Area Specific Wolf Management Plan for South Central/ Interior Alaska

Alaska Department of Fish and Game
Division of Wildlife Conservation
1300 College Road
Fairbanks, Akaska 99701-1599

If you are interested in wolves and wolf management, please attend one of the

Area Specific Wolf Management Plan Public Workshops

ANCHORAGE
October 6, 1992
Fairview Recreation Center
10th and Karluk
7:00 pm

FAIRBANKS
October 8, 1992
Noel Wien Public Library
Airport and Cowles
7:00 pm

Fish and Game staff will explain the interim draft and ask for your concerns and suggestions.

We also encourage you to give the Board of Game your comments in writing at:

Division of Boards
P.O. Box 2556
Juneau, AK 99802-5526

or attend the Board meeting in Fairbanks beginning November 9 and testify to the Board in person. (The Board will accept written comments until October 13, 1992.)

If you have any questions or comments about this interim draft plan or the planning process, or if you would like someone from the department to attend your group's meeting to explain it, call Fish and Game and ask for a member of the wolf planning team in Anchorage at 267-2179 or in Fairbanks at 456-5156.

Thanks for being involved!

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Message to Readers:

If you have been involved with the wolf management planning process, it may seem there has been a lull in planning activities since the Alaska Board of Game's spring meeting. In fact, the Alaska Department of Fish & Game (ADF&G) has been busy organizing for the next step in the planning process. This publication is designed to bring you up to date.

History:

The Alaska Board of Game adopted the Strategic Wolf Management Plan at its November 1991 meeting. The Strategic Plan resulted largely from recommendations by a citizens' advisory group. This 12-member planning team represented a wide range of interests in wolves and held six monthly meetings to develop a consensus on their recommendations. ADF&G spent several months writing a draft Strategic Wolf Management Plan that incorporated the team's final report and concerns. The draft plan was published in a newspaper format and distributed for public review.

At its fall 1991 meeting, the Board spent several days listening to presentations from ADF&G and the citizen planning team. The Board had also received hundreds of letters from throughout Alaska and the rest of the country offering additional suggestions and advice.

The Board then invited several members of the public and ADF&G to sit as non-voting members of a committee of the whole. For the next week, the committee considered, word-by-word, the draft Strategic Plan. The draft was revised repeatedly to address concerns raised by members of the public. The Board approved the Strategic Wolf Management Plan in November 1991, and copies are available from ADF&G offices.

The goals of the Strategic Plan are:

1) To ensure the long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.

2) To 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's interests.

3) To increase public awareness and understanding of the uses, conservation and management of wolves, their prey and habitat in Alaska.

Not everyone agrees on if or how wolves and other wildlife and habitat should be managed. The Strategic Plan recognizes this and offers seven different kinds of management zones and what activities may occur within each zone. The zones range from total protection of wolves and their prey from hunting and trapping to high harvests of both wolves and prey. Adoption of the Strategic Plan was the first step of the planning process. The Strategic Plan provides the conceptual framework for wolf management. It does not include details of how wolves will be managed in specific areas. The next step is to develop area-specific plans, which include zone boundaries and classifications and must spell out how wolves, prey, other predators and people will be managed.

As outlined in the Strategic Plan, ADF&G began immediately working with the public, land owners and managers, and other agencies to begin developing two area-specific plans, one for Units 11, 13 and 14 in Southcentral, and one for Units 12, 20 and 25C in Interior Alaska (see Map 1). These planning areas were chosen because they represented a variety of the management zones outlined in the Strategic Plan and covered areas of highest human use. The public helped ADF&G develop the draft area-specific plans through a series of public meetings and workshops. In addition, ADF&G asked for information and comments from a number of individuals and organizations. Drafts were presented to the Board at its March 1992 meeting. (Plans for other parts of the state are currently being developed.)

The Board made some significant changes in the area-specific plans offered by ADF&G for the Southcentral and Interior planning areas and tentatively approved them as interim drafts. Revisions included:

- Changing the zoning for private and state land within Unit 11

The goals of the Strategic Wolf Management Plan are:

1) To ensure the long-term conservation of wolves.

2) To provide the broadest possible range of human uses and values of wolves and their prey populations.

3) To increase public awareness and understanding about wolves.

from 4 to 5.

• Changing a corridor along the Steese Highway in Unit 25C from Zone 6 to Zone 4.

• Designating the northwestern part of Unit 20E, the eastern part of 20B and the northern part of Unit 20D as Zone 7.

• Designating the eastern part of Unit 20E as Zone 5.

Those changes have been included in the following pages. In this publication, the Southcentral and Interior lans are presented in a single document.

Schedule:

This publication was scheduled for distribution in August. It was mailed to everyone we have been able to identify as interested in the planning process by mail, telephone or public testimony. The Board-requested draft implementation plans were published in August in the regulations proposal booklet for the Board meeting.

We are eager to meet with groups and individuals to discuss these draft area-specific plans, draft implementation plans or the planning process in general. Please call us and we will meet with your group, or you can stop by our office. We will hold public workshops in Anchorage on October 6 and Fairbanks on October 8 to review these drafts with the public.

It may be helpful for you to read the glossary of terms in Appendix V before you begin reading the text.

Final action on this interim draft is scheduled for the Alaska Board of Game's November 1992 meeting. The meeting will begin November 9 in Fairbanks. Public testimony on wolf management issues will be accepted. This interim draft area-specific plan for Units 11-14, 20, and 25C will be presented to the Board, along with first drafts of 3 new area-specific management plans for Units 1-6, Units 19 and 21, and Unit 26.

What You Can Do:

Please read this publication carefully. Although we tried hard to cut it down to the essentials, it still is a lengthy document. It may be helpful for you to read the glossary of terms in Appendix V before you begin reading the text.

If you have questions, don't hesitate to call a member of the ADF&G wolf planning teams in Anchorage or Fairbanks, or invite us to one of your group's meetings. Our numbers are listed in a box on this page. We can also provide you with a copy of the Strategic Wolf Management Plan if you don't already have one.

Plan to attend one of the October workshops.

If you can't attend the fall meeting of the Alaska Board of Game, don't hesitate to write to the Board to express your views. Alaska Board of Game, Box 25526, Juneau, AK 99802. If your written comments reach Juneau by October 26, they will be included in the information packets given to each member before the meeting starts. Comments received after that date will be given to Board members as they are received.

If you feel more comfortable voicing your views rather than writing them, call a planning team member. Those views will be conveyed to the Board at their meeting.

Whatever approach you prefer, please participate. A public planning process like this one is only effective if people participate. Wolf management planning is crucial to the future of Alaska's wildlife. Be a part of it!

What is in this Plan?

This area-specific plan includes: plans and suggestions for nonconsumptive uses of wolves; a summary of public involvement; the Southcentral Alaska plan and the Interior Plan, each of which contain a description of the plan area; wildlife resources, human uses and past management; proposed management with accompanying tables. Several appendices are attached with more information. Alternative population and harvest objectives are listed in Appendix I. Draft implementation plans are included in Appendix II. Biological and management basis for wolf control is described in Appendix III. Major issues identified and addressed during the planning process are listed in Appendix IV. Definitions of planning terms are included in Appendix V, and a bibliography of predator/prey literature is offered in Appendix VI.

This interim draft has evolved as ADF&G has worked with the public, and is likely to change more before it is finished. We hope you will work with us to improve it.

Plans and Suggestions for Nonconsumptive Uses of Wolves: The Board asked ADF&G to explore several options for nonconsumptive uses. We are continuing to do so. Nonconsumptive uses

were identified as important in many areas and were considered when the plan was drafted. However, since we haven't collected any data about numbers of nonconsumptive users, locations, etc., objectives for nonconsumptive use are not listed in the proposed management tables.

Public Involvement Summary: How the public has been involved is summarized in a flow chart in this section.

Description of Plan Area: A description of the geographic area in the Southcentral and Interior plan areas is included.

Wildlife Resources, Human Uses and Past Management: These sections give information for Units 11-14, and 20 & 25C. For most species, information is given on natural history, populations, management objectives, harvest goals and whether the management objectives are being met. More detail is available for some species and areas than others. In some cases there are specific data, while in others little is known about the species or area. As more information is gathered, Area-Specific Management Plans may need to be amended.

Proposed Management and Tables: In this section, we describe the priorities for some key wildlife species that we heard during the planning process. The zones proposed in this draft plan are shown on Map 2 (page 8_). Tables 1 and 5 show how the proposed zones would compare with current management. The text describes the expected results of applying the proposed zoning scheme.

In some cases, restrictions on uses that can occur on federal lands limit management flexibility. For example, federal law prohibits all hunting and trapping in the original Denali National Park. As a result, this area can only be designated as Zone 1. On the other hand, federal law guarantees subsistence hunting and trapping in the extension to Denali National Park and Preserve, Yukon-Charley Rivers National Preserve and the Wrangell-St. Elias National Park and Preserve. Therefore, management in these areas can be no more restrictive than Zone 3. For a description of what each of the seven zones entails, please refer to the Strategic Plan.

We encountered some difficulty in applying the zones the Board of Game approved in the Strategic Plan because the seven zones do not cover all situations in Alaska. Zones 3-7 link human use and management intensity. In the real world, some intensively used areas do not require intensive management, and vice versa. Also, use and management intensity regarding wolves could be different than those for other wildlife species in the area. For example, human use of caribou can be high while use of wolves is low. After reviewing the Strategic Plan and considering the Board's intent when it was adopted, we concluded that zone definitions were intended to mainly reflect intensity pf management for wolves. Zone designations in this interim draft usually reflect similar use and management intensities for wolves and prey, but not always. In areas where human use or management goals differ between wolves and prey, the zone designation will be directed towards wolf management intensity rather than prey management intensity or human uses of wolves and prey.

Alternative Population and Harvest Objectives: (Appendix I) At the Spring 1992 meeting, the Board tentatively approved population and harvest objectives for major game species in parts of the plan area (Tables 2-4 and 6-16). In the proposed management section, we describe the management strategies that will be needed to achieve those objectives and the expected results.

During testimony before the Board, concerns were voiced that enough time had not been allowed for adequate public review of, and participation in, the planning process. The Board directed ADF&G to work with the public to make sure we understand the direction the public wants us to take, especially in areas which are tentatively proposed for wolf control. To do this, we have prepared several alternatives to the tentatively approved population and harvest objectives. The alternatives are included in Appendix I.

Draft Implementation Plans and Options: (Appendix II) Wolf

This Plan Includes:
- **Summary of public involvement**
- **Plans and suggestions for nonconsumptive uses of wolves**
- **Description of the plan area**
- **Wildlife resources, human uses and past management**
- **Proposed management with accompanying tables**

control programs can be considered in areas Zoned as 5, 6 or 7, but the Board must adopt Implementation Plans authorizing wolf control programs before wolf numbers could be regulated or reduced. In March, the Board directed ADF&G to draft implementation plans based on the tentatively approved interim draft Area-Specific Plans. These are included in Appendix II. Because the population and harvest objectives haven't been finalized, each draft implementation plan includes several options. Projected results of each implementation option are included in Tables 3 and 6-9. Once the population and harvest objectives are finalized and the area-specific plans are approved, the Board may adopt implementation plan(s) they feel to be appropriate.

Plans and Suggestions for Nonconsumptive Uses of Wolves

Several programs are being considered to help people learn more about wolves and enjoy them in ways other than by hunting and trapping them.

Commercial flight-seeing of radio-collared wolf packs is possible, and would provide a reliable opportunity to see wolves in the wild. A market for this activity probably exists, but developing the program may present some problems. Some people say that radio-collaring and subsequent flight-seeing would amount to harassing wolves and would diminish the quality of Alaska's wilderness. Other people fear that hunting and trapping opportunities may be lost if wolves associated with flight-seeing activities have to be protected. This activity is not currently legal. Regulations which require the department to keep radio collar frequencies confidential would have to be changed before commercial flight-seeing could be allowed.

Viewing programs at den sites could provide chances to see wolves in the wild. Once a pack left the den site for the season, people could be allowed to visit the denning area. There are several problems with this kind of program. The number of accessible den sites is limited. Disturbance could cause wolves to abandon a den. Providing personnel to supervise visitors would be expensive. Hunting and trapping opportunity could be lost because of demand for protection for those wolves.

Howling tours could provide inexpensive opportunities to hear wolves in the wild. Care would need to be taken to avoid attracting so many people that wolves abandon the area.

ADF&G has offered programs about wolf natural history and biology in Anchorage and Fairbanks. Education kits about wolves are being assembled and will be given to school districts.

Public Involvement

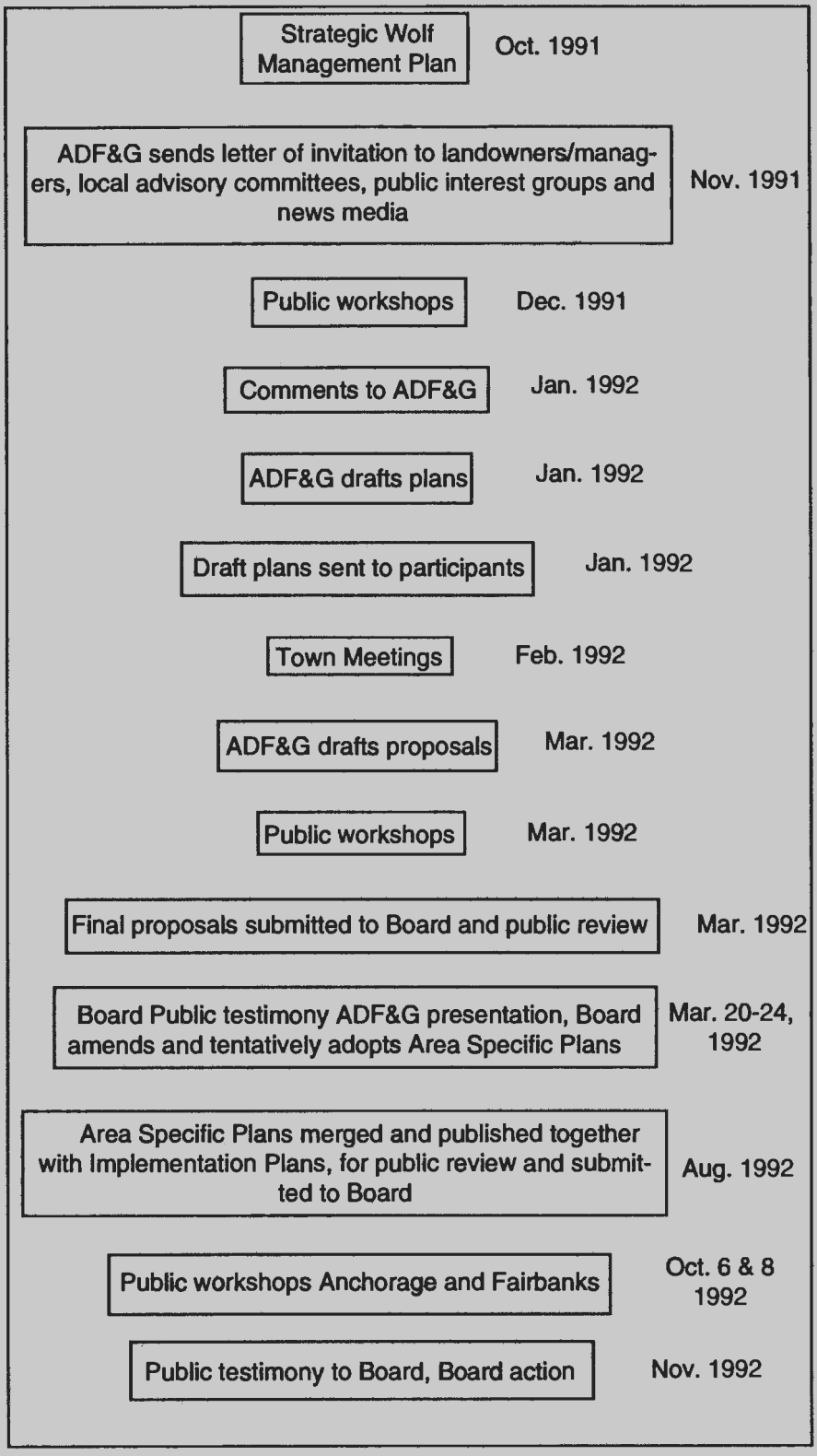
Public concerns have been incorporated into this plan throughout the process. When drafting this plan, ADF&G and the Board considered all interests, and all comments and suggestions received from the public, local fish and game advisory committees and land owners/managers. The values of people in small communities and rural areas were considered carefully along with those of people in large urban areas, so that those in the minority would not be over looked. Similarly, the interests of people with very different values were carefully considered in an attempt to provide for the full range of values.

It must be recognized that no plan can please every individual. Our goal is to produce a plan that will provide for the values of all people somewhere in Alaska. Public participation has been vital to the development of both the Strategic Plan and this area-specific plan. ADF&G remains committed to working with the public in developing this and future area - specific plans.

Appendices:

I. Alternative management objectives.
II. Draft implementation plans.
III. Biological and management basis for wolf control.
IV. Major issues identified and addressed during the planning process .
V. Definitions of planning terms.

This diagram outlines the steps used to develop this area-specific plan:



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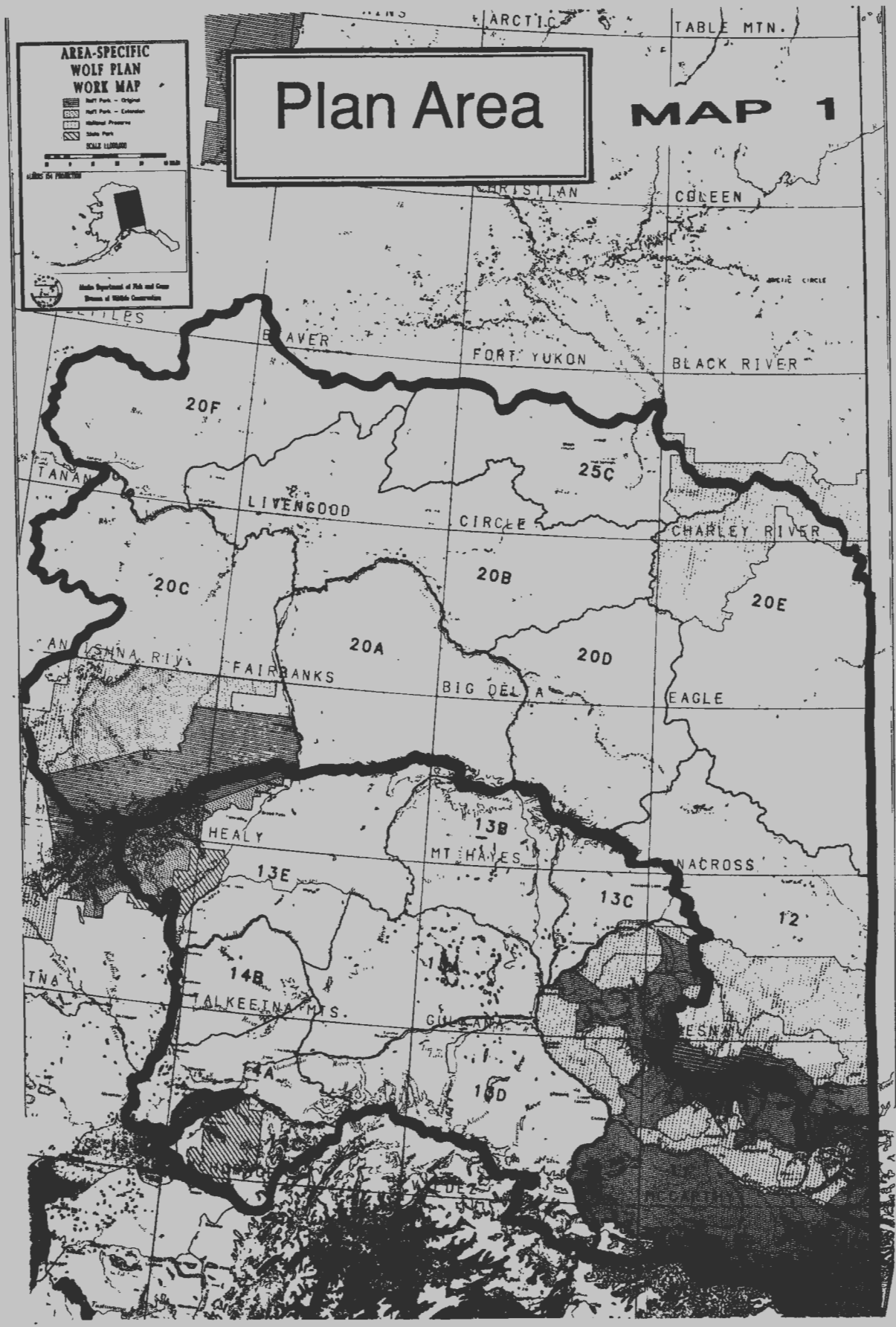
AREA-SPECIFIC
WOLF PLAN
WORK MAP
Plan Area
MAP 1
ARCTIC
TABLE MTN.
CHRISTIAN
COLEEN
ARCTIC CIRCLE
BEAVER
FORT YUKON
BLACK RIVER
20F
25C
TANANA
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FAIRBANKS
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14B
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GULKANA
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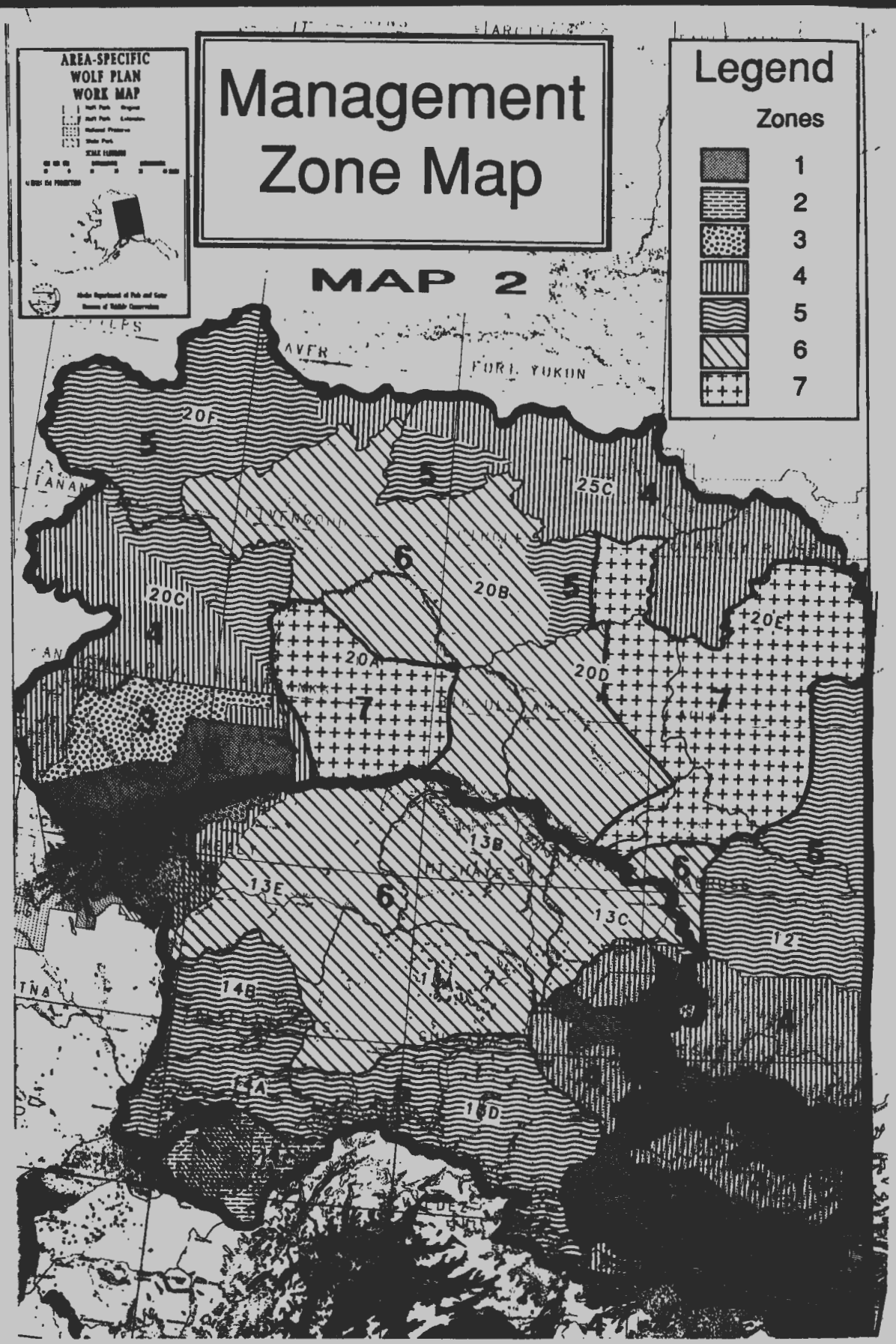
AREA-SPECIFIC
WOLF PLAN
WORK MAP
Management
Zone Map
MAP 2
Legend
Zones
1
2
3
4
5
6
7
FORT YUKON
20F
25C
20C
20B
20A
20D
20E
13B
13E
13C
14B
14A
18D
12

Southcentral (see Map 1 for unit boundaries) - Units 11, 13 and 14 .

Description of Plan Area

Unit 11: Unit 11 (12,872 square miles) is comprised of the southern Wrangell Mountains, a portion of the eastern Chugach Mountains and eastern drainages of the Copper River. The unit is dominated by the Wrangell Mountains, comprising about 80 percent of the total area, with peaks reaching over 16,000 ft. About 30 percent of the unit is covered by glaciers and nearly 60 percent of the unit is above 4000 ft elevation with little vegetation. The valleys, foothills, and well-drained lowlands support stands of white spruce, birch, cottonwood, and aspen. Wet lowlands are forested with black spruce and have numerous ponds and muskegs. River bars and streambeds contain extensive stands of willow and other shrubs. Dwarf birch and willow dominate the area immediately above timberline. Above the shrub zone is alpine tundra dominated by dwarf heath.

Approximately 90 percent of Unit 11 is within the Wrangell-St. Elias National Park and Preserve. Of land below 4000 ft elevation (primary wildlife habitat), about 76 percent is within the Park and Preserve. Subsistence hunting and trapping in the Park are limited to local residents, while general hunting and trapping are allowed in the Preserve. Native conveyed lands comprise about 7 percent of Unit 11 while another 7 percent has been selected but not conveyed. About 1 percent of the unit is state land and 0.5 percent is in non-native, private ownership. The area has few roads; only the Nabesna and McCarthy roads and some primitive mining roads penetrate the unit. Few people actually reside in Unit 11, probably less than 200 total. McCarthy, with a population of about 25, is the largest settlement.

The overall management goal for Unit 11 is to conserve all populations of wildlife; to manage for "natural" populations which are regulated primarily by natural environmental factors with a strong emphasis on nonconsumptive uses; to allow limited recreational hunting, under aesthetically pleasing conditions, and trapping when it will not adversely impact populations; to provide for bona fide subsistence needs.

Unit 13: This unit (23,376 square miles) is generally bounded by the Alaska Range, the Talkeetna Mountains, and Chugach Mountains, and the Copper River. The unit is essentially a large basin drained by the Matanuska, Susitna, Copper, Nenana, and Delta Rivers. About 31 percent of the area is above 4000 ft. elevation and is considered to be poor year-round wildlife habitat. Habitats include bare rock, glaciers, and snowfields in the mountains and dense spruce forests interspersed with lakes, ponds and muskegs in the lowlands. Intermediate habitats, important to wildlife, include alpine tundra and shrub lands. Wildfires create and maintain seral vegetation important to wildlife. No major fires have occurred in Unit 13 within the last 35 years due primarily to government-sponsored fire suppression. The unit is bisected by the trans-Alaska oil pipeline.

Major land owners/managers in Unit 13 include the State of Alaska, Bureau of Land Management, National Park Service, Matanuska-Susitna Borough and Native corporations. Denali State Park and Denali National Park comprise about 7 percent of the total acreage of the unit. The human population of Unit 13 is about 2750. Most residents (60 percent) live in the Glennallen-Copper Center-Kenney Lake area. While much of the area is remote and roadless, it is crossed by four major highways; the Denali, Glenn, Parks, and Richardson and is readily accessible from the major population centers in southcentral and interior Alaska. Many remote areas are accessible by all-terrain vehicles, snowmachines, or light aircraft.

The overall management goal for Unit 13 is to conserve all populations of wildlife; to produce high yields of caribou and moose for people and to provide the maximum opportunity to participate in hunting for these species; to provide a broad spectrum of uses of all wildlife populations.

Unit 14: Unit 14 (6625 square miles) includes the upper Cook Inlet area extending from the head of Turnagain Arm to Talkeetna. It is bounded by the Susitna, Talkeetna, and Chickaloon Rivers, Knik Arm, Turnagain Arm, Twentymile River, and Prince William Sound drainages. Unit 14 is subdivided into three subunits: 14A (2561 square miles) - the Matanuska Valley from the Knik River to Willow; 14B (2152 square miles) - the western Talkeetna Mountains from Willow to Talkeetna; and 14C (1912 square

Not everyone agrees how or if wolves should be managed. The Strategic Wolf Management Plan offers seven different kinds of management zones to provide for all values somewhere in the state

miles) - the greater Anchorage area from Knik River to Portage Creek drainage. The unit contains portions of two mountain ranges, the Chugach and Talkeetna Mountains. Major rivers, including Twentymile, Eagle, Eklutna, Knik, Matanuska, Little Susitna, Kashwitna, Talkeetna, Chickaloon, and many smaller streams, drain these mountain ranges. Valleys, foothills and well-drained lowlands support forests of white spruce, birch, aspen, and cottonwood. Wet lowlands are forested with black spruce and have numerous lakes, ponds, and muskegs. Shrub lands and alpine tundra are found above timberline. Glaciers, snowfields, and bare rock dominate higher elevations in both the Chugach and Talkeetna Mountains. Logging, clearing for agriculture and other human activities have created favorable moose habitat in many areas.

Much of the land in Unit 14 was transferred to private ownership through homesteading. Other major land owners/managers are the State of Alaska including Chugach State Park, Matanuska-Susitna Borough, Municipality of Anchorage, U.S. Army and Air Force, U.S. Forest Service, and Native corporations. Unit 14 is the most highly developed and populous area of the State with about 265,000 residents, nearly half of the State's total population. Most of these, 226,000, live in the greater Anchorage area. The Matanuska-Susitna Valley is the state's agricultural center. Much of the unit is accessible through a network of roads, however a great deal of the backcountry still might be considered wilderness.

The overall management goal for Unit 14 is to conserve all populations of wildlife. The goals for Units 14A and 14B are to produce high yields of moose for people and to provide maximum opportunity to participate in hunting for moose; to allow hunting of other wildlife populations while ensuring their perpetuation in face of increasing human populations and development; to provide opportunities for viewing and other nonconsumptive uses of wildlife. The goals for Unit 14C are to provide opportunities for viewing and other nonconsumptive uses of wildlife, and to provide opportunities to hunt abundant species in a way that minimizes conflicts with nonconsumptive uses.

Wildlife Resources, Human Uses and Past Management

Wolves

Wolf populations have been monitored in Units 11, 13, and 14 by aerial surveys during winter, opportunistic field observations, reports from the public, and through trapper questionnaires. Harvest data were obtained through a mandatory pelt sealing program in which information on numbers taken, location, date, method of take, and pack size is recorded. This program has been in place since 1971. Prior harvest data were obtained from bounty records, aerial permit reports, and fur buyer and export reports.

Unit 11: Wolf numbers in Unit 11 were very low in the mid-1950s following an extensive, federal wolf control program. The population grew after conclusion of the control program in 1953. In recent years the wolf population has averaged about 100 animals, post-harvest, in recent years. This equates to a relatively high density of one wolf per 128 square mile or one wolf per 52 square miles of area below 4000 ft elevation. Fall population estimates have averaged about 135 wolves in recent years. Reported annual harvests have averaged 25 wolves over the past five years with about 70 percent taken by trappers. Snowmachines (57 percent) and aircraft (25 percent) were the primary means of transportation for wolf hunters and trappers.

Wolves are thought to be abundant and further growth in the population probably will be limited by habitat and prey numbers. Dispersal of wolves into suitable habitat in Unit 13 where prey are more abundant is thought to occur. We expect wolf abundance to remain fairly high in Unit 11 in the near future. Most of the area is in National Park Service ownership and wildlife will be minimally managed. It is possible that caribou and moose populations may eventually decline to levels that will not support current wolf numbers. Such levels fall within the Park Service mandate of managing for "natural populations." The current population objective for Unit 11 is to maintain a post-hunting and trapping season population of at least 75 wolves. Currently the Unit 11 wolf population is well above the minimum population objective. 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.

Since statehood, wolf management in the unit has included wolf hunting and trapping. Aerial shooting was a legal method of harvest through 1971-72. Since then land-and-shoot hunting and trapping has occurred on an intermittent basis and during most years did not contribute substantially to the total harvest. When Wrangell-St. Elias National Park and Preserve were created in 1980, hunting and trapping of wolves on parklands was closed to all but local subsistence users. In 1990 the federal government banned land-and-shoot wolf hunting and trapping on all park and preserve lands. These lands com-

prise about 90 percent of Unit 11 thus nearly eliminating land-and-shoot hunting in the unit. Ground trapping has been the major method of harvest. Harvest apparently has not been limiting population size in recent years.

Unit 13: Wolf abundance in Unit 13 was very low in the mid-1950s because of federal wolf control activities conducted between 1948 and 1953. The population recovered rapidly after wolf control stopped and the season was closed. Wolf populations in Unit 13 peaked in the mid-1960s, mid-1970s, and again in the early-1990s. The population has fluctuated substantially in recent years with spring estimates ranging from 109 in 1982, to 285 in 1990. The 1991 spring estimate was 242; the fall estimate was 414. The spring estimate equates to an overall density of one wolf per 97 square miles or one wolf per 67 square miles of area below 4000 feet elevation. Annual wolf harvest over the past five years has averaged 91 animals. Trappers reported taking an average of 36 wolves each year during the same period. Aircraft (46 percent) and snowmachines (31 percent) were the primary means of transportation for successful wolf hunters and trappers over the past five years.

Hunting and trapping has been the primary factor controlling wolf abundance in Unit 13 in recent years. Future wolf abundance will largely depend on the level of harvest by human if prey species remain abundant. Currently, the Unit 13 wolf population exceeds the population objective of 150-200 wolves, distributed proportionally between subunits at the end of hunting and trapping seasons. The human use objective is to harvest as necessary to maintain the population at the objective level with normal hunting and trapping being the preferred methods of take; annual harvests will normally range between 50 and 150 wolves.

Hunting and trapping seasons were reestablished in 1965. Since then the wolf population has been regulated at levels below that which the prey base could support. Both aerial shooting and land-and-shoot trapping and hunting played major roles in regulating wolf abundance. Wolf population reduction by ADF&G personnel was conducted experimentally from 1976 through 1978 in a small portion of the unit to determine the effects of reduced wolf densities on moose survival.

Unit 14: Wolves have not been particularly abundant in Unit 14 since the federal predator control programs of the late-1940s and early-1950s reduced wolf populations. Disturbance and loss of habitat caused by human development and increasing numbers of people living in the Anchorage area and along the highway system in the Matanuska and Susitna valleys are probably responsible for wolf numbers remaining low in much of the area. The current estimate is 50-60 wolves in Unit 14, based on incidental observations and responses to a trapper questionnaire. This equates to an overall density of one wolf per 120 square miles or one wolf per 84 square miles for the area below 4000 ft elevation. Unit 14C probably has about 20 wolves and 14A and 14B combined about 30-40. Because wolf harvest in Unit 14 is low, systematic surveys are not conducted and precise estimates are not available.

Harvests over the past five years have averaged two wolves per year. Trappers accounted for just over half of the harvest. Wolf hunters and trappers reported using a wide variety of transportation including aircraft, snowshoes, boats, 3-wheelers, snowmachines, ORVs, and highway vehicles.

It is unlikely wolves will ever be abundant in the unit due to extensive human development. The population objective is to maintain a minimum unit-wide population of 55 wolves with about 35 in 14A and 14B combined, and 20 in 14C. These objectives are probably being achieved. The human use objective for 14A and 14B is to allow low levels of human harvest by hunting and trapping as long as it does not conflict with maintaining the population objective. For 14C, the human use objective is to provide for nonconsumptive uses such as viewing, photography, listening, and the knowledge that wolves are present in the area.

After statehood, the hunting and trapping seasons were closed in the northern portion of the unit until 1965. Some wolves were taken by aerial shooting and land-and-shoot hunting and trapping through 1985-86. Harvests since then have been limited to ground hunting and trapping. Much of Unit 14C has been closed to the taking of wolves since 1973.

Brown Bear

Brown bear harvest data were obtained through a mandatory skull and hide sealing program which began at statehood. Data on abundance were usually obtained through opportunistic observations made during other field work although censuses have been conducted in portions of Unit 13. It is was thought that regional brown bear abundance was reduced by

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ingestion of poison baits during the federal wolf control program conducted from 1948 -1953.

Unit 11: An abundant brown bear population appears to be distributed throughout Unit 11. Bears eat berries and salmon extensively during late-summer and fall. Brown bears also prey upon caribou and moose, particularly calves. Overall, Unit 11 has high-quality brown bear habitat with a variety of vegetation types, large tracts of undeveloped land, low human population, and many salmon streams throughout the unit. Most of Unit 11 brown bear habitat is within Wrangell-St. Elias National Park and Preserve where habitat loss should be minimal.

Brown bear harvests in the past five years have been low, averaging eight bears per year comprised of 63 percent males. This level of harvest is not thought to have an impact on the size of the brown bear population.

The brown bear population in Unit 11 should remain high because management intensity and harvests are expected to stay low and habitat is protected. The population objective is to maintain a population largely unaffected by human harvest. 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; annual harvests to average less than 20 bears/year.

In Unit 11 management over the past 12 years has largely followed the Park Service mandate of managing for "natural and healthy" populations. Management and harvest intensity have been low with harvests averaging only about half of those prior to establishment of Wrangell-St. Elias Park and Preserve.

Unit 13: Brown bears in Unit 13 were probably reduced to low numbers by the mid-1950s, a result of a federal wolf control program that included the use of nonselective poison baits. When this program was discontinued, the population recovered and brown bears were considered numerous by the mid-to-late-1970s. During this period, the brown bear population in Unit 13 was approximately 1200 bears. Population growth ceased about 1980, as bear hunting increased. Since 1980, evidence suggests bear numbers have declined in the more accessible, heavily-hunted portions of the unit. It now appears there are about 800-1000 bears in Unit 13. Bears have access to salmon in portions of the unit, however, most rely on berries and other vegetation, as well as killing caribou and moose, and scavenging carcasses for food.

Average annual harvests for the periods 1961-69, 1970-79, and 1980-90 were 39, 58, and 99 brown bears, respectively. Exceptionally high harvests averaged 133 between 1983 and 1986, when seasons were lengthened and the bag limit was increased to one bear every year. More restrictive hunting regulations between 1987 and 1990, lowered the average annual harvest to 83 bears. At the current population level, the annual sustainable harvest of brown bears in Unit 13 is 70 bears. If the harvest remains above this level, the population will most likely continue to decline.

There are a substantial number of remote mines, cabins, and homesites in Unit 13. Residents of these sites occasionally experience conflicts with bears and some animals are killed in defense of life or property. Problems often occur because of improper garbage disposal and food storage. These encounters have developed into a substantial mortality factor for bear populations associated with these sites. Continuing settlement of rural areas in Unit 13 is expected to affect the brown bear population negatively.

The management objective for the unit is to maintain a population of between 600 and 1200 bears. The annual sustainable harvest level has been exceeded in recent years, however, the population is probably within the population objective. The human use objective is to maintain an average annual harvest of less than 25 females with an overall average harvest of less than 75 bears beginning in 1992; if seasons need to be additionally restricted, preference will be given to hunters specifically hunting for brown bears over opportunistic hunters primarily in the field for ungulates.

In Unit 13 brown bear harvests and management intensity was low prior to 1980. Seasons and bag limits were liberalized during the early-1980s in response to high bear density and in an attempt to reduce bear predation on moose calves. Harvest of brown bears increased and the population apparently was reduced. In the late-1980s seasons and bag limits became more restrictive in an attempt to stabilize the population.

Unit 14: Brown bear distribution and abundance in Unit 14 has been adversely affected by loss of habitat due to expanding cities, agricultural development, and settlement in remote areas. Much of the brown bear habitat in Unit 14, including many salmon streams, has been degraded by human development and activity. While brown bears are common in remote portions of the unit, they are only occasionally seen in the more populated regions. We estimate there are between 150 and

200 bears in Unit 14A and 14B. A conservative estimate for Unit 14C is 30-40 bears, based on observations during sheep and goat surveys.

The average annual harvest in Unit 14 over the past five years was 12 bears. Most of Unit 14C is closed to brown bear hunting.

Brown bears will likely persist in Unit 14 as long as there are large undeveloped areas such as Chugach State Park and portions of the Talkeetna and Chugach Mountain ranges. However, brown bears will become less abundant as the human population increases. Humans are often intolerant of brown bears in urban areas and see them as a threat. The population objective for Unit 14 is to maintain a population of at least 150 bears in the face of increasing human population and development. This objective is being met.

The human use objective for 14A and 14B is to provide for low levels of human harvest by hunting as long as it does not conflict with maintaining the population objective; average annual harvests (including defense of life or property kills) should not exceed eight bears with at least 60 percent males. The primary human use objective for 14C is to provide for nonconsumptive uses such as viewing, photography, and the knowledge that brown bears are present in the area; limited human harvests are allowed in select areas; average annual harvests (including defense of life or property kills) should not exceed three bears).

Brown bear management in Unit 14 has not been intensive although harvests have probably been near or above sustainable levels. Recent management action reduced season length in order to decrease the harvest slightly.

Black Bear

Unit 11: Black bears are numerous in those portions of Unit 11 where suitable forested habitat occurs. The lower Chitina River valley, where salmon are available, has high bear densities. The majority of bear habitat is in protective land status and should benefit bear populations in the future.

Hunters killed 14 black bears (64 percent males) during the 1990-91 season, four more than the 5-year average of 10 bears a year. Males averaged 71 percent of the harvest during the past five years. Only subsistence hunting is allowed in Wrangell-St. Elias National Park. Access by aircraft is not permitted in the Park but is within the Preserve.

The objective for Unit 11 is to maintain a black bear population largely unaffected by human harvest. 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; annual harvests to average less than 20 bears/year.

Unit 13: Black bears occur in moderate numbers in Units 13D and 13E, areas of prime forested habitat.

Hunters reported killing 88 black bears (80 percent male) in the 1990-91 season. Average annual harvests, however, have increased from 62 between 1970-79, to 80 between 1981-90. The average annual harvest for the past five years was 78 animals. Males averaged over 65 percent of the harvest in the past five years. Units 13D and 13E account for 88 percent of the unit harvest. No changes in abundance are anticipated in Unit 13. The population objective for Unit 13 is to maintain a black bear population of a size that is largely unaffected by human harvest. The human use objective is to provide liberal opportunities to hunt black bears; annual harvests to average less than 125 bears.

Unit 14: Black bears are a common species throughout Unit 14. They tolerate people and development more readily than brown bears. There are an estimated 1200 black bears in the unit with the largest number occurring in Unit 14A. Black bears are usually found in forested habitat although they sometimes use subalpine areas, particularly during late-summer and fall.

The average annual harvest for the past five-years is 107 bears, about 60 percent of the harvest occurs in 14A and 20 percent each in 14B and 14C. There is concern that harvests, particularly in 14A, are exceeding sustainable yield and more restrictive regulations have been imposed. The population objective for Unit 14 is to maintain a black bear population of a size that appears largely unaffected by human harvest. The human use objective is to provide liberal opportunities to hunt black bears with annual average harvests of less than 80 bears. The population objective is not being met in 14A and the Board passed a more restrictive hunting season in spring 1992 to address this concern.

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Caribou

Mentasta Herd:The Mentasta Caribou herd calves, summers, and often winters in Unit 11, largely in Wrangell-St. Elias National Park and Preserve. The core range of the Mentasta Herd is the western flank of Mount Sanford between the Sanford River and Drop Creek, where most calving occurs. During the past several years, the herd has wintered north of the Mentasta Mountains in Unit 12. Historically, this is a small herd that reached peak size, about 3150, in the mid-1980s. Since then calf survival has been poor and the herd has declined in size.

The herd was estimated to be 1938 caribou in 1991.Calf recruitment was at an all time low with calves comprising only 1.5 percent of the herd in October 1991. Nearly all of the calves born in 1991 died, possibly related to a dry summer in 1990, which resulted in cows being in poor physical condition. Udder counts in the Mentasta Herd have indicated high pregnancy rates among cows. Calves have appeared healthy when born, but disappeared within six to eight weeks of calving. Similar patterns have been noted in cases where predation is limiting herd size.

Calf mortality studies have not been completed, but relatively high densities of predators (wolves and brown bears) are suspected to be one cause of chronically poor calf survival. Severe winters are not suspected because the Mentasta Herd recently has wintered with the Nelchina Herd, which has experienced high calf survival.

The state hunt for Mentasta herd caribou in Unit 11 was canceled in 1990 in response to declining herd size and low recrutment. A federally administered subsistence hunt in Unit 11 was closed in 1992. A few Mentasta caribou are killed incidentally in state and federal hunts targeted at abundant Nelchina caribou in Unit 12 during winter. In 1991, the harvest quota for Mentasta caribou was 50 bulls. The average annual harvest between 1983 and 1989 was 85 caribou.

We do not fully understand the causes of the Mentasta herd decline but suspect it is partially associated with high predator densities. Until the declining trend reverses, harvests should be limited to a very small number of bulls. The population objective for this herd is to attain a minimum fall population of 2000 adult caribou before allowing harvest under state regulation; and to maintain a minimum of 30 bulls: 100 cows. Herd size is below the population objective. It may be that our population objective is unrealistic considering the National Park Service mandate of managing for "natural populations." The human use objective is to allow limited human harvests when they do not conflict with management goals for the unit or population objectives for the herd. Only harvests of bulls would be allowed until the herd exceeds 2500 adult caribou, then limited cow harvests could be allowed, particularly for subsistence hunts.

Management of the Mentasta caribou herd has been directed at providing hunting opportunity under aesthetically pleasing conditions. A reduced population has resulted in progressive restrictions on hunting; currently no hunting occurs.

Nelchina Herd: The Nelchina Caribou herd calves and summers in Unit 13 although a few animals range into Unit 14B. Nelchina animals winter in Units 11, 12, 13, and 14. Much of the herd has wintered in Unit 12 during the past few years. The core of the Nelchina range is the foothills of the northeastern Talkeetna Mountains between Tsisi Creek and the Little Oshetna River, where most calving occurs. The Nelchina is a medium-sized herd that has ranged between 10,000 and 71,000 caribou over the past 30 years. The herd reached peak size in the early to mid-1960s and then declined to 10,000 animals in the early-1970s. Since then the herd has steadily grown to its current size of 45,000 caribou, because of high recruitment. During fall counts over the past 10 years calves have averaged 22 percent of the herd.

The Nelchina herd has been particularly important to hunters and wildlife viewers because of its accessibility and proximity to Anchorage and Fairbanks. Between 1954 and 1991 about 116,000 animals were killed by hunters. Over the past five years the average annual harvest has been 1873 animals. Nelchina caribou are currently harvested in state and federal hunts in both Units 12 and 13. Small numbers are also taken when Nelchina animals migrate into Canada. The Unit 13/14B harvest quota for regulatory year 1992-93 is 4000 caribou. There is concern nutritional constraints will affect population dynamics of the herd if it becomes too large. Although a few Nelchina caribou range into Unit 14A and occasionally into 14C, caribou hunting is not allowed in these Units.

The population objective is to stabilize the herd at about 40,000 total animals in 1992 with a minimum of 40 bulls/100 cows and 40 calves/100 cows; and to maintain 1990-92 levels of animal growth and condition. Herd size and the bull: cow ratio presently exceed population objectives. The human use objective is to maintain an average annual human harvest of 4000 caribou beginning in 1992.

Since the early-1970s, when the Nelchina herd was severely depressed, management objectives for the Nelchina Caribou herd have been to limit harvest to allow herd growth. The population objective was to reach 30,000 adult animals and a minimum post-hunting season ratio of at least 35 bulls:100 cows. The population objective has recently been exceeded and harvest objectives are now to maintain or slightly reduce herd size.

Moose

Unit 11: Moose habitat in Unit 11 is quite limited. Only 41 percent (5220 square miles) of the unit is below 4000 ft. elevation. While accurate estimates are not available, an estimated 2000 moose inhabit Unit 11. This equates to an overall density of 0.15 moose per square mile or 0.4 moose per square mile of area below 4000 ft. Compared to other areas in southcentral Alaska this is a low density moose population. Moose numbers peaked in Unit 11 in the early-1960s following federal wolf control programs. Moose numbers declined through 1979, then increased until the late-1980s. Since then, moose numbers have been stable or have declined slightly. Calf survival over the past 10 years has been low with an average of 10 percent calves in the fall population. This may reflect high predator abundance in the unit although severe winters in the late-1980s may have had an effect.

Moose in Unit 11 are harvested in both a federal subsistence season and a state general season. Annual harvests averaged 41 bulls between 1986 and 1990. This level of harvest is low because of limited access and low moose densities. We do not know if the moose population will increase if winter weather is favorable or if predation will limit population growth. Harvest should be limited to a few bulls considering the poor recruitment and low population density. The population objective for moose in Unit 11 is to maintain a population of at least 1000 moose with a post-hunting season sex ratio of 30 bulls:100 cows. The human use objective is to allow limited human harvests when they do not conflict with management goals for the unit or population objectives for moose.

Management objectives have been to allow limited harvest of bull moose and maintain a minimum ratio of 30 bulls:100 cows.

Unit 13: There are about 22,000 moose in Unit 13; an overall density of 0.9 moose per square mile or a density of 1.4 moose per square mile of area below 4000 ft. elevation. This is a relatively high-density moose population for interior habitats. Moose numbers in Unit 13 increased during the 1950s and peaked in the mid-1960s following federal wolf control. This was followed by a decline that continued through 1975. Moose numbers then increased until 1987 or 1988 when severe winters and high wolf densities contributed to another decline. Moose populations now appear comparable to levels observed in the early-1980s. Calf survival for the 10-year period, 1979-88, was reasonably high with calves averaging 18 percent of the fall population. Concurrent with increasing wolf numbers and severe winter weather, calf survival declined to 13 percent of the fall population from 1989 through 1991. Substantial additional mortality of calves occurred during winter throughout this period. During the past five years, the post-season sex ratio of adult bulls (older than two years old): 100 cows has averaged over 17 percent.

Annual moose harvests averaged 1011 for the five year period 1986-90, approximately 12 percent of the statewide total. During the past two years (1990-91) moose harvests have ranged between 500 and 600 animals, the result of more restrictive seasons that were mandated by low recruitment and declining moose numbers. It is unclear what to expect in the near future for the Unit 13 moose population. If wolf numbers are reduced and winter severity decreases, the population could recover to 1988 levels within several years. Population objectives in Unit 13 are to slightly increase the unit-wide population to about 25,000 moose by 1995 with a minimum of 25 bulls/100 cows, with a wide range of age classes (including a minimum of 10-15 bulls/100 cows older than yearlings), and a minimum of 25 calves/100 cows. Moose population size in Unit 13 is currently below the management objective. The human use objective is to achieve, and maintain an average annual harvest of at least 1300 moose by 1995; the harvest will include both sexes if appropriate to achieve the population objective.

In Unit 13 moose management has been intense because of the unit's accessibility to hunters and its nearness to population centers. In the past two decades harvest has been limited almost exclusively to bull moose. Because bull: cow ratios declined below acceptable levels antler size limits were placed on bull moose unit-wide in the early-1980s. During the mid-1980s further antler restrictions were added in part of the unit. Because of severe winters in the late-1980s

Wolves are not endangered or threatened in Alaska. Wolf poulations are present throughout their historic range in the state

and subsequent moose losses, seasons were severely curtailed in the early-1990s.

Unit 14: Moose are an important species in Unit 14; approximately 9800 moose occur in the unit. Overall density for the unit is 2.1 moose per square mile of area below 4000 elevation. Densities are particularly high in Unit 14A (see Table 4, page ____). Moose numbers in the unit were high in the late-1960s and then abruptly declined in the early-1970s, the result of two severe winters and large harvests. Populations gradually recovered, although deep snow in 1984-85 may have slightly reduced numbers. The winter of 1989-90 was especially severe, particularly in the northern portion of the unit, and moose numbers were reduced by about one-third in Unit 14B. Moose populations in Units 14A and 14C were not as severely affected, being reduced by 10-20 percent. Calf recruitment has been exceptionally good in Unit 14A where calves have averaged about 26 percent of the fall population. Since 1985, calves have averaged 16 percent and 23 percent of the fall population in 14B and 14C, respectively.

Since 1986 annual harvests in Unit 14 have averaged 862 moose, approximately 12 percent of the statewide harvest. Only Units 13 and 20 have consistently produced comparable moose harvests. 22 percent of the Unit 14 harvests were comprised of females

Mortality factors that appear to limit Unit 14 moose populations include severe winter weather, highway and railroad mortality, and hunter harvests. Loss of habitat is also an important limiting factor as the unit continues to be developed.

It is anticipated moose numbers will increase substantially in Unit 14B if winter weather conditions are mild. Large increases are not expected in Units 14A and 14C because moose populations are currently at high densities. Population objectives for Unit 14 are: 14A, to maintain a population of about 5000-5500 moose with a minimum sex ratio of 20 bulls/100 cows; 14B, to achieve, by 1995, and maintain a population of about 2500-2800 moose with a minimum sex ratio of 20 bulls/100 cows; 14C, to maintain a population of about 1800-2200 moose with a minimum sex ratio 25 bulls/100 cows. Currently, the population objectives are being met in Units 14A and 14C. The Unit 14B moose population is recovering from the severe winter of 1989-90. Human use objectives for Unit 14 moose are: 14A, to achieve and maintain an average annual human harvest of 600-700 moose by 1995; 14B, to achieve and maintain an average annual human harvest of 200-300 moose by 1997; 14C, to provide substantial opportunities to view moose and to maintain an average annual harvest of 200 moose.

Unit 14 has been intensively managed to provide for a high human use of moose. Management has included a substantial harvest of cows, habitat manipulation and efforts to reduce moose/vehicle accidents. In the southern portion of the unit management efforts have also promoted and provided viewing opportunities of moose. Hunting seasons were closed in the northern portion of the unit following the severe winter of 1989-90 and reduced in the remainder of the unit. Seasons have since been lengthened, however, they are still more restrictive than prior to 1989.

Mountain Goat

Unit 11: Mountain goats are found in the southern portion of Unit 11, in the Wrangell Mountains and the eastern Chugach Mountains. The northern most mountain goat range is not as high quality as the range farther south, and densities are generally low. Goat distribution is limited to specific areas of suitable habitat. Mountain goat habitat normally contains escape cover that is rocky, steep terrain often above 3000 ft. elevation. Winter ranges often contain steep, timbered hillsides.

There are about 400 goats in the Wrangell Mountains and about 300 in the Unit 11 portion of the Chugach Mountains. Kid recruitment for the period 1979-88 averaged a moderate 20 percent. Mountain goats are lightly harvested in Unit 11. Since 1986, annual harvests have averaged 19 goats. It is difficult to predict future population trends. Populations are influenced by deep snow and icing during winter, droughts in summer, and predation. The population objective for mountain goats in Unit 11 is to allow the population to fluctuate as dictated by natural environmental forces and to attempt to maintain a minimum pre-hunting season population of 500 animals. 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; annual harvests to average less than 6 percent of the population.

In Unit 11 mountain goat populations have not been intensively managed. Management objectives have been to maintain a pre-hunting season population of 500 goats allowing fluctuations to be largely dictated by natural environmental forces.

Unit 13: Mountain goats occur in Unit 13D in the Chugach Mountains. There are an estimated 150 animals in the unit. Occasionally an animal is observed in the Talkeetna

Mountains portion of Unit 13 and a small population (less than 20 goats) occurs in the Chulitna Mountains near Cantwell. These goat populations, like those in Unit 11, are on the periphery of suitable mountain goat range and occupy suboptimal habitat. Only Unit 13D animals are hunted; since 1987 the average annual harvest has been three goats. The future of mountain goats in Unit 13 depends largely on winter weather conditions. During the early-1970s, when deep snowfall occurred, goat numbers were greatly reduced. The population objective for Unit 13 mountain goats is to maintain viable populations within suitable habitat, which are controlled largely by natural factors, totaling a minimum of 100 animals. Currently, the objective is being met. The human use objective is to harvest up to 6 percent of the 13D population when it exceeds 100 animals while ensuring that local, accessible populations are not overharvested.

The goat hunting season in Unit 13 was closed from the mid-1970s until 1987 when a limited drawing permit hunt was established in the southern portion of the unit. Population objectives have been to maintain viable populations of goats in suitable habitat that are controlled primarily by natural environmental forces. Since the permit hunt was initiated, human use objectives are to harvest no more than 5 percent of the goats found in the southern portion of Unit 13.

Unit 14: Mountain goats occur primarily in the Chugach Mountains; limited numbers are also found in the Talkeetna Mountains. Approximate goat numbers by subunit are 550 in Unit 14C, 60 in 14A (south of the Matanuska River), and 40 in the Talkeetna Mountains portion of 14A and 14B. The Talkeetna Mountains are also in the northern mountain goat range and provide marginal habitat. The portion of Unit 14 north of the Matanuska River has been closed to hunting for the past three years. Goat harvests in the remainder of the unit have averaged 29 animals per year in recent years. The harvest has occurred mostly in the Lake George area. Given favorable weather conditions and low harvests, goats could increase somewhat in the Chugach Mountains portion of the unit. Goat habitat is marginal in the Talkeetna Mountains and it is unlikely the area will support a large goat population. The population objective for Unit 14 is to maintain viable populations within suitable habitat, which are controlled largely by natural factors, totaling a minimum of 100 goats in 14A and 14B combined and a minimum of 500 goats in 14C. The human use objective is to allow harvest of up to 6 percent of the population, outside of Chugach State Park, when it exceeds minimum population objectives.

Goat management in Unit 14 has been intensive and ranged from liberal seasons during the mid-1960s to restrictive drawing permit seasons during the late-1970s and early-1980s. Recently, goat seasons were liberalized to include registration permit hunts in the southern portion of the unit, but the northern portion has been closed since 1989. The population objective in the northern two-thirds of the unit has been to maintain a minimum of 100 goats. In the southern third of the unit the objective is to maintain a minimum population of 500 animals. Another objective is to allow population fluctuations to be dictated primarily by natural environmental forces.

Dall Sheep

Unit 11: The southern Wrangell Mountains and eastern Chugach Mountains provide substantial amounts of excellent sheep habitat in Unit 11. Most sheep (4000) occur in the Wrangells with lesser numbers (400) in the Chugach Range. Nearly all sheep habitat within the unit is in Wrangell-St. Elias National Park and Preserve. Subsistence hunting by local residents is allowed within the Park although aircraft cannot be used for hunting access to the Park. General and subsistence hunting are allowed within the Preserve and aircraft can be used for transportation. Harvests have averaged 124 animals in the past five years, and most of these were mature rams.

The sheep population is large and fluctuates because of weather conditions. Habitat in the Park and Preserve will remain protected. The population objective for Dall sheep in Unit 11 is to allow the population to fluctuate as dictated by natural environmental forces. The human use objective is to allow the opportunity to harvest mature rams as they are available in the population and to allow very limited harvests of other sex and age classes for bona fide subsistence use as long as it is not detrimental to the population.

Past management of Dall sheep in Unit 11 was to provide maximum opportunity to hunters to harvest mature rams. In 1989 the bag limit was liberalized to allow any sheep to be taken by local Unit residents.

The Proposed Management section for the Interior (Units 12, 20, and 25C) part of this plan begins on page 25.

During 1990 the season was further liberalized to allow any sheep to be taken by any Alaskan resident. The population objective is to allow the sheep population to fluctuate as dictated by natural environmental forces.

Unit 13: Approximately 1900 Dall sheep inhabit the Chugach Mountains, 1150 sheep occur in the Talkeetna Mountains, 500 sheep live in the Chulitna Mountains, and 200 sheep occupy the Watana Hills. Annual harvests have averaged 158 rams for the past five years. Hunting regulations limit the harvest to adult rams. The population objective for Dall sheep in Unit 13 is to allow the population to fluctuate as dictated by natural environmental forces, primarily climate and food availability. The human use objective is to harvest mature rams.

In Unit 13 the human use objective has been to allow the maximum opportunity to harvest full curl rams as they are available in the population. The population objective has been to allow the sheep population to fluctuate as dictated by natural forces.

Unit 14: Dall sheep are found in both the Chugach and Talkeetna Mountains. About 3100 sheep occur in the Chugach portion of the unit; 700 in Unit 14A and 2400 in Unit 14C. Approximately 1050 sheep are found in the Talkeetna portion of the unit; 700 occur in Unit 14A and 350 inhabit Unit 14B. Average annual harvests for the past five years were 123 sheep, with 65 percent coming from Unit 14C. Numbers are currently at a historically high level in Unit 14C. Adverse weather probably will cause a decline in sheep numbers. The population objective is to allow the population to fluctuate as dictated by natural factors, primarily climate and food availability. Human use objectives for Unit 14 are: 14A and B, to harvest full curl rams; for 14C, to provide for nonconsumptive uses such as viewing and photography, and to provide, in areas where it doesn't substantially conflict with nonconsumptive uses, the opportunity to participate in sheep hunting and to take mature rams and ewes (when populations are high) under aesthetic conditions.

The human use objective in Units 14A & B has been to provide the maximum opportunity to harvest full curl rams. In Unit 14C the human use objective was to provide for an aesthetic hunt and the opportunity to harvest large mature rams. Recently the objective was changed to also allow the harvest of ewe sheep as the population allows. These objectives required a limited drawing permit hunt regulation. In addition Unit 14C has had a management objective to provide for nonconsumptive uses such as photography and viewing. The population objective for the unit is to allow sheep populations to fluctuate as dictated by natural environmental factors.

Proposed Management

Unit 11: The management goal in Unit 11 reflects the National Park Service mandate of managing for "natural and healthy" populations. There is a strong emphasis on nonconsumptive uses although limited harvests are appropriate when they do not adversely affect populations. Predator populations are high and are not heavily harvested within the unit. Some prey populations may be limited by predation and periodic weather events and produce few surplus animals for human harvest. Most land in Unit 11 (about 90 percent) is within Wrangell-St. Elias National Park and Preserve. Therefore, management options and actions are dictated largely by federal law, regulation, and policy except on the limited state and private lands.

Under this plan lands in the Park would be managed as Zone 3 and Preserve lands as Zone 4 (Table 1). This was clearly the intent of the Board in defining these zones so that they comply with National Park Service regulation and policy. ADF&G originally recommended a Zone 4 for other public and private lands not in the Park because it was highly unlikely that wolf control would ever occur due to the small size of the parcels and their proximity to the park and preserve. However at the March 1992 meeting the Board decided that those lands should be Zone 5. It was stated that an important use of some of the private land is for subsistence hunting. The major private landowner expressed a strong preference for a zone that would allow wolf control, although none is anticipated under this plan.

We received suggestions that all of Unit 11 be Zone 1. This suggestion can not be adopted because federal law requires local subsistence users be allowed to hunt or trap wildlife on Park and Preserve lands except under special circumstances. Subsistence use has occurred in recent years and probably will continue.

We received suggestions that Park and Preserve lands be Zone 5. This could allow wolf control and more intensive management, however, the land manager did not concur and believed a Zone 5 was inappropriate. It is our understanding that under federal law, wolf control can be conducted on parks and preserves only under very limited circumstances that are unlikely to occur in Unit 11.

Major management actions in Unit 11 that would be conducted under this proposed plan include caribou and moose sex and age composition surveys and censuses, mountain goat surveys, and administration of mountain goat permit hunts.

Unit 13: ADF&G management goals for Unit 13, excluding Denali State Park and Denali National Park, call for high human harvests of caribou and moose with maximum opportunity to participate in hunting for these species. This reflects the long history of use, well developed access from major population centers, and highly productive habitat. Because of high human demand, caribou and moose populations have been managed to increase numbers and to provide large annual harvests and roadside viewing. Predators have been harvested at high rates to maintain populations at moderate to low levels and increase prey yields for people. Under this plan, Units 13A, 13B, 13C, and 13E (east of both the Parks Highway and Denali State Park) would be managed as Zone 6. Management intensity would be similar to what has occurred over the past decade when public land-and-shoot wolf hunting generally has kept wolf populations at moderate to low levels. It might be necessary to harvest cow moose to avoid overpopulation as the moose population approaches carrying capacity. Moose habitat enhancement would be considered. At the boards request, an implementation plan for this portion of the unit to allow wolf population regulation is included in Appendix II. The wolf population objective for Unit 13, maintaining a post-hunt population of 150 to 200 wolves, would limit the extent of wolf control.

Under this plan, Unit 13D would be managed as Zone 5. This area

TABLE 1-CURRENT MANAGEMENT AND PROPOSED ZONES FOR Units 11, 13, and 14.

Area	Current Management	Proposed Zones
Unit 11		
Wrangell-St. Elias National Park	3	3
Wrangell-St. Elias Preserve	4	4
Other Unit 11 Lands	5	5
Unit 13		
Old Denali National Park	1	1
New Denali National Park	3	3
Denali National Park buffer	4	4
Denali State Park	5	4
Units 13A, B, C, E*	6	6
Unit 13D	5	5
Unit 14		
Unit 14A	4	5*
Unit 14B	4	5*
Unit 14C	2/4	2

* Those portions of 13E east of both Denali State Park and the Parks Highway.
**Zones 2 and 4 should be considered for these areas. See page 20 .

has not been as intensively managed as other areas in the unit. Land-and-shoot harvest has not been very effective in the unit because of topography and habitat. Zone 5 allows intensive management of moose and retains the option of wolf control for unforeseen circumstances. No implementation plan will be prepared as wolf control is not envisioned.

Zone 1 is appropriate in a portion of the original Denali National Park in 13E because of federal prohibitions on hunting and trapping. A Zone 3 is fitting for the addition to Denali National Park in 13E as subsistence hunting and trapping by local residents is allowed by federal law. Under this plan, Denali State Park, the majority of which is in 13E, would be managed as Zone 4. This would allow moderate use of both wolves and prey and reflects current management and human use in the area. To provide management continuity and human use and also to provide an easily identifiable boundary between management zones, the portion of 13E west of the Parks Highway and outside of Denali National Park would be managed as Zone 4. An implementation plan will not be prepared for any of these areas as wolf control would not be allowed.

Public recommendations for Unit 13 ranged from the entire Unit being Zone 1 to Zone 7. Such broad-based approaches clearly did not accommodate the intent of the Board. We did consider these zones in portions of the unit. With the exception of the original Denali National Park we rejected Zone 1 because it was incompatible with existing uses and management or because federal law prevents such a designation. Zone 3 and 4 were also suggested but would not have allowed the intensive management of wolves that now occurs in portions of the unit. Zone 7 was the most common suggestion for the majority of Unit 13. This was rejected because prey populations are not depressed, wolf predation is not thought to be the principal factor limiting caribou and moose populations, and wolf population reduction is not anticipated in the area. This plan designates much of the unit as Zone 6 which allows sufficient flexibility to manage wildlife.

A recommendation to establish Zone 1 for one-half mile corridors along all highways and federally designated wild and scenic rivers was received. It was not adopted because of lack of support at public meetings.

Under all alternatives, major management actions would include sex and age composition sampling of caribou and moose populations, censuses of caribou, moose, wolf, and goat populations, and the administration of permit hunts for caribou, mountain goats, and possibly for antlerless moose. If wolf control is conducted, a stringent permitting process controlling public land-and-shoot taking would be employed.

Units 14A and 14B: Management emphasis in Unit 14A is to produce high harvests of moose for people and to provide maximum opportunity to participate in moose hunting. For other species of wildlife, including wolves, the emphasis is on allowing hunting while ensuring the perpetuation of these species in face of increasing human populations and development.

Predator populations are generally low with the exception of black bears in Unit 14B. Wolf predation is probably not a significant limiting factor of moose, sheep or mountain goat populations in the units. Important sources of mortality include severe winters, highway and railroad kills, hunter harvest and loss of habitat. It is unlikely that wolf control (regulation or reduction) will be appropriate because of low wolf abundance and the limited impact predation has on the high prey densities.

It is extremely unlikely that wolf control will ever be appropriate in 14A. In the past 40 years wolf control has not been necessary in this area and we don't anticipate a situation where wolf control will be needed in the future.

The board tentatively approved this interim draft area-specific plan including Units 14A and 14B as Zone 5. However, a Zone 2 (where wolves are completely protected and other species can be managed intensively) and a Zone 4 (where moose would continue to be managed intensively but no wolf control would be involved) should also be considered.

Public suggestions for zoning of Unit 14A and 14B ranged from 1-7. Zones 6 and 7 were rejected because of the extremely low likelihood of wolf control. Zones 1 and 3 seemed inappropriate given the emphasis on intensive use and management of the moose resource in the unit. Wolf numbers and harvests are low and it is likely that management objectives for other species could be obtained under a Zone 2. However, the low level of harvest during recent years has not limited growth of the wolf population. Closing the wolf hunting and trapping seasons (under a Zone 2 designation) would probably not result in an increase in wolf abundance, and would reduce hunting and trapping opportunity.

Primary management activities likely to be conducted under all alternatives include periodic moose censuses, occasional Dall sheep

and mountain goat surveys, monitoring of wolf and other furbearer abundance, efforts to reduce highway and railroad mortality of moose, moose range enhancement, and the administration of permit hunts for antlerless moose and mountain goats.

Unit 14C: Management emphasis in Unit 14C is on viewing and other nonconsumptive uses of wildlife as these populations are in close proximity to half of the state's population and to many tourists. There is, however, intensive management of two abundant species in the unit. Harvests by people are directed toward moose and Dall sheep in areas where conflicts with nonconsumptive uses are minimal. Mountain goats, black and brown bears are also taken in small numbers. Wolves occur in low densities and are not trapped or hunted in most of the unit. The Unit is highly developed in most areas outside of Chugach State Park, limited habitat occurs within the park and it is unlikely wolves will ever become abundant. Wolf predation does not appear to affect populations of moose, sheep, or mountain goats significantly in Unit 14C. An important mortality factor for moose and sheep in Unit 14C is severe winter weather, and for moose, collisions with highway vehicles.

Under this plan Unit 14C would be managed as Zone 2. This would protect the local wolf population from hunting and trapping and also would allow intensive management of moose and Dall sheep. This zone designation recognizes that nonconsumptive uses of wildlife are the emphasis for much of the area. Minimal loss of hunting and trapping opportunity would occur under this proposed plan.

The highest zone recommendation received for Unit 14C was a 5. We rejected that because the priority use of wildlife in the area, particularly wolves, is nonconsumptive. It is unlikely that wolf control will ever be appropriate in Unit 14C. Zones 1 and 3 are not compatible with the intensive management of moose and Dall sheep which now occurs in portions of the unit. A Zone 4 would be appropriate if it is desired to continue hunting and trapping wolves in portions of Unit 14C. It is important to continue managing moose because of declining habitat availability and public safety concerns, particularly moose/auto collisions.

Major management activities that will occur include surveys and censuses of moose, Dall sheep, and mountain goats and administration of permit hunts for these species. Efforts will continue to reduce the level of mortality caused by highway vehicles and to encourage the military to enhance moose habitat on the bases.

TABLE 2 - PROPOSED MANAGEMENT FOR UNIT 11

Species	Current Population Estimates	Population Objectives	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required To Meet Population and Harvest Objectives	Comments
Wolf	100	>75	25(14-37)	_*	Currently met	
Moose	2000	2200	41 (32-56)	_*	Currently met	
Caribou	1900	2000	85 (45-119)	_*	Unknown	(possible predator pit)
Sheep	4000	Natural fluctuations	124 (103-147)	_*	Currently met	
Mountain Goat	700	>500	19 (15-30)	<25	Currently met	
Grizzly Bear	Unknown	Natural fluctuations	8 (5-12)	<20	Currently met	
Black Bear	Unknown	Natural fluctuations	10 (7-14)	<30	Currently met	

* Harvest objectives will depend on population level

TABLE 3 - MANAGEMENT OPTIONS FOR UNIT 13

Species	Implem-ention Option	Current Population Estimates	Population Objective	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required to Meet Population and Harvest Objectives	Comments
Wolf	—[a]	223	350	91(52-145)	40-100	2 years	No Control
	I[b]		150-200		50-150	2 years	Population regulation.
	II[c]		50-100		25-75	3 years	Population reduction and regulation.
Moose	—[a]	22,000	20,000	1011 (521-1259)	800	1 years	No cow harvest.
	I[b]		25,000		1300	5 years	Possible cow harvest.
	II[c]		25,000		1800-2000	5 years	Cow harvest required.
Caribou	—[a]	45,000	40,000	1673 (959-3020)	3000	4 years	
	I[b]		40,000		4000	Currently met	
	II[c]		40,000		4500	2 years	
Sheep		3700	Natural fluctuations	123 (102-152)	mature rams as available	Currently met	
Mountain Goat		150	>100	3 (1-5)	5-8	Currently met	
Grizzly Bear		800-1000	600-1200	83 (73-98)	<75 (<25 female)	Currently exceeded	
Black Bear		7	Natural fluctuations	73 (64-88)	<125	Currently met	

[a] No wolf control.
[b] Wolf population regulation.
[c] Wolf population reduction followed by regulation.

Table 4- PROPOSED MANAGEMENT FOR UNIT 14

Species	Current Population Estimates	Population Objectives	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required to Meet Population and Harvest Objectives	Comments
Wolf						
Unit 14(A&B)	30-40	35	1 (0-2)	<5	Currently met	Requires board approval of closure.
14(C)	20	20	1 (0-3)	0	1 year	
Moose						
Unit 14(A)	5800	5,000-5,500	522 (258-624)	600-700	3 years	
14(B)	2000	2,500-2,800	184 (0-347)	200-300	3 years	
14(C)	2000	1,800-2,200	156 (125-177)	200	Currently met	
Caribou	See Unit 13					Caribou in Unit 14(B) are part of the Nelchina herd
Sheep	4100	Natural fluctuations	123 (102-152)	Full curl rams as available in 14 (A & B), mature rams and ewes (when population is high) in 14(C)	Currently met	
Mountain Goat						
Unit 14 (A & B)	100	100+	3 (1-7)	6% of population	Currently met	
14(C)	550	500+	26 (22-30)	6% of population	Currently met	
Grizzly Bear	150-200	150	13 (9-15)	8 (>60% males)	1 year	
Black Bear	1200	1200	107 (72-133)	<80	1 year	

Description of Plan Area

The planning area consists of approximately 65,000 square miles in the eastern and central portions of interior Alaska, including the entire Tanana River drainage and a portion of the middle Yukon River drainage. It encompasses approximately 11 percent of Alaska. The boundaries of the planning area include the Alaska Range to the south, the Ray and White mountains to the north and the Canadian border to the east. Fairbanks is near the center of Unit 20 and is the major population center with about 70,000 residents. More than 25 small communities occur within Units 12, 20 and 25C. Healy, Nenana, Tanana, Central, Delta, Tok, Eagle, and Northway are the largest of these rural population centers.

Elevations range from 200 feet in the west near Tanana, to over 20,000 feet in the Alaska Range. The western portion of Unit 20 is characterized by the extensive flats of the lower Tanana River, while the middle and eastern portions are characterized by rolling hills sometimes called the Tanana-Yukon uplands. There is both gentle and mountainous terrain in the Alaska Range, Ray and White mountains. Glaciers are present in the Alaska Range.

The climate in Units 12, 20 and 25C is semi-arid, with an average annual precipitation in the Fairbanks area of 11.2 inches. Most of this falls as snow, which averages about 67 inches each winter. Snow depth is highly variable in these units and is occasionally a major cause of mortality among prey species. Other extremes in climate such as flooding, abnormally cold or wet spring conditions or chronically dry summers may also affect wildlife.

Major tree species in Units 12, 20 and 25C include black spruce, white spruce, paper birch, aspen, balsam poplar and tamarack. Larger shrubs include alder and a variety of willow species. The vegetation in interior Alaska is greatly influenced by the slope and aspect of the terrain. Black spruce and alder predominate in flat areas and north-facing slopes, while white spruce, birch, aspen, poplar and willow thrive on the better drained and warmer soils found near streams and rivers and on south-facing slopes. At higher elevations, forests give way first to a zone of willow and alder, and then to alpine tundra where low forbs, sedges and grasses predominate. Tree line is at about 3000 to 4000 feet in these units.

Naturally occurring fires are common throughout the northern half of the units. Burning removes trees and thick, insulating ground cover that eventually develops in mature forest stands. This process allows the soil to warm and support an abundance of plants that are much more useful and important for many species of wildlife than those found in mature forests. Because fires burn in different areas each year, a mosaic pattern of vegetation has developed over time, providing a wide diversity of vegetation types.

Major federal conservation system land holdings within Units 12, 20 and 25C include portions of Wrangell-St. Elias National Park and Preserve (19,247 square miles), Denali National Park and Preserve (8900 square miles), Yukon-Charley Rivers National Preserve (2677 square miles), Steese-White Mountains National Conservation/Recreation Area (1875 square miles) and Tetlin National Wildlife Refuge (1094 square miles). The U.S. military is a major land holder in Game Management Units 20A, 20B, and 20D; the land on military reservations is managed by the U.S. Bureau of Land Management. Native corporations and the State of Alaska are the other major land owners in the units.

Wildlife Resources, Human Uses and Past Management

Wolves

Wolves inhabit nearly all of the planning area. Most packs include 6-12 animals, but packs as large as 20-30 wolves sometimes occur. In most areas, pack members remain within a home range with limited overlap in the ranges of neighboring packs. Wolves that depend on migratory caribou may, however, temporarily abandon their home range and travel long distances. The home range of most interior packs includes 200-800 square miles. Wolves are quite productive, and most packs in the interior successfully raise 4-7 pups each summer with pups making up 30-45 percent of populations in early winter.

Studies have shown that dispersals of up to 500 miles by individual wolves, especially yearlings, are a regular occurrence. Each year, one or more wolves from most resident packs disperse and travel to other regions in Alaska and Canada, sometimes joining or creating new packs. This is one reason wolves quickly recolonize vacant habitat. It also guarantees considerable genetic exchange among wolf populations in the interior.

If you'd like to comment on this interim draft plan, call a member of the Fish and Game wolf planning team in Anchorage at 267-2179 or in Fairbanks at 456-5156.

Caribou and moose are the major prey of wolves in most parts of the planning area, although Dall sheep can be an important food in mountainous areas. Wolf packs that rely primarily on moose generally make a kill every 3-10 days, while packs relying primarily on caribou usually kill a caribou every 2-4 days. Wolf predation is one of the major factors affecting caribou and moose population levels in the planning area. Bear predation, adverse weather and harvest by people also affect these prey populations.

The effect of wolf predation on caribou, moose, and sheep populations depends largely on the densities of predators relative to prey, and the total size and reproductive success of prey populations. Wolf predation can control the rate of prey population growth, can play an important role in prey population declines, and can maintain prey populations at low densities.

Prior to statehood in 1959, wolf numbers were reduced by federal control efforts in some areas, and prey species then became abundant in these areas. After federal wolf control efforts stopped, wolves became generally abundant during the late 1960s and early 1970s. In the early 1970s prey populations declined. For a few years during the late 1970s and early 1980s wolf numbers were reduced in parts of Units 12, 20A, 20B, 20D and 20E in an effort to allow low caribou and moose populations to increase. Wolf populations have since recovered in these areas. A summary of each program follows.

In Unit 20A, the moose population had fallen from a high of around 20,000 in the 1960s to an estimated 2800 moose by 1976. Caribou numbers had also dropped from about 5000 to about 1500 to 2000 during this period. Wolf control was initiated in late winter of 1976, and by fall 1978 the wolf population had been reduced by two-thirds. In response, the moose population grew to the present level of 11,100. The Delta caribou herd also grew rapidly, reaching a peak in 1989. Then, between 1989 and 1992, adverse weather caused poor caribou calf survival. At the same time, wolf predation on adult caribou increased and the caribou population declined from 10,700 caribou in 1989 to 5700 caribou in 1992. The wolf population has been increasing in recent years in Unit 20A and has fully recovered from wolf control programs which ended in 1982. There are presently 220-300 wolves in Unit 20A.

In central Unit 20B, there were about 2220 moose and 114 wolves prior to 1980. During the winter of 1982-83 about half of the wolf population was removed. Moose numbers have steadily increased since 1982 to the present level of 3500 to 4500. By 1985, the wolf population had recovered to near pre-control levels.

In western Unit 20B moose densities were low in most of the area, and wolves numbered about 80, prior to 1984. Between 1984 and 1986 wolf numbers were reduced by about half. Following the wolf control effort the moose population in western Unit 20B increased from 2650 moose in 1985 to 3400 moose in 1990. By 1991 wolf numbers had recovered to near pre-control levels.

In Unit 20D wolf control was conducted between 1980 and 1984 to decrease predation on caribou and moose. A total of 61 wolves was removed. This program resulted in moderate increases of moose populations, but was somewhat less effective than control programs in other parts of Units 12, 20 and 25C.

In Units 12 and 20E, wolf numbers were very low during the 1950s due to extensive federal wolf control from 1948-60. Wolf numbers rapidly increased following the control program and were at high levels during the early 1970s. Wolf numbers declined after 1975, following an earlier decline in caribou and moose numbers. During the early 1980s, caribou and moose populations were low to moderate in relation to wolves. In parts of Units 12 and 20E, wolf numbers were reduced by about half during the winter of 1981-82, and again by about half during the winter of 1982-83. This wolf control program was largely ineffective in helping to reach the population objectives for caribou and moose partly because grizzly bear predation proved to significantly affect moose populations, and partly because wolf control was not conducted for a long enough period of time. By 1986 wolf numbers had returned to near pre-control levels.

The wolf population in Unit 20E increased to 200-230 by fall 1990. However, the spring 1992 population estimate indicates that the population has declined to 142-156 wolves. The cause of the decline is unknown. No natural mortality factors have been identified that could explain such a rapid decline.

The wolf population throughout Unit 20E has been lightly harvested, except when control programs were in effect. The annual harvest has averaged 10 percent of the population for the past 8 years. This harvest rate is below sustainable levels (25-40 percent). However, in the more accessible central portion of the unit, the average annual harvest rate during the mid 1980s approached 25 percent. Trapping is the primary method of harvest. Land-and-shoot hunting has not been a successful method of wolf harvest in most of 20E because of

the forested terrain and lack of landing sites. However, this method of take can be used in northern and western Unit 20E.

An estimated 1210-1650 wolves now inhabit Units 12, 20 and 25C. In recent years, wolf densities in most areas have ranged from 1 wolf per 40 square miles to 1 wolf per 80 square miles. Unit 20A supports a higher density than most other areas, with 1 wolf per 25 square miles.

During the past two decades, wolf management in most of the planning area has not been intensive. Harvest levels in most units have remained well below the annual sustainable yield. Wolf populations in the interior can sustain harvests of 25 to 40 percent annually. Annual wolf harvests in the planning area have been low to moderate, ranging from 5 to 20 percent in most areas, with trapping accounting for most of the harvest. The low to moderate harvest rates mean that wolf populations can increase when prey availability and other conditions allow. In other words, human harvests of wolves are not high enough to control wolf populations in Units 12, 20 and 25C.

Nonconsumptive use of wolves in the Interior has been primarily concentrated in Denali National Park. Although wolf densities are higher in many areas outside the park, few of these places combine open terrain with road access to provide significant opportunities to view wolves. Hunters commonly see wolves in the foothills of the Alaska Range in Unit 20A, but the lack of road access prevents large numbers of people from taking advantage of the viewing opportunities. Wolves have been seen along major roads and highways in Units 12, 20 and 25C, and cross-country skiers and snowmachine users occasionally observe or follow wolf tracks in some areas. Limited "flight seeing" for wolves occurs also.

Brown Bears

Brown (or grizzly) bears occur throughout Units 12, 20 and 25C, but they are rarely found in mountain and glacial areas above 6000 feet. Although brown bears feed primarily on vegetation, they prey upon and scavenge caribou, moose and other large mammals also. Except for a few local instances, brown bears generally do not feed on salmon in these units.

The combined effect of brown bear and wolf predation on moose populations has been studied in two parts of the planning area. One study was done on the Tanana Flats in Unit 20A, an area of good moose habitat with low moose densities and poor brown bear habitat with low brown bears densities. In this study brown bear predation did not affect the recovery and growth of the low moose (or caribou) populations after wolf numbers were reduced. The second study was conducted in Units 12 and 20E, an area near Tok containing good moose habitat but low moose densities, and good bear habitat with moderate bear densities. Under these conditions, brown bear predation was more significant. Bears, along with wolf predation, kept moose populations at a low level.

Changes in brown bear populations in Units 12, 20 and 25C before 1980 are not well known. During the 1950s, federal wolf control programs included the wide use of poison baits. It is believed that bear populations were substantially reduced as a result of bears consuming baits intended for wolves. Although no practical method of estimating bear numbers existed until the 1980s, it is believed that conservative seasons and bag limits for brown bear hunting and restrictions following higher than average harvests have allowed bear populations to recover.

The total population of brown bears in the planning area is estimated to be between 1800 and 2100. The highest population densities occur in the mountain valleys and foothills of the Alaska Range (from one bear per 17-23 square miles). Moderate densities are present in the Tanana-Yukon uplands from the White Mountains to the Fortymile River drainage (estimated at one bear per 26 square miles). The lowest densities are present in the heavily forested and wet muskeg habitats of the Tanana and Yukon River lowlands (estimated at one bear per 67 square miles).

In most of the planning area, hunting pressure on brown bears is light and populations are probably stable. The annual harvest has averaged 69 since 1986. In some portions of Units 12, 20A, 20D and 20E bear density has declined since 1981 due to high harvests by people. Brown bear hunting regulations in Units 12 and 20E were liberalized to reduce bear predation on the moose populations of these units. Harvest is expected to decline and density may increase due to pending changes in hunting regulations.

As with wolves, most nonconsumptive use of brown bears occurs in Denali National Park. Although bear densities are lower in the White Mountains than in the Alaska Range, viewing opportunities may increase as access is developed and promoted in the Steese-White Mountains National Conservation/Recreation Area.

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In portions of Units 12, 20E and northern 20D, recent management objectives have called for temporary reductions in brown bear abundance until the moose population growth rate increases. In Unit 20A, research has been underway since 1981 to determine the harvest level that can be sustained by the brown bear population. Management objectives have called for maintaining the current high harvest rate in Unit 20A until 1992, then monitoring population recovery. In Units 20B, 20C, 25C, and southern 20D, management objectives are to maintain stable bear populations at current levels. Hunting is prohibited in the Denali National Park portion of Unit 20C. The management objective in this area is to minimize human-brown bear conflicts.

Black Bears

Black bears occur commonly in wooded and brushy habitat throughout the planning area, but are uncommon in mountainous and alpine habitats. Interior black bears eat mainly vegetation (green plants and berries), carrion, moose or caribou calves and some fish.

Black bears kill and eat moose calves in the planning area, but their effect on moose populations is unknown. Based on studies done elsewhere, black bear predation can reduce moose population growth rates when black bears are abundant in moose calving areas at calving time.

Little is known about the history of black bear populations in the planning area. Since large tracts of black bear habitat remain undisturbed, black bear populations are believed to be relatively healthy.

Harvest of black bears is highest in road-accessible areas near urban centers. Little or no harvest occurs in remote areas. Many bears are killed near roads within Unit 20B, especially in areas close to Fairbanks. This harvest level could lead to a population decline in this area. In the remainder of the planning area, including areas accessible by road, the present rate of harvest is sustainable on a long-term basis.

Viewing of black bears occurs on hillside areas along several highways during spring when bears seek new green vegetation, or in berry patches in the late summer and fall. Black bear viewing is enjoyed by hunters, who frequently indicate that they spend many hours watching and photographing bears, occasionally taking family or friends along to watch the bears as well.

Current management objectives for black bear populations in the planning area have been primarily oriented towards maintaining stable populations capable of sustaining harvest by hunters.

Caribou

The Chisana, Delta, Denali, Fortymile, Macomb, Ray Mountains, and White Mountains herds occur within Units 12, 20 and 25C. Caribou are wide-ranging, but are relatively faithful to calving grounds and wintering grounds. Their numbers fluctuate because of predation levels and weather. Population, human use and past management information is given below by herd.

Chisana Herd: The Chisana herd calves and summers primarily within the Wrangell-St. Elias National Preserve in Unit 12. In winter, the herd ranges north on to state land and east into Canada's Yukon Territory.

The herd was estimated at 3000 animals in the 1960s. The herd fluctuated between a low of about 1000 animals in 1980 and a peak of about 1800 animals in 1989. Poor calf survival has caused the population to decline to its present level of about 1400.

Hunting the Chisana herd in Alaska has been restricted to a fall season since 1974, and to only bulls since 1979. Since 1979, 30-60 bull caribou have been harvested from this herd annually (this includes up to 12 annually in the Yukon Territory). Most of the harvest in Alaska, and virtually all of the harvest in the Yukon Territory since the 1950s, has been by guided, nonresident hunters. Nonconsumptive use of the Chisana herd is very limited due to its remote location and limited access. However, at least one guide in the area is now offering summer pack trips for wildlife viewing.

Current management objectives called for maintaining a population of 2000 to 2500 caribou.

Delta Herd: The Delta herd ranges primarily on state land in the foothills and mountains of southern Unit 20A, but also uses some military land in the northern and eastern parts of the unit.

Estimates in the 1950s placed herd size at about 5000 animals. Since then, it has fluctuated in size from a low in 1976 of less than 2000 to a high in 1989 of 10,700. Wolf control during the late 1970s and early 1980s allowed the herd to increase at a high rate for a few years. Growth slowed during the mid-1980s. The herd declined rapidly between 1989 and 1991 due to poor survival of calves in summer and high mortality of adult females. It now numbers 5750 animals and is still declining.

Unit 20A is a popular and heavily used hunting area because of its proximity to Fairbanks and the diversity of big game present. The estimated caribou harvest has

ranged from 100 to 850 since the early 1980s. Harvests since 1986 have been near the maximum sustainable, and the hunting regulations have been complex in order to provide special opportunities for different types of access for hunting.

The 1991-92 winter hunting seasons were closed by emergency order, and the Board of Game closed the 1992-93 hunting season. These restrictions may not be sufficient to prevent a further decline.

Nonconsumptive use of the Delta herd is limited by remote access. However, "flight seeing" from Denali Park has been increasing in recent years, and one major lodge in the center of the herd's range has initiated summer wildlife viewing services.

Current management objectives are to increase the size of this herd to between 7500 and 8500 caribou to provide hunting opportunity; maintain a bull: cow ratio of at least 30:100; and be able to support a hunter success rate of at least 30 percent. Because hunting pressure has been high, the proportion of mature bulls declined in the late 1980s. To ensure that an adequate number of bulls is maintained in the population, management objectives have called for a mature bull: cow ratio of at least 6:100. The population objective is not currently being met, but the bull: cow ratio objective will be met by fall of 1992.

Denali Herd: The Denali herd has been one of the most studied in Alaska. It has calved in two areas: south of Denali National Park near Bull River and in the foothills of the northcentral portion of the park. Major winter ranges include the tundra flats and ridges in the vicinity of the Stampede Trail and the spruce-covered flats north and west of the Kantishna Hills.

The herd has fluctuated in size considerably from a high of about 25,000-40,000 in the 1920s to a low of about 1000 in the 1970s. The 1930s, 1940s and 1970s were periods of decline, and the 1920s, 1950s, 1960s and 1980s were periods of expansion. The population increased through the 1980s to about 3500 in 1989, but declined considerably in 1990 and 1991 due to unfavorable weather and high levels of predation. It now numbers about 2300.

The Denali herd was lightly harvested in the early 1970s but the hunting season has been closed since 1976. This herd serves as a valuable comparison in studies of more heavily hunted herds, particularly the adjacent Delta Herd.

Nonconsumptive use of the Denali herd occurs seasonally along the park road in Denali National Park. Several private lodges in Kantishna provide wildlife viewing services along the park road and in the area.

Current management objectives call for maintaining a naturally regulated caribou herd. Since 1976 the Denali herd has been managed for nonconsumptive use and study. The population has fluctuated at low levels for many years.

Fortymile Herd: The Fortymile herd presently ranges between the Steese Highway and the Yukon and Tanana rivers in Units 12, 20B, 20D, 20E and 25C. A portion of the herd winters in western Yukon Territory in the Fortymile, Sixtymile and Ladue River drainages. The herd calves and ranges primarily on state land, but also uses parts of the Yukon-Charley Rivers National Preserve during summer and fall, and the Steese-White Mountains National Conservation/Recreation Area during winter.

In the 1920s the herd was probably the largest in Alaska. Approximately 500,000 caribou ranged as far west as Rampart, east to near Whitehorse, Yukon Territory, and south to Fairbanks and Minto Flats. During the 1930s, the herd declined rapidly, reaching a low of only 10,000 to 20,000 in the early 1940s. Federal wolf control efforts helped the herd recover to 50,000-60,000 animals between 1954 and 1963. The herd declined to about 6000 caribou between 1963 and 1975. A natural decline in wolf numbers allowed the herd to grow slowly through 1990 to about 22,700. Increased wolf numbers and severe winter recently caused the herd to decline to about 21,000. Survival among newborn calves and adult females was particularly low in 1991.

Historically, the Fortymile Caribou herd has provided much of the meat needed by the Native and non-Native people in Alaska and western Yukon Territory, Canada. Between 1951 and 1972, estimated annual harvests ranged from 335 to 2360 caribou. The consumptive demand for Fortymile Caribou is high and growing, and presently 2500 people (98 percent Alaskan residents) register annually to hunt this herd.

The Taylor Highway and a well-developed trail system bisect the

The role of the division of Wildlife Conservation is to conserve and enhance Alaska's wildlife and to provide for a wide range of uses for the greatest benefit of current and future generations of the people.

herd's range in Unit 20E. This is a popular hunting area for Alaskan residents from many communities, including Delta Junction, Anchorage, Fairbanks and southeast Alaska, as well as residents of the local area. Since 1991, only Alaska residents have been allowed to hunt caribou along the Taylor Highway. When the Fortymile herd is distributed near the Taylor Highway, hunting is heavy and harvest quotas are reached quickly. In contrast, when the herd is away from the road, little harvest occurs and harvest quotas are not attained. Since 1986 reported harvests have averaged 450 animals. The Taylor Highway is also a scenic tour route in summer and the demand for wildlife viewing is high. The current low herd size restricts the opportunity for viewing of Fortymile caribou.

ADF&G and the Yukon Department of Renewable Resources completed work on a draft management plan for the Fortymile herd in 1990. The primary management goal for this herd is to reestablish the herd in its former range in Alaska and the Yukon Territory. To meet this goal, a population objective of 60,000 caribou by the year 2000 was set nd harvest guidelines were established. In 1991, the U.S. federal government opened a separate federal hunting season, even though the harvest quota had been reached. It is unclear whether the federal government will abide by the management plan. The sustainable harvest for this herd is currently 400 bulls which does not meet the local or state residents' consumptive demands.

The sustainable harvest would increase to 3000 to 6000 caribou under this plan after population objectives are achieved. Annual harvest would remain conservative until those objectives are attained.

The Fortymile Caribou herd has a large potential for growth based on the present size of the herd compared to historical levels. Rapidly increasing herds in Alaska and Canada have increased by 14-22 percent annually. Between 1975-1990 the Fortymile Herd increased between 3-10 percent annually.

Studies indicate predation to be the major factor currently limiting growth. Winters have been mostly mild since 1975 and harvests have been low (2-4 percent). Indices from body measurement data, pregnancy rates, timing of calving, and fecal samples indicate that the range condition is not limiting and a larger population could be supported.

Macomb Herd: The Macomb herd ranges and calves primarily in Unit 20D south of the Tanana River, but occasionally uses adjacent Unit 12 in fall and winter.

Since 1975, the herd has contained 600-800 caribou. In 1990 and 1991 the herd declined due to poor calf survival and now numbers no more than 600.

This herd received little harvest prior to the early 1970s, but hunters became more interested in the Macomb herd in the late 1970s as other hunting opportunities declined. Since 1975, annual harvest has averaged about 40-50 caribou. Since 1978, hunting opportunity has been restricted by permit and the harvest has been restricted to bulls. Limited viewing opportunity exists along open slopes south of the Alaska Highway in spring and fall. Viewing could be enhanced if the herd size increased significantly.

Current management objectives have called for increasing the population to 1500 and 2000 caribou.

Ray Mountains Herd: The Ray Mountains herd has been recognized as a distinct herd only since the late 1970s. The herd appears to range south from the West Fork of the Chandalar River through the Ray Mountains and west to the Tanana-Allakaket Trail. Reports from local residents and pilots indicate that caribou have been resident there since at least the 1940s. Calving is dispersed and occurs throughout higher elevations in the Ray Mountains. The herd winters throughout the Ray Mountains and on the eastern Kanuti Flats and adjacent hills. The Ray Mountains contain a large amount of alpine summer range and some of the most robust lichen ranges in Alaska, so the herd could undoubtedly become much larger.

Occasional aerial surveys have been flown, but no caribou from the herd have been radio-collared. Because the area is remote and lightly hunted, population data are not routinely collected. The herd has probably been stable at about 600-800 since 1984. Predation by wolves and bears in early summer is the most likely factor limiting population growth.

Since 1980, the annual reported harvests have totaled 5-14 animals. The fall harvests occur primarily in the vicinity of Caribou Mountain near the Dalton Highway. The late winter harvests occur near Tanana, primarily by residents of Tanana and the nearby Tozitna River homesites.

The department intends to establish population size in 1992.

White Mountains Herd: The White Mountains herd occupies parts of Units 20B, 20F and 25C in an area bounded by the Steese and Elliott highways and the Yukon Flats. The herd calves and summers primarily in the White Mountains Na-

tional Recreation Area between the Steese Highway and Beaver Creek. It winters primarily on state land west of Beaver Creek. Prior to 1967, part of this area was used by the Fortymile herd. The White Mountains herd was first recognized as a separate caribou herd in the late 1970s.

The White Mountains herd grew slowly during the 1980s, numbering 800-1000 caribou by 1989. The herd has not experienced the severe annual calf losses that other interior Alaskan herds have since 1989.

There is little documented historical use of the White Mountains for caribou hunting. The herd is mostly inaccessible during summer and fall. The annual harvest ranges from 6 to 20 bulls. A new winter hunt designed to increase hunting opportunities within the Steese-White Mountains National Conservation/ Recreation Area began in 1991. As the Bureau of Land Management develops and promotes access to the area, opportunities for viewing caribou in summer and winter may increase. Viewing could be enhanced by larger herd size.

Current management objectives are to increase the accuracy of population estimates, and to assess the potential impacts of increased recreational use and mineral development on the herd. The department intends to establish population size and harvest objectives in 1992.

Moose

Moose inhabit most of Units 12, 20 and 25C. They are absent only from mountainous areas above about 4500 feet elevation, where vegetation is scant or absent. In much of the planning area, moose are the only big game species present year round. Moose feed primarily on willow and birch twigs and leaves, but sedges and aquatic plants can be important summer food.

Moose numbers reached an all time high in these units during the 1960s as a result of extensive federal predator control efforts before statehood. In the late 1960s, moose densities were greater than the habitat could support. By 1971 moose numbers were declining rapidly due to record snowfall, predation, and in some areas, over-hunting. By 1975, most moose populations in the planning area had reached their lowest levels in decades. Moose presently remain at low to moderate densities throughout much of Units 12, 20 and 25C.

Over a 10-year period beginning in 1976, the department conducted several wolf population reduction programs in these units to help moose and/or caribou populations recover (see section on wolves). Three were successful in meeting their objectives and provided increases in the prey populations. One program was ineffective in reaching the objectives, in part because grizzly bear predation proved to be very significant in that area.

An estimated 35,000 moose currently inhabit Units 12, 20 and 25C, at a density of about one moose per two square miles. The capability of the habitat to support moose varies widely throughout these units. However, the habitat can support about a moose per square mile. Because browse plants are currently receiving light to moderate use, habitat is not believed to be limiting moose numbers. Hunting throughout these units has been restricted to short seasons for bulls only in recent years. Hunting does not appear to have any measurable affect on population size in most areas. Predation is believed to be the primary reason moose numbers remain below the level that the habitat could support in many parts of these units.

Much of the area in Units 12, 20 and 25C is easily accessible and has a long tradition of moose hunting. Currently, about 1200 bull moose (3.4 percent of the moose population) are harvested annually by about 5300 hunters. This is a low harvest rate.

Public demand for moose far exceeds what these populations can provide on a long-term basis. In many parts of Units 12, 20 and 25C, predators are taking a very high proportion of the moose, leaving few animals for people to harvest. Hunting regulations have become increasingly restrictive to keep use by people from adversely affecting moose populations, and unless management changes, more restrictive seasons will be needed in the future.

High nonconsumptive use of moose occurs in the summer along the park road in Denali National Park in Unit 20C and in the Chena River State Recreation Area in Unit 20B. The Taylor and Steese highways could provide significant viewing opportunity if moose were more abundant. Incidental viewing of moose occurs along the other roads and highways in the planning area, but the demand for viewing far exceeds the opportunities available.

During the winter months, moose are more concentrated in areas around Fairbanks in Unit 20B and are more easily seen. Skiers, snowmachine users and motorists often view moose browsing on willows along trails and roads. Many people also enjoy watching moose in rural subdivisions during winter. These opportunities have increased in recent years as the moose population in the lower Chena River drainage has grown.

Unit 12: Current management objectives for Unit 12 call for increasing the moose population to between 5000 and 7000 animals with a minimum bull: cow ratio of 40 bulls: 100 cows by the year 2000. Harvest goals call for an annual harvest of bulls up to 3 percent of the population, with a hunter success rate of 35 percent. The population estimated at 3000 to 3500 and is stable or slightly declining. The bull: cow ratio is about 50:100. About 3 percent of the population is being harvested. Based on current population trends, the herd size objective will not be met by the year 2000.

Unit 20A: Current management objectives for Unit 20A call for a population of 11,000 to 13,000 moose and a minimum bull:cow ratio of 30 bulls: 100 cows. Past harvest goals call for an annual harvest of up to 400 bulls until these management objectives are reached. These objectives are currently being met.

Unit 20B: Current management objectives for Unit 20B call for a population of 9000 to 10,000 moose, with about 4000 of these west of Fairbanks and about 6000 east of Fairbanks, and a minimum bull:cow ratio of 30 bulls: 100 cows. Harvest goals call for an annual harvest of at least 300 bulls. The population is now estimated at 9800 moose and increasing slowly. The management objectives are currently being met.

Units 20C, 20F and 25C: Moose densities in these units are low. Population size objectives have not been established. The department intends to obtain better information on moose distribution and abundance in these units. Current harvests are limited to bulls only. Management objectives call for maintaining a bull:cow ratio of at least 30:100. Because access is more difficult in these units, harvests are low, and the bull:cow ratio objective is being met. In addition, the department is encouraging habitat enhancement through proper management of wildland fires in these remote areas.

Unit 20D: Management objectives for Unit 20D call for increasing the moose population to 7000, including 1500 in the southeast, 2500 in the southwest, and 3000 in the north, and maintaining a bull:cow ratio of at least 30 bulls:100 cows. Harvest goals call for at least a 20 percent hunter success rate, as long as moose numbers are stable or increasing.

Unit 20E: The moose population in Unit 20E increased during the 1950s coinciding with the intensive federal wolf control program. The moose population numbered at least 10,000-12,000 during the late 1950' until 1965. The population declined to 2000 to 2500 between 1965-80 due to severe winters and high wolf and grizzly bear predation. The population began increasing in 1980 following a state wolf control program and increased bear harvests, and currently numbers between 4000 and 4500 animals. The maximum rate of increase observed during this growth phase was 5 percent. Early calf survival increased noticeably following increased bear harvests, but overwinter survival of these calves declined after wolf numbers increased in the 1980s.

During the past 5 years, an average of 300 people per year reported hunting moose in Unit 20E. This number is low as most caribou hunters (less than 1000 people) also hunt moose but do not report some they are not successful in Unit 20E. These hunters often go to another unit to hunt moose.

The average annual reported harvest is 57 bulls with most of the harvest coming from the Taylor Highway corridor and its associated trails. The sustainable harvest is between 80 and 100 bulls for the entire unit. Under the proposed plan, the sustainable harvest could increase to 280 to 400 animals and include harvest of some cow moose.

Annual browse surveys indicate that there is more browse than the current moose population in Unit 20E can use. A near-natural wildfire regime is now present in the majority of the unit, ensuring abundant moose browse and a high carrying capacity for moose.

The moose population in Unit 20E has a high potential for increase, based on historical numbers and the quality of the habitat. This population has been limited at low densities by wolf and grizzly bear predation. Nutrition, snow, and harvest have been only minor limiting factors. To increase this moose population, predator management will be necessary. Both wolf and grizzly bear populations should be should be deduced simultaneously to ensure the maximum benefit. Grizzly bear population reduction can be accomplished by conventional harvest. Both wolf and bear populations will be monitored to ensure their long term security in the unit. In Alaska where predators have been reduced, moose populations have experienced 18-20 percent growth rates (doubling time of 4 years).

Current management objectives for Unit 20E call for increasing the moose population to between 8000 and 10,000 animals with a minimum bull:cow ratio of 40:100 by the year 2000. Harvest goals have called for increasing hunter participation from 300 to 800 hunters by the year 2000, with a hunter suc-

cess rate of 35 percent. At the present growth rate, the management objectives and the harvest goals will not be met by the year 2000.

Dall Sheep

Dall sheep are found in two different habitat types in Units 12, 20 and 25C. Along the north slopes of the Alaska Range and the Wrangell Mountains, high quality Dall sheep habitat occurs in a continuous band across the alpine areas. In the Tanana-Yukon uplands between the Tanana and Yukon rivers, sheep habitat is high quality but discontinuous, occurring as patches of alpine areas separated by spruce lowlands.

Predation on sheep comes from several sources. Even though sheep are not preferred prey for wolves, wolves can sometimes have a significant effect on Dall sheep populations when preferred prey, such as caribou or moose, are scarce. Other factors, such as unfavorable weather, may make sheep temporarily more vulnerable to wolf predation. Other predators include golden eagles and coyotes. In the northern part of the planning unit, sheep populations are more vulnerable to predation of all types, because their populations are smaller, and their habitats contain less escape terrain.

Because Dall sheep feed on stable plant communities, sheep numbers tend to be stable over the long term. Changes in environmental conditions such as weather or predation can produce short-term fluctuations.

The mountains in the southern part of Unit 20 and 12 have historically supported high densities of sheep. Historical data suggest the Unit 20 portion of the Alaska Range can support 7000 sheep, and the Wrangell mountains can sustain about 12,000 sheep over the long term. However, data suggest that sheep numbers in this area are below the long-term, stable levels. The causes are unknown, but adverse weather and high levels of predation are likely responsible. The northern part of the planning unit supports low densities of sheep. Historical data suggest this area will sustain about 500 sheep over the long term.

High harvests of mature rams occur in the mountains of Units 20A, 20D and 12. Recent harvests in the Wrangell Mountains average about 280 rams per year. Recent harvests in the Unit 20 portion of the Alaska Range averaged 200 rams per year. Harvest in the Tanana Yukon uplands in northern Unit 20 average about 10 rams per year. Harvests are expected to remain stable even if sheep numbers decrease, because harvests have been small relative to the size of sheep populations.

Most nonconsumptive use of sheep occurs within Denali National Park. Mining roads in the Healy area east of Denali also provide access for sheep viewing, and sheep are occasionally seen from the Alaska and Glenn Highways in Unit 12 and the Richardson Highway in Unit 20D. Expanded use of the Steese-White Mountains National Conservation/Recreation Areas may result in additional sheep viewing in Unit 25C.

In the northern Wrangell Mountains of Unit 12 and the Alaska Range west of the Little Delta River in Unit 20A, sheep have been managed since statehood (1959) to provide maximum opportunity to harvest mature rams. East of the Little Delta River in Units 20A and 20D, two special management areas (the Delta Controlled Use Area and the Tok Management Area) restrict hunting by permit to provide aesthetically pleasing, high quality hunting opportunities and production of trophy sheep.

Sheep in the Tanana-Yukon uplands are managed to provide high quality hunting experiences for the small number of hunters who participate. In the eastern part hunting is limited by permit to achieve this goal, and in the western part (the White Mountains of Unit 25C) poor access limits the number of hunters using the area.

Harvest of ewe sheep has not been allowed in the planning area in recent history. Present bag limits restrict the harvest of sheep to mature, full curl rams and have little effect on the population.

Proposed Management

Unit 12: Maintaining relatively natural ecosystems was identified as a priority in much of Unit 12. Consumptive use of wildlife by people is also important to local residents and other Alaskans. In most areas, the management strategies proposed under this plan will result in low to moderate populations of moose and caribou, and low to moderate harvests by people from those populations (Table 6). In the northwest corner of the unit, management is intended to increase moose numbers so that more moose can be harvested by hunters (Table 7, Option I). Short-term reduction of wolf numbers is presented as one way to increase moose numbers in this area.

Most of the land in Unit 12 is included in either the Wrangell-St. Elias National Park and Preserve, the Tetlin National Wildlife Refuge, or the Tetlin Indian Reservation. In these areas, management options are limited by either federal law or reservation policy. Under this plan,

the Park will be managed as Zone 3, the Preserve will be managed as Zone 4, and the refuge and reservation will be managed as Zone 5 (Table 5). State and private lands in the Tok and Little Tok river drainages will be managed as Zone 6. The north facing slopes of the Alaska Range west of the Tok-Cutoff Road in northwestern Unit 12 will be managed as Zone 7 (see map 2).

Wolf control is not anticipated on the Zone 5 or Zone 6 areas, but could occur in the Zone 5 areas if requested by the land owner and approved by the Board. At public meetings during this wolf planning process, the U.S. Fish and Wildlife Service outlined stipulations that will have to be met prior to implementing any control programs on refuge lands. First, subsistence demands for caribou and moose will have to exceed availability. Second, an Environmental Impact Statement will have to be funded and written by the Fish and Wildlife Service. In addition, the public will not be allowed to participate in any control program on refuge lands. The department could assist with the implementation of control programs on refuge lands.

During the past five years the average annual wolf harvest rate was 18 percent . It is unlikely that wolf hunting or trapping pressure will increase substantially. This level of harvest will not limit wolf populations in those portions of Unit 12 where wolves are not managed intensively. Significant changes in resident caribou and moose populations or opportunities for consumptive use of those populations by people are not expected except in the northwestern portions of the unit.

Unit 20A: High levels of consumptive use of the Delta caribou herd, moose and other wildlife were identified as priorities in Unit 20A due to the variety of wildlife species present, their proximity to Fairbanks and their history of use. Viewing wolves and other wildlife has become popular in Unit 20A in recent years, mainly by hunters.

Under this plan, Unit 20A will be managed for moderate to high population levels of caribou and moose, and moderate population levels of wolves and bears. This will provide continued viewing opportunities and the opportunity to manage for high levels of harvest. Wolf, bear, moose and caribou populations, and their habitat, may be intensively manipulated to provide for increased use of the moose and caribou populations by people.

Table 5- PROPOSED MANAGEMENT FOR UNITS 12, 20, AND 25C.

Area	Current Management	Proposed Zones
Unit 12		
Tetlin National Wildlife Refuge	5	5
Wrangell-St. Elias National Park	3	3
Wrangell-St. Elias Preserve	4	4
Other Unit 12 lands	5/6/7	5/6/7
Unit 20A	7	4/6/7
Unit 20B	6	5/6*
Unit 20C		
Old Denali National Park	1	1
New Denali National Park	3	3
Denali National Preserve	4	4
Other Unit 20C lands	4	4/5
Unit 20D	6	6/7
Unit 20C		
Yukon-Charley National Preserve	4	4
Other Unit 20E lands	7	5/6/7
Unit 20F	4	4/5
Unit 25C		
Steese Nat'l. Conservation Area	5	4
White Mtns. Nat'l. Rec. Area	5	4/5
Other Unit 25C lands	5	4

*Zone 5 should be considered for some areas designated as zone 6 in this plan

Under this plan, the eastern Tanana Flats and the portion of this unit east of the Little Delta River will be managed as Zone 6. An area east of the Nenana River adjacent to Denali Park will be managed as Zone 4. (This area could be considered for Zone 2, where wolves would be completely protected, but other species could be managed intensively.) The remainder will be managed as Zone 7 (see map 2). Some form of wolf control may be needed in parts of the zone 6 and 7 areas to re-establish an allowable harvest by people from the Delta caribou herd and to maintain or increase current harvests of moose by people. The management strategies used will depend on the population and harvest objectives chosen (Appendix I).

We propose dividing the unit into northern and southern halves to focus management on what we believe are two different, although related, management concerns: caribou, moose and predators in the foothills and mountains of the Alaska Range; and moose and predators on the Tanana Flats. We have drafted two implementation plans to address the separate management concerns (Appendix II). Several options to reduce and/or regulate wolf numbers are provided (Tables 8 and 9) for each portion of the unit to illustrate the consequences of different management approaches.

One implementation plan focuses on management of the Delta caribou herd and moose in the southern half of Unit 20A. A reduction in wolf predation in only the foothills and mountains of the Alaska Range should be sufficient for management of the Delta caribou herd, since the herd spends most of its time in this portion of the unit. Management of wolves in this area would also affect the resident moose population and would incidentally benefit the migratory portion of the Tanana Flats moose population that winters in the foothills.

The other implementation plan focuses on moose management on the Tanana Flats. Caribou occur only in the southern portion of the flats for a portion of each winter. Management of wolves on the flats to increase moose harvest potential by people would have negligible effect on the caribou herd that resides largely in the mountainous southern half of the unit. It could, however, affect moose in the southern half because part of the Tanana Flats moose population spends part of each winter in the foothills of the Alaska Range.

Wolf packs that occur in southwestern Unit 20A might occupy territories that overlap boundaries of the Denali National Park or Preserve. The ADF&G plans to work cooperatively with the National Park Service to identify and radio mark all packs whose ranges potentially overlap park boundaries. The information from monitoring these packs will allow ADF&G to avoid them if wolf control is necessary in the Zone 7. If public participation in wolf control is allowed under permit as part of the Implementation Plan for the management program in this area, the data from monitored packs can be used to describe areas off-limits to public control activities.

The harvest of caribou by people was significantly reduced and the harvest limited to bull caribou in recent years. The season was closed in 1992. When a season is reopened, harvests will be limited to bull caribou until the herd recovers. It is unclear whether the herd can recover without reducing predation.

Studies in Alaska and elsewhere in North America have shown that when the population of an important prey species declines, wolves can shift to alternate prey. Presently, moose are abundant within the range of the Delta caribou herd. If wolves shift their diet from caribou to moose, wolf numbers could remain high despite a decline in caribou numbers. In that case, continuing high levels of wolf predation on caribou may push the number of caribou even lower and, eventually, also lead to a decline in the number of moose.

A moderate harvest of bull moose was allowed in recent years as the moose population was increasing. However, wolf numbers are now increasing and, on the Tanana Flats portion of Unit 20A, the moose population is stable. The current harvest of bull moose from the Tanana Flats can no longer be maintained with current predation levels, and human harvest must be reduced if wolf predation is not reduced. The moose population in the foothills portion of the unit is still increasing and capable of supporting current harvest levels.

Depending on the management alternative selected, caribou, moose and wolf numbers in Unit 20A could decrease, increase or be maintained at near current levels. Naturally occurring fires, prescribed fires, and mechanical disturbance could be used to enhance moose browse productivity and quality. Regardless of the management alternative selected, continued reduction in the bull caribou harvest will be required. If wolf numbers are reduced in the foothills portion to benefit caribou, moose numbers can be expected to increase substantially. This would place the moose population much closer to the maximum size sustainable by existing habitat conditions and would increase the risk that a bad winter could initiate a rapid decline in moose numbers. Cow moose harvests will be needed to

stabilize the moose population at a desired level and to sustain a large overall harvest without reducing the bull segment to very low levels.

A reduction in wolf numbers to stimulate caribou population growth could benefit sheep. The response of sheep populations to reduced wolf numbers is likely to be less than the response of caribou or moose populations because sheep are not the main prey of wolves in the central Alaska Range.

The numbers of grizzly bears in Unit 20A is lower than normal because a study of the effects of harvests on grizzly populations required high harvest rates since 1982. The reduction in caribou hunting opportunity is expected to reduce the number of grizzly bears harvested because many bears are taken incidentally by caribou hunters. Over the life of this plan, bear numbers should increase slowly.

Unit 20B: High levels of consumptive use of moose and enhanced wildlife viewing opportunities were identified as priorities in the central and western portions of Unit 20B. The board tentatively approved a Zone 6 for central and western portions of 20B based on high human use of prey. Zone 5 should also be considered in view of the revised interpretation of zone definitions.

In the eastern portion of the unit, a moderate level of consumptive use was identified as appropriate. Accordingly, the area will be managed under a Zone 5 designation. However, the headwaters of the Salcha River may initially be more intensively managed to benefit the Fortymile caribou herd under a Zone 7 designation (see map 2). Limited wolf reduction may occur in this part of Unit 20B (see Unit 20E). Remote access in this area will result in moderate harvests of wolves and moose.

Once moose population objectives are reached, moose harvests are expected to increase and the harvest of cow moose under permit may be necessary to meet population and human use objectives (Table 10). Opportunities for viewing moose along the Chena Hot Springs Road and other highways should increase. Wolf and moose harvests in the extreme eastern portion of Unit 20B will remain at low to moderate levels under the proposed plan because of remote access. Habitat enhancement to benefit moose populations will be accomplished by allowing naturally occuring fires to burn, by prescribed burning, by small scale mechanical manipulation and by logging.

Moose harvest in the Minto Flats Management Area has been kept low since 1979 under a permit system that gives a subsistence preference to rural residents. The moose population has been growing since the past wolf control effort. Hunting opportunity could be expanded to take advantage of the substantially improved moose situation. A Zone 6 would allow management to maintain moose populations at present levels.

Caribou harvests in Unit 20B have been low in recent years, but are expected to increase under the proposed plan due to anticipated increases in the Fortymile caribou herd. Opportunities to view caribou along the Chena Hot Springs Road and Steese Highway may increase also.

Unit 20C: The primary use of wildlife in Denali National Park and Preserve is nonconsumptive including, viewing and scientific study, but some consumptive use of moose, bears and wolves in the northern part of the unit, in areas near the Parks Highway and the Stampede Trail, is also important to local residents and hunters from Fairbanks.

Federal law and policy mandates that the original Denali Park be designated Zone 1, and the new portion of Denali Park Zone 3 (see map 2). Denali National Preserve and the state lands to the north have been proposed as a Zone 4. This designation will allow predator and prey populations to fluctuate largely independent of human influence (Table 11). The state lands along the Stampede Trail could be considered as a Zone 2. The northeastern portion of Unit 20C is proposed as a Zone 5.

Under this plan, Unit 20C will be managed to provide a naturally regulated caribou population, primarily for viewing, study and other nonconsumptive uses, and low to moderate harvests of moose and wolves. If the Denali caribou herd reaches a population level of greater than 4000 caribou during the life of this plan, a hunting season to harvest up to 2 percent of the herd annually may be considered for that portion of Unit 20C outside of Denali Park (Table 12). However, because wolf and bear numbers are presently high within the range of the Denali herd, it is unlikely that the herd will grow to that level during the life of this plan.

Under this plan the moose population is expected to remain at current low density levels in much of Unit 20C. Moose harvests are expected to fluctuate near the current harvest level. Wolf harvests in Unit 20C will have little or no affect on the wolf population.

Unit 20D: Under this plan, predators and prey in Unit 20D will be managed for high population levels

to allow high levels of harvest and viewing (Table 13). The area south of the Tanana River, except the Robertson River drainage and the northwestern portion of Unit 20D including Shaw Creek Flats and the lower Goodpaster River, will be managed as a Zone 6. The easternmost portion of Unit 20D (includes the headwaters of the Goodpaster and other rivers north of the Tanana River) will be designated as Zone 7 to provide the option to more intensively manage the Fortymile caribou herd (see Unit 20E). The Robertson River drainage will also be designated a Zone 7 to allow more intensive management of moose in that drainage. Limited wolf control may occur in these parts of Unit 20D.

Recently, Dall sheep and caribou populations declined and moose calf survival decreased in these areas. Human harvest of caribou and moose is severely restricted and may be further reduced in the short term. Efforts will be made to reverse the declining trend of the Macomb caribou herd and to increase moose populations throughout the area.

In order to achieve these goals, regulation of wolf numbers will be necessary in portions of the Zone 6 area at some point in the future. Limited land-and-shoot taking in conjunction with conventional hunting and trapping will probably be necessary to regulate wolf numbers. An implementation plan to allow limited land-and-shoot taking is not being offered at present, but may be in the future. The necessity for a reduction program in the Zone 6 area is not anticipated, but may be required if the Macomb caribou herd continues to decline under less intensive management.

Unit 20E: Management for moderate consumptive and nonconsumptive use of naturally regulated wildlife populations was identified as the highest priority for lands within the Yukon-Charley Rivers National Preserve. Under this plan, the preserve and some adjacent state land will be managed as Zone 4 to continue minimal management of predators and prey in this area.

The eastern portion of Unit 20E receives moderate use by people, primarily for consumptive use. Access is limited to a few trails. Moose and their predators are only lightly harvested. Predation is currently limiting moose population growth. Under this plan, this area will be managed as a Zone 5 because of the low level of use. Wolf control is not planned for this area.

The Taylor Highway and its associated trail system provides access for thousands of consumptive and nonconsumptive users annually. This area has a long history of consumptive use by people. The big game wildlife resources are relatively accessible from roads and rivers, and are not far from the major population centers in the planning area. Habitat is available to support increased numbers of caribou and moose in this area. Habitat productivity and diversity is expected to remain high because of changes caused by two large fires within the past 25 years and because current fire management zoning encourages limited fire suppression. Management for high consumptive and nonconsumptive use of the Fortymile caribou herd, moose and other wildlife along the Taylor highway during the summer was identified as a high priority during this planning effort. Consequently, this plan proposes to manage the central part of Unit 20E as a Zone 7 to stimulate caribou and moose population growth.

The Fortymile caribou herd spends the summer months in the northeastern portion of Unit 20D, the headwaters of the Salcha River in Unit 20B and the northwest portion of Unit 20E. Areas in eastern Unit 20E and the adjacent Yukon Territory are important fall-early winter range. Most of this area is relatively inaccessible and receives little public use. However, conditions affecting caribou in these remote areas of their range affect their availability for use along the Taylor Highway and its associated trail system. Consequently, this plan proposes to manage the headwaters of the Salcha River in Unit 20B, the easternmost portion of Unit 20D (including the headwaters of the Goodpaster and other rivers north of the Tanana River), and the northern portion of Unit 20E as a Zone 7 to provide the option to address wolf predation on all or part of the current range of the Fortymile caribou herd (see map 2).

Several management alternatives are being considered (Appendix I). Some assume that wolf predation is preventing growth of the Fortymile caribou herd. ADF&G is attempting to determine if wolf control on the calving and post-calving ranges will be necessary to reach the desired population level within 8 to 10 years. If control is necessary, several implementation options are being considered (Table 7).

ADF&G will coordinate with the federal land managers before conducting wolf control activities on or adjacent to federally managed lands. To decrease the possibility of killing wolves that largely reside within Yukon-Charley Rivers National Preserve, we propose that the National Park Service and ADF&G cooperatively radio collar the wolf packs in that area. In addition, permits will not be issued to the public to take wolves from aircraft as part of the control pro-

gram on lands adjacent to the preserve. If we find through radio monitoring, that a pack dens within the preserve, that pack will not be removed. Because the public will not be using aircraft to kill wolves, problems with enforcement or knowing if a pack is protected will not be a problem.

Until the caribou population goal is reached, the harvest will be limited primarily to bulls and the total harvest will be kept small. Once the caribou population goal is met, hunters will be allowed to harvest a larger proportion of the caribou population and the harvest of cows will be allowed. A portion of the harvest will be in Canada.

If wolf population reduction is conducted in eastern Unit 20D and western and central Unit 20E, the moose population is expected to grow rapidly from 4000 to 10,000 animals. Until moose population objectives are met, harvest will be restricted through short seasons and a one bull bag limit. The harvest of moose will be allowed to increase by the end of the planning period, and cow moose hunts may become necessary to stabilize the population.

Sheep populations in the central portion of Unit 20E are small due to limited habitat and predation. Presently, the sheep harvest is very low and is managed primarily for aesthetic hunting conditions. If conducted, wolf population reduction is expected to cause an increase in the sheep population, which may increase harvest.

The grizzly bear population in this area has remained stable or declined slightly over the past 10 years. This plan calls for continued management of the grizzly bear population to enhance caribou and moose calf survival. The liberal season and bag limit for grizzly bears will continue in Unit 20E during the life of this plan, and the annual harvest will probably remain similar to harvests in recent years unless access into the area improves.

It is important to continue managing predation by grizzly bears along with wolves. Reducing predation of only wolves may result in compensatory predation by bears, which would diminish the effects of the control program. However, no management programs which could threaten the viability of any wildlife population will be allowed.

The black bear population may slowly increase under this plan as caribou and moose numbers increase. Black bears are an important predator on moose calves. The survival rates of bear cubs and yearlings in areas with high moose densities are higher than in areas with similar habitats but lower moose densities. The harvest of black bears by humans may increase.

Unit 20F: Consumptive use of moose, mainly by local residents, was identified as a priority use of wildlife in this area. Residents of Unit 20F have expressed a desire for increased numbers of moose. However, current and projected levels of public use are not believed high enough to warrant a high level of management at this time. Under this plan, most of Unit 20F will be managed as a Zone 5 An upper portion of the Hess Creek drainage will be managed as a Zone 4 (see map 2). Moose populations are not expected to increase under the proposed management regime (Table 15).

Harvest of wolves will be limited to conventional trapping and hunting unless moose populations significantly decline, or additional actions to reduce wolf numbers are requested by the land manager and deemed appropriate by the Board of Game. Under the proposed plan, wolves, caribou, and moose are expected to fluctuate independent of human influence. The proposed management plan will have little effect on bear populations in Unit 20F.

Unit 25C: High levels of both consumptive use and viewing along the Steese Highway corridor were identified as priorities in Unit 25C. In the remainder of the unit, moderate to low use is expected. The proposed plan calls for the Yukon-Charley Rivers National Preserve, the Birch Creek and Preacher Creek drainages, and a portion of the Beaver Creek drainage along the northern boundary of Unit 25C to be managed as a Zone 4 (see map 2). The White Mountains in the western part of Unit 25C will be managed under a Zone 5 designation.

The number of caribou in the White Mountains has increased in recent years, but may increase or decline independent of human influence (Table 16). Moose, wolf, sheep and bear populations are expected to fluctuate independent of human influence under the proposed plan. Wolf population reduction or regulation is not anticipated within any portion of Unit 25C. Moose harvests along the Steese Highway are expected to increase in coming years as hunting pressure increases. The caribou harvest along the Steese Highway will probably not increase unless the Fortymile caribou herd increases in size so that more caribou from that herd spend time in Unit 25C. Opportunities to view these species may also increase slightly.

Table 6 - MANAGEMENT OPTIONS FOR UNIT 12 (except Upper Tanana/Fortymile Control Area)

Species	Current Population Estimates	Population Objectives	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required to Meet Population and Harvest Objectives	Comments
Wolf	180-225	180-225	33 (15-69)	15-75	Currently met	Population will fluctuate primarily independently of human influence.
Moose	2000-3000	1800-3500	74 (60-86)	60-100	Currently met	May increase slowly if grizzly bear harvest is increased.
Caribou	1400-1500	1000-2000	41 (30-49)	10-50	Currently met	The winter caribou population inUnit 12 can include all or part of the Nelchina and Mentasta herds; an additional 15,000-50,000 caribou.
Sheep	9500-12,000	9550-14,000	258 (220-284)		Currently met	
Grizzly Bear	200-300	180-270	15 (10-21)		10 years	Hunting regulations liberalized to cause a slow decline in the Unit 12 bear population.
Black Bear	500-800	500-800	21 (13-35)		Currently met	

TABLE 7 -
MANAGEMENT OPTIONS FOR UPPER TANANA/FORTYMILE CONTROL AREA
(parts of units 12, 20B, 20D, and 20E)

Species	Implementation Option	Current Population Estimates	Population Objective	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required to Meet Population and Harvest Objectives	Comments
Wolf	—[a]	180-225	160-250	26 (10-50)	10-50	Currently met	Naturally regulated.
	I[b]		35-70; 290-340*		5-50	5 years	Options I-3: Pop reduction followed by regulation.
	II[c]		50-85; 280-330*		7-50	5 years	
	III[d]		70-100; 270-310*		10-50	5 years	
Moose	—[a]	3400-4000	3400-4000	57 (42-84)	40-90	Currently met	
	I[b]		9000-10,000		300-650	7-10 years	Cow harvests
	II[c]		8000-9000		250-550	7-10 years	will be needed.
	III[d]		6500-7500		225-450	7-10 years	Option III: Taylor highway moose will not greatly increase.
Caribou	—[a]	20,000-22,000	18,000-30,000	466 (249-795)	360-600	Currently met	Option I and II: Portion of harvest
	I[b]		60,000		3000-6000	8-12 years	will occur in
	II[c]		60,000		3000-6000	8-12 years	Canada.
	III[d]		35,000-40,000		1000-1200	7-10 years	
Sheep	—[a]	800-1100	800-1100	28 (20-40)	20-40	Currently met	Small increase is projected.
	I[b]		1000-1700		30-50		
	II[c]		1000-1500		30-50		
	III[d]		1000-1500		30-50		
Grizzly Bear	—[a]	300-400	270-360	15 (9-20)	10-35	8-10 years	Regulations designed to slowly decrease bear population.
	I[b]		270-360				
	II[c]		230-325				
	III[d]		180-270				
Black Bear	—[a]	700-1300	700-1300	10 (5-17)	10-50	Undefined	Hunter interest in black bear is currently low.
	I[b]		700-1300		10-50		
	II[c]		600-1100		10-40		
	III[d]		500-1000		10-30		

[a] No wolf control.
[b] Wolf numbers reduced over entire 9700 mi², then regulated over southern portion.
[c] Wolf numbers reduced over 8500 mi² (excludes areas south of the Tanana River) then regulated over the southern portion.
[d] Wolf numbers reduced over 6975 mi² (excludes Unit 12, southern Unit 20E and the Robertson River drainage) then regulated in southeast portion.
*First entry relates to reduction effort, second entry relates to levels at 5-10 years.

TABLE 8 - MANAGEMENT OPTIONS FOR UNIT 20A
(Tanana Foothills Controled Area)

Species	Implem-ention Option	Current Population Estimates	Population Objective	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required to Meet Population and Harvest Objectives	Comments
Wolf	—[a]	131-165	100-200	19	15-25	Currently met	No control option: Population will fluctuate independently of human influence.
	I[b]		100-175		25-60	Currently met	
	II[c]		40-70; 100-175*		5-25; 25-40*	1-3 yrs; 5-10 yrs*	
	III[d]		70-110		15-40	1-3 years	
	IV[e]		40-70		10-25	1-3 years	
Moose	—[a]	5500-6500	5500-6500	137	0-500	Currently met	No control option: Population may decline independently of harvest. Option II: Harvest may be reduced after 3-5 years.
	I[b]		5500-6500		100-200	Currently met	
	II[c]		5500-6500		200-800	1-5 years	
	III[d]		5500-6500		400-800	1-3 years	
	IV[e]		5500-6500		500-1000	1-3 years	
Caribou	—[a]	5500-6500	1000-5000	655	<100	Currently met	No control option: Option I: Population expected to decline. Option II: Harvest may be reduced after 3-5 years.
	I[b]		1000-5000		<100	Currently met	
	II[c]		7500-8500		100-300	2-5 years	
	III[d]		7500-8500		200-500	2-5 years	
	IV[e]		7500-8500		500-900	2-5 years	
Sheep	—[a]	2000-4000	2000-4100	143	125-175	Currently met	
	I[b]		2000-4100		125-175	Currently met	
	II[c]		4000-6000		150-200	5-10 years	
	III[d]		4000-6000		150-200	5-10 years	
	IV[e]		4000-6000		150-200	4-7 years	
Grizzly Bear	—[a]	70-125	100-150	13	5-10	Currently met	
	I[b]		100-150		5-10	Currently met	
	II[c]		100-150		5-10	Currently met	
	III[d]		100-150		5-10	Currently met	
	IV[e]		100-150		5-10	Currently met	

[a] No wolf control.
[b]Wolf population regulated near current level.
[c]Wolf population reduced to low level, the allowed to increase.
*First entry relates to reduction effort, second entry relates to levels a 5-10 years.
[d]Wolf population reduced to low level, then allowed to increase and regulated at moderate level.
[e]Wolf population reduced to low level then held there.

TABLE 9 - MANAGEMENT OPTIONS FOR UNIT 20A (Tanana Flats Control Area)

Species	Implem-ention Option	Current Population Estimates	Population Objective	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required to Meet Population and Harvest Objectives	Comments
Wolf	—[a]	89-131	100-150	19 (15-28)	15-25	Currently met	No control option: Population will fluctuate independently of human influence. Option II: Wolf numbers back to precontrol level in 3-7 years.
	I[b]		90-130		15-35	Currently met	
	II[c]		30-60; 90-130*		5-15; 15-35*	1-3 yrs; 5-10 yrs*	
	III[d]		60-100		15-35	1-3 years	
	IV[e]		30-60		7-20	1-3 years	
Moose	—[a]	4200-5800	4200-5800	225 (187-260)	0-100	Currently met	No control option: Population may decline independdently of harvest. Option I: Population objectives may not be met. Option II: Harvest may be reduced after 2-5 years.
	I[b]		4200-5800		0-250	5-10 years	
	II[c]		5500-6500		300-600	1-2 years	
	III[d]		5500-6500		300-600	3-5 years	
	IV[e]		5500-6500		500-1000	1-2 years	
Grizzly Bear	—[a]	30-50	30-50	2	0-4	Currently met	
	I[b]		30-50		0-4	Currently met	
	II[c]		30-50		0-4	Currently met	
	III[d]		30-50		0-4	Currently met	
	IV[e]		30-50		0-4	Currently met	
Black Bear	—[a]	500-700	500-700	34	50-75	2-5 years	
	I[b]		500-700		50-75	2-5 years	
	II[c]		500-700		50-75	2-5 years	
	III[d]		500-700		50-75	2-5 years	
	IV[e]		500-700		50-75	2-5 years	

[a] No wolf control.
[b] Wolf population regulated near current level.
[c] Wolf population reduced to low level, then allowed to increase.
* First entry relates to reduction effort, second entry relates to levels at 5-10 years.
[d] Wolf population reduced to moderate level and held there.
[e] Wolf population reduced to low level and held there.

TABLE 10 - PROPOSED MANAGEMENT FOR UNIT 20B (except Upper Tanana/Fortymile control area)

Species	Current Population Estimates	Population Objectives	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required To Meet Population and Harvest Objectives	Comments
Wolf	150-225	150-225	20 (5-33)	6-40	Currently met	Population will fluctuate independently of human influence.
Moose	9000-10,000	9000-11,000	385 (310-433)	300-600	Currently met	
Caribou	Seasonal migrant - see Table 7.					
Sheep	See Table 7.					
Grizzly Bear	75-125	75-125	6 (3-9)	5-10	Currently met	
Black Bear	750-1200	750-1200	120 (95-152)	100-150	Currently met	

TABLE 11 - PROPOSED MANAGEMENT FOR UNIT 20C (Denali National Park)

Species	Current Population Estimates	Population Objectives	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required To Meet Population and Harvest Objectives	Comments
Wolf	125-175	*	0	0	Currently met	This area includes only Denali National Park. Denali National Preserve is included with remainder of Unit 20C.
MOOSE	2000	*	0	0	Currently met	
Caribou	2900	*	0	0	Currently met	
Sheep	1500-2500	*	0	0	Currently met	
Grizzly Bear	150-250	*	0	0	Currently met	
Black Bear	250-350	*	0	0	Currently met.	

*Population Objectives: Populations will fluctuate independent of human influence.

TABLE 12 - PROPOSED MANAGEMENT FOR UNIT 20C (except Denali National Park, but including Denali National Preserve)

Species	Current Population Estimates	Population Objectives	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required To Meet Population and Harvest Objectives	Comments
Wolf	50-125	50-125	17 (3-45)	0-15	Currently met	Wolf, moose, and caribou populations will fluctuate mostly independent of human influence. The Denali caribou herd ranges both in and out of Denali Park.
Moose	1500-2500	500-3000	100 (70-116)	25-150	Currently met	
Caribou	2900	See table #11	0	50-100 when population is over 4000	Unknown	
Sheep	0	0	0	0	N/A	
Grizzly Bear	60-110	60-110	4 (4-6)	0-10	Currently met	
Black Bear	700-1100	700-1100	17 (7-25)	5-50	Currently met	

TABLE 13 - PROPOSED MANAGEMENT FOR UNIT 20D (except Upper Tanana/Fortymile Control Area)

Species	Current Population Estimates	Population Objectives	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required To Meet Population and Harvest Objectives	Comments
Wolf	50-125	50-125	12 (2-23)	5-25	Currently met	
Moose	2000-4000	2000-4000	120 (116-120)			
Caribou	600	600-800	39(10-57)	0-50	Currently met	
Sheep	1000-1500	1000-2000	36	27-45	Currently met	
Grizzly Bear	60-120	60-100	6 (3-9)	8-12	10 years	Liberalized bag bag limits in north-eastern 20D may may not reduce population.
Black Bear	350-600	350-600	15 (15-18)	15-30	Currently met	

TABLE 14 - PROPOSED MANAGEMENT FOR UNIT 20E (except Upper Tanana/Fortymile Control Area)

Species	Current Population Estimates	Population Objectives	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required To Meet Population and Harvest Objectives	Comments
Wolf	100-125	100-150	8 (3-20)	5-20	Currently met	Wolf population will fluctuate independently of human influence.
Moose	2000-2300	2000-3300	10 (3-20)	50-75	0-5 years	Low harvest due to access.
Caribou	Seasonal migrant -see Table 7.					
Sheep	See Table 7.					
Grizzly Bear	175-225	175-225	5 (2-10)	5-15	Currently met	Low harvest due to remote access.
Black Bear	300-700	300-700	3 (1-10)	1-10	Currently met	

TABLE 15 - PROPOSED MANAGEMENT FOR UNIT 20F

Species	Current Population Estimates	Population Objectives	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required To Meet Population and Harvest Objectives	Comments
Wolf	75-125	75-125	7 (2-14)	0-20	Currently met	Wolf, moose, and caribou populations will fluctuate independently of human influence.
Moose	1000-2000	1000-2000	30 (20-40)	20-40	currently met	
Caribou	500-1000	500-1000	3(0-10)	0-25	Currently met	
Sheep	0	0	0	0	N/A	
Grizzly Bear	60-110	60-110	2 (1-4)	0-10	Currently met	
Black Bear	400-700	400-700	14 (5-32)	10-50	Currently met	Harvest increase expected with increased use of the Dalton Highway corridor.

TABLE 16 - PROPOSED MANAGEMENT FOR UNIT 25C

Species	Current Population Estimates	Population Objectives	Average (Range) Harvest 1986-1990	Annual Harvest Objectives When Population Objectives Are Met	Time Required To Meet Population and Harvest Objectives	Comments
Wolf	75-125	75-125	6 (1-11)	0-25	Currently met	Wolf, moose, and caribou population will fluctuate independently of human harvest.
Moose	500-1500	500-1500	34 (26-44)	25-75	Currently met	
Caribou	750-1000	500-2000	19(4-30)	25-50	Currently met	
Sheep	300-400	300-400	3(1-5)	0-10	Currently met	
Grizzly Bear	60-110	60-110	3 (2-4)	0-10	Currently met	
Black Bear	350-550	350-550	__[a]	25-50	Unknown	

a Harvest is not documented because there is no sealing requirement in Unit 25C.

Appendix I. Alternative Population and Harvest Objectives

Southcentral: Unit 13 Control Area

Three management alternatives are considered:

1. Take no action to manage predation. Under this alternative, an implementation plan will not be necessary since wolf numbers will be neither reduced nor regulated. Nearly the entire Unit (that area east of the Parks Highway and Denali State Park) would be classified as a Zone 4 or 5 with no land-and-shoot or aerial shooting of wolves allowed. The wolf population would become substantially higher than current levels, probably in the neighborhood of 300-400 at the conclusion of the hunting and trapping seasons (Table 3). Annual harvests would likely range between 40-100 wolves depending on factors such as pelt price and trapping conditions. Wolves in remote, inaccessible areas would receive little harvest. The human use objective for moose would be reduced from 1300 to about 800 and cow moose would not be harvested. The human use objective for Nelchina caribou would be reduced to about 3000 animals annually. Little change in human use objectives for bears, Dall sheep, and mountain goats would be required.

2. Manage for slight increases in harvest levels from a caribou population of 40,000 and a moose population of 25,000 (see Appendix II, Unit 13 Control Area, Implementation Option I, and Table 3, Option I). Under this alternative moose harvests would increase to the range of 1300 animals and cow moose harvests may be required. Yields of caribou would probably increase to about 4000 animals per year. The wolf population would be regulated at 150-200 animals (slightly below the current estimate) at the end of the hunting and trapping season.

3. Manage for increased harvests from a caribou population of 40,000 and a moose population of 25,000 (see Appendix II, Unit 13 Control Area, Implementation Option II, and Table 3, Option II). Under this alternative moose harvests would increase to the range of 1800-2000 animals and cow moose harvests would be required. Yields of caribou would probably increase to about 4500 animals per year. The wolf population would be reduced and then regulated at 50-100 animals at the end of the hunting and trapping season.

Interior: Upper Tanana/Fortymile Control Area (portions of Units 12, 20B, 20D and 20E)

Three management alternatives are considered:

1. Take no action to manage predation. Under this alternative, an implementation plan will not be necessary because wolf numbers will be neither reduced nor regulated. The wolf population will fluctuate naturally and is expected to remain at 160-250 wolves (Table 7).

2. Manage to achieve a caribou population of 60,000 in 8-12 years and a moose population of 8000-10,000 in 7-10 years (see Appendix II, Upper Tanana - Fortymile Control Area, Implementation Options I and II, and Table 7, Options I and II). These are the objectives in the Board-approved interim Area-Specific Plan. Both implementation options affect the caribou situation similarly and are designed to achieve the same caribou objective of 60,000 animals. However, Option II involves less area in the Upper Tanana and, hence, affects a smaller population of moose.

3. Manage to achieve a caribou population of 35,000-40,000 and a moose population of 6500-7550 in 7-10 years (see Appendix II, Upper Tanana - Fortymile Control Area, Implementation Option III, and Table 7, Options I and II). Option III encompasses less of the range of the Fortymile caribou herd than do Options I and II. Thus, growth of the caribou herd is expected to be slower and fewer moose will benefit from the control effort.

Interior: Unit 20A Foothills Control Area

Four management alternatives are considered:

1. Take no action to manage predation. Under this alternative, an implementation plan will not be necessary since wolf numbers will be neither reduced nor regulated. The wolf population will fluctuate naturally and is expected to remain at 100-200 wolves (Table 8). The moose population may decline independent of the harvest by people. The caribou population is expected to decline.

2. Manage for a moose population at the existing size of approximately 5500-6500 (the tentatively approved objective) and maintain the existing moose harvest level. To achieve this objective, wolf numbers will have to be regulated at a level slightly lower than currently exists (see Appendix II, Foothills Control Area, Implementation Option I, and Table 8, Option I). This level of wolf management would not be sufficient to stop the decline in caribou numbers. The caribou herd would be expected to decline to 1500-2500.

3. Manage for a moose population at the existing size of approximately 5500-6500 and a caribou population of 7500-8500. This is a caribou herd size that biologists feel can be safely sustained by the available range and is at the lower end of the range provided in the Board-approved interim Area-Specific Plan. Wolf predation would have to be reduced to achieve this objective. Implementation Options II, III and IV (see Appendix II, Foothills Control Area, and Table 8) provide ways to achieve these caribou and moose population objectives and provide differing levels of harvest by people.

4. Manage for a moose population at the existing size of approximately 5500-6500 and a caribou population of approximately 10,000. This is the caribou herd size that existed prior to the most recent decline. It is also at the upper end of the range provided in the Board-approved interim Area-Specific Plan. This alternative would require an implementation plan because wolf numbers would have to manipulated to obtain the proposed caribou objective. Biologists disagree as to whether a herd of 10,000 caribou can be sustained on the available range.

Interior: Unit 20A Tanana Flats Control Area

Four management alternatives are considered:

1. Take no action to manage predation. Under this alternative, an implementation plan will not be necessary since wolf numbers will be neither reduced nor regulated. The wolf population will fluctuate naturally and is expected to remain at 100-150 wolves (Table 9). The moose population may decline independent of the harvest by people.

2. Manage for a population at the existing size of approximately 4200-5800 moose and maintain the existing harvest level. To achieve this objective, wolf numbers will have to be regulated at a level slightly lower than currently exists (see Appendix II, Tanana Flats Control Area, Implementation Option I, and Table 9, Option I).

3. Manage for a moose population of approximately 5500-6500 (the tentatively approved objective) and increase the allowable harvest by people. A reduction in wolf predation will be necessary to achieve this objective. Implementation Options II, III and IV (Appendix II, Tanana Flats Control Area, and Table 9) provide different ways to manage for high harvest levels by people from a population of 5500-6500 moose.

4. Manage for a population larger than 5500-6500 moose. This alternative would require active habitat enhancement to increase the ability of the area to support a productive moose population larger than 5500-6500 moose. Once habitat enhancement efforts were underway, a short-term wolf reduction effort would be necessary to initiate an increase in the moose population to take advantage of the additional capability to support more moose. It is uncertain whether additional wolf management would become necessary after the wolf population recovers. That would depend on whether the wolf population stabilizes at pre-reduction levels or continues to increase to a new level as a result of the increase in prey abundance. An implementation plan will have to be developed if this management alternative is chosen.

Unit 13E - Controlled Area

5AAC 92.120 WOLF PREDATION CONTROL PROGRAMS. Control predation by wolves in GMUs 13A, B, C, and those portions of 13E east of both Denali State Park and the Parks Highway by implementing one of the following strategies:

Unit 13 Proposed Implementation Plan
STATEMENT OF PROPOSED ACTION

Two options are proposed for management of wolves within GMU 13:

I. Regulate wolf abundance to 150-200 wolves in GMU 13 by applying control measures in Subunits 13A, B, C and that portion of 13E east of the Parks Highway and Denali State Park.

II. Regulate wolf abundance to 50-100 wolves in GMU 13 by applying control measures in Subunits 13A, B, C and that portion of 13E east of the Parks Highway and Denali State Park.

JUSTIFICATION

Moose and caribou are abundant in GMU 13. The wolf population is highly productive because of the plentiful prey base. Annual pup recruitment can account for 30-40% of the population. At current population levels, unless a significant proportion of annual recruitment is harvested, wolf numbers will increase. Only by maintaining wolf numbers substantially below their potential can human use objectives for moose and caribou populations be achieved.

OPTION I

Under this option, the wolf population will be regulated to 150-200 wolves (slightly below the current estimate) at the end of each hunting and trapping season. Annual harvest will normally range between 50 and 150 wolves. The public will be allowed to take wolves by the land-and-shoot method in addition to conventional hunting and trapping methods. The department will not be conducting additional wolf control activities.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLAN. In accordance with the Strategic Wolf Management Plan and Area Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) Subunits 13A, B, C and that portion of 13E east of the Parks Highway and Denali State Park.

(1) the program objectives for this area are:

(A) Overall Management Goal: to conserve all populations of wildlife; to produce high yields of moose and caribou for humans and to provide the maximum opportunity to participate in hunting for these species; to maintain all populations of wildlife, including predators, at significant, visible levels to provide for a broad spectrum of uses.

(B) Nelchina Caribou Herd: to stabilize the herd at about 40,000 total animals in 1992 with a minimum of 40 bulls/100 cows and a minimum of 40 calves/100 cows; to maintain 1990-92 levels of animal growth and condition.

(i) to maintain an average annual human harvest of at least 4,000 caribou beginning in 1992.

(C) Moose: to slightly increase the unitwide population to about 25,000 moose by 1995 with a minimum of 25 bulls/100 cows, with a wide range of age classes, and a minimum of 25 calves/100 cows.

(i) to achieve and maintain an average annual human harvest of at least 1,300 moose by 1995; the harvest will include both sexes if appropriate to achieve the population objective.

(D) Wolves: to achieve, by 1993, and maintain a post-hunting season population of 150 to 200 wolves, distributed proportionally between subunits.

(i) harvest as necessary to maintain the population at objective level with normal hunting and trapping being the preferred methods of take; members of the public may also take wolves by land-and-shoot methods under terms and conditions of a permit issued by the department to facilitate control efforts; annual harvests will normally range between 50 and 150 wolves.

(2) the commissioner shall implement the program to achieve the objectives of the section in the following manner:

(A) beginning in January 1993 the commissioner may regulate the wolf population by allowing land and

shoot taking of wolves under a registration permit system for qualified individuals (see Strategic Wolf Management Plan for Alaska). This wolf population regulation measure will be implemented when the number of wolves in a subunit exceeds the population objective and ground trapping and hunting are not expected to reduce the population to objective levels. Subunit quotas for land and shoot control actions will be established annually if conditions were met to justify population regulation using this method of take. Permittees will be provided with specific information on where their permit is valid, when they can use it, and the number of wolves which can be taken. Permittees are required to immediately tag all wolves in the field with metal locking tags. They are require to report, to the Glennallen office, all wolves within 5 day of taking. When land and shoot quotas for individual subunits are reached, permittees will be notified that their permits are no longer valid for that area. Ground trapping and hunting will remain open until the season ends.

(B) this program is authorized for a five-year term beginning 1 January 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

The caribou population initially will be reduced from 45,000 to 40,000 by human harvest to attain the departments management objective. Caribou harvest will then be maintained at about 4,000 animals. The moose population will be allowed to increase from an estimated 22,000 animals to 25,000. Moose harvests will increase from 800 to about 1,300 and may include cow harvest.

OPTION II

Under this option, the wolf population will be reduced to and then regulated at, 50-100 wolves at the end of each hunting and trapping season. Annual harvest will normally range between 25 and 75 wolves. The public will be allowed to take wolves by the land-and-shoot method in addition to conventional hunting and trapping methods. The department will not be conducting additional wolf control activities.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLAN. In accordance with the Strategic Wolf Management Plan and Area Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:
(a) Subunits 13A, B, C and that portion of 13E east of the Parks Highway and Denali State Park.

(1) the program objectives for this area are:

(A) Overall Management Goal: to conserve all populations of wildlife; to produce high yields of moose and caribou for humans and to provide the maximum opportunity to participate in hunting for these species; to maintain all populations of wildlife, including predators, at significant, visible levels to provide for a broad spectrum of uses.

(B) Nelchina Caribou Herd: to stabilize the herd at about 40,000 total animals in 1992 with a minimum of 40 bulls/100 cows and a minimum of 40 calves/100 cows; to maintain 1990-92 levels of animal growth and condition.

(i) to maintain an average annual human harvest of at least 4,500 caribou beginning in 1992.

(C) Moose: to slightly increase the unitwide population to about 25,000 moose by 1995 with a minimum of 25 bulls/100 cows, with a wide range of age classes, and a minimum of 25 calves/100 cows. (i) to achieve and maintain an average annual human harvest of at least 1,800-2,000 moose by 1995; the harvest will include both sexes if appropriate to achieve the population objective. (D) Wolves: to achieve, by 1993, and maintain a post-hunting season population of 50 to 100 wolves, distributed proportionally between subunits.

(i) harvest as necessary to maintain the population at objective level with normal hunting and trapping being the preferred methods of take; members of the public may also take wolves by land-and-shoot methods under terms and conditions of a permit issued by the department to facilitate control efforts; annual harvests will normally range between 25 and 75 wolves.

(2) the commissioner shall implement the program to achieve the objectives of the section in the following manner:

(A) beginning in January 1993 the commissioner may regulate the wolf population by allowing land and shoot taking of wolves under a registration permit system for qualified individuals (see Strategic Wolf Management Plan for Alaska). This wolf population regulation measure will be implemented when the number of wolves in a subunit exceeds the population

objective and ground trapping and hunting are not expected to reduce the population to objective levels. Subunit quotas for land and shoot control actions will be established annually if conditions were met to justify population regulation using this method of take. Permittees will be provided with specific information on where their permit is valid, when they can use it, and the number of wolves which can be taken. Permittees are required to immediately tag all wolves in the field with metal locking tags. They are required to report, to the Glennallen office, all wolves within 5 days of taking. When land and shoot quotas for individual subunits are reached, permittees will be notified that their permits are no longer valid for that area. Ground trapping and hunting will remain open until the season ends.

(B) this program is authorized for a five-year term beginning 1 January 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

The caribou population initially will be reduced from 45,000 to 40,000 by human harvest to attain the departments management objective. Caribou harvest will then be maintained at about 4,500 animals. The moose population will be allowed to increase from an estimated 22,000 animals to 25,000. Moose harvests will increase from 800 to about 1,800 to 2,000 and would include cow harvest.

Unit 20A- Tanana Flats Control Area

5 AAC 92.120. WOLF PREDATION CONTROL PROGRAMS. Control predation by wolves in the Tanana Flats portion of Unit 20A by implementing one of the following strategies:

I. Attempt to regulate wolf numbers near the current level to provide moose harvest for hunters at or below the current level. Wolf numbers will not be significantly reduced. Land-and-shoot taking of wolves will be permitted. The annual harvest of wolves through traditional hunting and trapping practices will be continued.

II. Temporarily reduce wolf numbers to a low level. Wolf populations will then be allowed to recover to natural levels following the reduction effort. Moose harvests by hunters will increase significantly during the first 2 years following wolf population reduction. As the wolf population recovers, moose harvests will be reduced.

III. Moderately reduce wolf numbers, then regulate wolves at a moderate level for the life of the plan. Moose harvests will increase following wolf population reduction and will be relatively stable throughout the life of the plan. Moderate harvest of cow moose will be allowed

IV. Greatly reduce wolf numbers and attempt to regulate them at a low level for the life of the plan. Moose harvests by hunters will greatly increase following wolf population reduction and will remain at high levels throughout the life of the plan. High harvests of cow moose will be allowed.

Management actions under Options II-IV will result in an increased annual harvest of moose by people. This increase can be accomplished by reallocating more of the current annual production of moose from wolves to people.

JUSTIFICATION

There has been high public interest in managing the Tanana Flats for sustained high harvests of moose since the 1950s. Public testimony during the wolf planning process indicated continued interest in managing for high consumptive use of moose. It is less clear, however, just how intensively this moose population should be managed for human use. Some say that current moose densities and harvest rates are intensive for an interior moose population and adequate. Others would like to increase the size of the moose population and/or shift the allocation of the moose harvest from wolves to people.

Presently, hunters harvest less than 5% of the moose population each year. Management since 1984 has occurred in the form of regulations designed to reduce or increase harvest of moose. Harvests of wolves by conventional hunting and trapping, in combination with land-and-shoot hunting, have not prevented wolf population growth. The wolf population is currently high.

Overall, moose habitat quality is adequate. Habitat quality is not limiting moose populations at this time. Habitat enhancement will be dependent upon the management of wild and prescribed fires to produce vegetative conditions favorable to moose.

OPTION I

Under this option, wolf numbers will be regulated near current levels to maintain current moose harvest levels. If nothing is done, wolf numbers are expected

to continue to increase and current moose harvest levels could not be sustained. Public hunting and trapping activities, including land-and-shoot under permit, will be the primary means of annually regulating the wolf population. Reduction activities by the department, including trapping, snaring and aerial shooting, will be used to remove additional wolves if harvests by the public in any year are insufficient to maintain the wolf population at the desired level

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Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Tanana Flats area is bounded on the west by the Nenana River beginning at its intersection with the Rex Trail, then along the east bank of the Nenana River downstream to its confluence with the Tanana River, then easterly along the north bank of the Tanana River to its confluence with the Delta River, then upstream along the west bank of the Delta River to the 2000 foot contour line which intercepts the Delta River ear the mouth of Darling Creek. The Tanana Flats plan area is bounded on the south by the 2000 foot contour beginning at the Delta River then westerly to its intersection with Snow Mountain Gulch, then along Snow Mountain Gulch to the Wood River, then downstream along the west bank of the Wood River to the Rex Trail, then along the Rex Trail to its intersection with the Nenana River, the point of beginning.

(1) the program objectives for this area are:

(A) to achieve and maintain an early winter population of 4200-5800 moose; and

(B) after the moose population has reached 4200-5800, to maintain an early winter population of 90-130 wolves provide an average annual harvest of:

(i) up to 250 bull moose (up to 4% of the estimated early winter population);

(2) the commissioner shall implement this program to achieve the objectives of this section in the following manner:

(A) beginning January 1, 1993, the commissioner may regulate the wolf population between 90 and 130; however, the commissioner may not reduce the early winter wolf population below 90 wolves;

(B) members of the public may take wolves by the land-and-shoot method under terms and conditions of a permit issued by the department to facilitate control efforts;

(C) the commissioner shall conduct wolf population regulation activities in an efficient manner, but as safely and humanely as practical.

(3) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

Based on historical records, the harvest of wolves by the public is expected to only occasionally be sufficient to regulate wolf numbers, even when land-and-shoot hunting is permitted. Land-and-shoot could be an effective means of regulation in those years when snow and weather conditions are good for hunting by land-and-shoot method.

Moose numbers will be expected to remain stable at approximately 5000 moose throughout the life of this implementation plan. Moose harvests of up to 250 bull moose could be allowed. The department will adjust annual moose harvests based on annual estimates of moose population size and potential growth rate. Harvest of antlerless moose will not be allowed, and harvest of bull moose may be further restricted to meet population objectives.

OPTION II

Under this option, wolf numbers will be reduced by about 50-75% for 1-3 years to allow the moose population to grow slightly and to reallocate more of the allowable harvest of moose from wolves to people. Public hunting and trapping activities will be encouraged, but land-and-shoot taking will not be allowed. Reduction activities by the department, including trapping, snaring and aerial shooting, will be the primary means of annually reducing the size of the wolf population. Wolf numbers will be allowed to increase following the reduction effort. The size of the wolf population after it recovers from the control program will be determined naturally by the availability of prey.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Tanana Flats area is bounded on the west by the Nenana River beginning at its intersection with the Rex Trail, then along the east bank of the Nenana River downstream to its confluence with the Tanana River, then easterly along the north bank of the Tanana River to its confluence with the Delta River, then upstream along the west bank of the Delta River to the 2000 foot contour line which intercepts the Delta River near the mouth of Darling Creek. The Tanana Flats plan area is bounded on the south by the 2000 foot contour beginning at the Delta River then westerly to its intersection with Snow Mountain Gulch, then along Snow Mountain Gulch to the Wood River, then downstream along the west bank of the Wood River to the Rex Trail, then along the Rex Trail to its intersection with the Nenana River, the point of beginning.

(1) the program objectives for this area are:

(A) to achieve and maintain an early winter population of 5500-6500 moose; and

(B) after the moose population has reached 5500-6500, to provide an average annual harvest of:

(i) 300-600 moose of either sex during the first 2 years (5-10% of the estimated early winter population); thereafter annual moose harvests will be reduced as necessary to maintain the moose population objective;

(2) the commissioner shall implement the program to achieve the objectives of this section in the following manner:

(A) for up to 3 years beginning January 1, 1993, the commissioner may reduce the wolf population; however, the commissioner may not reduce the early winter wolf population below 30 wolves;

(B) department personnel may take wolves by trapping, snaring, and shooting, including shooting from aircraft between October 1 and April 30 during the term of the program;

(C) the commissioner shall conduct wolf population reduction activities in an efficient manner, but as safely and humanely as practical.

(3) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

Moose numbers are expected to increase to 6000 moose within 1-3 years. Until the objective is reached, harvest will be limited to no more than 200 bulls. After the population objective is reached, moose harvests of up to 600 moose, including up to 300 antlerless moose, could be allowed. The department will adjust annual antlerless moose permits based on annual estimates of moose population size and potential growth rate. Conventional hunting and trapping of wolves is not expected to regulate wolf numbers and the wolf population is expected to recover to near pre-control levels within 5 years after control programs end. Moose harvests by hunters will be reduced as needed at that time to maintain the moose population at 5500-6600 moose.

OPTION III

Under this option, wolf numbers will be reduced by about 25-50% for 1-3 years. Following the reduction effort, wolf numbers will be regulated at a moderate level similar to that found in unmanaged wolf-moose systems in interior Alaska. Allowable harvest of moose by people will moderately increase. During both the reduction and regulation phases of this program, public hunting and trapping activities will be encouraged, and land-and-shoot taking will be allowed under permit. Reduction activities by the department including trapping, shooting activities, including aerial shooting, will be used to augment the take by the public.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Tanana Flats area is bounded on the west by

the Nenana River beginning at its intersection with the Rex Trail, then along the east bank of the Nenana River downstream to its confluence with the Tanana River, then easterly along the north bank of the Tanana River to its confluence with the Delta River, then upstream along the west bank of the Delta River to the 2000 foot contour line which intercepts the Delta River near the mouth of Darling Creek. The Tanana Flats plan area is bounded on the south by the 2000 foot contour beginning at the Delta River then westerly to its intersection with Snow Mountain Gulch, then along Snow Mountain Gulch to the Wood River, then downstream along the west bank of the Wood River to the Rex Trail, then along the Rex Trail to its intersection with the Nenana River, the point of beginning.

(1) the program objectives for this area are:

(A) to achieve and maintain an early winter population of 5500-6500 moose; and

(B) after the moose population has reached 5500-6500, to maintain an early winter wolf population of 60-100 wolves to provide an average annual harvest of:

(i) 300-600 moose of either sex (5-10% of the estimated population).

(2) the commissioner shall implement the program to achieve the objectives of this section in the following manner:

(A) for up to 3 years beginning January 1, 1993, the commissioner may reduce the wolf population; however, the commissioner may not reduce the early winter wolf population below 60 wolves; and except during the 1992 regulatory year, the commissioner may not conduct a wolf population reduction or regulation program in a regulatory year that the Board of Game has not authorized the department to issue up to 500 antlerless moose permits for the Tanana Flats control area;

(B) once the moose population objective is met, the commissioner may annually remove the number of wolves necessary to maintain an early winter population of 60-100 wolves; however the commissioner may not reduce the early winter wolf population below 60 wolves;

(C) department personnel may take wolves by trapping, snaring, and shooting, including shooting from aircraft between October 1 and April 30 during the term of the program;

(D) members of the public may take wolves by the land-and-shoot method under terms and conditions of a permit issued by the department to facilitate control efforts;

(E) the commissioner shall conduct wolf population reduction and regulation activities in an efficient manner, but as safely and humanely as practical.

(3) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

Moose numbers are expected to increase to 6000 moose within 3-5 years after implementation of this plan. Until the population objective is reached harvest will be limited to no more than 300 bulls. After the population objective is reached, moose harvests of up to 600 moose, including up to 300 antleriess moose, could be allowed. The department will adjust annual antlerless moose permits based on annual estimates of moose population size and potential growth rate. Additional antlerless harvests may be necessary to regulate the moose population near the population objective.

OPTION IV

Under this option, wolf numbers will be reduced by about 50-75% and then maintained at this level to greatly increase the allowable harvest of moose by people. Public hunting and trapping activities will be encouraged, and land-and-shoot taking will be allowed under permit. Reduction activities by the department including trapping, snaring and aerial shooting will be used to augment the take by the public.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Tanana Flats area is bounded on the west by the Nenana River beginning at its intersection with the Rex Trail, then along the east bank of the Nenana River downstream to its confluence with the Tanana River,

then easterly along the north bank of the Tanana River to its confluence with the Delta River, then upstream along the west bank of the Delta River to the 2000 foot contour line which intercepts the Delta River near the mouth of Darling Creek. The Tanana Flats plan area is bounded on the south by the 2000 foot contour beginning at the Delta River then westerly to its intersection with Snow Mountain Gulch, then along Snow Mountain Gulch to the Wood River, then downstream along the west bank of the Wood River to the Rex Trail, then along the Rex Trail to its intersection with the Nenana River, the point of beginning.

(1) the program objectives for this area are:

(A) to achieve and maintain an early winter population of 5500-6500 moose; and

(B) after the moose population has reached 5500-6500, to maintain an early winter wolf population of 30-60 wolves to provide an average annual harvest of:

(i) 500-1000 moose of either sex (8-17% of the estimated population).

(2) the commissioner shall implement the program to achieve the objectives of this section in the following manner:

(A) beginning January 1, 1993, the commissioner may reduce the wolf population; however, the commissioner may not reduce the early winter wolf population below 30 wolves; and except during the 1992 regulatory year, the commissioner may not conduct a wolf population reduction or regulation program in a regulatory year that the Board of Game has not authorized the department to issue up to 700 antlerless moose permits for the Tanana Flats control area;

(B) once the moose population objective is met, the commissioner may annually remove the number of wolves necessary to maintain an early winter population of 30-60 wolves; however, the commissioner may not reduce the early winter population below 30 wolves;

(C) department personnel may take wolves by trapping, snaring, and shooting, including shooting from aircraft, between October 1 and April 30 during the term of the program;

(D) members of the public may take wolves by the land-and-shoot method under terms and conditions of a permit issued by the department to facilitate control efforts;

(E) the commissioner shall conduct wolf population reduction and regulation activities in an efficient manner, but as safely and humanely as practical.

(3) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

Moose numbers are expected to increase to 6000 moose within 1-3 years after implementation of this plan. Until the population objective is reached harvest will be limited to 400 bulls. After the population objective is reached, moose harvests of up to 500 antlerless moose and 700 bull moose could be allowed. The department will adjust annual antlerless moose permits based on annual estimates of moose population size and potential growth rate. Additional antlerless harvests may be necessary to regulate the moose population near the population objective.

Unit 20A - Tanana Foothills Control Area

5 AAC 92.120 WOLF PREDATION CONTROL PROGRAMS. Control predation by wolves in the foothills portion of Unit 20A by implementing one of the following strategies:

I. Attempt to regulate wolf numbers near the current level to sustain current or greater harvests of moose by people. Wolf numbers will not be significantly reduced and the Delta caribou herd will continue to decline. Land-and-shoot taking of wolves will be permitted. The annual harvest of wolves through traditional hunting and trapping practices will be continued.

II. Temporarily reduce wolf numbers to a low level. The wolf population will then be allowed to recover to natural levels following the reduction effort. Moose harvests will increase dramatically, and the caribou herd is expected to increase, initially. As the wolf population recovers, both moose and caribou harvests will be reduced. The wolf population reduction effort may have to be repeated in 5-15 years.

III. Greatly reduce wolf numbers, then allow wolves to recover to a moderate level and attempt to regulate their numbers at that level for the life of the plan. Moose harvests will increase, and the caribou herd will increase to the population objective within 5 years and

provide moderate harvests.

IV. Greatly reduce wolf numbers and attempt to regulate them at a low level for the life of the plan. Moose harvests will increase dramatically. The Delta caribou herd will increase and then provide high harvests.

Option I will attempt to maintain current harvest levels for moose, but caribou harvests will remain minimal. Management actions under options II-IV will result in an increased annual harvest of moose and caribou by people. This increase can be accomplished by increasing the population of the Delta caribou herd and by reallocating more of the current production of moose and caribou from wolves to people.

JUSTIFICATION

From 1984-89, the Delta caribou herd increased 5-10% per year, but the moose population was stable. In contrast, since 1989 the moose population has increased an average of 12% per year and the caribou population has declined by 25-30% per year. It appears the recent growth in the moose population and the rapid decline of the caribou herd were accompanied by changes in wolf predation patterns in which wolves took an increasingly large proportion of their food from the caribou population. Presently, wolves in the foothills are obtaining more than half of their food from the caribou population and wolf numbers are near record high levels. Harvests of wolves by conventional hunting and trapping, and land-and-shoot hunting, have not prevented wolf population growth.

Overall, moose and caribou habitat quality is high. Seasonal conditions may affect caribou nutritional status or vulnerability to wolves, but neither habitat quality nor density of caribou are limiting factors.

Unless predation on caribou is reduced, the Delta caribou herd will continue to decline. Currently, hunting of caribou is closed in Unit 20A. However, the moose population is at the desired level and continues to grow. Wolf control activities intended to benefit caribou should be accompanied by high harvests of antlerless moose to prevent the moose population from increasing above the long-term carrying capacity of the habitat.

OPTION I

Under this option, wolf numbers will be regulated near current levels to maintain current moose harvest levels. If nothing is done, wolf numbers are expected to continue to increase and current moose harvest levels could not be sustained. The Delta caribou herd will continue to decline. Public hunting and trapping activities, including land-and-shoot under permit, will be the primary means of annually regulating the wolf population. Reduction activities by the department, including trapping, snaring and aerial shooting, will be used to remove additional wolves if harvests by the public in any year are insufficient to maintain the wolf population at the desired level.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Unit 20A foothills area is bounded beginning at the intersection of the Rex Trail and the Nenana River then southerly along the east bank of the Nenana River to Lignite Creek, then along the North Bank of Lignite Creek to the mouth of Sanderson Creek, then in a direct line to the top of Pyramid Mountain, then in a direct south line to the south boundary of Unit 20A, then easterly along the south boundary of Unit 20A to the Delta River, then northerly along the west bank of the Delta River to its intersection with the 2,000 foot contour line, near Darling Creek, then along the 2,000 foot contour line to its intersection with Snow Mountain Gulch, than along Snow Mountain Gulch to the Wood River, then downstream along the west bank of the Wood River to the Rex Trail, then along the Rex Trail to its intersection with the Nenana River, the point of beginning.

(1) the program objectives for this area are:

(A) to achieve and maintain a mid-summer population of 1000-5000 caribou; and

(B) to achieve and maintain an early winter population of 5500-6500 moose; and

(C) to maintain an early winter population of 100-175 wolves to provide an average annual harvest of:

(i) up to 100 bull caribou; and

(ii) 100-200 bull moose (2-4% of the estimated population excluding calves); and

(iii) up to 40% of the estimated early winter wolf population.

(2) the commissioner shall implement the program to achieve the objectives of this section in the following manner:

(A) beginning January 1, 1993, the commissioner may regulate the wolf population between 100 and 175 wolves; however the commissioner may not reduce the early winter wolf population below 100 wolves;

(B) department personnel may take wolves by trapping, snaring, and shooting, including shooting from aircraft between October 1 and April 30 during the term of the program;

(C) members of the public may take wolves by the land-and-shoot method under terms and conditions of a permit issued by the department to facilitate control efforts;

(D) the commissioner shall conduct wolf population reduction and regulation activities in an efficient manner, but as safely and humanely as practical.

(3) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

The Delta caribou herd is expected to decline to a low level, independent of the harvest by people. A limited bulls only harvest may be annually available if the management objective of 30 bulls:100 cows is met. The moose population is expected to stabilize as wolf predation shifts from caribou to moose. An annual harvest of 100-200 bull moose can be allowed when the management objectives for bull:cow ratios were met.

OPTION II

Under this option, wolf numbers will be reduced by about 50-75% for 1-3 years to improve caribou survival and cause the herd to grow. Public hunting and trapping activities will be encouraged, but land-and-shoot taking will not be allowed. Reduction activities by the department, including trapping, snaring and aerial shooting, will be the primary means of annually reducing the size of the wolf population. Wolf numbers will be allowed to increase following the reduction effort. The size of the wolf population after it recovers from the control program will be determined naturally by the availability of prey.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Unit 20A foothills area is bounded beginning at the intersection of the Rex Trail and the Nenana River then southerly along the east bank of the Nenana River to Lignite Creek, then along the North Bank of Lignite Creek to the mouth of Sanderson Creek, then in a direct line to the top of Pyramid Mountain, then in a direct south line to the south boundary of Unit 20A, then easterly along the south boundary of Unit 20A to the Delta River, then northerly along the west bank of the Delta River to its intersection with the 2,000 foot contour line, near Darling Creek, then along the 2,000 foot contour line to its intersection with Snow Mountain Gulch, than along Snow Mountain Gulch to the Wood River, then downstream along the west bank of the Wood River to the Rex Trail, then along the Rex Trail to its intersection with the Nenana River, the point of beginning.

(1) the program objectives for this area are:

(A) to achieve and maintain a mid-summer population of 7500-8500 caribou; and

(B) to achieve and maintain an early winter population of 5500-6500 moose; and

(C) after these caribou and moose population objectives have been met, provide for an average annual harvest of:

(i) 100-300 caribou of either sex (2-5% of the estimated population); and

(ii) 200-800 moose of either sex (3-13% of the estimated population excluding calves).

(2) the commissioner shall implement the program to achieve the objectives of this section in the following manner:

(A) for up to 3 years beginning January 1, 1993,

the commissioner may reduce the wolf population; however, the commissioner may not reduce the early winter population below 40 wolves; and except during the 1992 regulatory year, the commissioner may not conduct a wolf population reduction program in a regulatory year unless the Board of Game has authorized the department to issue up to 500 antlerless moose permits for the foothills control area for that regulatory year;

(B) department personnel may take wolves by trapping, snaring, and shooting, including shooting from aircraft between October 1 and April 30;

(C) the commissioner shall conduct wolf population reduction activities in an efficient manner, but as safely and humanely as practical.

(3) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

The Delta caribou herd is expected to stabilize, then increase by approximately 10-20% per year following wolf population reduction. To ensure herd growth, harvest will be limited to no more than 150 bulls until the population objective is reached. The population objective of 7500-8500 caribou will be reached in 2-5 years. Harvests of 100-300 caribou can be expected after the population objective is reached.

A substantial increase in the harvest of moose may be necessary to stabilize or slow the growth rate of the foothills moose population following wolf population reduction. The department will adjust annual antlerless moose permits based on annual estimates of moose population size and growth rate. Harvests of up to 800 moose, including harvests of up to 400 cow moose may be allowed. Despite those harvests, the moose population may continue to increase. Additional antlerless moose permits may be necessary if the moose population exceeds 7000 moose. Wolf numbers are expected to recover to pre-control levels within 5 years after wolf population reduction is stopped. Moose harvests will be reduced as wolf numbers increased.

OPTION III

Under this option, wolf numbers will be reduced by about 50-75% for 1-3 years to improve caribou survival and cause the herd to grow. Following the reduction effort, wolf numbers will be allowed to increase to a moderate level similar to that found in unmanaged wolf-moose-caribou systems in interior Alaska. The size of the wolf population will then be maintained at this level. During both the reduction and regulation phases of this program, public hunting and trapping activities will be encouraged, and land-and-shoot taking will be allowed under permit. Reduction activities by the department including trapping, snaring and aerial shooting will be used to augment the take by the public.
This option will require a three-fold or greater increase in the moose harvest with a significant harvest of cow moose. Moderate caribou harvests will be possible when the caribou population objective is reached.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Unit 20A foothills area is bounded beginning at the intersection of the Rex Trail and the Nenana River then southerly along the east bank of the Nenana River to Lignite Creek, then along the North Bank of Lignite Creek to the mouth of Sanderson Creek, then in a direct line to the top of Pyramid Mountain, then in a direct south line to the south boundary of Unit 20A, then easterly along the south boundary of Unit 20A to the Delta River, then northerly along the west bank of the Delta River to its intersection with the 2,000 foot contour line, near Darling Creek, then along the 2,000 foot contour line to its intersection with Snow Mountain Gulch, than along Snow Mountain Gulch to the Wood River, then downstream along the west bank of the Wood River to the Rex Trail, then along the Rex Trail to its intersection with the Nenana River, the point of beginning.

(1) the program objectives for this area are:

(A) to achieve and maintain a mid-summer population of 7500-8500 caribou; and

(B) to achieve and maintain an early winter population of 5500-6500 moose; and

(C) after these caribou and moose population objectives have been met, maintain an early winter wolf

population of 70-110 wolves to provide for an average annual harvest of:

(i) 250-500 caribou of either sex (3-6% of the estimated population); and

(ii) 400-800 moose of either sex (7-13% of the estimated population excluding calves).

(2) the commissioner shall implement the program to achieve the objectives of this section in the following manner:

(A) for up to 3 years beginning January 1, 1993, the commissioner may reduce the wolf population; however, the commissioner may not reduce the early winter population below 40 wolves; and except during the 1992 regulatory year, the commissioner may not conduct a wolf population reduction or regulation program in a regulatory year unless the Board of Game has authorized the department to issue up to 500 antlerless moose permits for the foothills control area for that regulatory year;

(B) once the caribou and moose population objectives are achieved, the commissioner may annually remove the number of wolves necessary to regulate the early winter wolf population at 70-110 wolves; however, the commissioner may not regulate the early winter population below 70 wolves;

(C) department personnel may take wolves by trapping, snaring, and shooting, including shooting from aircraft between October 1 and April 30 during the term of the program;

(D) members of the public may take wolves by the land-and-shoot method under terms and conditions of a permit issued by the department to facilitate control efforts;

(E) the commissioner shall conduct wolf population reduction and regulation activities in an efficient manner, but as safely and humanely as practical.

(3) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

The Delta caribou herd is expected to stabilize, then increase by approximately 10-20% per year following wolf population reduction. To ensure herd growth, the caribou harvest will be limited to 150 bulls until the population objective is reached. The population objective of 7500-8500 caribou will be reached in 2-5 years. Harvests of 200-500 caribou are expected after the caribou population objective is reached.

A substantial increase in the harvest of moose may be necessary to stabilize or slow the growth rate of the foothills moose population following wolf population reduction. The department will adjust annual antlerless moose permits based on annual estimates of moose population size and growth rate. Harvests of up to 800 moose, including harvests of up to 400 cow moose could be allowed. Despite those harvests the moose population may continue to increase. Additional cow moose permits will be necessary if the moose population exceeds 7000 moose.

OPTION IV

Under this option, wolf numbers will be reduced by about 50-75% and then maintained at this level to improve caribou survival and cause the herd to grow. Public hunting and trapping activities will be encouraged, and land-and-shoot taking will be allowed under permit. Reduction activities by department personnel including, trapping, snaring and aerial shooting, will be used to augment the take by the public.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Unit 20A foothills area is bounded beginning at the intersection of the Rex Trail and the Nenana River then southerly along the east bank of the Nenana River to Lignite Creek, then along the North Bank of Lignite Creek to the mouth of Sanderson Creek, then in a direct line to the top of Pyramid Mountain, then in a direct south line to the south boundary of Unit 20A, then easterly along the south boundary of Unit 20A to the Delta River, then northerly along the west bank of the Delta River to its intersection with the 2,000 foot contour line, near Darling Creek, then along the 2,000 foot contour line to its intersection with Snow Mountain Gulch, than along Snow Mountain Gulch to the Wood River, then downstream along the west bank of the

Wood River to the Rex Trail, then along the Rex Trail to its intersection with the Nenana River, the point of beginning.

(1) the program objectives for this area are:

(A) to achieve and maintain a mid-summer population of 7500-8500 caribou; and

(B) to achieve and maintain an early winter population of 5500-6500 moose; and

(C) after these caribou and moose population objectives have been met, maintain an early winter wolf population of 40-70 wolves to provide for an average annual harvest of:

(i) 500-900 caribou of either sex (6-11% of the estimated population); and

(ii) 500-1000 moose of either sex (8-15% of the estimated population).

(2) the commissioner shall implement the program to achieve the objectives of this section in the following manner:

(A) beginning January 1, 1993, the commissioner may reduce the wolf population; however, the commissioner may not reduce the early winter population below 40 wolves; and except during the 1992 regulatory year, the commissioner may not conduct a wolf population reduction or regulation program in a regulatory year unless the Board of Game has authorized the department to issue up to 700 antlerless moose permits for the foothills control area for that regulatory year;

(B) once the caribou and moose population objectives are achieved, the commissioner may annually remove the number of wolves necessary to regulate the early winter wolf population between 40-70 wolves; however, the commissioner may not regulate the early winter population below 40 wolves;

(C) department personnel may take wolves by trapping, snaring, and shooting, including shooting from aircraft between October 1 and April 30 during the term of the program;

(D) members of the public may take wolves by the land-and-shoot method under terms and conditions of a permit issued by the department to facilitate control efforts;

(E) the commissioner shall conduct wolf population reduction and regulation activities in an efficient manner, but as safely and humanely as practical.

(3) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

The Delta caribou herd is expected to stabilize, then increase by approximately 10-20% per year following wolf population reduction. To ensure herd growth harvest will be limited to 150 bulls until the population objective is reached. The population objective of 7500-8500 caribou will be reached in 2-5 years. Harvests of 500-900 caribou are expected after the population objective is reached.

A substantial increase in the harvest of moose may be necessary to stabilize or slow the growth rate of the foothills moose population following wolf population reduction. The department will adjust annual antlerless moose permits based on annual estimates of moose population size and growth rate. Harvests of up to 1,000 moose, including harvests of up to 600 antlerless moose could be allowed. Despite those harvests the moose population may continue to increase. Additional antlerless moose permits will be necessary if the moose population exceeds 7000 moose.

Upper Tanana/Fortymile Control Area

5AAC 92.120. WOLF PREDATION CONTROL PROGRAMS. Control predation by wolves in the Upper Tanana/Fortymile area by implementing one of the following strategies:

I. Temporarily reduce wolf numbers to 35-70 wolves in a 9700 mi^2 area. The wolf population will then be allowed to increase to natural levels in the northern portion of the area and will be regulated at moderate levels in the southern portion to achieve human use and ungulate population objectives.

II. Temporarily reduce wolf numbers to 30-60 in a 8500 mi^2 area. The wolf population will then be allowed to increase to natural levels in the northern portion of the area and will be regulated at moderate levels in the southern portion to achieve human use and ungulate population objectives.

III. Temporarily reduce wolf numbers to 25-40 wolves in a 6975 mi^2 area. The wolf population will then be

allowed to return to natural levels.

These management actions are intended to increase the size of the Fortymile caribou herd and the area's moose population. The main difference between the options is the amount of area involved in wolf control activities. This difference will affect the rate of growth of the caribou herd and, thus, the time needed to reach the population objective. The smaller management area will also exclude some moose range and will not benefit moose in those areas.

JUSTIFICATION

There is high public interest in reestablishing the Fortymile caribou herd to its former range. This herd formerly numbered over 400,000 caribou and ranged between Rampart, Alaska and Whitehorse, Yukon Territory providing much of the meat needed by people in this area. Along the Taylor and Steese Highways in Alaska and along the Yukon River in Yukon Territory, the herd offered tremendous viewing opportunities to thousands of travellers annually. Public testimony during the wolf planning process supported intensive management to increase the herd to 60,000 or more caribou.

Presently, predation is limiting the growth rate of the Fortymile caribou herd. Over the past two years, observations of radio-collared caribou have shown that 23% of the adults die annually and 67% of the calves die each winter. Wolves have been the cause of death in over 95% of the cases.

Moose are not very numerous in the Upper Tanana/ Fortymile Control area (0.36-0.4 moose/mi^2) and the size of the population is being limited by predation. Each year, about 30% of the postcalving population is killed by wolves and grizzly bears. Wolves kill half of these. Historically, the area has been popular for hunting, especially along the Alaska and Taylor Highways. Presently, people are harvesting about 1% of the postcalving population. Public testimony during the wolf planning process supported increasing the moose population for higher consumptive use.

Conventional hunting and trapping, including land-and-shoot taking prior to 1992, have not reduced wolf predation enough to benefit prey populations. Management of grizzly bears has reduced bear predation, but moose and caribou continue to be limited by predators. Habitat quality is high. Hunting has been limited so it has no measurable impact on the moose or caribou populations.

Wolf population reduction will be necessary to reach the caribou and moose population objectives in this area. The effectiveness of the program (time needed to reach the population objectives and the amount of benefit to people) depends on the size and placement of the management area and the intensity of the wolf reduction effort. The three options offered differ in the size and placement of the management area, but have the same removal intensity.

OPTION I

Under this option, wolf numbers will be temporarily reduced by 70-80% over the entire 9700 mi^2 Upper Tanana/Fortymile area. This area encompasses most of the calving and summer ranges and a portion of the winter range of the Fortymile caribou herd, most of the prime moose wintering areas in Unit 20E, and the areas that receive the highest amounts of human consumptive and nonconsumptive use in Units 12 and 20E. Wolf abundance will be reduced to 1 wolf per 193-386 mi^2 from the present fall density of 1 wolf per 43-54 mi^2 by a combination of department reduction activities and conventional hunting and trapping. Management activities will occur in those portions of the area where wolf predation affects the Fortymile caribou herd for 5 years or until herd objectives are met. Wolf population reduction activities will occur in northwestern Unit 12, southeastern Unit 20D and southwestern Unit 20E for up to 5 years or until the human use and moose population objectives are met. Once objectives are met, control will cease in the northern portion of the area. In the southern portion of the area, wolf populations will be allowed to increase, then be regulated at 120-150 wolves. Moderate harvests of cow moose will be allowed.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATIONS PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Upper Tanana/Fortymile area includes portions of Units 12, 20B, 20D, and 20E and is bounded by a line beginning at the Taylor Highway at the junction with the Alaska Highway to the Dennison Fork of the Fortymile River, then along the east bank of the Dennison Fork to the confluence with the South Fork of the Fortymile

River, then north along the east bank of the South Fork of the Fortymile River to the Fortymile River, then east along the southeast bank of the Fortymile River to the Taylor Highway, then north along the Taylor Highway to American Summit, then along a northwest line from American Summit to the Crooked Creek Airstrip on the Seventymile River, then west along the north bank of the Seventymile River to the boundary of Yukon-Charley Rivers National Preserve, then along the east, south and west boundaries of the Preserve to the headwaters of Thanksgiving Creek along the west boundary of the Preserve, then westerly along the divide just north of the Yukon Fork of Birch Creek extending across the South Fork of Birch Creek, then southwesterly along the divide between Big Windy Creek and Sheep Creek to the boundary of the Fairbanks North Star Borough, then southerly on a direct line across the Middle Fork of the Chena River to the North Fork of the Salcha River, then down the east bank of the North Fork to the confluence with the Salcha River, then up the south bank of the Salcha River to Upper Boulder Creek, then up the west bank of Upper Boulder Creek across the divide to Glacier Creek, then down the west bank of Glacier Creek to the Goodpaster River, then down the north bank of Goodpaster River to the South Fork of the Goodpaster River, then up the south bank of the South Fork of the Goodpaster River to Michigan Creek, then up the southwestern bank of Michigan Creek to the headwaters, then on a southeasterly line to the west shore of Sand Lake, then down the west bank of Sand Creek to the Tanana River, then up the south bank of the Tanana River to the confluence with the Robertson River, then up the west bank of the Robertson River until the headwaters of the West Fork of the Robertson River, then southeast along the Unit 13 boundary to the head of the Tok Glacier, then on a northeastern line along the divide to the headwaters of Stibnite Creek, then along the divide over Shin Mountain on a southeastern line to the Tok Cutoff Highway, then north along the Tok Cutoff to the junction with the Alaska Highway, then east along the Alaska Highway to the junction with the Taylor Highway, the point of beginning.

(1) the program objectives for this area are:

(A) to increase the Fortymile Herd to 60,000 caribou by the year 2000; and

(B) to increase the early winter moose population to 9000-10,000 moose; and

(C) after these caribou and moose population objectives are met, to provide an average annual harvest of:

(i) 3000-6000 caribou (5-10% of the population) of either sex; and

(ii) 300-650 moose of either sex.

(2) the commissioner shall implement the program to achieve the objectives of this section in the following manner:

(A) beginning January 1, 1993, the commissioner may annually reduce the wolf population to 35-70; however the commissioner may not reduce the population below 35 wolves; and the commissioner shall cease wolf population reduction activities in those portions of the control area north and west of the Middle Fork Forty-mile River and Sand Creek when the caribou herd objective is met, and in the remainder of the area when the moose population objective is met;

(B) once the moose population objective is met, the commissioner may annually remove the number of wolves necessary to regulate the early winter wolf population at 120-150 wolves in that portion of the area south and east of the Middle Fork Fortymile River and Sand Creek; however, the commissioner may not regulate the population below 120 wolves;

(C) department personnel may take wolves by trapping, snaring, and shooting, including shooting from aircraft, between October 1 and April 30 during the term of the program;

(D) the commissioner shall conduct wolf reduction and regulation activities in an efficient manner, but as safely and humanely as practical;

(E) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

The Fortymile caribou herd is expected to increase to 60,000 caribou in 8-12 years. To ensure herd growth during this time, hunter harvest will be limited to no more than 3% of the herd, including no more than 1.5% of the females. Once the population objective is reached, caribou harvests of 3000-6000 caribou will be allowed. The area's moose population is expected to increase to 9000-10,000 in 7-10 years. Until the objective is reached, moose harvest will be limited to 3% of the herd, bulls only. Once the objective is reached, harvests of 300-650 moose will be allowed. The depart-

ment will adjust the annual antlerless moose harvest based on annual estimates of moose population size and potential growth rate.

OPTION II

Under this option, wolf numbers will be temporarily reduced by 70-80% within a 8500 mi² portion of the Upper Tanana/Fortymile area. This area encompasses most of the calving and summer ranges and a portion of the winter range of the Fortymile caribou herd, most of the prime moose wintering areas in Subunit 20E, and the areas that receive the highest amounts of human consumptive and nonconsumptive use in Unit 20E. Wolf abundance will be reduced to 1 wolf per 193-386 mi² from the present fall density of 1 wolf per 43-54 mi² by a combination of department reduction activities and conventional hunting and trapping. Wolf population reduction will occur in those portions of the area where wolf predation affects the Fortymile caribou herd for 5 years or until the herd objective is met. Reduction will occur in eastern Units 20B and 20D and Unit 20E for up to 5 years or until the human use and moose population objectives are met. Once objectives are met control will cease in the northern portion of the area. In the southern portion, wolf numbers will be allowed to increase, then will be regulated at 90-110 wolves. Limited cow moose harvests may be allowed.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Upper Tanana/Fortymile area includes portions of Units 20B, 20D, and 20E and is bounded by a line beginning at the Taylor Highway at the junction with the Alaska Highway to the Dennison Fork of the Fortymile River, then along the east bank of the Dennison Fork to the confluence with the South Fork of the Fortymile River, then north along the east bank of the South Fork of the Fortymile River to the Fortymile River, then east along the southeast bank of the Fortymile River to the Taylor Highway, then north along the Taylor Highway to American Summit, then along a northwest line from American Summit to the Crooked Creek Airstrip on the Seventymile River, then west along the north bank of the Seventymile River to the boundary of Yukon-Charley Rivers National Preserve, then along the east, south and west boundaries of the Preserve to the headwaters of Thanksgiving Creek along the west boundary of the Preserve, then westerly along the divide just north of the Yukon Fork of Birch Creek extending across the South Fork of Birch Creek, then southwesterly along the divide between Big Windy Creek and Sheep Creek to the boundary of the Fairbanks North Star Borough, then southerly on a direct line across the Middle Fork of the Chena River to the North Fork of the Salcha River, then down the east bank of the North Fork to the confluence with the Salcha River, then up the south bank of the Salcha River to Upper Boulder Creek, then up the west bank of Upper Boulder Creek across the divide to Glacier Creek, then down the west bank of Glacier Creek to the Goodpaster River, then down the north bank of Goodpaster River to the South Fork of the Goodpaster River, then up the south bank of the South Fork of the Goodpaster River to Michigan Creek, then up the southwestern bank of Michigan Creek to the headwaters, then on a southeasterly line to the west bank of Sand Lake, then down the west bank of Sand Creek to the Tanana River, then up the south bank of the Tanana River to its intersection with the Alaska Highway near Tetlin Junction, then along the Alaska Highway to the intersection with the Taylor Highway, the point of beginning.

(1) the program objectives for this area are:

(A) to increase the Fortymile Herd to 60,000 caribou by the year 2000; and

(B) to increase the early winter moose population to 8000-9000 moose; and

(C) after these caribou and moose population objectives are met, to provide an average annual harvest of:

(i) 3000-6000 caribou (5-10% of the population) of either sex; and

(ii) 240-550 moose of either sex.

(2) the commissioner shall implement the program to achieve the objectives of this section in the following manner:

(A) beginning January 1, 1993, the commissioner may annually reduce the wolf population to 30-60; however; the commissioner may not reduce the population below 30 wolves; and the commissioner shall cease wolf population reduction activities in those portions of the control area north and west of the Middle Fork Fortymile River and Sand Creek when the caribou

herd objective is met; and in the remainder of the area when the moose population objective is met;

(B) once the moose population objective has been met, the commissioner may annually remove the number of wolves necessary to regulate the early winter wolf population at 900-110 wolves in that portion of the area south and east of the Middle Fork Fortymile River and Sand Creek; however, the commissioner may not regulate the population below 90 wolves.

(C) department personnel may take wolves by trapping, snaring, and shooting, including shooting from aircraft between October 1 and April 30 during the term of the program;

(D) the commissioner shall conduct wolf reduction and regulation activities in an efficient manner, but as safely and humanely as practical;

(E) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

The Fortymile caribou herd is expected to increase to 60,000 caribou in 8-12 years. To ensure herd growth during this time, hunter harvest will be limited to no more than 3% of the herd, including no more than 1.5% of the females. Once the population objective is reached, caribou harvests of 3000-6000 caribou will be allowed. The area's moose population is expected to increase to 8000-9000 in 7-10 years. Until the objective is reached, moose harvest will be limited to 3% of the herd, bulls only. Once the objective is reached, harvests of 250-550 moose will be allowed. The department will adjust the annual antlerless moose harvest based on annual estimates of moose population size and potential growth rate.

Option II differs from Option I in that it may not benefit the moose population in northwestern Unit 12.

OPTION III

Under this option, wolf numbers will be temporarily reduced by 70-80% within a 6975 mi^2 portion of the Upper Tanana/Fortymile area. This area encompasses most of the calving and summer ranges and a small portion of the winter range of the Fortymile caribou herd. Wolf abundance will be reduced to 1 wolf per 193-386 mi^2 from the present fall density of 1 wolf per 43-54 mi^2 by a combination of department reduction activities and conventional hunting and trapping. Control activities will occur during the fall and spring ach year for 5 years or until the caribou population objective is met.

Proposed Regulation

5 AAC 92.xxx. WOLF PREDATION CONTROL IMPLEMENTATION PLANS. In accordance with 5 AAC 92.110, the Strategic Wolf Management Plan and the Area-Specific Plans, the commissioner or the commissioner's designee may conduct a program to control predation by wolves in the following areas, consistent with the following program objectives and constraints:

(a) The Upper Tanana/Fortymile area includes portions of Units 20B, 20D, and 20E and is bounded by a line beginning at the Taylor Highway at the junction with the Alaska Highway to the Dennison Fork of the Fortymile River, then along the east bank of the Dennison Fork to the confluence with the South Fork of the Fortymile River, then north along the east bank of the South Fork of the Fortymile River to the Fortymile River, then east along the southeast bank of the Fortymile River to the Taylor Highway, then north along the Taylor Highway to American Summit, then along a northwest line from American Summit to the Crooked Creek Airstrip on the Seventymile River, then west along the north bank of the Seventymile River to the boundary of Yukon-Charley Rivers National Preserve, then along the east, south and west boundaries of the Preserve to the headwaters of Thanksgiving Creek along the west boundary of the Preserve, then westerly along the divide just north of the Yukon Fork of Birch Creek extending across the South Fork of Birch Creek, then southwesterly along the divide between Big Windy Creek and Sheep Creek to the boundary of the Fairbanks North Star Borough, then southerly on a direct line across the Middle Fork of the Chena River to the North Fork of the Salcha River, then down the east bank of the North Fork to the confluence with the Salcha River, then up the south bank of the Salcha River to Upper Boulder Creek, then up the west bank of Upper Boulder Creek across the divide to Glacier Creek, then down the west bank of Glacier Creek to the Goodpaster River, then down the north bank of Goodpaster River to the South Fork of the Goodpaster River, then up the south bank of the South Fork of the Goodpaster River to Michigan Creek, then up the southwestern bank of Michigan Creek to the headwaters, then on a southeasterly line to the west shore of Sand Lake, then down the west bank of Sand Creek to the Tanana River, then up the south bank of the Tanana River to an unnamed creek just south of Round Lake, then up the south bank of the unnamed

creek over the divide to Mansfield Creek, then up Mansfield Creek over the divide to the South Fork of the Mosquito Fork of the Fortymile River, then down the southeast bank of the Mosquito Fork of the Fortymile River to the intersection with the Taylor Highway, the point of beginning.

(1) the program objectives for this area are:

(A) to increase the Fortymile Herd to 35,00-40,000 caribou by the year 2000; and

(B) to increase the early winter moose population to 6500-7500 moose; and

(C) after these caribou and moose population objectives are met, to provide an average annual harvest of:

(i) 1000-1200 caribou (5-10% of the population) of either sex; and

(ii) 225-450 moose of either sex.

(2) the commissioner shall implement the program to achieve the objectives of this section in the following manner:

(A) beginning January 1, 1993, the commissioner may annually reduce the wolf population to 25-45 wolves; however, the commissioner may not reduce the population below 25 wolves; and the commissioner shall cease wolf population reduction activities when the Fortymile caribou herd objective is met;

(B) department personnel may take wolves by trapping, snaring, and shooting, including shooting from aircraft, between October 1 and April 30 during the term of the program;

(C) the commissioner shall conduct wolf reduction and regulation activities in an efficient manner, but as safely and humanely as practical;

(D) this program is authorized for a 5-year term beginning January 1, 1993, and is subject to reauthorization under 5 AAC 92.110.

Expected Results

The Fortymile caribou herd is expected to increase to 35,000-40,000 caribou in 7-10 years. This is a lower herd size objective than that (60,000) in the Fortymile Caribou Herd Management Plan. To ensure herd growth during this time, hunter harvest will be limited to no more than 3% of the herd, including no more than 1.5% of the females. Once the herd reaches the management objective level, caribou harvests of 1000-1200 caribou will be allowed, but harvest will continue to be managed so that no more than 1.5% of the females are taken to sustain additional herd growth. The lower population total and slower growth rate will result from wolf control being restricted to less of the herd's winter range. The area's moose population is expected to increase to 6500-7500 in 7-10 years. Until the objective is reached, moose harvest will be limited to 3% of the herd, bulls only. Once the objective is reached, harvests of 225-450 moose will be allowed. The department will adjust the annual antlerless moose harvest based on annual estimates of moose population size and potential growth rate.

Option III differs from the other two options in that it attempts to increase the size of the Fortymile caribou herd by controlling wolves primarily within the herd's calving and summer ranges. This option covers less of the herd's wintering area and therefore will not restrict wolf recolonization back to the calving range as well as Options I and II. Therefore, the annual growth rate of the herd will not be as high as in other options. This option will not directly benefit the moose populations in the areas that receive the highest human use along the Alaska Highway and Tanana river in northwestern Unit 12 or the Taylor Highway in Unit 20E. Therefore, subsistence hunters will not be benefited to the extent they would be in Options I and II because of their reliance upon highway vehicles. Similarly, people wishing to view moose along the highways would not be benefited.

Appendix III. Biological and Management Basis for Wolf Control

(Footnotes refer to publications listed in Appendix V.)

Although wolf-bear-prey relationships are complex and vary between sites, it is generally recognized that in certain cases it is possible to increase prey populations, or yields of prey for people, by reducing wolf abundance.[3,5,6,13,15,16,28] Much has been learned about wolf predation and wolf population ecology by observing the responses of caribou, moose, and wolves when wolf numbers have been reduced or regulated.[10,13,16] For example, in east-central Yukon Territories where caribou and moose were at chronic low levels, reducing the original unharvested wolf numbers by 84 percent during six winters resulted in large increases in caribou and moose populations and yields for people. Wolves recovered to their original population size three years after reduction efforts were halted.[13]

Similar responses to wolf reduction were observed in Interior Alaska south of Fairbanks.[10,16] Here, a four-fold increase in moose numbers and a five-fold increase in caribou numbers followed five years of wolf population reduction. These eruptions in caribou and moose numbers indicate that wolves were killing many prey that would otherwise live and reproduce, not just sick and weak animals. For example, the number of caribou calves which survived the first year increased several fold when wolf numbers were reduced, and adult moose survival also increased significantly. Wolves recovered to pre-reduction densities within four years following the end of control. Caribou and moose populations continued to increase for at least eight years following the end of control, despite high harvests by people.

Caribou or moose populations are sometimes said to be in a "predator pit" when wolf and bear predation hold these populations at levels much lower than the habitat can support.[12,28] A recent review of Alaska and Yukon moose-wolf-bear systems concluded that without strong intervention by people, moose populations remain in a predator pit or decline to this level because wolves and bears together are efficient and effective predators of moose.[15] Wolf and bear predation also hold many small caribou herds below levels the habitat can support.[4]

If caribou or moose are in this predator pit, temporarily reducing predator abundance can help prey populations grow or can allow people to harvest more caribou or moose.[15,16] Predator management in these systems generally focuses on wolves rather than bears because wolves recover from reductions much more quickly than bears. Wolves have higher reproductive and dispersal rates than bears do.[15]

Managing to increase caribou and moose abundance can increase the value of wildlife habitat to society. When wildlife are abundant, it is easier to justify protecting wildlife habitat from uses which are not compatible with wolves and their prey. When wildlife are scarce, it is easier to justify converting wildlife habitat to something else.

Increases in wolf abundance can be expected following increases in caribou and moose abundance.[14] For example, some of the highest wolf densities in Alaska now occur where wolf numbers were strongly reduced in the past.[10,15,32] Over the long term, wolf abundance is strongly related to caribou and moose abundance unless people reduce wolf numbers or wolf habitat. In unmanaged areas, wolves are relatively scarce because caribou and moose are relatively scarce. Systems managed for high numbers of wolves, caribou, and moose can generally support more harvest of each population by people.

In situations where caribou and moose populations are high yet still below the level that the habitat can support, people may want to increase their yields of caribou and moose. In these cases it may be desirable to regulate wolves at densities below the level that prey can support.[3,15] Regulation differs from the short-term reduction of wolf numbers described above. Regulation involves maintaining wolves at moderate densities similar to those found in natural systems over long periods. Moose management is more complex in cases of wolf regulation because moose numbers an eventually increase to high levels that are near those that the habitat can support, unless people harvest cows. At densities near those that the habitat can support, moose are more vulnerable to environmental factors, especially deep snow. For these reasons, harvest of cow moose must be an acceptable management technique before wolf numbers are regulated.

Habitat enhancement can help increase the capacity of habitat to support moose, but will not eliminate the long-term need for cow moose seasons in areas where wolf numbers are regulated. The response of a moose or caribou population to wolf control is not entirely predictable. Each site has different capabilities of producing caribou and moose. The capabilities depend on weather, habitat, human use, and the movements, abundance, and interactions of predators and prey. Plans for increasing numbers or yields of caribou and moose by controlling wolves must be written for individual sites and specific times.

Appendix IV. Major Issues and Public Concerns

A number of issues and problems have been identified in the planning process. This section discusses these concerns and describes how they are being addressed.

Terminology

Problems resulted from vague terminology or the definitions of zones in the Strategic Wolf Management Plan. Terms such as "minimum," "moderate," "high use" or "intensive management" mean different things to different people. To clarify these terms, ADF&G drafted some definitions which were tentatively accepted as part of this draft by the Board (see Appendix V).

Zone Limitations

The system of seven zones outlined in the Strategic Wolf Management Plan does not provide appropriate management zones for all situations in Alaska. In the Strategic Wolf Management Plan, "use" and "management level" are linked together in Zones 3-7. This creates a problem if an area that is used intensively does not need to be managed intensively, or vice versa. After additional consideration of the Strategic Plan we concluded that the intent of the zone definitions was to reflect varying management intensity for wolves, not all species. Therefore, in this plan references to levels of human use or management of prey species will generally reflect the intensity of wolf management in each zone. In areas where human use or management goals conflict between wolves and prey, the zone will reflect wolf management intensity, rather than prey management intensity or human uses of wolves and prey.

Zone 6 vs. Zone 7

According to the Strategic Plan, wolf population control through regulation or reduction is allowed in both zones 6 and 7. In Zone 6, wolf population reductions are not anticipated, but may be allowed, while in Zone 7 Wolf population reduction may be necessary. The only distinction appears to be whether it is likely that wolf population reduction will be necessary.

In this plan, areas are identified as Zone 7 only if ADF&G believes it is likely that a reduction of wolves will be necessary to meet population and human use objectives during the life of this plan. However, reductions may not be necessary throughout all Zone 7 areas and are not expected to last over the entire life of the plan period. The specifics of any reduction programs will be spelled out in the implementation plans.

Areas are designated Zone 6 where there is high human use of prey. Some degree of wolf regulation may occur, but reduction is not anticipated. However, regulations may not be necessary throughout all Zone 6 areas and may not last over the entire life of the plan period. The specifics of any regulation programs will be spelled out in the implementation plans.

Blanket Recommendations

Recommendations to zone the entire planning area as Zone 1 or 7 were received. Such broad-based approaches clearly did not reflect the intent of the Strategic Plan to accommodate the complete range of public values, so they were rejected.

Buffers

Some people view buffers as necessary to protect National Park resources. Others see them as undesirable extensions of parks where consumptive uses have already been limited. It was also suggested that protected areas could compromise the effectiveness of management programs by providing a constant source of wolves to repopulate nearby areas where wolf numbers are being controlled.

Many say buffers are necessary to provide a transition between the protected areas within National Park lands and more heavily used adjacent lands. In some areas this transition is accomplished by zones that prohibit wolf control adjacent to park lands. In all cases, ADF&G will work with the National Park Service and others to minimize the effects of management programs on National Park lands.

A one-half mile buffer on either side of highway corridors and federally designated wild and scenic rivers was also suggested. This was not proposed in this plan because of a general lack of public support.

Balance

Some people say each area-specific plan should be balanced between nonconsumptive and consumptive uses. However, the intent of the Strategic Plan is to provide the full range of values for wolves over the entire state when all of the area-specific plans are completed. Some area-specific management plans will likely be weighted toward one use or the other.

Legal constraints

With the exception of the original Denali National Park, federal law requires that national parks and preserves allow local subsistence users to hunt and trap, except under special circumstances. Federal law also

requires the consent of the National Park Service for wolf control on national park and preserve lands. This means national park and preserve lands can not be zoned as 1, 2, 6 or 7. Wolf control can only be conducted on parks and preserves under very limited circumstances that are unlikely to occur in these units. For this reason, a Zone 5 classification would also be inappropriate for national park lands.

Protection for Wolves on State Land

Many federal lands are, in effect, zoned by federal law which precludes intensive wolf management. As a result, intensive management is most likely to occur on state lands. There is concern that wolves should be offered more protection on state lands. Some people say that nothing will be gained if this plan protects wolves only on federal land. In this draft, some additional state land is proposed for zones which protect wolves completely or preclude wolf control during the life of the plan.

Planning Process Rate of Speed

Many people stated that the planning process is going too fast. The short time between adoption of the Strategic Plan and the March 1992 board meeting limited the opportunity for public review of the draft plans. The Board of Game delayed final action on the draft plans until November 1992 to allow more public involvement.

Public Involvement in Setting Wildlife Management Objectives

Some members of the public stated that they (and other members of the public) were not adequately involved in setting wildlife population objectives. Key questions include:

*Does the public want an increase or a decrease in wildlife populations?

*What rate of population change is necessary or acceptable?

*At what cost? (financial costs, trade-off of natural areas versus managed areas, and distasteful management tools, such as wolf population regulation/reduction).

We hope that public review of these draft plans will allow the public to effectively participate in setting objectives for these plan areas.

Zone Honesty

If wolf control is not likely to happen, some people say zone designations should be as low as possible. The Board can revise the plan if more intensive management becomes necessary. Others say that Zones 5, 6 and 7 should predominate, in order to preserve management options, even if no wolf control is planned. Some areas in this draft are proposed as Zone 4 because wolf control is not anticipated during the life of this plan.

Intensive Management

Some people say all aspects of the ecosystem should be managed in areas designated for intensive management. This management would include habitat, predators, prey and human use, including enforcement of regulations, rather than just wolves. If all aspects are not managed, it should not be called an intensive management area. Others say any kind of wolf control is intensive management.

We feel that management in Zone 7 can be as intensive as desired by those who want all aspects of the ecosystem managed. However, as presently defined, Zone 7 includes a broader range of management options than the more intensive management advocated by some people. Intensive management is expensive, and will be selectively applied within the zone depending on where it is most beneficial.

The Size of Zone 7 Areas

Some people think areas proposed as Zone 7 are much larger than necessary to meet the management objectives. Others say the Zone 7 areas are too small to provide for human use. Canadian and Alaskan studies indicate that a wolf reduction program should cover at least 5800 square miles to be effective. Otherwise, immigration from neighboring wolf packs will repopulate the area before the prey population can increase.

Intensive Wildlife Management to Benefit Hunters

Some people say that long-term, intensive management of wolves and other wildlife to provide for high arvests of prey by people is not acceptable. Others say wildlife management should keep predator and prey numbers steady to maintain hunting opportunities.

The board's intent in the Strategic Wolf Management Plan was to provide the option of managing predators and prey in limited areas to provide for increased harvests by people. Such management may involve regulating wolf numbers at a level below what the prey can support in order to provide additional harvest for people.

Regulation vs. Reduction

Wolf control can be accomplished in two ways: through regulation or reduction. Regulation involves keeping wolf numbers at levels below what the prey could support, for five or more years. Reduction involves decreasing wolf numbers for three to five years to allow prey populations to increase, after which wolf numbers are allowed to recover.

Some people say wolf population reduction is less offensive than regulation. Others say wolf population regulation will prevent large swings in the number of prey, which benefits people.

ADF&G will continue to work with the public through the Implementation Planning process to identify the most appropriate and acceptable management tools.

Enforcement

Some people say enforcement of hunting and trapping regulations is inadequate, and that wolf control programs involving public participation could result in excessive harvests. The Strategic plan makes it clear that ADF&G must closely monitor control programs to prevent abuses. ADF&G will work closely with the Alaska Division of Fish and Wildlife Protection to ensure regulations are adequately enforced.

Harvest

Some people say heavy hunting pressure is solely to blame for low or declining wildlife populations. Studies show that harvest by people is a small part of all the wildlife deaths in the plan area. Predation, weather conditions, food supply and habitat condition have a greater effect on wildlife populations than people. Nevertheless, in areas where wolf population reduction is proposed, harvest of prey species by people has already been reduced substantially and may be restricted further until prey numbers increase.

Relationship Between Population Size and Harvest

Some people assume that a large population of caribou or moose will assure a large harvest for people. How many animals people can harvest from a wildlife population depends more on how productive the population is than how big it is. A large population which is not producing many young or whose young are not surviving can offer a smaller harvest to people than a moderate population which is producing many offspring that survive. A moderate size population can actually outproduce a large one.

In areas of high quality habitat, younger aged moose bear young, calves are born in better condition, and can allow more twins to be born. Reducing the number of predators increases survival of young.

A moderate-sized population can be more productive in an area of limited habitat than a large population in that same habitat, because the large population will decrease the quantity and quality of browse available more rapidly than the smaller population.

Wolves and bears are often capable of killing enough prey to equal what is annually produced, leaving little or none for people to harvest. To maintain high harvest levels by people, predator numbers will usually have to be reduced frequently or regulated at some level below what the prey populations would naturally support if there was no human harvest. It is theoretically possible for a highly productive large population tp require little or no predator management to sustain high harvest levels by people. Active habitat enhancement would be necessary to provide for a moose population that is both large and productive.

Wildlife Data

Some people say research conducted by ADF&G has shown past wolf control programs have not been worthwhile. They say data collected by department biologists are inaccurate and have lead to wrong conclusions. Others say past control programs have been effective and research conclusions are valid. Peer review is valuable for improving the quality of research. ADF&G biologists will continue to work closely with federal and Canadian wildlife biologists. In addition, research results undergo extensive review by nationally and internationally recognized experts when submitted for publication in international, professional ecology and wildlife management journals.

Appendix V. Definitions of Terms Used In the Planning Process

The Strategic Plan employs numerous terms, primarily relating to human use and management, that are not clearly defined. In developing area specific plans we have had to develop standardized definitions of these terms so that all parties have a common understanding of their meaning. Following is a list of some of the terms used in the Strategic Plan along with definitions of how we have used the terms in this draft.

Genetic diversity refers to genetic differences among individuals within and between populations. It results from the exchange of genes that occurs when animals mate. Genetic diversity of wolf populations will be maintained by preventing the isolation of populations and allowing wolves from different populations to interact.

Short-term. The duration of short-term effects is 1 to 5 years

Long-term. The duration of long-term effects is greater than 5 years.

Broadest possible range of human uses. Human use includes consumptive and nonconsumptive uses. Both of these endeavors are managed on a sustained yield basis. Common nonconsumptive uses include, but are not limited to, viewing, photographing, listening, and studying animals in natural settings. Common consumptive uses include hunting and trapping that may vary in intensity from low to maximum sustained yields.

Prey populations. Big game prey species of wolves include: caribou, moose, Dall sheep, mountain goat, Sitka black-tailed deer, and musk ox. For management purposes, populations of musk ox and caribou are identified as discrete herds; populations of Dall sheep and mountain goats are identified based on major mountain ranges; populations of deer are generally identified by islands and moose populations are identified on the basis of geographic area, usually Units or major drainages.

Predator populations. Big game predator species include: wolves, brown bears, and black bears. For management purposes populations of wolves and bears are generally identified on the basis of Units or major drainages.

Significantly influenced by people means that there are long-term measurable changes in population size, composition, density and/or distribution attributable to human activities.

Small portion of a wolf or prey population means a limited harvest of wolves or prey that has no measurable effects on population size, structure, and/or distribution. .Small portion, very low, and low harvest rates are used synonymously. At low harvest rates, populations of wolves and prey can be expected to fluctuate much as they would without human harvest.

Special needs refer to the opportunity for subsistence harvest that is guaranteed by law.

Moderate harvests of wolves and prey by people means levels of use of wolves or prey that may have measurable effects on population size, structure, and/or distribution. Under moderate harvest rates, populations of wolves and prey may fluctuate near the pre-determined levels, differing from those that might occur naturally, because of human harvests and natural environmental factors.

High harvests of wolves and prey by people means harvests near maximum sustainable levels that will have measurable effects on population size, structure, and/or distribution. Populations of wolves and prey can be expected to fluctuate near pre-determined objective levels as a direct result of harvest management.

Minimum, moderate, and intensive management of predator and prey populations. Wildlife management is the art and science taking actions that affect habitat, wildlife, people's use of wildlife to produce sustained yields and achieve specific human use goals, both consumptive and nonconsumptive and to ensure the welfare and perpetuation of animal populations. Wildlife management can vary in intensity depending upon the management techniques that are employed.

Minimum management involves limited manipulation of habitat or populations and few restrictions on human use. Under this management regime, predator and prey populations can be expected to fluctuate much as they would without human harvest; habitats will be unaffected by management. Examples of management activities that might be conducted include periodic surveys or censuses, general hunting seasons, and opportunistic law enforcement.

Moderate management involves intermediate manipulation of habitat or populations and moderate restrictions of human uses. In some cases predator popu-

lations may be reduced or regulated and the size or composition of prey populations may be affected.

Moderate management may include limited habitat improvement. Populations may produce higher sustained yields than would result from minimal management. Examples of management activities that might be conducted include permit hunts, either sex hunts, controlled use areas, specimen collections, routine surveys and censuses, and routine law enforcement.

Intensive Management involves substantial alteration of habitat, manipulation of populations and restrictions on human uses to achieve identified objectives. Predator populations will likely be regulated and may be reduced to achieve prey population management objectives. Intensive management may include a broad spectrum of habitat improvements including mechanical manipulation of vegetation and the use of fire. Populations of wolves and prey depend on management actions and result in maximum sustained yields. Other examples of management activities may include intensive surveys and censuses, permit hunts, either sex harvests, special seasons, specimen collections, and intensive law enforcement.

Management for **high human use** means significant exploitation (near maximum sustained yields) of predator and prey populations by people will be allowed for consumptive and nonconsumptive uses.

Sustained yield basis. Sustained yield, used in the context of consumptive uses, means the numbers or biomass that can be taken from a population year after year without jeopardizing the population.

Sustained yield, used in the context of nonconsumptive uses, implies maintaining opportunities to view, photograph, hear, enjoy, and learn about wildlife in a natural setting that is available year after year while assuring persistence of the resource.

Viable over time means that self-perpetuating populations of wolves will continue to exist in the plan area.

Predator pit describes the situation where predation is able to keep a prey population at a level well below what the habitat could support. Evidence indicates this situation can occur where moose are the primary prey species; wolves in conjunction with one or two bear species are the primary predators; and both predators and prey are lightly harvested. It appears that caribou and Sitka black-tailed deer populations can also be-

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If you are interested in wolves and wolf management, please attend one of the

Area Specific Wolf Management Plan Public Workshops

ANCHORAGE
October 6, 1992
Fairview Recreation Center
10th and Karluk
7:00 pm

FAIRBANKS
October 8, 1992
Noel Wien Public Library
Airport and Cowles
7:00 pm

Fish and Game staff will explain the interim draft and ask for your concerns and suggestions.

We also encourage you to give the Board of Game your comments in writing at:

Division of Boards
P.O. Box 2556
Juneau, AK 99802-5526

or attend the Board meeting in Fairbanks beginning November 9 and testify to the Board in person. (The Board will accept written comments until October 13, 1992.)

If you have any questions or comments about this interim draft plan or the planning process, or if you would like someone from the department to attend your group's meeting to explain it, call Fish and Game and ask for a member of the wolf planning team in Anchorage at 267-2179 or in Fairbanks at 456-5156.

Thanks for being involved!

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
Division of Wildlife Conservation
P.O. Box 25526
Juneau, AK 99802-5526

The role of the Division of Wildlife Conservation is to conserve and enhance Alaska's wildlife and to provide for a wide range of uses for the greatest benefit of current and future generations of people.