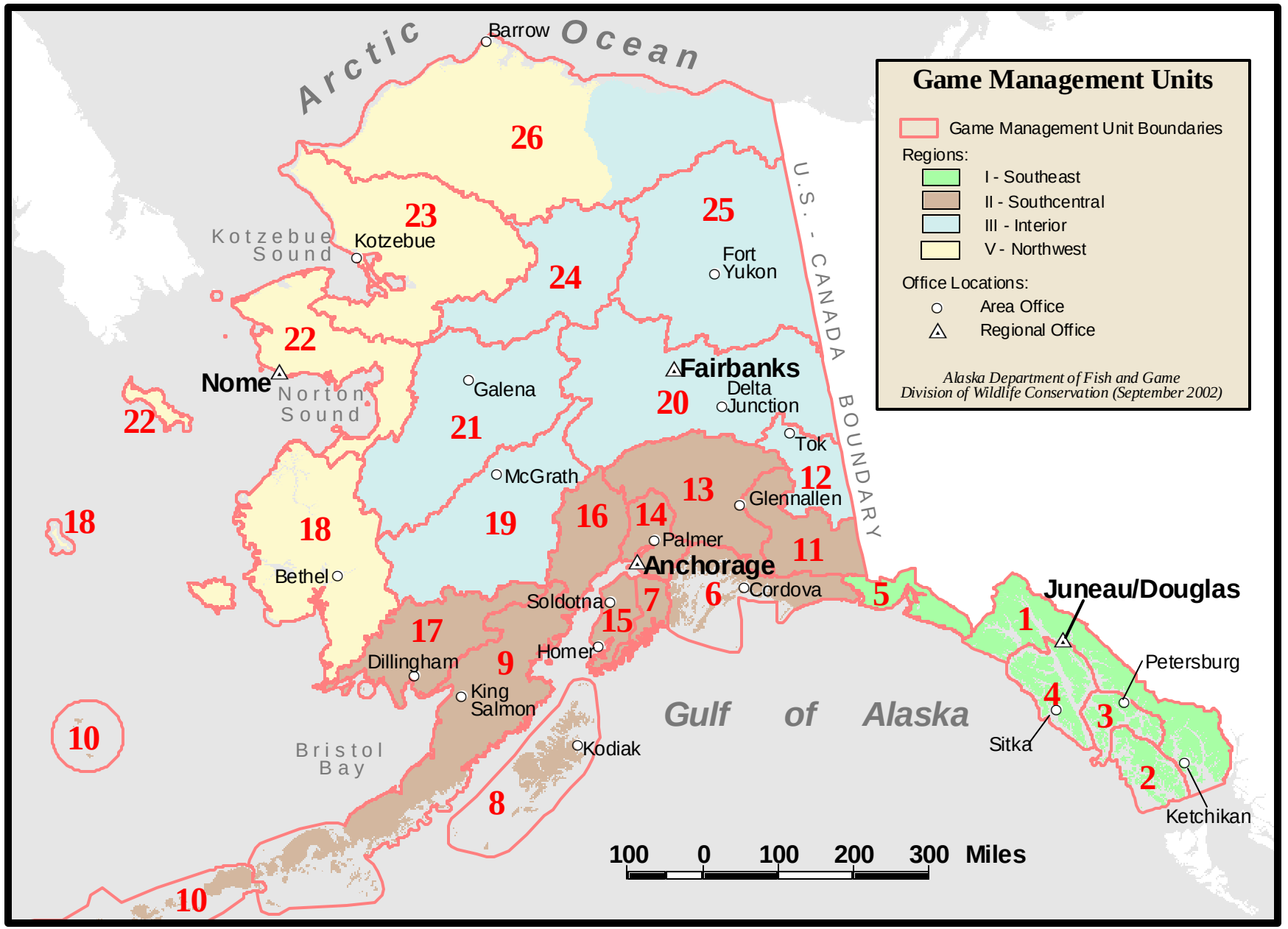
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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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 adjacent islands in search of prey.

Wolves feed primarily on deer in southern Southeast Alaska, particularly on islands in the area. On the mainland, where deer densities are generally lower than on islands, wolves prey primarily on mountain goats and beavers. Marine mammals, salmon, waterfowl, and small mammals supplement the diets of local wolves. Wolves along the Unuk River near Burroughs Bay probably kill moose found along the long river valley, which continues beyond the U.S./Canada border.

MANAGEMENT OBJECTIVE

- Maintain an average annual harvest of at least 20 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

No accurate population estimates are available 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.

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 wolf on Kupreanof 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 Revillagigedo Island, where it was caught by a trapper near Neets Bay.

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 lower than the previous 3-year period and lower than the long-term average. Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY03 = 1 July 2003 through 30 June 2004). Total harvest was 23 in RY 2002, 26 in RY 2003, and 9 in RY 2004. The sex of the harvest during this report period was almost evenly split between male and female, which is consistent with the long-term pattern. Trapping continues to be the most successful method of taking wolves (68%), followed by ground shooting (30%) (Table 1).

The RY 2004 harvest of only 9 wolves and an average catch of 1 wolf per trapper was the lowest harvest on record since 1985 (Porter 2003). Fourteen trappers took an average of 1.6 wolves during 2002, and 10 trappers took an average of 2.6 wolves during 2003 (Table 4). The past 3 winters have been mild in terms of snow accumulation and snow persistence, leaving deer, and consequently wolves widely dispersed.

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 (78%), while the remainder used highway vehicles (22%) (Table 2).

Harvest Chronology. March has historically seen the peak of the Unit 1A wolf harvest, followed by February. During the past 3 years, the harvest was spread over the open season, with slightly more taken during December, January and February, when pelts are prime (Table 3).

Hunter Residency and Success. Local residents regularly account for 90–100% of hunters and trappers taking wolves in Unit 1A. Ninety-five percent of the harvest since 1990 has been taken by local residents, followed by nonresidents (5%). Nonlocals accounted for less than 1% during that same period. During 2002–2004, residents harvested annually 86%, 90%, and 100% of the total, respectively (Table 5). Nonresidents that harvested wolves took them incidentally during September by ground shooting. Hunters often encounter wolves while pursuing other big game species.

Board of Game Actions. By regulation prior to 2005, the left foreleg was required to remain attached to the hide of harvested wolves until sealed for aging purposes. Effective June of 2006, under new regulation hunters and trappers will no longer be required to leave the foreleg attached to wolf hides. Additional new regulations allow Unit 1A hunters to harvest wolves during August and allow trappers to take wolves until the end of April.

Other Mortality

Mortality from natural causes (starvation, accidents, disease, fighting) in exploited populations is low, typically averaging 5 to 10% per year (Fuller 1989). One wolf was killed by vehicle collision near Ketchikan during 2003. This animal was salvaged, but unfortunately was not reported to authorities.

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 and catch per trapper were low during this 3-year period. The low harvest and low effort during 2003 and 2004 likely relate to $2–$3 per gallon gas prices and many trappers choosing other activities during the winter months. No regulation changes are recommended at this time.

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FULLER, T. 1989. Population dynamics of wolves in north-central Minnesota. *Wildlife Monographs* 105.

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TABLE 1 Unit 1A wolf harvest, 1990–2004

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	0
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
Average	16	15	0	31	9	21	1	0	25	5	1

[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

TABLE 2 Unit 1A wolf hunter/trapper transport method, 1990–2004

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
Average	0	25	4	1	1

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

TABLE 3 Unit 1A wolf harvest chronology, 1990–2004

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
Average	0	1	2	2	2	3	4	5	7	3	0	0

[a] Hunting season and bag limit changed from year-round, no limit, to 1 August–30 April, 5-wolf limit

TABLE 4 Number of license holders who killed Unit 1A wolves and average catch per trapper, 1990–2004

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
Average	16	2.0

TABLE 5 Residency of Unit 1A wolf trappers/hunters, 1990–2004

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
Average	20	0	1

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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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.

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. During the report period, 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., RY02 = 1 July 2002 through 30 June 2003).

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 (RY 2002)	Residents and Nonresidents
Trapping: No limit	10 November–30 April
Hunting: 5 wolves	1 August–30 April

Season and Bag Limit (RY 2003 and 2004)	Residents and Nonresidents
Trapping: No limit	10 November–31 March
Hunting: 5 wolves	1 September–31 March

Board of Game Actions and Emergency Orders. 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 region

Units 1–5 remain naturally attached to the hide until sealed. These regulatory changes will become effective and be reported on during the next report period.

No emergency orders were issued regarding Unit 1B wolf hunting during the report period.

Hunter/Trapper Harvest. In 2002–03 four individuals harvested 15 wolves, in 2003–04 four individuals harvested 8 wolves, and in 2004–05 nine individuals harvested 14 wolves (Table 1). In 2002–03, the last year foreleg bones were aged, 43% of wolves harvested were adults (Table 2).

Although trapping is usually the primary method of take, in 2004–05 over half of the wolves harvested (57%) 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. In 2002–03 January and February, each with an equal percentage of the overall harvest, accounted for the highest percent of the harvest, followed by November and March, also with equal percentages of the overall harvest (Table 3). In 2003–04, January, February and December, in descending order, accounted for the highest percent of the harvest. In 2004–05, October and December, each with an equal percentage of the overall harvest, and September and February, respectively, accounted for the highest percentage of the harvest. Wolves harvested in August, September, and October are usually taken incidentally 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 4). In 2003–04, no other methods of transportation were reported. In 2002–03 and 2004–05, however, some hunters and/or trappers reported using 3- and 4-wheelers as transportation to harvest a small proportion of wolves taken.

Other Mortality

The reported wolf harvest probably under represents the actual take of wolves during the report period. We suspect that some poaching of wolves is occurring and that each year some wolves are shot and left to lay, 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, 1991–2004

Regulatory year	Reported harvest				Method of take			Successful trappers/hunters
	M	F	Unk.	Total	Trap/Snare	Shot	Unk.	
1991	4	6		10	7	3		7
1992	3	5		8	7	1		2
1993	9	8		17	11	6		9
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	0	15	12	3		4
2003	4	3	1	8	8	0		4
2004	11	3	0	14	6	8		9

TABLE 2 Age of harvested Unit 1B wolves[a], 1997–2002[b]

Regulatory year	Adults	Subadults[c]	Percent adults
1997	2	4	33
1998	6	5	55
1999	5	3	63
2000	1	4	20
2001	3	12	20
2002	3	4	43

[a] Not all harvested wolves were aged.
[b] Aging of wolf leg bones was discontinued after RY 2002.
[c] Less than 1 year of age.

TABLE 3 Unit 1B wolf harvest chronology, by percent by time period, 1991–2004

Regulatory year	Harvest periods												
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	April	May	Jun	n
1991		10			10	20	60						10
1992					12	50	26			12			8
1993		6		6	17	36	12	17		6			17
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

TABLE 4 Unit 1B wolf harvest, by percent by transport method, 1991–2004

Regulatory year	Percent of harvest					
	Airplane	Boat	3-or 4-wheeler	Snowmachine	Other	n
1991		90		10		10
1992		100				8
1993	6	88		6		17
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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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. 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 2 consecutive winters. Also, a black female wolf was struck and killed along the Mendehall Loop spur road during spring of 2003, and it was pregnant with 4 pups. 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 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 and have expanded into several new areas (Mendenhall Lake Recreation Area and Douglas Island). 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

RY 2002-03*	*Season*	*Bag limit*
Hunting	1 August–30 April 30	5 wolves
Trapping	10 November–30 April	No limit

RY 2003–04	*Season*	*Bag limit*
Hunting	1 September–31 March	5 wolves
Trapping	10 November–31 March	No limit

* A regulatory year runs from 1 July to 30 June (e.g., RY 2002 ran 1 July 2002–30 June 2003).

Board of Game Actions and Emergency Orders. In fall 2002, the Board of Game passed proposals requiring that trappers individually mark all snares that have a cable diameter of $^{3}/_{32}$ inch or larger (that are set out of water) or post a sign within 50 yards of the set. Signage must list the trapper's name and address or the trapper's permanent identification number, such as an Alaska driver's license number or state identification card number. This applied to all of Unit 1C except Gustavus; here the board passed a separate proposal that required that all traps and snares to be marked or be posted with a sign as described above. The board passed another proposal specific to Gustavus that made it illegal to set a snare with a cable diameter greater than $^{2}/_{32}$ inch above water. This proposal was a response to concerns about moose being caught and killed in snares that were set for wolves. And finally, a third proposal specific to Gustavus required that traps be checked at least once every 72 hours.

In 2002, the board established a management area for wolves on Douglas Island that essentially closed the hunting and trapping seasons until ADF&G determined there were at least 7 wolves on the island. In addition, the board shortened both the wolf-hunting and wolf-trapping seasons in Units 1–5. Beginning in fall 2003, the wolf hunting season ran from 1 September to 31 March, and the trapping season from 10 November to 31 March.

During the 2004 meeting, the board adopted a proposal to allow a hunting and trapping season for wolves on Douglas, with an annual take of 3 wolves. The board also changed the wolf hunting and trapping seasons in Units 1–5 to the pre-2003 season lengths.

No wolf-related emergency orders were issued during the report period.

Hunter/Trapper Harvest. The harvest during 2002–2004 was 24 wolves, with 5 taken in 2002, 13 in 2003, and 6 in 2004. Harvest methods were composed of 10 (42%) taken in traps, 8 (33%) taken with snares, and 6 (25%) taken with firearms or otherwise by hunting. The average harvest over the previous 4 report periods was 22 wolves, with a range of 16 to 31 animals. Pelt colors during this report period included 16 gray wolves, 6 black wolves, and 2 of unrecorded color.

During 2002, five wolves (3 males, 2 females) were harvested (Table 1), with all of them taken from different locations. This was slightly lower than the previous 10-year mean annual harvest of 7.6 wolves (range = 4–14). In 2003, the harvest of 13 wolves (6 males, 7 females) was one of the highest harvests over the last 15 years. Four of the wolves were taken at Port Houghton, 4 in Saint James Bay, 2 from Homeshore, and 1 each from Snettisham, Gustavus and Excursion Inlet. In 2004, six wolves (4 males and 2 females) were harvested. Three wolves were taken in the Taku River area, 2 from Gustavus, and 1 from Steamboat Bay.

Hunter/Trapper Residency and Success. In 2002, unit residents harvested 4 of the 5 wolves taken. In 2003, unit residents harvested 9 of the 13 wolves, and in 2004, unit residents harvested 4 of the 6 wolves taken. Overall, Unit 1C residents took 71% of the wolves harvested, while nonlocal residents took the remaining 25%. Nonresidents did not harvest any wolves in Unit 1C during the report period.

Harvest Chronology. Trapping harvest is spread throughout the season, with the exception of summer months, and is not consistent from year to year (Table 2). Most recent harvest has occurred from January through March. This coincides with better snow conditions for tracking and traveling and longer days that allow more time to work a trapline.

Transport Methods. Boats, skis, and snowshoes were the primary access modes for wolf hunters and trappers (Table 3). Those running their traplines on foot almost all use a highway vehicle to access their traplines, but fail to report this mode of transportation.

Other Mortality

In 2002, a female black wolf was killed by a vehicle on the Glacier Spur Road near the Mendenhall Glacier in Juneau. Further examination determined the wolf was carrying 4 pups in utero.

CONCLUSIONS AND RECOMMENDATIONS

Little is known about Unit 1C wolf populations. Reports from people afield and incidental observations by ADF&G 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 to a near record of 13 during 2003, the harvest during the 3-year report period was near the mean of the previous 4 report periods. 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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BARTEN, N. L. 2006. Unit 1C wolf management report. Pages 16–22 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2002–30 June 2005. Alaska Department of Fish and Game. Project 14.0. Juneau, Alaska.

TABLE 1 Unit 1C wolf harvest chronology, 1990–2004

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
Mean annual harvest	3.7	3.5	0.2	7.4

TABLE 2 Unit 1C wolf harvest chronology by month, 1990–2004

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1990			1			3				1	1	
1991			2							2	1	
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			
Mean annual harvest	0	0.1	0.7	0.5	0.1	0.6	1.6	1.8	1.2	0.4	0.1	0

TABLE 3 Unit 1C wolf harvest, percent by transport method, 1990–2004

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					

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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 scientific wolf studies in this unit, so population information is based on anecdotal information, sightings made during aerial moose and goat surveys, and discussions with hunters and trappers. 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 successful hunters and trappers, we collected the following data: 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 of age), subadults, and adults. The population was monitored by whatever means were available, including anecdotal reports, aerial survey sightings, 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., RY02 = 1 July 2002 through 30 June 2003).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Although no quantitative data on wolf population size was collected during the report period, anecdotal reports and discussions with local hunters, trappers, and pilots suggest wolf numbers are stable.

MORTALITY

Harvest

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

RY 2002-03	*Season*	*Bag Limit*
Hunting	1 August–30 April	5 wolves
Trapping	10 November–30 April	No limit

RY 2003–04	*Season*	*Bag Limit*
Hunting	1 September–31 March	5 wolves
Trapping	10 November–31 March	No limit

Board of Game Actions and Emergency Orders. During the fall 2002 Board of Game meeting several regionwide regulatory changes were made associated with wolf hunting and trapping that applied to Unit 1D. The regulatory changes include the requirement that trappers individually mark all snares that have a cable diameter of $^{3}/_{32}$ inch or larger (that are set out of water) or post a sign within 50 yards of the set. Signage must list the trapper's name and address or the trapper's permanent identification number, such as an Alaska driver's license number or state identification card number. Additional regulatory changes aligned the wolf hunting and trapping seasons, so that wolf hunting opens on 1 September and closes on 31 March; the trapping season end date moved up to 31 March. All of the above regulatory changes went into effect on 1 July 2003.

No emergency orders were issued for this unit during the report period.

Hunter/Trapper Harvest. During the 2002 regulatory year 12 wolves (5 males, 7 females) were harvested in Unit 1D (Table 1). In 2003, two wolves, both males, were taken, and the 2004 harvest was 6 wolves (2 males, 4 females). The Unit 1D mean wolf harvest during the report period was 7 wolves, only slightly higher than the mean harvest of 5 wolves during both of the last 2 report periods. Unit residents took 18 (90%) of the wolves harvested during the report period. A guided nonresident brown bear hunter took the remaining 2 wolves.

As in past years, far more wolves were taken by shooting than by trapping during the report period. The harvest of 20 wolves was composed of 8 (40%) harvested with firearms, 7 (35%) harvested with traps and 5 (25%) taken with snares. The color of wolves killed during this period was 13 grays, 5 black and 2 of unrecorded color. Approximately half of the 3-year harvest was taken along the Chilkat River, where hunters have miles of access via the Haines Highway. The sighting of wolves along the open river sandbars allows for opportunistic harvest with firearms.

Harvest Chronology. There was no pattern to harvest timing during the report period (Table 2), and numbers are so low that the harvest of a few wolves by one individual could affect the harvest chronology. During the report period, the majority of wolves were harvested during October through March.

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 natural mortality was documented during the report period. In 2002, a wolf was taken near Klukwan that had a leghold trap and chain on its leg and showed an old snare scar on its neck.

CONCLUSIONS AND RECOMMENDATIONS

The status of the Unit 1D wolf population is uncertain. Little effort is made to take wolves in the area, but with fewer moose in the Chilkat Valley than in the past, any noticeable predation raises public concern. Anecdotal reports of increased wolf numbers in the unit do not correlate with higher numbers of animals being trapped. Balanced against this are nonconsumptive values that wolves may offer. No changes in seasons or bag limits are recommended at this time.

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SCOTT, R. 2006. Unit 1D wolf management report. Pages 23–28 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2002–30 June 2005. Alaska Department of Fish and Game. Project 14.0. Juneau, Alaska.

TABLE 1 Unit 1D wolf harvest chronology, 1990–2004

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
Average	1.9	2.1	0.1	4.1

TABLE 2 Unit 1D wolf harvest chronology, 1990–2004

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				
Average		.1	.4	.5	.5	.3	.9	.5	.6	.5		

TABLE 3 Unit 1D wolf harvest, percent by transport method, 1990–2004[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	

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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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. Movements between Unit 2 and the mainland have not been documented.

Wolves feed primarily on deer in southern Southeast Alaska. Black bears are occasionally killed by wolves, but probably provide a small portion of their diet. Marine mammals, salmon, waterfowl, beavers, and small mammals supplement wolves' diets in the area.

The coloration of Southeast Alaska wolf pelts varies; however, the brown/gray color is most common. During the past decade, at the 2 coloration extremes, white or near-white pelts have composed less than 1% of the harvest, while black pelts have accounted for about 8–10% of the Unit 2 harvest.

MANAGEMENT OBJECTIVES

- Our objective is to maintain an average annual harvest of at least 39 wolves from Unit 2. This reflects the average harvest for this unit during 1984–1990.

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 obtain harvest information through a mandatory sealing program. Information obtained from hunters and trappers includes 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.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Using a simulation model based on data collected in Unit 2, Person (2001) estimated that 321 wolves (Standard Error (SE)= 135) inhabited POW and surrounding islands during autumn 1994, and 199 wolves (SE = 111) during spring 1995. The smaller spring estimate reflected overwinter mortality, primarily from trapping (Table 1). 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 relatively abundant throughout Unit 2.

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.

MORTALITY

Harvest

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

Hunter/Trapper Harvest. The management objective of at least 39 wolves in the harvest was not met during the 2003 season. This marks only the second time since 1985 this harvest objective was not met.

The Unit 2 wolf harvest has fluctuated during the past 10 years from a high of 132 wolves during 1996 to a low of 29 during 2003. From 2002 to 2004, the total reported annual harvests were 62, 29, and 77, respectively (Table 1). During this report period, the number of successful trappers fell to a 3-year average of 18, well below the 20-year average of 27 (range 11–42). 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 (Table 4). As the human population continues to decline in Unit 2, mostly because of fewer timber-related jobs, we expect to see fewer trappers, and consequently, fewer wolves harvested. 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.

About 88% of the wolves harvested during the past 3 seasons were caught in traps or snares, while the other 11% were shot. This was well below the long term average of 27% taken by ground shooting (Table 1).

The sex ratio of harvest during the past 20 years has remained almost evenly split, including an average of 55% male and 44% female. During the current 3-year report period, males accounted for 54% of the harvest (Table 1).

Transport Methods. Highway vehicles (30%) and boats (67%) 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. However, during the past 3 years, the majority of wolves were taken during January (31%) and February (18%). December and March accounted for 13% and 9% respectively of the harvest during the same period (Table 3).

During the past 20 years (1985–2004), 26% of the harvest has been taken by shooting (both by trappers and hunters) (Table 1). Fewer wolves were taken with firearms after season dates for hunting and trapping changed in 1997, from 1 August–30 April to 1 December–31 March. We believe the reduction in the number of wolves shot was due to changes to the early and late season, which previously provided opportunity during fall deer and spring bear hunts, when many hunters are afield. As of July 2005, the season is back to its original dates, providing harvest opportunity during August and April.

Hunter Residency and Success. Local residents have accounted for 75% of the hunters and trappers who took wolves in Unit 2 during the past 15 years. However, during this report period 95% were taken by local residents living in the unit (Table 5).

Board of Game Actions. By regulation prior to 2005, the left foreleg was required to remain attached to the hide of harvested wolves until sealed for aging purposes. Effective June of 2006, under new regulations adopted by the Board of Game, hunters and trappers will no longer be required to leave the foreleg attached to wolf hides.

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. Of 17 radiocollared wolves on POW that died during a 3-year study, humans legally killed 53%, 29% were killed by humans but not reported, and 18% died from natural causes (Person 2001). Considering the additive effects of natural and unreported mortality, 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 the 2003 harvest was one of the lowest on record, we believe the Unit 2 wolf population has remained stable during this report period. The number of Unit 2 trappers who successfully catch wolves each year is declining, perhaps mirroring the slow 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 similar number of wolves each year. Fur market prices, and consequently, incentives to trap, changed little during the last report period. However, increasing gas prices ($2–$3 per gallon) may hamper future trapping effort due to the high cost of reaching some of the more remote areas in Unit 2.

By lengthening the trapping and hunting season for wolves back to its original dates, we hope to increase the annual harvest by an estimated 12%. No new regulatory changes are recommended at this time.

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PERSON, D. K. 2001. Alexander Archipelago wolves: Ecology and population viability in a disturbed, insular landscape. Ph.D. thesis. University of Alaska Fairbanks. 174 pp.

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PORTER, B. 2006. Unit 2 wolf management report. Pages 29–37 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2002–30 June 2005. Alaska Department of Fish and Game. Project 14.0. Juneau, Alaska.

TABLE 1 Unit 2 wolf harvests, 1985–2004

Regulatory year	Males	Females	Unk	Total	Method of take			Pelt color			
					Shot	Trapped	Unk	White	Gray	Black	Unk
1985	7	11	0	18	9	9	0	1	14	3	0
1986	22	16	1	39	16	23	0	0	32	7	0
1987	27	24	4	55	26	29	0	1	39	15	0
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
Average	39	32	1	72	19	53	0	0	62	8	1

TABLE 2 Unit 2 wolf hunter/trapper transport methods, 1985–2004

Regulatory year	Air	Boat	Highway[a] vehicle	Walked	Unknown
1985	0	4	5	0	9
1986	0	14	25	0	0
1987	0	31	20	0	4
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
Average	1	39	29	0	2

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

TABLE 3 Unit 2 wolf harvest chronology, 1985–2004

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1985	0	0	4	1	2	2	3	4	1	1	0	0
1986	0	1	1	1	2	11	6	9	5	2	1	0
1987	0	1	1	7	7	11	3	11	8	1	4	1
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	0	0	0	0	0	23	32	12	10	0	0	0
Average	0	1	2	3	3	14	18	16	10	2	1	1

[a] Hunting season changed from year-round, no-limit, to 1 August–30 April, 5-wolf limit.
[b] Hunting and trapping seasons changed from 1 August–30 April to 1 December–31 March.

TABLE 4 Numbers of trappers who caught wolves in Unit 2, and average catch per trapper, 1985–2004

Regulatory year	Number of trappers that harvested wolves	Average catch/trapper
1985	14	1.3
1986	27	1.4
1987	34	1.6
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
Average	27	2.8

TABLE 5 Residency of Unit 2 wolf trappers/hunters, 1990–2004

Regulatory year	Local resident[a]	Nonlocal resident[b]	Nonresident
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
Average	20	6	1

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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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 sources 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.

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. During regulatory year 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., RY02 = 1 July 2002 through 30 June 2003).

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 (RY 2002 residents and nonresidents)

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

Season and Bag Limit (RY 2003 and 2004 residents and nonresidents)

Trapping:	10 November–31 March	No limit
Hunting:	1 September–31 March	5 wolves

Board of Game Actions and Emergency Orders. 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 1B 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. These regulatory changes will become effective and be reported on during the next report period.

No emergency orders were issued regarding Unit 3 wolf hunting during the report period.

Hunter/Trapper Harvest. In 2002–03, 41 individuals harvested 71 wolves; in 2003–04, 20 individuals harvested 36 wolves; and in 2004–05, 20 individuals harvested 41 wolves (Table 1). In 2002–03, the last year foreleg bones were aged, 48% of wolves harvested were adults (Table 2).

Except for the 1998–99 and the 2003–04 seasons, trapping has been the primary method of taking wolves in Unit 3. Trapping accounted for 59% of the harvest in 2002–03, 44% in 2003–04, and 73% in 2004–05. Deer hunters, bear hunters, and occasionally moose hunters are generally responsible for wolves that are shot incidentally while hunters are pursuing other species.

Most of the wolf harvest takes place near local communities. The majority of Unit 3 is not trapped for wolves.

The harvest of 71 wolves in 2002–03 represents the highest wolf harvest in Unit 3 since at least 1984. In 2003–04 and 2004–05, the annual wolf harvest declined to 36 and 41, respectively, each below the preceding 10-year means of 52 and 50, respectively.

Harvest Chronology. In 2002–03, February and April, in descending order, followed by January and October, with an equal percentage of wolves taken, accounted for the highest percent of the harvest (Table 3). In 2003–2004, October and January, with an equal percentage of wolves taken, accounted for the highest percentage of harvest, followed by November. In 2004–05, February, March, and December accounted for the highest percent of the harvest.

Transport Methods. In 2002–03 and 2004–05, trappers/hunters using boats harvested the majority of wolves (Table 4). In 2003–2004, hunters/trappers using highway vehicles harvested the majority of wolves. Boats were the second most frequently used means of transportation. Some trapping occurs from the road system on Mitkof and Wrangell Islands. 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 2002–03 and 2003–04.

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 lay, 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

The Unit 3 wolf harvest has shown an increasing trend in recent years, culminating in the high harvest of 71 wolves in 2002–03. Although the harvest declined in 2003–2004 and 2004–05, to 36 and 41, respectively, we believe the reduced harvest was the direct result of Board of Game actions shortening the hunting and trapping seasons. We do not believe the reductions in harvest are indicative of declining wolf populations. Furthermore, several of the more prominent Unit 3 wolf trappers are known to have been inactive during the report period, and unusually mild winters probably contributed to reduced trapper success.

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 recently have begun to 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, 1991–2004

Regulatory year	Reported harvest				Method of take			Successful trappers/hunters
	M	F	Unk.	Total	Trap/snare	Shot	Unk.	
1991	26	25	0	51	33	17	1	25
1992	12	14	0	26	19	7	0	13
1993	27	19	2	48	37	11	0	20
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

TABLE 2 Age of Unit 3 harvested wolves[a], 1997–2002 [b]

Regulatory year	Adults	Subadults[c]	% adults
1997	22	16	58
1998	15	11	58
1999	17	24	41
2000	24	26	48
2001	14	30	32
2002	19	21	48

[a] Not all harvested wolves were aged.
[b] Aging of wolf bones was discontinued in RY 2002.
[c] Less than 1 year of age.

TABLE 3 Unit 3 wolf harvest chronology, by percent by time period, 1991–2004

Regulatory	Harvest periods													
year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Unk	n
1991	0	0	8	8	14	8	15	15	12	10	6	4	0	51
1992	0	0	15	4	0	12	35	0	15	19	0	0	0	26
1993	0	4	4	9	4	27	20	10	13	9	0	0	0	48
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

TABLE 4 Unit 3 wolf harvest, by percent by transport method, 1991–2004

	Percent of harvest							
Regulatory year	Airplane	Boat	3/4 wheeler	Snowmachine	ORV	Highway vehicle	Other	n
1991	4	69	0	0	0	22	6	51
1992	4	85	0	0	0	12	0	26
1993	4	81	0	0	0	13	2	48
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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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. 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 ubunit 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. We also required hunters and trappers to leave lower front leg bones attached to the hide for sealing. We used these bones to separate wolves into 3 age categories: juveniles (less than one year of age), subadults, and adults. ADF&G staff in Yakutat sealed wolves. The 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.

RY 2002-03*	*Season*	*Bag limit*
Hunting:	1 August–30 April 30	5 wolves
Trapping:	10 November–30 April	No limit

RY 2003–04	*Season*	*Bag limit*
Hunting	1 September–31 March	5 wolves
Trapping	10 November–31 March	No limit

* A regulatory year runs from 1 July to 30 June.(e.g., RY 2002 ran 1 July 2002–30 June 2003).

Board of Game Actions and Emergency Orders. During its fall 2002 meeting, the Board of Game made several regionwide regulatory changes associated with wolf hunting and trapping that applied to Unit 5. The regulatory changes include the requirement that trappers individually mark all snares that have a cable diameter of $^{3}/_{32}$ inch or larger (that are set out of water), or post a sign within 50 yards of the set. Signage must list the trapper's name and address or the trapper's permanent identification number, such as an Alaska driver's license number or state identification card number. Additional regulatory changes align the wolf hunting and trapping seasons so that wolf hunting opens on 1 September and closes on 31 March; the trapping season end date moved up to 31 March. All of the above regulatory changes went into effect on 1 July 2003.

No emergency orders were issued for this unit during the report period.

Hunter/Trapper Harvest. Thirteen wolves (6 male and 7 females) were taken in Unit 5 during the 2002 regulatory year (Table 1). In 2003, the harvest decreased to 5 wolves (2 males, 3 females), and in 2004, eight wolves were taken (6 males and 2 females). During this report period, the mean annual harvest of 9 wolves equaled that of the previous 12 years. 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. Only 2 wolves were taken in subunit 5B during the report period, both by nonresident hunters in combination with moose or bear hunts. Although we were able to categorize the harvested wolves into 1 of 3 age categories using the leg bones, the sample size was too small to provide much insight into the age structure of the population.

In the past, trapping and snaring were the primary methods of take. The combined harvest for 2002–2004 was 26 wolves, with only 3 (12%) taken in traps, 11 (42%) taken in snares, and 12 (46%) taken by shooting. Twenty of the wolves were gray, 5 were black, and 1 was white. 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. In 2002, unit residents took 9 wolves, nonlocal residents took 1 wolf and nonresidents took 3 wolves. In 2003 two local residents, 1 nonlocal resident, and 2 nonresidents accounted for the harvest. In 2004 five local residents and 3 nonlocal residents reported taking wolves. All wolves harvested by nonresidents were shot, almost always while hunting other game.

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. However, several wolves were found dead and rotting in snares adjacent to airstrips near Dry Bay. The trappers apparently set the snares, then forgot about them. Criminal charges were pressed against one of the trappers for failing to salvage a fur animal.

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 and mountain goat populations are doing well, and with the abundant beaver and salmon in the area, along with some deer, wolves do not lack for prey resources. Because of difficult access and inclement weather throughout the unit, hunting and trapping pressure on wolves will probably remain low. No changes in seasons or bag limits are recommended at this time.

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TABLE 1 Unit 5 wolf harvest, 1990–2004

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
Mean annual harvest	5.5	3.5	0.2	9.1

TABLE 2 Unit 5 wolf harvest chronology by month, 1990–2004

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					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					
Mean annual harvest	0	0.2	1.5	1.0	0.4	0.5	1.5	0.8	1.7	1.3	0.3	0

TABLE 3 Unit 5 wolf harvest, percent by transport method, 1990–2004

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	

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

LOCATION

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

GEOGRAPHIC DESCRIPTION: Prince William Sound and northern Gulf of Alaska 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 completely revised (Griese 1988). Under a much more conservative management strategy during the 1990s, 3 of 5 goat populations in Units 6B and western 6A recovered to prewolf levels (Crowley 2004). The 2 goat populations that did not recover despite closed hunting seasons occurred in habitat with limited or no escape terrain within the territories of 2 wolf packs.

Average annual wolf harvest in Unit 6 during the past 30 years was 4.4 wolves. The highest reported harvests occurred in 1996–97 (12 wolves) and 2000–01 (13 wolves). Wolf harvest was sustainable, although Carnes (2004) reported that during the 1990s, the wolf population in Unit 6C was reduced to a nonbreeding sink population as a result of human harvest. Unit 6C had easy access to a geographically limited wolf range (approximately 1025 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 a 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 41–52 animals during the reporting period, composed of 8–11 packs and loners. Numbers were relatively stable over the past 5 years (Table 1). Estimated posthunt wolf density (wolves/1000km2) in 2004 was as follows: 6A = 9, 6B = 6, and 6C = 2.4. Given the kill rates reported by Carnes (2004), and given current moose populations (unpublished survey data), wolves had the potential to kill 7 to 16% of the moose in Units 6A (west) and 6B annually.

Distribution

Unit 6A had approximately 29–35 wolves in 5 packs and loners during the reporting period: Icy Bay (2–4 wolves), White River (5–6), Tsiu River (8–10), Suckling Hills (9–11), and Bering River (3–4). Unit 6B had 7–8 wolves in 2 packs and loners: Martin River (4–7), and Russian River (1–2). Unit 6C had 2–4 wolves present, probably as pairs or loners. Unit 6D had 4–6 wolves in 2 packs: Rude River (1–2), Lowe River (2–4). 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 April with a bag limit of 5 wolves. The trapping season was 10 November–31 March with no bag limit.

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

Hunter/Trapper Harvest. Reported annual harvest during this reporting period was 0–9 wolves (13 total for the 3-year period), composed of 25–40% females (Table 2). Six wolves were trapped and 7 shot. Total estimated unreported and illegal harvest was 3. Nine wolves were harvested during 2004, resulting in approximate harvest rates that were below sustainable levels: Unit 6A = 14%, 6B = 9%, and 6C = 19%. Wolf hunting and trapping were hampered by warm, wet winters during the last 3 years.

Hunter Residency and Success. The number of successful hunters and trappers was 2, 0, and 7 during 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 September through December, during the reporting period (Table 3). This pattern was normal.

Transport Methods. Methods of transportation varied considerably between years, which is normal for Unit 6 wolf harvest (Table 4).

CONCLUSIONS AND RECOMMENDATIONS

The population objective was achieved and the number of packs exceeded the minimum of 5. 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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TABLE 1 Unit 6 fall wolf population estimates[a], 2000–04

Regulatory year	Population estimate	Number of packs
2000–01	42–49	9–11
2001–02	36–43	8–11
2002–03	41–47	8–11
2003–03	43–50	9–11
2004–05	46–52	9–11

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

TABLE 2 Unit 6 wolf harvest, 2000–04

Regulatory	Reported harvest				Estimated harvest		Method of take			Successful
Year	M	F	(%)	Total	Unreported	Illegal	Trap/snare	(%)	Shot	trappers/hunters
2000–01	7	5	(42)	13 [a]	0	1	9	(75)	3	5
2001–02	1	1	(50)	2	0	1	1	(50)	1	2
2002–03	3	1	(25)	4	0	1	3	(75)	1	2
2003–04	0	0	--	0	0	1	0	--	0	0
2004–05	3	2	(40)	9 [a]	0	1	3	(33)	6	7

[a] Includes harvested wolves of unknown sex

TABLE 3 Unit 6 wolf harvest chronology percent, 2000–04

	Harvest periods									
Regulatory Year	August	September	October	November	December	January	February	March	April	*n*
2000–01	0	8	0	23	15	0	23	23	8	13
2001–02	0	0	50	0	0	50	0	0	0	2
2002–03	0	0	25	0	75	0	0	0	0	4
2003–04	0	0	0	0	0	0	0	0	0	0
2004–05	0	22	33	0	22	11	0	0	11	9

TABLE 4 Unit 6 wolf harvest percent by transport method, 2000–04

	Percent of harvest								
Regulatory Year	Airplane	Dogsled/ skis/ snowshoes	Boat	Snow-machine	ATV	ORV	Highway vehicle	Other	*n*
2000–01	15	0	0	15	38	0	0	31	13
2001–02	50	0	0	0	50	0	0	0	2
2002–03	25	0	75	0	0	0	0	0	4
2003–04	0	0	0	0	0	0	0	0	0
2004–05	56	11	0	0	0	0	33	0	9

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

LOCATION

GAME MANAGEMENT UNITS: 7 and 15 (10,637 mi^2)

GEOGRAPHIC DESCRIPTION: Kenai Peninsula

BACKGROUND

Following a half-century absence, wolves recolonized the Kenai Peninsula during the 1960s. The first documentation of this was in 1961 when Jack Didrickson, a biologist with the Alaska Department of Fish and Game (ADF&G), observed a single wolf between Skilak and Tustumena Lakes. Observations increased throughout the 1960s, with the first pack sighting (10 wolves) in 1968 by Dimitri Bader (ADF&G).

The high density of moose and severe winters from 1971 through 1975 made moose easily available prey. In less than 15 years, wolves repopulated most suitable habitat. Peterson and Woolington (1981) estimated wolves annually killed 9–15% of the moose calves and 5–7% of adult moose on the Kenai Peninsula.

Aerial track counts and observations by trappers conducted from 1975 to 2002 indicated the Kenai Peninsula wolf population increased rapidly during the early 1970s, and then remained relatively stable at 200 animals. According to Peterson and Woolington (1981), annual mortality of radiocollared wolves in Unit 15A was 38%. Pups composed 37% of the early winter population, reflecting the stability of the population in the northern portion of the Kenai Peninsula from 1976 to 1981. Natural mortality rates were low, despite the 1970s growth rate of the wolf population. Mortality rates, however, may be increasing because of the dense population of wolves and declining prey.

Regulated wolf harvests on the Kenai Peninsula began with a permit hunt during the winter of 1973–74; 2 wolves were harvested. During the winter of 1974–75, 6 were harvested. Hunting and trapping were allowed the following season (1975–76), and the harvest increased to 19, with 12 wolves harvested by trappers and 7 by hunters. Although the 9-month season was liberal, the harvest of wolves increased slowly until 1978–79, when 55 wolves were taken. The harvest from 1978–79 to 1986–87 ranged from 42 to 64 wolves and averaged 51, suggesting 25% of the estimated population was removed annually from 1978 to 1987.

In 1987 the Kenai National Wildlife Refuge imposed a 4-day trap check for trappers using most refuge-managed lands, and the season was reduced. These restrictions reduced the harvest, which over the next 12 years ranged from 9 to 49 wolves and averaged 24 animals, 12% of the estimated population.

Historically, most of the wolf harvest has been during trapping season, while most nonconsumptive uses were in summer and early fall. Almost all wolves have been taken for recreational purposes; the dollar value received for pelts has been a secondary benefit. Although some hunters have used aircraft to locate wolves, trappers and hunters operating from the road system have killed most wolves. In the spring of 1986, the Board of Game prohibited the use of aircraft to locate wolves for the purpose of landing and shooting them. The land-and-shoot method was responsible for only 6% of the annual harvests from 1973 to 1985, occurring in only 5 of the 12 years. The low harvest was attributable to poor tracking and landing conditions in heavily forested areas, and the fact that refuge was closed to aircraft.

An infestation of biting lice (*Trichodectes canis*) was identified in 2 packs of wolves during 1982–83. Wolves from these packs in Unit 15A were brought in for sealing by local trappers, and department and refuge personnel initiated a control program to treat all infested wolves. Wolves were captured and treated, and a medication (ivermectin) was injected into moose recently killed by wolves or placed in treated baits near kills. Both methods proved unsuccessful, and the incidence of infestation spread rapidly across the Kenai. Infested wolves are now common; we have little chance to control the parasite using acceptable means.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- To maintain a postseason population of 25–35 wolves in Unit 15A, excluding the Indian and Quartz Creek/Mystery Creek packs.
- To maintain the spring wolf population at a maximum ratio of 1 wolf:50 moose in Units 15B and 15C and Unit 7.

METHODS

Incidental wolf observations are recorded during surveys for other species. Local trappers provided additional information concerning wolf pack distribution and size. We monitored harvest by sealing the pelts of harvested wolves.

This report reflects updated data in all tables; therefore, data may differ slightly from past reports.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Wolf surveys have not been conducted since the 1990s because of unfavorable snow conditions during early winter or lack of funding. Harvest data, observations by department staff, and reports from trappers indicated the number of wolves might have increased recently. However, lacking complete survey data, the estimated population for Units 7 and 15 remained at 200 wolves in 20 packs.

MORTALITY

Harvest

Season and Bag Limits. The hunting season in Units 7 and 15 was 10 August–30 April. The bag limit was 5, except on the Kenai National Wildlife Refuge, where the bag limit was 2.

The trapping season in Units 7 and 15 was 10 November–31 March, and there was no bag limit.

Board of Game Actions and Emergency Orders. There were no Board of Game actions affecting Units 7 and 15 wolves during this reporting period.

Hunter/Trapper Harvest. Forty-eight wolves were killed during the hunting and trapping seasons in 2002–03, 45 in 2003–04 and 63 during 2004–05 in Units 7 and 15 (Table 1). In 2002–03, females accounted for 61% (n=28) of the harvest for animals where sex was determined. They accounted for 52% (n=23) of the harvest in 2003–04 and 50% (n=31) in 2004–05 (Tables 2 and 3). The mean annual harvest (52) for these 3 years represented an annual harvest rate of 26% of the estimated population.

The combined harvest for 2002–03 to 2004–05 of 156 wolves included 88 (56%) taken by trapping or snaring, 61 (39%) by ground shooting and 7 (4%) from unidentified methods (Tables 2 and 3).

Harvest Chronology. The combined monthly harvest chronology for 2002–02 to 2004–05 was August, 16 (10%); September, 14 (9%); October, 6 (4%); November, 9 (6%); December, 24 (15%); January, 32 (20%); February, 36 (23%); March, 13 (8%), and other, 6 (4%) (Table 4).

CONCLUSIONS AND RECOMMENDATIONS

Given the mean annual harvest rate during this report period (26% of the estimated population), the wolf numbers probably will continue to be controlled by prey abundance, increased dispersal, and natural mortality.

The department and the U.S. Fish and Wildlife Service (FWS) signed an agreement in 1988 to manage wolves in Unit 15A using a harvest quota system. Terms of this agreement were based on continuing the current level of harvest opportunity while protecting the wolf population from overharvest. In addition to this agreement, the FWS implemented several new restrictions on trappers using the refuge. These restrictions included a mandatory trapper orientation course before obtaining a permit; closures to trapping (except mink and muskrat) within 1 mile of a road, trailhead or campground; prohibition of toothed traps; 4-day trap checks; a requirement that traps be tagged by the owner; and no snowmachine access until certain snow conditions exist. Reduced trapper effort and opportunity can be attributed to permit conditions on the refuge and the poor quality of lice-infested wolf pelts.

The management strategy for Unit 15A essentially mandates that we manage wolves pack by pack. I recommend we consider the entire wolf population on the Kenai Peninsula as one population, accepting the fact that some packs living close to developed areas will sustain heavy harvests in some years.

I am proposing to change the management objectives for wolves in Units 7 and 15 during the next report cycle to:

(1) Survey all areas outside Kenai Fjords National Park at least once every 5 years.

(2) Maintain a population of wolves on the Kenai Peninsula that allows for multiple uses (consumptive and nonconsumptive) of the resource.

The justification for these changes is outlined below:

Currently, the most significant management difficulty concerning wolves on the Kenai Peninsula is that we have not conducted a census or substantial surveys for this species during the past decade. Funding has been a major issue, but without these data it is difficult to have confidence that our current population estimate is accurate. Another issue is that there is not much incentive for trappers to harvest Kenai wolves. The lack of incentive is caused by poor quality pelts due to lice infestation and access and method restrictions throughout a significant portion of Unit 15 (Kenai National Wildlife Refuge). Also, with 71% of the land on the Kenai under federal jurisdiction, finding effective means to alter the number of wolves through human intervention is improbable. However, if changes to current federal policies occur, I will revisit the proposed management objectives and adjust them accordingly.

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SELINGER, J. 2006. Units 7 & 15 wolf management report. Pages 59-64 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2002–30 June 2005. Alaska Department of Fish and Game. Project 14.0. Juneau, Alaska.

TABLE 1 Wolf trapping and hunting mortality in Units 7 and 15, 1997–2004

Regulatory year	Unit 7	15A	15B	15C	15Z[a]	Total
1997–98	7	7	2	8		24
1998–99	13	9	7	21		50
1999–2000	15	7	3	12	1	38
2000–01	32	7	12	12		63
2001–02	7	12	4	14		37
2002–03	15	4	8	21		48
2003–04	3	16	16	10		45
2004–05	25	15	13	10		63

[a] Harvest occurred in Unit 15, but not enough information was available to determine in which subunit.

TABLE 2 Unit 7 wolf harvest, 1997–2004

	Reported Harvest				Method of Take			Successful
Regulatory year	Male	Female	Unk	Total harvest	Trap/snare	Shot	Unk	trappers/hunters
1997–98	6	1	0	7	4	3	0	6
1998–99	9	3	1	13	7	6	0	11
1999–00	10	5	0	15	11	4	0	7
2000–01	14	18	0	32	22	10	0	14
2001–02	2	5	0	7	6	1	0	5
2002–03	7	6	2	15	4	9	2	14
2003–04	2	1	0	3	1	2	0	3
2004–05	12	12	1	25	17	5	3	10

TABLE 3 Unit 15 wolf harvest, 1997–2004

	Reported Harvest				Method of Take			Successful
Regulatory year	Male	Female	Unk	Total Harvest	Trap/snare	Shot	Unk	trappers/hunters
1997–98	8	9	0	17	7	10	0	14
1998–99	17	17	3	37	19	17	1	24
1999–00	12	11	0	23	10	11	2	17
2000–01	15	16	0	31	18	12	1	19
2001–02	15	15	0	30	16	12	2	21
2002–03	11	22	0	33	21	12	0	19
2003–04	19	22	1	42	20	22	0	26
2004–05	19	19	0	38	25	11	2	20

TABLE 4 Harvest chronology for wolves in Units 7 and 15, 1997–2004

Regulatory	Month									
year	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Other	Total
1997–98	0	3	4	0	5	4	3	0	5	24
1998–99	1	3	0	3	4	14	11	9	5	50
1999–00	2	4	6	6	3	4	1	12	0	38
2000–01	5	4	2	10	9	8	9	9	7	63
2001–02	1	5	4	2	4	7	7	5	2	37
2002–03	5	4	4	2	9	9	8	5	2	48
2003–04	6	7	0	1	1	10	15	3	2	45
2004–05	5	3	2	6	14	13	13	5	2	63

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

LOCATION

GAME MANAGEMENT UNITS: 9 (33,638 MI^2) AND 10 (1586 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. 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 during the past 20 years. The Mulchatna caribou herd increased from about 14,000 in 1974 to over 200,000 by 1996, and then declined to 85,000 by 2004. 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 15,000–18,000. During the past 8 years the herd has declined, dropping to about 2500 by 2005. Caribou decreased dramatically on Unimak Island from a peak of 5000 in 1975 to only a few hundred by 1977. No change in caribou numbers on Unimak Island occurred during the next 20 years, but since the late 1990s the herd has grown; it numbered about 1000 by 2005. The Southern Alaska Peninsula Caribou Herd (SAPCH) peaked at 4200 in 2002 and is currently declining.

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 measure whether we are meeting the objective.

METHODS

Specific data were not collected on wolf densities in Units 9 or 10. We monitored trends through observations during other fieldwork, reports from hunters and guides, and responses to the annual trapper questionnaire. We monitored harvests from mandatory pelt-sealing reports.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

By piecing together observations of wolf packs and general knowledge of territory size, we estimate Units 9 and 10 contain approximately 350 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, despite the decline of the NAPCH since 1993. 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 Units 9 and 10 was 10 August–30 April, and the bag limit was 5 wolves. The trapping season was 10 November–31 March, with no bag limit.

Board of Game Actions and Emergency Orders. In March 2005 the board lengthened the hunting season to 25 May and opened the trapping season earlier, on 10 October.

Hunter/Trapper Harvest. The wolf harvests in Units 9 and 10 were 40 for 2002–03, 119 for 2003–04, and 64 for 2004–05 (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 snowmachines (Table 3).

Other Mortality

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

HABITAT

Assessment

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

CONCLUSIONS AND RECOMMENDATIONS

The wolf harvest in Unit 9 varies widely, depending on weather conditions and the activity of several individuals who use aircraft. Harvest has had little effect on the wolf populations in Units 9 and 10. For practical and budgetary reasons, 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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TABLE 1 Units 9 and 10 wolf harvest, 2000–05

Regulatory	Reported harvest				Method of take			Successful
Year	M	F	Unk	Total	Trap/Snare	Shot	Unk	Trappers/Hunters
2000–01	17	13	0	30	7	21	2	24
2001–02	61	44	3	108	28	79	1	45
2002–03	22	18	0	40	26	14	0	16
2003–04	66	51	2	119	39	71	9	59
2004–05	32	31	1	64	33	24	7	27

TABLE 2 Units 9 and 10 wolf harvest chronology percent, 2000–05

Regulatory Year	August	September	October	November	December	January	February	March	April	May	Unk	*n*
2000–01	0	13	13	3	17	30	17	0	0	0	7	30
2001–02	0	12	6	5	13	18	36	9	1	0	0	108
2002–03	0	2	5	10	25	30	8	8	5	0	7	40
2003–04	0	12	12	3	21	27	20	5	1	0	0	119
2004–05	2	8	0	6	33	17	17	8	3	0	6	64

TABLE 3 Units 9 and 10 wolf harvest percent by transport method, 2000–05

Regulatory Year	Airplane	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway Vehicle	Snowshoe Ski Foot	Unknown	*n*
2000–01	20	3	17	33	0	7	10	10	30
2001–02	16	0	15	62	0	1	5	2	108
2002–03	13	2	53	7	0	18	5	2	40
2003–04	18	1	13	44	1	6	7	10	119
2004–05	6	2	20	53	2	9	3	5	64

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

LOCATION

GAME MANAGEMENT UNIT: 11 (13,257 mi^2)

GEOGRAPHIC DESCRIPTION: Wrangell Mountains

BACKGROUND

Wolf population estimates and trends are unavailable for Unit 11 before the 1950s. Skoog (1968) assessed that wolf numbers were low from 1900 to the 1930s, then increased, according to written accounts by settlers. In 1948 the U.S. Fish and 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 relatively abundant (McIlroy 1975) with 1 wolf/80 mi^2 (4.8 wolves/1000km^2) and a calculated unit population of 100–125 animals. Unitwide population estimates were initiated in 1985. In the late 1980s wolf numbers were high, averaging an estimated 103 wolves in the spring and 152 wolves in the fall. Between 1991 and 2001, wolf numbers were relatively stable; the average spring estimate was 81 wolves. Since 2001, the population has increased slightly; the average spring estimate has been 103 wolves.

Although wolf harvests before mandatory sealing are unknown, harvests were probably similar to harvests reported during the early 1970s due to comparable trapping seasons and no bag limits. Wolf harvests since 1972 have averaged 25 wolves per year, ranging from 6 to 51 wolves per year.

Unit 11 is almost entirely within Wrangell–St. Elias National Park and Preserve. Much of the rest of land within the unit is owned by the Native corporation Ahtna Inc. Access has always been limited, and very few people live within the unit boundaries. The Nabesna Road provides access to the northern portion of the unit, and the McCarthy Road provides access to the southern portion. In years when the Copper River does not freeze up until late winter or not at all, the waterway effectively limits access for ground hunters and trappers. Aircraft had been the most commonly used method of access for wolf hunters and trappers; however, when the Wrangell St. Elias National Monument was created in 1979, National Park Service (NPS) regulations restricted the use of aircraft. In the last 10 years, Ahtna has also taken steps to restrict nonshareholder hunter and trapper access to its private lands, further reducing the take of wolves.

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

While the spring population estimates vary, the fall wolf estimates in Unit 11 have remained relatively stable since 1993. This pattern is due to the low density dynamic equilibrium (LDDE) predator/prey situation among wolves, moose and caribou in the area. While the estimates show a slight increase in the population over the last 2 years, the limited information used to estimate population numbers could be the cause. Very limited winter travel occurs in Unit 11 for trapping, hunting, or recreational purposes; therefore, reports from the public are very limited. The information we do have is generally concentrated near the few ground-accessible areas on the periphery of the unit.

Distribution and Movements

Wolf numbers were probably 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, moose, 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 caribou and sheep. Wolf numbers in the Chitina River valley remain lower than in the northern portion of the unit because caribou are absent, moose are less abundant, and sheep numbers have declined significantly. 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 concurrent with the 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 access and recent trespass issues, the wolf harvest in Unit 11 has been steadily declining. Though harvest levels have varied over the years, the most recent decline is probably due to the increased awareness of Ahtna private land issues, and warmer winters, which have kept the Copper River open most or all of the winter. From 1997 to 2000, the average annual harvest was 30 wolves. Since 2001, the average annual harvest has been 18 wolves (Table 2).

The harvest methods for wolves taken in Unit 11 over this reporting period are 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, 3 nonresidents harvested 3 wolves. Local residents harvested the majority of the wolves. During this period, 16 local hunters/trappers harvested 43 wolves, for an annual average of 14 wolves. 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 since 1997. 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 80% over this reporting period (Table 4). Though aircraft are sometimes used to locate wolf kills and to set traps or snares, not many local trappers use aircraft anymore due to cost. 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. The occurrence of high winds in Unit 11 often obscures tracks or blows 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 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. Some immediate action through treatment with the antiparasitic drug ivermectin or culling should be undertaken if lice are ever documented in Unit 11.

CONCLUSIONS AND RECOMMENDATIONS

Annual wolf harvests in Unit 11 are low and have ranged from 6 to 33% of the fall population. The annual harvest averaged only 14% 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. Moose surveys indicate a density of less than 0.2 cow moose/mi^2, considerably less than the 1.1 cow moose/mi^2 in the neighboring Nelchina Basin, which has an active wolf management program. The Mentasta caribou herd, which resides in northern Unit 11, has fallen from 2500–3000 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 Mounts Drum and 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. Given the large percentage of the unit that is covered by national park and preserve lands, the possibility of any such program is highly unlikely considering the NPS policy to let nature take its course and to specifically prohibit any active management for wildlife or its habitat.

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. Given low harvest rates and the late freeze-up of the Copper River, the trapping season could be extended to 15 October–30 April, similar to adjacent units to provide additional opportunity and help reduce predation issues without substantially impacting the wolf population.

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TABLE 1 Unit 11 wolf population estimates[a], 1997–2004

Regulatory Year	Population estimate [b] Fall	Spring	Packs
1997–98	85–105	70–85	10
1998–99	100–125	70–85	10
1999–00	100–115	60–75	15
2000–01	100–110	80–90	15
2001–02	100–115	100–110	14
2002–03	110–120	100–110	14
2003–04	110–120	90–105	15
2004–05	110–130	100–110	20

[a] Fall estimate = pretrapping season population.
[b] Aerial track surveys, incidental observations, reports from public, sealing records.

TABLE 2 Unit 11 wolf harvest, 1997–2004

Regulatory Year	Reported harvest M	%	F	%	Unk	%	Total	Method of take Trap/ snare	%	Shot	%	Unk	%	Successful trappers/ hunters
1997–98	11	(44)	12	(48)	2	(8)	25	24	(96)	1	(4)	0	0	11
1998–99	16	(44)	16	(44)	4	(11)	36	35	(97)	1	(3)	0	0	9
1999–00	16	(70)	7	(30)	0	(0)	23	21	(91)	2	(9)	0	0	11
2000–01	18	(51)	17	(49)	0	(0)	35	31	(89)	4	(11)	0	0	14
2001–02	6	(26)	17	(74)	0	(0)	23	21	(91)	2	(9)	0	0	8
2002–03	8	(42)	11	(58)	0	(0)	19	18	(95)	1	(5)	0	0	5
2003–04	8	(53)	6	(40)	1	(7)	15	11	(73)	3	(20)	1	(7)	7
2004–05	10	(67)	5	(33)	0	(0)	15	12	(80)	3	(20)	0	0	10

TABLE 3 Unit 11 chronology of wolf harvest by percentage, 1997–2004

Regulatory Year	Harvest periods									
	August	September	October	November	December	January	February	March	April	*n*
1997–98	0	0	0	20	8	28	36	8	0	25
1998–99	0	3	0	8	8	53	17	11	0	36
1999–00	0	9	0	0	22	30	13	26	0	23
2000–01	9	3	0	11	17	49	11	0	0	35
2001–02	4	0	0	0	4	9	43	39	0	23
2002–03	5	0	0	0	26	37	26	5	0	19
2003–04	8	8	0	0	8	15	0	62	0	13
2004–05	0	20	0	7	13	33	13	13	0	15

TABLE 4 Unit 11 transportation method of wolf harvest by percentage, 1997–2004

Regulatory year	Percent of Harvest								
	Airplane	Dog sled Skis/ Snowshoes	Boat	4-wheeler	Snowmachine	ORV	Highway Vehicle	Unknown	*n*
1997–98	4	4	0	0	88	0	3	0	25
1998–99	3	6	0	0	88	0	3	0	36
1999–00	0	0	0	9	91	0	0	0	23
2000–01	23	6	0	0	69	0	3	0	35
2001–02	17	9	0	4	70	0	0	0	23
2002–03	0	5	0	0	95	0	0	0	19
2003–04	29	0	0	0	64	0	7	0	15
2004–05	20	0	0	0	80	0	0	0	15

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005[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 presumably due to prey shortages (D. V. Grangaard, ADF&G, personal observation). 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. However, during years when marten and lynx pelt prices are low and wolf prices are adequate, more trappers concentrate on catching wolves. Also, when land-and-shoot taking of wolves was legal, harvests were higher, especially in the southern portion of the unit.

Historically moose have been the most important subsistence species in Unit 12 (Haynes et al. 1984; Halpin 1987). Throughout the 1980s, local residents requested that the Board of Game authorize the department to conduct wolf control to increase the moose population. However, about 65% of the land in Unit 12 is included in either Wrangell–St Elias National Park and Preserve or the Tetlin National Wildlife Refuge. Federal policy on those lands did not include predator management programs. As a result, department wolf control was conducted only in northwestern Unit 12, including the Robertson River drainage, during 1981–1983. The current wolf control program in Unit 12, projected to last 5 years, began in January 2005 in an 1190-mi^2

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

area north of the Alaska Highway and west of the Taylor Highway. The area was expanded in 2006 to include all portions of unit 12 north of the Alaska Highway.

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 on 30 October 1991 and revised on 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 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 unitwide 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.

METHODS

ESTIMATING WOLF POPULATION SIZE

Since 1980 the late winter wolf population estimates were based on sightings of wolves and wolf tracks observed during aerial surveys (Stephenson 1978; Gasaway et al. 1983). Trapper and pilot reports as well as trapper questionnaire results were compiled and contributed to population estimates when aerial surveys were not completed. Estimates of wolf numbers were increased by 10% to account for lone wolves present but not found (Mech 1973). All wolf packs with territories wholly or partially in Unit 12 were included in the estimate. Each year 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 we had no previous estimate of autumn pack size. For those packs we calculated autumn estimates by adding the annual wolf harvest to the late winter count (Table 1).

During winter 2002–2003 we developed a wolf population trend area of 4600 mi^2 (10,879 km^2) encompassing portions of Units 12, 20E, and 20D. The trend area includes areas with varying densities of moose and caribou and different trapping intensities. We plan to use changes in wolf densities within this trend area as an index to trends in wolf densities throughout Unit 12. We conducted repeated survey flights within this area during January–April. During each flight we plotted the location of wolf tracks by following tracks in both directions until they were no longer discernible in the snow. We resurveyed areas where we had previously found wolves as well as areas where we had not found them. The accumulation of track segments and sightings of associated wolves over the survey period were used to approximate home ranges and estimate densities. When packs ranged both inside and outside of the trend area, we estimated that portion of their home range within the trend area based on the proportion of the track segments found within the trend area. We used this estimated percent of home range within the study area as a multiplier to adjust pack size for those boundary packs. For example, if 50% of the track segments from a pack of 10 ranged inside and 50% outside the trend area, we use a pack size of 5 for that pack's contribution to the trend area wolf population estimate.

HARVEST MONITORING

Wolves taken in Alaska must be sealed by an Alaska Department of Fish and Game (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., RY04 = 1 July 2004 through 30 June 2005).

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 midpoint of the estimated Unit 12 autumn wolf population was 223 in RY96 to 237 in RY98 wolves (Table 1), a 22% increase from the previous report period. During RY02–RY04 the estimated wolf population was 240–255 wolves (Table 1), a 7% increase from the RY98–RY99 estimate.

During RY99–RY02 we collected area-specific estimates and individual pack size estimates and used changes in individual pack size and composition as an indicator of population trend. We compared pack size and color composition of 10 packs during RY01 and RY02 and found that 6 packs increased, 3 declined, and 1 remained unchanged. The total number of wolves in these 10 packs increased from 64 to 72 (12.5%). The 3 packs that declined ranged in the vicinity of either Tok or Tetlin and were intensively trapped.

We surveyed the range of the Chisana caribou herd in cooperation with Yukon Department of Environment during February 2001. We found 89–97 wolves in 18 packs (2–13 wolves/pack) in a 7339-mi^2 (19,008-km^2) area. The density estimate after factoring in 10% for single wolves was 14 wolves/1000 mi^2 (5.4 wolves/1000 km^2). Ten of these packs (30–36 wolves) were in Alaska. At least 13 wolves from the 10 Alaskan packs were trapped prior to the survey. Including these

wolves, the fall density estimate was 15.8 wolves/1000 mi^2 (6.1/1000 km^2). The Canadian portions of this same area were surveyed in 1987 (Sumanik 1987) and 1989 (Yukon Department of Environment, unpublished data). In those surveys, wolf densities were similar (17.4 and 14.5 wolves/1000 mi^2, or 6.7 and 5.6 wolves/1000 km^2, respectively). Caribou and Dall sheep numbers have declined in the Chisana area (Gardner 2002b; 2003) and presumably the ungulate prey base was lower in 2000 compared to the 1980s; however, wolf density did not change, suggesting that moose were the primary prey of wolves in this area and caribou and Dall sheep were alternate prey. Seip (1992) has shown how wolf predation can have large effects on caribou when moose are the primary prey.

In February–March RY02 we conducted a reconnaissance wolf survey in a 2000-mi^2 area of northwestern Unit 12. This was part of 4200 mi^2 we surveyed in the 4600-mi^2 wolf population trend survey area that included contiguous areas in Units 12, 20E, and 20D. We surveyed when conditions were adequate but did not survey the entire area in one day. During this period we found 18 packs ranging from 2 to 16 wolves and observed 124–127 different wolves, 3 of which were singles. 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 deleting half of the border packs from the estimate, density becomes 23.1 wolves/1000 mi^2 (8.9 wolves/1000 km^2). We used this estimate to determine a unitwide estimate of 240–255 wolves during RY02 (C. Gardner, ADF&G, personal communication; Table 1). This same survey was again conducted during winter 2003–2004. In Unit 12, 41–43 wolves were estimated at 21 wolves/1000 mi^2 (8 wolves/1000 km^2). These wolves consisted of 3 packs that had their entire home range in Unit 12 and 8 packs that shared their home range with either Units 20D or 20E. No unitwide estimate was estimated from this survey.

We conducted a wolf survey in winter 2004–2005 in the northwestern portion of Unit 12 that was part of the Unit 12 and 20E predator control program. This 1190-mi^2 area is the portion of Unit 12 west of the Taylor highway and north of the Alaska highway. The estimated population was 59–60 wolves (50 wolves/1000 mi^2 or 19 wolves/1000 km^2). There were 5 packs with home ranges completely in the 1190 mi^2 area and 5 border packs.

Combining estimates from these 3 areas, overall Unit 12 density was estimated to be 18.1–19.4 wolves/1000 mi^2 (7–7.5 wolves/1000 km^2) during RY02–RY04. Wolf numbers, particularly in northern Unit 12, benefited from high numbers of caribou since 1997 as a result of the Nelchina caribou herd wintering in the area and possibly from the snowshoe hare cycle high during 1998–2001. In the remainder of Unit 12 during RY02–RY04, the ungulate prey base remained stable.

MORTALITY

Harvest

Season and Bag Limit for RY02–RY04.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Unit 12.		
HUNTING: 5 wolves.	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

Alaska Board of Game Actions and Emergency Orders. In November 1996 Alaskan voters passed an initiative that prohibited same-day-airborne hunting of wolves, fox, lynx, and wolverine. This initiative became effective 25 February 1997. An initiative to ban the use of snares to catch wolves failed in November 1998. In spring 1999 the Alaska Legislature passed a law allowing the same-day-airborne taking of wolves in specific intensive management areas that included adjacent Unit 20D. This could have affected several packs that partly occupy Unit 12. A ballot initiative to overturn the same-day-airborne taking was passed by Alaskan voters in November 2000 and same-day-airborne hunting stopped in February 2001. No impact on Unit 12 wolf numbers from this same-day-airborne hunting regulation was detected. In March 2004 the Board of Game reauthorized aerial wolf control in northern Unit 12, and wolf control resumed in January 2005 in 1190 mi^2 of northwestern Unit 12 and in adjacent Unit 20E.

Hunter–Trapper Harvest. RY02, RY03, and RY04 wolf harvests in Unit 12 were 54, 31, and 28 wolves, respectively (Table 2). The average harvest was 38 wolves compared to 50 during RY99–RY01. The RY02 wolf harvest of 54 wolves was comparable to RY99–RY01 harvests. The harvest during RY03 and RY04 was lower than the previous 6 years and was likely due to a decreased number of hunters and trappers taking wolves. During RY99–RY01 an average of 23 different hunters and trappers harvested wolves. During RY02–RY04, an average of 18 individuals harvested wolves; only 8 harvested wolves in RY03, and 9 in RY04.

During RY95–RY04, the Unit 12 wolf population responded to harvest by hunters and trappers similarly to other wolf populations. Stable wolf populations throughout North America have sustained harvests of 20–40% (Keith 1983). Harvests >40% generally result in declining wolf populations, and wolf populations harvested at <20% generally increase. Effects of exploitation seem to be consistent across a broad range of reported wolf densities in Alaska, Canada, Michigan, and Minnesota. In Unit 12, based on current prey availability, it appears that the sustainable harvest rate for wolves is ≤30%.

Ninety-three percent of the wolves harvested in Unit 12 during RY02–RY04 were taken with traps or snares. Incidental harvest by moose and sheep hunters during August and September accounted for most of the remainder of the harvest. For unknown reasons, incidental harvest of wolves by moose, caribou, or sheep hunters was high in RY99 (11 wolves), representing 20% of the annual harvest.

Other Mortality. No wolf control program was in effect in Unit 12 during RY02–RY03. No wolves were harvested in the 1190 mi^2 portion of Unit 12 within the wolf control area during RY04 or RY05.

Harvest Chronology. Chronology of the Unit 12 wolf harvest during RY02–RY04 (Table 3) reflects a low incidental harvest of wolves (2.6%) during the August and September hunting seasons, 0.9% and 7.0% harvest during the snaring-only seasons in October and April, respectively. The highest harvest (89.5%) was during November–March when all harvest methods and means were allowed. The greatest harvest occurred in January and February.

Transport Methods. During RY02–RY04 most successful wolf trappers used snowmachines (68%) or airplanes (22%) (Table 4).

HABITAT

Assessment

Only 7000–8000 mi^2 of Unit 12 is considered wolf habitat. Wolves seldom use the remaining 2000–3000 mi^2 of glacial ice fields and high rocky terrain. Good wolf habitat is determined more by ungulate prey abundance than by vegetative characteristics. Using this criterion, the better 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 populations of Dall sheep, wolves apparently cannot subsist on sheep alone as a primary prey species (Sumanik 1987). The nonmigratory Chisana caribou herd was a reliable food source for wolves in eastern Unit 12. Though this herd declined during the past 12 years it may have stabilized or increased during RY02–RY04. Caribou from the Mentasta, Nelchina, and Macomb herds also used portions of Unit 12 in recent years. The use of Unit 12 during the winter by these herds, especially the Nelchina herd, may have improved productivity of the wolf population. Caribou availability in winter in combination with low wolf harvest has allowed the unit's wolf population to increase.

Approximately 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 wolves.

Enhancement

Wolf habitat enhancement is limited to ungulate habitat enhancement and is discussed in management reports for ungulate species in Unit 12.

NONREGULATORY MANAGEMENT PROBLEM/NEEDS

Gardner (2002a) foresaw that the intensive management law would likely be enacted in Unit 12 based on the downward trend of the moose population relative to moose population and harvest objectives. Gardner modeled the population status and trend data for moose and their predators using the modeling software PredPrey (McNay and DeLong 1998).

Past research found that predation by both wolves and bears was the primary factor maintaining the area moose populations at low densities. 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. In comparison, along the Nutzotin Mountains calf recruitment to 5 months was substantially lower and was more indicative of grizzly bear predation (Gasaway et al. 1992; U.S. Fish and Wildlife Service, unpublished data).

Modeling exercises using actual moose composition and predator kill rate data indicated the Unit 12 moose population continues to be primarily limited by wolves, although grizzly bears are 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.

Assuming grizzly bear predation rates remain relatively constant during the next 5 years, the model predicts that the Unit 12 moose population would remain relatively stable if 30% of the wolves were harvested annually. Under this harvest rate, the number of wolves using Unit 12 would stabilize at about 180; however, the moose population and harvest objectives most likely would not be met. Modeled wolf harvest rates of 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, it is likely wolves must be continuously reduced by more than 50% each year.

CONCLUSIONS AND RECOMMENDATIONS

The management objective during this report period was to temporarily close wolf trapping if the unit population declines below 100 wolves. No closure was necessary because the population remained above 100.

In 1998 the moose population in Unit 12 was designated by the Board of Game 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 the Unit 12 moose harvest becomes necessary because the moose population is depleted or has reduced productivity. During RY02–RY04 the moose population was depleted in northern Unit 12, and wolf control became necessary to comply with this law. Therefore, during the next reporting period the revised management objective will be to:

- Provide for a 3-year average annual harvest rate of no more than 30% of the wolf population, except in northern Unit 12 where greater harvest rates are mandated by approved wolf predation control implementation plans.

The Unit 12 wolf population increased by an estimated 22% from RY93–RY95 to RY96–RY98. A comparable estimate was not obtained for RY02–RY04, but results of surveys conducted in portions of Unit 12 and adjacent Unit 20E indicate wolf numbers increased during RY99–RY04, likely as a result of increased survival and productivity associated with an increased prey base and harvest below sustainable rates. Harvest rates averaged 22% during RY96–RY98 and probably 20–24% during RY99–RY01. With even lower harvest rate of wolves (10–12%) and the same prey base, wolf numbers likely continued to increase during RY02–RY04. Annual harvest rates of >30% would likely be required to preclude wolf population growth in Unit 12.

Prior to 1998 and the arrival of wintering Nelchina and Mentasta caribou herds and the increase in the Unit 12 wolf population, the moose population in Unit 12 increased about 5% annually (Gardner 2002a). The Unit 12 moose population stopped growing during the period of wolf population growth. Moose are the only ungulate prey available to much of the Unit 12 wolf population between late April and mid October. Since 1998 however, northern Unit 12 packs have had access to large numbers of caribou during the winter. Packs in central Unit 12 can also access large numbers of caribou in October, March, and April, but since 1997 only a few caribou winter in the central portion of the unit. The southern unit packs rely primarily on moose year-round.

During the 1980s the Unit 12 wolf population was lightly harvested. During the 1990s the annual wolf harvest in Unit 12 varied and in some years was the primary limiting factor to the wolf population. During RY99–RY01, harvest was light but caused area-specific declines in wolf numbers. During RY02–RY04 harvest was light and did not limit the wolf population. Harvest rates in the remote areas are dependent on fur price and weather conditions. Along the road system, trapping pressure is high especially around communities and wolves are regulated at lower numbers.

Most area residents desire some type of intensive management to benefit Unit 12 moose. Area residents support management that incorporates a combination of area-specific wolf reduction programs conducted by the public and habitat enhancement programs conducted by agencies. Modeling predicts this management regime could cause a low to moderate increase in the moose population. However this level of management is not expected to attain a high-density moose population. This management is feasible because the areas most trapped for wolves are also the areas most hunted for moose. The primary challenge will be to design a habitat enhancement program that is economically feasible, and is supported by the department and the public.

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TABLE 1 Unit 12 autumn[a] wolf population estimates, regulatory years 1988–1989 through 2004–2005

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]				

[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.

TABLE 2 Unit 12 wolf harvest, regulatory years 1988–1989 through 2004–2005

	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	12	12	(75)	4	(25)			0	8	2.1
1989–1990	15	(83)	3	(17)	20	11	7	(89)	2	(11)			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	15	20	(63)	8	(25)	4	(13)	0	16	2.1
1992–1993	26	(52)	24	(48)	54	22	51	(98)	1	(2)			0	15	3.6
1993–1994	37	(57)	28	(43)	71	36	54	(78)	6	(9)	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	21	35	(81)	8	(19)	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	20–24	40	(74)	14	(26)	0	(0)	0	25	2.2
2000–2001	34	(67)	17	(33)	55	20–23	48	(87)	7	(13)	0	(0)	0	21	2.6
2001–2002	18	(43)	24	(57)	42	18	34	(81)	8	(19)	0	(0)	0	24	1.8
2002–2003	26	(52)	24	(48)	54	21	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

[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] SDA = wolf harvest taken by hunters and trappers same day airborne.

TABLE 3 Unit 12 wolf harvest chronology by time period, regulatory years 1988–1989 through 2004–2005

Regulatory year	Harvest periods																					
	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	(2)	5	(8)	9	(13)	21	(31)	13	(19)	10	(15)	1	(2)	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

TABLE 4 Unit 12 wolf harvest by transport method, regulatory years 1988–1989 through 2004–2005

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	(76)	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	(9)	0	(0)	0	(0)	0	(0)	38	(82)	0	(0)	0	(0)	4	46
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	(6)	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

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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

LOCATION

GAME MANAGEMENT UNIT: 13 (22,857 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 from exploding. During the mid 1990s, without any form of aerial control, 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.

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 posthunting 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, wolf control by land-and-shoot has been conducted by permit through the implementation plan. Pilots and gunners must apply for permits. Permittees are selected based on flying 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. Over the course of a winter, up to 2000 hours can be flown by control permittees looking for and tracking wolves. The wolf sighting reports by these permittees greatly increase our ability to assess population size and trend.

Monitoring of moose and wolf population trends the last 3 years led to the conclusion that additional wolf control was needed. Following a presentation to the Board of Game in March 2005, 13C was added to the wolf control implementation plan.

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. Land-and-shoot control in 2003–04 and 2004–05, which was concentrated in the remote portions of the unit, has been essential for reducing wolf density in the less accessible remote areas. The fall population was reduced to 380 wolves (9.0 wolves/1000 km^2) in 2004.

Unitwide spring population (postharvest) estimates have remained relatively steady since 2001. The 2004–05 spring estimate of 230 wolves (5.5 wolves/1000 km^2) was well above the objective of 135–165. Given the continuation of the land-and-shoot program, annual take during the next few years is expected to exceed production, and the unitwide population is expected to further decline.

Since spring 2004, the wolf density on those lands within the wolf control implementation area has been near or within the objective density range. With reduced wolf numbers, this area, as expected, is proving to be a sink for dispersing wolves, and continued land-and-shoot take will be necessary until the moose population can rebound.

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 cycle through the late 1990s probably helped support this increased production and survival. Hares are an important alternate food source when big game populations decrease, as they have across the unit in recent years. Since the decline in hares in 2001, wolf productivity has probably declined slightly, reducing the number of young wolves entering the population.

Distribution and Movements

Distribution and movement patterns of wolves in Unit 13 depend on prey availability (Ballard et al. 1987). In Unit 13, wolf territory, size, and productivity are primarily functions of moose densities. Locations of radiocollared wolves in the unit indicate that wolves do not generally follow caribou migrating out of a wolf pack's territory. 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 are harvested annually under hunting and trapping regulations. The trapping season dates have continually been liberalized over the past 10 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 to 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 did not result in many wolves being taken. 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 and is also open to land-and-shoot.

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 harvest objective of 135 wolves. The implementation plan was also extended until 2010.

Hunter/Trapper Harvest. Hunters and trappers harvested a record of 269 wolves in Unit 13 during the 2000–01 season (Table 2). Since 2000, 1017 wolves have been taken unitwide by all legal methods. The annual average take was 203. Harvest composition data suggest an overall even distribution of males and females in the harvest (Table 2).

Snaring and trapping are generally the most consistent methods of taking wolves. Ground shooting has been highly variable, accounting for 15–44% of the annual take since 1997 (Table 2).

Permit Hunts. In 1990 and 1991, when permitted pilots were allowed to take wolves by land-and-shoot means, 86 and 88 wolves were taken, respectively. Land-and-shoot accounted for 61 and 77% of the total take, respectively. For a short period during 2000, land-and-shoot was allowed 300 ft from the aircraft; only 14 wolves were taken.

Since 2000, wolf control in Unit 13 by the public has been limited to residents of Alaska. Permittees receive no monetary compensation, and commercial activity is prohibited. Permittees are experienced pilots, gunners, and wolf trackers who participate on a voluntary basis. Beginning in January 2004, land-and-shoot was reinitiated under wolf control regulations.

During 2003–04, 34 pilots and 32 gunners were permitted, and 125 wolves were taken. During 2004–05, 26 pilots and 36 gunners were permitted, and 67 wolves were taken. Land-and-shoot accounted for 51% of the take in 2003–04 and 49% in 2004–05 (Table 2).

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.

Excluding wolf control same-day-airborne permittees, an average of 64 hunters/trappers successfully harvested a wolf in Unit 13 annually since 1997. With no nonresident moose or caribou hunting, the harvest of wolves by nonresidents is limited. Over the 3 years covered by this reporting period, 13 nonresidents took 13 wolves. The harvest of wolves was dominated by nonlocal Alaska residents, followed by local residents. The annual average take by 34 nonlocal residents was 69 wolves. The annual average take by 16 local residents was 38 wolves.

The effect of general hunting and trapping varies. From 1992 to 1999—between wolf control programs—the unitwide harvest varied from 30 to 45% of the fall population, averaging 38% annually. During this same period, the wolf population climbed 68% from 310 to 520 wolves, an all-time peak. Considering that current seasons and bag limits provide the maximum opportunity for hunting and trapping wolves, and harvest pressure continues to be moderately heavy, these methods have proven insufficient to control wolves in Unit 13.

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 general trapping conditions. Wolf control permittees are mostly influenced by snow depths that affect tracking and the ability to land on rough terrain.

Transport Methods. When same-day-airborne wolf control is allowed, the majority of the total wolf take comes from those using aircraft. Historically, the majority of wolves have been taken with the use of aircraft, reflecting the remote nature of the unit and the importance of same-day-airborne take. In the last decade, the use of snowmachines has surpassed aircraft as the most important method of transportation for hunters and trappers (Table 4). This shift occurred largely due to the cessation of same-day-airborne take in the early 1990s. Aircraft use increased slightly in 2000 due to the short-lived same-day-airborne regulation, then again in 2003–04 and 2004–05, when same-day-airborne take was again allowed (Table 4). Though improvements in snowmachines have increased their utility dramatically, there is no alternative to using aircraft to take wolves consistently from the interior portion of Unit 13.

Other Mortality

Ballard et al. (1987) determined 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 probably minimized, as some deaths are compensatory. Field observations in recent years indicate the illegal wolf harvest in Unit 13 is minimal and does not affect population levels.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The possible introduction of the biting dog louse into the Unit 13 wolf population could become a serious problem. 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, 2 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 lice 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. Permission was given to allow a wolf control 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 2 pack members were not found. The following winter (2004-05), within 10 miles of this area, one female wolf from a pack of approximately 6 was snared, and found to have lice.

Given the high louse infection rate of wolves in Units 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.

CONCLUSIONS AND RECOMMENDATIONS

The complexity of predator–prey relationships in Unit 13 has long been the focus of research and management experiments. Wolves, being the dominant year-round predator, are the most significant source of mortality to non-neonate moose and caribou in the unit. Because wolf populations are not naturally regulated by the density of their prey until prey densities become very low, the end result of management inaction is indefinitely low density equilibrium among all 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 in 1999 and harvest pressure was considered moderate to heavy, the wolf population was still able to rise nearly 70% over a period of 8 years. During this period, no same-day-airborne hunting, trapping, or wolf control was allowed, and 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 late winter and early fall. The resilience of this population is an inherent problem when the management goal is well below current population estimates.

To reach the spring population objective of 135–165 wolves, heavy harvest pressure must be maintained. The spring 2005 wolf population estimate of 230 wolves must be reduced in order for the moose population to adequately recover. With continued land-and-shoot wolf control and lower reproductive levels given reduced prey availability, the goal should be attainable.

If rough terrain, a lack of snow, or thick cover keep land-and-shoot wolf control permittees from adequately reducing the wolf density in a particular year or area, changing the wolf control method to aerial shooting will be the most viable, effective, and efficient way to reach the population objectives.

Future wolf management in Unit 13 should ensure the wolf population is never allowed to reach the highs seen during the late 1990s if the moose population is below the objective level. During this period, the abundance and movement of alternate prey rapidly affected the trajectory of the wolf population. To actively manage an exploding wolf population, managers must have the capability to act quickly. 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 management staff is forced to wait until an 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 [a], 1997–2004

	Population estimate [b]				
Regulatory Year	Fall		Spring		Packs
1997–98	380	(360–400)	260	(240–280)	50
1998–99	500	(475–525)	300	(280–320)	55
1999–00	520	(490–540)	270	(250–290)	60
2000–01	520	(490–540)	220	(200–240)	62
2001–02	480	(460–500)	230	(210–250)	68
2002–03	420	(400–440)	250	(230–270)	54
2003–04	490	(470–510)	230	(210–250)	70
2004–05	380	(360–400)	230	(210–250)	70

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

TABLE 2 Unit 13 wolf harvest, 1997–2004

	Reported take							Method of take								Successful
Regulatory year	M	%	F	%	Unk	%	Total	Trap /Snare	%	Shot	%	L&S[a]	%	Unk	%	trappers / hunters
1997–98	73	(49)	76	(50)	2	(1)	151	126	(83)	22	(15)	0	(0)	3	(2)	50
1998–99	84	(48)	86	(49)	6	(3)	176	142	(81)	34	(19)	0	(0)	0	(0)	58
1999–00	115	(52)	101	(46)	4	(2)	220	121	(55)	97	(44)	0	(0)	2	(1)	88
2000–01	129	(48)	134	(50)	6	(2)	269	166	(62)	79	(29)	14	(5)	10	(4)	80
2001–02	116	(52)	105	(47)	2	(1)	223	140	(63)	83	(37)	0	(0)	0	(0)	70
2002–03	70	(49)	57	(40)	16	(11)	143	62	(43)	81	(57)	0	(0)	0	(0)	59
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

[a] Land and shoot.

TABLE 3 Unit 13 chronology of wolf harvest by percentage, 1997–2004

Regulatory Year	Harvest Periods									
	August	September	October	November	December	January	February	March	April	*n*
1997–98	3	2	3	17	14	14	31	14	3	151
1998–99	1	5	2	8	17	17	24	22	5	176
1999–00	2	6	0	6	20	16	27	17	6	220
2000–01	1	4	1	5	16	24	23	18	7	269
2001–02	0	5	0	10	16	21	21	20	7	223
2002–03	3	9	1	6	14	24	17	18	7	143
2003–04	1	7	1	2	13	20	34	17	5	246
2004–05	2	8	3	4	13	31	27	7	5	136

TABLE 4 Unit 13 transportation method of wolf harvest by percentage, 1997–2004

Regulatory Year	Transportation Method								
	Airplane	Dog sled skis/ snowshoes	Boat	4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
1997–98	6	1	0	1	78	1	12	1	151
1998–99	22	1	1	0	63	9	3	2	176
1999–00	4	3	0	4	80	1	6	1	220
2000–01	25	4	1	1	60	0	4	4	269
2001–02	7	0	0	1	78	0	8	5	223
2002–03	3	1	2	5	75	2	11	0	143
2003–04	59	0	1	1	29	0	9	0	246
2004–05	51	1	2	5	29	0	9	2	136

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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, contributed to the increases. High wolf densities also occurred in adjacent units because of reduced wolf hunting and trapping pressure. Wolf numbers remained high or even slightly increased through 2005; hunters, pilots, and winter recreationists frequently observed wolves or tracks from wolf packs. The reported harvest has also increased, coincident with high wolf densities.

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 2 packs in Unit 14B were infested, as well as 1 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 1200 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.

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 100–130 wolves during fall 2004 (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.

Diseases/Parasites

In spite of louse control efforts in the 1990s, at least one pack remains infested in Unit 14A. There were no indications that any 14B or 14C packs are currently affected. 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 in Units 14A and 14B was 10 November–31 March, and in Unit 14C the trapping season ran 10 November–28 February. Trappers had no bag limit on wolves.

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

Hunter/Trapper Harvest. Harvest averaged 30 wolves per season (range 27–32) during the 3 seasons spanning 2002–03 through 2004–05 (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 comparatively stable in the last 10 years ranging from 3 to 11 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 4 to 25 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 currently high and provide good summer prey. Salmon escapement has remained fairly consistent at near objective levels, providing an 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 more than twice the objective in Unit 14. Slight increases in the number of wolves taken in the past 4 years have coincided with an increase in the number of successful trappers; thus, it is possible that the population is not currently increasing at a significant rate. 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 $6000 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 remained at approximately 22 to 35% during the last 3 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, 1994–2005

Year	Population estimate	Packs (nr)	Basis of estimate
1994–95	60–85	8–11	Sample Unit Probability Estimate in 14C, incidental observations in 14A and 14B
1995–96	70–100	9–11	Incidental observations, sealing records, reports from public
1996–97	80–115	11–13	Reports from trappers, staff, public
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

TABLE 2 Unit 14 wolf harvest, 1994–2005

Regulatory year	Reported harvest				Method of take				Successful
Unit 14A	M	F	Unk	Total	Shot	Trap	Snare	Unk	trapper/hunters
1994–95	9	7	0	16	7	5	4	0	8
1995–96	12	7	0	19	5	3	11	0	6
1996–97	6	4	0	10	2	4	4	0	7
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
Unit 14B									
1994–95	2	2	0	4	3	0	1	0	2
1995–96	2	0	0	2	0	1	1	0	2
1996–97	3	2	0	5	3	1	1	0	4
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

TABLE 2 continued

Regulatory year	Reported harvest				Method of take				Successful
Unit 14C	M	F	Unk	Total	Shot	Trap	Snare	Unk	trapper/hunters
1994–95	0	2	0	2	1	1	0	0	2
1995–96	0	3	0	3	1	0	2	0	3
1996–97	2	2	0	4	2	0	1	1	3
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
Unit 14 Total									
1994–95	11	11	0	22	11	6	5	0	12
1995–96	14	10	0	24	6	4	14	0	11
1996–97	11	8	0	19	7	5	6	1	14
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

TABLE 3 Unit 14 wolf harvest chronology percent, 1994–2005

Regulatory year	Harvest periods							
	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*
1994–95	14	0	41	41	4	0	0	22
1995–96	4	4	42	33	8	4	4	24
1996–97	0	5	16	21	21	26	11	19
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

[a] Includes one or more unknown dates of kill.

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
1994–95	9	0	0	23	59	0	0	9	0	22
1995–96	4	0	0	58	4	0	17	13	4	24
1996–97	5	0	0	16	47	0	5	21	5	19
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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

LOCATION

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

GEOGRAPHIC DESCRIPTION: West side of Cook Inlet

BACKGROUND

Prior to the 1900s and the establishment of major human settlements in Anchorage, Palmer–Wasilla and Kenai–Soldotna, wolf numbers in Unit 16 fluctuated with prey densities. Since 1900 wolf populations have been heavily influenced by various human harvest regimes. These have ranged from predator-control strategies (including the use of poison, bounties, and aerial shooting) to only trapping and sport hunting (Harkness 1991; Masteller 1994).

Reports from trappers, pilots, and staff indicate wolf numbers began increasing in the early 1990s. 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. The population has more than quadrupled since that survey.

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, hunter 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. Over the winter of 2004–2005, SDA-permitted pilot–gunner teams reported flying 415 days looking for and tracking wolves. 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 170–240 wolves in up to 22 packs during fall 2004 (Table 1). This is 2–4 times the number estimated 10 years earlier. 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 2001–02 and may have been stable at about 250 animals. Most large prey species have declined substantially in recent years, and we expect wolf productivity has declined. However, summer food sources, such as salmon, are plentiful and available in most of the unit.

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 1 (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 with the implementation of SDA wolf control in 2004–2005. Five confirmed lousy wolves and 17 suspected lousy wolves were examined by department staff during the season. Other lousy packs likely include those found at Alexander Creek, Beluga Mountain, Kahiltna River, and Lake Creek.

MORTALITY

Harvest

Season and Bag Limit. The bag limit for Unit 16 was increased beginning in fall 2002 from 5 wolves to 10, 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. During January 1998 division staff asked the Board of Game to clarify whether wolf-hybrids could be possessed without a permit. The board members addressed the subject by stating that in their view possession of any hybrid of an animal not on the "clean" list had always been illegal, but they added language to 5AAC 92.029 explicitly addressing possession of hybrids. Top officials in both the Division of Wildlife Conservation and the Department of Public Safety's Division of Fish and Wildlife Protection (DPS/FWP) stated, however, that they would take no drastic enforcement action against the many people and several businesses that possess and sell hybrid wolves. The board readdressed this issue in January of 2002, prohibiting the possession of wolf hybrids (5AAC 92.030), including offering for sale any animal represented as a wolf hybrid. In addition, possession of wolf hybrids would be allowed if the animal was sterilized and tagged with a subcutaneous microchip.

Hunter/Trapper Harvest. Harvest averaged 61 wolves per year (range 47–90) during 2000–2004 (Table 2), continuing an increasing trend since the late 1980s. 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 trappers/hunters has generally been increasing, probably due to increases in human population, increases in wolf populations, and improvements in snowmachines. In Unit 16B, SDA wolf control take in 2004–2005 was 91 wolves (Table 5).

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. Many of these hunters report seeing wolves with increasing frequency.

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 have been declining. 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. Heavy snow conditions in the Susitna Valley during winter 1999–2000 undoubtedly increased both moose vulnerability to wolves and moose starvation, providing plentiful carrion. 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

Our wolf population objective has not been met because we estimate the population is 3–4 times larger than the stated 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 sustainable rates (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%.

The wolf management goals for this area include conserving the wolf population, providing sustainable wolf harvest, and retaining "desirable" predator–prey ratios. With a large population, and until recently, relatively low harvest rates, the first 2 goals have been met. However, we have not defined desirable predator–prey ratios. With the increase in wolf numbers and decrease in moose numbers, the number of moose per wolf has declined from approximately 250:1 in 1993 to 70:1 in 1999 and possibly as few as 25:1 in 2004. 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. This will require approximately $8000 and appropriate technical staff time every 3 years.

The spread of the nonnative louse to the Susitna Valley is a concern for managers. Six infested wolves, including 2 that had been treated in January 1999, were trapped in Unit 16 during winter 1999–2000. Additional wolves have been trapped each year since. This indicates we were unsuccessful in eliminating lice from the area. With current high wolf densities, this parasite could spread rapidly within the Susitna Valley. Given natural dispersal rates for wolves (Mech et al. 1998), it is likely that lice will infest wolves in other parts of the state soon. Managers in other areas should be prepared to answer public inquiries regarding division policy on this matter.

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TABLE 1 Unit 16 fall wolf population estimates[a], 1994–2005

Year	Population estimate	Packs (nr)	Basis of estimate
1994–95	57–79	11–13	Incidental observations, sealing records, reports from public
1995–96	46–75	11–13	Reports from trappers, staff, public
1996–97	60–85	10–12	Reports from trappers, staff, public
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

[a] Fall estimate = pretrapping season population.

TABLE 2 Unit 16 wolf harvest, 1994–2004 (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
1994–95	14	14	0	28	17	4	7	0	28
1995–96	6	9	0	15	6	1	8	0	15
1996–97	13	12	1	26	14	3	9	0	26
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

TABLE 3 Unit 16 wolf harvest chronology 1994–2004 (does not include wolves taken in control program)

Regulatory	Percent of Harvest							
year	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*
1994–95	7	0	14	61	11	7	0	28
1995–96	0	13	20	0	33	27	7	15
1996–97	35	4	4	31	15	8	4	26
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

TABLE 4 Unit 16 wolf harvest percent by transport method, 1994–2004

Regulatory year	Harvest percent									*n*
	Airplane	Dogsled	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Snowshoes	Unk.	
1994–95	18	11	4	0	43	0	7	18	0	28
1995–96	27	0	0	0	73	0	0	0	0	15
1996–97	31	4	4	0	54	0	0	8	0	26
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

TABLE 5 2004–05 Unit 16B SDA wolf control harvest chronology

Sex	Percent of Harvest					*n*
	Dec	Jan	Feb	Mar	Apr	
Male	18	25	32	20	5	44
Female	19	23	45	11	2	47

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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 from observations incidental to moose and caribou surveys, as well as through observations reported by local air taxi pilots.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Trapper reports and general observations indicate the wolf population has remained stable, or perhaps even 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 common 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 2004 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 (Table 1).

Distribution and Movements

Wolves are present throughout the unit. Highest densities are along the major drainages of the Nushagak and Mulchatna rivers. There is no evidence of transitory packs following the Mulchatna caribou herd, although lone 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–31 March

Board of Game Actions and Emergency Orders. In March 2005 the Board of Game extended, the wolf trapping season for Unit 17 to April 30; however, the use of steel traps or snares smaller than $^{3}/_{32}$ of an inch in diameter was prohibited during April. The board also changed the regulations to allow the use of snowmachines and all-terrain-vehicles (ATVs) for taking wolves during trappings seasons, provided the animals are not shot from a moving snowmachine or ATV.

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 5 years (2000–01 through 2004–05), the annual average harvest was 82 (Table 2). During 2002–03, 20 hunter/trappers reported taking 30 wolves (15 males, 13 females, 2 sex not reported), with 1 taken in Unit 17A, 28 in 17B and 1 in 17C. During 2003–04, 48 hunter/trappers reported taking 141 wolves (66 males, 74 females, 1 sex not reported). Two were taken in Unit 17A, 64 in 17B, and 64 in 17C; no subunit was recorded for 11 wolves. During 2004–05, 32 hunter/trappers reported taking 60 wolves (32 males, 26 females, 2 sex not reported), with 2 taken in Unit 17A, 28 in 17B and 30 in 17C. Most were taken with firearms (Table 2).

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 3). In most years, harvest chronology reflects the suitability of snow conditions for tracking and travel by snowmachine rather than the availability of wolves. Harvest of wolves incidental to moose and caribou hunting activities during August and September has increased during the past few years. This is due to

the increased interest by moose and caribou hunters in taking wolves, as well as the availability of wolves in the area.

Transport Methods. Before 1992, aircraft were the most common means of transport of wolf hunter/trappers in Unit 17 (Table 4). 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 generally 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 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 infer 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 6 wolves trapped in the 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 fall wolf population estimates[a, b], 1991–92 to 2004–05

Year	Population estimate	Number of packs
1991–92	200–250	20–30
1992–93	250–350	20–30
1993–94	300–350	25–35
1994–95	400–475	30–40
1995–96	320–425	30–42
1996–97	320–425	30–42
1997–98	350–465	32–46
1998–99	350–465	32–46
1999–00	450–550	32–46
2000–01	450–550	32–46
2001–02	450–550	32–46
2002–03	450–550	32–46
2003–04	450–550	32–46
2004–05	450–550	32–46

[a] Fall estimate = pretrapping season population.
[b] Estimates based on trapper questionnaire, incidental observations during moose and caribou surveys, and harvest data.

TABLE 2 Unit 17 wolf harvest, 1991–92 to 2004–05

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 (--)	34
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%)	2 (2%)	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

TABLE 3 Unit 17 wolf harvest chronology percent by time period, 1991–92 to 2004–05

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	14%	10%	31%	16%	--	29%[c]	125
1995–96	2%	20%	49%	22%	--	7%	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

[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 (6%) in September, 1 (1%) in October, 21 (17%) in November and 4 (3%) harvested at unknown times.
[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.

TABLE 4 Unit 17 wolf harvest percent by transport method, 1991–92 to 2004–05

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%	--	--	5%	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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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 indicate 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. The distribution and abundance of wolves in Unit 18 reflect the expanding distribution and increased abundance of moose and caribou of the last decade. The reported wolf harvest continued to increase 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 and boat-supported 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 by recruiting an administrative clerk whose responsibilities include recruiting and supporting license vendors and fur sealers. 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 the increasing trend 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 2002-2005 the population ranged from 250-300 animals in 25-30 packs.

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 is at least one resident pack along the Kuskokwim River near Lower Kalskag. The distribution of these packs follows the distribution, population growth, and range expansion of moose in Unit 18.

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 their distribution probably changes with caribou availability. Some resident wolf packs remain throughout the year, but when caribou depart to calve in Unit 17, these packs are left with very little prey.

We occasionally encounter wolves on the tundra between the Kuskokwim River and the Yukon River riparian corridors but these wolves are probably transient. We do not know of any established packs in this area.

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: 19 during the 2002-2003 regulatory year, 83 in 2003-2004, and 58 in 2004–2005. The highest harvest during the decade preceding this reporting period was 17 in 1988–1989 and the average harvest was 7 from 1984–1985 through 1995–1996. Clearly, recent harvests have increased dramatically (Figure 1).

Since 1996–1997, 79% of the known harvest occurred in the Kuskokwim River drainage (Table 2). This reflects the distribution of caribou and caribou hunters who opportunistically shoot wolves (Table 3). It also reflects the trapping activity of one particularly successful trapper, active within the drainages of the Kuskokwim River, who was responsible for 30% of the Unit 18 wolf harvest during this reporting period.

Male wolves are more vulnerable to harvest than females. From 1985–1986 through this reporting period, there were many more males (n = 305) taken than females (n = 185) in Unit 18 (Table 3).

These 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 (Table 4). During this reporting period there was also a high harvest in January. This pattern is explained by the usual timing of snow accumulation and the improvement in travel conditions. 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.

The 2002–2003 harvest was 19, the lowest during this reporting period. Travel conditions unit-wide remained poor through most of the season and explain the lower harvest.

Transport Methods. Hunters and trappers typically use snowmachines to harvest wolves. One hunter used a boat in August 2000, 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 caribou in the Yukon and Kuskokwim drainages have already resulted in an increase in the number of wolves in Unit 18 compared to the 1980s. 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 habitat will be enhanced.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

There were no nonregulatory management problems or issues associated with wolves in Unit 18 that were identified during the reporting period.

CONCLUSIONS AND RECOMMENDATIONS

Wolf numbers continue 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 to the Yukon River Delta. Wolves have also increased in the Kilbuck Mountains in response to a seasonal influx of caribou. Some resident wolf packs have become established in the Kilbuck Mountains, but because there is so little prey available after caribou leave, we surmise that most of the wolves that use the eastern portion of Unit 18 leave the unit as caribou leave.

The current population for Unit 18 is about 250–300 wolves in 25–30 packs including wolves that use adjacent game management units when caribou are not 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.

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 19 in 2002–2003 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.

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 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 moose along the Kuskokwim and 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 predation. The current harvest levels are appropriate.

The regulations are poorly understood by many wolf hunters, particularly those who take wolves opportunistically. Some hunters use snowmachines to take wolves illegally. Wolf pelts are frequently presented for sealing after the sealing deadline has passed, and many of these are sealed by someone other than the hunter or trapper. Typically, these pelts are given as gifts to skin sewers, frequently elderly women, who discover the need to seal pelts when 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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PHILLIP, P. 2006. Unit 18 wolf management report. Pages 126–135 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2002–30 June 2005. Alaska Department of Fish and Game. Project 14.0. Juneau, Alaska, USA.

TABLE 1 Unit 18 fall wolf population estimates[a], 1985–1986 through 2004-2005

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	225–275	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

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

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	0	19
2003-2004	27	45	11	83
2004-2005	15	40	3	58

TABLE 3 Unit 18 wolf harvest, 1985–1986 through 2004-2005

Regulatory	Reported harvest			Method of take			Number successful
Year	M	F	Unknown	Trap/Snare	Shot	Unknown	trap/hunt
1985–1986	1		6	6	1		2
1986–1987	2		2		2	2	2
1987–1988	4	4	3	5	5	1	6
1988–1989	11	6					7
1989–1990	2	2					2
1990–1991	1			1			1
1991–1992	2	2		4			2
1992–1993	0	0	7	0		7	-
1993–1994			6			6	-
1994–1995	3		3	4	2		4
1995–1996	6	2	6	5	1	8	3
1996–1997	9	17	14	17	11	12	-
1997–1998	29	7	7	27	11	5	10
1998–1999	24	13	8	23	22		18
1999–2000	52	23	10	44	41		23
2000–2001	17	9	5	15	13	3	17
2001–2002	54	41	14	51	52	6	34
2002-2003	10	8	1	8	11	0	11
2003-2004	47	26	10	32	50	1	26
2004-2005	31	25	2	28	28	2	25

TABLE 4 Unit 18 wolf harvest chronology by time period, 1985–1986 through 2004-2005

	Harvest period						
Regulatory year	Nov	Dec	Jan	Feb	Mar	April	*N*
1985–1986	6	1					7
1986–1987		2					4[a]
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[a]
1993–1994			2		2		6[a]
1994–1995		4		1	1		6
1995–1996	1			6	1		14[a]
1996–1997	2	5	4	17			40[a,b]
1997–1998	3	1	12	20	2		43[a]
1998–1999	4	6	3	5	15	10	45 [a]
1999–2000	2	9	30	32	12		85
2000–2001	1	2	11	4	6	1	31[a,b]
2001–2002	4	4	27	43	19		109[a]
2002-2003	0	1	5	10	2	0	19
2003-2004	0	9	15	31	27	0	83
2004-2005	0	13	20	15	8	1	58
Totals	23	63	136	193	110	12	594

[a]Includes unknown month of harvest
[b]Includes one wolf shot during the fall hunting season

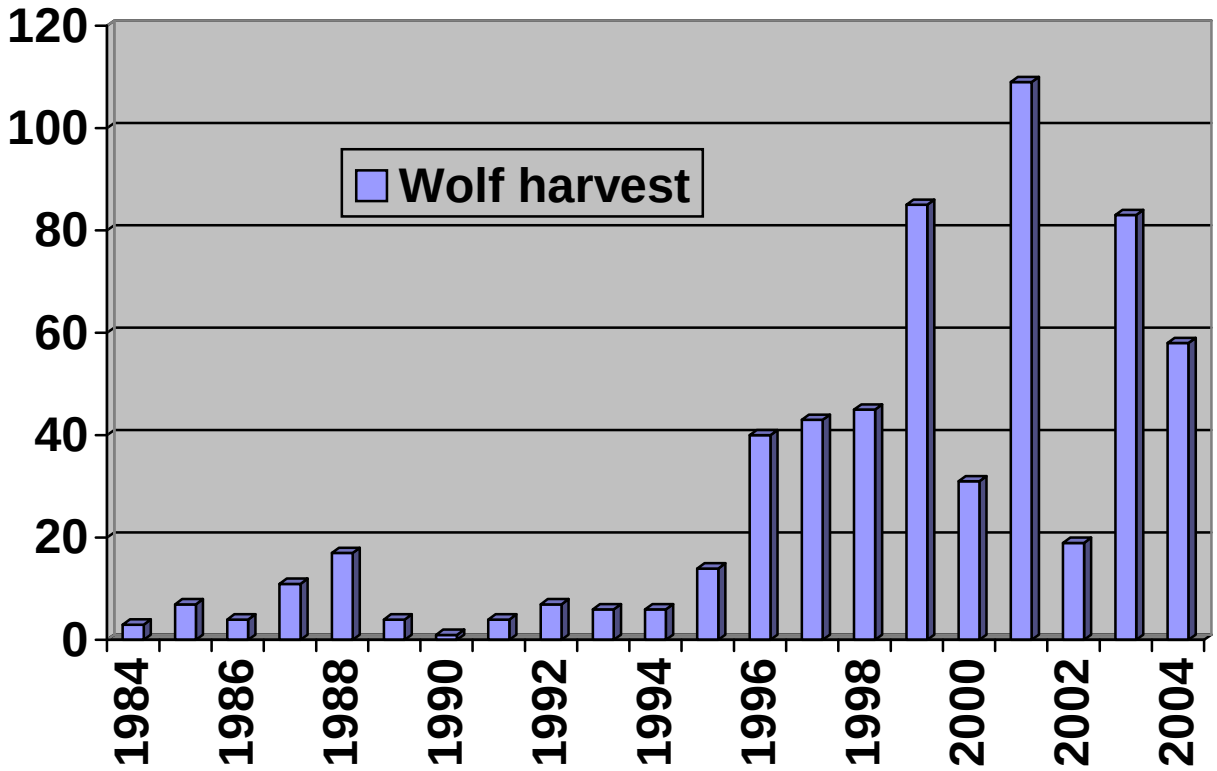

FIGURE 1 Reported wolf harvest 1984–2004

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

From: 1 July 2002
To: 30 June 2005[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 region. 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 prescribe harvests 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 until regulatory year (RY) 1992 (RY begins 30 June and ends 1 July; e.g., RY92 = 30 June 1992 through 1 July 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 moved more than 300 feet 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 hunting of wolves.

As early as 1980, biologists recognized that moose densities were low in the upper Kuskokwim. 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 residents met with officials from ADF&G to discuss predator control options. Local residents favored wolf control programs designed to reduce wolf numbers and increase moose for subsistence use. The Alaska Board of Game adopted a Wolf Control Implementation Plan for Unit 19D East (8513 mi$^{2)}$, the eastern portion of Unit 19D which encompasses Unit 19D upriver of, but not including,

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

the Black and Selatna river drainages; Fig. 1) in 1995 and reauthorized the same plan with updates in January 2000, March 2001, and March 2003. (Reauthorizations occurred again in January 2006, and May 2006).

In 2001 the Experimental Micro Management Area (EMMA), a 528-mi^2 area located within a 20-mi radius of McGrath, was established. This area encompasses the highest density of moose in Unit 19D East and was established as a treatment area where predator population manipulations and other management actions could be tested.

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 (Keech et al. 2002). This understanding has focused management toward efforts to reduce predation. These predation control programs are instrumental to our moose management programs and are critical for compliance with intensive management mandates. Meanwhile, local support for these programs remains high, particularly in Unit 19D where residents saw moose populations increase. 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, 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.

Active predation control took place in Unit 19A during RY04–RY05, in Unit 19D East during RY03–RY05, and has continued to present. Within these areas, wolf numbers were reduced in an effort to decrease predation on moose to promote moose population recovery to the levels dictated by intensive management laws. Within Unit 19D East, wolf population reduction was focused within the EMMA.

MANAGEMENT OBJECTIVES

Management objectives for wolf populations have differed within Unit 19 depending on whether the population was in an area that included an active wolf predation control program. 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

Unit 19A

- Reduce the wolf population by 80%, but to no fewer than 40–53 wolves during RY04–RY05.

Unit 19D East

- Reduce predation on moose by wolves to as low as possible within the EMMA.

MANAGEMENT ACTIVITIES

- 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 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

We estimated wolf abundance within Unit 19D East during February 2001, March 2005, and March 2006 using reconnaissance track surveys (Stephenson 1978). During these surveys, fixed-wing aircraft were deployed and observers made direct observations of wolves and counted tracks in assigned areas. Wolf observations (packs, pairs, and singles), tracks, and kill sites were mapped, and team members discussed potential overlap among sightings to reduce the possibility of overestimating the number of packs or wolves in a pack. All independent observations were combined 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 and trappers.

Wolf surveys were conducted in Unit 19A using reconnaissance track surveys during January 2006 south of the Kuskokwim River and during March 2006 north of the Kuskokwim River. Also during the March survey, the Holokuk and Oskawalik River drainages were surveyed south of the Kuskokwim. These surveys were combined to generate a single estimate of the Unit 19A wolf population, taking into account harvest as well as wolves killed by pilots permitted to conduct wolf control from fixed-wing aircraft.

Fall wolf population size estimates in the portions of Unit 19 not directly surveyed were summarized 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.

Successful wolf control pilot and gunner applicants were screened by the Department of Public Safety, Bureau of Wildlife Enforcement for violations and were awarded permits based on piloting experience, wolf harvest and experience with same-day-airborne (SDA) methods, knowledge of the terrain in the wolf control area, and other factors. After the first year of each program, the wolf control permittee's track record of successful wolf kill was also included in this consideration. Permit packets that included permits, private land liability waivers, maps, reporting instructions, and SDA seals were issued in person at selected ADF&G offices. Permittees were required to check in with 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 SDA wolf take.

Trapper questionnaires were sent out annually to assess trappers' sense of wolf and other furbearer populations, conditions, and other issues. However, results of these questionnaires were unavailable after having been lost in a fire.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size and Density

We completed a reconnaissance-style wolf survey within the Unit 19D East moose survey area during 21–24 February 2001 (Fig. 1). From that survey, we estimated 103 wolves occurred there

(Table 1a), 47 of which were believed to be permanent residents of the survey area. The rest were considered boundary wolves that likely did not reside within the survey area at all times. We estimated the density of wolves from this survey at 19.6 wolves/1000 mi^2. Not counting single wolves as packs, there were 14 packs and an average of 6 wolves/pack.

During 17–19 March 2005, we conducted a reconnaissance-style wolf survey in Unit 19D East, focusing primarily on the wolf control zone (Fig. 1). During that survey, we estimated 53–65 wolves within the survey area (an area slightly larger than the Unit 19D East moose survey area), with 9 of those wolves within the wolf control zone. We estimated the density of wolves to be 12.5 wolves/1000 mi^2, slightly lower than in 2001. Not counting single wolves as packs, there were 12–13 packs and an average of 3.5–4.8 wolves/pack.

During 14–17 March 2006 we conducted another reconnaissance-style wolf survey in Unit 19D East, focusing primarily on the wolf control zone within Unit 19D East. From that survey, we estimated 82 wolves within Unit 19D East, with 13 of those wolves within the wolf control zone. From this survey, we estimated the density of wolves at 15.8 wolves/1000 mi^2, slightly lower than in 2001. Not counting single wolves as packs, there were 18 packs with an average of 4.3 wolves/pack.

Early in 2006 we conducted reconnaissance-style wolf surveys in Unit 19A in January south of the Kuskokwim River, and in March north of the Kuskokwim River and within the Holokuk and Oskawalik River drainages. Overall, we estimated the population at 107–115 wolves including 8–9 singles in 26–27 packs (3.6–4.1 wolves/pack) or approximately 11–12 wolves/1000 mi^2. Ten wolves were removed prior to the survey and 67 wolves were reported killed after the survey was completed, leaving an estimated 40–48 wolves in the population on 3 April 2006, when all take of wolves in Unit 19A was suspended.

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; 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. These populations were likely stable, though as prey populations decline wolf populations will likely follow.

Pack sizes in Units 19B and 19C were probably similar to the average pack size of 6 found during the 2001 survey in Unit 19D East. Also, surveys conducted since 2001 documented that between 6% and 18% of these populations were single wolves. Assuming a pack size of 6 and considering the observed percentage of single wolves found during surveys between 2001 and 2006, we estimated that there were 16–24 packs in Unit 19B, and 14–21 packs in Unit 19C. Since RY02, wolf populations and the number of packs in Unit 19 have declined (Table 1b).

Population Composition

Since RY00, 781 wolves have been reported taken, including 410 (52.1%) males, 352 (45.1%) females, and 19 (2.4%) of unknown/unrecorded sex (Table 2a). Included were 61 females and 61 males taken by wolf control permittees. This suggests that the overall population had a 50:50 sex

ratio, but males may have been slightly more vulnerable to harvest by trapping and hunting methods than females.

Distribution and Movements

Harvest locations, observed wolf tracks, and incidental sightings indicated the wolf population was well 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 RY02–RY04.

MORTALITY

Harvest

Season and Bag Limit.

Unit/Bag Limit/Special Restrictions	Resident and Nonresident Open Seasons
RY02 and RY03	
Units 19A, 19B, and 19C	
HUNTING: 5 wolves.	10 Aug–30 Apr
TRAPPING: No limit.	1 Nov–30 Apr
Units 19D	
HUNTING: 10 wolves per day.	10 Aug–30 Apr
TRAPPING: No limit.	1 Oct–30 Apr
RY04–RY06	
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. Beginning in RY02, the Board of Game changed wolf regulations throughout Unit 19 to allow the use of snowmachines to harvest wolves, provided the snowmachine is stopped before shooting. The board also extended the hunting season beginning in RY04 to 1 August–31 May and increased the bag limit in Units 19A, 19B and 19C from 5 wolves per season to 10 wolves per day.

On 3 April 2006 we issued an emergency order to close wolf hunting and trapping seasons and ceased wolf control activities in Unit 19A after having achieved the population objective.

A wolf control implementation plan for Units 19A and 19B was first adopted by the Board of Game in March 2004. It was approved for 5 years and began on 1 July 2004. The board authorized the commissioner to issue public aerial shooting permits or public land and shoot

permits as methods of wolf removal pursuant to AS 16.05.783. In January 2006 the board adopted a revised implementation plan in the form of an emergency regulation. The emergency regulation limited control activities to Unit 19A and clarified and updated key components of the 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 and adopted it as a final regulation. Authorization to issue public aerial shooting permits or public land and shoot permits was reaffirmed, and the following wolf population levels and population objectives were specified:

- Fall 2004 precontrol wolf population: 125–150
- Wolf population control objective: 30–36

The Unit 19D East wolf predation control implementation plan was established by the board in fall 1995. In January 2000 the board made a finding of emergency regarding the Unit 19D East situation and extended the commissioner's authority to reduce wolves during a 5-year period, 2000–2005. In March 2001 the board supported recommendations from the Adaptive Wildlife Management Team (AWMT) by adopting several regulations to begin implementing predator control.

Incorporating recommendations from the AWMT, ADF&G established the EMMA to conduct research on predator–prey issues. The concept of the EMMA was a change from previous approaches dealing with predator management because it focused predator management around a village to provide more moose for subsistence needs. In March 2003 the board reevaluated the Unit 19D East wolf predation control program and issued comprehensive new board findings. The board endorsed the EMMA concept and allowed the department discretion to change the size of the control area to allow for adaptive management. Thus, the Unit 19D East wolf predation control implementation plan involves both research and management components. The board also recommended the department implement the Unit 19D East experimental management program according to these specific guidelines:

1) Establish the EMMA.
2) Close hunting in the EMMA during predator control. Reopen hunting when intensive removal of predators ceases.
3) Remove and relocate bears from the EMMA.
4) Remove wolves from the EMMA.

The 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. 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 adopted the final regulation. The

May 2006 final regulation also extends predator control to 2008. The following wolf population levels and population objectives for Unit 19D East are included in the final regulation:

- Fall 2000 precontrol wolf population estimate: 198
- Wolf population control objective:
    - As low as possible in EMMA
    - No less than 40 in Unit 19D East

Hunter–Trapper Harvest. During RY02, RY03, and RY04, 126, 109, 123 wolves were reported harvested by hunters and trappers or taken by wolf control permittees in Unit 19 (Table 2a). From RY00 through RY05 the total number of wolves taken by all methods was 781 and the average number of wolves taken was 128 (range = 106–164). The number of wolves taken by wolf control permittees in Unit 19A during RY04 and RY05 was 42 and 47, respectively while in Unit 19D East during RY03, RY04, and RY05, the number of wolves taken by wolf control permittees was 17, 14, and 4 (Table 2b).

During RY02–RY04, 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 was the most important method of take while in Units 19A and 19D, the most important method of take was snaring (Table 2b).

Three hundred wolves were taken from Units 19B and 19C combined during RY00–RY05 (Table 2b). This is about 20% of the estimated populations from these areas.

Hunter–Trapper Residency and Success. Local trappers and hunters contributed to most of the annual wolf harvest during RY00–RY06 in all units (86%; Table 2a). However, 14% of the wolf harvest was by nonresidents; generally during the fall incidental to hunting other big game species.

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 (Table 2a). This number was fairly steady at 2–3 wolves during RY00–RY05. However, of the 781 wolves taken, 315 (40%) were taken by only 15 residents, 8 of whom lived outside Unit 19.

Harvest Chronology. Most reported wolf harvest during RY00–RY05 was during September, January, February and March ($\bar{x}$ = 17 wolves/month; Table 3a). Winter wolf harvests vary with travel conditions which typically improve by mid December. September wolf harvests are typically incidental to other big game hunts. February and March were the most important months for taking wolves using SDA methods (Table 3b).

Wolf Control Kill. Wolf control take is summarized by area in Table 2b, by chronology of take in Table 3b, and by participation in Table 3c. An average of 0.51 wolves were taken per permit issued from RY03 through RY05. Table 4 shows the percentage of wolves taken from within the EMMA.

Transport Methods. The primary method of transportation used by hunters and trappers to harvest wolves has steadily shifted from dog team to snowmachine, which is now the top transportation choice, followed by aircraft (Table 5). Other methods, which included ATVs and other/unreported methods contributed about 13% to the harvest. No dog teams were reported used during RY00–RY05.

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 the animal which was known or assumed to be dead. These animals are noted in Tables 2b, 3b, and 3c.

NONREGULATORY MANAGEMENT PROBLEMS, NEEDS, AND EDUCATION

Lice were present among wolf populations throughout Unit 19 and beyond. Few cost-effective tools exist to treat this problem, so it is likely to persist. Wolf pelts with lice have little value yet hunters–trappers are still inclined to take wolves infected with lice to: a) remove the infected individual from the population, b) remove the predator from the population in the belief that a public service is being rendered, and c) take advantage of whatever value such wolves might have. Depending on the degree of infection, 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 enjoyed universal local support but there was little comprehension of the staffing cost associated with them. A full-time seasonal worker was hired to administer these programs, but when he was on seasonal leave other important activities were displaced because remaining staff were required to administer wolf control programs. Additionally, continual court challenges from national groups 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. As reported earlier, trapper questionnaires were among the data that were lost.

CONCLUSIONS AND RECOMMENDATIONS

Throughout Unit 19, we ensured the long-term conservation of wolves, provided for the broadest possible 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 remained in Unit 19A and 40 wolves in Unit 19D East remained in place 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 the need for public education regarding wolves and their prey gained the attention of the Board of Game and Fish and Game advisory committees. The public became more aware of the ecological role of wolves and their prey through the media and other means.

We harvested fewer than 30% of the wolves from populations where there were no control efforts. The objective of harvesting *up to* 30% of these populations was met, but the average

harvest of only 20% from these populations was below the 30% benchmark and additional harvest would be desirable.

During RY04 we took 71 wolves from Unit 19A. This was short of our goal of taking 140–190 wolves, which was based on a population of 180–240 wolves and our objective of leaving 40–53 wolves in the unit. During RY05 we achieved the objective of reducing the Unit 19A wolf population to this level. Of 107–115 wolves estimated in Unit 19A, 67 were taken after the survey, and overall, 77 wolves (69% of the pre-removal population) were taken during RY05. Additional survey data allowed us to refine the original 2004 wolf population estimate for Unit 19A. Therefore, the new wolf control objective, beginning in RY06, will be to reduce the wolf population to no fewer than 30–36 individuals.

Within Unit 19A, wolf removal was concentrated within those areas conducive to take using SDA methods. These areas included the Holitna, Hoholitna, Stony and to a lesser extent, the Aniak River drainages. We anticipate wolf reductions of sufficient magnitude to change predation rates within these drainages only, although other areas produced a few wolves for SDA permittees in RY04–RY05.

In Unit 19D outside Unit 19D East, harvest was light. Within Unit 19D East harvest and take by SDA permittees was heavier and concentrated within the EMMA, an area making up only 6% of Unit 19D East but accounting for an average of 44% of the harvest and wolf control take during RY02–RY04 (Table 4). Our wolf control objective of reducing predation within the EMMA was achieved. Beginning in RY06, our wolf control objective for Unit 19D East will be to reduce the wolf population within the EMMA as low as possible, but to maintain no fewer than 40 wolves throughout Unit 19D East.

Due to the nature of the landscape, focusing wolf removal in limited areas through regulation or through other methods provides the best chance to change wolf predation rates on moose. This approach should be encouraged in areas where wolf predation depresses prey populations or prevents their recovery.

The average number of wolves taken per permittee was 0.5 (Table 3c). This success rate is low and is attributable to a variety of reasons, including cost (e.g., aviation fuel in Sleetmute was $8.00/gallon); remoteness of the SDA areas; 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 SDA; and other reasons including those not necessarily related to the abilities of the pilot and gunner crews. Future programs should favor those permittees with a track record of success.

In Units 19B and 19C, because of declining populations and issues surrounding user conflicts, moose and caribou hunting opportunities for resident and nonresident hunters using aircraft may not remain widely available. Because incidental take of wolves accounts for approximately half of the total wolf harvest in these units, wolf harvest will decline as other big game hunting opportunities diminish. This will be particularly true in Unit 19B where many hunters were drawn to the area by the Mulchatna caribou herd (MCH). As this herd continues to decline rapidly, we expect numbers of big game hunters and the wolves they harvest to drop.

The decline of the MCH will also have a substantial influence on systems throughout that herd's range. In particular, high wolf numbers that have been supported by this herd will no longer persist. Other prey species, such as moose, are also likely to be affected.

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 and these requirements should be eliminated.

The average age of trappers continued to decline and recruiting new wolf trappers would be desirable. One way to do this and to address 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. Other potential management benefits may follow. These clinics should continue as resources allow.

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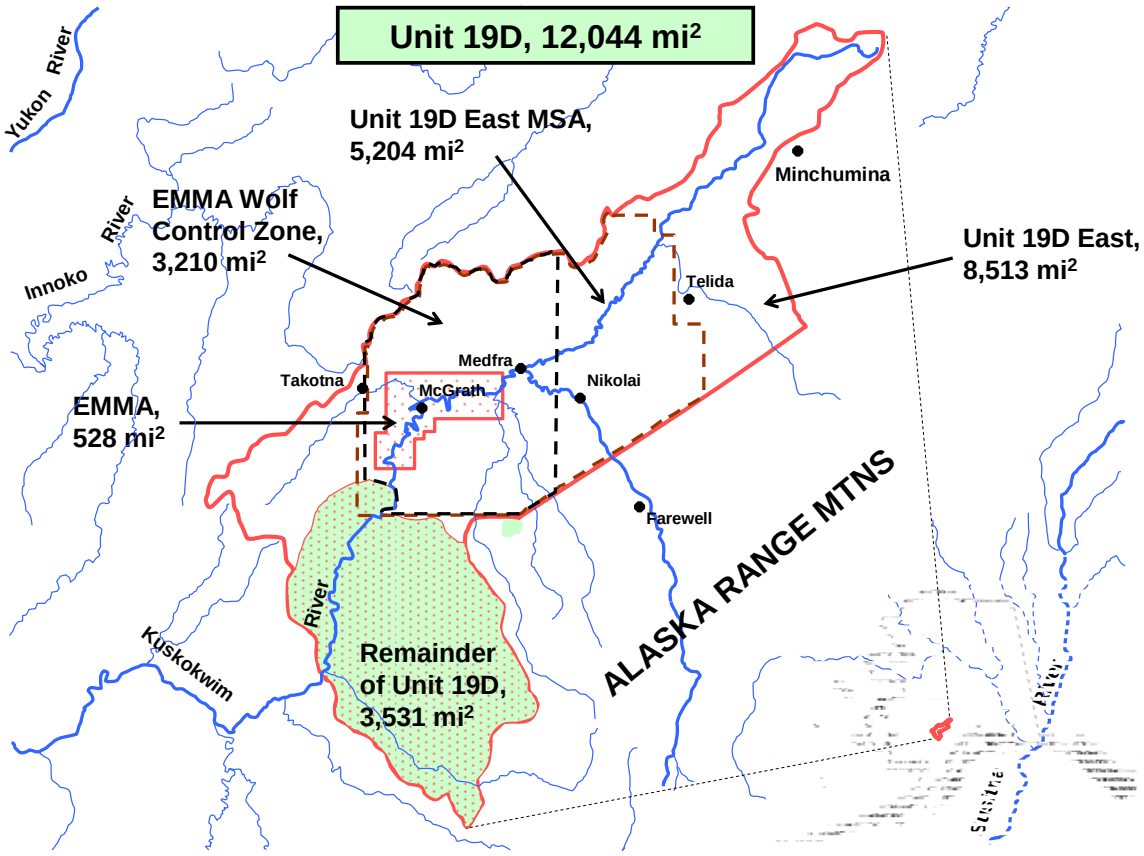

FIGURE 1 Unit 19D showing management activity areas

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

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

Year	Population estimate	No. of packs	$\bar{x}$ Wolves/ pack
2001[a]	103	14	6
2005[b]	53–65	12–13	3.5–4.8
2006[b]	82	18	4.3

[a] Area surveyed was Unit 19D East moose survey area.
[b] Area surveyed was slightly larger than Unit 19D East moose survey area.

TABLE 1b Units 19 late winter wolf population estimates, regulatory years 2001–2002 through 2005–2006

Regulatory year	Population estimate	Number of packs
2001–2002[a]		
2002–2003	650–970	97–145
2003–2004[a]		
2004–2005	450–594	69–94
2005–2006	404–478	74–90

[a] Data not available for these years.

TABLE 2a Units 19 wolf harvest and control take, regulatory years 2000–2001 through 2005–2006

Regulatory	Reported harvest				Residency			$\bar{x}$ Wolves/
year	M	F	Unknown	Total	Nonresident	Resident[a]	Unknown	Trapper
2000–2001	69	45	5	119	24	95	0	1.9
2001–2002	84	77	9	170	23	147	0	2.7
2002–2003	62	62	2	126	21	105	0	1.9
2003–2004	60	47	2	109	15	94	0	2.5
2004–2005	63	59	1	123	8	115	0	2.9
2005–2006	72	62	0	134	16	118	0	2.7
Total	410	352	19	781	107	674	0	
% of Total	52%	45%	2%		14%	86%		Avg = 2.4

[a] Resident of the State of Alaska, including residents of the unit, sometimes referred to as nonlocal.

TABLE 2b Units 19A, 19B, 19C, and 19D wolf harvest and harvest method, regulatory years 2000–2001 through 2005–2006[a]

Regulatory	Unit 19A					Unit 19B[b]			
year	Shoot	Trap	Snare	SDA[c,d]	Total[e]	Shoot	Trap	Snare	Total[e]
2000–2001	8	8	7		25	20	12	6	38
2001–2002	17	22	6		49	24	19	13	57
2002–2003	4	9	12		25	17	7	9	35
2003–2004	8	3	18		29	20	4	6	30
2004–2005	7	9	13	42	71	8	3	4	15
2005–2006	10	3	17	47[g]	77	18	4	4	26
Total	54	54	73	89	276	107	49	42	201
% of Total	20%	20%	26%	32%		53%	24%	21%	

TABLE 2b continued

Regulatory	Unit 19C[b]				Unit 19D				
year	Shoot	Trap	Snare	Total[e]	Shoot	Trap	Snare	SDA[c,f]	Total[e]
2000–2001	7	4	5	16	12	9	15		37
2001–2002	8	8	12	28	5	6	14		30
2002–2003	15	5	1	21	5	10	29		44
2003–2004	5	1	2	11	1	4	8	17	36
2004–2005	3	0	2	5	2	2	14	14	32
2005–2006	7	3	8	18	1	1	9	4[g]	15
Total	45	21	30	99	26	32	89	35	194
% of Total	45%	21%	30%		13%	16%	46%	18%	

[a] Harvest from unreported locations in the management area, but not included in unit totals includes 3 with unreported method taken in RY00, 6 trapped in RY01, 1 shot in RY02, and 3 with unreported method in RY03.
[b] Same-day-airborne methods not permitted in Units 19B and 19C.
[c] SDA = same day airbone under wolf control programs.
[d] Same day airborne in Unit 19A began in regulatory year 2004–2005.
[e] Total may include additional harvest where method is other/unknown/unreported.
[f] Same day airborne in Unit 19D began in regulatory year 2003–2004.
[g] Includes 1 wolf killed but not recovered.

TABLE 3a Units 19, wolf hunting and trapping harvest chronology by month, regulatory years 2000–2001 through 2005–2006

Regulatory	Harvest chronology by month										Total
year	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	harvest
2000–2001	3	28	2	21	16	17	14	16	2		119
2001–2002	6	14	8	13	32	23	33	21	11	9	170
2002–2003	8	24	2	17	21	19	13	16	6		126
2003–2004	3	16	2	7	9	14	13	20	8		92
2004–2005	4	6	3	9	1	19	9	13	3		67
2005–2006	1	15	7	2	6	12	17	18	7		85
Total	25	103	24	69	85	104	99	104	37	9	659
% of Total	4%	16%	4%	10%	13%	16%	15%	16%	6%	1%	

TABLE 3b Units 19A and 19D East, wolf control chronology by month, using same-day-airborne methods regulatory years 2003–2004 through 2005–2006

Regulatory	Chronology by month										Total
year	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	take
2003–2004							3	14			17
2004–2005				2	2	13	17	19	3		56
2005–2006							30	21[a]			51
Total				2	2	13	50	54	3		124
% of Total				2%	2%	10%	40%	44%	2%		

[a] Includes 2 wolves killed by not recovered.

TABLE 3c Units 19A and 19D East, number of permitted pilots and gunners, number of wolves taken, and wolves taken per permit using same-day-airborne methods regulatory years 2003–2004 through 2005–2006

					Both areas		
Regulatory	Unit 19A		Unit 19D East		Total	Wolves	Wolves
year	Pilots	Gunners	Pilots	Gunners	permits	taken	per permit
2003–2004	n/a	n/a	8	12	20	17	0.85
2004–2005	35	85	6	11	137	56	0.41
2005–2006	30	52	3	3	88	51[a]	0.58
Totals	65	137	17	26	245	124	0.51

[a] Includes 2 wolves killed but not recovered.

TABLE 4 Wolves killed by all methods from Units 19D, 19D East, and the EMMA during regulatory years 2000–2001 through 2005–2006

Regulatory year	Wolf kill			% Unit 19D East take in EMMA
	Unit 19D	Unit 19D East	EMMA	
2000–2001	37	36	17	47
2001–2002	30	24	7	29
2002–2003	44	39	22	56
2003–2004	36[a]	27	7	26
2004–2005	32[b]	29	15	52
2005–2006	15[c]	15	7	47
Total	194	170	75	44
6-year $\bar{x}$	32	28	13	

[a] Seventeen of the 36 wolves were taken in the wolf control program.
[b] Fourteen of the 32 wolves were taken in the wolf control program.
[c] Four of the 15 wolves were taken in the wolf control program.

TABLE 5 Units 19 hunting and trapping harvest by transport method, regulatory years 2000–2001 through 2005–2006

Regulatory year	Harvest by transport method				
	Aircraft	Snowmobile	Skis/Snowshoe	Other[a]	Total
2000–2001	35	53	16	15	119
2001–2002	41	65	33	31	170
2002–2003	39	58	8	21	126
2003–2004	37	41	4	10	92
2004–2005	22	33	5	7	67
2005–2006	27	44	10	4	85
Totals	201	294	76	88	659

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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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.

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., RY04 = 1 Jul 2004 through 30 Jun 2005). We collected miscellaneous observations and reports for all areas. We also collected additional information for Units 20A and 20B while conducting lynx–hare surveys (RY03–RY04), 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 2004. No other wolf surveys were conducted RY02–RY04 due to funding constraints and poor survey conditions. 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.

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, U.S.A.) 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.

Specifically, we will locate the den of the Blair Lakes pack and the Clear Creek pack and treat those dens during early summer 2005 with Ivermectin baits dropped from fixed-wing aircraft. Using radio collars, we will monitor the life history of these wolves to determine the efficacy of a single treatment in eliminating the parasite. We will determine the effectiveness of that treatment by recapturing and examining those wolves in late autumn 2005. In autumn 2005 we will attempt to capture, treat, and radiocollar wolves from the St. George Creek pack. We will search known dens in that area for current use.

During winter 2005–2006 we will locate radiocollared wolves once each month from the air and note indications of louse infestation manifested in the wolves' appearance or behavior. In spring 2006, dens of packs known to have lice will be treated by dropping baits from a fixed-wing aircraft.

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 650–900 wolves in 85–130 packs in fall 2002–2004. The ranges represent the combined minimum and maximum estimates for each unit (Table 1). This estimate results in an estimated wolf density of 17–23 wolves/1000 mi^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), 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 estimates 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.

In early April 2005, we captured, radiocollared, and treated with Ivermectin all 5 wolves from the pack diagnosed with lice near Blair Lakes in Unit 20A. Symptoms were most severe in a single female pup, and less severe in a male sibling and in older animals. We also captured a single animal from an adjacent pack of 3 wolves. From the air all 3 of those wolves appeared to have normal pelts. The captured wolf had a normal pelt, but was given a prophylactic treatment of Ivermectin.

A wolf caught by a trapper near St. George Creek in the foothills of the Alaska Range was received in Fairbanks in April 2005 and tested positive for lice.

MORTALITY

Harvest

Season and Bag Limit. Smith (1994) summarized the history of regulations pertaining to same-day-airborne and land-and-shoot taking of wolves in Alaska. 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		
RY02		
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
RY03		
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
RY04		
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.

October 2002 — The Board of Game (board) established the Nenana Canyon Closed Area: Units 20A and 20C, those portions bounded by a line beginning at the confluence of Healy Creek and the Nenana River, east along the south bank of Healy Creek to the eastern edge of the southern Anchorage-to-Fairbanks intertie right-of-way, then south along the eastern edge of the intertie right-of-way to the southern boundary of Unit 20A, then west along the boundary of Unit 20A and then across the Nenana River to the west bank of the Nenana River, then north along the west bank of the Nenana River to the Moody Bridge at MP 242.9 of the George Parks Highway, then across the Moody Bridge to the Unit 20A boundary, then north along the boundary of Unit 20A to the point of beginning; closed to the taking of wolves. The board also made it unlawful in those portions of Units 20A and 20C described above (5 AAC 92.550[8]), to take furbearers by using a snare with a cable diameter of 3/32 inch or larger that is set out of water.

March 2004 — The board modified the Nenana Canyon Closed Area as follows: Units 20A and 20C, those portions bounded by a line beginning at the intersection of the Unit 20A and Unit 13E boundary and a point exactly one mile east of the Parks Highway, then southwest along the Unit 20A and Unit 13E boundary to the boundary of Denali National Park and Preserve, then north along the boundary of Denali National Park and Preserve to its intersection with the west bank of the Nenana River at Moody Bridge (MP 242.9), then across the Moody Bridge to the Unit 20A boundary, then north along the boundary of Unit 20A to a point exactly one mile east of the Parks Highway, then due south on a line paralleling the east side of the Parks Highway at a distance of one mile to the point of beginning; closed to the taking of wolves.

March 2006 — The board extended the wolf hunting season in Units 20A, 20B, 20C, 20F, and 25C through May. Beginning in RY06 the wolf hunting season will be 10 August–31 May.

Hunter–Trapper Harvest. Area-wide 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; Table 2). This was the case for all units, except Unit 25C, but not all years.

Wolf harvest varied considerably across years. Excluding years in which wolf control was conducted (i.e., 1993 and 1994), area-wide 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 near record lows of 150 wolves in RY04. This general pattern was apparent in nearly all units. These oscillations were not likely related to fluctuations in wolf numbers, but rather to other unidentified factors (e.g., weather, snow conditions, trapping pressure). For instance, in Unit 20A the percentage of the estimated fall wolf population harvested by hunters and trappers fell from 33% in RY95 and RY96 to 20% in RY97 (M. E. McNay, ADF&G, unpublished data), despite an apparent increase in the wolf population (Tables 1 and 2).

Area-wide, the number of 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 wolves taken per successful trapper declined each year from RY01 through RY04 (Table 2).

Harvest Chronology. Area-wide, most wolves were harvested during the periods Nov–Dec and Jan–Feb (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. Area-wide, 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 17–23 wolves/1000 mi^2. 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. To date, we have not taken advantage of increased moose yields by harvesting more cows and calves during periods of population growth through the 1980s and 1990s because the public desires higher moose densities, or fears that predation and antlerless (i.e., cow and calf) harvests will cause a moose population decline. Those concerns are understandable given the history of the effects of predation and cow harvests in Unit 20A during the 1970s (Gasaway et al. 1983). To gain public support for more aggressive harvest of enhanced moose populations, we need a clear strategy for management of enhanced predator–prey systems. Forming a viable management strategy hinges on a thorough understanding of wolf predation, weather, and competition for food among moose.

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. In RY99 and RY00, hunters and trappers harvested an estimated 44–50% of the autumn wolf population in Unit 20A. High harvest levels could potentially regulate the wolf population at a level that allows high moose harvests. Alternatively, social or complex food-related factors may result in regulation of the wolf population. The theoretical wolf densities expected from the current prey biomass have not been observed in Interior Alaska. Further, wolf harvest intensity may influence the operation of such density-dependent factors. Similar questions apply to wolf–caribou relationships (Dale 1997).

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. Additionally, I recommend maintaining wolf trapping and hunting seasons in the remainder of the area. There is no need to recommend changes for these units.

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TABLE 1 Units 20A, 20B, 20C, 20F, and 25C fall wolf population estimates, 2000–2004

Unit	Year	Population estimate[a]	Number of packs	Basis of estimate
20A	2000	191[b]	20–25	Radiotelemetry and aerial surveys (mountains), extrapolation (Tanana Flats)
	2001	206–215	20–25	2000 density estimate (mountains)[c]; aerial survey, harvest reports (Tanana Flats)[d]
	2002	200–250	20–25	Extrapolation from previous year
	2003	200–250	20–25	Extrapolation from previous year
	2004	200–250	20–25	Extrapolation from previous year
20B	2000	150–225	20–30	Extrapolation from previous year
	2001	150–225	20–30	Extrapolation from previous year
	2002	150–225	20–30	Extrapolation from previous year
	2003	150–225	20–30	Extrapolation from previous year
	2004	150–225	20–30	Extrapolation from previous year
20C	2000	150–200	25–35	Denali National Park data and extrapolation from previous year
	2001	150–200	25–35	Denali National Park data and extrapolation from previous year
	2002	150–200	25–35	Denali National Park data and extrapolation from previous year
	2003	150–200	25–35	Denali National Park data and extrapolation from previous year
	2004	150–200	25–35	Denali National Park data and extrapolation from previous year
20F	2000	75–125	10–20	Extrapolation from previous year
	2001	75–125	10–20	Extrapolation from previous year
	2002	75–125	10–20	Extrapolation from previous year
	2003	75–125	10–20	Extrapolation from previous year
	2004	75–125	10–20	Extrapolation from previous year
25C	2000	75–125	10–20	Extrapolation from previous year
	2001	75–125	10–20	Extrapolation from previous year
	2002	75–125	10–20	Extrapolation from previous year
	2003	75–125	10–20	Extrapolation from previous year
	2004	75–125	10–20	Extrapolation from previous year

[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 2000–2001 through 2004–2005

		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	2000–2001	53	38 (42)	4	95	84	33 (36)	46 (51)	12 (13)	4	38	2.5
	2001–2002	48	39 (45)	11	98	87	37 (38)	53 (54)	8 (8)	0	32	3.1
	2002–2003	42	40 (49)	0	82	92	30 (37)	40 (49)	12 (15)	0	28	2.9
	2003–2004	35	25 (42)	1	61	80	32 (59)	20 (37)	2 (4)	7	26	2.3
	2004–2005	23	28 (55)	3	54	66	21 (40)	23 (44)	8 (15)	2	24	2.3
20B	2000–2001	48	48 (50)	3	99	80	35 (35)	48 (48)	16 (16)	0	47	2.1
	2001–2002	37	45 (55)	8	90	85	39 (44)	44 (49)	6 (7)	1	34	2.6
	2002–2003	42	28 (40)	3	73	87	13 (18)	48 (66)	12 (16)	0	34	2.1
	2003–2004	39	40 (51)	1	80	81	16 (20)	55 (69)	9 (11)	0	32	2.5
	2004–2005	21	32 (60)	0	53	69	17 (32)	26 (49)	10 (19)	0	30	1.8
20C	2000–2001	16	21 (57)	0	37	36	7 (19)	20 (54)	10 (27)	0	16	2.3
	2001–2002	7	10 (59)	0	17	31	8 (47)	5 (29)	4 (24)	0	13	1.3
	2002–2003	18	13 (42)	0	31	28	11 (35)	14 (45)	6 (19)	0	15	2.1
	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
20F	2000–2001	2	2 (50)	0	4	6	0 (0)	1 (25)	3 (75)	0	4	1.0
	2001–2002	17	16 (48)	0	33	16	9 (28)	19 (59)	4 (13)	1	10	3.3
	2002–2003	4	3 (43)	1	8	15	2 (25)	6 (75)	0 (0)	0	4	2.0
	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
25C	2000–2001	5	4 (44)	0	9	7	4 (44)	3 (33)	2 (22)	0	4	2.3
	2001–2002	1	3 (75)	7	11	9	0 (0)	8 (73)	3 (27)	0	5	2.2
	2002–2003	10	10 (50)	0	20	13	9 (45)	6 (30)	5 (25)	0	10	2.0
	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
Combined	2000–2001	124	113 (48)	7	244	214	79 (33)	118 (49)	43 (18)	4	109	2.2
	2001–2002	110	113 (51)	26	249	228	93 (38)	129 (52)	25 (10)	2	94	2.6
	2002–2003	116	94 (45)	4	214	236	65 (30)	114 (53)	35 (16)	0	91	2.4
	2003–2004	107	87 (45)	2	196	220	64 (34)	97 (51)	28 (15)	7	93	2.1
	2004–2005	61	86 (59)	3	150	187	54 (38)	64 (44)	26 (18)	6	79	1.9

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

TABLE 3 Units 20A, 20B, 20C, 20F, and 25C wolf harvest chronology, regulatory years 2000–2001 through 2004–2005

Unit	Regulatory year	Harvest periods[a]												Unk	*n*
		Aug	(%)	Sep–Oct	(%)	Nov–Dec	(%)	Jan–Feb	(%)	Mar	(%)	Apr	(%)		
20A	2000–2001	1	(1)	6	(6)	27	(28)	54	(57)	4	(4)	3	(3)	0	95
	2001–2002	0	(0)	8	(8)	24	(24)	54	(55)	10	(10)	2	(2)	0	98
	2002–2003	0	(0)	11	(13)	18	(22)	41	(50)	12	(15)	0	(0)	0	82
	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
20B	2000–2001	0	(0)	12	(12)	27	(28)	34	(35)	21	(21)	4	(4)	1	99
	2001–2002	0	(0)	5	(6)	34	(38)	41	(46)	8	(9)	1	(1)	1	90
	2002–2003	1	(1)	9	(12)	23	(32)	31	(42)	6	(8)	3	(4)	0	73
	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	53
20C	2000–2001	0	(0)	6	(16)	18	(49)	9	(24)	2	(5)	2	(5)	0	37
	2001–2002	0	(0)	1	(6)	7	(41)	5	(29)	2	(12)	2	(12)	0	17
	2002–2003	0	(0)	6	(19)	13	(42)	10	(32)	2	(6)	0	(0)	0	31
	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
20F	2000–2001	1	(25)	2	(50)	0	(0)	0	(0)	1	(25)	0	(0)	0	4
	2001–2002	0	(0)	3	(9)	14	(42)	12	(36)	3	(9)	1	(3)	0	33
	2002–2003	0	(0)	0	(0)	3	(38)	4	(50)	1	(13)	0	(0)	0	8
	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
25C	2000–2001	0	(0)	2	(22)	0	(0)	4	(44)	3	(33)	0	(0)	0	9
	2001–2002	1	(9)	1	(9)	6	(55)	3	(27)	0	(0)	0	(0)	0	11
	2002–2003	0	(0)	3	(15)	1	(5)	13	(65)	1	(5)	2	(10)	0	20
	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
20A, 20B, 20C, 20F, and 25C	2002–2003 thru 2003–2004	3	(1)	62	(11)	139	(25)	241	(43)	96	(17)	17	(3)	2	560

[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 2000–2001 through 2004–2005

		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	2000–2001	29	(32)	5	(5)	1	(1)	1	(1)	54	(59)	0	(0)	1	(1)	4	95
	2001–2002	6	(6)	5	(5)	0	(0)	4	(4)	80	(82)	3	(3)	0	(0)	0	98
	2002–2003	6	(7)	2	(2)	3	(4)	3	(4)	67	(82)	1	(1)	0	(0)	0	82
	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
20B	2000–2001	1	(1)	6	(6)	3	(3)	4	(4)	78	(79)	0	(0)	7	(7)	0	99
	2001–2002	1	(1)	3	(3)	0	(0)	0	(0)	79	(91)	0	(0)	4	(5)	3	90
	2002–2003	6	(8)	1	(1)	0	(0)	6	(8)	47	(64)	0	(0)	13	(18)	0	73
	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
20C	2000–2001	5	(14)	5	(14)	0	(0)	6	(16)	21	(57)	0	(0)	0	(0)	0	37
	2001–2002	3	(18)	1	(6)	0	(0)	0	(0)	13	(76)	0	(0)	0	(0)	0	17
	2002–2003	6	(20)	0	(0)	0	(0)	7	(23)	11	(37)	0	(0)	6	(20)	1	31
	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
20F	2000–2001	0	(0)	1	(25)	0	(0)	1	(25)	1	(25)	0	(0)	1	(25)	0	4
	2001–2002	1	(3)	0	(0)	1	(3)	0	(0)	28	(85)	0	(0)	3	(9)	0	33
	2002–2003	0	(0)	0	(0)	0	(0)	0	(0)	8	(100)	0	(0)	0	(0)	0	8
	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
25C	2000–2001	0	(0)	0	(0)	1	(11)	1	(11)	7	(78)	0	(0)	0	(0)	0	9
	2001–2002	0	(0)	0	(0)	0	(0)	2	(18)	8	(73)	0	(0)	1	(9)	0	11
	2002–2003	4	(20)	0	(0)	1	(5)	2	(10)	13	(65)	0	(0)	0	(0)	0	20
	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
20A, B, C, F, and 25C	2002–2004	60	(11)	19	(3)	10	(2)	37	(7)	386	(71)	2	(0)	32	(6)	14	560

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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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 (ADF&G 1984). 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 (ADF&G 1983). 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, 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; observations of packs with radiocollared wolves when applicable; 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 the observation was deemed 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., RY04 = 1 July 2004 through 30 June 2005).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

RY02. An aerial wolf survey was flown in Unit 20D on 7–11 March 2003 for 20.3 hours of survey time. Additional tracking of wolves in northern Unit 20D occurred as part of the Fortymile Nonlethal Predation Control program.

In southern Unit 20D we estimated 34–44 wolves in 4–6 packs during spring 2003. An additional 13 wolves were killed by trappers and hunters during RY02. Therefore, a minimum of 47–57 wolves were present within southern Unit 20D during fall 2002 (Table 1).

The fall RY02 northern Unit 20D estimate was based primarily on data collected as part of the Fortymile Nonlethal Predation Control Program and resulted in a fall estimate of 52–56 wolves in 8 packs (Table 1), but does not include data for the Shaw Creek area. Two of the packs (Healy River and Eisenmenger) contained sterilized wolves and each consisted of only a pair.

The Unit 20D RY02 fall population contained at least 108–124 wolves after including an estimate of an additional 10% for single wolves (Table 1). The population estimate results in a density estimate of 19.2–22.0 wolves/1000 mi^2 or 7.4–8.5 wolves/1000 km^2 (Table 1) and meets the population objective. This estimate has been refined since November 2003 when the Unit 20D Wolf Control Implementation Report reported 88–98 wolves in fall 2002.

RY03. Spring aerial wolf surveys were flown in southern Unit 20D for 12.4 hours on 7–8 March and 1 April 2004. In addition, tracking of wolves in northern Unit 20D occurred as part of the Fortymile Nonlethal Predation Control Program.

The spring southern Unit 20D fall population estimate was 27–30 wolves in 4–5 packs. Trappers and hunters killed 29 wolves in southern Unit 20D, resulting in a fall estimate of 56–59 wolves (Table 1).

No surveys were flown in northern Unit 20D, but fall pack size was observed for 2 packs as part of the Fortymile Nonlethal Predation Control Program. The Tibbs pack contained 13 wolves, the Eisenmenger pack had 2 sterile adults. No wolves were found within the traditional range of the Harper pack.

No Unit 20D wolf population estimate was calculated because of the inability to estimate wolf numbers in northern Unit 20D.

RY04. Aerial wolf surveys were flown in southern Unit 20D on 15–16 March and 4 April 2005 for 13.9 hours. Tracking of wolves in northern Unit 20D also occurred as part of the Fortymile Nonlethal Predation Control Program.

The southern Unit 20D spring population estimate was 30–32 wolves in 5 packs. It is worth noting that the Jarvis Creek pack contained 13 wolves, which is the largest this pack has been in many years. Thirteen wolves were reported harvested in southern Unit 20D by trappers, resulting in a fall estimate of 43–45 wolves (Table 1).

The northern Unit 20D population estimate was 32–36 wolves in 8 packs. This estimate includes 1 pack that contained sterilized wolves. Sixteen wolves were killed by trappers and hunters, resulting in a fall estimate of 48–52 wolves (Table 1).

The Unit 20D RY04 population estimate of 91–97 wolves in 13 packs, plus an additional 10% for single wolves resulted in an estimate of 100–107 wolves with a density of 17.7–18.9 wolves/1000 mi^2 (6.9–7.3wolves/1000 km^2) (Table 1). The population met the management objective of 15–125 wolves.

Using RY04 wolf population estimates and a Unit 20D moose population estimate of 9075 moose, results in a Unit 20D moose:wolf ratio of approximately 88 moose:wolf. The moose: wolf ratio in southern Unit 20D is approximately 151:1 and in northern Unit 20D it is 48:1. Gasaway et al. (1983) predicted that moose:wolf ratios of >30 would not limit moose population growth without other adverse conditions.

Unit 20D wolves also overlap the range of the Macomb caribou herd. Wolf packs that overlap the range of the Macomb Herd in Unit 20D include all packs in southern Unit 20D, and the Billy Creek Pack in northern Unit 20D.

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		
RY02–04		
HUNTING: 5 wolves. No wolf hunting same day airborne.	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit. No same-day-airborne shooting of wolves, except wolves caught in a trap or snare. No trapping with a steel trap or with a snare smaller than 3/32" in diameter during April or October.	15 Oct–30 Apr	15 Oct–30 Apr

Alaska Board of Game Actions and Emergency Orders. The Unit 20D wolf control implementation plan was reauthorized by the Board of Game in spring 2004 for 5 years beginning 1 July 2004.

Hunter–Trapper Harvest. Hunters and trappers reported taking 25 wolves in RY02, 34 in RY03, and 29 in RY04 (Table 2). The mean annual harvest of 29 wolves during the RY02–RY04 reporting period was lower than the average of 44 wolves/year during the previous 3 years. During RY02–RY04, 52% of harvested wolves were male, 45% were female, and 2% were unknown sex (Table 2).

Wolf harvest rate was calculated for RY02 and RY04 when population estimates were calculated for the entire unit. In RY02, trappers and hunters took 25 wolves which was approximately 21% of the estimated fall population. In RY04, trappers and hunters took 29 wolves, which was an estimated 28% of the estimated fall population. 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 did not likely exceeded sustainable levels during this reporting period.

Most wolves were taken each year by trapping and snaring. Seventy-seven percent of all wolves taken from RY02–RY04 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 RY02–RY04 (Table 3). Among wolves with known harvest locations, 66% were taken in southern Unit 20D, probably because road and trail access is better in the southern part of the unit.

Harvest Chronology. There were no significant changes in wolf harvest chronology during RY02–RY04. Most wolves were harvested during November–March (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 65% of the wolves during RY02–RY04, and highway vehicles were used to take 19%.

CONCLUSIONS AND RECOMMENDATIONS

During RY02 and RY04 the Unit 20D wolf management objective to maintain a population of 15–125 wolves was met. The objective was also likely met in RY03, but no population estimate was calculated that year. Harvest rates have not exceeded sustainable levels. Current moose:wolf ratios should not be limiting moose or caribou population growth in Unit 20D. Therefore, no regulatory changes are recommended at this time.

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TABLE 1 Unit 20D fall wolf population estimate, regulatory years 2000–2001 through 2004–2005

Area	Regulatory year (1 Jul–30 Jun)				
	2000–2001	2001–2002	2002–2003	2003–2004	2004–2005
Southern Unit 20D[a,b]	44–47	46–52	47–57	56–59	43–45
Northern Unit 20D[c]	42–44	45	52–56	n/a	48–52
Unit 20D subtotal	86–91	91–97	99–113	n/a	91–97
Estimate 10% single wolves	9	9–10	9–11	n/a	9–10
Unit 20D total	95–100	100–107	108–124	n/a	100–107
Estimated wolves/1000 mi^2	16.9–17.7	17.7–18.9	19.2–22.0	n/a	17.7–18.9
Estimated wolves/1000 km^2	6.5–6.9	6.9–7.3	7.4–8.5	n/a	6.9–7.3

[a] Includes a "pack equivalent" calculation for the 100-Mile Creek pack which overlaps eastern Unit 20A.

[b] Unit 20D south of the Tanana River.

[c] Unit 20D north of the Tanana River.

TABLE 2 Unit 20D wolf harvest, regulatory years 1985–1986 through 2004–2005

Regulatory year	Reported harvest			Estimated harvest		Method of take				Total
	M	F	Unk	Unreported	Illegal	Trap/snare	Shot	SDA[a]	Unk	
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

[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 2004–2005

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

TABLE 4 Unit 20D wolf harvest chronology, regulatory years 1985–1986 through 2004–2005

Regulatory year	Harvest periods											
	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

TABLE 5 Unit 20D wolf harvest by transport method, regulatory years 1985–1986 through 2004–2005

Regulatory year	Harvest by transportation method									*n*
	Airplane	Dogsled/ Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Ski/ Walk	Unk	
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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005[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. However, wolves 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 the control program ceased in 1960, wolves rapidly increased and by the mid 1960s were abundant in Unit 20E. 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 efforts reduced the wolf population by 73% by spring 1983. Subsequent harvest by public hunters and trappers maintained the population below precontrol size through 1986. Wolf productivity increased following control efforts (Gasaway et al. 1992). During the late 1980s the wolf population in Unit 20E 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, wolves in 15 packs, within and adjacent to western Unit 20E, were reduced to the dominant pair under the Fortymile nonlethal wolf control program. Treatment included sterilizing the dominant pair and translocating the remaining wolves.

During its spring 1998 meeting, the Board of Game designated the Unit 20E moose population within the Fortymile and Ladue River drainages and the Fortymile caribou herd as important for

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

high levels of human consumptive use under the intensive management law (AS 16.05.255[e]–[g]).

In March 2004 the Board of Game adopted a wolf control implementation plan that authorized the commissioner of ADF&G to conduct a wolf population reduction or regulation program in southern Unit 20E, within the Upper Yukon–Tanana predator control area. The program became effective 1 January 2005, and was authorized for a period up to 5 years.

Historically, public 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 and means. 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. Also, wolf trapping pressure in Unit 20E was higher when land-and-shoot taking of wolves was legal, because local trappers who used airplanes for access killed more wolves incidentally while trapping lynx and marten.

During 1995 and 1996, wolf harvest was higher 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

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 wolves in natural interactions with their environment is also recognized as an important human use of wolves. The possession of captive 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 on 30 October 1991 and revised on 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 OBJECTIVES

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

MANAGEMENT ACTIVITIES

- Provide opportunity to participate in hunting, trapping, and viewing wolves.
- Monitor harvest through sealing records and trapper questionnaires.
- Temporarily close wolf trapping if the unit population declines below 50 wolves.
- Monitor wolf numbers and population characteristics.
- Conduct fixed-wing aerial surveys to determine wolf density, number of packs, and pack size in a 4600-mi^2 trend area that encompasses portions of Units 20E and 12.
- Radiocollar selected packs to monitor wolf recovery within the Fortymile nonlethal wolf control area.
- Increase public awareness of wolf population trends, effects on moose and caribou populations, and management directions.

METHODS

WOLF POPULATION SIZE AND CHARACTERISTICS

Wolf population size was estimated in Unit 20E using standard aerial wolf reconnaissance survey techniques (Stephenson 1978; Gasaway et al. 1983; M. McNay, ADF&G, personal communication), standard radiotelemetry techniques, wolf observations by area pilots and trappers, and information from sealing certificates (Table 1). This information and information from the literature was used to develop extrapolated estimates for areas where no other information was available.

Population data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY02 = 1 July 2002 through 30 June 2003). In RY02, wolf surveys were conducted in a 4600-mi^2 area encompassing portions of Units 12, 20E, and 20D, and all wolf packs with territories wholly or partially in Unit 20E were included in the Unit 20E estimate. In RY03, wolf surveys were conducted in a 12,900-mi^2 area encompassing portions of Units 12 and 20E, and the number of wolves from each pack included in the Unit 20E estimate was based on the percent of the pack's estimated home range that fell within Unit 20E. If a pack's territory was wholly within Unit 20E, all wolves were included in the estimate. If only a portion of a packs home range fell within Unit 20E, the pack size was multiplied by the estimated percentage of the pack's home range within Unit 20E, to calculate a pack size for the Unit 20E estimate. Individual packs were identified by size and color composition. All wolf estimates were increased by 10%

to account for lone wolves present but not found (Mech 1973). No wolf surveys were conducted in Unit 20E in RY04.

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, date, sex, color of pelt, estimated size of the wolf pack, and transportation.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Wolf population trends in Unit 20E during the 1990s were discussed in Gardner (2003). The population increased during RY00–RY04, likely due to increased productivity and survival as a result of a larger prey base and reduced harvest mortality. Since 1997 the caribou numbers have increased substantially in Unit 20E; the Fortymile herd (42,000 caribou) spends 8–10 months in the unit and 5000–30,000 Nelchina caribou occupy Unit 20E between November and April. In addition, the snowshoe hare population began to increase during RY03–RY04.

RY02. During February–April 2003 we surveyed a 4300-mi^2 area in northern Unit 12 and southern Unit 20E. We located 18 wolf packs of 2–16 wolves and observed 124–127 different wolves, including 3 singles. Average pack size was 6.7 wolves. The minimum density, including a 10% correction factor for single wolves, was 31.3 wolves/1000 mi^2 (12.1 wolves/1000 km^2). This overestimated the population because we gave equal weight to border packs without considering the juxtaposition of their territory in relation to the survey boundaries. We refined the estimate by deleting half the border packs, for a density estimate of 23.1 wolves/1000 mi^2 (8.9 wolves/1000 km^2).

The trend area was designed to include areas with varying densities of moose and caribou and different trapping intensities so that wolf densities and population trends in the study area would be indicative of densities and trends throughout Unit 20E. However, this method has some limits because some effects of the nonlethal (sterilization) wolf control program do not mimic trapping or other environmental factors. Instead of extrapolating strictly from survey results, Gardner (2003) determined the unit estimate by adding the number of wolves within the nonlethal wolf control area to the estimate generated for the remainder of the unit determined by the survey. I estimated that 245–260 wolves (22.9–24.3 wolves/1000 mi^2 or 8.8–9.4 wolves/1000 km^2) inhabited Unit 20E before the RY02 trapping season.

RY03. During February 2004 we surveyed a 12,900-mi^2 area in Units 12 and 20E. We located 35 packs of 2–21 wolves and observed 232–234 different wolves, including 3 singles. Minimum population size was 255–257 with a 10% correction factor for single wolves. Average pack size was 6.6 wolves. The minimum density, including an estimate for single wolves, was 19.8 wolves/1000 mi^2 (7.6 wolves/1000 km^2). The highest wolf density was in southern Unit 20E, which had 30–32

wolves/1000 mi^2 (11.6–12.3 wolves/1000 km^2), similar to the unitwide density estimate in RY02. I estimated 234–265 wolves (21.9–24.8 wolves/1000 mi^2 or 8.4–9.5 wolves/1000 km^2) inhabited Unit 20E before the RY03 trapping season by adding the number of wolves in the nonlethal wolf control area to the estimate for the remainder of the unit.

RY04. No wolf surveys were flown in RY04. I estimated the unitwide population by adding the number of wolves within the nonlethal wolf control area to the extrapolated estimate for the remainder of the unit determined by reports from wolf control permittees, trappers, my observations during fall moose surveys, and from sealing records. I estimated 252–313 wolves in Unit 20E before the RY04 trapping season. By spring 2005, high success by trappers, hunters, and wolf control permittees had reduced the wolf population, as estimated the previous fall, by about 70% in southwestern Unit 20E and about 30% in southeastern Unit 20E.

MORTALITY

Harvest

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Unit 20E.		
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

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 when 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 allowed the department 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.

Hunter–Trapper Harvest. The reported number of wolves harvested by hunters and trappers in Unit 20E was 28, 40, and 47 wolves during RY02, RY03, and RY04 (Table 2). Estimated annual harvest rates were below the estimated maximum sustainable harvest rate of 25–30% of the total population, in RY02 (10–11%) and RY03 (15–17%). In RY04 the number of wolves killed in the

predator control program when combined with the harvest by hunters and trappers (58 taken under predator control and 47 taken by hunters and trappers = total take in Unit 20E of 105 wolves, Table 2) exceeded the estimated maximum sustainable harvest rate of 25–30% for the first time since RY95.

Trappers continued to use snares and traps as the primary methods to catch wolves in Unit 20E (Table 2). During RY02–RY03, 4–6 wolves were taken by hunters incidental to moose or caribou hunts during the fall hunting season. In RY04, 19 wolves were taken by hunters incidental to moose or caribou hunts during the fall hunting season. This is the highest annual take of wolves reported by hunters in Unit 20E.

Harvest Chronology. During RY02–RY04, most wolves were harvested during November through March (Table 3).

Transport Methods. Snowmachines and highway vehicles were the most common types of transportation used by trappers and hunters during RY02–RY04, while wolf control permittees used airplanes to take the majority of the wolves in RY04 (Table 4). Airplanes were used by a small number of trappers to access areas not trapped by land-based trappers.

Other Mortality

In RY04, permits were issued to 17 pilots and 33 gunners to shoot wolves from fixed-wing aircraft in the wolf control program designated as MW303 in the Upper Yukon–Tanana wolf control area. Fifty-eight wolves were killed in Unit 20E by these permittees and are listed in Table 2 as having been killed same-day-airborne.

CONCLUSIONS AND RECOMMENDATIONS

The management objective to reduce the fall population to no less than 60 wolves was not met in RY02 and RY03, as the population increased each of those years. However, the objective was met in RY04, as the population was reduced from the fall population estimate, but remained higher than 60 wolves. Efforts will continue during the next reporting period to meet this objective through aerial wolf control as well as hunting and trapping. Most of the management activities were completed during RY02–RY04. There was no need to close wolf trapping seasons, as the population remained well above 50 wolves and no radio collars were deployed. Wolf hunting and trapping seasons were long and met consumptive needs. Status of the wolf population in Unit 20E, the effects of wolf control, and trends of moose, caribou, and Dall sheep in relation to wolf predation were tracked. Management and research efforts were presented in "The Comeback Trail," a newsletter sent to over 5000 people in Alaska and Canada.

The wolf population in most of Unit 20E increased during RY02–RY04 due to expanding caribou numbers and range use, increasing numbers of snowshoe hares and limited trapping pressure. In combination with public trapping efforts, wolf numbers in 8 Unit 20E pack territories were reduced by 78% under the nonlethal wolf control program. Nonlethal wolf control ended in May 2001. By the end of RY04, wolf numbers in at least 11 of the 15 treated pack territories were recovering. The final 2–4 pairs had only one radio collar per pair still

working. The effects of nonlethal wolf control on the Fortymile caribou population trend is still being analyzed.

Wolf harvest was below maximum sustainable levels during RY95–RY03 due to reduced fur prices and trapper interest. Wolf harvest in RY04 exceeded maximum sustainable levels in southern Unit 20E, primarily due to aerial wolf control. Trappers and hunters continued to be important contributors to the wolf control efforts in southern Unit 20E.

The management objective during the next report period continues to be to reduce the fall population to no less than 60 wolves, which parallels objectives approved by the Board of Game for ongoing predator control programs in Unit 20E. The Upper Yukon–Tanana predator control program calls for a 75% reduction in the wolf population, but requires maintaining at least 60 wolves in Unit 20E. Management activities will be changed to those activities required to manage wolves consistent with guidelines outlined in the Upper Yukon–Tanana predator control program. Activities for the next report period will be to 1) monitor harvest through sealing records and trapper questionnaires; 2) conduct aerial surveys in southern Unit 20E, to determine wolf density, number of packs, pack size and population characteristics; 3) temporarily close aerial wolf control and wolf trapping and hunting if the unit population declines below 60 wolves; and 4) increase public awareness of wolf population trends, effects on moose and caribou populations, and management directions. No 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 2004–2005[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, radio collars
1992–1993	194–214	32	5.7	Aerial survey, observations, reports, radio collars
1993–1994	200–224	34	5.7	Aerial survey, observations, reports, radio collars
1994–1995	192–204	34	5.3	Aerial survey, observations, reports, radio collars
1995–1996	227–238	34	6.2	Aerial survey, observations, reports, radio collars
1996–1997	220–230	34	6.0	Aerial survey, observations, reports, radio collars
1997–1998	221–236	34	6.0	Aerial survey, observations, reports, radio collars
1998–1999	195–225	34	5.6	Aerial survey, observations, reports, radio collars
2002–2003	245–260	34	7.4	Aerial survey, observations, reports, radio collars
2003–2004	234–265	24–36	6.6–11.0	Aerial survey, observations, reports, radio collars
2004–2005	252–313	26–42	6.0–12.1	Aerial survey, observations, reports, radio collars

[a] Fall estimate = pretrapping season population.

[b] No unitwide surveys were conducted during RY99–RY01, 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.

TABLE 2 Unit 20E wolf harvest, regulatory years 1990–1991 through 2004–2005

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	(77)	1	(5)	3	(17)	1	10	1.9
1992–1993	28	(49)	28	(49)	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	(51)	39	(49)	84	37	80	(95)	3	(4)	1	(1)	0	18	4.6
1996–1997	24	(44)	23	(43)	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	(53)	6	(35)	17	8	12	(71)	5	(29)	0	(0)	0	9	1.9
1999–2000	18	(58)	11	(35)	31	–[f]	27	(96)	1	(4)	0	(0)	3	21	1.5
2000–2001	27	(54)	20	(40)	50	–[f]	44	(88)	6	(12)	0	(0)	0	12	4.2
2001–2002	20	(63)	11	(34)	32	–[f]	29	(91)	3	(9)	0	(0)	0	10	3.2
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	33	3.2

[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 in regulatory year 2004–2005 within the upper Yukon–Tanana wolf control area, in the southern portion of the unit, by permittees only.

[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 2004–2005

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	(22)	14	(40)	3	(9)	5	(14)	0	(0)	36
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

[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 2004–2005[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 (33)	1 (4)	0 (0)	2 (8)	10 (42)	0 (0)	2 (8)	1	24
1991–1992	4 (21)	1 (5)	0 (0)	1 (5)	10 (53)	0 (0)	1 (5)	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 (9)	0 (0)	1 (2)	1 (2)	43 (80)	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

[a] Unknown transport not used to calculate harvest.

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

LOCATION

GAME MANAGEMENT UNITS: 21A and 21E (23,270 mi^2)

GEOGRAPHIC DESCRIPTION: Drainages of the Yukon River from Paimiut upstream to, but not including, the Blackburn Creek drainage; the entire Innoko River drainage; and the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna Rivers.

BACKGROUND

Wolves play multiple roles in the economy of most areas of the state, but the dominant roles in Units 21A and 21E are for both personal use and commercial sale. Hunters also consider wolves a trophy big game animal and nearly every Unit 21A and 21E resident considers wolves to be a competitor for moose. This was clearly expressed during an extensive public planning process that resulted in the Yukon–Innoko Moose Management Plan (YIMMP). This document directs the department to manage wolves in such a way 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 villages. However, wolf harvest in this area remains too light to change natural predation rates.

The portion of the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna Rivers, encompassing 4453 mi^2, will become part of Unit 21B after this reporting period. This report includes data from the larger area, but future reports will not.

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

- Provide for a sustained annual harvest rate of up to 30% of the combined wolf population of Units 21A and 21E, except where greater harvest rates are mandated by an approved wolf predation control implementation plan.

MANAGEMENT ACTIVITIES

- Continue to refine annual wolf population estimates in the area, 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 and Board of Game.

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

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

METHODS

Estimates of areawide wolf population size were made 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.

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 >90% 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. 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 and Density

Population estimates from 1985 to 1999 are available in Szepanski (2003). Trappers reported through questionnaires that wolves were abundant and may have been increasing during RY02–RY04, however, few questionnaires were returned. Sealing records and biologists' observations support the trappers' reports that the wolf population was abundant and stable to increasing across Units 21A and 21E during RY02–RY04 (Table 1).

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 were roughly 1:1 (45 males: 43 females with 1 unknown) during RY02–RY04, and are assumed to represent overall population sex ratios.

Distribution and Movements

Harvest locations, observed wolf tracks, and incidental sightings indicated the wolf population was well distributed throughout these units. Wolf habitat is defined less by physical habitat requirements than by abundance of prey, and potential ungulate prey existed throughout the management area during the reporting period.

MORTALITY

Harvest

Season and Bag Limit. The wolf hunting and trapping seasons and bag limits remained the same in Units 21A and 21E throughout the reporting period as shown in the table below.

Bag Limit	Resident/Nonresident Open Seasons
RY02 through RY04	
HUNTING: 5 wolves.	10 Aug–30 Apr
TRAPPING: No limit.	1 Nov–30 Apr

Alaska Board of Game Actions, Emergency Orders, and Legislative Actions. The Alaska Board of Game did not make any regulatory changes to wolf hunting or trapping regulations in Units 21A or 21E during RY02–RY04.

During the January 2006 Board of Game meeting the boundaries of Unit 21A were changed such that the entire Nowitna River drainage will be included in Unit 21B beginning in July 2006. This will reduce the size of Unit 21A by 4453 mi^2.

Hunter–Trapper Harvest. Harvest data for 1985–1999 are available in Szepanski (2003). During RY02–RY04, 32, 24, and 33 wolves were reported harvested in Units 21A and 21E (Table 2).

Hunter Residency and Success. During RY02–RY04, nonresidents took 6, 3, and 1 wolf, all by shooting during September. This is typical for wolf harvests incidental to other big game hunts.

Alaska residents took the balance of the wolf harvest during these years, and 18, 9, and 25 were taken by residents of Units 21A and 21E. Overall, local residents accounted for 58% of the total harvest during RY02–RY04.

The average number of wolves taken per successful individual was 2.3 (range 1–10). The highest number reported shot by an individual was 6. However, individuals who killed 5–10 wolves typically did so with snares and/or traps. Total harvest and harvest by method of take since RY85 is found in Table 2.

Harvest Chronology. Harvest chronology data for 1985–1999 are available in Szepanski (2003). Most of the reported wolf harvest during RY00–RY04 occurred during February and March. September harvest was generally incidental to big game hunts for other species (Table 3).

Transport Methods. Transportation use data for 1985–1999 are available in Szepanski (2003). Noteworthy in that report is the decrease in harvest coincident with restrictions on aerial methods. This was most pronounced in Unit 21A where the average annual harvest during RY86–RY90 was 47 but declined to 13 between RY00 and RY04 (Table 2).

During RY02–RY04, 81% of the wolves harvested were taken by trappers who used snowmachines. Aircraft and boats were used by the remainder of successful trappers. No other access methods were reported (Table 4). However, during previous years, few trappers reported using snowshoes, dogs, or other methods.

Other Mortality

No other wolf mortality data are available for RY02–RY04.

NONREGULATORY MANAGEMENT PROBLEMS, NEEDS, AND EDUCATION

Yukon-Innoko Moose Management Plan (YIMMP)

The YIMMP 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 includes 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 in hunting in the region.

The YIMMP 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 broken down into 2 categories. First, a strategy and recommendations have been developed which are designed to reduce the level of predation on moose through hunting and trapping efforts and public education. A second strategy is to apply more active management of predation according to the state intensive management laws. This strategy includes consideration of measures such as establishing an aerial wolf predation control program.

Goals, objectives, strategies and recommendations of the YIMMP 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 2A: Reduce the effects of predation on moose so there are no less 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.

Allowing use of snowmachines to take wolves will increase the ability of local residents to harvest wolves and may help reduce wolf predation. Providing this additional method for taking wolves may contribute to an increase in the moose population.

Board of Game Action Taken: The board adopted a proposal which authorized the use of a snowmachine to position hunters to take wolves in Units 21 (including both Subunits 21A and 21E) and Unit 24.

In January 2006 the board adopted standard language for use of snowmachines to take wolves in all areas of the state where the practice is allowed. The new regulations state "a snowmachine may be used to position hunters to select individual wolves for harvest, and wolves may be shot from a stationary snowmachine." Also, there is a new provision in the regulations that using a snowmachine to take wolves will not be allowed on National Park Service or National Wildlife Refuge lands unless approved by the federal agencies. Therefore, use of snowmachines will not be allowed to take wolves in the portions of Unit 21A and 21E within the Innoko or Yukon Delta National Wildlife Refuges.

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

This recommendation will provide for additional take of wolves under hunting regulations and may help contribute to an increase in the moose population.

Board of Game Action Taken: The board adopted the proposal to increase the hunting bag limit for wolves in Unit 21E to 10 wolves per day.

The board also amended another proposal submitted by the public and increased the hunting bag limit for wolves in Unit 21A to 10 wolves (per season) and extended the wolf trapping season to 1 October–30 April. The early trapping season opening primarily provides opportunity for persons from Takotna that may travel to Unit 21A by road to trap earlier than it would normally be possible traveling by snowmachine.

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 harvest of species that prey on moose. 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 2B: 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.

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. Population estimates are the most difficult to obtain because they require adequate search conditions, experienced pilot–observer teams, and sufficient personnel and funding available to take advantage of the proper search conditions. An effort of this magnitude is not being contemplated for Units 21A or 21E because of a lack of resources. However, if those resources were available, it would enhance the information we have to manage this species.

Hunting and trapping of wolves in Units 21A and 21E has not regulated the wolf population since restrictions were placed on the use of aircraft in the early 1990s. As more local people realized that predator control actions by the department are constrained politically, interest in trapping clinics and trapping incentive programs increased. However, achieving wolf harvest by the public sufficient to increase moose survival is unlikely given current high fuel prices and the small number of active, capable wolf trappers.

To encourage ethical trapping, promote best management practices, and reduce nontarget catch, we expect to offer wolf trapping and snaring clinics in area villages. This is useful as a mechanism to comply with agreements made in the YIMMP. However, funding for this effort is not secure.

CONCLUSIONS AND RECOMMENDATIONS

The objective to provide for a sustained annual harvest rate of up to 30% from the combined wolf population of Units 21A and 21E was achieved, as the opportunity was available. However, during RY02–RY05 the average harvest of 6% of the population was well below that level.

Based on goals, objectives, and recommendations of the YIMMP, the management objectives for the next reporting period are to:

- Maintain a viable wolf population of a total of at least 100 wolves.
- Maintain a 3-year average harvest of at least 25% of the estimated wolf population.

Management activities for the next reporting period are 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 trapping and snaring clinics in villages that have expressed interest in the program.
- Cooperate with other agencies that conduct wolf studies within Units 21A and 21E, and incorporate local knowledge and assistance in management strategies for wolves. This includes addressing wolf predation consistent with the YIMMP.

The boundary for Units 21A and 21B will change in RY06 to facilitate moose management within the Nowitna River drainage. Future reports for Unit 21A will not include data for the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna Rivers.

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TABLE 1 Units 21A and 21E wolf population estimates, regulatory years 2000–2001 through 2004–2005

Regulatory year	Unit	Population estimate Min	Population estimate Max	Number of packs	Trend
2000–2001	21A	340	460	49–66	stable
	21E	180	240	25–35	stable
2001–2002	21A	340	460	49–66	stable
	21E	180	240	25–35	stable
2002–2003	21A	340	460	49–66	stable
	21E	180	240	25–35	stable
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

TABLE 2 Units 21A and 21E wolf harvest and harvest method, regulatory years 1985–1986 through 2004–2005

Regulatory year	Unit 21A					Unit 21E				
	Shoot	Trap	Snare	Other/ Unk	Total	Shoot	Trap	Snare	Other/ Unk	Total
1985–1986	3	6	0	0	9	3	2	0	1	6
1986–1987	18	15	6	1	40	7	4	0	7	18
1987–1988	31	3	11	0	45	28	4	1	0	33
1988–1989	43	1	0	0	44	22	2	0	0	24
1989–1990	38	5	21	0	64	3	2	0	0	5
1990–1991	38	1	3	0	42	25	0	0	0	25
1991–1992	1	2	4	0	7	7	8	0	0	15
1992–1993	0	7	2	0	9	3	2	0	1	6
1993–1994	3	0	4	0	7	5	1	0	1	7
1994–1995	4	0	5	0	9	28	21	0	6	55
1995–1996	0	2	2	0	4	20	0	14	0	34
1996–1997	9	4	26	0	39	8	8	8	10	34
1997–1998	3	11	10	0	24	7	2	1	2	12
1998–1999	4	3	16	0	23	15	9	8	0	32
1999–2000	5	6	10	0	21	4	11	0	0	15
2000–2001	7	1	19	0	27	29	1	5	0	35
2001–2002	4	1	3	4	12	17	14	1	0	32
2002–2003	4	2	2	0	8	10	7	7	0	24
2003–2004	3	7	2	0	12	7	1	4	0	12
2004–2005	4	4	0	0	8	2	17	6	0	25
Total	222	81	146	5	454	250	116	55	28	449
% of Total	49	18	32	1	100	56	26	12	6	100
5-year $\bar{x}$					13					26

TABLE 3 Units 21A and 21E wolf harvest chronology by month, regulatory years 2000–2001 through 2004–2005

Regulatory year	Harvest chronology by month										Total harvest
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	
2000–2001	1	3	0	2	3	13	13	16	0	0	51
2001–2002	0	2	0	7	4	1	2	35	1	5	57
2002–2003	0	6	0	0	1	1	15	6	3	0	32
2003–2004	0	4	0	5	4	4	3	3	1	0	24
2004–2005	0	3	0	2	0	7	8	10	3	0	33
Total	1	18	0	16	12	26	41	70	8	5	197
% of Total	0.5	9.1	0.0	8.1	6.1	13.2	20.8	35.5	4.0	2.5	

TABLE 4 Units 21A and 21E harvest by transport method, regulatory years 2000–2001 through 2004–2005

Regulatory year	Harvest by transport method				
	Aircraft	Snowmobile	Boat	Other/Unk	Total
2000–2001	4	45	0	2	51
2001–2002	3	50	0	4	57
2002–2003	7	22	3	0	32
2003–2004	2	20	2	0	24
2004–2005	1	30	2	0	33

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

LOCATION

GAME MANAGEMENT UNITS: 21B, 21C, and 21D (20,655 mi^2)

GEOGRAPHIC DESCRIPTION: Yukon River drainage above Paimiut to Tozitna River, including Koyukuk River up to Dulbi Slough

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 the number 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.

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 February 1994 a Sample Unit Probability Estimator (SUPE) survey (Becker et al. 1998) was conducted in Unit 21D. 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. SUPE surveys were also conducted during March 1996 in Unit 21B and during March 2000 primarily in Unit 24, but along the common boundary with Unit 21D.

Wolf reconnaissance surveys were flown in the northern portion of Unit 21D in March 1999 and in Unit 21B in April 2001, 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 the data (ADF&G files, Galena, 7 May 1999; 26 April 2001).

Fall wolf population and pack size was estimated for Unit 21D by adding overwinter mortality (26%, Spindler 1992) and hunting mortality to the late winter population estimates. Late winter estimates and fall population estimates were the same in Units 21B and 21C because no overwinter mortality data was available and harvest was relatively small. Population 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).

In order to monitor harvest, wolves harvested by trappers and hunters were required to be sealed by 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.

We conducted wolf snaring and trapper education courses during RY02–RY04 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–RY04 with 427–771 wolves in 52–80 packs during the report period (Table 1).

We completed a SUPE survey in Unit 21D (12,113 mi^2) during 8–16 March 1994. Of 760 sample units, 66.6% of the high (n = 144), 33% of the medium (n = 259), and 14% of the low (n = 357) were flown and searched for wolf tracks. We observed 173 wolves (or distinct tracks). The estimated unit population was 220–292 ($\bar{x}$ = 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). The number of single wolves was 6.5% of the total. We also estimated 49.3 ± 6.1 packs (Becker et al. 1998).

We completed an aerial reconnaissance survey during March 1999 in the northern portion of Unit 21D. Eighty-seven wolves were seen, along with 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). We also completed a SUPE survey in adjacent Unit 24 during March 2000 that included part of the area surveyed during 1999 in Unit 21D. In the Unit 24 survey, the population estimate was 147.8 wolves (± 32.2; 90% CI) over a 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 Unit 24, I estimated the late winter 2000 wolf population in all of Unit 21D was 309–445 wolves ($\bar{x}$ = 377) in 37–55 packs (9.8–14.2 wolves/1000 km^2).

We completed a SUPE survey in Unit 21B (4871 mi^2) during 15–17 March 1996 to estimate the size of the wolf population. 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. The estimate 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).

We conducted a reconnaissance survey in Unit 21B (4871 mi^2) during 13–14 April 2001, but conditions were poor for tracking wolves (ADF&G files, Galena, 26 April 2001). There were 7 wolves observed during that survey with an additional 40 wolves identified by distinct tracks (minimum estimate of 11 packs). Location of tracks and pack size was similar to pack locations from previous surveys, 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 12,616-km^2 survey area. Using the annual growth rate of 3.4% observed in Unit 21D, data from the 1996 SUPE survey, and the 2001 information, I estimated the Unit 21B population was stable at 56–96 wolves ($\bar{x}$ = 76 wolves) in 9–15 packs.

Unit 21C was not surveyed. During the mid 1990s, the fall density was 12.9–18.1 wolves/1000 mi^2 (5–7 wolves/1000 km^2) (Woolington 1997). Based on this information, I estimated the Unit 21C late winter population was 48–66 wolves in 6–10 packs.

Distribution and Movements

In 1994 on the Kaiyuh Flats, the density was 28.5 wolves/1000 mi^2 (11 wolves/1000 km^2); on the Koyukuk lowlands north of Galena (including Three-day Slough) the density was 20.7 wolves/1000 mi^2 (8 wolves/1000 km^2); and in the Nowitna drainage the density was 18.1 wolves/1000 mi^2 (7 wolves/1000 km^2) (Spindler 1992).

Telemetry data from previous studies 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 they 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 because 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.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Units 21B, 21C, and 21D		
RY02–RY04		
Hunting: 5 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 board 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 and beginning RY95 the trapping season was extended through April. However, in RY97 this provision of same-day-airborne harvest was eliminated in the trapping regulations as well. No changes were adopted during RY98–RY05.

Hunter–Trapper Harvest. Hunters and trappers reported harvesting 91, 47, and 52 wolves during RY02, RY03, and RY04 (Table 2). Harvest increased above historic levels during RY00–RY02, but returned to historic levels during RY03–RY04. This fluctuation is likely due to differences in winter travel and trapping conditions during those years. High fuel prices also may have influenced 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. We estimate this unreported harvest averages approximately 25 wolves/year. Information gathered through personal interviews improved our estimate of the number of unreported wolves harvested in RY00 and RY01.

In RY02, 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 February, March, and September during RY02–RY04 (Table 3). Beginning in RY97 the proportion of wolves harvested in the fall increased substantially and remained high through RY02–RY04, while the proportion of wolves harvested during winter decreased.

Transport Methods. Most wolves were taken by people who used snowmachines for transportation during RY02–RY04 (Table 4). Airplanes and boats were the only other modes of transportation commonly used by successful wolf hunters and trappers.

CONCLUSIONS AND RECOMMENDATIONS

Overall the wolf population in the reporting area remained stable during RY02–RY04. Densities probably were unchanged in Units 21B and 21C during RY99–RY01, and had apparently stopped increasing in Unit 21D by RY01 due to a declining prey base.

Total harvest in all 3 units during RY01–RY04 averaged 88 wolves/year, an estimated 11–20% of the autumn population. Because moose are the primary prey for wolves in this area, a reduction in moose numbers will subsequently cause a decline in wolves. Moose numbers declined throughout the area during RY99–RY01 and declined more slowly during RY02–RY04. This decline in prey, combined with continued hunting pressure on wolves during RY99–RY04 appears to have stabilized the number of wolves.

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. Activities to promote increased hunting and trapping pressure should continue to be a priority in order to achieve this objective. 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 128 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 4% in RY02. Although response declined in RY03 by 13%, it increased by 33% in RY04. Overall, trapper response to the questionnaire increased 22% from the end of the previous report period (RY01, $n = 23$) to the end of this report period (RY04, $n = 28$).

Although no surveys were conducted during RY02–RY04, the other management activities were accomplished during RY02–RY04. 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 1988–1989 through 2004–2005

Regulatory year	Population estimate	Number of packs
1988–1989	305–330	42–52
1989–1990	295–340	40–55
1990–1991	295–335	54–58
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

[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 1988–1989 through 2004–2005

Regulatory year	Reported harvest				Estimated unreported harvest	Total estimated harvest	Method of take			
	M	F	Unk	Total			Trap/snare	Shot	SDA[a]	Unk
1988–1989	5	6	0	11	20	31	3	2	5	1
1989–1990	14	15	0	29	20	49	7	3	19	0
1990–1991	14	4	3	21	20	41	9	12	0	0
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

[a] Wolves taken by hunters the same day they were airborne. In regulatory years 1994–1995 through 1996–1997 this includes wolves taken by trappers using aircraft for transportation.

TABLE 3 Units 21B, 21C, and 21D wolf harvest chronology percent by time period, regulatory years 1991–1992 through 2004–2005

Regulatory year	Harvest periods							
	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*[a]
1991–1992	2	2	9	18	45	23	0	44
1992–1993	2	0	0	14	24	57	2	49
1993–1994	2	0	29	23	29	17	0	52
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

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

TABLE 4 Units 21B, 21C, 21D wolf harvest percent by transport method, regulatory years 1991–1992 through 2004–2005

	Harvest percent by transport method								
Regulatory year	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	*n*[a]
1991–1992	41	32	11	2	2	0	0	11	44
1992–1993	6	0	0	0	86	0	0	8	49
1993–1994	0	2	2	0	88	0	0	8	52
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

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

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WOLF MANAGEMENT REPORT

From: 01 July 2002
To: 30 June 2005

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 never 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. Big-game harvest surveys were conducted in 5 villages, and fur-harvest questionnaires were mailed to hunters and trappers annually during the 2002–2005 reporting period to collect additional information about wolf harvest and abundance in Unit 22.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

We have no survey data or information to determine the wolf population in Unit 22. Beginning in February 2006 (the next reporting period), we will begin using track surveys to assess population status of wolves in the central portion of Unit 22A, where moose numbers are critically low. Wolf abundance depends on the presence of WAH in Unit 22, and increases during winter months (October–April), when caribou were present. Increasingly, wolves are becoming permanent residents of the unit.

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 WAH influence wolf distribution in Unit 22. Due to the occurrence of regular caribou winter range in eastern Unit 22, wolf abundance has historically been higher in Units 22A and 22B. However, since 1996 varying numbers of caribou have wintered in Units 22D, 22E and western 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 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., RY04 = 1 July 2004 through 30 June 2005).

2002–2003 to 2004–2005 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. There were no Board of Game actions or emergency orders affecting wolf hunting or trapping in Unit 22 during the reporting period. However, in November 2005 the board adopted a regulation allowing the taking of wolves with snowmachines, all-terrain vehicles (ATVs) and boats in Unit 22, effective in the 2006 regulatory year.

Hunter/Trapper Harvest. The annual reported harvest during the reporting period ranged from 22 to 45 wolves (Table 1). The reduced harvest in 2003–2004 (22 wolves) coincided with the lowest estimate of overwintering caribou on the Seward Peninsula since 1996, which probably resulted in fewer wolves on the peninsula that winter. Sex composition of the reported harvest during the 3–year reporting period was as follows: 56% males, 38% females, and 6% sex unknown (n = 108). As in previous years, the majority of wolves were harvested in Units 22A and 22B; however, in 2004–2005 harvest 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. In May 2002 and 2003 and June 2004 village-based harvest surveys were completed in 5 villages in Unit 22 to obtain better harvest information on wolves and other big game species. Results from harvest assessment surveys revealed an additional 33 wolves harvested during 2002–2004 that had not been sealed (Table 3).

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 95% of the wolves taken during the reporting period. Residents from Unit 22A harvested 31% of the wolves, Unit 22B residents harvested 27% of the harvest, Unit 22C residents took 20% and Unit 22D and 22E residents were each responsible for 8% of the harvest. Alaska residents living outside of Unit 22 harvested 2 wolves, and nonresidents harvested 3 wolves.

Harvest Chronology. Wolf harvest in Unit 22 occurs primarily in the winter months when snowmachines can be used for transportation, hides are prime, and wolves are most abundant due to the presence of the WAH. During this reporting period, 99% of the harvest occurred between November and April; 1% was reported in September.

Harvest Methods. During the reporting period, 82% 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 snared 9% of the wolves. The method of harvest for the remaining 9% is unknown (Table 1).

Transport Methods. Hunters/trappers using snowmachines harvested 82% of the wolves during the reporting period. Individuals using 4-wheelers took 7% of the wolves, and hunters using planes, highway vehicles, dog teams or unknown means of transportation took 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 WAH 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 or trapping regulations for wolves are liberal, and to encourage increased harvest in Unit 22, beginning in 2006 wolves can be taken using motorized vehicles. 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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PERSONS, K. 2006. Unit 22 wolf management report. Pages 210–217 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2002–30 June 2005. Alaska Department of Fish and Game. Project 14.0. Juneau, Alaska, USA.

TABLE 1 Reported Unit 22 wolf harvest for regulatory years 2002–2003 through 2004–2005

Regulatory Year	Reported harvest				Method of take			Total successful trapper / hunters
	M	F	Unk.	Total	Trap / Snare	Shot	Unk.	
1988–1989	11	8	2	21	1	20	0	9
1989–1990	28	13	2	43	0	43	0	14
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

TABLE 2 Reported wolf harvest by unit, 1990–91 through 2004–05

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
2002–2003	13	27	1	1	2	3
2003–2004	11	6	4	1	0	0
2004–2005	12	9	0	13	5	0

TABLE 3 Wolf harvest by Unit 22 village residents, 2002–2003 through 2004–2005

Village	Harvest reported on village surveys	Nr of wolves sealed	Percent of wolf harvest reported on sealing certificate	Time frame of harvest asked on survey
Stebbins	5	0	0%	May 2002–April 2003
Unalakleet	13	2	15%	May 2002–April 2003
Saint Michael	2	1	50%	April 2003–March 2004
Shaktoolik	17	5	29%	April 2003–March 2004
Unalakleet	5	5	100%	April 2004–March 2005
Koyuk	6	2	33%	April 2004–March 2005

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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 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 insensitive to 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.

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. Community assessments were conducted in Kiana (1999), Noatak (2 surveys: 1 each during 1999 and 2001–2002), Noorvik (2002), Selawik (1999), Shungnak (1998–1999), and Ambler (2002–2003). 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 my opportunistic observations, indicate wolf numbers have increased in that portion of Unit 23 west of and including the Buckland River drainage. This is probably attributable to large numbers of caribou wintering in this area during most years since 1996. Wolf numbers also seem to be higher in the upper Kobuk River drainage than prior to the mid 1990s (personal observations; also, A. Williams and G. Bamford, personal communication). In contrast, wolf numbers appear to have declined somewhat in the upper Noatak River drainage since the late 1990s.

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). During this reporting period the highest densities of overwintering caribou occurred on the Seward Peninsula (2002–2003), on the south slopes of the upper Kobuk and Koyukuk drainages (2003–2004) and in the Nulato Hills (2004–2005). 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. There were no changes to wolf hunting or trapping seasons during this reporting period. The bag limit was increased from 10 to 20 wolves per regulatory year during 2004–05. A regulatory year (RY) begins on July 1, i.e., RY 04 begins July 1, 2004 and ends June 30, 2005.

Regulatory years 2002–03, 2003–04, 2004–05 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 wolf limit (*2002–03 and 2003–04*) 20 wolf limit (*2004–05*)	10 Aug–30 Apr	10 Aug–30 Apr

Board of Game Actions and Emergency Orders. In November 2003 the Board of Game increased the Unit 23 wolf hunting bag limit from 10 to 20 wolves/regulatory year. This change went into effect 1 July 2004. 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). Poor conditions for traveling via snowmachine probably accounted for the relatively low harvest during 2004–2005.

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 1998–1999 (Table 2, n=7) yields an annual mean harvest of 18.0 wolves/community (SD=16.6; note that this excludes Kotzebue). Combining annual reported harvests from sealing data for these same communities (n=18) during 2002–2003 through 2004–2005 yields an annual mean wolf harvest of 2.6 wolves/community (SD=4.8). 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, harvest levels during that year were 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. Roughly 20–25 individuals have sealed wolves in Unit 23 annually since the late 1980s (Table 4). Residents of Unit 23 took most of the total harvest. Residents who live outside Unit 23 took 6 wolves during 2002–03, 1 during 2003–04 and 4 during 2004–05 (9%, 2% and 4% of the total harvest, respectively). During those same years nonresidents took 2, 4, and 5 wolves, respectively (3%, 10% and 5% of the total harvest,).

Harvest Chronology. Most wolves taken during this reporting period were harvested between December and April (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. As in the past, most wolves harvested in Unit 23 were shot rather than trapped during this reporting period (Table 6). A higher proportion of the total reported harvest was trapped during 2004–2005 compared to previous years. No one reported using 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 occasionally kill a few wolves each year, but the number is probably low.

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 have declined to low levels in large portions of Unit 23 (0.1–0.6 adult moose/mi^2). Predation by black and brown bears, especially on moose calves, and by wolves has probably contributed to this decline. However, predation isn't the only factor reducing moose numbers here. Several severe winters during the early 1990s caused many moose to starve. Since that time, wolf numbers have remained stable or slowly increased, brown bear numbers may have increased, and numbers of nonlocal moose hunters have steadily increased. Additionally, Unit 23 is at the margin of moose range in Alaska. Although the habitat appears capable of supporting higher numbers of moose than are currently present, snow conditions often preclude access to this food. 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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DAU, J. 2006. Unit 23 wolf management report. Pages 218–228 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2002–30 June 2005. Alaska Department of Fish and Game. Project 14.0. Juneau, Alaska.

TABLE 1 Reported wolf harvest from sealing certificates for Unit 23, 1977–1978 through 2005–2006

Regulatory year	Males	Females	Unknown	Total
1977–1978	–	–	65	65
1978–1979	–	–	50	50
1979–1980	12	6	0	18
1980–1981	33	17	0	50
1981–1982	10	7	0	17
1982–1983	25	19	4	48
1983–1984	30	14	2	46
1984–1985	45	20	0	65
1985–1986	10	8	1	19
1986–1987	23	10	1	34
1987–1988	52	33	9	94
1988–1989	42	36	5	83
1989–1990	27	25	5	57
1990–1991	17	15	13	45
1991–1992	30	22	6	58
1992–1993	28	32	11	71
1993–1994	30	17	3	50
1994–1995	24	19	10	53
1995–1996	35	25	3	63
1996–1997	30	18	13	61
1997–1998	6	12	5	23
1998–1999	11	10	9	30
1999–2000	69	41	2	112
2000–2001	39	14	15	68
2001–2002	25	16	4	45
2003–2004	34	24	12	70
2004–2005	25	16	0	41
2005–2006	47	37	13	97

TABLE 2 Comparison of wolf harvests from community harvest assessments and fur sealing documents in selected communities within Unit 23, 2002–2003 through 2004–2005

Community	Community harvest estimate	Fur Sealing Data		
		2002–2003	2003–2004	2004–2005
Ambler	19 (2002–2003)	1	0	3
Kiana	17 (1999)	0	0	1
Noatak	15 (1999), 3 (2001)	8	0	0
Noorvik	52 (2002)	13	16	3
Selawik	2 (1999)	0	0	0
Shungnak	18 (1998–1999)	2	0	0

TABLE 3 Wolf harvest by drainage in Unit 23, 1974–1975 through 2004–2005

Regulatory year	Kivalina -Wulik	Noatak	Kobuk	Selawik	N. Seward	Unknown	Total
1974–1975	3	5	22	20	0	0	50
1975–1976	2	9	78	53	0	0	142
1976–1977	0	26	28	82	1	20	157
1977–1978	0	3	25	20	1	16	65
1978–1979	7	4	11	15	1	12	50
1979–1980	1	2	9	4	2	0	18
1980–1981	2	3	11	24	3	7	50
1981–1982	1	10	3	3	0	0	17
1982–1983	1	11	6	21	8	1	48
1983–1984	0	9	7	21	7	2	46
1984–1985	1	16	20	21	3	4	65
1985–1986	0	11	4	2	2	0	19
1986–1987	2	5	6	18	0	3	34
1987–1988	0	27	41	11	15	0	94
1988–1989	1	12	28	39	0	3	83
1989–1990	3	10	27	2	15	0	57
1990–1991	0	7	18	15	5	0	45
1991–1992	2	8	30	4	13	1	58
1992–1993	2	11	30	15	4	9	71
1993–1994	0	17	28	3	2	0	50
1994–1995	1	12	26	7	7	0	53
1995–1996	0	11	27	18	7	0	63
1996–1997	6	9	24	15	7	0	61
1997–1998	0	2	17	0	0	4	23
1998–1999	0	6	12	1	10	0	29
1999–2000	0	8	60	13	13	18	112
2000–2001	0	8	35	10	15	0	68
2001–2002	3	9	28	2	3	0	45
2002–2003	0	20	18	8	24	0	70
2003–2004	3	3	26	0	9	0	41
2004–2005	9	28	48	1	10	1	97

TABLE 4 Number of users (hunters and trappers combined) and method of transport to harvest wolves in Unit 23, 1985–1986 through 2004–2005

Regulatory year	Hunters/ trappers	Airplane	Snow-machine	Boat	Dog team	Highway vehicle	Off-road vehicle	Unknown	Total harvest
1985–1986	12	8	7	0	0	0	0	4	19
1986–1987	17	20	9	0	0	0	0	5	34
1987–1988	32	48	40	2	0	0	0	4	94
1988–1989	29	10	70	0	0	0	0	3	83
1989–1990	25	11	32	2	0	0	0	12	57
1990–1991	23	4	32	0	0	0	0	9	45
1991–1992	25	9	47	0	0	0	0	2	58
1992–1993	24	2	69	0	0	0	0	0	71
1993–1994	24	2	44	0	0	0	0	4	50
1994–1995	21	1	52	0	0	0	0	0	53
1995–1996	20	1	61	1	0	0	0	0	63
1996–1997	23	5	48	3	5	0	0	0	61
1997–1998	12	1	18	0	0	0	0	4	23
1998–1999	13	2	28	0	0	0	0	0	30
1999–2000	22	4	103	0	0	1	0	4	112
2000–2001	22	3	63	0	0	0	0	2	68
2001–2002	26	7	34	3	0	0	0	1	45
2002–2003	27	5	60	4	0	0	0	1	70
2003–2004	19	3	31	4	0	0	0	3	41
2004–2005	20	3	88	2	0	0	0	4	97

TABLE 5 Chronology of wolf harvest for Unit 23 from 1993–1994 through 2004–2005

Regulatory year	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unknown	Total
1993–1994	1	2	0	3	11	7	5	6	10	5	50
1994–1995	0	1	0	10	3	8	8	14	9	0	53
1995–1996	0	2	0	6	5	2	1	37	9	1	63
1996–1997	0	2	2	4	14	7	12	14	0	6	61
1997–1998	0	1	0	0	5	0	5	2	6	4	23
1998–1999	0	2	0	1	5	6	7	7	1	1	30
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	8	0	1	3	2	12	13	0	1	45
2002–2003	0	9	0	1	9	3	9	31	7	1	70
2003–2004	0	7	0	0	1	17	7	7	2	0	41
2004–2005	1	5	0	2	3	21	21	31	13	0	97

TABLE 6 Methods of harvesting wolves in Unit 23, 1985–1986 through 2004–2005

Regulatory year	Shot	Trapped	Snared	Unknown	Total harvest
1985–1986	14	2	0	3	19
1986–1987	26	4	0	4	34
1987–1988	90	2	0	2	94
1988–1989	72	9	0	2	83
1989–1990	45	8	0	4	57
1990–1991	32	3	3	7	45
1991–1992	43	7	0	8	58
1992–1993	69	2	0	0	71
1993–1994	44	4	0	2	50
1994–1995	41	12	0	0	53
1995–1996	42	19	0	2	63
1996–1997	50	11	0	0	61
1997–1998	12	7	0	4	23
1998–1999	20	8	0	2	30
1999–2000	89	23	0	0	112
2000–2001	58	8	0	0	66
2001–2002	33	11	0	1	45
2002–2003	58	12	0	0	70
2003–2004	29	9	0	3	41
2004–2005	50	47	0	0	97

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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 concurrent increases in wolf numbers. Now wolves are more numerous than in the 1970s but probably not as abundant as during the 1940–1950s (Woolington 1997).

There are probably more wolves in the southern portion of the unit now than before the 1940s because a stable prey base is available. 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. Wolf numbers are presently as high in southern Unit 24 as at any time known.

Reported wolf harvests during regulatory year (RY) 1989 through RY01 were 30–119 wolves per year and averaged 74 wolves annually (RY = 1 Jul through 30 June, e.g., RY01 = 1 July 2001 through 30 June 2002). 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 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:

MANAGEMENT GOALS

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

MANAGEMENT OBJECTIVES

- Maintain a fall density of 13–23 wolves/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 the southern portion of Unit 24. Population data were summarized by regulatory year.

A wolf reconnaissance survey was flown in a limited area of Unit 24 and the northern portion of 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).

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.

We conducted wolf snaring and trapper education courses during RY99 and RY01 in local villages to improve trapper skills and knowledge of wildlife management issues.

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. There are more wolves in the south and north 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 the southern portion of Unit 24 and adjacent Unit 21D. The SUPE survey completed in March 2000 in the southern portion of Unit 24 indicated there were 148 wolves (±32, 90% CI) over a 4175-mi^2 survey area for 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).

In RY95 the estimated Unit 24 fall population was 405–540 wolves (Table 1). This estimate was derived by plotting known pack locations and by assuming a density of 15–21 wolves/1000 mi^2 (6–8 wolves/1000 km^2) for unknown areas. No new information about unsurveyed areas was obtained during RY99–RY01 in the central and northern portions of the unit. Therefore, the same density was used for these areas when we estimated the unitwide population during RY99–RY02.

The unitwide fall population probably did not change during RY02–RY04. In the northern portion of the unit, there were probably 155–206 wolves, with a density of 15–21 wolves/1000 mi^2 (6–8 wolves/1000 km^2). In the central portion of the unit there were probably 103–155 wolves, with a density of 10–15 wolves/1000 mi^2 (4–6 wolves/1000 km^2). In southern Unit 24 the SUPE indicated 116–180 wolves. Therefore, the estimated fall population for the entire unit was 374–541 during RY02–RY04.

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). Packs roamed over 2556–4059 mi^2, and average pack size was 4. 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 during the winter with the Western Arctic caribou herd. 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.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Unit 24		
RY02–RY04		
HUNTING: 5 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 their 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. However, beginning in RY97 same-day-airborne harvest was eliminated in the trapping regulations as well. No new regulations were adopted during RY98–RY05.

Hunter–Trapper Harvest. Hunters and trappers reported harvesting 66, 37, and 61 wolves during RY02, RY03, and RY04 (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 conditions and 50 wolves/year under poor conditions (Woolington 1997).

During RY02–RY05, 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.

Harvest Chronology. Wolves were generally taken in December through March during RY91–RY04, and the highest harvest was typically in February (Table 3). Like nearby Unit 21D, incidental harvest in the fall increased during RY00–RY04, possibly due to increased sightings during the fall moose season.

Transport Methods. Most wolves were taken using snowmachines for transportation during RY92–RY04 (Table 4). No other trends in transportation methods were apparent.

CONCLUSIONS AND RECOMMENDATIONS

The unitwide wolf population was stable during RY02–RY04 and has shown little change since RY93, with some localized annual fluctuations. Wolf numbers were highest (9–11 wolves/1000 km^2) and probably increased in the southern portion of the unit (south of Hughes). There were moderate, stable numbers (4–6 wolves/1000 km^2) in the central portion of the unit (Bettles to Hughes), and variable numbers (6–8 wolves/1000 km^2) with some declines in the north (north of Bettles).

Management objectives were met during RY02–RY04. 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, this provided for a harvest 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 2 of 3 years during this report period, and averaged greater than 1% increase per year. Participation in the Trapper Questionnaire increased 4% in RY02, declined 13% in RY03, and increased 33% in RY04. Overall, trapper response to the questionnaire increased 22% from the end of the previous report period (RY01, $n = 23$) to the end of this report period (RY04, $n = 28$).

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 conducted during RY04 proved effective in teaching new techniques and ways to avoid accidental snaring of moose. Such education courses should continue, as they seem to encourage more trappers to attempt to take wolves. An aerial wolf survey was planned but not completed in the central portion of the unit due to poor survey conditions.

I recommend an aerial survey be conducted to determine wolf densities in the central portion of 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 1988–1989 through 2004–2005

Regulatory year	Population estimate[b]	Number of packs
1988–1989	420–450	55–60
1989–1990	400–440	55–60
1990–1991	400–440	55–60
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

[a] Fall estimate = pretrapping season population.

[b] Basis of estimate: Alaska Department of Fish and Game, National Park Service, and US Fish and Wildlife Service aerial surveys, hunter–trapper reports, sealing records, and incidental observations.

TABLE 2 Unit 24 wolf harvest, regulatory years 1988–1989 through 2004–2005

Regulatory year	Reported harvest				Estimated unreported harvest	Total estimated harvest	Method of take			
	M	F	Unk	Total			Trap/snare	Shot	SDA[a]	Unk
1988–1989	38	32	6	76	50	126	16	20	39	1
1989–1990	17	9	4	30	60	90	25	3	0	2
1990–1991	16	24	2	42	60	102	22	20	0	0
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	14	81	50	131	57	20	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

[a] Animals taken by hunters the same day hunters or trappers were airborne.

TABLE 3 Unit 24 wolf harvest chronology percent by month, regulatory years 1991–1992 through 2004–2005

Regulatory year	Harvest chronology percent by month							
	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*[a]
1991–1992	7	14	18	22	25	8	6	85
1992–1993	3	1	8	7	32	50	0	92
1993–1994	7	7	20	10	25	26	7	92
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

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

TABLE 4 Unit 24 wolf harvest percent by transport method, regulatory years 1991–1992 through 2004–2005

Regulatory year	Harvest percent by transport method								
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway Vehicle	Unk	*n*[a]
1991–1992	18	51	32	0	0	0	0	0	85
1992–1993	3	0	0	0	89	1	4	2	92
1993–1994	3	4	3	0	83	0	1	5	92
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	69	0	5	5	84
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

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

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005[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 on 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 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. However, no systematic surveys have been conducted in Unit 26B. Aerial wolf population surveys were completed in Unit 25D West in March 1983 and 1984 (Nowlin 1985). Wolf surveys covering portions of Unit 25D were completed in March 1992, 1997, and 1999, and in Unit 25D and part of Unit 25B in 2000 and 2001. 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,

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

and scientific and educational purposes. The aesthetic value of being aware of or observing 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 has not adopted an implementation plan for control of wolf predation in any of these units, although this could occur in the future. However, the Yukon Flats Cooperative Moose Management Plan was completed and endorsed by the board in 2002. It outlines strategies to increase moose numbers, including increasing the harvest of bears and wolves. Management in Units 26B and 26C will continue to be directed at maintaining a sustainable harvest and accommodating nonconsumptive uses of wolves. Management objectives for Units 25D and 25B will be revised for the next reporting period. The objectives for this reporting period are listed below.

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 Units 25B, 25D East, and 25D West.

METHODS

Population estimates in Unit 25D and parts of Unit 25B were based on aerial track surveys completed in late winter 1983, 1984, 1992, 1996, 1998, 2000, 2001 and 2006. Population estimates in a large part 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. Aerial track surveys were conducted in late winter with PA-18 Super Cub or Scout aircraft flown at 400–500 ft above ground level and generally occurred 3–5 days after snowfall.

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 July 2004–30 June 2005).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population density is low relative to other parts of the Interior 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, estimates from surveys, hunter observations, and harvest data indicated that 72–93 packs, including 520–630 wolves, were present in Units 25A, 25B, and 25D and 150–215 wolves in 22–32 packs were present in Units 26B and 26C. These estimates are still considered representative, based in part on the results of recent surveys in Unit 25. 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 subunits (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 about 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 Unit 25D West, 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 area.

A March 2000 aerial survey indicated 125–133 wolves were present in a 35,700 km^2 area of southern Unit 25B and eastern Unit 25D, with a density of 9.1–9.8 wolves/1000 mi^2 (3.5–3.8/1000 km^2). Group size ranged from 1–13 wolves and averaged 4.6. Mean group size was 5.3 wolves for groups containing more than 2 wolves (n = 23). During the survey, biologists observed 65 wolves (26 black and 39 gray or white) and the remains of 34 moose and 1 caribou that were apparently killed by wolves.

In April 2001 we estimated there were 181–204 wolves (10.9–12.3 wolves/1000 mi^2 or 4.2–4.7/1000 km^2) within a 26,703-mi^2 (43,000 km^2) survey area including eastern Unit 25D and central Unit 25B. Groups included 1–12 wolves and groups of 3 or more wolves averaged 4.6. We identified 31 packs of 3 or more, 6 pairs, and 7 lone wolves. During the survey, biologists observed 98 wolves (34 black and 64 gray) and remains of 29 wolf-killed moose. No surveys were completed in 2002, 2003, 2004 or 2005 because of a lack of suitable snow conditions or lack of funding.

In March 2006 we surveyed about 18,850 mi^2 in Game Management Unit 25D and the upper Black River in Unit 25B in the Yukon Flats, a small part of the upper Hodzana River drainage in Unit 25A and some areas along the northern edge of Unit 25C. Survey aircraft tracked and/or observed wolves that we estimate represent 44 different packs of 2 or more wolves. Groups included from 1 to 12 wolves and averaged 4.6. A total of 107 wolves were observed, including 52 black and 55 gray, blue or white wolves. Thirty-two moose kills were located, and 3 relatively long successful chases of 6.5, 10 and 19 miles were documented by aerial tracking. The survey indicated there were 216–229 wolves in the 18,850 mi^2 (48,820 km^2) survey area, or a density of from 1 wolf/82–87 mi^2 (11.5–12.2 wolves/1000 mi^2 or 4.4–4.7 wolves/1000 km^2). Adding 10% to account for lone wolves would increase the maximum estimate to 252 wolves, or 1 wolf/75 mi^2 (13.3 wolves/1000 mi^2 or 5.2 wolves/1000 km^2).

Based on a 9-year telemetry study involving 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 (YCRNP), including part of Unit 25B. Fall pack size averaged 7.2 wolves, ranged from 4.3 to 9.1, and appeared to be increasing as a result of the growth of the Fortymile caribou herd.

An aerial wolf survey in a 5232 mi^2 area in the foothills and mountains in Unit 26B, from the Itkillik River to the Canning River, was completed in April 2003. Survey aircraft included 2 PA-18 Super Cubs. A total of 30 hours of survey flying were involved. The survey accounted for 20 wolves based on tracks and/or observations. These included 5 packs of 2 or more wolves and a single wolf. We estimated there were as many as 25 wolves in the area, or a density of about 4.8 wolves/1000 mi^2 (1.8/1000 km^2).

Distribution and Movements

In the early 1980s wolves were radiocollared in northern ANWR. 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. Relocations indicated wolves did not follow caribou to their winter ranges but generally remained within the same pack territories all year. Wolves preyed primarily on caribou from spring to fall but 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 YCRNP, and that 28% of 91 radiocollared wolves dispersed from 30 to 470 km.

MORTALITY

Harvest

Season and Bag Limit. The hunting season in Units 25 and 26 was open from 10 August through 30 April during RY02–RY04. The bag limit was 10 wolves; however, same-day-airborne hunting of wolves was prohibited. The trapping season in both areas was 1 November–30 April, with no bag limit. In accordance with trapping regulations, wolves caught in traps or snares could be taken by shooting the same day a trapper was airborne.

Units/Bag Limits/Special Restrictions	Resident/Subsistence Open Season	Nonresident Open Season
RY02–RY04		
Units 25A, 25B, and 25D		
HUNTING: 10 wolves.	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit.	1 Nov–30 Apr	1 Nov–30 Apr
Units 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

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 will take effect in RY07.

Hunter–Trapper Harvest. Annual wolf harvests in the reporting area were relatively stable during RY02–RY04 (range 39–69; Table 1). The 3-year average harvest for RY02–RY04 was 53, which compares to 66 for the previous 3 years (RY99–RY01). During RY02–RY04, 28% of the harvest occurred in Unit 25A, 8% in Unit 25B, 46% in Unit 25D, 18% in Unit 26B, and less than 1% in Unit 26C. The pattern is similar to the previous 3 years (RY99–RY01), except that the harvest in Unit 25D is higher and the harvest in Unit 26C is lower. Harvest during the early to mid 1990s was somewhat higher (3-year average RY90–RY92 was 86 and RY93–RY95 was 78). The lower harvest in recent years was probably a reflection of reduced fur prices, poor snow conditions, and reduced trapping effort.

Wolves were reported taken in scattered locations in Unit 25 including parts of the Coleen, Sheenjek, Hodzana, and Chandalar drainages in Unit 25A; the Black and Porcupine drainages in Unit 25B; and in the Birch, Beaver, Hodzana, Porcupine, and Yukon drainages in Unit 25D. In Unit 26B wolves were taken at scattered locations near the trans-Alaska pipeline corridor from the Atigun River north to Sagwon. Only one wolf was harvested in Unit 26C during RY02–RY04, probably because of limited access and low wolf density. Harvests generally included slightly more males than females. Some unreported harvest occurs, primarily in Units 26B and 26C, where hides are often used locally in clothing and handicrafts (Whitten 1988).

As in previous years, trapping or snaring was the predominant method of take. The proportion taken by shooting from the ground was highest in Unit 26B, probably because of the relatively open terrain in the area. Wolves were taken primarily by trapping or snaring in Units 25A, 25B and 25D (Table 1), probably because these are the most effective methods in forested terrain. Prior to 1988, when same-day-airborne hunting was prohibited, the predominant method of take for the entire reporting area was the land-and-shoot method involving aircraft.

Harvest Chronology. Most reported wolf harvest occurred from November through March, although some wolves were taken in August or September, primarily in Units 25A and 26B (Table 2).

Transport Methods. Over most of the reporting area, snowmachines were the most common method of access, and their use has changed little over the years (Table 3). In Unit 26B most hunters and trappers used highway vehicles to reach the area by the Dalton Highway. Individuals using dogsled/skis/or snowshoes or aircraft took a few wolves.

Natural Mortality

The relatively low density of wolves in northeastern Alaska is consistent with the relative scarcity of prey. Moose populations are generally at low density, and caribou are only seasonally abundant because of their wide-ranging migrations.

The high number of predators relative to prey in the area indicates that predation is a major factor affecting prey population dynamics. Population modeling exercises using the PredPrey model developed by Alaska Department of Fish and Game (McNay and DeLong 1998) were used to explore effects of predation by wolves and bears on moose populations on the Yukon Flats. These simulations indicate that wolf predation plays an important role in limiting moose numbers, which are likely to remain near a low-density equilibrium unless predation is reduced. 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 YCRNP produced an average of 3.7 (range, 1.4–4.9) pups annually.

Rabies and predation by other wolves (Zarnke and Ballard 1987) are probably the major causes of natural mortality among adult wolves in northeastern Alaska. Rabies in wolves is generally confined to coastal areas in northern and western Alaska, including Units 26B and 26C.

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 RY02–RY04, reported harvest accounted for a maximum of 8–10% of the estimated population in Units 25A, 25B, and 25D and 7–11% of the population in Units 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. I recommend continued monitoring of wolf populations, particularly in the most important moose hunting areas in Units 25B and 25D. Likewise, the status of prey populations should be closely monitored in these areas.

People throughout the study area and especially in Units 26B and 26C should be periodically reminded of the requirement to seal wolf pelts. We should continue efforts to develop and maintain fur sealing officers in communities in the region.

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 the wolf harvest in Unit 25D appears to have increased somewhat during RY03 and RY04, it appears that the level of increase was not sufficient to meet the second objective of temporarily reducing wolf numbers and predation on moose. That management objective for Unit 25D was revised to support the goals of the Yukon Flats Cooperative Moose Management Plan, which was completed in 2002. Moose populations are currently limited by predation and wolves are an important predator on moose (Gasaway et al. 1992; ADF&G, unpublished data). 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, the board must consider intensive management if regulatory action to significantly reduce moose harvest becomes necessary because of a decline in numbers or productivity. One of the goals of the Yukon Flats Cooperative Moose Management Plan is to increase moose numbers. The plan identified the need to reduce predation by grizzly bears, black bears, and wolves.

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TABLE 1 Units 25A, 25B, 25D, 26B, and 26C wolf harvest, regulatory years 1996–1997 through 2004–2005

Regulatory	Reported harvest				Method of take		
year	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
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
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
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

Regulatory year	Reported harvest				Method of take		
	M	F	Unk	Total	Trap/snare	Shot	Unk
2003–2004	3	7	6	16	10	6	0
2004–2005	4	1	0	5	0	4	1
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

[a] No harvest reported

TABLE 2 Units 25A, 25B, 25D, 26B, and 26C wolf harvest chronology percent by time period, regulatory years 1996–1997 through 2004–2005

Regulatory year	Harvest periods										
	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
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
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
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

Regulatory year	Harvest periods										
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	*n*
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
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

[a] No harvest reported

TABLE 3 Units 25A, 25B, 25D, 26B, and 26C harvest percent by transport method, regulatory years 1996–1997 through 2004–2005

Regulatory year	Method of transportation								
	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
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
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

Regulatory year	Method of transportation								
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	*n*
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
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
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

[a] No harvest reported

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WOLF MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2005

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 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.

The reported annual harvest of wolves ranged from 8 to 60 animals during the 1990s, but the actual annual harvest was approximately 30 to 120 wolves. The harvest has declined in recent years 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. 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.

Trent (1988) surveyed 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. Carroll (1994) surveyed a 23,293 km^2 (8955 mi^2) area using a Traditional Track Count method and a 10,343 km^2 (3994 mi^2) area around Umiat using a Track Intercept Probability technique in 1992 and estimated the density of wolves to be 4.2 wolves/1000 km^2. 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 wolves/1000 km^2. A SUPE survey was completed in 1998, and a density estimate of 1.6 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). There has not been a successful wolf survey since 1998.

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.
- Determine the impact of wolves on Unit 26A moose.
- 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.
- 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.
- Monitor the wolf population by conducting surveys in the primary moose habitat area once every 3 years.
- Record wolf observations during moose counts and compare these to observations made during past counts.

METHODS

A Sample Unit Probability Estimator (SUPE) sample design was developed to census wolves in a 10,343 km^2 area bordered by the Colville, Killik, and Itkillik Rivers and Gunsight Mountain. This method is based on surveys flown using a PA-18 and a Scout aircraft. The study area is divided into 4- by 4-mile sample units that are classified as high, medium and low categories, according to the likelihood they contained fresh wolf tracks. Randomly selected units are surveyed proportionally, such that most units in the "high" category are surveyed, with fewer in the "medium" category and fewer still in "low" category surveyed. Attempts are made to fly surveys 2 days after a snowfall. Each selected unit is searched thoroughly to determine whether fresh wolf tracks are present. When tracks are found, they are followed to determine how many wolves are in the pack and what course the wolves have followed since the last snowfall. A population estimate for the area is obtained using the number of wolves counted and the probability of observing wolf tracks on the survey, which is a function of the number and category of sample units containing wolf tracks. To prepare accurate estimates, a researcher must not miss any wolf tracks in the selected sample units, must correctly identify all sample units that a set of tracks passes through, and must correctly count the number of wolves in the packs (Becker et al. 1998).

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 we have obtained composition data from wolf carcasses collected by hunters at Anaktuvuk Pass.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

We attempted to census wolf populations in 2003 and 2004, but were unsuccessful due to weather conditions. We saw no wolves during moose trend counts those years, so wolf density appeared to be quite low.

In 1992 we surveyed a 23,293 km^2 (8955 mi^2) area using a Traditional Track Count method and a 10,343 km^2 (3994 mi^2) area around Umiat using a Track Intercept Probability technique and estimated the density of wolves to be 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 wolves/1000 km^2. A SUPE survey was completed in 1998, resulting in a density estimate of 1.6 wolves/1000 km^2 (Carroll 2000). The 1998 survey was incomplete because of poor conditions, but it was apparent that the wolf population had declined (Table 1).

The number of wolves seen during moose surveys also declined. 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 moose census, we spotted 16 wolves in 2 packs during 36 hours of flight, indicating that the wolf population may be increasing.

A reduced prey base is probably the major reason that wolf numbers in the study area decreased during the late 1990s. The Unit 26A moose population declined by 75% between 1992 and 1996. In addition, relatively few caribou from either the Teshekpuk herd or the Western Arctic herd wintered in the area between Umiat and Anaktuvuk Pass during most years after 1996. It is also possible that disease could have been a factor in the decline in wolf numbers.

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. The total number appears to be lower than that now.

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 through 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. Harvest dates were unknown for 5 wolves.

Of 52 carcasses examined during 1991–1992, 35 were from wolves harvested in Unit 26A. Twenty-eight (54%) were males, 23 (44%) were females, and 1 was unknown. Twenty-three (44%) were pups, 15 (29%) were adults, and 4 were of unknown age. Eight (15%) animals were black, 43 (83%) 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 (48%) were males, 2 (10%) 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 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. For instance, during the winters of 1990–1991 and 1993–1994, many caribou concentrated near Anaktuvuk Pass, which attracted wolves and resulted in a large wolf harvest.

MORTALITY

Harvest

Season and Bag Limit

Area	Bag limit	Season
Unit 26A:		
Trapping	No limit	1 Nov–30 Apr
Hunting	10 wolves	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 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 2002–03 season, 5 wolves were sealed; during 2003–04, 13 wolves were sealed; and during 2004–05, 5 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 that during 1994–1995 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 2002–03, 2 North Slope residents reported harvesting 3 wolves, and 2 wolves were reported harvested by 2 nonresident hunters. During 2003–04, 3 North Slope residents reported harvesting 10 wolves, a nonlocal resident harvested 2 wolves, and 1 nonresident harvested 1 wolf. In 2004–05, 3 North Slope residents reported harvesting 5 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 Western Arctic caribou herd (WAH), which numbers over 490,000 animals, seasonally occupies parts of Unit 26A, and a portion of this herd remains throughout the winter. The Teshekpuk caribou herd (TCH) numbers over 45,000 animals, and most of this herd remains in the unit during most years.

The Colville River moose population numbered approximately 1600 by 1991, but declined by 75% between 1992 and 1996; this consistent prey base was greatly reduced, but is now recovering and numbers over 1000 moose. Dall sheep are preyed on in mountainous regions, but also declined in the 1990s. 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 indicate that the density of wolves in the southeast corner of Unit 26A increased from 2.6 wolves/1000 km^2 in 1986 to 4.2 wolves/1000 km^2 in 1992 and 4.1 wolves/1000 km^2 in 1994, but declined to 1.6 wolves/1000 km^2 in 1998. The number of wolves seen during moose censuses was 29 in 1991, 16 in 1995, 0 in 1999, and 4 in 2002.

During the 2005 moose census, we spotted 16 wolves in 2 packs, indicating that wolf numbers may be increasing after a period of very low numbers.

A reduced prey base is probably the major reason that wolf numbers in the study area decreased. The Unit 26A moose population declined by 75% between 1992 and 1996. The moose population has increased substantially in recent years, so the wolf population may be increasing in response. In addition, very few caribou from either the Teshekpuk herd or the Western Arctic caribou herd have wintered in the area between Umiat and Anaktuvuk Pass during most years since 1997. During years when large numbers of caribou are in the area, there are generally more wolves; however, when there are too many caribou tracks, it is difficult to track and count wolves.

We have not conducted counts in other areas of Unit 26A, but the number of wolves sealed throughout the unit has decreased in recent years. Assuming that hunting pressure has stayed the same, this would indicate a decline in the wolf population throughout Unit 26A. Hunter and trapper harvest, and disease in the wolf population, have also contributed to the decline in wolf numbers.

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, but none was sealed. We will have more accurate harvest information if the NSB program continues and becomes established in more North Slope villages.

Wolf predation has been a factor for both Dall sheep and moose populations in Unit 26A. 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. The Colville River moose population also declined by 75% between 1992 and 1996. Several factors were involved in this decline, one of which was wolf predation. The moose population began to increase after 1997 while the density of wolves remained low. It is difficult to determine whether the wolf density is driving the moose population fluctuation or if wolves immigrated to the area in response to high moose and caribou numbers and left when the numbers of prey animals declined. We will continue to conduct wolf and moose surveys to monitor the impact of hunters on wolves and the combined impact of hunters, bears, and wolves on moose.

Although the wolf population is low in Unit 26A, I recommend no changes in bag limits or seasons at this time. The decline in wolf density in the study area appears to be more related to a reduced prey base than it is to hunting pressure. The Unit 26A moose population is currently recovering; and, if caribou become more plentiful in the area, wolf numbers will also be more abundant. Because aerial and land-and-shoot hunting are not allowed, extensive areas in Unit 26A receive little hunting pressure. Except for the area within 50–70 miles of Anaktuvuk Pass, much of the wolf population inhabiting the foothills and mountains of the Brooks Range

probably will not be heavily hunted or trapped. Hunters from other North Slope villages range over much of the coastal plain, where wolves probably will not become plentiful.

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TABLE 1 Wolf density and population estimates for Unit 26A and the Colville River study area, 1982–1998

	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]

[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
	Percent male	Percent Females	Percent unknown	Percent gray	Percent black	Percent 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

TABLE 3 Method and transportation percent of reported wolf harvest, Unit 26A, 1988–2005

Regulatory year	Method of take (%)				Transportation method (%)				Total reported harvest
	Trap	Rifle	Snare	Unknown	Aircraft	Snowmachine	ORV	Boat/Skis	
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		27	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

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

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.

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