# Wolf
# Management Report
## of survey-inventory activities
## 1 July 1999–30 June 2002

Carole Healy, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation
December 2003

ADF&G

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

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If used in part, the reference would include the author's name, unit number, and page numbers. Authors' names and the reference for using part of this report can be found at the end of each unit narrative.

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## 1 July 1999–30 June 2002

Carole Healy, Editor
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Division of Wildlife Conservation

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Federal Aid in Wildlife Restoration
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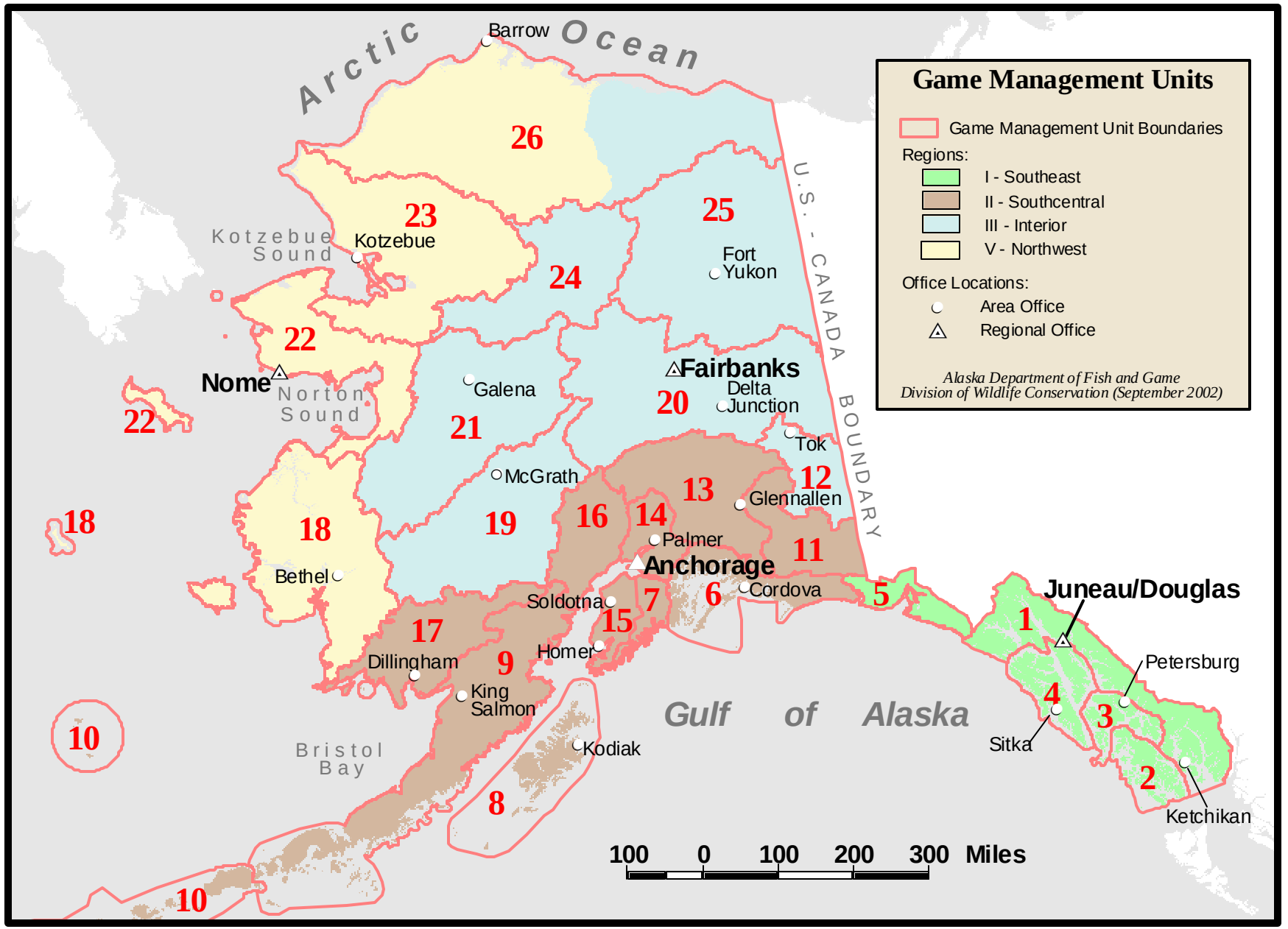
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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## LOCATION

**GAME MANAGEMENT UNIT**: 1A (5,300 $mi^{2)}$

**GEOGRAPHIC DESCRIPTION**: Unit 1A — 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 primary 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 primarily prey on mountain goats and moose. Marine mammals, salmon, waterfowl, and small mammals supplement the diets of local wolves.

The coloration of Southeast wolf pelts varies; however, the brown/gray color is most common. During the past decade, white or near-white pelts have comprised less than 1% of the harvest while black pelts have accounted for about 20% of the Unit 1A harvest.

From 1915 through the early 1970s, cash bounty was paid for wolves taken in the region and in the 1950s Federal agents poisoned wolves on many Southeast islands in an effort to increase or maintain deer numbers. None of these programs had long-lasting effects on wolf abundance or distribution. However, in 1990 Southeast Alaska wolves, named by some taxonomists as the Alexander Archipelago wolf, were identified by a USDA Forest Service-sponsored interagency committee as a species for which there were concerns about viability or distribution as a result of extensive timber harvesting in the Tongass National Forest. In 1993 the Biodiversity Legal Foundation (Boulder, CO) and an independent biologist from Haines, Alaska filed a petition with the U. S. Fish and Wildlife Service (FWS) requesting that Southeast Alaska wolves be listed as a threatened subspecies pursuant to the Endangered Species Act. The FWS ruled that listing was not warranted at the time, but indicated that they felt it was clear that without significant changes to the existing Tongass Land Management Plan, the long-term viability of Southeast wolves was seriously imperiled. A comprehensive conservation assessment was subsequently prepared through the USDA Forest Service (Person et al. 1996). The most important consideration identified in the assessment was the

need to maintain a long-term carrying capacity for deer, the principal prey for most wolves. The authors suggested that a series of old growth forest reserves might increase the likelihood that wolves would persist where extensive timber harvesting had occurred or was planned. Several old growth reserves have been identified for Units 1A and 2.

### MANAGEMENT OBJECTIVES

Our management objectives are to maintain an average annual harvest of at least 20 wolves from Unit 1A. This level reflects the average harvest for this unit during 1984–1990.

## METHODS

We obtained harvest information through a mandatory-sealing program. By regulation, the left foreleg was left attached to the hide of harvested wolves until sealed for aging purposes. 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 current population data are available for Unit 1A wolves. Based on the moderate harvest levels reported and moderate indices of abundance ($I_A$) reported by trappers, wolves in Unit 1A appear to be stable during this report period (Kephart 2001).

*Distribution and Movements*

There are currently no research projects in Unit 1A and consequently no radio transmitter-equipped wolves in the unit. Attempts to collar wolves on the Cleveland Peninsula during fall 1999 resulted in 2 males being outfitted with transmitters, however both of those animals died within one month of capture. Anticipated work on Cleveland Peninsula and Gravina Island will eventually provide demographic information in an area with less access (fewer roads) and less historical logging activity to compare to data gathered in ongoing Unit 2 research.

### MORTALITY

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

Hunter/Trapper Harvest. The Unit 1A wolf harvest during this report period was slightly higher than the previous 3-year period and higher than the long-term average. Total harvest during 1999 was 47 and during both 2000 and 2001 there were 44 wolves harvested. The sex of the harvest during this report period was split, with slightly more females (52%) than males (48%). Trapping continues to be the most successful method of taking wolves (49%) followed by snaring (25%) and ground shooting (23%).

The 1999 harvest of 46 wolves was the second highest since 1985 and well above the long-term average of 30. The average catch per trapper was also the highest on record. Fifteen trappers took an average of 3.1 wolves during 1999. That winter was severe in terms of snow depth and snow persistence. Snow accumulations up to 3 feet forced deer to lower elevations and wolves consequently spent more time at low elevations and along beaches, making them more accessible to trappers using boats.

Hunter Residency and Success. Local residents regularly account for 94–100% 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 nonlocals (3%) and nonresidents (2%). During 1999–2001, residents have harvested 98%, 98%, and 95% of the total, respectively. Nonresidents that harvested wolves took them incidentally during September by ground shooting. Hunters often encounter wolves while pursuing other big game species.

Harvest Chronology. March has historically seen the peak of the Unit 1A wolf harvest, followed by February. In the past 2 years the harvest was spread over the open season, with slightly more taken during December and March. During both the 1999 and 2000 seasons, March saw the highest harvest of wolves. The 2001 season was different with the majority of trappers more successful during January (25%) and February (16%).

Transport Methods. Boats and off road vehicles continue to account for the majority of transport methods used by successful Unit 1A wolf hunters and trappers. During this 3-year report period the majority of trappers used boats (86%), while the remainder used off road vehicles (12%) and highway vehicles (2%).

*Other Mortality*

Mortality from natural causes (starvation, accidents, disease, fighting) in exploited populations is low, typically averaging 5 to 10% per year (Fuller 1989). There were no wolves reported as killed by vehicle collisions during this report period. Four wolves have reportedly been killed near Ketchikan on the Tongass Highway by cars since 1985.

## CONCLUSIONS AND RECOMMENDATIONS

The management objective of harvesting 20 wolves per season was met during this report period, and we believe Unit 1A wolf numbers have remained stable. Trapping success increased slightly, and trapping effort is up from the preceding 10-year average. The high harvest during the 1999 season likely resulted from severe winter conditions rather than increased wolf density.

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Porter, B. 2003. Unit 1A wolf management report. Pages 1–9 *in* C. Healy, editor. Wolf management report of survey and inventory activities 1 July 1999–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Unit 1A wolf harvest, 1985–2001

| Regulatory | | | | | | Method of take | | | Pelt color | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| year | Males | Females | Unk | Total | | Shot | Trapped | Unk | White | Grey | Black | Unk |
| 1985 | 6 | 5 | 0 | 11 | | 1 | 10 | 0 | 0 | 7 | 4 | 0 |
| 1986 | 11 | 10 | 0 | 21 | | 3 | 18 | 0 | 0 | 16 | 5 | 0 |
| 1987 | 14 | 9 | 0 | 23 | | 9 | 14 | 0 | 0 | 16 | 7 | 0 |
| 1988 | 13 | 8 | 0 | 21 | | 10 | 11 | 0 | 0 | 14 | 7 | 0 |
| 1989 | 12 | 19 | 2 | 33[a] | | 14 | 19 | 0 | 0 | 25 | 8 | 0 |
| 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[b] | | 17 | 29 | 3 | 0 | 38 | 11 | 0 |
| 1996 | 5 | 10 | 0 | 15 | | 3 | 12 | 0 | 0 | 12 | 3 | 0 |
| 1997 | 13 | 13 | 0 | 26[c] | | | 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 | 8 | 35 | 0 | 0 | 38 | 5 | 1 |
| 2001 | 19 | 25 | 0 | 44 | | 11 | 31 | 0 | 0 | 33 | 6 | 5 |
| Average | 16 | 15 | 0 | 30 | | 9 | 21 | 0 | 0 | 24 | 6 | 1 |

[a] Does not include 1 gray female killed by a car on South Tongass Highway, Ketchikan.
[b] Does not include 2 gray males killed by cars on North Tongass Highway and White River Road, Ketchikan.
[c] Does not include 1 gray male killed by a car on South Tongass Highway, Ketchikan.

Table 2 Unit 1A wolf hunter/trapper transport method, 1985–2001

| Regulatory year | Air | Boat | Highway[a] vehicle | Walked | Unknown |
|---|---|---|---|---|---|
| 1985 | 0 | 5 | 3 | 0 | 3 |
| 1986 | 10 | 11 | 0 | 0 | 0 |
| 1987 | 0 | 21 | 2 | 0 | 0 |
| 1988 | 0 | 16 | 5 | 0 | 0 |
| 1989 | 2 | 26 | 5 | 0 | 0 |
| 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 |
| Average | 1 | 24 | 4 | 1 | 1 |

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

Table 3 Unit 1A wolf harvest chronology, 1985–2001

| Regulatory year | July | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | June |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1985 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 3 | 2 | 1 | 0 | 0 |
| 1986 | 0 | 1 | 0 | 0 | 1 | 2 | 3 | 11 | 2 | 1 | 0 | 0 |
| 1987 | 0 | 0 | 1 | 1 | 0 | 4 | 6 | 3 | 1 | 1 | 3 | 3 |
| 1988 | 0 | 1 | 2 | 1 | 3 | 2 | 4 | 0 | 3 | 4 | 1 | 0 |
| 1989 | 0 | 1 | 1 | 4 | 4 | 5 | 3 | 3 | 6 | 5 | 1 | 0 |
| 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 |
| Average | 0 | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 3 | 1 | 0 |

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

Table 4 Number of license holders who killed Unit 1A wolves, and average catch per trapper, 1985–2001

| Regulatory year | Number of license holders harvesting wolves | Average catch/license holder |
|---|---|---|
| 1985 | 7 | 1.6 |
| 1986 | 10 | 2.1 |
| 1987 | 12 | 1.9 |
| 1988 | 15 | 1.4 |
| 1989 | 18 | 1.8 |
| 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 |
| Average | 15 | 1.9 |

Table 5 Residency of Unit 1A wolf trappers/hunters, 1990–2001

| 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 |
| Average | 23 | 1 | 1 |

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

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## LOCATION

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

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

## BACKGROUND

Wolves inhabit the mainland of Unit 1B, where they immigrated following post-glacial immigration and establishment of Sitka black-tailed deer populations. Deer are the primary food source for wolves in Southeast Alaska, with moose and mountain goat important in some mainland areas.

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 the estimated number of wolves associated with the ones killed. The left foreleg was collected from each sealed wolf to determine relative age, beginning in regulatory year 1997.

We recorded observations of wolves made by ADF&G and US Forest Service biologists, trappers, hunters, and other members of the public. An annual statewide trapper survey supplied additional information.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

We collect insufficient data to make a meaningful estimate of the Unit 1B wolf population. Conversations with trappers, hunters, pilots, and other biologists and information from trapper questionnaires indicated the wolf population increased in the 1990s corresponding to an increase in deer.

### MORTALITY

*Harvest*

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

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

Hunter/Trapper Harvest. In 1999–00, five individuals harvested 10 wolves, in 2000–01 eight individuals harvested 9 wolves, and in 2001–02 eight individuals harvested 19 wolves (Table 1). In 1999–00, adults comprised 60% of the harvest, and 20% of the harvest were adults in 2000–01 and 2001–02 (Table 2). Trapping continues to be the primary method of take. Deer and bear hunters and occasionally moose hunters are generally responsible for wolves that are shot incidental to hunting effort for these other species.

Most of the central Southeast Alaska wolf harvest takes place in close proximity to local communities in nearby Unit 3. The majority of the mainland is not trapped.

Harvest Chronology. In the 1999–00 season, January, October, and September, in descending order, accounted for the highest percent of the harvest (Table 3). In 2000–01, September, October and December, and January accounted for the highest percent of the harvest. In 2001–02, January, February, and April accounted for the highest percentage of the harvest. Wolves harvested in August and September are taken incidentally to other hunting activities.

Transport Methods. Trappers using small boats harvested all wolves reported taken during the report period (Table 4). No other methods of transportation have been reported to harvest wolves since 1994–95.

## CONCLUSIONS AND RECOMMENDATIONS

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

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Table 1 Unit 1B wolf harvest, 1988–01

| Regulatory year | Reported harvest | | | | Method of take | | | Successful |
|---|---|---|---|---|---|---|---|---|
| | M | F | Unk. | Total | Trap/Snare | Shot | Unk. | |
| 1988 | 4 | 5 | | 9 | 6 | 3 | | 6 |
| 1989 | 12 | 7 | | 19 | 14 | 5 | | 8 |
| 1990 | 7 | 8 | | 15 | 10 | 5 | | trappers/hunters 3 |
| 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 |

Table 2 Age of harvested Unit 1B wolves[1], 1997–01

| Regulatory year | Adults | Subadults[2] | % adults |
|---|---|---|---|
| 1997 | 2 | 4 | 33 |
| 1998 | 6 | 5 | 55 |
| 1999 | 5 | 3 | 63 |
| 2000 | 1 | 4 | 20 |
| 2001 | 3 | 12 | 20 |

[1] Not all harvested wolves were aged.
[2] Less than 1 year of age.

Table 3 Unit 1B wolf harvest chronology, by percent by time period, 1988–01

| Regulatory | Harvest periods | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| year | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | April | May | June | n |
| 1988 | | 11 | | 11 | 11 | 56 | 11 | | | | | | 9 |
| 1989 | | | 11 | 11 | 16 | 32 | 26 | | | 15 | | | |
| 1990 | | | | 13 | | | 40 | 13 | 26 | | | | 15 |
| 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 | | | |

Table 4 Unit 1B wolf harvest, by percent by transport method, 1988–01

| Regulatory year | Percent of harvest | | | | | |
|---|---|---|---|---|---|---|
| | Airplane | Boat | 3/4 wheeler | Snowmachine | Other | n |
| 1988 | 11 | 78 | | 11 | | 9 |
| 1989 | | 89 | | 11 | | 19 |
| 1990 | | 73 | 7 | 13 | 7 | 15 |
| 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 |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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. An exception is in 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. Also, a pack of at least seven wolves was seen routinely during summer 2001 on the southwest side of Douglas Island, and a single wolf pup was found dead near the Eaglecrest Ski area in September 2001. There is no evidence that wolves occur on Shelter, Lincoln, or Sullivan islands.

## 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 populations of wolves for viewing and harvest. Our management strategy is to maintain wolf harvests at a level similar to the mean for the previous 5 seasons. No wolf control is contemplated for this area at this time.

## 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 of age), subadults, and adults. The population was monitored 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 collected insufficient data to make meaningful estimates of wolf populations within the unit. Although no quantitative data is available, anecdotal reports and discussions with local hunters, trappers, and pilots as well as harvest data suggest wolf numbers are stable or slowly increasing. 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. For the first time in more than 20 years, wolves were documented on Douglas Island and produced at least 6 pups.

We gathered pack size information on sealing forms to gain some insight into the number of wolves present. Pack sizes ranged from one to 12 wolves, with a mean pack size of 5.5 wolves.

### MORTALITY

*Harvest*

Seasons and Bag Limits

| | | |
|---|---|---|
| Hunting: | August 1–April 30 | 5 Wolves |
| Trapping: | November 10–April 30 | No Limit |

Board of Game Actions and Emergency Orders. There were no Board of Game actions or Emergency Orders issued during the report period.

Hunter/Trapper Harvest. Five wolves (3 males, 2 females) were harvested in 1999 (Table 1), 3 from Nugget Creek near the Mendenhall Glacier, 1 from the Gustavus Forelands, and one from Cape Fanshaw. This was slightly lower than the previous 10-year mean harvest of 6.8 wolves (range = 4–12). In 2000, the harvest of 12 wolves (4 males, 8 females) equaled the previous high harvest from 1989. Five of the wolves were from the Chilkat Mountains, 4 from Gustavus, and 3 from Nugget Creek. In 2001, 13 wolves (6 males and 7 females) were harvested (one male wolf was found dead and brought in for sealing). This total of 14 wolves was the highest recorded since 1988, and was the first time in at least 25 years that wolves were harvested from Douglas Island. Eight of the wolves sealed were from Douglas Island, 4 from the Chilkat Mountains, and 2 from the Cape Fanshaw area.

The combined harvest for 1999–2001 was 30 wolves, composed of 8 (27%) taken in snares, 16 (53%) taken with traps, and 6 (20%) taken with firearms. Pelt colors included 19 gray and 11 black wolves.

Hunter/Trapper Residency and Success. In 1999, 2 residents of the unit harvested 4 of 5 wolves that were taken. In 2000 the effort was more distributed, with 5 unit residents taking all 12 wolves. In 2001, 10 of the wolves harvested were taken by unit residents, and 3 by non-local residents.

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.

Transport Methods. Highway vehicles and boats were the primary access modes for wolf hunters and trappers (Table 3).

*Other Mortality*

A juvenile male wolf was found dead on Douglas Island during October 2001. This wolf was brought into ADF&G for sealing; the animal had no apparent wounds.

## 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. During the report period the presence of wolves on Douglas Island was met with public emotion ranging from excitement to horror. One trapper harvested what appeared to be an entire pack of wolves, and caused uproar in Juneau over what many perceived as unethical and non-sustainable trapping practices.

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

Although the wolf harvest increased to higher levels during 2000 and 2001, 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. 2003. Unit 1C wolf management report. Pages 16–21 *in* C. Healy, editor. Wolf management report of survey and inventory activities 1 July 1999–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Unit 1C wolf harvest chronology, 1988–2001

| Regulatory year | Males | Females | Unknown | Total |
|---|---|---|---|---|
| 1988 | 3 | 2 | 0 | 5 |
| 1989 | 4 | 7 | 1 | 12 |
| 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 |
| Mean annual harvest | 3.6 | 3.6 | 0.3 | 7.4 |

Table 2 Unit 1C wolf harvest chronology by month, 1988–2001

| Regulatory year | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1988 | | | | | | | | | 5 | | | |
| 1989 | | | | 1 | 1 | 5 | 3 | 1 | | 1 | | |
| 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 | | | |
| Mean annual harvest | 0 | 0.7 | 0.6 | 0.4 | 0.2 | 0.8 | 1.6 | 1.5 | 1.4 | 0.5 | 0.1 | 0 |

Table 3 Unit 1C wolf harvest, percent by transport method, 1988–2001

| Regulatory year | Airplane | Dogsled, skis, snowshoes | Boat | 3- or 4-wheeler | Snow-machine | ORV | Hwy vehicle | Unknown |
|---|---|---|---|---|---|---|---|---|
| 1988 | | | 50 | | 50 | | | |
| 1989 | | | 84 | | 8 | | 8 | |
| 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 | |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 wolf investigations in this unit, and population information is based upon 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, and beaver. 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. Our management strategy is to maintain wolf harvests at a level similar to the mean over the previous 5 seasons. No wolf control methods are planned at this area at this time.

## 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 & Game and Fish and Wildlife Protection staff sealed wolves in Haines.

# RESULTS AND DISCUSSION

## POPULATION STATUS AND TREND

*Population Size*

We collected insufficient data to make meaningful estimates of wolf populations within the unit. Although no quantitative data is available, anecdotal reports and discussions with local hunters, trappers, and pilots suggest wolf numbers are stable.

## MORTALITY

*Harvest*

| Seasons and Bag Limits | Residents and Nonresidents | |
|---|---|---|
| Hunting: | August 1–April 30 | 5 Wolves |
| Trapping: | November 10–April 30 | No Limit |

Board of Game Actions and Emergency Orders. No Board of Game actions were taken or emergency orders concerning wolves were issued for this unit during the report period.

Hunter/Trapper Harvest. During the 1999 regulatory year 7 wolves (3 males, 4 females) were harvested in Unit 1D (Table 1). In 2000, 6 wolves (3 males, 2 females, 1 of unknown sex) were taken, and the 2001 harvest was 3 wolves (2 males, 1 female).

As in past years, far more wolves were taken by shooting than by trapping during the report period. The combined harvest for 1999–2001 was 16 wolves, composed of 10 (62%) harvested with firearms, 4 (25%) harvested with traps or snares, and 2 (13%) killed by a guided bow hunter. The color of wolves killed during this period was 2 white, 7 gray, and 7 black. At least half of the 3-year harvest was taken along the Chilkat River, which hunters access via the Haines Highway. The ease of sighting wolves along the open river valleys of the Chilkat and other large drainages in the unit likely increases the chances of their being harvested by firearms. Over a 3-year period, the harvest was composed of 9 adults and 5 juveniles; not all animals were aged.

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. Guided bear hunters killed at least 3 wolves during this report period, all taken in the fall.

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.

*Other Mortality*

No natural mortality was documented during the report period. One wolf trapper caught a small, emaciated black bear, in a Conibear trap in January 2002; the skull and hide were sealed and surrendered to the state.

## 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. Wolf management planning in 1991 and 1992 showed most local respondents preferred no wolf control and some even recommended no harvest of wolves. No changes in seasons or bag limits are recommended at this time.

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Table 1 Unit 1D wolf harvest chronology, 1988–2001

| Regulatory year | Males | Females | Unknown | Total |
|---|---|---|---|---|
| 1988 | 0 | 1 | 0 | 1 |
| 1989 | 3 | 1 | 1 | 5 |
| 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 |
| Average | 2 | 2 | <1 | 3 |

Table 2 Unit 1D wolf harvest chronology, 1988–2001

| Regulatory year | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1988 | | | | | | 1 | | | | | | |
| 1989 | | | | 3 | | 1 | | | 1 | | | |
| 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 | | |
| Average | | .1 | .4 | .5 | .3 | .4 | .16 | .1 | .5 | .5 | | |

Table 3 Unit 1D wolf harvest, percent by transport method, 1988–2001

| Regulatory year | Airplane | Dogsled, skis, & snowshoes | Boat | 3- or 4-wheeler | Snow-machine | ORV | Highway vehicle | Unknown |
|---|---|---|---|---|---|---|---|---|
| 1988 | | | 100 | | | | | |
| 1989 | | | | 20 | 20 | | 60 | |
| 1990 | | | | | | | 100 | |
| 1991 | | | | | | | | |
| 1992 | 67 | | | | | | 33 | |
| 1993 | | | 100 | | | | | |
| 1994 | | | | | | | 100 | |
| 1995 | | | | | 33 | | 33 | 33 |
| 1996 | | | | | | | 43 | |
| 1997 | | 25 | 25 | | | | 50 | |
| 1998 | | 25 | | | | | 50 | |
| 1999 | | 29 | 28 | 14 | | | | |
| 2000 | | 17 | 33 | 17 | | | 17 | 16 |
| 2001 | | 33 | 33 | 25 | 34 | | | |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## LOCATION

**GAME MANAGEMENT UNIT** 2: (3,600 $mi^2$)
**GEOGRAPHIC DESCRIPTION: UNIT 2 -** 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 are much less frequent.

Wolves feed primarily on deer in southern Southeast Alaska, and Unit 2 wolves depend on deer for the majority of their diet. Black bears are occasionally killed by wolves, but probably provide a small portion of their diet. Marine mammals, salmon, waterfowl, 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, white or near-white pelts have comprised less than 1% of the harvest while black pelts have accounted for about 8–10% of the unit's harvest.

From 1915 through the early 1970s, a cash bounty was paid for wolves killed in Southeast Alaska, and in the 1950s Federal agents poisoned wolves in the region in an attempt to increase or maintain deer numbers. None of these programs had long-lasting effects on wolf abundance or distribution. In 1990, Southeast Alaska wolves (named by some taxonomists as the Alexander Archipelago wolf) were identified by a USDA Forest Service-sponsored interagency committee as a species for which there were concerns about viability or distribution as a result of extensive timber harvesting on the Tongass National Forest. In 1993, the Biodiversity Legal Foundation (Boulder, CO) and an independent biologist from Haines, Alaska, filed a petition with the U. S. Fish and Wildlife Service (FWS) requesting that Southeast wolves be listed as a threatened subspecies pursuant to the Endangered Species Act. The FWS ruled that listing was not warranted, but indicated that without significant changes to the existing Tongass Land Management Plan the long-term viability of Southeast wolves was seriously imperiled. A comprehensive conservation assessment was subsequently prepared through the USDA Forest Service (Person et al. 1996). The most important consideration identified in the assessment was the need to maintain long-term carrying

capacity for deer, the principal prey for wolves in the region. The authors suggested that a series of old-growth forest reserves could provide an effective strategy to increase the persistence of wolves where extensive timber harvesting had occurred or was planned. In 1996 the Board of Game (Board) adopted a harvest cap of 25% of the annual Unit 2 wolf population estimate, effective with the 1997–98 hunting and trapping season. In fall 1999 the Unit 2 wolf population was estimated at about 350 wolves. The harvest guideline was reached during the 1999–00 trapping season and an emergency order was issued closing the remainder of the hunting and trapping season February 29, 1999.

### MANAGEMENT OBJECTIVES

Our objectives are 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

We obtained harvest information through a mandatory sealing program. Throughout Southeast the left foreleg must remain attached to the hide until sealed for aging purposes. Information obtained from hunters and trappers included the number and sex of harvested wolves, date and location of harvest, method of take, transportation used, and pelt color. We 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. We also obtained information from research programs on both Heceta Island and POW looking at predator-prey relationships.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

Using a simulation model based on data collected through a graduate research project in Unit 2, Person and Ingle (1995) estimated that 321 wolves (SE = 135) inhabited POW and Kosciusko 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 is available, nor are subsequent estimates available. Consistently high harvests during the past 5 seasons suggest that wolves have remained relatively abundant, although declines in the indices of abundance suggest that the population may have declined slightly during the past 3 seasons (Kephart 2000).

Pack sizes on POW and Kosciusko islands were larger in early autumn before trapping season, averaging 7 to 9 wolves (Person and Ingle 1995). An entire wolf pack is rarely observed except during winter, thus pack sizes are difficult to estimate unless repeated direct observations are made (Person et al. 1996).

*Distribution and Movements*

On POW and Kosciusko islands, Person et al. (1996) reported average home ranges of 109 $mi^2$. Core areas where wolf activity was concentrated averaged 48 $mi^2$, or 55 to 60% smaller than total home ranges.

Pups that survive to adulthood either remain in their natal packs or disperse. In wolf populations with high mortality, lone wolves may be more successful at finding vacant territories to occupy or being accepted into established packs (Ballard et al. 1987). Dispersing wolves are more vulnerable than non-dispersers to hunting and trapping and are also more likely to be killed by other wolves (Peterson et al. 1984).

## MORTALITY

*Harvest*

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

Game Board Actions and Emergency Orders. During fall 1996 the Board considered a petition to list the Alexander Archipelago wolf as a threatened subspecies. The Board adopted a shorter trapping and hunting season for Unit 2. Effective July 1, 1997 the hunting and trapping season was changed from August 1–April 30 to December 1–March 31. The Board also imposed a harvest cap of 25% of the unit's fall population estimate. A harvest in excess of the guideline was determined to be non-sustainable in the long term and could lead to a population decline. The 1999 fall population, based on population modeling augmented by radiotelemetry and demographic data, was estimated at about 350 wolves. A harvest of 80–90 wolves would represent about 25% of the fall population. To provide more hunting and trapping opportunity, avoid emergency order closures, and improve harvest reporting, in fall 2000 the Board increased the harvest cap to 30% of the fall population estimate. Many wolves trapped in Unit 2 during the season have poor pelt quality. They are discarded and consequently not sealed. Increasing this harvest cap will hopefully capture some of the unreported harvest.

The 1999–00 season was the first time the harvest reached a Board-established guideline, and the season was closed on February 29 by emergency order. In 1999–00 there was an increase in successful trappers – several new trappers worked Unit 2 with good success – whereas historically 3 or 4 trappers took more than 10 wolves each. After that season the number of productive trappers reverted to the long-term norm, with 2 trappers in 2000 and 2001 and 3 trappers in 1999 that caught more than 10 wolves per season.

Hunter/Trapper Harvest. The Unit 2 wolf harvest has shown a steady decline during the past 3 years. From 1999–2001 the total harvest was 96, 73, and 58 respectively (Table 1). The annual harvest ranged from a 1985 low of 18 to a high of 132 wolves in 1996. During the report period the number of successful trappers fell to a 3-year average of 17, well below the 10-year average of 27 (range 16–37). The number of trappers reached a high of 42 in 1990 and a low of 14 during the 1985 season. Average wolf harvest per trapper has ranged from a

low of 1.1 in 1989, to a high of 5.5 during 1999 (Table 4). The number of active trappers is down from a long-term average of 28 with an average catch of 2.8 wolves each. As the human population continues to decline in Unit 2, mostly because of fewer timber related jobs, we expect to see fewer trappers, yet similar success by the remaining resident trappers.

About 92% of the wolves harvested during the past 3 seasons were caught in traps or snares, while the other 8% were shot, well below the long-term average of 28% shot (Table 1).

The sex ratio of harvest during the past 18 years has remained almost evenly split at an average of 54% male and 42% female. During the current report period males accounted for 52% of the harvest (Table 1).

Hunter Residency and Success. Nonlocal residents have accounted for 34% of the hunters and trappers who took wolves in Unit 2 during the past 13 years. However, during this report period there were no wolves taken by nonlocals, and nonresidents took only 4% (Table 5).

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. Typically the Unit 2 harvest has been highest during December and January. However, during the past 2 years the majority of wolves were taken during January (26%) and February (22%).

During the past 10 years (1992–2002), 17% of the harvest has been taken by shooting (both by trappers and hunters). Fewer wolves have been taken with firearms since the season dates for hunting and trapping changed July 1, 1997, from August 1–April 30 to December 1–March 31. We believe the reduction in the number of wolves shot was due to the elimination of opportunistic kills during fall deer hunts when many hunters are afield.

Transport Methods. Highway vehicles and boats account for the majority of transport methods used by successful Unit 2 wolf hunters and trappers. Highway vehicles accounted for 28% and boats 47% of the transport methods used to harvest wolves during the past 3 years (Table 2).

*Other Mortality*

Mortality from natural causes (starvation, accidents, disease, fighting) in exploited populations is low, typically averaging 5 to 10% per year (Fuller 1989). We believe that in Unit 2 substantial mortality results from unreported killing of wolves (Person et al. 1996). 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. 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 with radio collars. Regardless, we believe that reported mortality substantially underestimates total Unit 2 wolf mortality.

### HABITAT

*Assessment*

As we have reported previously (Wood 1990, Larsen 1991) and as Person et al. (1996) reiterated recently, the expanding Unit 2 road system and increasing human population will continue to have a direct effect on wolves. We expect long-term reductions in wolf numbers as a result of deer declines through habitat loss. As the uneven-aged old growth forest is logged, deer carrying capacity will be reduced, and consequently wolf populations will decline as well. To mitigate the effects of habitat loss, Person et al. (1996) suggested maintaining large, unfragmented and unroaded blocks of habitat within biogeographic areas where extensive timber harvesting has occurred, or where extensive harvesting is planned. The authors believe that making old growth reserves large enough to encompass the core activity areas of at least one wolf pack would markedly increase the likelihood of the reserves effectiveness and reduce the long-term risk to wolf viability. Work is ongoing to define and designate appropriate old growth reserves in Unit 2.

## CONCLUSIONS AND RECOMMENDATIONS

We believe that wolf populations have decreased slightly in Unit 2 during this report period. Although we do not consider wolves threatened in southern Southeast Alaska at this time, we have conservation concerns stemming from long-term habitat changes, human population growth, and increased roaded access into once remote wolf habitats. We support the concept of establishing roadless reserves within logged areas. Current old growth reserves appear to be providing some temporary refugia for wolves and work is ongoing to identify and establish viable old growth reserves across the unit. Few wolves have been recently harvested in existing reserves due to limited access during trapping season.

The number of Unit 2 trappers who successfully catch wolves is declining, perhaps mirroring the slowly declining local human population. 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, remain about the same.

By shortening the trapping season to coincide with the period of maximum pelt primeness (December 1–March 31) the Board has reduced the annual wolf harvest by an estimated 12%. Current regulations relieve some concern about harvesting wolves beyond a sustainable level in a unit where habitat changes and increased access are an issue.

We continue to be concerned about under-reporting of wolves killed that are during the season but not officially sealed.

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Table 1 Unit 2 wolf harvests, 1985–2001

| Regulatory | | | | | Method of take | | | Pelt color | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| year | Males | Females | Unk | Total | Shot | Trapped | Unk | White | Grey | 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 | 30 | 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 | 15 | 0 |
| 2000 | 36 | 37 | 0 | 73 | 9 | 63 | 0 | 0 | 69 | 4 | 0 |
| 2001 | 32 | 26 | 0 | 58 | 0 | 58 | 0 | 0 | 57 | 1 | 0 |
| Average | 41 | 32 | 1 | 75 | 21 | 53 | 0 | 0 | 65 | 8 | 1 |

Table 2 Unit 2 wolf hunter/trapper transport methods, 1985–2001

| 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 |
| Average | 1 | 40 | 31 | 0 | 2 |

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

Table 3 Unit 2 wolf harvest chronology, 1985–2001

| Regulatory year | July | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | June |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 |
| Average | 0 | 1 | 3 | 4 | 4 | 15 | 17 | 17 | 10 | 2 | 1 | 1 |

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

Table 4 Numbers of trappers who caught wolves in Unit 2, and average catch per trapper, 1985–2001

| 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 | 5.5 |
| 2000 | 19 | 3.8 |
| 2001 | 16 | 3.6 |
| Average | 28 | 2.8 |

Table 5 Residency of Unit 2 wolf trappers/hunters, 1990–2001

| 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 |
| Average | 21 | 8 | 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 1999
To: 30 June 2002

## LOCATION

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

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

## BACKGROUND

Wolves inhabit Unit 3 islands where they immigrated following post-glacial 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.

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 1970's in an effort to increase deer numbers. Today a few recreational trappers and opportunistic hunters harvest wolves.

## 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 the estimated number of wolves associated with those killed. We collected the left foreleg from each sealed wolf to determine age.

We recorded observations of wolves made by ADF&G and US Forest Service biologists, trappers, hunters, and other members of the public. An annual statewide trapper survey supplied additional information.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

We collected insufficient data to make a meaningful estimate of wolf populations. Conversations with trappers, hunters, pilots, and other biologists along with information from trapper questionnaires indicated the wolf population increased during the 1990's corresponding to the increase in deer numbers.

### MORTALITY

*Harvest*

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

Board of Game Actions and Emergency Orders. There was no pertinent Board of Game actions or emergency orders issued during this report period.

Hunter/Trapper Harvest. In regulatory year 1999–00, 28 individuals harvested 57 wolves, in 2000–01 35 individuals harvested 59 wolves, and in 2001–02 29 individuals harvested 51 wolves (Table 1). In 1999–00 adults comprised 41% of the kill, in 2000–01 48% were adults, and in 2001/02 32% were adults (Table 2).

Except for the 1998–99 season, trapping has been the primary method of taking wolves in Unit 3. Trapping accounted for 60%, 66% and 67% of the harvest in 2000, 2001, and 2002, respectively. Deer hunters, bear hunters, and occasionally moose hunters are generally responsible for wolves that are shot incidentally as they pursue these other species.

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

Harvest Chronology. In 1999–00, February, January, and March, in descending order, accounted for the highest percent of the harvest (Table 3). February, December, January, and April accounted for the highest percentage of the harvest in 2000–2001. In 2001–02, January, February, and March accounted for the highest percent of the harvest.

Transport Methods. During the report period trappers using small boats harvested the majority of wolves (Table 4). Some trapping occurs from the road system on Mitkof and Wrangell islands. Other forms of transportation are rarely used.

## CONCLUSIONS AND RECOMMENDATIONS

Wolf populations and harvest have both increased in recent years. Much of Unit 3 is not trapped. We recommend no change in regulations.

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Lowell, R. E. 2003. Unit 3 wolf management report. Pages 39–44 *in* C. Healy, editor. Wolf management report of survey and inventory activities 1 July 1999–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Unit 3 wolf harvest, 1988–2001

| Regulatory year | Reported harvest | | | | Method of take | | | Successful trappers/hunters |
|---|---|---|---|---|---|---|---|---|
| | M | F | Unk. | Total | Trap/snare | Shot | Unk. | |
| 1988 | 5 | 5 | 0 | 10 | 5 | 5 | 0 | 6 |
| 1989 | 12 | 10 | 0 | 22 | 12 | 10 | 0 | 13 |
| 1990 | 11 | 7 | 0 | 18 | 15 | 3 | 0 | 10 |
| 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 |

Table 2 Age of Unit 3 harvested wolves[1], 1997–2001

| Regulatory year | Adults | Subadults[2] | % adults |
|---|---|---|---|
| 1997 | 22 | 16 | 58 |
| 1998 | 15 | 11 | 58 |
| 1999 | 17 | 24 | 41 |
| 2000 | 24 | 26 | 48 |
| 2001 | 14 | 30 | 32 |

[1] Not all harvested wolves were aged.
[2] Less than 1 year of age.

Table 3 Unit 3 wolf harvest chronology, by percent by time period, 1988–2001

| Regulatory | Harvest periods | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| year | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | April | May | June | Unk | n |
| 1988 | 10 | 0 | 10 | 0 | 0 | 0 | 0 | 50 | 0 | 20 | 10 | 0 | 0 | 10 |
| 1989 | 0 | 9 | 9 | 16 | 0 | 32 | 13 | 4 | 13 | 4 | 0 | 0 | 0 | 22 |
| 1990 | 0 | 6 | 0 | 6 | 0 | 11 | 28 | 22 | 16 | 11 | 0 | 0 | 0 | 18 |
| 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 |

Table 4 Unit 3 wolf harvest, by percent by transport method, 1988–2001

| | Percent of harvest | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Regulatory year | Airplane | Boat | 3/4 wheeler | Snowmachine | ORV | Highway vehicle | Other | n |
| 1988 | 10 | 70 | 0 | 0 | 0 | 20 | | 10 |
| 1989 | 0 | 77 | 5 | 0 | 0 | 18 | | 22 |
| 1990 | 0 | 72 | 0 | 17 | 0 | 11 | | 18 |
| 1991 | 4 | 69 | 0 | 0 | 0 | 22 | 6 | 51 |
| 1992 | 4 | 85 | 0 | 0 | 0 | 12 | | 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 | | 59 |
| 1997 | 2 | 85 | 2 | 0 | 2 | 9 | | 43 |
| 1998 | 6 | 74 | 0 | 0 | 0 | 20 | | 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 |

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# WOLF MANAGEMENT REPORT

From: July 1, 1999
To: June 30, 2002

## LOCATION

**GAME MANAGEMENT UNIT:** 5 (5800 $mi^2$)

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

## BACKGROUND

Lifelong residents of Yakutat report that wolves were present on the Yakutat Forelands prior to the immigration of moose in the early 1930s (ADF&G files). Klein (1965) suggested that wolves reached this area through the Alsek/Tatsenshini River valley. Interestingly, there were no reports of wolves on the west side of Yakutat Bay (Unit 5B) before 1971, well after moose were established there. However, based on anecdotal information, a viable wolf population was probably established there by 1976.

In winter 1977, Yakutat Area Wildlife Biologist R. Quimby estimated a minimum of 6 different wolf packs in Unit 5A, including 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 (pre-pupping), 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 felt wolf numbers were stable or increasing in Unit 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/early winter food source.

Because of the decline in moose numbers and the apparent predation on moose by wolves, an attempt was made to reduce wolf numbers from 1974–76. This effort was unsuccessful, with only 1 wolf killed during 31 hours of aerial hunting. Bad weather, rough terrain, and dense forest prevented a higher take.

There have been no attempts in recent years to quantify wolf numbers in Unit 5. However, anecdotal evidence collected from discussions with local hunters and trappers, hunting guides, pilots, and local ADF&G personnel suggests that wolves are distributed throughout Unit 5.

## 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. Our management strategy is to maintain wolf harvests at a level similar to the mean for the previous 5 seasons. No wolf control methods are contemplated for this area at this time.

## 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 1 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 the annual statewide trapper surveys.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

We collected insufficient data to make meaningful estimates of wolf populations within the unit. Although no quantitative data is available, anecdotal reports and discussions with local hunters, trappers, and pilots suggest wolf numbers are stable. Data we collected on pack size from hunters and trappers while sealing wolves ranged from 1–7 animals, with a mean pack size of 2.6 animals.

### MORTALITY

*Harvest*

| Seasons and Bag Limits | Residents and Nonresidents | |
|---|---|---|
| Hunting: | August 1–April 30 | 5 Wolves |
| Trapping: | November 10–April 30 | No Limit |

Board of Game Actions and Emergency Orders. No Board of Game actions were taken or emergency orders issued for this unit during the report period.

Hunter/Trapper Harvest. Difficult travel conditions and inconsistent weather (heavy snows often changing to rain) in the Yakutat area restricts hunting and trapping effort for wolves.

Only 3 wolves (1 male and 2 females) were taken in Unit 5 during the 1999 regulatory year (Table 1). This equaled 1997 as the lowest harvest in the past 10 years, but is likely a reflection of reduced trapping effort more than a scarcity of wolves. One trapper took one of these wolves, while 2 were harvested by hunters while on moose and bear hunts. The 10-year mean for previous years is 10 wolves/year (range = 3–24). The low trapper harvest of wolves mirrors the overall low trapping effort in 1999 that resulted in one of the lowest furbearer harvests in many years. In 2000, the harvest increased to 11 wolves (4 males, 7 females), with 5 being trapped and seven taken by hunters. The 2001 harvest was 6 wolves (4 males, 2 females); only 2 were trapped while hunters shot 4.

In the past, trapping and snaring were the primary method of take. The combined harvest for 1999–2001 was 20 wolves, with only 8 (40%) taken in traps or snares, while 12 (60%) were taken by hunters. Fifteen of the wolves were gray, 2 were black, one was white, and 2 were of unknown color.

Hunter/Trapper Residency and Success. In 1999, 2 nonlocal residents and 1 nonresident accounted for the entire wolf harvest. This is the first year in many that Yakutat residents did not take any wolves, and is largely due to the absence of a single trapper who generally accounts for much of the Yakutat trapping effort. In 2000, 5 local residents, 3 nonlocal Alaskans, and 3 nonresidents accounted for the harvest. In 2001, 3 local residents, one nonlocal Alaskan, and 2 nonresidents 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 year to year (Table 3). Because of the small harvest, 1 or 2 serious trappers using consistent transport methods dominate this category.

*Other Mortality*

There was one wolf killed at Icy Bay logging camp in Unit 5B after it attacked a child. Information about this incident suggests this wolf was being fed by people in the camp.

## 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 of Fish and Game 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 few deer and abundant beaver in the area, 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.

## LITERATURE CITED

KLEIN, DAVID R. 1965. Postglacial Distribution Patterns of Mammals in the Southern Coastal Regions of Alaska. Arctic, Vol. 18, No. 1. 4 pp.

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Barten, N. L. 2003. Unit 5 wolf management report. Pages 45–51 *in* C. Healy, editor. Wolf management report of survey and inventory activities 1 July 1999–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Unit 5 wolf harvest, 1988–2001

| Regulatory year | Males | Females | Unknown | Total |
|---|---|---|---|---|
| 1988 | 3 | 5 | 0 | 8 |
| 1989 | 7 | 6 | 0 | 13 |
| 1990 | 4 | 3 | 0 | 7 |
| 1991 | 8 | 3 | 0 | 11 |
| 1992 | 2 | 2 | 0 | 4 |
| 1993 | 6 | 3 | 0 | 9 |
| 1994 | 10 | 2 | 3 | 15 |
| 1995 | 6 | 3 | 0 | 9 |
| 1996 | 8 | 16 | 0 | 24 |
| 1997 | 2 | 1 | 0 | 3 |
| 1998 | 4 | 3 | 0 | 7 |
| 1999 | 1 | 2 | 0 | 3 |
| 2000 | 4 | 7 | 0 | 11 |
| 2001 | 4 | 2 | 0 | 6 |
| Mean annual harvest | 4.9 | 4.1 | 0.2 | 9.3 |

Table 2 Unit 5 wolf harvest chronology by month, 1988–2001

| Regulatory year | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1988 | | | | 1 | 1 | 1 | | 2 | | | | |
| 1989 | | | | 1 | 1 | | | | | 2 | 4 | |
| 1990 | | 2 | 1 | 1 | 1 | | 1 | | | 1 | 2 | |
| 1991 | | 4 | 1 | | | 1 | | 3 | 3 | 1 | 2 | |
| 1992 | | | 1 | 1 | | | | | | 2 | | |
| 1993 | | | | | | 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 | | | | 1 | | | 2 | 1 | 2 | 3 | | |
| 2001 | | | | | | | | | | 1 | | |
| Mean annual harvest | 0 | 0.3 | 1.7 | 0.9 | 0.5 | 0.6 | 0.9 | 0.9 | 1.8 | 1.4 | 0.6 | 0 |

Table 3 Unit 5 wolf harvest, percent by transport method, 1988–2001

| Regulatory year | Airplane | Dogsled, skis, & snowshoes | Boat | 3 or 4 wheeler | Snow-machine | ORV | Highway vehicle | Unknown |
|---|---|---|---|---|---|---|---|---|
| 1988 | 88 | | | 12 | | | | |
| 1989 | 38 | | 8 | 15 | | 8 | 31 | |
| 1990 | 43 | | 43 | | 14 | | | |
| 1991 | 46 | 8 | | 38 | | | | |
| 1992 | 75 | | 25 | | | | | |
| 1993 | 44 | | | | | | | |
| 1994 | 7 | | | | | 8 | | |
| 1995 | 44 | | | 11 | | | 33 | 11 |
| 1996 | 25 | 22 | | 75 | | 33 | | |
| 1997 | 67 | 2 | 33 | | | 5 | | |
| 1998 | 86 | | 14 | | | | | |
| 1999 | 67 | | | | | | 33 | |
| 2000 | 37 | 18 | | 27 | | | | |
| 2001 | 67 | | 33 | | | | | |
| | | | | | | 18 | | |

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# WOLF MANAGEMENT REPORT

From: July 1, 1999
To: June 30, 2002

## LOCATION

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

**GEOGRAPHIC DESCRIPTION:** Prince William Sound and North Gulf Coast

## BACKGROUND

Gray wolves are endemic to the mainland areas of Unit 6. During the early and mid-20th century, wolves occurred at low densities (Nelson, G.B. 1934). Heller (1910) reported tracks in Nelson Bay in eastern Unit 6D, and locals indicated that wolves were present east of Nelson Bay in Unit 6C. The only ungulate prey available during this period were mountain goats. However, salmon, beaver and waterfowl are also important prey for coastal wolves (Carnes et al. 1996). Railroad, oil and coal development projects on the Copper and Bering River Deltas during the early 1900s may have impacted wolf numbers as human access into these areas increased.

Additional ungulate prey became available in during the mid 1900s as a result of successful Sitka black-tailed deer and moose introductions (Burris and McKnight 1973). Deer were introduced during 1916–1923 to islands of Prince William Sound, which subsequently established populations on the mainland of eastern Unit 6D (Nelson, G.B. 1932). Moose calves were released on the Copper River Delta during 1949–1958 and the herd rapidly grew and expanded eastward toward Cape Yakataga. However, wolves were rare in Unit 6 through the 1950s, with few bounties paid on wolves during the years of predator control from the 1940s through 1960s (Robards FC. 1955, Reynolds 1973). Predator control on interior populations may have prevented wolves from colonizing Unit 6 prior to the 1970s.

Wolves began to increase and disperse during the 1970s in areas of Unit 6 where moose were established. By 1973, a pack of 15–20 wolves occupied Unit 6B, from which 6 were harvested (Reynolds 1973). Reynolds (1979) reported that mountain goats had declined by 50% between 1970 and 1978 in the mountains of Units 6B and western 6A, attributing the decline to predation by wolves. I suspect that lack of escape terrain, naïve goats, and a switch from compensatory to additive hunting pressure contributed to the goat decline. Wolf numbers apparently peaked in the late 1980s (Griese 1990), then declined and stabilized at a lower density during the 1990s (Carnes et al. 1996, Nowlin 1997). During the 1990s, three of five goat populations in Units 6B and western 6A recovered to pre-wolf levels. The other 2 populations are in marginal goat habitat with limited escape terrain.

## 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

I estimated population size and distribution of wolves before the trapping season using incidental observations by staff, trappers, hunters and guides. The U.S. Forest Service studied wolves in Units 6A, 6B and 6C during 1992–96 using radiotelemetry (Stephenson et al. 1993, Carnes et al. 1996). I assumed that pack distribution has remained similar to that described by Carnes et al. (1996).

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 pack size. I also used basic modeling (in spreadsheet form) to make a best guess at sizes for those packs not observed for several years but where harvest has occurred. My model assumptions were 1–2 pups recruited per year per pack (5 pups per litter with 30% survival) and 10–15% non-hunting mortality on adults. I adjusted pack models to fit opportunistic field observations taken during moose surveys or by experienced guides.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

The wolf population was approximately 42–60 during 2001–02, composed of 10 packs and loners. Numbers were relatively stable over the past 5 years (Table 1).

*Distribution*

Unit 6A had approximately 21–31 wolves in 5 packs: Icy Bay (2–4 wolves), White River (3–4), Tsiu River (6–9), Suckling Hills (7–9), and Bering River (2–6). Unit 6B had 12–14 wolves in 2 packs: Martin River (5–6), and Russian River (7–8). Unit 6D had 10–14 wolves in 3 packs: Rude River (3–4), Lowe River (4–6), and Wortmanns Glacier (3–4). Pack size and distribution in Unit 6D remains speculative.

Unit 6C had only 1–3 wolves during the reporting period. For 8–10 years (circa 1987–1996) there were 2 packs present in 6C. Easy access by trappers and hunters from Cordova ultimately caused the decline and break-up of these packs (Carnes et al. 1996), leaving Unit 6C with brown bears as the only important predators. The average proportion of calves in the moose population during 1996–2001 was 18% in Unit 6C, compared to 12% in Units 6A and 6B, where both wolf and bear predation occur.

Wolves have not become established on major islands in Unit 6D. Deer would be adequate prey for wolves, as they are in Southeast Alaska. Wolves or wolf sign have been occasionally

reported on Hawkins and Hinchinbrook Islands, both 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 who may conduct wolf control opportunistically. However, no legal kills have ever been reported from the islands.

### MORTALITY

*Harvest*

Season and Bag Limit. The hunting season was from 10 August to 30 April, with a bag limit of 5 wolves. The trapping season was 10 November to 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 2–13 wolves (25 total), composed of 33–50% females (Table 2). Six wolves were trapped, 17 shot, and a vehicle hit 1. Total estimated unreported and illegal harvest was 4–5. Harvest of 13 wolves during 2000–01 was the highest on record, although it included 1 road kill from Unit 6C. One wolf was killed in April 2000 after it attacked a 6 year-old boy at the Icy Bay logging camp (McNay 2002).

Hunter Residency and Success. The number of successful hunters and trappers was 2–9 (Table 2). Poor snow and trapping conditions during 2001–02 resulted in only 2 wolves being killed. Unit 6B, where most wolf harvest occurs, was inaccessible for most of that season.

Harvest Chronology. Wolves were taken throughout the season during the reporting period (Table 3).

Transport Methods. During this reporting period the primary methods of transportation were airplanes, snowmachines and highway vehicles (Table 4). Two wolves were taken by boat during 1999.

## CONCLUSIONS AND RECOMMENDATIONS

The population objective was achieved. Number of packs exceeded the minimum of 5. The wolf population was lightly harvested and sustained the take of 10 animals specified in the objective. No management changes are recommended.

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

Crowley, D. W. 2003. Unit 6 wolf management report. Pages 52–57 *in* C. Healy, editor. Wolf management report of survey and inventory activities 1 July 1999–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Unit 6 fall wolf population estimates[a], 1997–02

| Regulatory Year | Population estimate | Number of packs | Basis of estimate |
|---|---|---|---|
| 1997/98 | 44–60 | 9 | b,c |
| 1998/99 | 51–68 | 8 | b,c |
| 1999/00 | 55–71 | 9–11 | b |
| 2000/01 | 52–67 | 9–11 | b |
| 2001/02 | 44–62 | 9–11 | b |

[a] Pre-trapping season.

[b] Incidental observations, harvest locations, basic modeling

[c] US Forest Service, Cordova Ranger District telemetry

Table 2 Unit 6 wolf harvest, 1997–02

| Regulatory | Reported harvest | | | | Estimated harvest | | Method of take | | | Successful |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | M | F | (%) | Total | Unreported | Illegal | Trap/snare | (%) | Shot | Total trap/hunt |
| 1997/98 | 4 | 2 | (33) | 6 | 2 | 2 | 3 | (60) | 2 | 4 |
| 1998/99 | 2 | 4 | (67) | 6 | 2 | 2 | 1 | (20) | 4 | 5 |
| 1999/00 | 7[a] | 3 | (33) | 10 | 2 | 2 | 0 | (0) | 9 | 9 |
| 2000/01[b] | 7 | 4 | (36) | 13 | 1 | 1 | 5 | (42) | 7 | 7 |
| 2001/02 | 1 | 1 | (50) | 2 | 2 | 4 | 1 | (50) | 1 | 2 |

[a] One road kill, 1 DLP from Icy Bay attack

[b] Two of unknown sex, 1 unknown methods

Table 3 Unit 6 wolf harvest chronology percent, 1997–02

| Regulatory Year | Harvest periods | | | | | | | | | *n* |
|---|---|---|---|---|---|---|---|---|---|---|
| | August | September | October | November | December | January | February | March | April | |
| 1997/98 | 0 | 0 | 0 | 20 | 20 | 20 | 20 | 0 | 20 | 6 |
| 1998/99 | 0 | 33 | 33 | 0 | 0 | 0 | 0 | 33 | 0 | 6 |
| 1999/00 | 0 | 22 | 22 | 0 | 0 | 11 | 11 | 22 | 11 | 9 |
| 2000/01 | 0 | 8 | 0 | 23 | 15 | 0 | 23 | 23 | 8 | 13 |
| 2001/02 | 0 | 0 | 50 | 0 | 0 | 50 | 0 | 0 | 0 | 2 |

Table 4 Unit 6 wolf harvest percent by transport method, 1997–02

| Regulatory Year | Percent of harvest | | | | | | *n* |
|---|---|---|---|---|---|---|---|
| | Airplane | Dogsled skis Snowshoes | Boat | Snow-machine | ORV | Highway vehicle | |
| 1997/98 | 20 | 20 | 0 | 60 | 0 | 0 | 5 |
| 1998/99 | 50 | 0 | 0 | 0 | 0 | 50 | 6 |
| 1999/00[a] | 0 | 0 | 22 | 11 | 22 | 33 | 9 |
| 2000/01 | 15 | 0 | 0 | 15 | 0 | 0 | 13 |
| 2001/02 | 50 | 0 | 0 | 0 | 50 | 0 | 2 |

[a]One unknown

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 recent documentation was in 1961 when Jack Didrickson (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, 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 refuge was closed to aircraft.

An infestation of biting lice (*Trichodectes canis*) was identified from 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 common; using acceptable means we have little chance to control the parasite.

Following exhaustive searches over the years, infested wolves were found only on the Kenai Peninsula until December 1998 when they were discovered in Units 14 and 16. Three packs, totaling approximately 28 animals, were identified with *T. canis.* Treatment efforts by the department and harvesting of wolves by local trappers from these packs dealt with most of the infested wolves.

## 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

Experienced pilots and observers conducted aerial surveys during November and December but only under suitable snow and tracking conditions. Local trappers provided additional information concerning wolf pack distribution and size for unsurveyed areas. We monitored harvest by sealing the pelts of harvested wolves.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

Wolf surveys were not conducted over the entire Kenai Peninsula because of unfavorable snow conditions during early winter. Harvest data, observations by department staff, and reports from trappers indicated the number of wolves probably increased from previous years. However, lacking complete survey data, the estimated population for Units 7 and 15 remained at 200 wolves in 20 packs (Tables 1 and 2).

### MORTALITY

*Harvest*

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

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

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

Hunter/Trapper Harvest. Thirty-eight wolves were killed during the hunting and trapping seasons in 1999–00, 63 in 2000–01 and 37 during 2001–02 in Units 7 and 15 (Table 3). Females accounted for 42% (n=16), 54% (n=34) and 54% (n=20) of the harvest during these years respectively (Tables 4 and 5). The mean annual harvest (46) for these 3 years represented an annual harvest rate of 23% of the estimated population.

The combined harvest for 1999–00 to 2001–02 of 138 wolves, included 83 (60%) taken by trapping or snaring, 50 (36%) by ground shooting and 5 (4%) from unidentified methods (Tables 4 and 5).

Harvest Chronology. The combined monthly harvest chronology for 1999–00 to 2001–02 (Table 6) was August, 8 (6%); September, 15 (11%); October, 12 (9%); November, 18 (13%); December, 16 (12%); January, 19 (14%); February, 17 (12%); March, 26 (19%), and Other, 7 (5%).

## CONCLUSIONS AND RECOMMENDATIONS

A mean annual harvest of 46 wolves during the past 3 years represents 23% of the early winter population estimate of 200 for Units 7 and 15. With this low rate of harvest, the wolf population will probably be controlled by prey abundance, increased dispersal, and natural mortality.

The department and the US 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 these permit conditions on the refuge, a limited season on lynx harvest by the Board of Game, and the poor quality of lice-infested wolf pelts.

I recommend that we discontinue the quota system for Unit 15A. With low effort and harvest (average 8 from 1997–2002), it is not warranted or cost effective. The management strategy for Unit 15A essentially mandates 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. The increased harvest in 2000–01 was probably the result of good trapping conditions (snow cover and weather patterns) and possibly an increase in wolf density. Wolf survival probably increased during the severe winters of 1997–98, 1998–99 and 2000–01 when large numbers of moose died from winter stress. Allowable harvest should not exceed 35% or a 3-year mean annual harvest of 70 wolves.

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Selinger, J. 2003. Units 7 & 15 wolf management report. Pages 58–65 *in* C. Healy, editor. Wolf management report of survey and inventory activities 1 July 1999–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1. Unit 7 fall wolf population estimate[a], 1994–2002

| Year | Population estimate | Number of packs | Basis of estimate |
|---|---|---|---|
| 1994–95 | 45 | 6 | b |
| 1995–96 | 45 | 6 | b |
| 1996–97 | 45 | 6 | b |
| 1997–98 | 45 | 6 | b |
| 1998–99 | 45 | 6 | b |
| 1999–00 | 45 | 6 | b |
| 2000–01 | 45 | 6 | b |
| 2001–02 | 45 | 6 | b |

[a] Fall estimate = pretrapping season population.
[b] Estimates derive from incidental observations of staff, sealing records, and reports from public.

Table 2. Unit 15 fall wolf population estimates[a], 1994–2002

| Year | Population estimate | Number of packs | Basis of estimate |
|---|---|---|---|
| 1994–95 | 155 | 14 | b |
| 1995–96 | 155 | 14 | b |
| 1996–97 | 155 | 14 | b |
| 1997–98 | 155 | 14 | b |
| 1998–99 | 155 | 14 | b |
| 1999–00 | 155 | 14 | b |
| 2000–01 | 155 | 14 | b |
| 2001–02 | 155 | 14 | b |

[a] Fall estimate = pretrapping season population.
[b] Results of research and management studies in addition to incidental observations and trapper reports.

Table 3. Known wolf mortality in Units 7 and 15, 1994–2002

| | Unit | | | | |
|---|---|---|---|---|---|
| Year | 7 | 15A | 15B | 15C | Total |
| 1994–95 | 7 | 7 | 3 | 3 | 20 |
| 1995–96 | 17 | 6 | 10 | 9 | 42 |
| 1996–97 | 9 | 10 | 5 | 6 | 30 |
| 1997–98 | 7 | 7 | 2 | 8 | 24 |
| 1998–99 | 13 | 9 | 7 | 21 | 50 |
| 1999–00 | 15 | 7 | 3 | 13 | 38 |
| 2000–01 | 32 | 7 | 12 | 12 | 63 |
| 2001–02 | 7 | 12 | 4 | 14 | 37 |

Trapping season 10 November–28 February.

Table 4 Unit 7 wolf harvest, 1994–2002

| Regulatory year | Reported Harvest | | | Method of Take | | | Successful Trappers/hunters |
|---|---|---|---|---|---|---|---|
| | M | F(%) | Unk | Trap/snare (%) | Shot | Unk | |
| 1994–95 | 3 | 4(57) | 0 | 3(43) | 4 | 0 | 6 |
| 1995–96 | 11 | 5(31) | 1 | 11(65) | 6 | 0 | 12 |
| 1996–97 | 3 | 6(67) | 0 | 5(63) | 3 | 1 | 7 |
| 1997–98 | 6 | 1(17) | 0 | 4(57) | 3 | 0 | 6 |
| 1998–99 | 8 | 3(27) | 1 | 7(58) | 5 | 0 | 10 |
| 1999–00 | 10 | 5(33) | 0 | 11(73) | 4 | 0 | 7 |
| 2000–01 | 14 | 18(56) | 0 | 22(69) | 10 | 0 | 14 |
| 2001–02 | 2 | 5(71) | 0 | 6(86) | 1 | 0 | 5 |

Table 5 Unit 15 wolf harvest, 1994–2002

| Regulatory year | Reported Harvest | | | Method of Take | | | Successful Trappers/hunters |
|---|---|---|---|---|---|---|---|
| | M | F(%) | Unk | Trap/snare (%) | Shot | Unk | |
| 1994–95 | 5 | 7(67) | 1 | 9(69) | 4 | 0 | 9 |
| 1995–96 | 11 | 14(56) | 0 | 12(48) | 13 | 0 | 17 |
| 1996–97 | 12 | 9(43) | 0 | 10(48) | 10 | 1 | 17 |
| 1997–98 | 8 | 9(53) | 0 | 7(41) | 10 | 0 | 14 |
| 1998–99 | 17 | 17(50) | 3 | 19(53) | 17 | 1 | 27 |
| 1999–00 | 12 | 11(48) | 0 | 10(48) | 11 | 2 | 17 |
| 2000–01 | 15 | 16(52) | 0 | 18(60) | 12 | 1 | 18 |
| 2001–02 | 15 | 15(50) | 0 | 16(57) | 12 | 2 | 21 |

Table 6 Harvest chronology for wolves in Units 7 and 15, 1994–2002

| | Month | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Other | Total |
| 1994–95 | 0 | 5 | 0 | 1 | 5 | 1 | 7 | 1 | 0 | 20 |
| 1995–96 | 4 | 2 | 1 | 4 | 12 | 8 | 4 | 7 | 0 | 42 |
| 1996–97 | 1 | 4 | 0 | 1 | 3 | 9 | 8 | 3 | 1 | 30 |
| 1997–98 | 0 | 3 | 4 | 0 | 5 | 4 | 3 | 0 | 5 | 24 |
| 1998–99 | 1 | 3 | 0 | 3 | 4 | 14 | 11 | 9 | 4 | 49 |
| 1999–00 | 2 | 4 | 6 | 6 | 3 | 4 | 1 | 12 | 0 | 38 |
| 2000–01 | 5 | 6 | 2 | 10 | 9 | 8 | 9 | 9 | 5 | 63 |
| 2001–02 | 1 | 5 | 4 | 2 | 4 | 7 | 7 | 5 | 2 | 37 |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 long term 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 in 1996, and appear to have declined slightly since then. 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 to about 6,300 in 2001. 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 starting in the late 1990s the herd has grown to about 1,200 by 2001. The Southern Alaska Peninsula Caribou Herd (SAPCH) peaked at over 10,000 in 1983, and then declined to 2000 by 1995. This segment of the SAPCH has recovered to about 3900 by 2002.

## 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 was impractical to set a management goal based on a desired wolf density or total population when there is no feasible way to measure whether we were 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, I estimate that 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 to 30 April, and the bag limit was 5 wolves. The trapping season in Units 9 and 10 was 10 November to 31 March with no bag limit.

Board of Game Actions and Emergency Orders. In March 2003 the Board changed the hunting bag limit to 10 per day with not seasonal limit.

Hunter/Trapper Harvest. The wolf harvest for 1999–00, 2000–01, and 2001–02 were 142, 30, and 106, respectively, in Units 9 and 10 (Table 1). Two wolves were sealed from Unit 10 in 2000 and 1 wolf was sealed in 2001.

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. Harvest chronology continues to peak December–March (Table 2).

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

*Other Mortality*

One rabid wolf was confirmed in Port Heiden, and a number of rabid red foxes and 1 coyote were reported elsewhere in Unit 9E during 1998. No significant out breaks of rabies has 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. I recommend no regulatory changes.


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


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**TABLE 1 UNITS 9 AND 10 WOLF HARVEST, 1999–00 THROUGH 2001–02**

| Regulatory | Reported harvest | | | | Method of take | | | Successful |
|---|---|---|---|---|---|---|---|---|
| Year | M | F | Unk | Total | Trap/Snare | Shot | Unk | Trappers/Hunters |
| 1997–98 | 36 | 30 | 6 | 72 | 51 | 21 | 0 | 43 |
| 1998–99 | 57 | 32 | 2 | 91 | 60 | 25 | 6 | 41 |
| 1999–00 | 74 | 61 | 7 | 142 | 31 | 111 | 0 | 57 |
| 2000–01 | 17 | 13 | 0 | 30 | 7 | 21 | 2 | 23 |
| 2001–02 | 59 | 44 | 3 | 106 | 28 | 78 | 0 | 44 |

Table 2 Units 9 and 10 wolf harvest chronology percent, 1999–00 through 2001–02

| Regulatory Year | August | September | October | November | December | January | February | March | April | *n* |
|---|---|---|---|---|---|---|---|---|---|---|
| 1997–98 | 0 | 10 | 11 | 7 | 15 | 24 | 28 | 3 | 3 | 72 |
| 1998–99 | 1 | 1 | 1 | 0 | 3 | 24 | 24 | 34 | 3 | 91 |
| 1999–00 | 0 | 7 | 5 | 1 | 9 | 41 | 19 | 15 | 1 | 138 |
| 2000–01 | 0 | 20 | 13 | 3 | 17 | 30 | 17 | 0 | 0 | 30 |
| 2001–02 | 0 | 11 | 7 | 5 | 12 | 18 | 37 | 9 | 1 | 106 |

Table 3 Units 9 and 10 wolf harvest percent by transport method, 1999–00 through 2001–02

| Regulatory Year | Airplane | Dogsled Skis Snowshoe | Boat | 3- or 4-Wheeler | Snowmachine | ORV | Highway Vehicle | Unknown | *n* |
|---|---|---|---|---|---|---|---|---|---|
| 1997–98 | 32 | 0 | 0 | 21 | 39 | 3 | 5 | 0 | 72 |
| 1998–99 | 3 | 0 | 0 | 7 | 78 | 0 | 4 | 8 | 91 |
| 1999–00 | 12 | 0 | 1 | 1 | 85 | 0 | 0 | 1 | 142 |
| 2000–01 | 20 | 0 | 3 | 17 | 33 | 0 | 7 | 10 | 30 |
| 2001–02 | 15 | 0 | 0 | 15 | 63 | 0 | 1 | 5 | 106 |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 abundant (McIlroy 1974) with 1 wolf/80 $mi^2$ (4.8 wolves/1000$km^2$), and a unit population of 100–125 animals. Unitwide population estimates were initiated in 1985. In the late 1980s wolf numbers were high, averaging an estimated 106 wolves in the spring. During the period between 1991 and 2001, wolf numbers were stable but lower with an average spring estimate of 81 wolves.

Although the size of wolf harvests before mandatory sealing is 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 26 wolves per year, ranging widely from 6 to 51 wolves per year.

## MANAGEMENT DIRECTION

### MANAGEMENT OBJECTIVES

- To maintain a minimum posthunting and trapping season population of 75 wolves.

- The human-use objective is to allow limited human harvests when they do not conflict with management goals for the unit or objectives for the population.

## METHODS

We monitor 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 from 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*

Wolf numbers are currently higher than the 10-year (1991–2000) mean population estimate of 80 wolves in Unit 11. The spring population estimate for Unit 11 increased by 23%, going from 80 to 90 (15 packs) in 2001 to 100–110 (14 packs) in 2002 (Table 1).

*Distribution and Movements*

Wolf numbers were higher in the northern portions of the unit, especially from the Dadina River northeast to the Copper River. Caribou were available to wolves at least part of the year in this area, and moose were more abundant than in the southern portions of the unit. Telemetry data during the winter of 1996–97 showed some wolves also use the higher elevations, suggesting they also target sheep as prey. Wolf numbers in the lower Chitina river valley remain lower than in the northern portion of the unit because caribou are absent and moose less abundant. Wolves heavily utilized sheep and mountain goats in the lower Chitina Valley, but because of their smaller body size and the difficult terrain, these prey did not support as large a wolf population.

### MORTALITY

*Harvest*

Season and Bag Limit. The hunting season in Unit 11 was from 10 August to 30 April and the bag limit was 5 wolves. Trapping season was from 10 November to 31 March and there was no bag limit.

Board of Game Actions and Emergency Orders. In 1993 the Board of Game passed a regulation allowing trappers to shoot wolves same-day-airborne if the trapper was 300 feet away from the aircraft before shooting. Methods and means for taking wolves in Unit 11 remained unchanged until Proposition 3 passed during the November 1996 general election. This referendum prohibited taking of wolves the same-day-airborne unless the wolf was in a trap or snare, effective 25 February 1997.

Hunter/Trapper Harvest. Hunters and trappers harvested 23 wolves from Unit 11 during the 2001–02 season (Table 2). Harvests during this reporting period fluctuated between years but the 5-year average take of 28 wolves was similar to the 26 wolf average harvest since 1972, when sealing of wolves became a requirement. Males composed 48% of the take during this reporting period, down slightly from 54% of the reported harvest during 1992–96. Hunters and trappers reported taking most of the wolves from either the Nabesna Road or along the Copper River. This harvest pattern was similar to past years when harvests were near areas with easy access.

The harvest methods for wolves killed in Unit 11 over the past 5 years are provided in Table 2. Over the period 1997–2002, trapping and snaring accounted for 93% of the harvest for which the method of take was known. Prior to 1987, when land-and-shoot was legal, this harvest method was popular and accounted for 25% of the wolf harvest between 1980 and 1987. Unreported and illegal harvests were minimal during the reporting period.

Hunter/Trapper Residency and Success. During the 2000–01 season, 8 individuals sealed an average of 2.9 wolves from Unit 11. During the preceeding 5 seasons, the average harvest was 3.1 wolves per individual. Most individuals sealing wolves from Unit 11 live in the unit or in rural communities adjacent to the unit.

Harvest Chronology. Table 3 presents the harvest chronology for wolves over the past 5 years. The proportion of the harvest by month has varied yearly, but January and February had the highest harvest. 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 months, presumably by big game hunters, has ranged from 1 to 4 since 1985 and includes most of the nonresident take for trophies.

Transport Methods. The method of transport used in harvesting wolves has only been recorded on sealing certificates since 1985. In Unit 11 most wolves have been taken with the use of snowmachines (Table 4). The use of aircraft has declined since land-and-shoot became illegal. Trappers who use aircraft to fly out and make sets have taken very few wolves, although aircraft can be used effectively to find wolf kills, and a trapper can land and set snares for returning wolves at the kill site. Most aircraft use was by hunters who took a wolf incidentally while on fly-in hunting trips for other big game.

### NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Wolf estimates are difficult to assess in Unit 11. All wolf estimates for the unit are based on pack or track sightings by department staff, hunters, trappers, and the public. Track surveys have been done only periodically and in different locations since 1978. The lack of a systematic survey method hampers efforts to estimate wolf numbers. Even establishing a yearly trend area will not assure yearly population estimates. The occurrence of high winds in Unit 11 often obscures tracks or blows snow to the extent that surveys are not feasible. The use of radiocollared wolves would provide more accurate information on wolf numbers in this unit.

## CONCLUSIONS AND RECOMMENDATIONS

The number of wolves estimated to inhabit Unit 11 increased slightly the last two years of this report period. Between 1991 and 2000, wolf population estimates for Unit 11 were relatively stable with some yearly fluctuations as a direct result of survey effort and snow conditions that affect survey results. However, wolf estimates in Unit 11 are considered a minimum because of the limited data available for many large areas in the unit.

Harvests have varied between 23 and 36 wolves over the last 5 years in Unit 11. The wolf harvest rate for this period was 26% of the estimated fall population. Because the number of trappers taking wolves in Unit 11 is low, individual effort and weather conditions affect the harvest more than changes in wolf abundance. Most wolf harvest in Unit 11 is concentrated near access points and inhabited areas where trappers live. High harvest rates concentrated in these areas could result in localized population declines. In vast portions of the unit, however, wolves are not hunted or trapped. The reasons are that aircraft use is illegal, much of the unit is without roads, and physical barriers such as large rivers and mountains limit snowmachine and ORV travel. Current low harvest levels are not thought to limit the wolf population. The availability of prey is considered the limiting factor in wolf abundance in Unit 11.

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Table 1. Unit 11 fall and spring wolf population estimates[a], 1997–2002.

| | Population estimate | | | |
|---|---|---|---|---|
| Year | Fall | pring | Packs | Basis of estimate |
| 1997–1998 | 85–105 | 70–85 | 10 | b, c |
| 1998–1999 | 100–125 | 70–85 | 10 | b, c |
| 1999–2000 | 100–115 | 60–75 | 15 | b, c |
| 2000–2001 | 100–110 | 80–90 | 15 | b, c |
| 2001–2002 | 100–115 | 100–110 | 14 | b, c |

S

[a] Fall estimate = pretrapping season population.
[b] Fall estimates based on known spring pack sizes, mean birth rate of 5–6.5 pups/pack, a pup survival rate of 0.82 and fall sightings.
[c] Basis of spring estimate is from limited track surveys, incidental observations, reports from public, and sealing records.

Table 2. Unit 11 wolf harvest, 1997–2002.

| Regulatory | Reported harvest | | | | | | | Estimated Harvest | | Method of Take | | | | | | Successful trappers/ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | M | % | F | % | Unk | % | Total | Unreported | Illegal | Trap/ snare | % | Shot | % | Unk | % | Hunters |
| 1997–1998 | 11 | (44) | 12 | (48) | 2 | (8) | 25 | 2 | 3 | 24 | (96) | 1 | (4) | 0 | 0 | 11 |
| 1998–1999 | 16 | (44) | 16 | (44) | 4 | (11) | 36 | 2 | 3 | 35 | (97) | 1 | (3) | 0 | 0 | 9 |
| 1999–2000 | 16 | (70) | 7 | (30) | 0 | (0) | 23 | 2 | 3 | 21 | (91) | 2 | (9) | 0 | 0 | 11 |
| 2000–2001 | 18 | (51) | 17 | (49) | 0 | (0) | 35 | 2 | 3 | 31 | (89) | 4 | (11) | 0 | 0 | 14 |
| 2001–2002 | 6 | (26) | 17 | (74) | 0 | (0) | 23 | 2 | 3 | 21 | (91) | 2 | (9) | 0 | 0 | 8 |

a In 1997,

Table 3. Unit 11 wolf harvest percent chronology by month, 1997–2002.

| Regulatory | Harvest periods | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | August | September | October | November | December | January | February | March | April | *n* |
| 1997–1998 | 0 | 0 | 0 | 20 | 8 | 28 | 36 | 8 | 0 | 25 |
| 1998–1999 | 0 | 3 | 0 | 8 | 8 | 53 | 17 | 11 | 0 | 36 |
| 1999–2000 | 0 | 9 | 0 | 0 | 22 | 30 | 13 | 26 | 0 | 23 |
| 2000–2001 | 9 | 3 | 0 | 11 | 17 | 49 | 11 | 0 | 0 | 35 |
| 2001–2002 | 4 | 0 | 0 | 0 | 4 | 9 | 43 | 39 | 0 | 23 |

Table 4. Unit 11 wolf harvest percent by transport method, 1997–2002

| | Percent of Harvest | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Regulatory year | Airplane | Dog sled skis/ Snowshoes | Boat | 4-wheeler | Snowmachine | ORV | Highway Vehicle | Unknown | *n* |
| 1997–1998 | 4 | 4 | 0 | 0 | 88 | 0 | 3 | 0 | 25 |
| 1998–1999 | 3 | 6 | 0 | 0 | 88 | 0 | 3 | 0 | 36 |
| 1999–2000 | 0 | 0 | 0 | 9 | 91 | 0 | 0 | 0 | 23 |
| 2000–2001 | 23 | 6 | 0 | 0 | 69 | 0 | 3 | 0 | 35 |
| 2001–2002 | 17 | 9 | 0 | 4 | 70 | 0 | 0 | 0 | 23 |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## LOCATION

GAME MANAGEMENT UNIT: 12 (9978 $mi^2$)

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

## BACKGROUND

Historically, the Unit 12 wolf population fluctuated dramatically in response to federal and state predator control programs, ungulate prey abundance, and harvest. During the 1940s, wolves were abundant but numbers were reduced by a federal control program conducted between 1948 and 1960. Also, prior to 1960, local residents commonly killed wolf pups at dens, which maintained wolf populations at low levels near human settlements. After 1960 the wolf population increased rapidly and remained high until the mid 1970s. About 1975 the wolf population declined substantially due to prey shortages (DV Grangaard, personal observation). Since 1975 the moose and wolf populations in Unit 12 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 price 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), but since the mid 1970s unitwide moose densities have been low. Throughout the 1980s, local residents requested the Board of Game to conduct wolf control to benefit the depressed 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. The department did conduct wolf control within the northwestern portion of Unit 12 between 1981 and 1983.

# 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 30 October 1991 and revised 29 June 1993. Those goals are to:

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

## MANAGEMENT OBJECTIVE

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

## MANAGEMENT ACTIVITIES

- Monitor harvest through sealing records and trapper questionnaires.
- Estimate wolf pack sizes and number of packs in selected areas within Unit 12.
- Cooperate with any ongoing wolf studies conducted by the US Fish and Wildlife in Tetlin National Wildlife Refuge.

In 1998 the moose population in Unit 12 was designated by the Board of Game to be important for high levels of human consumptive use under the intensive management law (AS 16.05.255[e]–[g]). This designation means that the board must consider intensive management if regulatory action to significantly reduce the Unit 12 moose harvest becomes necessary because the population is depleted or has reduced productivity. If wolf control becomes necessary in the future to comply with this law, Unit 12 wolf population objectives will be changed.

# METHODS

## ESTIMATING WOLF POPULATION SIZE

Since 1980 the late winter wolf population estimates were based upon sightings of wolves and wolf tracks observed during aerial surveys (Stephenson 1978; Gasaway et al. 1983). Trapper and pilot reports and trapper questionnaire results were compiled and contributed to population estimates where complete aerial surveys were not flown. Estimates of wolf numbers were increased by 10% to account for lone wolves present but not found (Mech 1973). All wolf packs having territories that were 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 pack size for 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.

During winter 2000–2001, in cooperation with Yukon Department of Environment, we conducted aerial wolf surveys (Stephenson 1978) within the Chisana caribou herd's range. During winter 2002–2003 we developed a wolf population trend area of 4600 $mi^2$ encompassing portions of Units 12, 20E, and 20D. We plan to survey the trend area annually to monitor wolf population trends.

The trend area includes areas with varying densities of moose and caribou and different trapping intensities. We plan to use trends in wolf densities within the 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 survey area, we estimated that portion of their home range within the survey area based on track segments found within vs. outside. We used the estimated percent of home range within the study area as a multiplier to adjust packs size for those boundary packs. For example, if 50% of the track segments from a pack of 10 ranged inside and 50% outside the study area, we use a pack size of 5 for that pack's contribution to the study area wolf population estimate.

### Determining Wolf Population Characteristics

Wolf research was not conducted in Unit 12 during the report period.

### Harvest Monitoring

Wolves taken in Alaska must be sealed by an ADF&G representative or appointed fur sealer. During the sealing process, information is obtained on the date and specific location of take, sex, color of pelt, estimated size of the wolf pack, method of take, and access used. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY01 = 1 Jul 2001 through 30 Jun 2002).

## RESULTS AND DISCUSSION

### Population Status and Trend

*Population Size*

During the past 15 years, Unit 12 wolf numbers have fluctuated with prey availability and harvest rates. Gardner (2000) described wolf population trends during RY88–RY98. During RY96–RY98, the Unit 12 autumn wolf population was estimated at 223–237 wolves (Table 1), a 22% increase from the previous report period. We did not conduct thorough

enough surveys in Unit 12 to directly compare the wolf population trend during this report period with previous estimates.

During RY99–RY02 we collected area-specific estimates and individual pack size estimates. We used changes in individual pack size and composition as an indicator of population trend. We were able to compare pack size and color composition of 10 packs during RY01 and RY02 and found that 6 packs increased, 3 declined, and 1 remained at the same number of wolves. The 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.

During February 2001 we conducted a wolf survey within the range of the Chisana caribou herd (including Yukon, Canada). We found 89–97 wolves in 18 packs (2–13 wolves/pack) in a 19,008-$km^2$ area. The density estimate after factoring in 10% for single wolves was 5.4 wolves/1000 $km^2$ (14 wolves/1000 $mi^2$). 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 6.1/1000 $km^2$ (15.8 wolves/1000 $mi^2$). 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 (6.7 and 5.6 wolves/1000 $km^2$, respectively). Caribou and Dall sheep numbers have declined in the Chisana area (Gardner 2002b; Gardner 2003 [in press]) and presumably the ungulate prey base was lower in 2000 compared to the 1980s, however, wolf density has not changed, suggesting that moose are the primary prey of wolves in this area and caribou and Dall sheep act as alternate prey. Seip (1992) has shown how wolf predation can have large effects on caribou when moose are present and are the primary prey.

In winter 2002–2003 we conducted a reconnaissance wolf survey within 4200 $mi^2$ of the 4600 $mi^2$ wolf population trend survey area, including contiguous areas in Units 12, 20E, and 20D; about 2000 $mi^2$ was in Unit 12. During February–April RY02 we surveyed where conditions were adequate but never surveyed 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 12.1 wolves/1000 $km^2$ (31.3 wolves/1000 $mi^2$). 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 8.9 wolves/1000 $km^2$ (23.1 wolves/1000 $mi^2$).

Wolf numbers particularly in northern Unit 12 have benefited from high numbers of caribou since 1997 and possibly from the snowshoe hare cycle high during 1998–2001. In the remainder of Unit 12 during the report period, the ungulate prey base remained stable and snowshoe hares were high during 1998–2001 Combining estimates from the 3 areas of Unit 12, overall Unit 12 density probably ranges between 7–7.5 wolves/1000 $km^2$ (18.1–19.4 wolves/1000 $mi^2$) and increased compared to RY98.

MORTALITY

*Harvest*

Season and Bag Limit.

| Units and Bag Limits | Resident Open Seasons | Nonresident Open Seasons |
|---|---|---|
| Unit 12. | | |
| 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. In November 1996 Alaskan voters passed an initiative that prohibited same-day-airborne hunting of wolves, fox, lynx, and wolverine. This initiative became effective on 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 which could have affected several Unit 12 packs. An initiative to overturn the same-day-airborne taking was voted on by Alaskan voters in November 2000 and passed resulting in stopping same-day-airborne hunting in February 2001. No impact on Unit 12 wolf numbers from this short-lived same-day-airborne hunting regulation was detected.

During the spring 1998 meeting, the board designated the Unit 12 moose population as important for high levels of human consumptive use under the intensive management law (AS 16.05.255[e]–[g]). This designation means that the board must consider intensive management if regulatory action to significantly reduce moose harvest in Unit 12 becomes necessary because the population is depleted or has reduced productivity. Wolf control has been identified by the legislature as an important management tool consistent with the intent of the intensive management law. As of May 2002 the moose population and harvest objectives were not being met in Unit 12.

Hunter–Trapper Harvest. RY99, RY00, and RY01 wolf harvests in Unit 12 were 54, 55, and 42 wolves, respectively (Table 2). The average harvest was 50 wolves compared to 49 during the previous report period (RY96–RY98). During RY99, harvest distribution was concentrated and 3 trappers accounted for 50% of the harvest. Harvest distribution and rates in RY99 caused wolf numbers to decline in the Gardiner Creek flats, and in the Tok and Little Tok River drainages. The effects of lower wolf numbers were reflected in harvest distribution during RY00 and RY01. During those years no trapper took more than 3 wolves/year in these

areas compared to 6–19 during RY99 even though trapping pressure was comparable. In the remainder of the unit, harvests were below sustainable rates and wolf numbers increased.

During the past 10 years, the response of the Unit 12 wolf population to harvest by hunters and trappers was similar to that documented in 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 those populations harvested at <20% generally increase. Those 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%.

Eighty-four percent of wolves harvested in Unit 12 during RY99–RY01 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 in RY99, incidental harvest of wolves by moose, caribou, or sheep hunters was high (11 wolves), representing 20% of the annual harvest. The loss of same-day-airborne hunting had little effect on wolf harvest in Unit 12. The average take during the last 6 years that method was legal was 3.8 wolves (7% of the harvest).

Harvest Chronology. Chronology of the Unit 12 wolf harvest during RY99–RY01 (Table 3) reflects a low incidental harvest of wolves (9.9%) during the August and September hunting seasons, 1.3% and 3.3% harvest during the snaring-only seasons in October and April, respectively, and the highest harvest (85.4%) between November and March when all harvest methods and means are allowed. The greatest harvest occurred in January and February.

Transport Methods. During RY99–RY01 most successful wolf trappers used snowmachines (74%) or airplanes (13%) (Table 4). Between RY89 and RY93, 27% of successful trappers used airplanes for transportation. During RY94–RY98, this transport method declined to 7%. Increased use during this report period can be attributed to 2 new airplane trappers in the area. Wolf harvest by trappers who use airplanes is expected to remain low because of the high costs associated with using an airplane for trapping and the relatively low market value for wolves.

## HABITAT

*Assessment*

Only 7000–8000 $mi^2$ of Unit 12 is considered normal 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 dense populations of Dall sheep, wolves apparently cannot thrive 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, but has declined during the past 12 years and in 2002,

numbered about 300 animals. Caribou from the Mentasta, Nelchina, and Macomb herds also used portions of Unit 12 in recent years. It seems the use of Unit 12 during the winter by these herds, especially the Nelchina Herd, has improved the productivity of the wolf population. Caribou availability in winter in combination with high snowshoe hare numbers during 1998–2001 and low 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*

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

During June–September 1990 a wildfire burned approximately 97,000 acres of primarily decadent black spruce muskeg in the Tetlin Hills and the adjacent Tok River lowlands. This fire is expected to improve moose winter browse for at least 20 years to the benefit of both moose and wolves. By 1997 moose densities in this area increased from 0.2 to 1.0 moose/mi$^2$ and has remained at about 1.0 moose/mi$^2$ until 2002. By 1994 at least 2 wolf packs numbering 6–11 wolves resided in the area. Moose composition surveys indicate the primary cause of the moose population increase was elevated productivity and survival, not immigration. As of RY99 the moose density in this area was 1.1 moose/mi$^2$, and 3 different wolf packs numbering 7–13 wolves were observed using the area. During the report period these 3 packs used the area but were limited to 3–6 wolves by harvest.

Habitat enhancement programs using mechanical crushing and different logging techniques are being planned to affect over 1000 acres in the Tok River valley, a prime wintering area for moose. These programs are expected to benefit many species of wildlife including wolves.

## NONREGULATORY MANAGEMENT PROBLEM/NEEDS

In the foreseeable future the intensive management law will most likely be enacted in Unit 12 based on the current trend of the unit's moose population relative to population and harvest objectives (Gardner 2002a). In an attempt to better predict the outcome of wolf management on the moose population in Unit 12, I modeled the current 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 (0.2–1.0 moose/mi$^2$, Gasaway et al. 1992; US Fish and Wildlife Service, unpublished data). The effects of wolves and bears vary between areas within Unit 12. In the Northway and Tetlin Flats, both calf mortality and

predation rate studies indicated that wolves were the primary predator on calves and adult moose throughout the year. In comparison, along the Nutzotin Mountains calf recruitment to 5 months was substantially lower and was more indicative of grizzly bear predation.

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 unit's wolves were harvested annually. Under this harvest rate, the number of wolves using Unit 12 would stabilize at about 180. Under this scenario, 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 by humans, it is likely wolves must be continuously reduced by more than 50% each year.

If unitwide wolf control was an option, the moose population could increase at 8–14% annually if the unit's wolf population is controlled at the 80% reduction level, which has been found to have allowed moose and caribou population increases in other areas of Alaska and Yukon (Boertje et al. 1996). However, wolf control is not an option on federal lands, which constitute a majority of Unit 12. If wolf control is conducted only on state and private lands, the moose population would increase at about 6–9% annually.

Based on the response of the moose population affected by the combination of the 1990 Tok Wildfire and intense public hunting and trapping of wolves, it appears local moose population increases can occur in Unit 12 without government wolf control but with intensive habitat management. Such moose population increases will be moderate and will be eventually limited by predation. However, the increases would be enough to satisfy the intensive management law as long as the number of moose hunters does not substantially increase. Because of landownership patterns in Unit 12, this will be the management direction taken during the next 5 years.

## CONCLUSIONS AND RECOMMENDATIONS

Comparing the estimated average wolf population size during RY96–RY98 to RY93–RY95, the Unit 12 wolf population increased by an estimated 22%. A comparable estimate was not obtained during this report period, but survey results conducted in portions of Unit 12 and adjacent Unit 20E indicates wolf numbers increased during RY99–RY02. The increase probably resulted from 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. It would likely require annual harvest rates >30% to preclude wolf population growth in Unit 12.

The Unit 12 moose population stabilized 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, northern Unit 12 packs have had access to thousands of caribou during the winter. The packs in central Unit 12 can easily access thousands 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 have to rely primarily on moose year-round. Prior to the arrival of the wintering Nelchina and Mentasta herds and the increase in the unit's wolf population, the moose population in Unit 12 was increasing at about 5% annually.

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, unitwide harvest was light but harvest distribution was concentrated especially in RY99 and caused area-specific declines in wolf numbers. Harvest rates in the remote areas are dependent on fur price and weather conditions. Along the road system, trapping pressure is high especially around the communities and wolf numbers are regulated at a lower number.

Most of the 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 the 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, supported by the department, and will be supported by the public.

The only quantifiable 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.

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TABLE 1 Unit 12 autumn[a] wolf population estimates, regulatory years 1988–1989 through 2002–2003

| 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 |

[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 2001–2002

| | 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 | 2.0 |
| 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 | 2.0 |
| 1992–1993 | 26 | (52) | 24 | (48) | 54 | 22 | 51 | (98) | 1 | (2) | | | 0 | 15 | 3.5 |
| 1993–1994 | 37 | (57) | 28 | (43) | 71 | 36 | 54 | (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 |

[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 2001–2002

| 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 | (1) | 5 | (7) | 9 | (13) | 21 | (31) | 13 | (19) | 10 | (15) | 1 | (1) | 0 | (0) | 0 | 67 |
| 1999–2000 | 5 | (9) | 6 | (11) | 0 | (0) | 0 | (0) | 7 | (13) | 8 | (15) | 14 | (26) | 10 | (19) | 3 | (6) | 1 | (2) | 0 | 54 |
| 2000–2001 | 0 | (0) | 2 | (4) | 0 | (0) | 2 | (4) | 10 | (18) | 15 | (27) | 21 | (38) | 4 | (7) | 1 | (2) | 0 | (0) | 0 | 55 |
| 2001–2002 | 0 | (0) | 2 | (5) | 2 | (5) | 5 | (12) | 8 | (19) | 12 | (29) | 11 | (26) | 2 | (5) | 0 | (0) | 0 | (0) | 0 | 42 |

TABLE 4 Unit 12 wolf harvest by transport method, regulatory years 1988–1989 through 2001–2002

| | Harvest by transport method | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Regulatory year | 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) | 0 | 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 |

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

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# WOLF MANAGEMENT REPORT

From: July 1, 1999
To: June 30, 2002

## LOCATION

**GAME MANAGEMENT UNIT:** 13 (22,857 $mi^2$)

**GEOGRAPHIC DESCRIPTION:** Nelchina and Upper Susitna Rivers

## BACKGROUND

Wolf numbers in Unit 13 were low from about 1900 until the early 1930s, reflecting corresponding 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 U.S. Fish and Wildlife Service (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 wolf control, wolf numbers increased rapidly. A population of 350 to 450 wolves was estimated in 1965, and fall population estimates in subsequent years exceeded 300 wolves through the 1970s (Ballard et al. 1987). During the early-to-mid 1980s, wolf estimates were lower, averaging 275 wolves during the fall, then increased to a 370 wolf average during the mid 1990s. By the late 1990s, the Unit 13 wolf population increased to record high numbers.

Before statehood (i.e., 1959) wolves were harvested under 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 a 5-year period. In 1965, a short season was held. During the late 1960s, seasons were established that approximated current dates with no bag limits. In 1971 mandatory sealing was established and aerial shooting without a permit was prohibited (Harbo and Dean 1983). Harvest levels prior to mandatory sealing are unknown. Between 1971 and 1991, an average of 91 (range = 32–145) wolves per year were sealed in Unit 13. Harvests increased through the mid-to-late 1990s, averaging 155 (range = 95–220) wolves per year.

## MANAGEMENT DIRECTION

### MANAGEMENT GOALS

Determine wolf population estimates yearly. Regulate wolf harvests yearly to prevent overharvesting yet maintain adequate harvests to assure that management objectives for wolves in Unit 13 are met.

### MANAGEMENT OBJECTIVES

To achieve and maintain a posthunting and trapping season population of 135 to 165 wolves (3–4 wolves/1000 $km^2$) distributed proportionally among subunits.

## METHODS

We conducted aerial track surveys to estimate the wolf population in Unit 13 during late fall and again in late winter. Biologists flew surveys in a systematic manner in an attempt to locate wolf tracks, then followed tracks to determine the size and color composition of the pack. Additional information on wolf numbers and distribution was collected by trapper surveys and incidental sightings by department personnel and the public. This information was combined with survey data to extrapolate a unit population estimate. We monitored harvest by requiring sealing of all wolves taken in the unit.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

The spring 2002 wolf population estimate was 230 (5.4 wolves/1000 $km^2$) wolves (Table 1), down 23% from the spring 1999 population estimate of 300 wolves (7.0 wolves/1000 $km^2$). This 1999 estimate was the highest spring population estimate reported in Unit 13 in over 25 years. Fall population estimates approached 500 (12.0 wolves/1000 $km^2$) wolves (Table 1) between 1998 and 2001 and are the highest ever reported in Unit 13. Historically, other portions of Alaska have supported wolf densities as high as 20 wolves/1000 $km^2$ (Ballard et al. 1987). The fall 2002 estimate of approximately 390 (9.1 wolves/1000 $km^2$) wolves was a calculated estimate based on reduced productivity estimates. Weather conditions and a lack of snow during 2002–03 prevented unitwide wolf surveys.

*Population Composition*

Sex composition data for wolves in Unit 13 are not available. Age composition data are inferred by comparing fall population estimates to the previous spring. The fact that fall estimates are appreciably higher than spring estimates indicate pup production and survival has been good in Unit 13. Pup production and survival in the late 1990s was especially high, possibly because of a snowshoe hare cycle high. Hares provide an additional source of food during the critical whelping period and allow for higher pup survival. Pup production and/or survival was thought to be lower starting in 2001 because of the crash in hares and rather appreciable declines of moose and caribou in recent years.

*Distribution and Movements*

Distribution and movement patterns of wolves in Unit 13 are dependent 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 indicate wolves usually do not follow caribou that are migrating out of the wolf pack's territory. As in other areas in Alaska, a certain percentage of Unit 13 wolves are observed as singles and may be dispersing.

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 under hunting and trapping regulations. Wolf trapping season runs from 15 October until 30 April. However, steel traps or snares smaller than 3/32-inch diameter may be used only between 10 November and 31 March. Wolf hunting season runs from 10 August to 30 April with a bag limit of 10 wolves per day. Between March and December 2000, land and shoot taking of wolves was legal in the wolf control implementation area of 13A, B, and E if the hunter was 300 feet from the aircraft.

Board of Game Actions and Emergency Orders. The board designated Unit 13 an intensive management area in 1995. Increased human harvest of moose and caribou became the primary objective for the unit. As a result, the Board reduced the wolf population management objective to between 135 and 165 wolves postharvest in the spring. Methods and means for wolf hunting and trapping remained unchanged until a statewide vote in the November 1996 general election passed Proposition 3. This proposition eliminated the taking of wolves the same-day-airborne as of 25 February 1997. During the March 1999 Board of Game meeting, the bag limit for wolf hunters in Unit 13 was increased to 10 wolves per day. The Board of Game, in March 2000, passed a wolf predation control implementation plan for Units 13A, B, and E east of the Alaska railroad except for federal lands. The management objective for a post control wolf population was 25 wolves in both 13A and B and 50 wolves in 13E. At this meeting, the Board also liberalized use of snowmachines for taking wolves. In spring 2000, the legislature passed a measure (SB267) allowing land and shoot taking of wolves in a wolf control implement area but in November 2000 another voter referendum again passed that prohibited land and shoot taking of wolves.

Hunter/Trapper Harvest. Hunters and trappers harvested 223 wolves in Unit 13 during the 2001–02 season (Table 2). The 2000–01 harvest of 269 was the highest ever reported in Unit 13. During this 5 year reporting period, 1,039 wolves were taken for a yearly average harvest of 208. A definite increase in the Unit 13 wolf harvest is evident when this 5-year average take is compared to the yearly average harvest of 81 wolves during the 10 years from 1980 to 1989. Harvest composition data suggest an overall even distribution of males and females in the harvest, but this is variable yearly (Table 2).

Snaring and trapping are the most successful methods of taking wolves since land-and-shoot permit hunts ended; snaring and trapping accounted for 55–84% of the harvest during this 5-year reporting period (Table 2). Ground shooting of wolves increased during the last 3 years of this reporting period, going from 15% of the take in 1997–98 to 37% in 2001–02. Only 14 wolves were taken during the short period in 2000 when land and shoot was again legalized.

Permit Hunts. The last wolf permit hunt in Unit 13 was a land-and-shoot registration hunt held between 1991 and 1993.

Hunter/Trapper Residency and Success. During the 2001–02 season, 70 hunters and trappers harvested an average of 3.2 wolves in Unit 13; the average take per trapper during the previous 4 years (1997–01) was 3.0 wolves per year. The average take per trapper has increased slightly from the 2.1 wolf average observed during the 1980s. In 2001–02, four nonresidents took 4 wolves, 25 local residents killed 84 wolves, and 41 nonlocal Alaska residents took 135 wolves.

Harvest Chronology. Harvest chronology varied somewhat during the last 5 years (Table 3). During this reporting period, February had the highest reported wolf harvest but there was little difference between all the mid-winter months. The change in harvest chronology between years probably reflects yearly changes in snowfall and temperature, which influences access and trapping conditions.

Transport Methods. When same-day-airborne hunting was legal (before 1992–93), successful hunters and trappers preferred using aircraft. Historically, more wolves were taken with the use of aircraft, reflecting the remote nature of the unit and the importance of same-day-airborne harvesting. In recent years use of snowmachines has surpassed using aircraft as the most important method of transportation (Table 4). This change occurred not only because it became illegal to take wolves same-day-airborne but because of improvements in snowmachines themselves. A few years ago significant improvements occurred in snowmachine design and manufacturing. Modern snowmachines are more powerful, faster, travel better in deep snow, are more comfortable to ride and much more mechanically reliable. As a result, trappers and hunters are able to penetrate further into remote portions of the unit. Aircraft use did increase in 2000 but this increase was attributed to the short-lived same day airborne regulation that allowed aircraft use for only a few weeks in the early winter.

*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 9% to accidents, injuries, starvation, and drowning. Ballard attributed the remaining 80% to legal and illegal human harvest. Since completion of this study, taking of wolves by land-and-shoot has become illegal. By observing kill sites, we can determine illegal use of airplanes to take wolves. 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. The outlook for preventing the spread of lice into Unit 13 is poor because of the high infection rate of wolves in Units 14 and 15 coupled with the observed dispersal of wolves from these units into Unit 13. Also, domestic dogs in Unit 13 have periodically been diagnosed as having lice, thus providing another possible source of infection.

## CONCLUSIONS AND RECOMMENDATIONS

Wolf numbers in Unit 13 decreased during this reporting period. The spring population estimate went from 300 wolves in 1999, the highest Unit 13 spring wolf estimate in over 25 years, to 230 in 2002. The reason for much of this decline was the increase in human harvests of wolves during this reporting period. These harvests were among the highest ever reported in Unit 13, and in some heavily trapped and hunted areas, exceeded 35% of the population. The percent harvest may be somewhat overestimated due to conservative wolf population estimates. Harvests in excess of 35% should result in an overall population decline. Even though record harvests were recently reported, the Unit 13 wolf population remains far above management objectives set by the Board of Game for wolves in Unit 13 in 1995.

The fall 2002 wolf estimate was the lowest in 4 years, though it also had the lowest confidence given that it was a calculated estimate. A lack of snowfall in 2002–03 made surveys extremely difficult. Sightings of a number of smaller packs lead to the speculation that a decline in productivity and/or pup survival may have occurred. Because of this, productivity and survival estimates were lowered when calculating the fall 2002 wolf population estimate. A decline in productivity and/or survival could be entirely possible because of a reduction of the Unit 13 prey base recently. Moose numbers in Unit 13 have declined as much as 40% in some areas. The Nelchina caribou herd is also down by 30% from 1995, and herd movements the last three years have been more restrictive and included fewer pack territories. Also the snowshoe hare cycle went from a 30-year high in the late 1990s to almost no hares the last two years. During the high, wolves were frequently observed taking hares and they were considered an important food source for pups in the den and allowed increased litter survival rates. This suspected slow decline in productivity or pup survival is typical of situations where wolves remain high enough to drive prey populations very low before wolf numbers are regulated (Gasaway et al. 1983). Because wolf populations show little self-regulation until prey become very low, wolf harvests must be increased to take a higher percentage of the wolf population in order to bring wolves within management objectives. Modeling of predator prey populations in Unit 13 suggest wolf numbers must be heavily reduced so the spring population approaches the minimum population objective of 135 wolves, or declines in moose numbers will continue.

Management options to reduce wolf numbers in Unit 13 are limited. Land-and-shoot wolf hunting effectively and economically allowed high wolf harvests that were distributed throughout the unit, even in remote areas. After land-and-shoot became illegal, human harvests by traditional hunting and trapping methods and means could not take a high enough portion of the wolf population to offset the high productivity rate observed in the Unit 13 wolfs, thus wolf numbers increased throughout the unit.

Economic factors play an important role in limiting wolf harvests by traditional ground trapping methods employed by the general public. Costs of snowmachines, gas, traps and other equipment have increased tremendously over the last 20–25 years, yet the price paid for wolf pelts has declined. Currently there is a good demand for only the best quality adult wolves. Pups and average adults are much less marketable. Unless the fur market improves, economic incentives to wolf trappers would be needed to increase trapping effort and wolf

harvests over current levels observed in Unit 13. Also, the average age of trappers is rising as the economic incentives are not high enough for young people to enter the trapping profession. Three or four professional trappers in Unit 13 account for a large portion of the catch, and there does not appear to be any young people to replace them when they quit. Because of this, relying on trapping as traditionally practiced to limit wolf populations in Unit 13 may not be an effective management tool in the future.

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Tobey, R. W. 2003. Unit 13 wolf management report. Pages 91–98 *in* C. Healy, editor. Wolf management report of survey and inventory activities 1 July 1999–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Unit 13 fall and spring wolf population estimates[a], 1997–2002

| | Population estimate | | | | |
|---|---|---|---|---|---|
| Regulatory Year | Fall | Spring | | Packs (nr) | Basis of estimate |
| 1997–98 | 360–400 | 260 | (240–280) | 50 | b |
| 1998–99 | 475–525 | 300 | (280–320) | 55 | b |
| 1999–2000 | 490–540 | 270 | (250–290) | 60 | b |
| 2000–01 | 490–540 | 228 | (200–240) | 62 | b |
| 2001–02 | 460–500 | 230 | (210–250) | 67 | b |
| 2002–03 | 370–420 | --- | --- | 54 | b |

[a] Fall estimate = pretrapping season population; spring estimate = posttrapping season population.
[b] Basis of estimate, aerial track surveys, incidental observations, reports from public, sealing records.

Table 2 Unit 13 wolf harvest, 1997–2002

| Reg Year | Reported harvest | | | | | | | Estimated Harvest | | Method of Take | | | | | | | | Successful trappers/ Hunters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | % | F | % | Unk | % | Total | Unreported | Illegal | Trap snare | % | Shot | % | L&S | % | Unk | % | |
| 1997/98 | 73 | (49) | 76 | (50) | 2 | (1) | 151 | 5 | 5 | 126 | (83) | 22 | (15) | 0 | (0) | 3 | (2) | 50 |
| 1998/99 | 84 | (48) | 86 | (49) | 6 | (3) | 176 | 5 | 5 | 142 | (81) | 34 | (19) | 0 | (0) | 0 | (0) | 58 |
| 1999/00 | 115 | (52) | 101 | (46) | 4 | (2) | 220 | 5 | 5 | 121 | (55) | 97 | (44) | 0 | (0) | 2 | (1) | 88 |
| 2000/01 | 129 | (48) | 134 | (50) | 6 | (2) | 269 | 5 | 5 | 166 | (62) | 79 | (29) | 14 | (5) | 10 | (4) | 80 |
| 2001/02 | 116 | (52) | 105 | (47) | 2 | (1) | 223 | 5 | 5 | 140 | (63) | 83 | (37) | 0 | (0) | 0 | (0) | 70 |

Table 3 Unit 13 wolf harvest chronology percent, 1997–02

| Regulatory | Harvest periods | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | 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 |

Table 4 Unit 13 wolf harvest percent by transport method, 1997–02

| | Percent of Harvest | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Regulatory Year | Airplane | Dog sled skis/ Snowshoes | Boat | 4-wheeler | Snowmachine | ORV | Highway vehicle | Unknown | *n* |
| 1997–98 | 6 | 1 | 0 | 1 | 79 | 1 | 12 | 0 | 151 |
| 1998–99 | 22 | 1 | 1 | 0 | 62 | 8 | 4 | 2 | 176 |
| 1999–00 | 4 | 3 | 0 | 4 | 80 | 1 | 6 | 1 | 220 |
| 2000–01 | 25 | 4 | 1 | 2 | 60 | 0 | 4 | 4 | 269 |
| 2001–02 | 7 | 0 | 0 | 1 | 79 | 0 | 8 | 5 | 223 |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 cessation of predator control activities and bounty payments. Wolf numbers remained low in the Matanuska Susitna Valley 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 2002; hunters, pilots and winter recreationists frequently observed wolves or tracks from wolf packs. Coincident with high wolf densities, reported harvest has also increased.

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 Alaskan wolves outside 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 was the cause. During January 1999 we mounted an effort to evaluate the extent of infestation and we treated 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 1,200 medicated baits, aimed at coyotes, dogs and lone wolves. However, several louse-infested wolves were caught the following winter indicating we were unsuccessful in eliminating lice from area wolves.

## 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 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 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 about trends in wolf abundance through our trapper questionnaire.

We continued to monitor the spread of lice in the Susitna Valley through close inspection of all hides sealed. During moose surveys any wolves spotted were observed for any indication of infestation (excessive scratching by members or visible patterns of hair loss). Radiocollared wolves were tracked periodically to visually assess pelt characteristics and whether all pack members had been treated. No efforts were made to treat domestic pets in the affected area. The louse control effort is outlined completely in Golden et al. (1999).

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

With information gathered during the lice control project, coupled with sealing information and observations from trappers and the public, we estimated Unit 14 contained 120–150 wolves during fall 1998 (Table 1). While this appears to be a large increase within a 5-year period, we believe wolf numbers had steadily increased in recent years and wolf numbers were under-estimated in prior years. The effort to control the spread of lice allowed us to get reliable minimum estimates of pack sizes and distribution in most of Unit 14B and the western portion of Unit 14A, the resulting numbers were substantially higher than previous estimates in those areas. This demonstrates that the "traditional" method of estimating wolf populations solely from incidental observations by staff, trappers, pilots and other outdoor enthusiasts probably results in under estimation of wolf numbers.

*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 these large cities.

*Diseases/Parasites*

Of 6 packs examined during louse-control efforts in Units 14A and 14B, 2 packs (Willow Mountain and Montana Creek) were confirmed to have lice. Of 2 other packs in eastern Unit 14A evaluated by inspecting the hides of wolves taken by trappers or hunters, neither appeared infested (Golden et al. 1999). Trappers continue to report infested wolves from the original packs and packs to the north and west of the original infestation. There were no indications that any 14C packs were affected. Because coyote 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.

During January 1998 Division staff asked the Board of Game to clarify whether wolf-hybrids could be possessed without a permit. The Board 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 Department of Public Safety, 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, which 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 21 wolves per season (range 16–31) during the 5 seasons spanning 1997–98 to 2001–02 (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) with more wolves taken by snares. The number of wolves shot has remained comparatively stable in the last 7 years, ranging from 4–7 animals annually. The number trapped can be greatly affected by weather and trapping conditions, whereas the number shot is more dependent on travel conditions.

Harvest Chronology. Most wolves were taken during mid-winter (December–February), when snow conditions allowed for good trapping conditions and travel. The number of wolves taken during August–October (Table 3) ranged from 9 to 25 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. During 1998–99 and 1999–2000 there was little snow on the ground during December, and extremely cold temperatures during January. These factors probably combined to increase wolf harvest during February, relative to other years. In 2001 substantial snow fell in late October and early November. Trappers were able to begin trapping when the season began on November 10.

Transport Methods. Most successful wolf trappers and hunters routinely used snowmachines to access their trapping/hunting areas (Table 4). Use of aircraft increased in 1998–99, due mainly to several experienced pilot/trappers who, after not trapping for several years, made a concerted effort to snare wolves in relatively remote parts of Unit 14.

*Other Mortality*

Following the louse-control capture effort there was an extended period of cold weather, with temperatures to 30 degrees below zero Fahrenheit. During this period 2 heavily louse-infested pups (or yearlings) disappeared from the Montana Creek pack. We suspect these 2 wolves died during this cold period, because of heavy pelt damage from lice (Golden et al. 1999). About 1 wolf per year is killed by vehicle collision in Unit 14C.

### 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 utilize areas altered by humans.

### NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

We received many reports from the public about wolves attacking dogs and possibly threatening other pets and livestock. Wolves have killed an estimated 3–10 dogs/year in the Anchorage area. As wolf numbers increase, wolf/domestic animal conflicts may increase, especially with the dispersed pattern of human development in this area. Increasingly, we receive similar calls regarding wolf hybrids.

## CONCLUSIONS AND RECOMMENDATIONS

While the population objectives have been met for Unit 14, and the number of wolves is increasing, systematic surveys will be necessary to maintain accurate population estimates of wolf numbers. The human-use objective was also met, with both consumptive and nonconsumptive users enjoying many opportunities to interact with wolves, even on the outskirts of urban areas. 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,

utilizing 2–3 aircraft during a short period in January or February. This will require an additional $6,000, and some technical staff time, every 3 years. Current methodology (observations by staff, trappers and the public) should suffice for distribution information.

The spread of the non-native louse to the Susitna Valley is a concern for managers. Unfortunately, the sensitivity surrounding wolf issues prevent managers from acting quickly to attempt to control the infestation. Conflicting human interests precluded action involving lethal methods of control, as was the case during the initial infestation on the Kenai Peninsula (Golden et al. 1999). By the time most wolves were treated (late January 1999), some wolves had probably begun to disperse Mech et al. 1998). Although a great effort was expended to attempt to treat infested wolves during early 1999, financial and feasibility considerations precluded a follow-up program during winter 1999–2000.

Given natural dispersal rates for wolves and current high density, it appears likely that lice will infest wolves in other parts of the state in the near future. 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 20% 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.

Staff worked with the Board of Game to strengthen the wolf hybrid regulations. It is now much more difficult to possess or market hybrids, however, many unregistered animals exist. Both ADFG and DPS/FWP have chosen not to enforce the regulation prohibiting possession of these animals. Enforcement is admittedly difficult because people can circumvent the regulation by claiming their animal is a "husky-mix," and to date there are no simple genetic test that can differentiate between pure and hybrid wolves. Also, the Matanuska-Susitna Borough will not register an animal as a wolf hybrid because there is no approved rabies vaccine for hybrids. Many people own hybrid wolves in this area, and we receive many complaints about hybrid wolves running loose and threatening humans and livestock. We should investigate whether new genetic techniques will help distinguish between hybrid and wild wolves.

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Table 1 Unit 14 fall (pre-trapping season) wolf population estimates, 1994–2002

| Year | estimate | Packs (nr) | Basis of estimate |
|---|---|---|---|
| 1994–95 | | | Sample Unit Probability Estimate in 14C, incidental observations in 14A and 14B. |
| 1995–96 | | 9–11 | Incidental observations, sealing records, reports from public |
| 1996–97 | | 11–13 | reports from trappers, staff, public |
| 1997–98 | | 11–13 | reports from trappers, staff, public |
| 1998–99 | 8–11 | | ADF&G staff; wolf/lice project |
| 1999–2000 | | 19–21 | reports from trappers, staff, public |
| 2000–01 | | 18–21 | reports from trappers, staff, public |
| 2001–02 | | 18–21 | ADF&G staff; wolf/lice project |

Population
60–85
70–100
80–115
70–105
~~120–150~~ ~~19–21~~
90–120
90–120
85–115

Table 2 Unit 14 wolf harvest, 1994–2002

| Regulatory Year | Reported harvest | | | | Method of take | | | | Successful Trapper/hunters |
|---|---|---|---|---|---|---|---|---|---|
| | M | F | Unk | Total | Shot | Trap | Snare | Unk | |
| Unit 14A | | | | | | | | | |
| 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 |
| 2000–2001 | 7 | 8 | 0 | 15 | 3 | 6 | 6 | 0 | 12 |
| 2001–2002 | 5 | 3 | 0 | 8 | 3 | 2 | 3 | 0 | 7 |
| 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 |
| Unit 14C | | | | | | | | | |
| 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 |

Table 2 cont.

| Regulatory Year | Reported harvest | | | | | Method of take | | | | Successful Trapper/hunters |
|---|---|---|---|---|---|---|---|---|---|---|
| | M | F | Unk | Total | Shot | Trap | Snare | Unk | | |
| Unit 14C cont. | | | | | | | | | | |
| 1999–2000 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | | 1 |
| 2000–01 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | | 1 |
| 2001–02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Unit 14 Total | | | | | | | | | | |
| 1994–95 | | 11 | 0 | | | 6 | 5 | 0 | | |
| 1995–96 | | 10 | 0 | | | 4 | 14 | 0 | | |
| 1996–97 | 11 | 8 | 0 | 19 | 11 | 7 | 5 | 6 | 1 | 14 |
| 1997–98 | 12 | 4 | 0 | 16 | 6 | 6 | 4 | 6 | 0 | 13 |
| 1998–99 | 14 | 17 | 1 | 24 | | | 13 | 13 | 0 | |
| 1999–2000 | 8 | 9 | 0 | 17 | | 6 | 5 | 4 | 2 | 13 |
| 2000–01 | 12 | 9 | 0 | 21 | 5 | 4 | 7 | 9 | 1 | 16 |
| 2001–02 | 13 | 7 | 1 | 21 | | 4 | 7 | 9 | 1 | 13 |
| | | | | 31 | | | | | 12 | |
| | | | | | | | | | 11 | |
| | | | | | | | | | 18 | |

Table 3 Unit 14 wolf harvest chronology percent, 1994–2002

| Regulatory year | Harvest periods | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Aug–Oct | November | December | January | February | March | April | *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 |

[a] Includes one unknown date of kill.

Table 4 Unit 14 wolf harvest percent by transport method, 1994–2002

| Regulatory year | Harvest percent | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 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 |

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# WOLF MANAGEMENT REPORT

From: July 1, 1999
To: June 30, 2002

## 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) prior to statehood 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 tripled since that survey.

During November and December 1998 trappers caught several wolves (and coyotes) in the lower Susitna Valley (Units 16A and 14B) that were infested with the dog-biting louse *Trichodectes canis*. This was the first time lice had been confirmed in Alaskan wolves outside the Kenai Peninsula, where louse-infested wolves were first seen in 1981. The source of the recent infestation was unknown, but we suspect feral dogs or wolf-hybrids near the Parks Highway corridor. During January 1999 we mounted a large effort to treat infested wolves in the Susitna Valley, to prevent the spread of lice to other areas of the state. Our efforts revealed that 1 pack in Unit 16A (and 2 adjacent packs in Unit 14B) were infested. We attempted to capture and treat all infested wolves with the antiparasitic drug ivermectin (Merck & Co, Inc.). We also distributed medicated baits, meant to treat coyotes, dogs and lone wolves. However, we were unsuccessful in eliminating lice from area wolves, as 6 louse-infested wolves (including 2 that had previously been treated) were trapped or found dead in Unit 16 during winter 1999–2000. These wolves were distributed from the lower Beluga River north to the West Fork of the Yentna River and east to the Susitna River.

## 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 from interviews with trappers and hunters sealing fur from Unit 16. During 1998–99 numbers were estimated during our effort to control the lice infestation in the area. Annual wolf harvest was determined by sealing all wolves presented for examination.

With the unanticipated discovery of louse-infested wolves in this area and the fear the infestation would move north, we met with staff from headquarters and from the Southcentral and Interior Regions to discuss management options, political considerations and funding strategies. We decided that area staff would use non-lethal means to attempt to eliminate lice from Susitna Valley wolves and coyotes, employing a capture/treatment program for wolves and distribution of medicated baits for coyotes.

We enlisted the aid of several other area biologists in our effort to capture and treat all infested wolves in the Susitna Valley. We used aerial reconnaissance from Piper PA-18 aircraft to first locate and examine wolf packs, then we captured 1–2 wolves in each pack to confirm the presence or absence of lice. We captured and treated all known members of the infested packs, using 2 capture crews with 2 Robinson R-22 helicopters. Wolves were immobilized using Telezol and ivermectin was administered to rid wolves of lice. We also distributed approximately 1200 meat baits, containing ivermectin paste, in the general area occupied by infested packs, to attempt to medicate coyotes and lone wolves potentially missed during our capture operation. Radiocollared wolves were tracked periodically to visually assess pelt characteristics and whether all pack members had been treated. No efforts were made to treat domestic pets in the affected area. The louse control effort is outlined completely in Golden et al. (1999).

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

Unit 16 contained an estimated 120–140 wolves, in 16–19 packs, during fall 1998 (Table 1). This is approximately twice the number estimated during February 1993. In 2001–02 we estimated that the population increased an additional 50%. The effort to control the spread of lice allowed us to get reliable minimum estimates of pack sizes and distribution in a large portion of Unit 16 and the resulting numbers were substantially higher than previous estimates in those areas. This demonstrates that the "traditional" method of estimating wolf populations solely from incidental observations by staff, trappers, pilots and other outdoor enthusiasts probably results in a significant under estimation of wolf numbers.

The wolf population probably peaked in 2001–02. Most large prey species have declined substantially in recent years and we expect wolf productivity to decline. However, summer food sources are still abundant.

*Distribution and Movements*

Wolves inhabit most portions of Unit 16 (Table 2). Several packs utilize 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 during the louse-control effort in Units 16, only 1 pack (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). We captured and treated 11 wolves in the Deshka River pack and 2 wolves each in the Kahiltna River, Alexander Creek and Theodore River packs. The Kahiltna Glacier and Yentna River packs were classified as "clean" based on aerial observations only. The operational cost of the louse-control effort was $60,000 (including both Units 14 and 16).

### MORTALITY

*Harvest*

Season and Bag Limit. During the report period the hunting season for Unit 16 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. During January 1998 Division staff asked the Board of Game to clarify whether wolf-hybrids could be possessed without a permit. The Board 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 Department of Public Safety, 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 which 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 50 wolves per year (range 17–88) during 1997–2001 (Table 3), continuing an increasing trend since the late 1980s. Trappers took most wolves in Unit 16 (Table 2) by snares. The number of wolves shot fluctuated annually from 26–68 percent. The number trapped can be greatly affected by weather and trapping conditions, whereas the number shot is more dependent on travel conditions. The total number of trappers/hunters has generally been increasing, probably because of increases in human population, increases in wolf populations and improvements in snowmachines.

Harvest Chronology. Most wolves were taken during mid-winter (December–March), when snow conditions allowed for good trapping conditions and travel. The number of wolves taken during August–October (Table 3) ranged from 11 to 44 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 area (Table 4).

### HABITAT

*Assessment*

Moose populations throughout Unit 16 have been declining. Many hunters report Dall sheep and caribou numbers are declining in the Alaska Range. Summer foods like 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, which were 23–56% annually during the report period, were above sustainable rates (Ballard et al. 1987) for the last two years and may help to achieve our population objectives.

The wolf management goals for this area include conserving the wolf population, providing sustainable wolf harvest and retaining "desirable" predator–prey ratios. With a growing population and 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 2001. 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). Good summer prey availability, harsh winter conditions increasing vulnerability of moose (and sheep and caribou) and potentially reduced wolf harvest rates because of lice may combine to further increase wolf density.

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 subsequent results will be described 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 has at least tripled between 1993 and 2001 and that wolf numbers cannot accurately be estimated 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 $8,000 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 infested 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 in the near future. Managers in other areas should be prepared to answer public inquiries regarding division policy in this matter.

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Table 1 Unit 16 fall wolf population estimates[a], 1994–2002

| Year | Population estimate | | Basis of estimate |
|---|---|---|---|
| | | Packs (nr) | |
| 1994–95 | | 11–13 | Incidental observations, sealing records, reports from public |
| 1995–96 | | 46–75 | reports from trappers, staff, public |
| 1996–97 | | 60–85 | 11–13 reports from trappers, staff, public |
| 1997–98 | 57–79 | 75–110 | 10–12 reports from trappers, staff, public |
| 1998–99 | | 120–140 | 12–15 ADFG staff, wolf/lice project |
| 1999–2000 | | 140–160 | 16–19 reports from trappers, staff, public |
| 2000–01 | | 110–150 | 16–19 reports from trappers, staff, public |
| 2001–02 | | 160–245 | 16–21 reports from trappers, staff, public |
| | | | 25–28 and late winter pack survey |

[a] Fall estimate = pre-trapping season population.

Table 2 Unit 16 wolf harvest, 1994–2002

| Regulatory year | Reported harvest M | F | Unk | Total | | Method of take Trap | Snare | Unk | | | Successful |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1994–95 | 14 | 14 | 0 | 28 | Shot | 17 | 4 | 7 | 0 | | 16 |
| 1995–96 | 6 | 9 | 0 | 15 | | 6 | 1 | 8 | 0 | | 7 |
| 1996–97 | 13 | 12 | 1 | 26 | | 14 | 3 | 9 | 0 | | 14 |
| 1997–98 | 8 | 8 | 1 | 17 | | 5 | 3 | 9 | 0 | | 9 |
| 1998–99 | 13 | 20 | 2 | 35 | | 15 | 6 | 13 | 1 | | 22 |
| 1999–2000 | 16 | 28 | 2 | 46 | | 17 | 7 | 19 | 3 | | 24 |
| 2000–01 | 31 | 30 | 1 | 62 | | 42 | 6 | 14 | 0 | | 42 |
| 2001–02 | 46 | 38 | 4 | 88 | | 23 | 19 | 46 | 0 | | 35 |

Table 3 Unit 16 wolf percent harvest chronology, 1994–2002

| Regulatory year | Percent of Harvest Aug.–Oct. | November | December | January | February | March | April | *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 |
| 1997–9 | 12 | 6 | 18 | 18 | 35 | 6 | 6 | 17 |
| 1998–99 | 31 | 3 | 3 | 14 | 26 | 20 | 0 | 35 |
| 1999–2000 | 11 | 15 | 20 | 13 | 11 | 15 | 15 | 46 |
| 2000–01 | 44 | 5 | 3 | 18 | 13 | 5 | 10 | 62 |
| 2001–02 | 13 | 8 | 32 | 16 | 13 | 14 | 6 | 88 |

Trapper/hunters

Table 4 Unit 16 wolf harvest percent by transport method, 1994–2002

| Regulatory year | Harvest percent | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Airplane | Dogsled | Boat | 3- or 4-Wheeler | Snowmachine | ORV | Highway vehicle | Snowshoes | Unk. | *n* |
| 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 | 16 | 2 | 2 | 2 | 72 | 1 | 0 | 2 | 2 | 88 |

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# WOLF MANAGEMENT REPORT

From: July 1, 1999
To: June 30, 2002

## 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.

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

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

Trapper reports and general observations indicate that the wolf population likely increased during this reporting period. Wolf density peaked in Unit 17 from 1974 to 1977 but declined sharply by 1980. Rabies may have been a contributing factor. Densities seemed to increase again until 1989 when another rabies epidemic affected canid populations in the unit. Wolf populations began to increase again in 1992.

*Population Size*

The estimated 2001 fall wolf population in Unit 17A was 20–30 wolves in 6 to 8 packs; the Unit 17B population was 280–320 wolves in 16 to 22 packs; and the Unit 17C population was 150–200 wolves in 10 to 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 that follow 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 take advantage of caribou when they move through those territories.

**MORTALITY**

*Harvest*

Season and Bag Limit.

| | | | |
|---|---|---|---|
| Hunting: | Unit 17 | 5 wolves | August 10–April 30 |
| Trapping: | Unit 17 | No Limit | November 10–March 31 |

Board of Game Actions and Emergency Orders. The Board of Game restricted the bag limit for hunters from 10 to 5 wolves starting in the 1992–93 regulatory year. This action resulted from a statewide proposal and was not precipitated by biological concerns specific to wolf populations in Unit 17. Statewide regulations affecting same-day-airborne shooting of wolves fluctuated between 1991 and 1993. During 1991–92 all same-day-airborne trappers were required to affix a metal locking tag to wolves as soon as they were harvested. In 1992–93 same-day-airborne trapping was prohibited. Starting in the 1993–94 season, same-day-airborne trapping was reinstated, but trappers were required to be more than 300' from their aircraft before shooting a wolf. In 1996 a referendum was passed prohibiting the take of wolves same day as airborne. In late winter of 1996–97, taking wolves the same day as airborne became illegal. There were no Board actions changing wolf seasons or bag limits in Unit 17 during this reporting period.

Hunter/Trapper Harvest. The wolf harvest in Unit 17 fluctuates greatly from year to year and is greatly dependent upon winter travel conditions. The past 5 year (1997–98 through 2001–02) annual average harvest was 90 wolves (Table 2). During 1999–00, 34 hunter/trappers reported taking 84 wolves (60 males, 23 females, 1 sex not reported), with 3 taken in Unit 17A, 55 from 17B and 26 taken in 17C. During 2000–01, 41 hunter/trappers reported taking 89 wolves (45 males, 40 females, 4 sex not reported), with none taken in Unit 17A, 59 from 17B and 30 taken in 17C. During 2001–02, 35 hunter/trappers reported taking 91 wolves (46 males, 43 females, 2 sex not reported), with 1 taken in Unit 17A, 59 from 17B and 35 taken in 17C. Most were taken with firearms (Table 2).

Harvest Chronology. Harvest chronology has been quite variable. Most wolves were harvested in January and February (Table 3). In most years, harvest chronology reflects the

suitability of snow conditions for tracking and travel 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, due to increased numbers of moose and caribou hunters, as well as wolves.

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 of wolves in 1992–93 and after 1996–97, most wolves have been harvested by hunter/trappers using snowmachines for transportation. The advent of larger, more reliable snowmachines has contributed greatly to the use of these machines when hunting and trapping wolves.

## CONCLUSIONS AND RECOMMENDATIONS

Few data are available to interpret the status of the wolf population in Unit 17. General observations and public contacts suggest that the wolf population is healthy and has rebounded from the apparent decline from 1989 through 1992. Moose and caribou are probably the primary prey for most packs in the unit. Although no packs are known to follow the Mulchatna caribou herd in Unit 17, wolves in this unit appeared to take advantage of this herd as it increased through the mid 1990s. It is logical to expect that wolf populations increased along with the prey densities.

The apparent 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 that were trapped in Unit 17 area in 1991–92 were sent to the Alaska State Virology Laboratory for rabies tests. All were negative; however, the tests could not determine if the wolves had been exposed to rabies at one time and survived.

Same-day-airborne shooting of wolves was historically a common and effective method of harvesting wolves in Unit 17. Department records confirm this from 1961–62 through 1991–92 and local residents have documented extensive use of aircraft by wolf hunters back to the 1930s. Prohibition of same-day-airborne wolf shooting in 1992–93 resulted in a shift to snowmachines for access.

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 1 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 2001–02

| 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 |

[a]Fall estimate = pre-trapping 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 2001–02

| 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 | 75 | 35 | 11 | 121 | 33 (27%) | 88 (73%) | 0 (--) | 34 |
| 1995–96 | 26 | 15 | 0 | 41 | 15 (27%) | 26 (63%) | 0 (--) | 18 |
| 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 | 60 | 23 | 1 | 84 | 14 (17%) | 68 (81%) | 2 (2%) | 34 |
| 2000–01 | 45 | 40 | 4 | 89 | 13 (15%) | 75 (84%) | 1 (1%) | 41 |
| 2001–02 | 46 | 43 | 2 | 91 | 38 (42%) | 52 (57%) | 1 (1%) | 35 |

Table 3 Unit 17 wolf harvest chronology percent by time period, 1991–92 to 2001–02

| 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% | 7% | 32% | 17% | -- | 30%[c] | 121 |
| 1995–96 | 2% | 20% | 49% | 22% | -- | -- | 41 |
| 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% | 84 |
| 2000–01 | 7% | 11% | 22% | 35% | 1% | 24% | 89 |
| 2001–02 | 7% | 16% | 42% | 13% | -- | 22% | 91 |

[a]Includes 1 wolf (5%) harvested in August and 1 wolf (5%) harvested in October.
[b]Includes 3 wolves (6%) harvested in September.
[c]Includes 2 wolves (2%) harvested in August, 8 (7%) in September, 1 (1%) in October, 21 (17%) in November and 4 (4%) harvested at unknown times.

Table 4 Unit 17 wolf harvest percent by transport method, 1991–92 to 2001–02

| | Percent of harvest | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Regulatory year | Airplane | Dogsled 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 | 29% | 10% | 2% | -- | 60% | -- | -- | 2% | 121 |
| 1995–96 | 19% | 5% | -- | -- | 49% | -- | -- | -- | 41 |
| 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% | 84 |
| 2000–01 | 17% | 1% | 4% | -- | 73% | -- | 1% | 3% | 89 |
| 2001–02 | 12% | 1% | -- | 1% | 73% | -- | 1% | 12% | 91 |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 the local newspaper with regular informational articles on topics such as wolves, trapping, and regulations.

## 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 which include 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 inferred that the 1999 population ranged from 200–225 animals in 18–22 packs, and grew to 250–300 animals in 25–30 packs (Table 1) by the end of the reporting period.

*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 return to Unit 17 to calve 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: 85 during the 1999–2000 regulatory year, 31 in 2000–2001, and 109 in 2001–2002 (the highest reported harvest to date). 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, 81% of the 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 ($n$ = 217) taken than females ($n$ = 126) 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. Only one successful resident, who shot a wolf in August, resided outside Unit 18.

No measure of success is available.

Harvest Chronology. The highest reported harvests have historically been in February; the second highest 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. Travel conditions usually improve by January and through February. The 2000–2001 harvest was 31, the lowest during this reporting period. Travel conditions 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 an increase of about 100 wolves since the previous 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 31 in 2000–2001 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.

We recruited an administrative clerk whose duties include recruiting, educating, and supporting license vendors and fur sealers. This should result in better compliance with our

regulations, higher retention of better trained fur sealers and license vendors, and better harvest information.

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Table 1 Unit 18 fall wolf population estimates[a], 1985–1986 through 2001–2002

| 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 |

[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, 1996–1997 through 2001–2002

| 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 |

Table 3 Unit 18 wolf harvest, 1985–1986 through 2001–2002

| 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 |

Table 4 Unit 18 wolf harvest chronology by time period, 1985–1986 through 2001–2002

| | 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] |
| Totals | 23 | 40 | 96 | 137 | 73 | 11 | 434 |

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

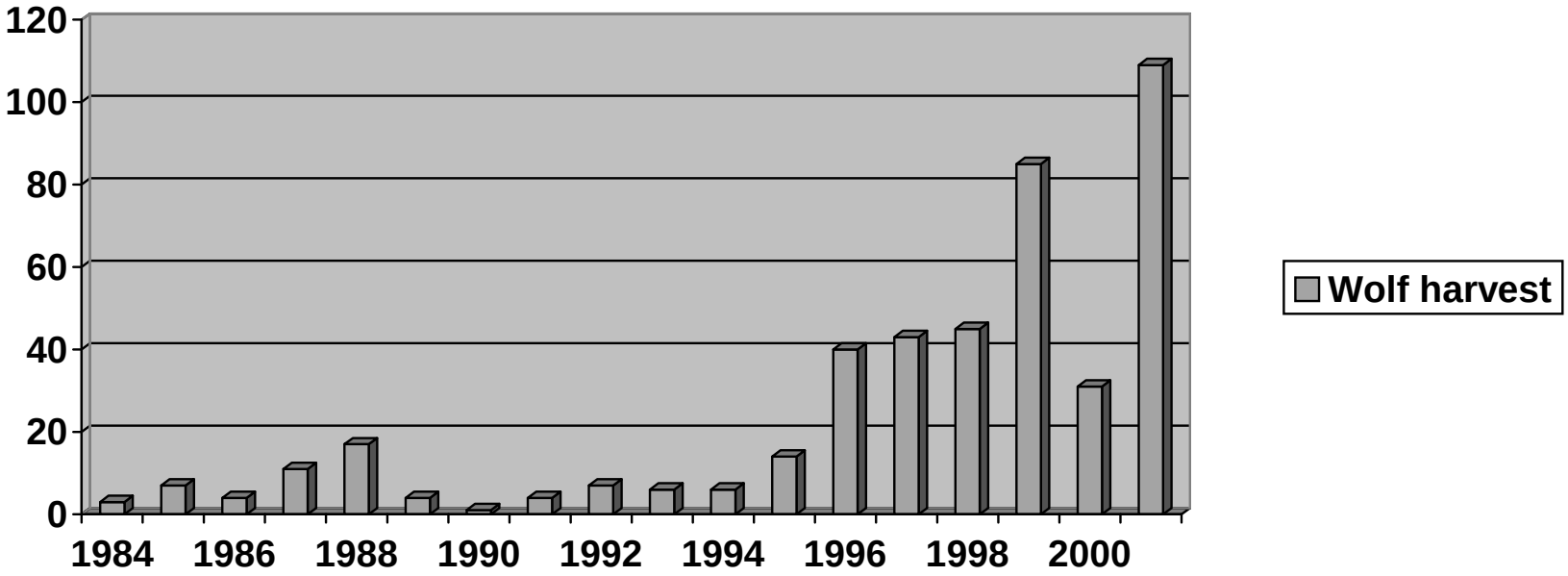


Figure 1 Reported wolf harvest 1984–2001

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## LOCATION

**GAME MANAGEMENT UNITS:** 19A, B, C, and D and 21A and E (60,523 $mi^2$)

**GEOGRAPHIC DESCRIPTION:** Drainages of the Kuskokwim River upstream from the village of Lower Kalskag; Yukon River drainage 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 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 Units 19 and 21 have changed frequently in response to public controversies over wolf control programs in other regions of the state. 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.

Few wolves were taken by aerial shooting in Unit 19, with the exception of regulatory year (RY) 1978 (RY78 = 1 Jul 1978 through 30 Jun 1979), when 29 were reported killed using this method. Only 4 wolves, other than those taken in RY78, were taken under the authority of aerial permits during RY72–RY83. Most harvest (67%) during that period occurred by land-and-shoot hunting, and the kill was 32–81 annually (Pegau 1984). Hunting of wolves by land-and-shoot continued until RY92 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 ft from the aircraft before shooting a wolf. A public ballot initiative in November 1996 repealed that “land and walk” regulation beginning in late February 1997, again prohibiting all same-day-airborne hunting of wolves.

Wolf predation can play a significant role in the population dynamics of moose (Gasaway et al. 1992), but the specific effects of wolf predation on moose populations within the

Kuskokwim drainage have not been thoroughly studied. However, Keech et al. (2002) recently gained significant insight into the degree and causes of mortality among moose calves. Black bears, wolves, and grizzly bears all were identified as significant predators. As early as 1980, biologists recognized 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 the Alaska Department of Fish and Game 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 (5200 $mi^2$ which includes Unit 19D upriver of, but not including, the Black and Selatna river drainages) in 1995 and reauthorized the same plan with updated population numbers in January 2000. To date, no plan has been implemented.

## 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 incompatible with department management policies.

Management may include various options ranging from manipulation of wolf population size by humans to 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 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% from the combined wolf population of Units 19, 21A, and 21E, except where greater harvest rates are mandated by approved wolf predation control implementation plans.

**MANAGEMENT ACTIVITIES**

- Monitor wolf numbers and population parameters.
- Synthesize incidental sightings, hunter interviews, trapper questionnaires, and sealing document information to refine annual wolf population estimates in the management area.
- Continue to purchase wolf carcasses from local trappers to obtain morphometric and reproductive information.
- Model the potential effects of wolf predation on prey populations in all subunits.
- Develop a proposal to conduct research on low-density wolf–prey population dynamics in Unit 19D East.
- Monitor harvests through sealing records and trapper questionnaires.
- Conduct wolf predation control programs as directed by the ADF&G commissioner and the Alaska Board of Game.
- Encourage wolf harvest through education programs designed to increase trapper skills, ethics, and regulatory compliance.
- Conduct wolf trapping and snaring clinics in communities that have expressed interest in the program.
- Provide classroom presentations to schools on wolf biology and management.
- Maintain communication with other local agencies, Native corporations, and locals regarding wolf management, and cooperate with any ongoing wolf studies.
- Incorporate local knowledge, information, and assistance in management strategies for wolves.
- Encourage reporting of wolf harvests and observations on trapper questionnaires.

## METHODS

We estimated wolf abundance within Unit 19D East during February 2001 using a reconnaissance track survey (Stephenson 1978). The same area was surveyed in 1995 and 1997 using a Sample Unit Probability Estimator (SUPE; Becker et al. 1998). During the 2001 survey, 4 experienced pilot–observer teams were deployed in fixed-wing aircraft to make direct observations of wolves and to count tracks in assigned blocks of land. 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.

Estimates of areawide wolf population size were summarized by regulatory year for previous reporting periods through RY98. Autumn wolf population size in Units 19, 21A, and 21E was estimated again in 2002 using a combination of information from 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 >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. Where practical, harvest indicated on sealing documents was validated by Fur Acquisition Reports and Fur Export Reports.

During RY00–RY02 we purchased and examined over 75 wolf carcasses taken in Unit 19D East by trappers. We recorded location, date and method of take, pelt color, body measurements, injuries, and fat indices. Placental scars were quantified from excised female reproductive tracts. A premolar was extracted from each cleaned skull for cementum aging. In addition to payment by ADF&G for wolf carcasses, trappers received $100/wolf from the McGrath Village Council to compensate for fuel and equipment costs.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size and Density*

We estimated 1200–1600 wolves occupied home ranges within the management area (Units 19, 21A, and 21E) during RY96–RY98 (Table 1a) and that 1330–1880 wolves ranged within the management area in autumn 2002 (Table 1b). Local trappers who responded to the 2001–2002 trapper questionnaire thought wolves were moderate to abundant during RY99–RY01, and populations were stable or increasing.

Three spring wolf population estimate surveys have been conducted in Unit 19D East since RY94 (Table 1c). During February 1995, 164 wolves (90% CI = 121–209) in 23 packs were estimated (SUPE) to use the area. The same area was surveyed during February 1997 (SUPE), and we estimated 56 wolves (90% CI = 43–73) in 14 packs. In February 2001 we estimated 102 wolves among 14 packs in Unit 19D East, roughly the midpoint of the 1995 and 1997 survey results. Large differences in wolf population estimates between 1995 and 1997 could reflect a wolf numerical response to increased moose vulnerability following severe winters

in the early 1990s (Whitman and McNay 1997). However, the Mulchatna caribou herd extended its range into the Kuskokwim drainage during 1996–1997 and likely provided an alternate prey source for wolves. In addition to windy conditions, the network of caribou tracks complicated wolf tracking during 1997 surveys south and east of McGrath. Consequently, several wolf packs observed in 1995 and 2001 were likely not quantified in 1997. Packs missed/not observed in those areas could have resulted in the significantly lower population estimate for that year.

Current estimates of wolf densities within Unit 19D East are consistent with predicted prey biomass and wolf density relationships observed in other parts of Alaska and North America (Fuller 1989).

*Population Composition*

The only data available relative to the sex composition of the wolf population were sex ratios from the harvested segment of the population reported on sealing documents. Ratios in the harvest were not significantly different from 1:1 (males:females) during RY85–RY01 ($P = 0.09$), and were 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 the management area. 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.

| Unit/Bag Limit/Special Restrictions | Resident/Nonresident Open Seasons |
|---|---|
| ***RY99*** | |
| Units 19, 21A, and 21E. | |
| HUNTING: 5 wolves. | 10 Aug–30 Apr |
| TRAPPING: No limit. | 1 Nov–30 Apr |
| ***RY00*** | |
| Units 19A, 19B, 19C, 21A, and 21E. | |
| HUNTING: 5 wolves. | 10 Aug–30 Apr |
| TRAPPING: No limit. | 1 Nov–30 Apr |

| Unit/Bag Limit/Special Restrictions | Resident/Nonresident Open Seasons |
|---|---|
| Unit 19D. | 10 Aug–30 Apr |
| HUNTING: 10 wolves per day. | 1 Oct–30 Apr |
| TRAPPING: No limit. | |
| ***RY01*** | |
| Units 19A, 19B, and 19C. | |
| HUNTING: 5 wolves. | 10 Aug–30 Apr |
| TRAPPING: No limit. | 1 Nov–30 Apr |
| Unit 19D. | |
| HUNTING: 10 wolves per day. | 10 Aug–30 Apr |
| TRAPPING: No limit. | 1 Oct–30 Apr |
| Units 21A and 21E. | |
| 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 reauthorized an updated version of the Wolf Control Implementation Plan in January 2000. Updates to the plan included revisions to the population estimates and corresponding population goals and objectives. No plan has been implemented to date. In January 2000 the board also authorized the use of snowmobiles to pursue wolves in areas with current Wolf Control Implementation Areas, including Unit 19D East. In March 2000 the board increased the wolf hunting bag limit in Unit 19D from 5 per season to 10 wolves per day with no season limit. The start of the trapping season was also changed from 1 November to 1 October, with the "snare only of 3/32" or larger" stipulation already in regulation for the April and October portion of wolf trapping season. In May 2001 the board established a requirement that wolves harvested in Unit 19D be reported to McGrath ADF&G within 10 days of kill and, in March 2002, made it legal in Unit 19 to use snowmachines to take wolves, provided the snowmachine is stopped before shooting.

Hunter–Trapper Harvest. During RY99–RY01, 148, 181, and 208 wolves (respectively) were reported harvested in the management area (Table 2a); the average reported harvest was 179 wolves ($s$ = 30.1, 90% CI = 150–208). Reported harvest in Unit 19D East during the same time period was 34, 36, and 23, respectively (Table 1c). Harvest data and population estimates both are based, in part, on anecdotal information and the assumption that no significant changes have occurred since we conducted more rigorous surveys. If we have met this assumption and our harvest reporting error is low, wolves in Unit 19D East presently are harvested at around 26%. Given current population size estimates and rates of harvest, the Unit 19D East wolf population is likely not limited by harvest and existing harvest levels appear to be sustainable. During the reporting period, wolves were harvested by ground shooting ($\bar{x}$ = 75/year, Tables 2b and 2c), trapping ($\bar{x}$ = 50/year), and snaring ($\bar{x}$ = 48/year).

For all subunits, ground shooting was the most common method to harvest wolves (42%), but the importance of trapping versus snaring differed among areas.

Hunter Residency and Success. Local trappers and hunters contributed to most of the annual wolf harvest in all subunits (51%; Table 2a). However, during the last 2 reporting periods, nonresidents were more successful than residents in harvesting wolves during the fall, incidental to hunting other big game species.

Success rates by wolf hunters/trappers are difficult to determine. One indicator may be the mean number of wolves taken per successful hunter/trapper (Table 2a). This number varies annually and shows no clear trend.

Harvest Chronology. Most reported wolf harvest occurred during February and March ($\bar{x}$ = 35 and 36, respectively; Table 3). February wolf harvests have remained stable for the last 5 reporting periods, but March harvests have declined by 18% per reporting period during that same time. In the past, trappers took advantage of increased day length and deeper snow to effectively harvest wolves in March. Greater snow depths allowed trappers to track wolf packs, to travel overland by snowmachine, and land aircraft to facilitate greater harvests of wolves during that month. However, restrictions placed on aircraft during the mid-1990s appear to have caused declines in March harvests.

September and December wolf harvests have increased during the previous 5 reporting periods. Fall moose and caribou hunters incidentally harvested greater numbers of wolves than previously observed. During the RY93–RY95 reporting period, hunters harvested an average of 7 wolves during September, but took an average of 24 wolves during the same month in RY99–RY01 (Table 3). Of the 134 wolves harvested in September since 1995, nonresidents took 91 (68%) while residents took 43 wolves (32%). Several factors likely contributed to this increase including reduction or elimination of nonresident tag fees, heightened interest in wolf harvest by guided hunters, and perceptions by hunters of the effects of wolf predation on ungulate populations. These chronologic changes in wolf harvest were evident in sealing data gathered during the reporting period, and confirm Whitman's (1997) prediction that with aircraft restrictions in place, harvests will become more equally distributed throughout the winter.

Transport Methods. The method of transportation used by hunters and trappers to harvest wolves has steadily shifted from primarily aircraft during RY87–RY91 to snowmachines during RY96–RY01 (Table 4). In past years, hunters/trappers who used airplanes for access typically traveled from the south side of the Alaska Range to take wolves in Units 19 and 21, but aircraft-use restriction limited this mode of access. If harvest of wolves by nonresidents continues to increase, use of aircraft as a transport method may also increase again. Other methods of transport, such as dog team and snowshoes, were less important.

*Other Mortality*

During winter 1999–2000, a trapper in Unit 19D observed a wolf crippled by what appeared to be a blow to the spine. The wolf was paralyzed from the hips back and, after skinning, a large contusion was noted just anterior of the pelvis. Injuries sustained during predatory

attempts on moose are one source of natural mortality. Intraspecific aggression also contributes to natural mortality, however we did not observe specific cases of natural mortality during the reporting period.

### POSTMORTEM EXAMINATIONS

Unit 19D East wolf necropsy data (RY00–RY02) are summarized in Table 5 and will be analyzed at a future date.

### NONREGULATORY MANAGEMENT PROBLEMS, NEEDS, AND EDUCATION

Collecting survey and inventory information on wolf populations is a major challenge faced by wildlife managers. Population size estimates are the most difficult to derive, because they require adequate search conditions, an experienced pilot–observer team, and sufficient funding. While it will continue to be important to gather data on wolf populations in Unit 19D East, data gaps exist in the rest of the management area. Potential moose planning efforts in those areas need relatively good information to proceed, and we have not surveyed wolf populations in those subunits.

To encourage ethical trapping, promote best management practices, and reduce nontarget catch, we offered free-of-charge wolf trapping and snaring clinics in Sleetmute, Aniak, and Anvik in January 2000, and in McGrath in February 2002. Participants each made a dozen snares equipped with modified locks designed to release adult moose and were taught snare-setting techniques to maximize wolf harvest while minimizing incidental moose take. At the request of the Grayling city council, we also will conduct a clinic in that community in winter 2003.

## CONCLUSIONS AND RECOMMENDATIONS

Hunting and trapping of wolves in Units 19, 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 realize that predator-control actions by the department are constrained politically, interest in clinics and trapping incentive programs may increase. Public involvement and enthusiasm may be determined by how much the tribal and/or city councils are willing to contribute to incentive programs that compensate successful trappers for their time, fuel, and equipment. Community dynamics vary across the management area, and some villages may be more likely to increase wolf harvests than others. For example, Grayling residents typically ground-shoot wolves along the river; many are not familiar with wolf trapping–snaring techniques nor can they typically afford trapping hardware. Encouraging different methods of take may generate more interest in wolf trapping in Unit 21E.

While some trapper incentive programs will undoubtedly increase harvest in small areas, they will not effectively reduce overall wolf numbers. Likewise, recent regulatory changes by the Board of Game will likely have little effect on the overall harvest of wolves. Due to the topography in Unit 19D, using snowmachines to pursue wolves is not likely to be an effective means of increasing harvest.

Our objective for the next reporting period will be to continue to provide for a sustained annual harvest rate of up to 30% from the combined wolf population of Units 19, 21A, and 21E, except where greater harvest rates are mandated by approved wolf predation control implementation plans. In addition to this management objective, the Board of Game has approved objectives as part of the Unit 19D East wolf predation control implementation plan to reverse the decline in the Unit 19D East moose population by reducing the wolf population (to no fewer than 20 wolves) in an efficient, safe, and humane manner.

Management activities for the next reporting period are:

- Conduct an aerial survey of the wolf population in Unit 19D East in late winter 2004.
- 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.

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TABLE 1a Units 19, 21A, and 21E autumn wolf population estimates[a], regulatory years 1985–1986 through 2002–2003

| Regulatory year | Population estimate | Number of packs | $\bar{x}$ Wolves/Pack |
|---|---|---|---|
| 1985–1986 | 660–780 | 110–129 | 6.0 |
| 1986–1987 | 670–780 | 107–136 | 6.0 |
| 1987–1988 | 665–770 | 76–95 | 8.4 |
| 1988–1989 | 710–815 | 72–88 | 9.5 |
| 1989–1990 | 720–940 | 72–91 | 10.2 |
| 1990–1991 | 720–940 | 72–91 | 10.2 |
| 1991–1992 | 720–940 | 72–91 | 10.2 |
| 1992–1993 | 750–950 | 71–92 | 10.4 |
| 1993–1994 | 970–1000 | 72–90 | 12.2 |
| 1994–1995 | 1568–1768 | 170–200 | 9.0 |
| 1995–1996 | 1200–1768 | 170–200 | 8.0 |
| 1996–1997 | 1200–1300 | 150–170 | 7.8 |
| 1997–1998 | 1300–1500 | 160–180 | 8.2 |
| 1998–1999 | 1400–1600 | 170–190 | 8.3 |
| 1999–2000 thru 2001–2002[b] | | | |
| 2002–2003 | 1330–1800 | 189–258 | 7.0 |

[a] Fall estimate = pretrapping season population based on population surveys, incidental observations, reports from public, sealing records, and trapper questionnaires.
[b] Data not available for these years.

TABLE 1b Units 19, 21A, and 21E wolf population estimates, autumn 2002

| | Autumn population estimate | | Number | |
|---|---|---|---|---|
| Subunit | Min | Max | of packs | Trend |
| 19A | 220 | 300 | 31–43 | stable to increasing |
| 19B | 170 | 230 | 24–33 | increasing |
| 19C | 150 | 205 | 21–29 | increasing |
| 19D | 270 | 365 | 39–52 | stable |
| 21A | 340 | 460 | 49–66 | stable |
| 21E | 180 | 240 | 25–35 | stable |
| Total | 1330 | 1800 | 189–258 | |

TABLE 1C Unit 19D East (5200 $mi^2$) wolf population estimates and harvest

| Year | Population estimate | 90% CI | Range | No. packs | $\bar{x}$ Wolves/ pack | Estimated density Wolves/ 1000 $mi^2$ | Estimated density Wolves/ 1000 $km^2$ | Moose/Wolf ratio | Total harvest | Harvest rate |
|---|---|---|---|---|---|---|---|---|---|---|
| 1994–1995 | 164[a] | 27.7% | 121–209 | 23 | 7 | 31.4 | 12.1 | 12 | 25 | 13% |
| 1996–1997 | 56[a] | 30.8% | 43–73 | 14 | 4 | 10.8 | 4.2 | 23–25 | 39 | 41% |
| 2000–2001 | 102[b] | NA | NA | 14 | 6 | 19.6 | 7.6 | 22 | 36 | 26% |

[a] Sample Unit Probability Estimator (SUPE).
[b] Reconnaissance track survey.

TABLE 2a Units 19, 21A, and 21E wolf harvest, regulatory years 1985–1986 through 2001–2002

| Regulatory | Reported harvest | | | | Residency | | | $\bar{x}$ Wolves/ | Harvest |
|---|---|---|---|---|---|---|---|---|---|
| year | M | F | Unknown | Total | Nonresident | Resident | Unknown | Trapper | rate (%) |
| 1985–1986 | 25 | 30 | 0 | 55 | 0 | 2 | 53 | 2.1 | 8 |
| 1986–1987 | 70 | 49 | 14 | 133 | 0 | 2 | 131 | 3.3 | 18 |
| 1987–1988 | 114 | 97 | 9 | 220 | 0 | 0 | 220 | 3.8 | 31 |
| 1988–1989 | 89 | 68 | 21 | 178 | 0 | 0 | 178 | 3.6 | 23 |
| 1989–1990 | 105 | 86 | 12 | 203 | 0 | 0 | 203 | 3.4 | 24 |
| 1990–1991 | 102 | 87 | 6 | 195 | 0 | 0 | 195 | 3.1 | 23 |
| 1991–1992 | 57 | 62 | 15 | 134 | 0 | 0 | 134 | 2.4 | 16 |
| 1992–1993 | 22 | 13 | 15 | 50 | 3 | 28 | 19 | 1.9 | 6 |
| 1993–1994 | 48 | 45 | 5 | 98 | 4 | 91 | 3 | 2.6 | 10 |
| 1994–1995 | 124 | 92 | 34 | 250 | 12 | 225 | 13 | 3.0 | 15 |
| 1995–1996 | 78 | 46 | 1 | 125 | 7 | 118 | 0 | 3.8 | 8 |
| 1996–1997 | 89 | 94 | 5 | 188 | 11 | 177 | 0 | 2.7 | 15 |
| 1997–1998 | 54 | 42 | 8 | 104 | 15 | 89 | 0 | 1.9 | 7 |
| 1998–1999 | 97 | 64 | 12 | 173 | 30 | 143 | 0 | 2.1 | 11 |
| 1999–2000 | 85 | 60 | 3 | 148 | 23 | 125 | 0 | 2.3 | –[a] |
| 2000–2001 | 95 | 72 | 14 | 181 | 27 | 154 | 0 | 2.3 | –[a] |
| 2001–2002 | 112 | 87 | 9 | 208 | 25 | 183 | 0 | 2.8 | –[a] |
| Total | 1366 | 1094 | 183 | 2643 | 157 | 1337 | 1149 | | |
| % of Total | 52 | 41 | 7 | 100 | 6 | 51 | 43 | | |

[a] Harvest rate not calculated because population estimate was not obtained.

TABLE 2b Units 19A, 19B, 19C, and 19D wolf harvest and harvest method, regulatory years 1985–1986 through 2001–2002

| Regulatory | Unit 19A | | | | | Unit 19B | | | | | Unit 19C | | | | | Unit 19D | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| year | Shoot | Trap | Snare | O/U[a] | Total | Shoot | Trap | Snare | O/U[a] | Total | Shoot | Trap | Snare | O/U[a] | Total | Shoot | Trap | Snare | O/U[a] | Total |
| 1985–1986 | 1 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 1 | 4 | 1 | 1 | 0 | 6 | 20 | 7 | 4 | 0 | 31 |
| 1986–1987 | 0 | 4 | 4 | 0 | 8 | 15 | 1 | 0 | 0 | 16 | 12 | 6 | 4 | 0 | 22 | 13 | 11 | 1 | 4 | 29 |
| 1987–1988 | 52 | 1 | 1 | 1 | 55 | 55 | 1 | 0 | 0 | 56 | 9 | 3 | 1 | 0 | 13 | 11 | 2 | 1 | 1 | 15 |
| 1988–1989 | 3 | 2 | 0 | 1 | 6 | 31 | 1 | 0 | 0 | 32 | 37 | 2 | 1 | 0 | 40 | 29 | 2 | 1 | 0 | 32 |
| 1989–1990 | 21 | 1 | 1 | 3 | 26 | 43 | 2 | 0 | 1 | 46 | 41 | 0 | 0 | 0 | 41 | 15 | 2 | 3 | 1 | 21 |
| 1990–1991 | 40 | 1 | 0 | 0 | 41 | 10 | 1 | 0 | 0 | 11 | 40 | 1 | 3 | 0 | 44 | 30 | 2 | 0 | 0 | 32 |
| 1991–1992 | 19 | 0 | 1 | 0 | 20 | 21 | 1 | 0 | 0 | 22 | 47 | 1 | 1 | 0 | 49 | 13 | 3 | 4 | 0 | 20 |
| 1992–1993 | 11 | 3 | 0 | 0 | 14 | 2 | 2 | 0 | 1 | 5 | 6 | 1 | 4 | 0 | 11 | 0 | 3 | 0 | 0 | 3 |
| 1993–1994 | 0 | 0 | 6 | 0 | 6 | 14 | 2 | 0 | 3 | 19 | 21 | 4 | 11 | 1 | 37 | 8 | 4 | 10 | 0 | 22 |
| 1994–1995 | 40 | 1 | 4 | 0 | 45 | 25 | 17 | 0 | 0 | 42 | 36 | 4 | 21 | 0 | 61 | 9 | 5 | 21 | 3 | 38 |
| 1995–1996 | 15 | 0 | 6 | 2 | 23 | 22 | 3 | 2 | 0 | 27 | 14 | 0 | 5 | 0 | 19 | 9 | 6 | 3 | 0 | 18 |
| 1996–1997 | 11 | 1 | 1 | 0 | 13 | 10 | 3 | 6 | 0 | 19 | 19 | 3 | 11 | 0 | 33 | 6 | 12 | 21 | 3 | 42 |
| 1997–1998 | 4 | 5 | 5 | 0 | 14 | 10 | 3 | 1 | 0 | 14 | 7 | 0 | 0 | 0 | 7 | 3 | 10 | 17 | 0 | 30 |
| 1998–1999 | 28 | 12 | 1 | 2 | 43 | 14 | 23 | 2 | 0 | 39 | 6 | 2 | 6 | 0 | 14 | 8 | 5 | 7 | 0 | 20 |
| 1999–2000 | 18 | 1 | 2 | 0 | 21 | 13 | 15 | 0 | 0 | 28 | 13 | 4 | 7 | 0 | 24 | 17 | 2 | 20 | 0 | 39 |
| 2000–2001 | 8 | 8 | 7 | 2 | 25 | 20 | 12 | 6 | 0 | 38 | 7 | 4 | 5 | 0 | 16 | 12 | 9 | 15 | 1 | 37 |
| 2001–2002 | 14 | 22 | 6 | 4 | 46 | 22 | 19 | 13 | – | 55 | 8 | 8 | 12 | – | 28 | 5 | 6 | 13 | 5 | 29 |
| Total | 285 | 62 | 46 | 15 | 408 | 327 | 107 | 30 | 6 | 470 | 327 | 44 | 93 | 1 | 465 | 208 | 91 | 141 | 18 | 458 |
| % of Total | 70 | 15 | 11 | 4 | 100 | 70 | 23 | 6 | 1 | 100 | 70 | 9 | 20 | <1 | 100 | 45 | 20 | 31 | 4 | 100 |
| 5-year $\bar{x}$ | | | | | 30 | | | | | 35 | | | | | 18 | | | | | 31 |

[a] O/U = Other/Unknown.

TABLE 2c Units 21A and 21E wolf harvest and harvest method, regulatory years 1985–1986 through 2001–2002

| Regulatory year | Unit 21A | | | | | Unit 21E | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Shoot | Trap | Snare | O/U[a] | Total | Shoot | Trap | Snare | O/U[a] | 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 | – | 12 | 17 | 14 | 1 | 0 | 32 |
| Total | 211 | 68 | 142 | 5 | 426 | 231 | 91 | 38 | 28 | 388 |
| % of Total | 50 | 16 | 33 | 1 | 100 | 60 | 23 | 10 | 7 | 100 |
| 5-year $\bar{x}$ | | | 4 | | 21 | | | | | 25 |

[a] O/U = Other/Unknown.

TABLE 3 Units 19, 21A, and 21E wolf harvest chronology by month, regulatory years 1985–1986 through 2001–2002

| Regulatory year | Harvest chronology by month | | | | | | | | | | Total harvest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | Unk | |
| 1985–1986 | 0 | 2 | 0 | 2 | 11 | 16 | 19 | 5 | 0 | 0 | 55 |
| 1986–1987 | 0 | 0 | 0 | 13 | 11 | 13 | 51 | 40 | 1 | 4 | 133 |
| 1987–1988 | 1 | 5 | 0 | 5 | 9 | 37 | 53 | 87 | 18 | 5 | 220 |
| 1988–1989 | 2 | 3 | 1 | 4 | 7 | 15 | 14 | 118 | 2 | 12 | 178 |
| 1989–1990 | 1 | 8 | 0 | 7 | 21 | 30 | 25 | 108 | 3 | 0 | 203 |
| 1990–1991 | 0 | 5 | 1 | 0 | 9 | 21 | 43 | 116 | 0 | 0 | 195 |
| 1991–1992 | 0 | 2 | 0 | 1 | 19 | 19 | 35 | 57 | 1 | 0 | 134 |
| 1992–1993 | 1 | 5 | 0 | 4 | 1 | 3 | 12 | 21 | 3 | 0 | 50 |
| 1993–1994 | 2 | 7 | 0 | 4 | 10 | 21 | 13 | 35 | 3 | 3 | 98 |
| 1994–1995 | 4 | 12 | 2 | 4 | 31 | 50 | 64 | 67 | 16 | 0 | 250 |
| 1995–1996 | 0 | 1 | 1 | 6 | 2 | 17 | 33 | 56 | 9 | 0 | 125 |
| 1996–1997 | 1 | 16 | 0 | 19 | 31 | 32 | 34 | 51 | 1 | 3 | 188 |
| 1997–1998 | 5 | 21 | 0 | 8 | 15 | 7 | 25 | 21 | 2 | 0 | 104 |
| 1998–1999 | 3 | 24 | 3 | 6 | 15 | 28 | 35 | 56 | 3 | 0 | 173 |
| 1999–2000 | 5 | 24 | 0 | 10 | 18 | 9 | 41 | 35 | 6 | 0 | 148 |
| 2000–2001 | 4 | 32 | 2 | 23 | 19 | 33 | 30 | 36 | 2 | 0 | 181 |
| 2001–2002 | 6 | 16 | 8 | 20 | 35 | 22 | 35 | 38 | 14 | 14 | 208 |
| Total | 35 | 183 | 18 | 136 | 264 | 373 | 562 | 947 | 84 | 41 | 2643 |
| % of Total | 1 | 7 | 1 | 5 | 10 | 14 | 21 | 36 | 3 | 2 | 100 |

TABLE 4 Units 19, 21A, and 21E harvest by transport method, regulatory years 1985–1986 through 2001–2002

| Regulatory year | Harvest by transport method | | | | Total |
|---|---|---|---|---|---|
| | Aircraft | Snowmobile | Dog team/snowshoe | Other[a] | |
| 1985–1986 | 13 | 8 | 12 | 22 | 55 |
| 1986–1987 | 88 | 23 | 7 | 15 | 133 |
| 1987–1988 | 179 | 30 | 8 | 3 | 220 |
| 1988–1989 | 139 | 14 | 5 | 20 | 178 |
| 1989–1990 | 161 | 35 | 1 | 6 | 203 |
| 1990–1991 | 162 | 24 | 4 | 5 | 195 |
| 1991–1992 | 109 | 2 | 14 | 9 | 134 |
| 1992–1993 | 9 | 29 | 5 | 7 | 50 |
| 1993–1994 | 49 | 36 | 5 | 8 | 98 |
| 1994–1995 | 64 | 121 | 53 | 12 | 250 |
| 1995–1996 | 85 | 29 | 8 | 3 | 125 |
| 1996–1997 | 40 | 102 | 31 | 15 | 188 |
| 1997–1998 | 28 | 48 | 16 | 12 | 104 |
| 1998–1999 | 42 | 113 | 5 | 13 | 173 |
| 1999–2000 | 34 | 88 | 20 | 6 | 148 |
| 2000–2001 | 39 | 108 | 18 | 16 | 181 |
| 2001–2002 | 44 | 97 | 33 | 34 | 208 |

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

TABLE 5 Unit 19D wolf necropsy data, regulatory years 2000–2001 through 2002–2003

| Regulatory year | *N* | Males | Avg skinned weight (lb) | Females | Avg skinned weight (lb) | Age: Pups | Age: Yrlg | Age: 2+ yr | Xiphoid fat (g) | Total fat[a] (mm) | Reproductive females | Total scars |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000–2001 | 23 | 14 | 70 | 9 | 65 | 6 | 6 | 11 | 137 | 27 | 2 | 9 |
| 2001–2002 | 25 | 16 | 65 | 9 | 49 | –[b] | [b] | [b] | 94 | 22 | –[c] | [c] |
| 2002–2003 | 29 | 15 | 70 | 14 | 61 | –[b] | [b] | [b] | 117 | 28 | 5 | 19 |

[a] Sum of rump, sternum, and flank fat measurements.
[b] Data not yet available.
[c] Reproductive tracts were not analyzed.

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 1993–94 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 in adjacent Unit 20C, a 16-year wolf study continues because of interest in the animal as 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 OBJECTIVES

Objectives during this reporting period were to:

1 Monitor harvest through sealing certificates.

2 Conduct aerial surveys in Units 20B, 20C, 20F, and 25C.

3 Monitor the wolf population in Unit 20A by maintaining radio collars in wolf packs, including packs inhabiting the flats.

4 Assist wolf research efforts in Unit 20A.

## METHODS

### POPULATION SIZE

To obtain population estimates for Unit 20A in regulatory years (RY) 1999 and 2000 (RY = 1 Jul through 30 Jun; e.g., RY00 = 1 Jul 2000 through 30 Jun 2001), we estimated wolf numbers from radiocollared packs in the foothills/mountains and extrapolated to the Tanana Flats. Work in the foothills/mountains was conducted as part of ongoing wolf research in the unit (McNay 1999). Snow conditions during spring 2000 were not adequate to conduct aerial wolf population surveys on the Tanana Flats. In spring 2001 a reconnaissance survey to assess snow conditions in the flats was conducted, but conditions were deemed too poor to conduct a reliable survey. In RY01 we estimated wolf numbers by extrapolating from the RY00 foothills/mountains estimate using radiocollared packs (research in the foothills/mountains ended in spring 2001) and adding the estimated number derived from a spring 2002 population survey conducted on the Tanana Flats.

We collected miscellaneous observations and reports for all areas. We also collected additional information for Unit 20B while conducting lynx–hare surveys (RY99 and RY00), moose surveys, and other reconnaissance flights. However, extrapolations from earlier or adjacent surveys provided the primary basis for estimates in areas other than Unit 20A. We used data from radiotelemetry surveys in Denali National Park to estimate wolf numbers in Unit 20C.

### 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 subunits, we estimated 600–850 wolves in 85–130 packs in fall 1999, 650–850 wolves in 85–130 packs in 2000, and 650–900 wolves in 85–130 packs in 2001. While total wolf numbers vary slightly, they only reflect new information for Units 20A and 20C (Table 1). The ranges represent the combined subjective minimum and maximum estimates for each subunit.

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 (ME McNay, ADF&G, personal communication), and then increased between 1999 and 2001. It appears that as a result of high harvests, wolf densities in 20A are now below theoretical densities that could be supported by current moose densities. By contrast, researchers in Denali National Park and Preserve 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 (LA Adams, USGS–Biological Resources Division, personal communication). Lower estimates reflect those observations.

### 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 20 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 | | |
| *RY99* | | |
| 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 |

| Units and Bag Limits | Resident/Subsistence Open Seasons | Nonresident Open Seasons |
|---|---|---|
| *RY00* | | |
| 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 |
| 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 |
| *RY01* | | |
| 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. In June 1993 the Alaska Board of Game authorized same-day-airborne shooting of wolves, provided the person attempting to take a wolf had a trapping license and was at least 300 ft from the airplane. In November 1996 this method of take was prohibited through a statewide ballot referendum (effective 25 Feb 1997).

*November 2000* – A small area of approximately 19 $mi^2$ in Unit 20C near Denali was closed to the taking of wolves. The area was closed to all wolf hunting and trapping, beginning at the point of intersection of the boundary of Denali National Park and the Savage River, along a straight line northwest to a point on the park boundary 2 miles south of the Stampede Trail, then south and east along the park boundary to the point of beginning. This regulation became law on 3 January 2001.

*May 2001* – Expanded the 19-$mi^2$ area in Unit 20C closed to the taking of wolves to approximately 72 $mi^2$ (Stampede Closed Area: Unit 20C, all lands west of the Savage River bounded by Denali National Park). Also made it unlawful in that portion of Unit 20C described above (5 AAC 92.550[7]), to take furbearers by using a snare with a cable diameter of 3/32 inch or larger that is set out of water.

*October 2002* – 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. 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.

Hunter–Trapper Harvest. Areawide wolf harvest, in general, increased between RY96–RY98 (annual mean = 186 wolves) and RY99–RY01 (annual mean = 225 wolves; Table 2). This was the case for all subunits, but not all years.

Wolf harvest varied considerably across years. Excluding years in which wolf control was conducted (i.e., 1993 and 1994), areawide wolf harvest increased in RY96 to its highest level (209 wolves) since RY85, fell in RY97 to its lowest level (146 wolves) since RY89, and then increased again to record highs in RY00 and RY01 (244 and 249 wolves, respectively). This general pattern was apparent in all subunits. 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).

Areawide, the number of trappers increased at an average rate of about 13% annually between RY97 and RY00, but then declined by 13% between RY00 and RY01 (Table 2). There was no apparent trend in the number of wolves taken per successful trapper during the last 5-year period.

Harvest Chronology. Areawide, most wolves were harvested during the periods Nov–Dec and Jan–Feb (Table 3). Most of the remainder of the harvest was evenly distributed between the Sep–Oct and Mar periods. The August and April periods accounted for only a small portion of the harvest. Although these trends were apparent in all subunits, the more remote subunits (i.e., Units 20C, 20F and 25C) exhibited greater annual variability probably because of smaller sample sizes.

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

## CONCLUSIONS AND RECOMMENDATIONS

Management objectives during this reporting period were not quantitative, and therefore can only be subjectively evaluated. We made progress on all of them, except conducting aerial surveys in Units 20B, 20C, 20F, and 25C. We monitored harvest, conducted aerial surveys in Unit 20A, monitored the Unit 20A population using radiotelemetry (i.e., packs in the foothills/mountains, but not packs inhabiting the Tanana Flats), and assisted wolf research efforts in Unit 20A. Regarding aerial surveys in Unit 20A, poor snow conditions and low funding levels compromised our ability to meet that objective.

During the next reporting period, Objectives 3 and 4 will be eliminated for 2 primary reasons: 1) The department will not be conducting field research on wolves in Unit 20A and, therefore, has no plans to maintain a sample of radiocollared animals; and 2) Maintaining radio collars in wolf packs on the Tanana Flats is cost prohibitive because of high attrition rates resulting from high harvest, natural mortality, and dispersal. Consequently, Objective 2 will be changed to an activity and expanded to include aerial surveys in Unit 20A. Therefore, for the next reporting period the quantifiable objective is to manage for fall density ≥ 11 wolves/1000 $mi^2$. Management activities will be to 1) monitor harvest through sealing certificates (Objective 1 from this reporting period), and 2) conduct aerial surveys in Units 20A, 20B, 20C, 20F, and 25C (Objective 2 from this reporting period).

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 (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 the Interior. Further, wolf harvest intensity may influence the operation of such density-dependent factors. Similar questions apply to wolf–caribou relationships (Dale 1997).

At this juncture, 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 April trapping–hunting season, concerns over fur quality and the pregnancy status of adult females will probably continue to generate proposals. Because trappers take so few wolves in April, little biological rationale exists for or against April seasons.

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TABLE 1 Units 20A, 20B, 20C, 20F, and 25C fall wolf population estimates, 1992–2001

| Unit | Year | Population estimate[a] | Number of packs | Basis of estimate |
|---|---|---|---|---|
| 20A | 1992 | 220–295 | 25–35 | Extrapolation from previous year |
| | 1993 | 254[b] | 20–25 | Radiotelemetry and aerial surveys (mountains), extrapolation (Tanana Flats) |
| | 1994 | 175[b] | 20–25 | Radiotelemetry and aerial surveys (mountains), extrapolation (Tanana Flats) |
| | 1995 | 180[b] | 20–25 | Radiotelemetry and aerial surveys (mountains), extrapolation (Tanana Flats) |
| | 1996 | 188[b] | 20–25 | Radiotelemetry and aerial surveys (mountains), extrapolation (Tanana Flats) |
| | 1997 | 206[b] | 20–25 | Radiotelemetry and aerial surveys (mountains), extrapolation (Tanana Flats) |
| | 1998 | 244[b] | 20–25 | Radiotelemetry and aerial surveys (mountains), extrapolation (Tanana Flats) |
| | 1999 | 152[b] | 20–25 | Radiotelemetry and aerial surveys (mountains), extrapolation (Tanana Flats) |
| | 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] |
| 20B | 1992 | 150–225 | 20–30 | Extrapolation from 1989 and Unit 20B West (1990) |
| | 1993 | 150–225 | 20–30 | Extrapolation from previous year |
| | 1994 | 150–225 | 20–30 | Extrapolation from previous year |
| | 1995 | 150–225 | 20–30 | Extrapolation from previous year |
| | 1996 | 150–225 | 20–30 | Extrapolation from previous year |
| | 1997 | 150–225 | 20–30 | Extrapolation from previous year |
| | 1998 | 150–225 | 20–30 | Extrapolation from previous year |
| | 1999 | 150–225 | 20–30 | Extrapolation from previous year |
| | 2000 | 150–225 | 20–30 | Extrapolation from previous year |
| | 2001 | 150–225 | 20–30 | Extrapolation from previous year |
| 20C | 1992 | 200–320 | 25–40 | National Park Service study and extrapolation |
| | 1993 | 200–320 | 25–40 | Denali National Park data and extrapolation from previous year |
| | 1994 | 150–200 | 25–40 | Denali National Park data and extrapolation from previous year |
| | 1995 | 150–200 | 25–35 | Denali National Park data and extrapolation from previous year |
| | 1996 | 150–200 | 25–35 | Denali National Park data and extrapolation from previous year |
| | 1997 | 150–200 | 25–35 | Denali National Park data and extrapolation from previous year |
| | 1998 | 150–200 | 25–35 | Denali National Park data and extrapolation from previous year |
| | 1999 | 150–200 | 25–35 | Denali National Park data and extrapolation from previous year |

| Unit | Year | Population estimate[a] | Number of packs | Basis of estimate |
|---|---|---|---|---|
| | 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 |
| 20F | 1992 | 75–125 | 10–20 | Density extrapolation from Units 20C (1989) and 20B (1990) |
| | 1993 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1994 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1995 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1996 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1997 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1998 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1999 | 75–125 | 10–20 | Extrapolation from previous year |
| | 2000 | 75–125 | 10–20 | Extrapolation from previous year |
| | 2001 | 75–125 | 10–20 | Extrapolation from previous year |
| 25C | 1992 | 75–125 | 10–20 | Density extrapolation from Units 20C (1989) and 20B (1990) |
| | 1993 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1994 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1995 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1996 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1997 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1998 | 75–125 | 10–20 | Extrapolation from previous year |
| | 1999 | 75–125 | 10–20 | Extrapolation from previous year |
| | 2000 | 75–125 | 10–20 | Extrapolation from previous year |
| | 2001 | 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 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 September 2001 through January 2002 results in fall minimum estimate of 80–89 wolves.

TABLE 2 Units 20A, 20B, 20C, 20F, and 25C wolf harvest, regulatory years 1997–1998 through 2001–2002

| | | Reported harvest[a] | | | | | | Method of take[b] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | year | M | F | (%) | Unk | Total | 3-year mean | Trap | (%) | Snare | (%) | Shot | (%) | Unk/ Other | Successful Trappers/ hunters | Wolves/ person |
| 20A | 1997–1998 | 23 | 21 | (48) | 2 | 46 | 56 | 19 | (42) | 15 | (33) | 11 | (24) | 1 | 24 | 1.9 |
| | Regulatory | 39 | 41 | (51) | 10 | 90 | 66 | 35 | (39) | 46 | (51) | 9 | (10) | 0 | 29 | 3.1 |
| | | 41 | 26 | (39) | 0 | 67 | 68 | 29 | (43) | 24 | (36) | 14 | (21) | 0 | 30 | 2.2 |
| | | 53 | 38 | (44) | 4 | 95 | 83 | 33 | (36) | 46 | (51) | 12 | (13) | 4 | 38 | 2.4 |
| | 1998–1999 | 48 | 39 | (46) | 11 | 98 | 87 | 37 | (38) | 53 | (54) | 8 | (8) | 0 | 32 | 3.0 |
| | 1999–2000 | | | | | | | | | | | | | | | |
| 20B | 1997–1998 | 39 | 27 | (41) | 1 | 67 | 65 | 14 | (21) | 43 | (65) | 9 | (14) | 1 | 28 | 2.4 |
| | 2000–2001 | 35 | 36 | (51) | 5 | 76 | 75 | 18 | (25) | 45 | (62) | 10 | (14) | 3 | 32 | 2.4 |
| | 2001–2002 | 34 | 28 | (45) | 3 | 65 | 69 | 15 | (24) | 35 | (56) | 13 | (21) | 2 | 35 | 1.9 |
| | | 48 | 48 | (50) | 3 | 99 | 80 | 35 | (35) | 48 | (48) | 16 | (16) | 0 | 47 | 2.1 |
| | 1998–1999 | 37 | 45 | (55) | 8 | 90 | 85 | 39 | (44) | 44 | (49) | 6 | (7) | 1 | 35 | 2.6 |
| | 1999–2000 | | | | | | | | | | | | | | | |
| 20C | 1997–1998 | 9 | 9 | (50) | 0 | 18 | 21 | 5 | (29) | 10 | (59) | 2 | (12) | 1 | 11 | 1.6 |
| | 2000–2001 | 18 | 8 | (31) | 6 | 32 | 29 | 8 | (25) | 22 | (69) | 2 | (6) | 0 | 13 | 2.5 |
| | 2001–2002 | 25 | 14 | (36) | 1 | 40 | 30 | 14 | (39) | 9 | (25) | 13 | (36) | 4 | 19 | 2.1 |
| | | 16 | 21 | (57) | 0 | 37 | 36 | 7 | (19) | 20 | (54) | 10 | (27) | 0 | 16 | 2.3 |
| | 1998–1999 | 7 | 10 | (59) | 0 | 17 | 31 | 8 | (47) | 5 | (29) | 4 | (24) | 0 | 13 | 1.3 |
| | 1999–2000 | | | | | | | | | | | | | | | |
| 20F | 1997–1998 | 6 | 7 | (54) | 0 | 13 | 8 | 4 | (31) | 4 | (31) | 5 | (38) | 0 | 11 | 1.2 |
| | 2000–2001 | 2 | 0 | (0) | 0 | 2 | 8 | 0 | (0) | 2 | (100) | 0 | (0) | 0 | 1 | 2.0 |
| | 1998–1999 | 7 | 5 | (42) | 0 | 12 | 9 | 1 | (8) | 9 | (75) | 2 | (17) | 0 | 7 | 1.7 |
| | 2001–2002 | 2 | 2 | (50) | 0 | 4 | 6 | 0 | (0) | 1 | (25) | 3 | (75) | 0 | 4 | 1.0 |
| | | 17 | 16 | (48) | 0 | 33 | 16 | 9 | (28) | 19 | (59) | 4 | (13) | 1 | 10 | 3.3 |
| | 1999–2000 | | | | | | | | | | | | | | | |
| 25C | 1997–1998 | 0 | 1 | (100) | 1 | 2 | 10 | 2 | (100) | 0 | (0) | 0 | 0 | 0 | 2 | 1.0 |
| | 2000–2001 | 2 | 1 | (33) | 2 | 5 | 8 | 0 | (0) | 4 | (80) | 1 | (20) | 0 | 3 | 1.7 |
| | 2001–2002 | 4 | 4 | (50) | 0 | 8 | 5 | 2 | (25) | 4 | (50) | 2 | (25) | 0 | 6 | 1.3 |
| | | 5 | 4 | (44) | 0 | 9 | 7 | 4 | (44) | 3 | (33) | 2 | (22) | 0 | 4 | 2.3 |
| | 1998–1999 | 1 | 3 | (75) | 7 | 11 | 9 | 0 | (0) | 8 | (73) | 3 | (27) | 0 | 5 | 2.2 |
| | 1999–2000 | | | | | | | | | | | | | | | |
| Combined | 1997–1998 | 77 | 65 | (46) | 4 | 146 | 160 | 44 | (31) | 72 | (50) | 27 | (19) | 3 | 76 | 1.9 |
| | 2000–2001 | 96 | 86 | (47) | 23 | 205 | 186 | 61 | (30) | 119 | (59) | 22 | (11) | 3 | 78 | 2.6 |
| | 2001–2002 | 111 | 77 | (41) | 4 | 192 | 181 | 61 | (33) | 81 | (44) | 44 | (24) | 6 | 97 | 2.0 |
| | | 124 | 113 | (48) | 7 | 244 | 214 | 79 | (33) | 118 | (49) | 43 | (18) | 4 | 109 | 2.2 |
| | 1998–1999 | 110 | 113 | (51) | 26 | 249 | 228 | 93 | (38) | 129 | (52) | 25 | (10) | 2 | 95 | 2.6 |
| | 1999–2000 | | | | | | | | | | | | | | | |
| | 2000–2001 | | | | | | | | | | | | | | | |
| | 2001–2002 | | | | | | | | | | | | | | | |

[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 1997–1998 through 2001–2002

| Unit | Regulatory year | Harvest periods[a] Aug (%) | Sep–Oct (%) | Nov–Dec (%) | Jan–Feb (%) | Mar (%) | Apr (%) | Unk | n |
|---|---|---|---|---|---|---|---|---|---|
| 20A | 1997–1998 | 3 (7) | 3 (7) | 13 (28) | 21 (46) | 3 (7) | 3 (7) | 0 | 46 |
| | | 1 (1) | 8 (9) | 15 (17) | 52 (60) | 10 (12) | 0 (0) | 4 | 90 |
| | | 3 (4) | 8 (12) | 25 (37) | 27 (40) | 4 (6) | 0 (0) | 0 | 67 |
| | | 1 (1) | 6 (6) | 27 (28) | 54 (57) | 4 (4) | 3 (3) | 0 | 95 |
| | | 0 (0) | 8 (8) | 24 (24) | 54 (55) | 10 (10) | 2 (2) | 0 | 98 |
| 20B | 1997–1998 | 0 (0) | 7 (10) | 21 (31) | 14 (21) | 20 (30) | 5 (7) | 0 | 67 |
| | 1998–1999 | 1 (1) | 8 (11) | 24 (32) | 27 (36) | 15 (20) | 1 (1) | 0 | 76 |
| | 1999–2000 | 0 (0) | 10 (15) | 26 (40) | 22 (34) | 7 (11) | 0 (0) | 0 | 65 |
| | 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 |
| 20C | 1997–1998 | 0 (0) | 0 (0) | 2 (12) | 12 (71) | 3 (18) | 0 (0) | 1 | 18 |
| | 1998–1999 | 0 (0) | 1 (3) | 10 (31) | 11 (34) | 10 (31) | 0 (0) | 0 | 32 |
| | 1999–2000 | 0 (0) | 9 (23) | 10 (25) | 20 (50) | 1 (3) | 0 (0) | 0 | 40 |
| | 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 |
| 20F | 1997–1998 | 0 (0) | 3 (23) | 3 (23) | 5 (38) | 2 (15) | 0 (0) | 0 | 13 |
| | 1998–1999 | 0 (0) | 0 (0) | 1 (50) | 1 (50) | 0 (0) | 0 (0) | 0 | 2 |
| | 1999–2000 | 0 (0) | 2 (17) | 5 (42) | 2 (17) | 3 (25) | 0 (0) | 0 | 12 |
| | 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 |
| 25C | 1997–1998 | 0 (0) | 0 (0) | 0 (0) | 1 (50) | 1 (50) | 0 (0) | 0 | 2 |
| | 1998–1999 | 0 (0) | 0 (0) | 0 (0) | 2 (40) | 2 (40) | 1 (20) | 0 | 5 |
| | 1999–2000 | 0 (0) | 2 (25) | 3 (38) | 3 (38) | 0 (0) | 0 (0) | 0 | 8 |
| | 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 |
| 20A, B, C, F, and 25C | 1999–2001 | 6 (1) | 77 (11) | 226 (33) | 290 (42) | 69 (10) | 15 (2) | 2 | 685 |

[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 1997–1998 through 2001–2002

| | | 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 | 1997–1998 | 0 | (0) | 7 | (16) | 0 | (0) | 1 | (2) | 29 | (64) | 1 | (2) | 7 | (16) | 1 | 46 |
| | 1998–1999 | 10 | (12) | 3 | (4) | 1 | (1) | 2 | (2) | 66 | (79) | 1 | (1) | 1 | (1) | 6 | 90 |
| | 1999–2000 | 4 | (6) | 4 | (6) | 0 | (0) | 4 | (6) | 51 | (81) | 0 | (0) | 0 | (0) | 4 | 67 |
| | 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 |
| 20B | 1997–1998 | 2 | (3) | 1 | (2) | 0 | (0) | 3 | (5) | 53 | (80) | 0 | (0) | 7 | (11) | 1 | 67 |
| | 1998–1999 | 1 | (1) | 3 | (4) | 0 | (0) | 2 | (3) | 54 | (75) | 0 | (0) | 12 | (17) | 4 | 76 |
| | 1999–2000 | 1 | (2) | 2 | (3) | 5 | (8) | 0 | (0) | 49 | (79) | 0 | (0) | 5 | (8) | 3 | 65 |
| | 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 |
| 20C | 1997–1998 | 3 | (18) | 2 | (12) | 0 | (0) | 0 | (0) | 12 | (71) | 0 | (0) | 0 | (0) | 1 | 18 |
| | 1998–1999 | 0 | (0) | 7 | (23) | 1 | (3) | 0 | (0) | 22 | (73) | 0 | (0) | 0 | (0) | 2 | 32 |
| | 1999–2000 | 0 | (0) | 3 | (8) | 5 | (13) | 3 | (8) | 27 | (68) | 2 | (5) | 0 | (0) | 0 | 40 |
| | 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 |
| 20F | 1997–1998 | 1 | (8) | 2 | (15) | 1 | (8) | 0 | (0) | 7 | (54) | 0 | (0) | 2 | (15) | 0 | 13 |
| | 1998–1999 | 0 | (0) | 0 | (0) | 0 | (0) | 0 | (0) | 2 | (100) | 0 | (0) | 0 | (0) | 0 | 2 |
| | 1999–2000 | 0 | (0) | 0 | (0) | 0 | (0) | 0 | (0) | 7 | (78) | 0 | (0) | 2 | (22) | 3 | 12 |
| | 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 |
| 25C | 1997–1998 | 0 | (0) | 0 | (0) | 0 | (0) | 0 | (0) | 2 | (100) | 0 | (0) | 0 | (0) | 0 | 2 |
| | 1998–1999 | 2 | (40) | 0 | (0) | 0 | (0) | 0 | (0) | 2 | (40) | 0 | (0) | 1 | (20) | 0 | 5 |
| | 1999–2000 | 1 | (17) | 0 | (0) | 0 | (0) | 0 | (0) | 4 | (67) | 0 | (0) | 1 | (17) | 2 | 8 |
| | 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 |
| 20A, B, C, F, and 25C | 1999–2001 2000–2001 | 52 | (8) | 35 | (5) | 16 | (2) | 26 | (4) | 507 | (76) | 5 | (1) | 25 | (4) | 19 | 685 |

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

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## LOCATION

**GAME MANAGEMENT UNIT:** 20D (5637 $mi^2$)

**GEOGRAPHIC DESCRIPTION:** Central Tanana Valley near Delta Junction

## BACKGROUND

Wolves are present throughout Unit 20D where their primary prey are moose, caribou, and Dall sheep. Wolf and prey numbers were high in Unit 20D during the 1960s. The population was an estimated 200–250 wolves at that time (38.3–48.2 wolves/1000 $mi^2$ or 14.8–18.6 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, 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 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 OBJECTIVES

- 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 wolf population size using aerial surveys; observations of packs with radiocollared wolves; interviews with local trappers, hunters, and pilots; and information about pack size recorded on fur sealing certificates. Aerial surveys were conducted by flying major rivers, creeks, exposed ridges, and other locations and searching for wolf tracks. 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 subunit

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

Several wolf packs, including the 100-Mile Creek pack in Unit 20A and the West Fork Charley River and the Middle Fork Fortymile River packs from Unit 20E were included in the Unit 20D population estimate by calculating a Unit 20D "pack equivalent" based on the estimated home range within Unit 20D. The pack equivalents were 20% for the 100-Mile Creek, 50% for the Middle Fork Fortymile pack, and 70% for the West Fork Charley River pack. Therefore, the estimated pack size was multiplied by the pack equivalent to calculate a pack size for the Unit 20D population estimate. Population data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY99 = 1 Jul 1999 through 30 Jun 2000).

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.

Unit 20D was subdivided into 2 areas for calculating population estimates, using the Tanana River as the boundary. The portion of Unit 20D south of the Tanana River is southern Unit 20D. The portion of Unit 20D north of the Tanana River is northern Unit 20D.

Wolves from some northern Unit 20D packs were radiocollared as part a research project conducted in the Fortymile Nonlethal Predation Control Area. Dominant wolves within some of these packs were sterilized and other members of those packs were relocated to areas outside Unit 20D (Boertje and Gardner 2000).

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

The RY99–RY01 reporting period was characterized by very poor wolf survey conditions, making accurate wolf population estimates difficult to calculate and compliance with management objectives difficult to determine. Although wolf population data is also obtained from trapper interviews and other observations, that information can be difficult to interpret without correlative aerial survey data.

RY99. An aerial wolf survey was flown in southern Unit 20D on 28 March 2000 with 2 aircraft for a combined 6.5 hours of survey time. Additional surveys were cancelled because survey conditions were poor. Intensive tracking of radiocollared wolves in northern Unit 20D occurred as part of the Fortymile Nonlethal Predation Control program. An accurate fall RY99 population estimate was not possible, however I calculated a minimum fall RY99 estimate of 117–118 wolves.

In southern Unit 20D we sighted 9 wolves in the Macomb pack on 28 March 2000. An additional 26 wolves were killed by trappers and hunters during RY99. Therefore, a minimum

of 35 wolves ranged within southern Unit 20D but accurate pack size information was not available for the other southern Unit 20D packs.

The fall RY99 northern Unit 20D estimate of 78–81 wolves in 8 packs was more accurate than the southern estimate because we intensively monitored northern Unit 20D during implementation of the Fortymile Nonlethal Predation Control program. That estimate also includes a pack of 7 wolves (West Fork Charley River pack) that denned in the Yukon–Charley National Preserve but wintered in northern Unit 20D. The Indian–Tibbs pack and the Black Mountain–Harper pack remained small with 2 and 3 wolves respectively, after the dominant pairs were sterilized and other pack members were relocated.

The Unit 20D RY99 fall population contained at least 117 wolves, (41 wolves/1000 $mi^2$, 9.4–9.5 wolves/1000 $km^2$; Table 1) and probably exceeded the population objective of 125 wolves. During winter 1999–2000, additional northern Unit 20D packs were treated during the Fortymile Nonlethal Predation Control program. Nine wolves were relocated from the Healy River pack and the dominant pair was sterilized. Also, 4 wolves were relocated from the Eisenmenger Pack and the dominant pair was sterilized. By spring 2000 the dominant pairs of 4 northern Unit 20D packs had been sterilized.

RY00. Spring aerial wolf surveys were flown in southern Unit 20D for 14.9 hours on 15 and 22 February and 17–18 March 2001. Survey conditions were poor and additional aerial surveys were not possible. In addition, intensive tracking of radiocollared wolves in northern Unit 20D occurred as part of the Fortymile Nonlethal Predation Control program.

The southern Unit 20D population fall estimate included 44–47 wolves in 4 packs, plus a pack equivalent of 2 wolves for the 100–Mile Creek pack in Unit 20A. An additional 10% for "loners" was included, resulting in a southern Unit 20D population estimate of 48–51 wolves.

The northern Unit 20D population estimate was 42–44 wolves in 10 packs. That estimate included 4 sterilized packs, and 2 pack equivalents of 6 wolves for the West Fork Charley River pack and 1 wolf for the Unit 20E Middle Fork Fortymile River pack. Including 10% loners increased the population estimate to 46–48 wolves.

The Unit 20D RY00 population estimate of 94–99 wolves resulted in an estimated density of 19.6–20.6 wolves/1000 $mi^2$ (7.6–8.0 wolves/1000 $km^2$) within an estimated 4800 $mi^2$ of wolf habitat (Table 1). Those estimates met the population objective of 15–125 wolves in the unit.

Using RY00 wolf population estimates and a 1999–2000 Unit 20D moose population estimate of 6327 moose (RY99 northern Unit 20D = 2395; RY00 southern Unit 20D = 3932) results in Unit 20D moose:wolf ratios of 65 moose:wolf. The southern Unit 20D ratio is 79 moose:wolf and the northern ratio is 51 moose:wolf. Gasaway et al. (1983) predicted that moose:wolf ratios of >30 would not limit moose population growth without other adverse conditions.

RY01. Aerial wolf surveys were flown in southern Unit 20D on 22 January and 1 February 2002 for 4.0 hours each day. Additional surveys were not possible due to poor snow and survey conditions. Intensive tracking of radiocollared wolves in northern Unit 20D also occurred as part of the Fortymile Nonlethal Predation Control program.

The southern Unit 20D population estimate was 46–52 wolves in 5 packs plus a pack equivalent of 1 wolf for the 100-Mile Creek pack. Including 10% loners increased the population estimate to 51–57 wolves. Part of the increased estimate over RY00 includes the estimate of 17 wolves in the Gerstle pack. This large pack was observed by several trappers and appears to be a reliable estimate.

The northern Unit 20D population estimate was 45 wolves in 8 packs including pack equivalents of 5 wolves for the West Fork Charley River pack and 2 wolves for the Middle Fork Fortymile River pack. Adding 10% loners increased the estimate to 49 wolves. This estimate includes 3 packs that consist only of sterilized pairs.

The Unit 20D RY01 population estimate of 100–106 wolves in 13 packs resulted in a density estimate of 20.8–22.1 wolves/1000 $mi^2$ (8.1–8.5 wolves/1000 $km^2$;Table 1). The population met the management objective of 15–125 wolves.

Using RY01 wolf population estimates and a 1999–2001 Unit 20D moose population estimate of 5830 moose (RY99 northern Unit 20D = 2395; RY01 southern Unit 20D = 3435) results in Unit 20D moose:wolf ratios of 57 moose:wolf. The southern Unit 20D ratio is 64 moose:wolf and the northern ratio is 49 moose:wolf. Gasaway et al. (1983) predicted that moose:wolf ratios of >30 would not limit moose population growth without other adverse conditions.

*Distribution and Movements*

Wolves from several packs in northern Unit 20D were radiocollared as part of the Fortymile Caribou Herd Nonlethal Predation Control Program. Boertje and Gardner (2000) reported movements of these wolves.

**MORTALITY**

*Harvest*

Season and Bag Limit.

| Unit/Bag Limit/ Special Restrictions | Resident Open Seasons | Nonresident Open Seasons |
|---|---|---|
| Unit 20D | | |
| *RY99* | | |
| 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 |

| Unit/Bag Limit/<br>Special Restrictions | Resident<br>Open Seasons | Nonresident<br>Open Seasons |
|---|---|---|
| *RY00* | | |
| HUNTING: 5 wolves.<br>No wolf hunting same day airborne. | 10 Aug–30 Apr | 10 Aug–30 Apr |
| TRAPPING: No limit.<br>A wolf may be shot same day airborne if 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 |
| *RY01* | | |
| HUNTING: 5 wolves.<br>No wolf hunting same-day-airborne. | 10 Aug–30 Apr | 10 Aug–30 Apr |
| TRAPPING: No limit.<br>A wolf may be shot same day airborne if caught in a trap or snare. Wolves may be taken from a snowmachine in active wolf management areas in Unit 20D outside of the Fort Greely Military Reservation or the Fortymile Nonlethal Predation Control Area.<br>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. Legislative actions taken relative to wolves are noteworthy, although they are not emergency orders or Alaska Board of Game actions. In 1999 the Alaska legislature passed a bill allowing the public to shoot wolves the same day they had been airborne in areas where the Board of Game had authorized predator control. This included Unit 20D except those portions within the Fort Greely Military Reservation and within the Fortymile Nonlethal Predation Control Area. Governor Knowles then vetoed the bill but the legislature overrode the veto. A ballot initiative that passed November 2000 reversed the legislative override and again prohibited same-day-airborne hunting of wolves in areas previously authorized for wolf control by the Board of Game.

For the RY00 trapping season, the Alaska Board of Game passed a regulation that authorized taking wolves from a snowmachine in Unit 20D except those portions within the Fort Greely Military Reservation and within the Fortymile Nonlethal Predation Control area.

Hunter–Trapper Harvest. Hunters and trappers reported taking 42 wolves in RY99, 41 in RY00, and 50 in RY01 (Table 2). The mean annual harvest of 44 wolves during the RY99–RY01 reporting period was higher than the average of 31 wolves/year during the previous 3 years. During RY99–RY01, 50% of harvested wolves were male, 43% were female, and 7% were unknown sex.

No harvest rate was calculated for RY99 because an accurate population estimate was not calculated. In RY00, trappers and hunters took 41–44% of the estimated fall population. In RY01, wolf mortality was an estimated 47–50% 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, wolf harvest, combined with nonlethal control of several packs in northern Unit 20D, likely exceeded sustainable levels during this reporting period. However, the population is near the upper population objective and these harvest rates are not a concern at this time.

Most wolves were taken each year by trapping and snaring. Eighty-seven percent of all wolves taken from RY99–RY01 were killed in traps or snares (Table 2).

Trappers and hunters took more wolves from southern than from northern Unit 20D during RY99–RY01 (Table 3). Among wolves with known harvest locations, 67% were taken in southern Unit 20D, probably because road and trail access is better in the southern part of the unit.

Harvest Chronology. There were no significant changes in wolf harvest chronology during RY99–RY01. Most wolves were harvested during November through March (Table 4).

Transport Methods. Snowmachines and highway vehicles were the most common mode of transportation used by trappers and hunters who harvested wolves (Table 5). Snowmachines were used to take 70% of the wolves during RY99–RY01, and highway vehicles were used to take 18%.

## CONCLUSIONS AND RECOMMENDATIONS

During RY99–RY01 we met the wolf management objective to maintain a population of 15–125 wolves and conducted wolf management activities, as established by the Alaska Board of Game. Recent harvest rates combined with experimental relocation and sterilization of wolves from Unit 20D in the Fortymile Nonlethal Predation Control Area have reduced wolves in northern Unit 20D below levels achieved by trapping alone. Because the Alaska Board of Game has determined that human use of moose and Macomb caribou in Unit 20D is the preferred use, and have adopted a wolf control implementation plan for wolves in Unit 20D, the current harvest rate is acceptable until the wolf population is reduced to the lower limit of the population objective. No regulatory changes are recommended at this time. However, the

wolf control implementation plan adopted as 5 AAC 92.125 expired on 30 June 2002. The plan and management objectives should be reevaluated during the next reporting period.

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TABLE 1 Unit 20D fall wolf population estimate, regulatory years 1996–1997 through 2001–2002

| Area | Regulatory year (30 Jun–1 Jul) | | | | | |
|---|---|---|---|---|---|---|
| | 1996–1997 | 1997–1998 | 1998–1999 | 1999–2000 | 2000–2001 | 2001–2002 |
| Southern Unit 20D[a,b] | 32–40 | 31–34 | –[c] | 35[c] | 44–47 | 46–52 |
| Northern Unit 20D[d] | 54–57 | 75–77 | 56–58 | 71–74 | 42–44 | 45 |
| Unit 20D subtotal | 86–97 | 106–111 | –[c] | 106–107[c] | 86–91 | 91–97 |
| Estimate 10% "loners" | 9–10 | 11 | –[c] | 11 | 8 | 9 |
| Unit 20D total | 96–107 | 117–122 | –[c] | 117–118[c] | 94–99 | 100–106 |
| Estimated wolves/1000 $km^2$ | 7.1–7.9 | 8.7–9.1 | –[c] | 9.4–9.5[c] | 7.6–8.0 | 8.1–8.5 |

[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] No estimate or minimum estimate due to poor spring survey conditions.

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

TABLE 2 Unit 20D wolf harvest, regulatory years 1985–1986 through 2001–2002

| Regulatory | Reported harvest | | | Estimated harvest | | Method of take | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| year | M | F | Unk | Unreported | Illegal | Trap/snare | Shot | SDA[a] | Unk | Total |
| 1985–1986 | 17 | 10 | 1 | 0 | 0 | 19 | 0 | 9 | 0 | 28 |
| 1986–1987 | 11 | 7 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 18 |
| 1987–1988 | 5 | 7 | 0 | 0 | 0 | 11 | 1 | 0 | 0 | 12 |
| 1988–1989 | 5 | 12 | 4 | 0 | 0 | 20 | 1 | 0 | 0 | 21 |
| 1989–1990 | 2 | 4 | 0 | 0 | 0 | 4 | 2 | 0 | 0 | 6 |
| 1990–1991 | 8 | 13 | 2 | 0 | 0 | 6 | 4 | 13 | 2 | 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 |

[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 2001–2002

| Regulatory year | North of Tanana River | South of Tanana River | Unknown |
|---|---|---|---|
| 1996–1997 | 10 | 18 | |
| 1997–1998 | 17 | 24 | |
| 1998–1999 | 12 | 13 | |
| 1999–2000 | 13 | 28 | 1 |
| 2000–2001 | 12 | 29 | |
| 2001–2002 | 18 | 32 | |

TABLE 4 Unit 20D wolf harvest chronology, regulatory years 1985–1986 through 2001–2002

| 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 | 0 | 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 | 16 | 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 |

TABLE 5 Unit 20D wolf harvest by transport method, regulatory years 1985–1986 through 2001–2002

| 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 | | 0 | 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 | 1 | 40 | 0 | 9 | 1 | 0 | 50 |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 but 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 were abundant by the mid 1960s 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 a wolf control program was conducted by the Alaska Department of Fish and Game (ADF&G) in a 6000-$mi^2$ area primarily located in Unit 20E. The combination of wolf control and public trapping 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 overall remained stable.

Historically, wolf harvest in Unit 20E had little effect on wolf population trend. However, during some years, moderate to high harvests caused population declines in accessible areas. Wolf trapping intensity is primarily affected by the fur market, but it also is affected by trapping methods and means. When marten and lynx fur prices are high, most area trappers spend less time trapping wolves. 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 would take more wolves incidentally to marten trapping and also because more nonlocal wolf trappers traveled to the area. During 1995 and 1996, wolf harvest was higher due to a privately funded wolf harvest

incentive program designed to increase wolf kill 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.

Since 1980, 2 wolf control programs were implemented to increase ungulate populations. The effects of the 1981–1983 wolf control program were difficult to interpret because the program was terminated prematurely and adequate removal rates were not obtained. Neither moose nor caribou calf survival increased due to control efforts. The wolf control area did not overlap any of the caribou herd's calving range. Gasaway et al. (1992) concluded that in Unit 20E wolf predation on moose calves was not a detectable source of additive mortality when grizzly bears were abundant. Adult moose and caribou survival did increase during wolf control. The treatment area happened to include the area where most of the caribou herd wintered during 1981–1983. Increased adult moose and caribou survival was documented following other wolf control programs (Boertje and Gardner 2000; Valkenburg et al. 2002; Hayes et al., in press; B Hayes, personal communication). Overall, moose and caribou numbers increased following wolf control but at rates comparable to adjacent control populations. Aside from inadequate wolf removal, favorable weather conditions prevailed during this period and appeared to benefit moose and caribou populations throughout the area, increasing the difficulty in interpreting the effects of wolf control.

During the 1980s and 1990s, wildlife agencies in Alaska and Canada experienced difficulties in implementing and completing wolf management programs due to opposition from a variety of public groups. Philosophical differences concerning wolf management have caused heated disagreements and divisiveness between wildlife proponents. Most of the local residents in Unit 20E and adjacent Unit 12 support an intensive management program designed to increase caribou and moose numbers. Following the premature stoppage of the 1981 wolf control program and Governor Hickel's decision in 1992 to rescind a wolf control program scheduled to begin in 1993, it became evident that a wolf management program designed to help ungulate populations recover in Unit 20E must include diverse public views concerning wildlife management and all of the responsible agencies.

In February 1994 a planning group was formed (Fortymile Caribou Herd Management Team). The process was started by the public and included 14 public members representing a wide range of special interest groups and 5 management agencies. The team agreed to the goal of trying to manage for the recovery of the Fortymile caribou herd using a series of management steps designed to conserve habitat, reduce caribou harvest, and reduce wolf predation. The team developed a plan that recommended a combination of public trapping and state-conducted nonlethal wolf control to reduce wolf predation on Fortymile caribou. Before the predator control recommendations in the plan were implemented, they had to meet the following criteria established by Governor Knowles: 1) scientific merit; 2) economic value; and 3) public acceptance. The Alaska Board of Game adopted the implementation plan in spring 1996, and Governor Knowles allowed the nonlethal wolf control program to begin in fall 1997 after reviewing the program relative to these 3 criteria.

# MANAGEMENT DIRECTION

### MANAGEMENT GOALS

The wolf management goals in Unit 20E follow the goals listed in the Wolf Conservation and Management Policy for Alaska, adopted by the Board of Game on 30 October 1991 and revised 29 June 1993. Those goals are to:

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

### MANAGEMENT OBJECTIVES

Objectives will be formulated by 30 June 2005.

### 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

### ESTIMATING WOLF POPULATION SIZE

Wolf population size and trend was estimated in all or portions of Unit 20E using aerial wolf surveys (Stephenson 1978; Gasaway et al. 1983), standard radiotelemetry techniques, wolf observations by area pilots and trappers, and sealing (Table 1). In winter 2002–2003 we developed a wolf population trend area (about 4600 $mi^2$) encompassing portions of Units 12,

20E, and 20D. All estimates of wolf numbers were increased by 10% to account for lone wolves present but not found (Mech 1973). All wolf packs that had territories wholly or partially in Unit 20E or the specific study areas were included in the estimates. Population data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY01= 1 Jul 2001 through 30 Jun 2002).

### WOLF POPULATION CHARACTERISTICS

Within the Fortymile caribou herd's range, we captured 320 wolves between 1991 and 2002. Before November 1997 all wolves captured were radiocollared to help us evaluate wolf movements and numbers. Usually 2–3 wolves per pack were radiocollared. Since November 1997 we relocated 140 wolves from 15 packs; 30 of these wolves were radiocollared. We sterilized 41 adult wolves (23 females and 18 males) and radiocollared them to 1) evaluate the efficacy of fertility control, 2) determine if the sterilized pair maintained their alpha status and territory, 3) monitor the pairs' movement patterns, and 4) determine survival rates. Wolves captured outside of the nonlethal control treatment area were part of packs we used as control packs to evaluate the effects of relocation and sterilization. Blood samples and body measurements were routinely taken from all captured wolves. Radiocollared wolves were located periodically to determine pack and territory size, movement patterns, and population demographics.

### NONLETHAL WOLF CONTROL

During November 1997–May 2001, we captured and relocated all subordinate wolves and sterilized the 2 alpha wolves in 15 packs most accountable for Fortymile caribou calf mortality (excluding the packs that resided within Yukon–Charley Rivers National Preserve). Capture methods are outlined in Boertje and Gardner (2000). Relocated wolves were moved >100 miles from their original territory in 1997 and >200 miles during 1998–2001 to minimize the chance of their return. These wolves were released in areas that supported ungulate densities as high or higher than in their original territory. The dominant wolves were sterilized by veterinary surgeons. Males were vasectomized and females were tubal ligated to retain gonadal cycling. The sterilized wolves were kept overnight for observation to ensure they completely recovered from the immobilizing drug before release and on the following day were released at or near the point of capture.

### HARVEST MONITORING

We determined harvest statistics from sealing documents and fur acquisition reports. An official ADF&G seal must be attached to all wolves taken 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. Harvest data were summarized by regulatory year.

# RESULTS AND DISCUSSION

## POPULATION STATUS AND TREND

### *Population Size*

We conducted thorough fall wolf surveys in most of Unit 20E during RY91, RY92, RY95, and RY96–RY98. During the report period (RY99–RY01), most of our efforts were focused on monitoring wolf recovery within the nonlethal wolf control area and therefore did not obtain population estimates for the subunit. During February–April RY02 we surveyed about 4300 $mi^2$ of the Units 20E and 12 trend area and 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 12.1 wolves/1000 $km^2$ (31.3 wolves/1000 $mi^2$). 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 8.9 wolves/1000 $km^2$ (23.1 wolves/1000 $mi^2$).

Based on the RY02 survey, the wolf population increased during the report period. During the 1980s and 1990s, estimated wolf densities ranged between 6 and 7 wolves/1000 $km^2$ (15.5 and 18.1 wolves/1000 $mi^2$). The trend area was designed to include areas with varying densities of moose and caribou and different trapping intensities with the objective that wolf densities and population trends in the study area would indicate densities and trends throughout Unit 20E. However, this method has some limits because some effects of the nonlethal wolf control program (sterilization) do not mimic trapping or other environmental factors. Instead of extrapolating strictly on survey results, I determined the unit estimate by adding the number of wolves within the wolf treatment area to the estimate generated for the remainder of the unit determined by the survey. I estimated 245–260 wolves in Unit 20E before trapping season, the highest estimate since 1990 and a 20% increase since RY99.

Wolf population trends in Unit 20E during the 1990s was discussed in Gardner (2000). In brief, the population increased during RY90–RY95, declined slightly during RY96–RY99, and increased during RY00–RY02. The cause of increasing population during the report period is likely increased productivity and survival due to a greater prey base and reduced harvest mortality. Since 1997 the caribou numbers have increased substantially in Unit 20E; the Fortymile Herd (46,000 caribou and increasing) 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 was high from RY99 through RY00.

**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. In November 1996, Alaskan voters passed an initiative that prohibited same-day-airborne hunting of wolves, fox, lynx, and wolverine. This initiative became effective on 25 February 1997. 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 and could have affected several Unit 20E packs. An initiative to overturn this decision was passed by Alaskan voters in November 2000, and resulted in stopping same-day-airborne hunting in February 2001. No wolves from these Unit 20D/20E border packs were known to be taken under this regulation.

During their spring 1997 meeting, the board adopted the Fortymile Nonlethal Wolf Control Implementation Plan as regulation which allowed nonlethal wolf control in portions of Units 20E, 20B, and 20D until June 2001. The regulation was implemented in November 1997 after Governor Knowles ruled in its favor. As directed, nonlethal wolf control ended by June 2001.

During their spring 1998 meeting, the board designated the Unit 20E moose population within the Fortymile and Ladue River drainages and the Fortymile caribou herd as important for high levels of human consumptive use under the intensive management law (AS 16.05.255[e]–[g]). This designation means the board must consider intensive management if regulatory action to significantly reduce moose or caribou harvest in Unit 20E becomes necessary because the population is depleted or has reduced productivity. Wolf control has been identified by the legislature as an important management tool consistent with the intent of the intensive management law. As of May 2002 the caribou population and harvest objectives were being met but the moose objectives were not.

Hunter–Trapper Harvest. The reported annual Unit 20E wolf harvest was 31, 50, and 32 wolves during RY99, RY00, and RY01, respectively (Table 2). Estimated annual harvest rates were 13–21% less than the estimated maximum sustainable harvest rate of 25–30%. Harvest has been less than the maximum sustainable rate since RY95.

Elevated harvest during RY95 and RY96 in portions of Unit 20E was due to the Fortymile Caribou Calf Protection Program developed by trappers to assist the recovery of the Fortymile caribou herd. To stimulate harvest, this group paid $400/wolf caught within the range of the Fortymile Herd. This payment approximately doubled the market value of wolf pelts and was instrumental in increasing the harvest. The trappers who administered this program were against implementing the nonlethal wolf control program, believing the trapping program could cause desired herd growth. When the nonlethal wolf control program was adopted by the Board of Game in spring 1997, the group ended their trapping program, and in addition, one of the primary fur buyers in the Interior decided not to purchase wolves trapped in Unit 20E. These actions were the primary causes for reduced wolf harvest during RY97 and RY98. Even though trappers ended the privately funded Fortymile Caribou Calf Protection Program when the nonlethal wolf control plan was approved, the Fortymile caribou recovery program benefited from their participation. Wolf harvest has remained low because of low prices and declining trapper interest.

Trappers continued to use snares and traps as the primary methods to catch wolves in Unit 20E (Table 2). During RY99–RY01, 2–4 wolves were taken by hunters incidental to moose or caribou hunts during the fall hunting season.

Harvest Chronology. During RY99–RY01, the average percent wolf harvest during August and September (wolf hunting only), November through March (snaring, trapping, and hunting), and October and April (snaring only) was 7%, 79%, and 14%, respectively (Table 3). During the report period and historically, most harvest occurred during December through February. During the 2 years of the privately funded Fortymile Caribou Calf Protection Plan, trappers who shifted their lines to western Unit 20E did so during February, resulting in most of the additional harvest occurring during February–April.

Transport Methods. Most successful wolf trappers used snowmachines in Unit 20E (Table 4). Airplanes were used by a small number of trappers to access areas not trapped by land-based trappers. The number of wolves caught by trappers using airplanes for transportation was primarily dependent on market price for wolves, lynx, and marten. During years of high marten or lynx prices, these trappers reduced their wolf trapping efforts unless wolf pelt prices were also high. During RY99–RY01, trappers using airplanes for access were responsible for 20–35% ($\bar{x}$ = 27%) of the harvest, the highest 3-year average since 1988. This harvest was mostly by several trappers who attempted to reduce wolf packs that ranged within the Fortymile caribou herd's calving grounds and commonly killed calves but had not been reduced by nonlethal wolf control. Most wolves taken by trappers using highway vehicles were taken along the southern half of the Taylor Highway between Chicken and the Alaska Highway.

## HABITAT

*Assessment*

Prey availability dictates wolf habitat use, therefore, preferred wolf habitat occurs with a greater ungulate prey base. Because of the migratory behavior of caribou and their fidelity to calving grounds, high densities of caribou are available seasonally to certain wolf packs. The Fortymile

Herd has increase over 100% since 1995 and in summer 2002, numbered about 46,000 caribou. The Fortymile Herd spends 8–10 months in Unit 20E. Since winter 1997, the Nelchina and Mentasta caribou have primarily wintered in Unit 20E adding 5000–40,000 caribou into the unit. Almost all Unit 20E wolf packs have thousands of caribou available throughout the winter. Between May and October, only the Fortymile Herd is in Unit 20E, and it is concentrated in certain areas. During this period, most packs must rely on moose or small mammals as their primary prey. Snowshoe hare densities were high during 1998–spring 2001 but crashed to very low levels in spring 2001. Moose densities in Unit 20E are low (0.2–0.7 moose/mi$^2$, $\bar{x}$ = 0.46 moose/mi$^2$) (Gardner 2002). Based on prey availability, wolf habitat currently is moderate, but the habitat could support higher populations of prey and wolves if environmental conditions or management actions allowed the moose population to increase substantially.

Human development is not currently a problem for wolves in the area. Habitat quality for ungulates is currently not a limiting factor for any ungulate prey species.

*Enhancement*

Since the early 1970s, the Upper Tanana–Fortymile ecosystem has contained relatively low density wolf and ungulate populations. To enhance the Fortymile caribou herd, nonlethal wolf control was implemented in November 1997. To enhance the moose population, 3 different prescribed burns during 1998 and 1999 were ignited and burned 95,000 acres. Also, Unit 20E is included in the Alaska Interagency Fire Management Plan. At least 60% of the area is classified in limited suppression status, which should assure a near-natural wildfire regime. This, in turn, should increase habitat diversity that will benefit wolf prey species.

**NONREGULATORY MANAGEMENT PROBLEM/NEEDS**

Nonlethal wolf control was conducted during November 1997–May 2001. A brief description of the preliminary results follows.

*Wolf Reduction*

We used a combination of nonlethal wolf relocation and public wolf trapping to reduce wolf numbers by 78% within 15 pack territories. To ensure minimum return, wolves older than 11 months were moved ≥200 miles. Mortality rates for relocated wolves ranged between 50–60%, which is similar to naturally dispersing wolves (Peterson et al. 1984; Ballard et al. 1997). Trapping was the primary cause of mortality. It appears that moving subordinate wolves will not increase their mortality if they are moved at the age when most wolves naturally disperse to areas that support prey densities as high as or higher than the original territory.

The 15 pack territories were maintained at 2 wolves/pack by sterilizing the alpha wolves. The sterilized wolves have maintained their territories for 2–5 years, and as of June 2003 wolf numbers in 10 of the 15 pack territories were still limited due to the presence of 1–2 sterilized wolves. The program effects will continue as long as these wolves restrict productivity. Wolf sterilization appears to be a viable technique to maintain wolf packs at desired levels.

Comparing wolf treatment years (RY97–RY00) to pretreatment years when the Fortymile caribou herd was stable (RY90–RY95), adult caribou survival significantly increased ($P$ = 0.02) and May–July calf mortality due to wolves significantly declined ($P$ = 0.02). The herd increased an average >10%/year during 1998 and 2002. Wolf predation continues to be the primary cause of mortality for Fortymile caribou. The 15 packs encompassed most but not all of the herd's calving and summer range and the herd travels through territories of an additional 25–30 packs during the remainder of the year.

The wolf and caribou data will be analyzed more completely and published in future research and management reports and journals. A more conclusive analysis of the effect of reducing wolves in only a portion of the herd's range on herd trend relative to other factors will be included.

*Wolf–Moose Relationships*

The moose population in Unit 20E exists at low density and is limited by grizzly bear and wolf predation (Gasaway et al. 1992). During RY01, Gardner (2002) estimated the Unit 20E moose population was declining slowly. In most of Unit 20E, wolf numbers are increasing. Based on observations of radiocollared packs, it appears that caribou have become the primary prey for most wolves in Unit 20E during the winter (J Burch, NPS, personal communication; R Boertje, ADF&G, unpublished data). However in most areas, caribou are unavailable during the summer and wolves must shift their diet to moose and small mammals. Seip (1992) has shown how wolf predation can have large effects on ungulate populations when wolf populations benefit from alternate prey. In Unit 20E, wolf numbers have increased due to a combination of increasing caribou, high snowshoe hare numbers, and low harvest. Moose calf:cow ratios have declined since 1998 and yearling bull:cow ratios since 2000 (Gardner 2002) coincident with increasing wolf numbers.

I used McNay and DeLong's (1998) PredPrey model to estimate the effects of wolves on the Unit 20E moose population during the next 3 years (RY02–RY05). I assumed that caribou would remain the primary prey for wolves during the winter and grizzly bears will remain the primary predator on moose calves. Based on this exercise, the following scenario seems likely: 1) if wolf harvest rates remains low (20%), wolf numbers will increase; 2) caribou numbers will continue to increase; 3) moose numbers will continue to decline slowly if wolf numbers stay constant at RY02 levels; and 4) moose numbers will decline 2–3% faster per year if wolf numbers increase as projected.

The moose population in Unit 20E exists at low density but can decline further due to increasing predation effects by wolves. Increasing numbers of caribou has increased the complexity of this system and it appears there is no easy answer for moose–caribou–wolf–grizzly bear management in Unit 20E. It is likely that moose numbers and bull:cow ratios will decline to unacceptable levels within 5–7 years unless wolf and grizzly bear predation effects are lessened. This area may offer an excellent opportunity to study the effects of wolf predation on low density moose when a rapidly expanding caribou population is the primary prey.

## CONCLUSIONS AND RECOMMENDATIONS

The wolf population in most of Unit 20E increased during RY99–RY02 due to expanding caribou numbers and range use, high numbers of snowshoe hares and limited trapping pressure. Nonlethal wolf control ended in May 2001. In combination with public trapping, wolf numbers in 8 Unit 20E pack territories were reduced by 78%. By RY02, wolf numbers in 4 of those territories were recovering.

The effects of nonlethal wolf control on Fortymile caribou population trend is still being analyzed. Preliminary indications are that reduced wolf numbers benefited adult and summer calf survival. The herd increased 5–14% annually following wolf reduction.

Wolf harvest has been below sustainable levels since RY95 due to reduced fur prices and trapper interest. Trappers continued to be important contributors to the Fortymile caribou recovery effort because they selected for wolf packs that were not reduced by nonlethal wolf control but were significant predators on caribou calves.

All of the work activities were completed during this report period. More travelers use the Taylor Highway to see wildlife and the number of reported wolf sightings has increased. Wolf hunting and trapping seasons were long and met consumptive needs. Status of the wolf population in Unit 20E, the effects of the nonlethal wolf control program, and trends of moose, caribou, and Dall sheep in relation to wolf predation are presented 1–2 times/year in "The Comeback Trail" a newsletter sent to over 5000 people in Alaska and Canada. Management objectives will be formulated during the next reporting period.

Wolf predation on moose may become more of an influence on moose population trends. Modeling data indicates that wolf predation may become increasingly important in perpetuating a decline in the unit's moose population, if projected increases in wolf numbers occur as the result of increasing caribou numbers. The predator–prey relationships in Unit 20E are becoming more complex due to a rapidly increasing caribou herd, which is allowing wolf numbers to increase.

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TABLE 1 Unit 20E fall wolf population estimates[a], regulatory years 1988–1989 through 2002–2003[b]

| Regulatory year | Population estimate[c] | Number of packs | Mean pack size[d] | | Basis of estimate |
|---|---|---|---|---|---|
| 1988–1989 | 173 | 32 | 4.9 | | Aerial survey, observations, reports |
| 1989–1990 | 205 | 33 | 5.6 | | Aerial survey, observations, reports |
| 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 | (6.2)[e] | Aerial survey, observations, reports, radio collars |
| 2002–2003 | 245–260 | 34 | 7.4 | (7.8) | Aerial survey, observations, reports, radio collars |

[a] Fall estimate = pretrapping season population.

[b] No unitwide surveys were conducted during RY99–RY01, therefore no estimates were done.

[c] Includes 10% estimated number of single wolves present.

[d] Calculated using mean population estimate × 0.9 divided by number of packs.

[e] In parentheses is mean pack size for all packs not affected by the nonlethal wolf control program.

TABLE 2 Unit 20E wolf harvest, regulatory years 1988–1989 through 2001–2002

| Regulatory year | Reported harvest | | | | | | Method of take | | | | Successful | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | (%) | F | (%) | Total[a] | % Autumn population[b] | Trap or snare (%) | Shot (%) | SDA[c] (%) | Unk | Trappers and hunters | Wolves/ person |
| 1988–1989 | 2 | (22) | 7 | (78) | 9 | 5 | 7 (78) | 2 (22) | | 6 | 6 | 1.5 |
| 1989–1990 | 7 | (54) | 6 | (46) | 15 | 7 | 12 (80) | 3 (20) | | 10 | 10 | 1.5 |
| 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 | 15 | 3.6 |
| 1997–1998 | 16 | (44) | 20 | (56) | 36[d] | | 32 (89) | 3 (8) | | 0 | 10 | 3.5 |
| 1998–1999 | 9 | (53) | 6 | (35) | 17 | 8 | 12 (71) | 5 (29) | | 0 | 9 | 1.9 |
| 1999–2000 | 18 | (58) | 11 | (35) | 31 | –[e] | 27 (96) | 1 (4) | | 3 | 21 | 1.5 |
| 2000–2001 | 27 | (54) | 20 | (40) | 50 | –[e] | 44 (88) | 6 (12) | | 0 | 12 | 4.2 |
| 2001–2002 | 20 | (63) | 11 | (34) | 32 | –[e] | 29 (91) | 3 (9) | | 0 | 10 | 3.1 |

[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] SDA taking prohibited during regulatory years 1988 and 1989 and beginning in regulatory year 1997.

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

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

TABLE 3 Unit 20E wolf harvest chronology, regulatory years 1988–1989 through 2001–2002

| Regulatory year | Harvest periods | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aug | (%) | Sep | (%) | Oct | (%) | Nov | (%) | Dec | (%) | Jan | (%) | Feb | (%) | Mar | (%) | Apr | (%) | *n*[a] |
| 1988–1989 | 0 | (0) | 1 | (11) | 0 | (0) | 0 | (0) | 2 | (22) | 2 | (22) | 3 | (33) | 1 | (11) | 0 | (0) | 9 |
| 1989–1990 | 0 | (0) | 2 | (13) | 1 | (7) | 2 | (13) | 3 | (20) | 6 | (40) | 1 | (7) | 0 | (0) | 0 | (0) | 15 |
| 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 | (39) | 3 | (8) | 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 |

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

TABLE 4 Unit 20E wolf harvest by transport method, regulatory years 1988–1989 through 2001–2002[a]

| Regulatory year | Harvest by transport method | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Airplane (%) | Dogsled, skis, or snowshoes (%) | Boat (%) | 3- or 4-Wheeler (%) | Snowmachine (%) | ORV (%) | Highway vehicle (%) | Unk | *n* |
| 1988–1989 | 1 (11) | 1 (11) | 0 (0) | 1 (11) | 6 (67) | 0 (0) | 0 (0) | 0 | 9 |
| 1989–1990 | 1 (7) | 5 (33) | 0 (0) | 0 (0) | 7 (47) | 1 (7) | 1 (7) | 0 | 15 |
| 1990–1991 | 8 (33) | 1 (4) | 0 (0) | 2 (9) | 10 (43) | 0 (0) | 2 (9) | 1 | 24 |
| 1991–1992 | 4 (24) | 1 (6) | 0 (0) | 1 (6) | 10 (59) | 0 (0) | 1 (6) | 2 | 19 |
| 1992–1993 | 6 (11) | 6 (11) | 0 (0) | 0 (0) | 41 (72) | 0 (0) | 4 (7) | 0 | 57 |
| 1993–1994 | 16 (24) | 0 (0) | 0 (0) | 1 (1) | 31 (46) | 0 (0) | 19 (28) | 1 | 68 |
| 1994–1995 | 14 (36) | 0 (0) | 0 (0) | 0 (0) | 23 (59) | 0 (0) | 2 (5) | 0 | 39 |
| 1995–1996 | 11 (13) | 3 (4) | 0 (0) | 1 (1) | 67 (80) | 0 (0) | 2 (2) | 0 | 84 |
| 1996–1997 | 5 (9) | 0 (0) | 1 (2) | 1 (2) | 43 (83) | 1 (2) | 1 (2) | 2 | 54 |
| 1997–1998 | 1 (3) | 0 (0) | 0 (0) | 1 (3) | 22 (61) | 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 |

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

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## LOCATION

**GAME MANAGEMENT UNITS:** 21B, 21C, 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 fluctuate depending upon the availability of prey and harvest by humans.

Unit 21D and the lowlands of Unit 21B have more wolves than Unit 21C. Prior to 1945, moose were uncommon and caribou numbers fluctuated in Unit 21D. 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. Wolf populations in Units 21B and 21C may be lower than in the early 1900s because moose densities are now lower.

Each year many wolf pelts taken for personal use are not sealed; therefore, actual harvest is moderately higher than reported on sealing certificates or on export and acquisition documents. Personal use includes 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 will be managed to provide for human uses and to ensure that wolves remain an integral part of Interior Alaska's ecosystems. Management may include manipulation of wolf population size or 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.

**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 US Fish and Wildlife Service (FWS) 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 in those subunits. Population data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

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–RY02 in local villages to improve trapper skills and knowledge of wildlife management issues.

Beginning in 1986, 50 wolves were radiocollared in 25 packs on the Koyukuk National Wildlife Refuge (NWR) and the Nowitna NWR. Wolves were collared at Dalki River, Upper Dulbi River, Lower Dulbi River, Nayuka River, Nowitna River mouth, Monzonite Hills, Ham Island, Three-day Slough, Bishop Rock, Happy Slough, Bonanza Creek, North Creek and Bear Creek.

## 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.

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 previous reporting period, 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.

The total population during fall in all 3 subunits likely increased during RY99–RY00 and stabilized in RY01. Using all data sources, estimates were 427–746, 442–771, and 442–771 wolves during RY99, RY00 and RY01, respectively (Table 1). The estimated number of packs during those regulatory years was unchanged at 52–80 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 followed 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 | | |
| 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 ft from the aircraft before taking a free-ranging wolf. Beginning in RY97 this provision of same-day airborne harvest was eliminated in the trapping regulations as well. Beginning RY95 the trapping season was extended through April. No changes were adopted during the reporting period.

Hunter/Trapper Harvest. Hunters and trappers reported harvesting 54, 87, and 75 wolves during RY99, RY00, and RY01, respectively (Table 2). Most of the wolves were taken in Unit 21D. The actual number harvested was higher because some village residents seal only those wolf pelts that are sent to a commercial tannery or sold to a fur buyer. For most years, this unreported harvest probably averaged 20 wolves/year. Information gathered through personal interviews improved our estimate of the number of unreported wolves that were harvested in RY00 and RY01.

In RY99–RY02, ADF&G sponsored wolf-snaring clinics in the villages of Galena, Ruby, Kaltag, Nulato, and Huslia. 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. They were also registered for the statewide trapper questionnaire.

Harvest Chronology. Most wolves were harvested in January, February, and March during RY99–RY01 (Table 3). Increased sightings and incidental harvest during the fall moose hunting seasons was probably due to higher wolf densities.

Transport Methods. Most wolves were taken using snowmachines for transportation during RY99–RY01 (Table 4).

## CONCLUSIONS AND RECOMMENDATIONS

Overall the wolf population in the reporting area increased during RY99–RY00. However, wolf population trends varied in different subunits. Densities probably were unchanged in Units 21B and 21C during the reporting period, but continued to increase in Unit 21D through RY00. By RY01 the number of wolves in Unit 21D apparently stabilized due to a declining prey base and increased harvest.

Total harvest in all 3 subunits during the reporting period averaged 105 wolves/year, an estimated 14–24% of the autumn population. Because moose are the primary prey for wolves in this area, a reduction in their numbers will subsequently cause a decline in wolves. Moose numbers declined during RY99–RY01 throughout the reporting area, and combined with apparent increased hunting pressure on wolves it appeared that the number of wolves had stabilized in this area.

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 provided for a harvest of at least 128 wolves in RY99 and 155 wolves in RY00–RY01. In RY99–RY00, the third objective, to increase trapper participation in statewide trapper survey by at least 1% annually, was achieved with an increase in participation in the Trapper Questionnaire of 100% in RY99 and an additional 19% in RY00; however, response declined in RY01 by 26%.

All management activities were accomplished during RY99–RY01. 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. Finally, although a definitive model of wolf predation dynamics was not fully completed, we applied the PredPrey computer model (McNay and DeLong 1998) in several scenarios. Work with the PredPrey model will be continued.

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 NWR in Units 21B and 21D, radiotelemetry studies have 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 2001–2002

| 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 |

[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 2001–2002

| 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 | 25 | 29 | 21 | 75 | 25 | 100 | 38 | 26 | 0 | 11 |

[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 2001–2002

| 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 | 14 | 9 | 12 | 14 | 29 | 21 | 5 | 58 |
| 1999–2000 | 19 | 2 | 26 | 2 | 33 | 15 | 4 | 54 |
| 2000–2001 | 10 | 0 | 6 | 21 | 15 | 31 | 16 | 86 |
| 2001–2002 | 18 | 4 | 13 | 11 | 16 | 36 | 4 | 56 |

[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 2001–2002

| 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 | 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 | 17 | 1 | 9 | 0 | 72 | 0 | 0 | 0 | 75 |

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

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 much of this 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 and 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. During this time period the Unit 22 wolf population was estimated at fewer than 100 wolves (Grauvogel 1980). From 1980 until 1996 wolf numbers and pack sizes increased and were most abundant in Units 22A and 22B where caribou from the Western Arctic Caribou Herd (WAH) wintered. WAH expanded its winter range westward in 1996, and wolves followed into areas of Units 22D and 22E.

## 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 utilizing 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

Research has never been conducted in Unit 22 to assess wolf distribution and population trend. Estimates of wolf distribution, population trend, harvest, and human use data are annually obtained from sealing certificates and observations by staff, reindeer herders, and other local residents. Big game harvest surveys were conducted in seven villages (Table 3), and fur-harvest questionnaires were mailed to hunter/trappers annually during 1999–2002 (this 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. 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 hunter/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 abundance in Unit 22. Due to the occurrence of regular caribou winter range in eastern Unit 22, wolf abundance has historically been higher in Unit 22A and Unit 22B. However, during 1996–2002 caribou expanded their winter range westward into Units 22D and 22E, and wolf harvest and observations in those areas 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.

| *1999-2000 to 2001-2002* 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.

Hunter/Trapper Harvest. The annual reported harvest during the reporting period ranged from 32 to 63 wolves (Table 1). The high harvest in 1999–2000 resulted from wolf abundance due to wintering caribou, and good snow conditions in spring 2000 that allowed hunters and trappers long periods of access to wolves. Sex composition of the reported harvest during the 3-year reporting period was as follows: 55% males, 36% females, and 9% sex unknown ($n$ = 157). As in previous years, the majority of wolves were harvested in Units 22A and 22B. Reported harvest during the reporting period in Unit 22A decreased by 24% and increased in Unit 22B by 140%. This change in harvest reflects the abundance of wintering WAH during the reporting period, which wintered in increasing numbers in Unit 22B, and in decreasing numbers in Unit 22A.

The magnitude of unreported wolf harvest each year in Unit 22 is thought to be substantial and fursealing data provides only a minimum estimate of harvest. Although fursealing agents are available in all Unit 22 villages, often hunter/trappers seal only those pelts that will be commercially tanned or sold to furbuyers. Many wolf hides are home tanned and used locally and people see no reason to seal them (Persons 2000). In May 1999, 2000, and 2001 village-based harvest surveys were completed in 7 villages in Unit 22 to obtain better harvest information on wolves and other big game species. Results from harvest assessment surveys revealed an additional 27 wolves harvested during 1999–2001 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 94% of the wolves taken during the reporting period. Residents from Unit 22A and 22B harvested 76% (n=113) of the wolves; Alaska residents living outside of Unit 22 harvested 3 wolves, and nonresidents harvested 6 wolves.

Harvest Chronology. Wolf harvest in Unit 22 occurs primarily in the winter months when snow machines can be used for transportation, hides are prime, and wolves are most abundant

due to the presence of WAH. During this reporting period, 95% of the harvest occurred between November and April, 2% in September and 1% in October.

Harvest Methods. During the reporting period 80% (n=157) of the wolf harvest in Unit 22 was by subsistence or sport hunters, or done opportunistically by local residents while engaged in other activities. The few serious trappers in Unit 22 trapped or snared 8% of the wolves. The method of harvest for the remaining 12% is unknown (Table 1).

Transport Methods. Snowmachines were used 92% of the time by hunters/trappers during the reporting period. Individuals using airplanes, highway vehicles, boats and four-wheelers took 9 wolves during snow-free months.

*Other Mortality*

There were no observations of 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

There were no nonregulatory management issues to report related to wolves in Unit 22 during the reporting period.

## 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 of Unit 22.

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 become a factor affecting moose management throughout Unit 22.

Public participation in the statewide Trapper Questionnaire program was valuable, providing impressions about abundance of wolves and other furbearers from numerous hunters/trappers throughout the unit (Persons 2000). Big game harvest surveys also proved to be an effective method of gathering more accurate harvest information from selected villages. The Harvest Assessment program should be continued, and expanding the program to include annual surveys in additional villages should be considered.

No changes in Unit 22 hunting or trapping regulations for wolves 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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Gorn, T. 2003. Unit 22 wolf management report. Pages 206–213 *in* C. Healy, editor. Wolf management report of survey and inventory activities 1 July 1999–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Reported Unit 22 wolf harvest for regulatory years 1988–1989 through 2001–2002

| Regulatory | Reported harvest | | | | Method of take | | | Total successful |
|---|---|---|---|---|---|---|---|---|
| | M | F | Unk. | Total | Trap / Snare | Shot | Unk. | Trapper / hunters |
| 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 | 33 | 22 | 7 | 62 | 4 | 53 | 5 | 31 |
| 2001–2002 | 17 | 15 | 0 | 32 | 3 | 29 | 0 | 22 |

Table 2 Reported wolf harvest by unit, 1990–1991 through 2001-2002

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

Table 3 Wolf harvest by Unit 22 village residents, 1999-2000 and 2000-2001

| Village | Harvest reported on village surveys | Nr. of wolves sealed | Percent of wolf harvest reported on sealing certificate | Timeframe of harvest asked on survey |
|---|---|---|---|---|
| Elim | 13 | 2 | 15% | May 1999–April 2000 |
| Shaktoolik | 16 | 4 | 25% | May 1999–April 2000 |
| White Mountain | 4 | 3 | 75% | May 1999–April 2000 |
| Teller | 0 | 0 | - | May 2000–April 2001 |
| Brevig Mission | 8 | 5 | 63% | May 2000–April 2001 |
| Wales | 0 | 0 | - | May 2000–April 2001 |
| Shishmaref | 2 | 2 | 100% | May 2000–April 2001 |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 dead 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 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 human 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 alternate 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) and Shungnak (1998–1999). The department (Division of Wildlife Conservation and Subsistence Division) and Maniilaq Association conducted the community harvest surveys (S. Georgette, pers. commun.).

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

Ballard (1993) estimated a density of 1 wolf/50 $mi^2$ (80% CI 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 yields a population estimate of 869 wolves (80% CI, 580–1169). This unit-wide estimate should be viewed as a crude approximation of actual abundance.

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 due to large numbers of caribou wintering in this area since 1996. Wolf numbers also seem to be higher in the upper Kobuk River drainage compared to before the mid 1990s (my observations as well as A. Williams and G. Bamford, pers. commun.). 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. The movements and distribution of wolves are influenced by caribou, especially during the winter (Ballard 1993). During this reporting period significant numbers of caribou overwintered in the lower Noatak River drainage (2001–2002), upper Kobuk River (2002–2003) and on the Seward Peninsula (both regulatory years).

### MORTALITY

*Harvest*

Season and Bag Limit. There were no changes to wolf hunting or trapping seasons or bag limits during this reporting period.

| *1999-2000, 2000-2001 and 2001-2002* | Resident Open Season | Nonresident Open Season |
|---|---|---|

| Unit and Bag Limits | (Subsistence and General Hunts) | |
|---|---|---|
| Unit 23 | | |
| Residents and | | |
| Nonresidents: | | |
| Trapping – no limit | 1 Nov–15 Apr | 1 Nov–15 Apr |
| Hunting – 5 wolves | 10 Aug–30 Apr | 10 Aug–30 Apr |

Board of Game Actions and Emergency Orders. In November 2001 the Board of Game increased the Unit 23 wolf hunting bag limit from 5 to 10 wolves/regulatory year. This change went into effect 1 July 2002 (after this reporting period). No emergency orders were issued that affected wolf hunting or trapping during this reporting period.

Hunter/Trapper Harvest. One hundred twelve wolves were sealed by hunters and trappers during 1999–2000, 45 during 2000–2001 and 68 during 2001–2002 (Table 1). Late snow and poor tracking conditions during 2000–2001 reduced the wolf harvest compared to 1999–2000 and 2001–2002. The harvest in 1999–2000 was the 3rd highest reported since 1974–1975.

Few residents of Unit 23 seal their wolves. Georgette (1999) reported that perhaps <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 (n=6) yields an annual mean wolf harvest of 17.8 wolves/community (SD=18.1). Combining annual reported harvests from sealing data for these same communities (n=15) during 1999–2000 through 2001–2002 yields an annual mean wolf harvest of 5.1 wolves/community (SD=6.3). These figures suggest ~29% of the actual wolf harvest was sealed (Table 2). The percentage of the actual wolf harvest that was sealed may have been lower than 29% because 2 of the community harvest assessments provided wolf harvests that seem unreasonably low. Even so, using a 29% sealing rate suggests the actual Unit 23 wolf harvest may have approached 390 wolves in 1999–2000, 237 wolves in 2000–2001 and 157 wolves in 2001–2002.

It is generally accepted that >50% of all packs must be removed from an area before it has a lasting effect on the wolf population level. The public almost never totally eliminates an entire wolf pack because hunters quickly reach the point of diminishing returns after the pup cohort has been taken. If the Unit 23 wolf population is between the point estimate of 869 wolves and the upper 80% CI of 1169 wolves as estimated by Ballard (1993), a harvest of even 390 wolves would be sustainable without reducing wolf density. Admittedly, this entire exercise is very crude and is reported only to evaluate whether our wolf harvest and population data are reasonable.

Harvest levels reported through the fur sealing program can change dramatically when a department employee or protection officer visits a village and encourages hunters and trappers to seal their furs. That partially explains the high reported harvest in 1999–2000 when Trooper J. Rodgers visited a number of communities in Unit 23 and offered to seal furs. Therefore, the harvest levels reported here should be viewed as absolute minimum estimates of harvest.

Users continued to harvest wolves most heavily in the Kobuk River drainage during this reporting period (Table 3). This is undoubtedly because more people reside in this drainage than any other in Unit 23. Wolf harvests on the northern Seward Peninsula have increased during recent years.

Permit Hunts. There were no permit hunts for wolves in Unit 23 during the reporting period.

Hunter Residency and Success. The number of individuals who sealed wolves taken in Unit 23 has remained relatively stable since the late 1980s. Twenty-two individuals sealed wolves in each of the 1999–2000 and 2000-2001 regulatory years, and 26 sealed wolves during 2001–2002. During 1999–2000, all but 8 wolves were taken by residents of Unit 23 (5 by nonlocal residents and 3 by nonresidents). In 2000–2001, a nonlocal resident sealed 1 wolf and a nonresident sealed 1 wolf. During 2001–2002, nonlocal residents took 3 wolves and nonresidents took 6 wolves. All nonresident hunters harvested wolves opportunistically during fall while hunting moose or caribou.

Harvest Chronology. Most wolves taken during this reporting period were harvested between December and April (Table 4). This temporal harvest pattern was consistent with previous years.

Transport Methods. Hunters primarily used snowmachines to harvest wolves (Table 5). Some individuals used aircraft to access hunting areas and 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). No one reported using snares to harvest wolves in Unit 23.

*Other Mortality*

There were no reports of wolf mortality due to causes other than hunting or trapping. We suspect rabies and canine distemper kill some wolves every 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 (0.1-0.3 moose/mi$^2$). Predation by black and brown bears, and by wolves, especially on moose calves, has undoubtedly 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 remained stable, 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 here, 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 thereby reducing predation on moose and sheep.

## CONCLUSIONS AND RECOMMENDATIONS

Harvest data should be interpreted with caution given the generally poor and inconsistent compliance with fur sealing requirements throughout Unit 23. Likewise, the unit-wide estimate of wolf density reported by Ballard (1993) should be viewed with caution because that estimate is now >10 years old and was based on a large extrapolation of wolf density from a small study area.

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. 2003. Unit 23 wolf management report. Pages 214–222 *in* C. Healy, editor. Wolf management report of survey and inventory activities 1 July 1999–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Reported wolf harvest from sealing certificates for Unit 23, 1974–1975 through 2001–2002

| Regulatory year | Males | Females | Unknown | Total |
|---|---|---|---|---|
| 1974–1975 | – | – | 50 | 50 |
| 1975–1976 | – | – | 142 | 142 |
| 1976–1977 | – | – | 157 | 157 |
| 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 | 25 | 16 | 4 | 45 |
| 2001–2002 | 39 | 14 | 15 | 68 |

Table 2 Comparison of wolf harvests from community harvest assessments and fur sealing documents in selected communities within Unit 23, 1999–2002

| Community | Community harvest estimate | Fur Sealing Data | | |
|---|---|---|---|---|
| | | 1999-2000 | 2000-2001 | 2001-2002 |
| Kiana (1999) | 17 | 0 | 4 | 0 |
| Noatak (1999) | 15 | 0 | 4 | 7 |
| Noatak (2001–2002) | 3 | | | |
| Noorvik (2002) | 52 | 20 | 15 | 5 |
| Selawik (1999) | 2 | 0 | 0 | 0 |
| Shungnak (1998– | 18 | 10 | 11 | 1 |

Table 3 Wolf harvest by drainage in Unit 23, 1974–1975 through 2001-2002

| 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 | 10 | 157 |
| 1977–1978 | 0 | 3 | 25 | 20 | 1 | 70 | 65 |
| 1978–1979 | 7 | 4 | 11 | 15 | 1 | 30 | 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 | 62 |
| 1985–1986 | 0 | 11 | 4 | 2 | 2 | 0 | 19 |
| 1986–1987 | 2 | 5 | 6 | 18 | 0 | 2 | 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 | 0 | 112 |
| 2000–2001 | 3 | 9 | 28 | 2 | 3 | 0 | 45 |
| 2001–2002 | 0 | 8 | 35 | 10 | 15 | 0 | 68 |

Table 4 Chronology of wolf harvest for Unit 23 from 1993–1994 through 2001-2002

| Reg. 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 | 5 | 8 | 0 | 1 | 3 | 2 | 12 | 13 | 0 | 1 | 45 |
| 2001–2002 | 0 | 3 | 0 | 1 | 6 | 4 | 19 | 19 | 7 | 9 | 68 |

Table 5 Number of users (hunters and trappers combined) and method of transport to harvest wolves in Unit 23, 1985–1986 through 2001-2002

| Reg. year | Hunters | Airplane | Snow-machine | Boat | Dog team | Highway vehicle | Off road vehicle | Unk. | 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 | 62 | 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 | 0 | 112 |
| 2000–2001 | 22 | 3 | 63 | 0 | 0 | 0 | 0 | 2 | 68 |
| 2001–2002 | 26 | 7 | 34 | 3 | 0 | 0 | 0 | 1 | 45 |

Table 6 Methods of harvesting wolves in Unit 23, 1985–1986 through 2001-2002

| Reg. 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 | 2 | 66 |
| 2001–2002 | 33 | 11 | 0 | 1 | 45 |

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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 Jun, 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 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. 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 US 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 occur 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). It 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 portion 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 RY99–RY02. 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 RY99–RY01.

### 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 the unit 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 | | |
| 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 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. Beginning in RY97 same-day airborne harvest was eliminated in the trapping regulations as well. Beginning in RY95 the trapping season was extended through April. Wolves could be taken under either hunting or trapping regulations. No new regulations were adopted during RY99–RY01.

Hunter–Trapper Harvest. Hunters and trappers reported harvesting 91, 81, and 71 wolves during RY99, RY00 and RY01, respectively (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).

Harvest Chronology. Wolves were generally taken in January, February, and March during RY91–RY01 (Table 3). The exception was RY97 and RY99 when November and December were also important months. Like nearby Unit 21D, incidental harvest in the fall increased slightly during RY99–RY01, possibly due to increased sightings during the fall moose season.

Transport Methods. Most wolves were taken using snowmachines for transportation during RY92–RY01 (Table 4). No other trends in transportation methods were apparent.

## CONCLUSIONS AND RECOMMENDATIONS

The unitwide wolf population was stable during RY99–RY01 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 RY99–RY01. 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. With respect to the third objective, to improve trapper questionnaire response, there was 100% increase in RY99 ($n$ = 26) over the number that were returned in RY98 ($n$ = 13), and in RY00 ($n$ = 31) the increase in response was 19% from the previous year.

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 conducted and proved effective in teaching new techniques and ways to avoid accidental snaring of moose. An aerial wolf survey was planned but not completed in the central portion of the unit due to persistently poor survey conditions.

I recommend an aerial survey be conducted to determine wolf densities in the central portion of Unit 24. I also recommend continued monitoring of radiocollared 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 2002–2003

| 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 |

[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 2001–2002

| 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 | 2 | 71 | 50 | 121 | 51 | 20 | 0 | 0 |

[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 2001–2002

| Regulatory year | Harvest periods | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 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 | 11 | 8 | 11 | 15 | 27 | 25 | 1 | 71 |

[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 2001–2002

| Regulatory year | Percent of harvest | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 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 | 10 | 81 |
| 2001–2002 | 1 | 4 | 6 | 0 | 68 | 0 | 6 | 15 | 71 |

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

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# WOLF MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2002

## 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. US 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, 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.

**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 objective for this reporting period is listed below.

- Provide for a sustained annual harvest rate of no more than 30% of the total combined wolf population in Units 25A, 25B, and 25D; and no more than 30% of the combined wolf population of Units 26B and 26C.

**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 and 2001. 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., RY00 = 1 Jul 2000–30 Jun 2001).

## 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 181–204 wolves (10.9–12.3 wolves/1000 $mi^2$ [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 because of a lack of suitable snow conditions.

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.

*Distribution and Movements*

Radiocollared wolves in northern ANWR were 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 RY99–RY01. The bag limit was 5 wolves in Unit 25 and 10 wolves in Unit 26; 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 |
|---|---|---|
| *RY99–RY01* | | |
| Units 25A, 25B, and 25D | | |
| HUNTING: 5 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 |
| *RY02* | | |

| Units/Bag Limits/Special Restrictions | Resident/Subsistence Open Season | Nonresident Open Season |
|---|---|---|
| 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.

Hunter–Trapper Harvest. Annual wolf harvests in the reporting area were relatively stable during RY99–RY01 (range 51–79) (Table 1). The 3-year average harvest for RY99–RY01 was 66 compared to 56 for the previous 3 years (RY96–RY98). During RY99–RY01, 27% of the harvest occurred in Unit 25A, 24% in Unit 26B, 19% in Unit 25D, 18% in Unit 25B, and 13% in Unit 26C. The pattern is similar to the previous 3 years (RY96–RY98). Harvest during the early to mid-1990s was somewhat higher (3-year average RY90–RY92 was 86 and RY93–RY95 was 78). The decline in harvest 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. Few wolves were harvested in Unit 26C, probably because of limited access and low wolf density. Most wolves harvested in Unit 26C were taken on the Canning River and in various drainages south of Barter Island. Harvests generally included more males than females. Some unreported harvest occurs, primarily in Units 26B and 26C, where hides are often used in clothing and handicrafts (Whitten 1988).

During RY99–RY01 the number of wolves harvested in Unit 25A with traps or snares and by shooting from the ground was similar. In previous years, trapping or snaring was the predominant method of take. In Units 25B and 25D, wolves were taken primarily by trapping or snaring, probably because these are the most effective methods in forested terrain. In Unit 26B, 61% of the wolves were taken by shooting from the ground and 39% by trapping or snaring, similar to previous years. In Unit 26C, 67% of the wolves were taken by trapping or snaring and 33% were taken by shooting from the ground. In previous years shooting from the ground was the primary method of take in Unit 26C. 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 a few wolves were taken in August or September (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 few wolves. The use of dogsled/skis/or snowshoes increased in winters with little snowfall because trappers were unable to use snowmachines.

*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 recently 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 RY99–RY01, reported harvest accounted for a maximum of 7–9% of the estimated population in Units 25A, 25B, and 25D and 7–23% 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 objective of providing for a sustained annual harvest rate of no more than 30% from the combined wolf population in Units 25A, 25B, 25D; and the wolf population in Units 26B and 26C. Management objectives for Unit 25D should be 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. The wolf management goals and objectives are revised as follows for the next reporting period:

#### MANAGEMENT GOAL

- Provide maximum opportunity to participate in hunting and trapping wolves in Unit 25D.

#### MANAGEMENT OBJECTIVES

- Provide for a sustained annual harvest rate of no more than 30% of the total combined wolf population in Units 25A and 25B; and no more than 30% of the combined wolf population of Units 26B and 26C.

- Manage for a temporary reduction in wolf numbers 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.

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TABLE 1 Units 25A, 25B, 25D, 26B, and 26C wolf harvest, regulatory years 1987–1988 through 2001–2002

| Regulatory | Reported harvest | | | | Method of take | | |
|---|---|---|---|---|---|---|---|
| year | M | F | Unk | Total | Trap/snare | Shot | Unk |
| *Unit 25A* | | | | | | | |
| 1987–1988 | 14 | 16 | 0 | 30 | 7 | 23 | 0 |
| 1988–1989 | 2 | 6 | 2 | 10 | 6 | 4 | 0 |
| 1989–1990 | 5 | 9 | 0 | 14 | 8 | 6 | 0 |
| 1990–1991 | 15 | 6 | 2 | 23 | 18 | 5 | 0 |
| 1991–1992 | 7 | 11 | 7 | 25 | 14 | 11 | 0 |
| 1992–1993 | 20 | 7 | 0 | 27 | 11 | 16 | 0 |
| 1993–1994 | 8 | 10 | 0 | 18 | 15 | 3 | 0 |
| 1994–1995 | 7 | 10 | 0 | 17 | 17 | 0 | 0 |
| 1995–1996 | 12 | 12 | 0 | 24 | 14 | 10 | 0 |
| 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 |
| *Unit 25B* | | | | | | | |
| 1987–1988 | 4 | 1 | 1 | 6 | 5 | 1 | 0 |
| 1988–1989 | 3 | 4 | 5 | 12 | 12 | 0 | 0 |
| 1989–1990 | 3 | 1 | 1 | 5 | 4 | 1 | 0 |
| 1990–1991 | 2 | 2 | 1 | 5 | 4 | 1 | 0 |
| 1991–1992 | 7 | 5 | 1 | 13 | 13 | 0 | 0 |
| 1992–1993 | 7 | 7 | 1 | 15 | 14 | 1 | 0 |
| 1993–1994 | 6 | 1 | 5 | 12 | 11 | 1 | 0 |
| 1994–1995 | 4 | 9 | 3 | 16 | 16 | 0 | 0 |
| 1995–1996 | 5 | 9 | 0 | 14 | 12 | 2 | 0 |
| 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 |
| *Unit 25D* | | | | | | | |
| 1987–1988 | 2 | 2 | 2 | 6 | 6 | 0 | 0 |
| 1988–1989 | 0 | 0 | 2 | 2 | 2 | 0 | 0 |
| 1989–1990 | 6 | 5 | 1 | 12 | 9 | 3 | 0 |
| 1990–1991 | 14 | 10 | 0 | 24 | 6 | 18 | 0 |
| 1991–1992 | 8 | 11 | 0 | 19 | 9 | 10 | 0 |
| 1992–1993 | 2 | 1 | 8 | 11 | 9 | 1 | 1 |
| 1993–1994 | 10 | 7 | 2 | 19 | 17 | 2 | 0 |
| 1994–1995 | 18 | 12 | 2 | 32 | 31 | 1 | 0 |

| Regulatory | Reported harvest | | | | Method of take | | |
|---|---|---|---|---|---|---|---|
| year | M | F | Unk | Total | Trap/snare | Shot | Unk |
| 1995–1996 | 12 | 5 | 0 | 17 | 11 | 6 | 0 |
| 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 |
| *Unit 26B* | | | | | | | |
| 1987–1988 | 2 | 1 | 0 | 3 | 0 | 3 | 0 |
| 1988–1989 | 12 | 3 | 0 | 15 | 7 | 7 | 1 |
| 1989–1990 | 4 | 7 | 0 | 11 | 3 | 7 | 1 |
| 1990–1991 | 15 | 9 | 1 | 25 | 0 | 24 | 1 |
| 1991–1992 | 10 | 4 | 3 | 17 | 6 | 10 | 1 |
| 1992–1993 | 14 | 11 | 6 | 31 | 5 | 26 | 0 |
| 1993–1994 | 17 | 11 | 2 | 30 | 10 | 20 | 0 |
| 1994–1995 | 11 | 5 | 0 | 16 | 4 | 12 | 0 |
| 1995–1996 | 9 | 3 | 1 | 13 | 2 | 11 | 0 |
| 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 |
| *Unit 26C* | | | | | | | |
| 1987–1988 | 1 | 1 | 0 | 2 | 0 | 2 | 0 |
| 1988–1989 | 3 | 0 | 0 | 3 | 0 | 3 | 0 |
| 1989–1990 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 1990–1991 | 7 | 4 | 1 | 12 | 2 | 10 | 0 |
| 1991–1992 | 3 | 2 | 0 | 5 | 0 | 5 | 0 |
| 1992–1993 | 3 | 3 | 0 | 6 | 3 | 3 | 0 |
| 1993–1994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1994–1995 | 4 | 1 | 0 | 5 | 2 | 3 | 0 |
| 1995–1996 | 1 | 1 | 0 | 2 | 0 | 2 | 0 |
| 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 |

TABLE 2 Units 25A, 25B, 25D, 26A, and 26B wolf harvest chronology percent by time period, regulatory years 1987–1988 through 2001–2002

| Regulatory year | Harvest periods | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | Unk | *n* |
| *Unit 25A* | | | | | | | | | | | |
| 1987–1988 | 3 | 7 | 0 | 3 | 7 | 7 | 7 | 67 | 0 | 0 | 30 |
| 1988–1989 | 0 | 30 | 0 | 10 | 10 | 0 | 10 | 40 | 0 | 0 | 10 |
| 1989–1990 | 0 | 21 | 0 | 21 | 14 | 29 | 14 | 0 | 0 | 0 | 14 |
| 1990–1991 | 0 | 4 | 0 | 0 | 26 | 13 | 17 | 39 | 0 | 0 | 23 |
| 1991–1992 | 8 | 0 | 0 | 12 | 12 | 16 | 12 | 36 | 4 | 0 | 25 |
| 1992–1993 | 7 | 4 | 0 | 15 | 7 | 0 | 4 | 59 | 4 | 0 | 27 |
| 1993–1994 | 0 | 17 | 0 | 5 | 11 | 39 | 17 | 0 | 0 | 0 | 18 |
| 1994–1995 | 0 | 0 | 0 | 12 | 6 | 18 | 23 | 41 | 0 | 0 | 17 |
| 1995–1996 | 13 | 29 | 0 | 8 | 21 | 0 | 29 | 0 | 0 | 0 | 24 |
| 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 |
| *Unit 25B* | | | | | | | | | | | |
| 1987–1988 | 0 | 0 | 0 | 17 | 17 | 33 | 17 | 17 | 0 | 0 | 6 |
| 1988–1989 | 0 | 0 | 0 | 17 | 50 | 8 | 17 | 8 | 0 | 0 | 12 |
| 1989–1990 | 0 | 0 | 0 | 20 | 60 | 0 | 0 | 20 | 0 | 0 | 5 |
| 1990–1991 | 0 | 0 | 0 | 0 | 20 | 20 | 0 | 60 | 0 | 0 | 5 |
| 1991–1992 | 0 | 0 | 0 | 0 | 69 | 8 | 15 | 8 | 0 | 0 | 13 |
| 1992–1993 | 0 | 0 | 0 | 0 | 7 | 33 | 27 | 33 | 0 | 0 | 15 |
| 1993–1994 | 0 | 0 | 0 | 8 | 25 | 6 | 0 | 8 | 0 | 0 | 12 |
| 1994–1995 | 0 | 0 | 0 | 19 | 0 | 44 | 19 | 19 | 0 | 0 | 16 |
| 1995–1996 | 0 | 14 | 0 | 0 | 7 | 36 | 29 | 14 | 0 | 0 | 14 |
| 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 | 12.5 | 38 | 0 | 38 | 13 | 0 | 0 | 8 |
| 2001–2002 | 0 | 13 | 0 | 25 | 13 | 25 | 0 | 13 | 13 | 0 | 8 |
| *Unit 25D* | | | | | | | | | | | |
| 1987–1988 | 0 | 0 | 0 | 0 | 50 | 33 | 17 | 0 | 0 | 0 | 6 |
| 1988–1989 | 0 | 0 | 0 | 0 | 50 | 0 | 50 | 0 | 0 | 0 | 2 |
| 1989–1990 | 0 | 0 | 0 | 0 | 42 | 0 | 25 | 33 | 0 | 0 | 12 |
| 1990–1991 | 0 | 8 | 0 | 0 | 8 | 8 | 0 | 75 | 0 | 0 | 24 |
| 1991–1992 | 0 | 0 | 0 | 0 | 0 | 5 | 21 | 74 | 0 | 0 | 19 |
| 1992–1993 | 0 | 0 | 0 | 9 | 18 | 0 | 64 | 0 | 9 | 0 | 11 |
| 1993–1994 | 0 | 0 | 0 | 0 | 32 | 26 | 10 | 26 | 5 | 0 | 19 |
| 1994–1995 | 0 | 0 | 0 | 25 | 0 | 16 | 22 | 28 | 3 | 6 | 32 |

| Regulatory year | Harvest periods | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | Unk | *n* |
| 1995–1996 | 0 | 0 | 0 | 6 | 23 | 29 | 6 | 35 | 0 | 0 | 17 |
| 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 | 11 | 11 | 11 | 11 | 19 |
| *Unit 26B* | | | | | | | | | | | |
| 1987–1988 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 33 | 33 | 0 | 3 |
| 1988–1989 | 0 | 13 | 0 | 7 | 33 | 0 | 0 | 40 | 7 | 0 | 15 |
| 1989–1990 | 18 | 18 | 0 | 27 | 18 | 9 | 0 | 9 | 0 | 0 | 11 |
| 1990–1991 | 16 | 8 | 0 | 4 | 0 | 4 | 0 | 4 | 64 | 0 | 25 |
| 1991–1992 | 18 | 6 | 0 | 0 | 24 | 12 | 0 | 18 | 24 | 0 | 17 |
| 1992–1993 | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 58 | 36 | 0 | 31 |
| 1993–1994 | 7 | 13 | 0 | 3 | 0 | 3 | 33 | 23 | 17 | 0 | 30 |
| 1994–1995 | 0 | 44 | 0 | 6 | 12 | 0 | 0 | 19 | 19 | 0 | 16 |
| 1995–1996 | 0 | 0 | 0 | 8 | 15 | 8 | 15 | 8 | 46 | 0 | 13 |
| 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 | 37.5 | 0 | 16 |
| 2001–2002 | 0 | 0 | 0 | 0 | 14 | 29 | 43 | 14 | 0 | 0 | 7 |
| *Unit 26C* | | | | | | | | | | | |
| 1987–1988 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 2 |
| 1988–1989 | 0 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 0 | 3 |
| 1989–1990 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1990–1991 | 25 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 50 | 0 | 12 |
| 1991–1992 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 1992–1993 | 17 | 33 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 6 |
| 1993–1994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1994–1995 | 20 | 40 | 0 | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 5 |
| 1995–1996 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 2 |
| 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 |

TABLE 3 Units 25A, 25B, 25D, 26B, and 26C harvest percent by transport method, regulatory years 1987–1988 through 2001–2002

| Regulatory year | Method of transportation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Airplane | Dogsled, Skis, Snowshoes | Boat | 3- or 4-Wheeler | Snowmachine | ORV | Highway vehicle | Unk | *n* |
| *Unit 25A* | | | | | | | | | |
| 1987–1988 | 73 | 7 | 3 | 0 | 17 | 0 | 0 | 0 | 30 |
| 1988–1989 | 10 | 20 | 10 | 0 | 60 | 0 | 0 | 0 | 10 |
| 1989–1990 | 21 | 29 | 0 | 0 | 36 | 0 | 14 | 0 | 14 |
| 1990–1991 | 0 | 13 | 4 | 0 | 70 | 0 | 0 | 13 | 23 |
| 1991–1992 | 8 | 8 | 0 | 0 | 72 | 0 | 0 | 12 | 25 |
| 1992–1993 | 11 | 0 | 0 | 0 | 78 | 0 | 4 | 7 | 27 |
| 1993–1994 | 11 | 0 | 6 | 0 | 83 | 0 | 0 | 0 | 18 |
| 1994–1995 | 24 | 0 | 0 | 0 | 76 | 0 | 0 | 0 | 17 |
| 1995–1996 | 21 | 38 | 0 | 0 | 38 | 0 | 0 | 4 | 24 |
| 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 |
| *Unit 25B* | | | | | | | | | |
| 1987–1988 | 0 | 17 | 0 | 0 | 67 | 0 | 17 | 0 | 6 |
| 1988–1989 | 0 | 17 | 0 | 0 | 83 | 0 | 0 | 0 | 12 |
| 1989–1990 | 60 | 0 | 0 | 40 | 0 | 0 | 0 | 0 | 5 |
| 1990–1991 | 20 | 0 | 0 | 0 | 80 | 0 | 0 | 0 | 5 |
| 1991–1992 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 13 |
| 1992–1993 | 7 | 13 | 0 | 0 | 67 | 0 | 0 | 13 | 15 |
| 1993–1994 | 0 | 42 | 8 | 0 | 50 | 0 | 0 | 0 | 12 |
| 1994–1995 | 0 | 6 | 0 | 0 | 75 | 0 | 0 | 19 | 16 |
| 1995–1996 | 0 | 7 | 14 | 0 | 79 | 0 | 0 | 0 | 14 |
| 1996–1997 | 0 | 10 | 10 | 0 | 80 | 0 | 0 | 0 | 10 |

| Regulatory year | Method of transportation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Airplane | Dogsled, Skis, Snowshoes | Boat | 3- or 4-Wheeler | Snowmachine | ORV | Highway vehicle | Unk | *n* |
| 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 |
| *Unit 25D* | | | | | | | | | |
| 1987–1988 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 6 |
| 1988–1989 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 2 |
| 1989–1990 | 8 | 0 | 0 | 0 | 92 | 0 | 0 | 0 | 12 |
| 1990–1991 | 54 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 24 |
| 1991–1992 | 58 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 19 |
| 1992–1993 | 9 | 0 | 0 | 0 | 82 | 0 | 9 | 0 | 11 |
| 1993–1994 | 11 | 0 | 0 | 0 | 89 | 0 | 0 | 0 | 19 |
| 1994–1995 | 9 | 0 | 0 | 0 | 91 | 0 | 0 | 0 | 32 |
| 1995–1996 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 17 |
| 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 |
| *Unit 26B* | | | | | | | | | |
| 1987–1988 | 33 | 0 | 0 | 0 | 0 | 0 | 33 | 33 | 3 |
| 1988–1989 | 13 | 0 | 0 | 0 | 47 | 0 | 33 | 7 | 15 |
| 1989–1990 | 18 | 0 | 0 | 9 | 0 | 0 | 64 | 9 | 11 |
| 1990–1991 | 12 | 0 | 0 | 0 | 16 | 0 | 20 | 52 | 25 |
| 1991–1992 | 18 | 6 | 0 | 0 | 24 | 0 | 53 | 0 | 17 |
| 1992–1993 | 3 | 0 | 0 | 0 | 13 | 0 | 84 | 0 | 31 |

| Regulatory year | Method of transportation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Airplane | Dogsled, Skis, Snowshoes | Boat | 3- or 4-Wheeler | Snowmachine | ORV | Highway vehicle | Unk | *n* |
| 1993–1994 | 10 | 0 | 0 | 0 | 40 | 0 | 48 | 3 | |
| 1994–1995 | 38 | 0 | 6 | 0 | 6 | 0 | 44 | 6 | 16 |
| 1995–1996 | 0 | 0 | 0 | 0 | 46 | 0 | 39 | 15 | 13 |
| 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 |
| *Unit 26C* | | | | | | | | | |
| 1987–1988 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 2 |
| 1988–1989 | 67 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 3 |
| 1989–1990 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1990–1991 | 25 | 0 | 0 | 0 | 75 | 0 | 0 | 0 | 12 |
| 1991–1992 | 60 | 0 | 40 | 0 | 0 | 0 | 0 | 0 | 5 |
| 1992–1993 | 50 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 6 |
| 1993–1994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1994–1995 | 60 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 5 |
| 1995–1996 | 50 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 2 |
| 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 |

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

From: 1 July 1999
To: 30 June 2002

## 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 in recent years has ranged from 13 to 60 animals, but the actual annual harvest has ranged from approximately 50 to 120. 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.

Stephenson and James (1982) estimated the wolf population size for Unit 26A at 144–310 wolves in 1982. 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 $mi^2$) 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 $km^2$. 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).

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).

## MANAGEMENT DIRECTION

### MANAGEMENT GOALS

- Maintain viable wolf populations in Unit 26A.
- Determine 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 most heavily hunted area in Unit 26A once every 3 years.
- Monitor harvest through the statewide sealing program by interviewing knowledgeable people in the villages and working with the North Slope Borough (NSB) to develop a more effective 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 to observations made during past counts.

## METHODS

A Sample Unit Probability Estimator (SUPE) sample design was used to census wolves in a 10,343 $km^2$ area bordered by the Colville, Killik, and Itkillik rivers and Gunsight Mountain. Surveys were flown using a PA-18 and a Scout aircraft on 15 and 16 April 1998. The study area as divided into 4 x 4 mile sample units. The units were classified into high, medium and low categories; according to the likelihood they contained fresh wolf tracks. We randomly selected units to be surveyed, with proportionally the most units in the “high” category surveyed, “medium” second, and “low” third. We attempted to fly surveys 2 days after a snowfall. Each selected unit was searched thoroughly to determine whether or not fresh wolf tracks were present. When tracks were found we followed them to determine how many wolves were in the pack, and what course the wolves had followed since the last snowfall. A population estimate for the area was obtained using the number of wolves counted and by determining 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, correctly identify all sample units that a set of tracks passes through, and correctly enumerate the number of wolves in the packs (Becker, 1998).

We collected harvest data from sealing certificate records and informal discussions with knowledgeable village residents. Harvest data for some villages was obtained through the NSB Harvest Documentation Program that maintains monitoring in North Slope villages. In past years we have obtained composition data from wolf carcasses collected by hunters at Anaktuvuk Pass.

A wolf management plan for the North Slope was developed during 1992 and 1993. In developing the management plan, public meetings were held in North Slope villages, and local governments and federal management agencies were consulted.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

Estimates of wolf numbers were not attempted during the reporting period. Previously, we estimated the number of wolves in Unit 26A 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.

A SUPE sample design was used to census wolves in a 10,343 $km^2$ area bordered by the Colville, Killik, and Itkillik rivers and Gunsight Mountain on 15 and 16 April 1998. Lack of fresh snow and wind blown snow conditions resulted in poor tracking conditions in the southern half of the study area. We concentrated our efforts on the northern 5000 $km^2$ . Only 7 wolves were seen in 2 packs, resulting in an estimate of 8 wolves, with a confidence range of 5–11 at the 90% level. A density estimate was calculated at 1.6 wolves per 1000 $km^2$ in the 5000 $km^2$ area.

Results of surveys (previously reported) indicate the density of wolves increased from approximately 2.6 wolves/1000 $km^2$ in 1987 to 4.2 wolves/1000 $km^2$ in 1992 and 4.1 wolves/1000 $km^2$ in 1994. Although our 1998 survey was incomplete it was apparent that the density of wolves had declined in the area (Table 1).

The number of wolves seen during moose surveys has also declined in recent years. During the spring 1991 moose census 29 wolf sightings were recorded in 39 hours of flight in Unit 26A. During the 1995 survey, 16 wolves were observed during 35 hours of flight. We did not see any wolves during moose counts in 1998, 1999, 2000 or 2001. We saw 4 wolves in 2002.

The most likely reason that wolf numbers in the study area have decreased in recent years is a reduced prey base. The Unit 26A moose population declined by 75% between 1992 and 1996. In addition, very few caribou from either the Teshekpuk Herd or the Western Arctic Herd have wintered in the area between Umiat and Anaktuvuk Pass in recent years. It is also

possible that disease could have been a factor in the decline in wolf numbers.

In order to assist with the recovery of the 40 Mile Caribou Herd, North Slope residents agreed to have 15 wolves relocated from the Tok area to the North Slope in 1999. At the request of local residents the wolves were not collared, so it has been difficult to monitor the survival of the wolves. The relocated wolves did have ear tags and 2 of these were reported harvested by trappers.

*Population Composition*

No population composition data was collected in Unit 26A during the reporting period. Previously, US National Park Service and department staff collected necropsy data on wolves harvested at Anaktuvuk Pass from the winters of 1985–1986 to 1992–1993. Out of 110 wolf carcasses examined at Anaktuvuk Pass during 1990–91, 73 were from wolves harvested in Unit 26A. Forty-six (42%) were males, 52 (47%) were females, and 12 (11%) were unknown. Of 82 carcasses that were aged, 37 (45%) were adults and 45 (55%) were pups. Ninety-three (85%) of the wolves were gray or white, and 17 (15%) were black. Sixty-seven (61%) of these wolves were shot and 43 (39%) were trapped. Fifteen were caught during December, 23 during January, 23 during February, and 44 during March.

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 (81%) were gray, and one 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 unknown. Twelve (57%) were shot and 9 (43%) were trapped. All were gray.

No composition data was available from Anaktuvuk Pass after 1993. Composition of the harvest probably does not reflect accurate age composition because pups are more susceptible to harvest than adults. Composition data from sources other than hunter harvest are not available at this time.

*Distribution and Movements*

Most wolves are in the southern portion of Unit 26A in the Brooks Mountain Range and foothills and along the Colville River system. However, residents have seen wolves in increasing numbers on the coastal plain during recent years. Wolves often move toward areas of high caribou concentration. 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–15 Apr |
| Hunting | 10 wolves | 10 Aug–30 Apr |

Board of Game Actions and Emergency Orders. The Board of Game had made it legal under trapping regulations to shoot a wolf the same-day-airborne 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 it illegal to hunt wolves the same-day-airborne.

Hunter/Trapper Harvest. During the 1999–2000 season, 8 wolves were sealed; during 2000–2001, 29 wolves were sealed; and during 2001–2002, 16 wolves were sealed. For percentages of males and females and colors of wolves see Table 2.

Previous harvests have been documented by the NSB Department of Wildlife Management Harvest Documentation Project. The NSB found during 1994–1995 that at least 59 wolves were harvested in Anaktuvuk Pass while 17 were sealed. Eighteen were harvested in Nuiqsut, 2 in Atqasuk, and 8 in Kaktovik while none were sealed in any of those villages (Brower and Opie 1996,1997; Hepa and Brower, 1997).

Permit Hunts. There were no permit hunts for wolves in Unit 26A during the reporting period.

Hunter Residency and Success. In 1999–2000, 5 North Slope residents harvested 7 wolves and 1 wolf was reported harvested by a nonresident hunter. During 2000–2001, 8 North Slope residents harvested 25 wolves, a nonlocal resident harvested 2 wolves, and 2 nonresidents harvested a total of 2 wolves. In 2001–2002, 3 North Slope residents harvested 12 wolves and a nonlocal resident harvested 4 wolves. There is no information on the number of unsuccessful hunters.

Method of Take, Transportation, and Chronology. The method of take, transportation, and chronology 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 450,000 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 has been greatly reduced but is now recovering. Dall sheep are preyed upon in mountainous regions, but also declined in the 1990s. Snowshoe hares have 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. Hunter/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 the 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 surveys has also declined.

Wolf numbers in the study area have decreased because of a reduced prey base. The Unit 26A moose population declined by 75% between 1992 and 1996. 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 since 1997.

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 that there has been a decline in the wolf population throughout Unit 26A. Hunter/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. Department personnel have been assisting the NSB develop a harvest documentation system that is more acceptable to local residents. Harvest monitors have been hired in each village and are collecting harvest information for several species. During 1994–1995 the NSB found that at least 59 wolves were harvested in Anaktuvuk Pass while 17 were sealed and that 18 were harvested in Nuiqsut while none was sealed. We will have more accurate harvest information if the NSB program continues and becomes established in more North Slope villages.

A wolf management plan for the North Slope was developed during 1992 and 1993. In developing the management plan, public meetings were held in North Slope villages, and

local governments and federal management agencies were consulted. Most local people agreed that 1) a moderate level of harvest of wolves should continue, 2) wolf pelts are highly prized and are a valuable resource for North Slope residents, 3) wolf control is unnecessary on the North Slope at this time, 4) residents oppose using aircraft to harvest wolves, and 5) if wolf populations become too large, local people could use ground hunting methods to control the populations.

Wolf predation has been a factor for both Dall sheep and moose populations in Unit 26A. Sheep populations declined in number 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 is wolf predation. The moose population has begun to increase since 1997 while the density of wolves has been low. It is difficult to determine whether the wolf density is driving the moose population fluctuation or if the 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.

In order to assist with the recovery of the 40 Mile Caribou Herd, North Slope residents agreed to have 15 wolves relocated from the Tok area to the North Slope in 1999. At the request of local residents, the wolves were not collared, so it has been difficult to monitor the survival of the wolves. The relocated wolves did have ear tags and 2 of these were reported harvested by trappers.

Although the wolf population has declined 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 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 surveyee
[e] Incomplete survey due to poor snow cover.

Table 2 Sex and color of wolves from reported harvests and estimated unreported harvest, Unit 26A, 1989–2002

| Regulatory year | Sex | | | Color | | | Estimated unreported harvest | Total reported harvest |
|---|---|---|---|---|---|---|---|---|
| | % Male | % Females | % Unknown | % Gray | % Black | % White | | |
| 1988–1989 | 38 | 62 | | 100 | 0 | 0 | | 13 |
| 1989–1990 | 71 | 29 | | 64 | 29 | 7 | 48 | 14 |
| 1990–1991 | 66 | 34 | | 83 | 13 | 3 | 82 | 30 |
| 1991–1992 | 67 | 28 | | 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 |

Table 3 Method and transportation percent of reported wolf harvest, Unit 26A, 1988–2002

| Regulatory | Method of take (%) | | | | Transportation method (%) | | | | Total reported |
|---|---|---|---|---|---|---|---|---|---|
| Year | Trap | Rifle | Snare | Unknown | Aircraft | Snogo | ORV | Boat/Skis | harvest |
| 1988–1989 | 15 | 85 | | | | 100 | | | 13 |
| 1989–1990 | 64 | 36 | | | 15 | 85 | | | 14 |
| 1990–1991 | 20 | 80 | | | 3 | 90 | 7 | | 30 |
| 1991–1992 | 39 | 61 | | | 6 | 94 | | | 18 |
| 1992–1993 | 30 | 63 | | 7 | 7 | 89 | 4 | | 29 |
| 1993–1994 | 33 | 66 | 1 | | 8 | 85 | 0 | 7 | 60 |
| 1994–1995 | 7 | 90 | 3 | | 28 | 72 | | | 47 |
| 1995–1996 | 21 | 74 | 5 | | | 95 | | 5 | 19 |
| 1996–1997 | 71 | 29 | | | 5 | 95 | | | 21 |
| 1997–1998 | 0 | 100 | | | 0 | 100 | | | 16 |
| 1998–1999 | 0 | 100 | 0 | | 13 | 87 | | | 15 |
| 1999-2000 | 0 | 63 | | 27 | 80 | 20 | | | 8 |
| 2000-2001 | 4 | 96 | 0 | | 7 | 86 | | 7 | 29 |
| 2001-2002 | 0 | 100 | 0 | | 0 | 100 | | | 16 |

Table 4 Chronology for reported wolf harvest in Unit 26A, 1988–2002

| Regulatory | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Unknown | Total |
| 1988–1989 | 1 | | | | 1 | | 2 | 9 | | | | 13 |
| 1989–1990 | | | | | 2 | 2 | 2 | 5 | | | | 14 |
| 1990–1991 | | 1 | | | 3 | | | 22 | 4 | | | 30 |
| 1991–1992 | | 1 | | | | 2 | 1 | 11 | 3 | | | 18 |
| 1992–1993 | 2 | | 1 | | 2 | | | 18 | 4 | | | 29 |
| 1993–1994 | 2 | 5 | | | 4 | 2 | 5 | 29 | 12 | | | 60 |
| 1994–1995 | 2 | 2 | | | 5 | 2 | 10 | 13 | 10 | | | 47 |
| 1995–1996 | 2 | 1 | 2 | 3 | | | | 11 | 1 | 3[1] | | 19 |
| 1996–1997 | 1 | | 1[1] | | 1 | 4 | 11 | 3 | | | | 21 |
| 1997–1998 | | | 3 | | 5 | 3 | 1 | 5 | | | | 16 |
| 1998–1999 | 1 | 1 | | | | | 4 | 5 | 3 | | | 15 |
| 1999-2000 | | 1 | | 2 | | | 3 | | | | 2 | 8 |
| 2000-2001 | 2 | | 2 | | | 1 | 9 | 8 | 4 | | | 29 |
| 2001-2002 | | | 2 | | 3[1] | | 7 | 4 | | | | 16 |
| | | 3 | | 2 | | | | | | | | |

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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