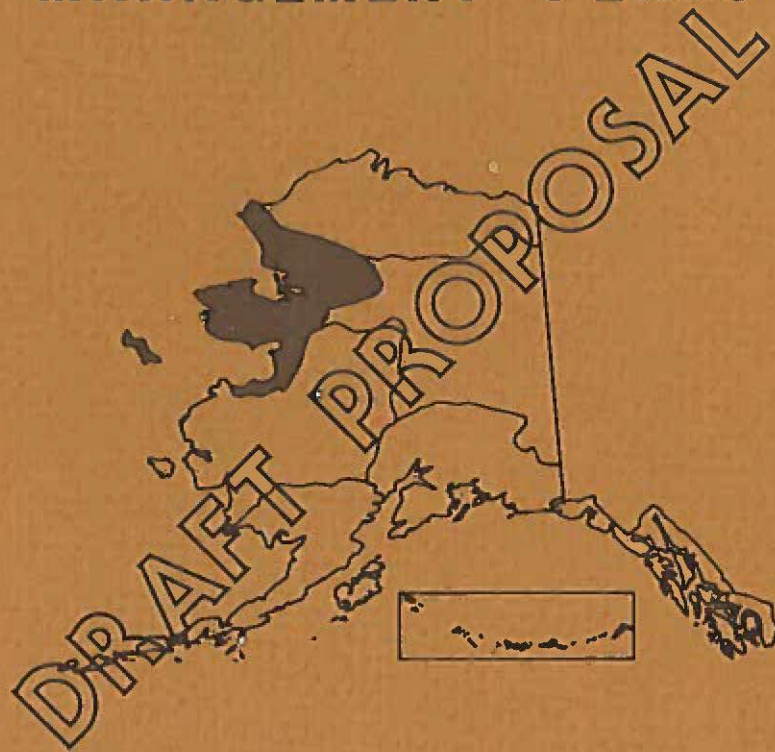


**ALASKA WILDLIFE
MANAGEMENT PLANS**



**NORTHWESTERN
ALASKA**

Alaska Dept. of Fish and Game

ALASKA WILDLIFE MANAGEMENT PLANS

A PUBLIC PROPOSAL FOR THE MANAGEMENT OF ALASKA'S WILDLIFE

STATE OF ALASKA

Jay S. Hammond, Governor

Department of Fish and Game
James W. Brooks, Commissioner

Division of Game
Robert A. Rausch, Director

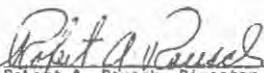
Financed in part through Federal Aid in Wildlife Restoration, Project W-17-R

FOREWORD

These Alaska Wildlife Management Plans are first and foremost proposals for wildlife management developed by the Division of Game for consideration by the public. The many ideas contained in the plans are only a beginning - they form a basis upon which the public can comment and recommend. The plans are not inflexible, and even after they attain a more final form and are implemented, they will be subject to change as wildlife populations and public needs demand such changes.

In addition to proposing management directions, the plans contain a wealth of information on the status and use of Alaska's wildlife populations. This valuable information was compiled from a number of widely scattered sources and much of it was not previously available in written form. These plans represent the most accurate assessment of wildlife status and use available to the Game Division at the time of writing in 1976. However, wildlife populations are dynamic, and much of the information on population status will require reevaluation with time.

Virtually the entire Game Division staff participated in the preparation of these proposals. Coming as it did amidst many other important tasks of the Division, this planning effort was most demanding. I am gratified by my staff's cooperation and support in this endeavor; their accomplishment reflects their professionalism and dedication.


Robert A. Rausch, Director
Division of Game

CONTENTS

FOREWORD	i
PART I: WILDLIFE MANAGEMENT IN ALASKA	1
THE PLANS, THE DEPARTMENT OF FISH AND GAME AND THE PUBLIC	1
What the Plans Contain	2
Regional Booklets.	3
MANAGEMENT GOALS.	5
MANAGEMENT BACKGROUND	10
The Legal Basis for Wildlife Management in Alaska.	10
Legislature	11
Governor.	12
Commissioner of the Department of Fish and Game	12
Division of Game.	12
Board of Game	14
Public.	15
Biological Considerations.	16
Wildlife Habitat.	16
Population Dynamics	17
Problems of Management	18
Natural Factors	19
Land Use.	21
Use of Wildlife	25
Management Limitations.	28
PART II: INDIVIDUAL SPECIES MANAGEMENT PLANS	31
BLACK BEAR.	31
1. Interior-Western Alaska Black Bear Management Plan.	32
BROWN BEAR.	35
1. Brooks Range Brown Bear Management Plan	37
3. Northwestern Alaska Brown Bear Management Plan.	40
4. Seward Peninsula Brown Bear Management Plan	42
WOLF.	44
1. Alaska Wolf Management Plan	47

BARREN GROUND CARIBOU	54
3. Western Arctic Caribou Management Plan.	57
DALL SHEEP.	60
3. Southern Brooks Range Sheep Management Plan	62
4. Western Brooks Range Sheep Management Plan.	64
MOOSE	66
5. Seward-Kobuk-Noatak Moose Management Plan	67
6. Upper Noatak-Kobuk Moose Management Plan.	70
9. Nome Area Moose Management Plan	72
10. Granite Mt. Moose Management Plan	74
MUSKOX.	76
2. Northwestern Alaska Muskox Management Plan.	77
FURBEARERS.	79
1. Greater Alaska Furbearer Management Plan.	81
SMALL GAME.	94
1. Alaska Small Game Management Plan	97
WATERFOWL	103
1. Northern Alaska Waterfowl Management Plan	106
MARINE MAMMALS.	109
1a. Bering-Chukchi-Beaufort Seas Seal Management Plan	118
1b. Bering-Chukchi-Beaufort Seas Walrus Management Plan	121
1c. Bering-Chukchi-Beaufort Seas Belukha Management Plan.	124
2. Sledge-Besboro Islands Walrus Management Plan	126
UNCLASSIFIED GAME	128
1a. Alaska Raptor Management Plan	134
1b. Alaska Bald Eagle Management Plan	136
5. Serpentine Hot Springs Gyrfalcon Management Plan.	138
6. Iron Creek Gyrfalcon Management Plan.	140
10. Nome Area Ornithological Management Plan.	142
16. Alaska Seabirds Management Plan	144

PART I:
WILDLIFE MANAGEMENT IN ALASKA

the 1990s, the number of people in the UK who are employed in the public sector has increased by 1.5 million, from 2.5 million in 1980 to 4 million in 1995 (Department of Health 1996).

There is a growing emphasis on the need to improve the efficiency of the public sector, and to ensure that the public sector is able to deliver the services that are required by the public. This has led to a number of initiatives, including the introduction of competition, the restructuring of public services, and the introduction of new management practices.

One of the key challenges facing the public sector is the need to improve the quality of services. This is a challenge that is being met by a number of initiatives, including the introduction of new standards, the implementation of quality management systems, and the introduction of new management practices.

Another key challenge facing the public sector is the need to improve the efficiency of services. This is a challenge that is being met by a number of initiatives, including the introduction of new management practices, the implementation of cost reduction measures, and the introduction of new technologies.

One of the key challenges facing the public sector is the need to improve the accessibility of services. This is a challenge that is being met by a number of initiatives, including the introduction of new management practices, the implementation of accessibility measures, and the introduction of new technologies.

Another key challenge facing the public sector is the need to improve the sustainability of services. This is a challenge that is being met by a number of initiatives, including the introduction of new management practices, the implementation of sustainability measures, and the introduction of new technologies.

One of the key challenges facing the public sector is the need to improve the transparency of services. This is a challenge that is being met by a number of initiatives, including the introduction of new management practices, the implementation of transparency measures, and the introduction of new technologies.

Another key challenge facing the public sector is the need to improve the accountability of services. This is a challenge that is being met by a number of initiatives, including the introduction of new management practices, the implementation of accountability measures, and the introduction of new technologies.

WILDLIFE MANAGEMENT IN ALASKA

THE PLANS, THE DEPARTMENT OF FISH AND GAME AND THE PUBLIC

Alaska's Wildlife Management Plans are the result of a long-term planning effort which first resulted in the development of the Alaska Game Management Policies in 1973. These plans are another step toward developing a program for wise husbandry of Alaska's wildlife resources and, basically, are recommendations to the public by the Department of Fish and Game for the management of all wildlife in the state.

The information and recommendations contained in these plans represent a concerted effort by Department staff to compile and review existing information on the status, distribution, and uses of Alaskan wildlife populations. Current and projected land use patterns and natural resource potentials and developments are also considered. Synthesis of these plans began at the field level where local needs and conditions were best understood.

The need for planning in the management of wildlife, and particularly in the allocation of use of wildlife, has become pressing in recent years. Alaska is experiencing unprecedented growth in human population at the same time that immense land areas, conveyed to private ownership or federal single-purpose classification, may be lost to multipurpose public use. Development and mobilization of resources are impacting wildlife and its habitat and are bringing more people into contact with once-remote wildlife populations. In simplest terms, Alaska faces a rapidly growing demand for wildlife use which is in sharp contrast to the shrinking resource area available to support such use. Moreover, as pressures on wildlife populations increase, there are increasing possibilities that any given use will have detrimental effects. There is, therefore, need for greater precision in management.

The complexity of resource allocations requires the systematic approach provided by planning. In keeping with mandates of Alaska's constitution, the Department's planning efforts are intended to eventually achieve optimum, diversified use of Alaska's wildlife throughout the foreseeable future.

Publication and distribution of these recommendations mark the beginning of the second phase in this planning process: the public's review of the staff's recommendations and its involvement and participation in shaping the initial proposal into a statement of direction for wildlife management in Alaska.

The responsibility of the Department is to manage Alaska's wildlife resources for the benefit of the people. Therefore, it is incumbent on the Department to determine what the public wants from its wildlife resources. It is clear also that the Department will not be able to maintain the continuity of long-term management programs without the support of Alaska's people.

Development and implementation of the wildlife plans will affect Alaskans in several ways. First, the public will participate in the initial formulation of the basic long-term management direction. Second, the plans as presented for review will inform the public about Alaska's wildlife populations and their current and potential uses. They will also give the public a clearer understanding of the role and responsibilities of the Department of Fish and Game. Third, if implemented, the plans will provide Alaskans and other interested persons with an array of alternative uses of wildlife which can be maintained through purposeful management.

All interested people are invited to contribute to the wildlife management planning effort. The Division of Game recommendations contained in this and other booklets and maps are being distributed to the public throughout the state. Included is a questionnaire soliciting opinions about the management the Division is proposing. In addition to printed circulation of the proposed plans, the Division will hold public meetings in many Alaskan communities to obtain comment and discussion.

All public response will be considered in evaluating and modifying the proposed plans. Allocation of wildlife values among competing users and between conflicting uses is a complex problem which will have to be resolved through careful consideration of expressed public desires and the biological capabilities of the wildlife populations in question. Minority as well as majority demands should be accommodated if we are to retain the values afforded by a spectrum of wildlife-oriented experiences.

The Division will work closely with the Alaska Board of Game and with the Board's local advisory committees during the entire public review process. As the principal forum for the public's voice in Alaska's wildlife management, the Alaska Board of Game will modify and make the final determination on proposed wildlife plans. The Division of Game will assist the Board by providing a full report of the public review process and the response it engenders.

After the public review process, and revision and adoption by the Board of Game, the plans will be published and distributed to the public. Needless to say, the plans are not intended to be inflexible. Conditions change with time, and the plans will need to be adaptable. Revision of plans may occur as the result of periodic reviews or when individual situations require modification. Revision of plans will be made with participation by the public.

Implementation of the plans will begin as soon as practical after final acceptance by the Board of Game. Those areas or species now receiving the greatest use or in danger of losing those attributes called for by the plans should receive the earliest attention. Implementation will involve development of operational plans, formulation of regulations, internal Department actions such as research and management activities, and interagency cooperative actions as required.

Development and implementation of these management plans will be strongly affected by conveyance of 40 million acres of land into private ownership and by inclusion of up to 80 million acres of classified federal withdrawals into "Four Systems" federal management under terms of the Alaska Native Claims Settlement Act. Development of staff recommendations has proceeded with the knowledge that many changes in the contents of the final plans are inevitable. Management of wildlife on lands under federal jurisdiction or under private ownership will necessarily be commensurate with the land-use policies of the respective landowners. Important land-use decisions are being made now and in the next few years that will affect wildlife and its future use in the state. By developing wildlife plans now, we can improve the rationale by which land-use policies will be formulated.

WHAT THE PLANS CONTAIN

This regional booklet is only one portion of a comprehensive public proposal by the Division of Game, Department of Fish and Game, for the planned management of Alaska's wildlife resources. The proposal consists of: 1) seven regional booklets (of which this is one) containing recommendations for management of each species of wildlife, and 2) a set of eleven statewide maps outlining boundaries of individual species

management plan areas. The maps are intended to complement the material presented in the regional booklets. For complete understanding of the plans, the maps and appropriate regional booklets should be used together. These plans are for your review. Questionnaires have been included with the maps and booklets for your written comments. In addition, public meetings will be held throughout the state to explain plans and receive comment. You are invited to contact the Game Division staff to discuss these plans.

REGIONAL BOOKLETS

Each regional booklet is arranged in two parts. Part I contains an explanation of the planning effort and how the public will participate in the development of the plans. Included is an explanation of the management goals upon which the recommendations are structured. In addition, Part I presents a brief discussion of wildlife management in Alaska, reviewing the formal structure of management, the biological bases for wildlife use, and the problems encountered in managing wildlife. Part II contains the individual species/area management recommendations.

Each of the regional booklets corresponds to one of seven geographic regions of the state, depicted in the figure below.



All proposed management plans covering all or part of a region are included in the booklet for that region. The plans are arranged by species in Part II of each booklet, and each plan is titled and numbered to provide easy reference to the corresponding species map. Each individual plan includes:

- 1) A geographical description of the location of the area covered by the plan.
- 2) Goals - One primary goal and in some cases one or more secondary goals.
- 3) Examples of Management Guidelines - These are used to qualify or quantify in a more specific way the recommended management under a goal for any particular area.

Management Guidelines are statements about:

- the wildlife population: its size, sex and age structure and productivity.
 - use: season lengths and timing, bag limits, number or distribution of hunters or other users, access, transport, viewing, and aesthetic enjoyment.
 - habitat: alteration or protection.
- 4) A short summary of available information on the species and its use in the area to provide perspective for evaluation of the proposed management framework.
 - 5) Statements of problems that may be encountered in managing for proposed goals. In general, problems deal with:
 - maintaining wildlife population levels: loss of animals or loss of habitat.
 - use of wildlife: exclusion of hunting, excessive access, noncompliance with regulations, state and federal legislation, and limitations on Department authority.
 - conflicts caused by wildlife: agricultural depredations, and safety of life and property.
 - 6) A summary of the impacts of the proposed management in terms of its effects on the species in question, on characteristics of its use by man, on other species, and on other uses of the area.

MANAGEMENT GOALS

We have selected six management goals for these wildlife plan proposals. The goals are categories of use into which the various appropriate forms of human interactions with wildlife can be grouped. The goals provide direction for management with flexibility in mind. In most individual plans, multiple goals are assigned: a single primary goal and one or more secondary goals. Each goal emphasizes one general type of use opportunity. This does not necessarily mean that other uses will be excluded. Rather, it recognizes that if uses conflict, uses appropriate to the stated goals will receive preference. Furthermore, uses indicated by stated goals will be actively managed for. The overall content of each plan will further define goals for that specific area.

All proposed management goals are based on Alaska's constitutional mandate that its wildlife shall be reserved to the people for common use and shall be utilized and maintained on the sustained yield principle for the maximum benefit of the people. Use on a sustained yield basis for the maximum benefit of the people will take on different dimensions depending on individual situations. As an example, in rural Alaska the benefit of the people may, in large part, be concerned with the harvest of meat for domestic use, and yield would refer to pounds of meat or number of animals harvested. In another situation the greatest benefit to the people may accrue from only observing wildlife. Yield in this instance refers to the important but often intangible enjoyment derived from viewing or otherwise being aware of the presence of wildlife.

The choice of goals and their various combinations are intended to accommodate the variety of situations which exist in Alaska. The six wildlife management goals are:

1. TO PROVIDE AN OPPORTUNITY TO VIEW, PHOTOGRAPH AND ENJOY WILDLIFE.
2. TO PROVIDE FOR AN OPTIMUM HARVEST.
3. TO PROVIDE THE GREATEST OPPORTUNITY TO PARTICIPATE IN HUNTING.
4. TO PROVIDE AN OPPORTUNITY TO HUNT UNDER AESTHETICALLY PLEASING CONDITIONS.
5. TO PROVIDE AN OPPORTUNITY TO TAKE LARGE ANIMALS.
6. TO PROVIDE AN OPPORTUNITY FOR SCIENTIFIC AND EDUCATIONAL STUDY.

A thorough understanding of the goals is essential to understand and evaluate the plans. We urge you to study the following explanations of each goal.

1. TO PROVIDE AN OPPORTUNITY TO VIEW, PHOTOGRAPH AND ENJOY WILDLIFE.

This goal recognizes the great values of being able to see wildlife in a context not necessarily related to actual taking, and emphasizes yield in terms of aesthetic values. There are important areas where the combination of wildlife abundance, unique opportunity and human access result in this use accruing the maximum benefit to people. Emphasis is on viewing and photographing and may exclude all other uses. However, other uses including hunting may be allowed if compatible.

So-called "nonconsumptive" use of wildlife is popular in the state today. Viewing and photographing occur most frequently along the state's road and trail systems, areas which often receive heavy hunting use and which are most susceptible to human development. In some areas where unusual abundance, visibility, or accessibility of wildlife enable ready observation by the public without detrimental effects to wildlife, management for these purposes should be provided. Prompt identification, establishment and management of such areas is necessary to avoid losses to encroaching development and competing uses. Many of these areas have been previously identified.

Management which provides an opportunity to view, photograph, and enjoy a species is concerned with maintaining a sustained, observable population of that species. Human uses of wildlife or of the area supporting wildlife which significantly detract from the opportunity to observe the primary species may be regulated or restricted. Hunting for the primary species is generally excluded during the period when most observation takes place. Limitations on the number, distribution, or activities of viewers and photographers may be necessary where unlimited use would detract from the opportunity to observe wildlife or cause undue disturbance. Hunting may be allowed when year-round or area-wide observation does not occur. In some situations concurrent consumptive and "nonconsumptive" uses may be compatible.

Viewing and photographing are often compatible with other uses; this is reflected in the numerous plans where viewing and photography occur in combination with other goals. When applied as a secondary goal the emphasis on viewing and photographing is subdued, and uses addressed by primary goals may at times limit opportunities for observation. In some cases, however, management for other primary goals may enhance opportunities for observation of wildlife.

2. TO PROVIDE FOR AN OPTIMUM HARVEST.

This goal emphasizes yield of animals for human use. Within this goal are accommodated the needs for domestic utilization, especially by rural residents, but also by recreational hunters primarily interested in meat; commercial harvests; and situations involving maintenance of wildlife populations at specified levels. Aesthetic quality of experience and production of trophy animals may be compromised.

Direct domestic utilization of wildlife is important to many rural residents and is a valuable supplement to the larders of urban citizens. Emphasis of management will be to achieve an optimum harvest. This goal is also desirable in situations where excessive wildlife numbers develop and the welfare of wildlife populations or the safety of human life or property will require maintaining some lower optimum number of the species in question. Finally, management to provide for an optimum harvest is used where direct commercial utilization is warranted.

Optimum harvest can be defined as the amount or level of yield that is most favorable to some specified end result, whether it is productivity or density of a wildlife population, within the constraints of sustaining that population for future use. Such a harvest will differ from area to area, from species to species, and over time.

Management of populations under this goal will be intensive, involving manipulation of the numbers and/or sex and age structure of the population. Controls on methods and means of taking game, adjustments to lengths of

hunting seasons and bag limits and restrictions on the number of hunters are ways by which use will be regulated. In cases where production of food is important to local residents, the species may be managed to maximize sustained productivity, and use may be regulated to favor those people with the greatest dependency on the resource.

Management under this goal has wide latitude depending on the conditions and requirements of any particular area where it is employed. The goal is often compatible with the goal of providing the greatest opportunity to participate in hunting and with other goals by regulating the time and place of use. This goal may adversely affect aesthetic hunting considerations and the production of trophy class animals. "Nonconsumptive" uses may be available on an opportunistic basis.

This goal differs from the other five goals because it does not directly consider opportunity for use, but rather use itself. Perhaps the greatest similarity between this goal and other goals is with that of providing the greatest opportunity to participate in hunting. Under both goals the upper limit to consumptive use is the maximum harvest that a population can sustain. But whereas "greatest opportunity to participate in hunting" is dependent on the optimum harvest, attaining an "optimum harvest" is not dependent on providing the greatest opportunity to participate in hunting. Yield of the latter is participation. In the former, yield is in number of animals (biomass) that can be taken.

3. TO PROVIDE THE GREATEST OPPORTUNITY TO PARTICIPATE IN HUNTING.

This goal recognizes the recreational value of hunting and emphasizes the freedom of opportunity for all citizens to participate. In this case, the opportunity to participate is deemed more important than success or standards of quality of experience.

As Alaska moves away from the open frontier lifestyle, recreational hunting is an increasingly important use of wildlife in the state. Yet even as the demand for recreational hunting is growing, the area available for such use is decreasing. Extensive private land ownership and additional extensive parks, refuges and other lands designated for limited use will strongly affect recreational hunting opportunities in the state.

Providing the greatest opportunity to participate in hunting will not mean maximizing opportunity to kill. Management will consider participation more desirable than success. Opportunity must sometimes be limited to maintain harvests within the numbers that a wildlife population can sustain. Restricting harvest will usually involve altering methods and means of taking game, bag limits, and lengths and timing of seasons before limiting number of hunters. When participation must be limited, time allowed for a hunt will be limited before limiting number of hunters.

Management to provide the greatest opportunity to participate in hunting often will be similar to providing for an optimum harvest, because where demand to hunt is sufficient, full beneficial use of the resource will be allowed. Consequently these two goals are recommended in combination in many areas. Used as the only goal in an area, greatest opportunity to participate in hunting may compromise aesthetic considerations or reduce opportunity to take large (trophy) animals; "nonconsumptive" uses would be available on an opportunistic basis.

4. TO PROVIDE AN OPPORTUNITY TO HUNT UNDER AESTHETICALLY PLEASING CONDITIONS.

This goal emphasizes quality of hunting experience. To achieve it will often require limiting the number of people who may participate, as well as the means used to take game. Criteria for such areas include natural or wilderness character of the land, low hunter densities, and emphasis on hunting without the aid of mechanized vehicles.

Quality of experience is becoming increasingly important to a greater number of hunters, especially for those who value the aesthetics of the hunting experience as much or more than hunting success. For them the proliferation of off-road vehicles, riverboats, airplanes and the "hunter behind every bush" situation is distasteful. Under this goal, aesthetically pleasing conditions refers to a hunting experience which usually includes low hunter densities, controlled methods of transport, undisturbed wilderness character, and regulation of other conflicting uses, separately or in combination. Human activities which adversely affect the aesthetic quality of the hunting experience will be discouraged, limited, or prohibited. Opportunity as used here does not guarantee unlimited participation, and would normally imply limits on participation. Controls on hunter transport may reduce hunting success. This goal will not usually require large or dense populations of wildlife, nor will animals necessarily be of large (trophy) size. Harvests need not attain the highest levels that can be supported by the population.

The value of aesthetics is often considered when other goals are primary, and this goal is often used in combination with other goals to reflect the considerations of quality not explicitly stated in other goals. To the extent that other uses conflict with aesthetic values, timing and zoning of the area of use can be employed to obtain greater utilization of a wildlife population.

5. TO PROVIDE AN OPPORTUNITY TO TAKE LARGE ANIMALS.

This goal emphasizes the opportunity for hunters to take large animals. To accomplish this goal will usually mean that participation of hunters will be limited and the species population within the area may be manipulated to produce the maximum number of large animals.

Many recreational hunters are especially interested in taking a large animal. With development and increasing human pressures on wildlife resources, the opportunities for hunters to be selective for large animals are becoming fewer. Management under this goal may ensure that in some areas and for some species such opportunity will be retained. Areas recommended for management under this goal must have a reasonable number of large, old or trophy animals available or the potential to produce such animals. Opportunity as used here would not guarantee unlimited participation, but would provide a reasonable chance of success to those who do participate. Management will often be intensive, involving manipulation of the sex and age composition to produce large animals, and possible controls on number and distribution of hunters.

This goal and that of hunting under aesthetically pleasing conditions will often be compatible, and hunting both for large animals and under aesthetic conditions will be enjoyed simultaneously. Management for other goals is possible when the production of large animals is not affected. However, intensive management to produce large animals may

require taking other population segments by other users. For example, to produce large bull moose it may be necessary to harvest substantial numbers of female moose. This goal does not preclude "nonconsumptive" uses, and in fact may enhance "nonconsumptive" use experiences by providing improved opportunities to view large animals.

6. TO PROVIDE AN OPPORTUNITY FOR SCIENTIFIC AND EDUCATIONAL STUDY.

This goal recognizes the desirability and need to provide for scientific and educational use of wildlife to achieve a scientific basis for evaluating management options. Such management may require setting aside areas solely for this purpose, but in most cases, this use is compatible with other types of use.

The Alaskan wilderness, including its wildlife, is a unique natural laboratory for the scientific study of ecosystems and wildlife biology, and for the educational enrichment of the people. Scientific study and education have continually taken place in many areas of Alaska, reflecting the wide compatibility of such use with other uses of wildlife. Occasionally however, undisturbed or closely controlled conditions are necessary for study requirements and justify the designation of areas managed primarily for the scientific and educational study of wildlife. Study requirements would specify the extent to which other uses, both consumptive and nonconsumptive, would be allowed. In some cases, intensive population or habitat manipulation could be necessary to achieve study objectives. Participation could be limited.

This goal appears most often in combination with the goal of providing an opportunity to view, photograph and enjoy wildlife because they often have much in common. Educational studies are often enhanced by relatively undisturbed wildlife populations in areas established for viewing and photography. Providing for scientific and educational study is proposed as a primary goal in very few areas. Such limited direct application of this goal emphasizes the fact that opportunities for scientific and educational study exist throughout the state and special designation is unnecessary unless intensive population or environmental controls are required.

MANAGEMENT BACKGROUND

To properly evaluate the individual species plans presented in this volume, it is necessary to have some appreciation for the Alaska setting in which these plans are developed. There are, of course, biological or ecological characteristics of wildlife which affect its management. There are also a number of human institutions that affect management: constitutional and statutory authority, requirements, and constraints; policy; user requirements; and the demands of the "new Alaska." It is hoped that the following discussion touching on these considerations helps to place the plans in a more relevant perspective for public understanding.

THE LEGAL BASIS FOR WILDLIFE MANAGEMENT IN ALASKA

Wildlife management in Alaska was formally established in 1925 when Congress created the Alaska Game Commission "to protect game animals, land furbearing animals, and birds in Alaska, and for other purposes." Prior to 1925 protection of wildlife had been undertaken by the Departments of Treasury, Commerce, and Agriculture, and by the territorial governor.

The five-member Alaska Game Commission, appointed by the governor, represented each of four Judicial Divisions of the state and the U. S. Bureau of Biological Survey, later to become the U. S. Fish and Wildlife Service. This commission set hunting seasons and bag limits subject to approval by the Secretary of Interior. Emphasis of management was on establishment of wildlife refuges and on enforcement and predator control activities until the 1950's when research of game populations was increased.

With the attainment of statehood in 1959 a formal framework for State management of Alaska's wildlife resources was established. In addressing natural resources, Article VIII of the Constitution of the State of Alaska states:

Section 1. Statement of Policy. It is the policy of the State to encourage the settlement of its land and the development of its resources by making them available for maximum use consistent with the public interest.

Section 2. General Authority. The legislature shall provide for the utilization, development, and conservation of all natural resources belonging to the State, including land and waters, for the maximum benefit of its people.

Section 3. Common Use. Wherever occurring in their natural state, fish, wildlife, and waters are reserved to the people for common use.

Section 4. Sustained Yield. Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial uses.

In accordance with these mandates, the Alaska Legislature established by statute a Department of Fish and Game, provided for a Commissioner as the principal executive officer of the Department, and created a Board of Fish and Game. The Division of Game was one of several divisions created to carry out the responsibilities of the Department.

Since statehood the role of the Legislature and the functions, structure, and interrelationships of the Board of Fish and Game, its advisory committees, and the Department have undergone changes in response to

public concerns over increased use of wildlife, increased conflicts between users, growing public involvement in government and increased public environmental concern.

Legislature

The Legislature, by virtue of its broad constitutional authority, has been a dominant force in establishing the character and direction of Alaska's management of wildlife. At statehood the Legislature enacted the Fish and Game Code of Alaska (Title 16) which established the Commissioner and Department of Fish and Game and a Board of Fish and Game, and defined the powers, duties and functions of each. In addition, this act, or amendments and additions to it, provided for: the authority to enforce laws and regulations; licensing of hunting and trapping, including specification of licenses and tags required and their fees; protection of fish and game from human activities; establishment of state game refuges and sanctuaries, and designation of critical habitat areas; suppression of and bounties for predatory animals; commercial use of fish and game; and the specification of unlawful acts, violations, and penalties therefor. Among the powers specifically reserved to the Legislature were those of regulatory and administrative legislative review, approval of areas set apart as fish and game reserves, refuges, and sanctuaries by the Board, the authority to change the amount of fees or licenses, and budgetary controls. This legislation, in essence, formed the basic framework for the entire scope of activities carried on by the Department and the Board.

Since statehood, the Legislature has variously added to, amended or repealed portions of the original State fish and game statutes, reflecting increased complexities of resource management, and increased demands on the Legislature by the people. In general, revisions of the statutes have served to clarify or expand legislative intent and to increase provisions for management, protection, regulation and use of wildlife. Although many of the revisions have affected the scope of activities of the Commissioner, the Department, and the Board, most have had little substantive effect on the interrelationships between these principals. Some recent state legislation however, has affected the traditional structure of Commissioner and Board authorities. The general effect of these recent legislative actions has been a diminution of Commissioner and Board authorities in favor of increased parochial advisory committee roles and increased public participation. Included in such acts are those relating to:

- Boards of Fisheries and Game. This 1975 act restructured the 12 member Board of Fish and Game into two, 7-member boards, one for fisheries and one for game; repealed the status of the Commissioner of Fish and Game as an ex-officio member of the Board; redefined the regulatory powers of the Boards; amended the provision establishing advisory committees to concurrently expand advisory committee authority to close seasons and limit the Commissioner's authority to overrule closures established by advisory committees.
- Taking of antlerless moose. This 1975 act expanded the authority of advisory committees and the Department while limiting the regulatory authority of the Board of Game by prohibiting the taking of antlerless moose except under regulations adopted by the Board after requisite recommendations for open seasons are made by the Department and by a majority of active local advisory committees for the game management unit or units affected.

Although it is important to recognize that the Legislature has delegated broad regulatory authority to the Board of Game, it is also important to

understand that the Legislature has the authority to affect that delegation at any time. For example, seasons and bag limits, normally set by the Board, could legally be established by the Legislature. However, the Legislature has generally restricted its activities to more general and enabling legislation.

Governor

The Governor, as chief executive of the State, is responsible for the conduct of the Department of Fish and Game in serving the people of Alaska. All actions of the Department are subject to review and concurrence by the Governor. In addition, the Governor may invoke independent executive actions. Under his strong constitutional authority, the Governor has brought about major reorganization of the Department in the past. In 1962 most of the functions and powers of the Department relative to the collection, accountability, and custody of fish and game revenues was transferred to the Department of Revenue by executive order. Similarly, the Division of Protection, with primary responsibility for enforcement of all fish and game laws and regulations for the Department, was transferred to the Department of Public Safety in 1972.

Commissioner of the Department of Fish and Game

The Commissioner is the principal executive officer of the Department of Fish and Game. He is appointed by the Governor for a term of 5 years, subject to confirmation by the Legislature, and serves at the pleasure of the Governor. The Commissioner functions to "manage, protect, maintain, improve, and extend the fish, game and aquatic plant resources of the state in the interest of the economy and general well-being of the state" (AS 16.05.020). To that end, he supervises and controls the Department, including appointments of personnel and assistants necessary for the general administration of the Department and he may delegate his authority to subordinate officers.

Among the powers and duties of the Commissioner are administrative, budgeting and fiscal powers; the collection, classification and dissemination of statistics, data and information; the emergency opening or closure of seasons or areas; and the capture, propagation, transport, purchase, sale, or exchange of fish or game or eggs for scientific or stocking purposes.

In addition to that authority specifically provided to the Commissioner by statute, the Board may delegate to the Commissioner authority to make regulations. However, such delegation in the past has been limited and specific in nature.

Division of Game

The Division of Game was established in 1959 under provisions of the act creating the Department of Fish and Game. As one of several divisions of the Department, the Division of Game functions in meeting the legislative charge to the Commissioner to "manage, protect, maintain, improve and extend the....game....resources of the state....." as well as in providing such assistance to the Board of Game as it requires in the performance of its functions. In each of these areas, the Division attempts to maintain a public posture by disseminating information and encouraging public involvement in the management of Alaska's wildlife.

The Division of Game conducts many activities to meet its responsibilities including:

- * Assessment of game population status involving biological

research, surveys and inventories of game populations, and compilation and analysis of harvest statistics.

- * Identification and protection of important wildlife habitats. The Division provides information and recommendations to federal, state and local agencies which plan for, manage, regulate, or otherwise affect lands in Alaska or their use, to minimize detrimental impacts of land and water uses upon wildlife habitat in Alaska.
- * Preparation of reports on the status, management and use of Alaska's wildlife resources, for public information, scientific publication and use, and to provide the Board of Game with information it requires to promulgate regulations.
- * Recommending appropriate regulations for consideration by the Board of Game.
- * Enforcement of regulations. Although primary responsibility for enforcement of fish and game regulations falls to the Division of Wildlife Protection in the Department of Public Safety, Game Biologists are authorized as enforcement officers and maintain an active profile in the enforcement of regulations.
- * Providing the public with information, assistance and other services. The Division disseminates reports of Division activities to the public, contributes to Departmental information and education activities including television and radio programs, a Fish and Game magazine and newspaper articles, distributes regulation pamphlets to the public, and provides personal assistance and explanation on an individual inquiry basis.

At present, the Division of Game is staffed with approximately 110 full-time positions. About 75 positions are filled by professional biologists, all of whom possess at least a Bachelor's degree in wildlife management or other biological sciences. Many possess Master's degrees or higher. The remainder comprise the support staff of clerical, technical, and statistical positions. In addition to the Division headquarters in Juneau, regional offices are maintained in Fairbanks, Anchorage and Juneau. A total of 21 area field offices are maintained in major communities throughout the state.

Activities of the Division of Game are largely funded by a federal-state matching funds arrangement, made possible through a "Fish and Game Fund" and the Federal Aid in Wildlife Restoration Act of 1937.

Under the Federal Aid in Wildlife Restoration Act and its amendments, funds from an excise tax on sporting arms and ammunition, including pistols, revolvers, bows and arrows, and parts and accessories are made available to the various states on a matching basis for use in wildlife restoration work, including land acquisition, research, development and management projects, and for use in hunter safety programs. Monies are made available on a maximum share basis of 3 federal to 1 state dollar basis. Provisions in the act require the various participating states to maintain funds obligated to fish and wildlife restoration work as defined by the act.

The Alaska Legislature established the Fish and Game Fund at the same time the Department was established. Most of the money comprising the Fish and Game Fund derives from the sale of state sport fishing and hunting licenses and special permits, although funds from other sources are possible. Funds gained from license sales or permit fees cannot be used for other than the protection, propagation, investigation and restoration of sport fish and game resources and the expenses of administering the Sport Fish and Game Divisions of the Department.

Board of Game

The Board of Game, as presently constituted, was established in 1975. Originally established in 1959 as an eight-member Board of Fish and Game, the Board was subsequently enlarged by statute to 10 and then 12 members before being divided into two Boards, one for fisheries and one for game. The Board of Game now has seven members, appointed by the Governor and subject to confirmation by the Legislature. The staggered term of office for members is four years. Members serve at the pleasure of the Governor.

The primary functions of the Board of Game in conserving and developing the game resources of the state are the promulgation of regulations affecting use of wildlife and the establishment and conduct of advisory committees.

The Board of Game is empowered to make regulations for:

- (1) setting apart game reserve areas, refuges and sanctuaries in the waters or on the lands of the state over which it has jurisdiction, subject to the approval of the Legislature;
- (2) establishment of open and closed seasons and areas for the taking of game;
- (3) establishment of the means and methods employed in the pursuit, capture and transport of game;
- (4) setting quotas and bag limits on the taking of game;
- (5) classifying game as game birds, song birds, big game animals, furbearing animals, predators or other categories;
- (6) investigating and determining the extent and effect of predation and competition among game in the state, exercising control measures considered necessary to the resources of the state and designating game management units or parts of game management units in which bounties for predatory animals shall be paid;
- (7) engaging in biological research, watershed and habitat improvement, and game management, protection, propagation and stocking;
- (8) entering into cooperative agreements with educational institutions and state, federal, or other agencies to promote game research, management, education, and information and to train men for game management;
- (9) prohibiting the live capture, possession, transport, or release of native or exotic game or their eggs; and
- (10) establishing the times and dates during which the issuance of game licenses, permits and registrations and the transfer of permits and registrations between registration areas and game management units or subunits is allowed. (AS 16.05.255)

In addition, the Board of Game may adopt regulations upon the recommendation of the Department, by the majority vote of affected local advisory committees, or by written petition by interested residents of an area as regards the establishment of subsistence hunting areas, the control of transportation methods and means within subsistence hunting areas, and the establishment of open and closed seasons and areas to protect subsistence hunting. (AS 16.05.257)

Promulgation of regulations by the Board must be in accordance with Alaska's Administrative Procedure Act (AS 44.62) which requires among

other things that:

1. Meetings of the Board be open to the public and that reasonable public notice be given for such meetings.
2. A procedure be used for adopting regulations which includes:
 - a. prior public notification of proposed actions,
 - b. opportunity for any interested person to present statements, arguments, or contentions in reference to a proposed action, and,
 - c. opportunity for an interested person to petition the Board for the adoption, amendment, or repeal of a regulation.
3. Regulations be codified and published.

The Boards of Fisheries and Game are empowered to establish advisory committees in various parts of the state for the purpose of providing the Boards with recommendations on fish and game in their areas of jurisdiction. The Boards set the number and terms of the members of advisory committees, delegate one member of each committee as chairman and give him authority to hold public hearings on fish or game matters. Advisory committees have the authority to declare emergency closures during established seasons under procedures established by the Board. Furthermore, advisory committees must recommend openings of antlerless moose seasons in their respective areas, in conjunction with Department recommendations for open seasons, before the Board of Game may adopt regulations for the taking of antlerless moose.

The Board of Game meets at least once each year, but may meet more often as it considers necessary. Special Board meetings may be called at any time by the Commissioner or at the request of two Board members.

Public

Alaska's people are the ultimate managers of their wildlife resources. Through the electoral process and other mechanisms of government responsiveness, the public can and does effect the management of wildlife in Alaska.

Wildlife management in Alaska is an exceptionally public process. Aside from the economic interest in resource utilization, few other resources elicit public attention to the extent that fish and wildlife do because an intimate association with wildlife has been an important part of the Alaskan lifestyle. There is a traditional sense of personal ownership of wildlife that doesn't exist to the same degree with other natural resources. Other contributing factors are the increasing importance of outdoor recreational activities and the widespread public association with "ecological awareness."

Alaska's constitution reserves the state's wildlife to the people for common use consistent with the public interest. In order to assume an active and productive role in the management and use of wildlife, the public must be cognizant of the responsibilities demanded by such a role. The public has a responsibility to be informed about the status of wildlife resources and the options for their use. The public should also be informed about the governmental management framework - which agencies are involved, what their responsibilities are, how their functions and authority are interrelated, and what legal, budgetary, and administrative constraints limit their actions. Citizens should be aware of the opportunities to express their concerns as provided by statute, directive and policy: the legislative stage, the public forum provided by the Board of Game, public hearings and meetings, petitions,

and personal contact. The public should participate in the regulatory process and should actively support current regulations. Finally, all wildlife users should bear their share of costs of conservation. Although many people who do not hunt or fish derive substantial benefits from fish and wildlife, in Alaska almost all costs of wildlife management by the Department of Fish and Game are borne not by the general public, but by those individuals who purchase hunting and fishing licenses, guns and ammunition, and fishing tackle.

BIOLOGICAL CONSIDERATIONS

Wildlife Habitat

The dependency of wildlife on its habitat is of fundamental importance, yet many people are unaware of the relationships involved. Habitat is a combination of many interrelated factors which provide living space for a species. Food and cover are general terms for basic necessities that are often complicated and variable according to season and circumstance. Suitable and often different areas are needed for breeding, nesting, rearing young, resting, escaping and feeding. Not only must all these essential components be present in a habitat to make it "habitable" for a species, but they must be accessible to the animals. Some migratory birds satisfy their habitat needs by depending on habitat components over the breadth of two continents while some small mammals live their entire lives in the space of a backyard. But the "backyard" must have the necessary variety of areas to be good habitat. For many species, the more "edge effect" created by interspersions of vegetative types, the better the habitat. The suitability of a habitat is the first concern in any effort to establish, maintain, or enhance populations of a species.

There is a limit to the number of animals supported by a unit of habitat, and this limit varies from season to season and from year to year as the adequacy of the essential habitat factors vary. When expressed as an average density of animals that can be supported this limit is called the carrying capacity. When carrying capacity is exceeded by a population, habitat can be damaged, and the result is often a reduction in the carrying capacity followed by a decline in the wildlife population.

A species usually relies on more than one specific habitat area or factor for the essentials of life. The area or factor in shortest supply determines the maximum number of animals that a habitat can support. This is known as a limiting factor. If food is the limiting factor, and the supply is increased, the carrying capacity for that species will increase until it becomes limited by the shortage of another factor, such as a place to escape from predators. Specific habitat areas of great importance to a wildlife population are called critical areas or critical habitat. Such areas are critical because they are limiting, and their loss or reduction would result in elimination or reduction of the population.

Habitat changes are continuously occurring naturally. Vegetation associations succeed one another as each successional stage, through its occupancy, makes conditions more favorable for its successor until a climax vegetation stage is established. Climax communities remain in tenuous balance with the long-term forces of climate and geological change. There are reversals in the process as well, and these normally are sudden and drastic in comparison to the subtle progress of succession. Fire is perhaps the most spectacular, but there are many others, such as deposition of material by rivers and glaciers, effects of windstorms, insect infestations, and man-made clearings. Wildlife populations change in response to changes in habitat, as it becomes more or less

favorable for the species.

Manipulation of habitat (including protection when necessary) is therefore a prime tool in managing for desired populations of wildlife. With the proper techniques the successional stages most favorable to a species can be maintained on a long-term basis, variety of desired vegetation can be improved beyond natural occurrence, and special habitat necessities can sometimes be artificially provided. Response of wildlife to habitat improvements can be dramatic.

Some qualifications on the benefits of habitat improvement should be noted. Habitat improvement programs are directed at increasing or maintaining numbers of desired wildlife populations. Since a habitat favorable for some species may be less favorable for others, manipulation of habitat will mean reductions of some species populations as well as gains to others. Also, manipulation of habitat does not always result in increases of wildlife because the effectiveness of habitat improvements may be limited by the influence of uncontrolled factors such as climate and soil quality. There also are a number of species which are dependent upon climax vegetation associations. Because their populations cannot be benefitted through short-term vegetation changes management must be directed to other factors which are alterable.

Population dynamics

Maintenance of populations at carrying capacity, however useful as a management concept, is rarely achieved under natural, unmanaged conditions. How many individuals of a species there actually are in an area at any time is a result of the interplay of the population with the allowance of its living area. Wildlife is often "out of phase" with its habitat in a never-ending see-saw of adjustments to the excesses and shortages of its environment. The processes of adjustment by which a population's size is balanced with its habitat are termed population dynamics. Essentially, these are the opposing forces of reproduction and mortality.

Reproduction is the main way new individuals are recruited into a population (migration may add animals, too). The increase of a population, excluding the effects of movement or mortality, is limited by the reproductive potential of that species. The number of young each female can produce in a year, the minimum and maximum ages at which breeding may occur, the sex ratio of breeding adults, and longevity of individuals, all together determine the maximum rate of increase that a population may exhibit. Wildlife populations, however, rarely increase at their maximum rate. Mortality is the main reason, of course, but other factors may depress reproductive success. For example, not all females capable of breeding find males; or younger animals capable of breeding may be inhibited in attempting to breed because of dominance exerted by older individuals; and many species give birth to fewer young in times of adversity. Such depressants on reproduction are commonly self-regulating mechanisms, through which animals respond to conditions of overcrowding, food shortages, or poor nutrition.

Mortality operates against population growth by removing animals. Starvation, predation, hunting, inclement weather, diseases and parasites, accidents, and strife between animals all contribute to losses of wildlife. The relative importance of any one factor is generally dependent on two things: the effects of other mortality factors, and the density of the population. Animals injured by accident or strife may have difficulty obtaining food and may starve. Others, weakened by starvation or debilitated by disease, may fall easy prey to predators. In the absence of predation and hunting, populations can outgrow their food supply and starvation will be the major cause of mortality. Some factors, such as predation, starvation, and disease, increase in their importance as the density of the population rises and these are known as density-dependent mortality.

factors. Success of predators increases as their prey becomes more abundant. Starvation is more common as competition for food increases. Transmission of disease is facilitated by crowding of animals. The reverse situation is also true. As a population is reduced, relatively fewer losses occur to these factors. Also, greater losses to one cause will result in reduced losses due to other factors. To some extent, change in one kind of loss is compensated for by change in another kind of loss.

These direct and indirect compensatory relationships between reproductive performance, various mortality factors, and population density make it possible to some extent for human use of wildlife to replace other kinds of mortality.

Losses to wildlife populations are replaced by reproduction. If everything is working right and habitat quality is reasonably good, animals characteristically produce more young than are needed for replacement. This creates a "surplus" of individuals, both young and old, that is trimmed off by the various mortality factors. The surplus may be small if the new individuals are accommodated by excellent habitat, or it may be large as the population exceeds the capacity of the habitat. Wildlife management seeks to take advantage of compensatory relationships to make some of the surplus available for human use.

Removal of animals lowers population density. Fewer animals are then lost to density-dependent mortality factors. Lowered density results in reduced competition for food, which in turn increases survival of young, for it is the young (and the very old) which suffer the greatest losses to starvation. Within limits, increasing the removal of adult animals continues to boost the survival of young. Furthermore, lower population density makes more food available, more animals breed successfully as a result of being in good physical condition, and more young are produced and raised by each female.

The productivity of a species in terms of its use by humans is called "yield." Normally, yield applies to consumptive use, but it can also include so-called "nonconsumptive" use as well. Management of wildlife is aimed at producing a sustained yield, that is, utilizing a wildlife population at such a level that the capability of the population to continue to provide such use is not impaired. Sustained yield is the central concept in the management of any renewable resource.

There is usually a range in intensity of use that wildlife populations will sustain, from no use to that which is the maximum allowable. Human use is another force acting on a population, affecting, and in turn being affected by, the compensatory relationships of the various natural reproductive and mortality factors. Consequently, a wildlife population will establish an equilibrium with the forces acting upon it, as long as the minimal species requirements are met.

PROBLEMS OF MANAGEMENT

Management of wildlife has its share of problems. Although many problems can be foreseen and avoided by giving careful thought to the future, dealing with wildlife and with people is full of surprises and the wildlife manager must be "ready for anything."

The difficulties faced by wild animals in their daily lives become part of the problems faced by wildlife managers. Many of the crucial problems faced by wildlife in obtaining enough good food, having a chance to reproduce, and avoiding an untimely death are known. Many remain nature's secrets. A large part of the wildlife manager's job consists of learning to recognize these crucial problems, and trying to either minimize or make allowance for them.

Perhaps a larger part of the manager's job involves regulating man's use of wildlife and its habitat. There are two broad problem areas involved. The most difficult is attempting to insure that use and development of resources other than wildlife cause the least difficulties for wildlife and its habitat. The second broad problem area involves developing a system of wildlife use that enriches the lives of the public in various ways without impairing the welfare of wildlife species, their habitat, or their relations with other species. The latter problem is the wildlifer's "first love," but more often than not he's "married" to the former!

Taken together, these two broad problem areas include a whole spectrum of potential difficulties for wildlife, wildlife managers, and the public who wishes to enjoy wildlife. Problems range in importance from critical to mere nuisances, depending on their nature, location, duration, season and magnitude. The most important problem affecting the well-being of wildlife in Alaska and indeed, in most parts of the world, is loss of suitable living space, or habitat. Alaska is fortunate in that the wildlife habitat that has been lost or significantly damaged is small at this time, but the trend toward increasing losses is clear.

Many other problems exist, and the following review may give readers a feeling for the variety and importance of problems encountered in wildlife management. For convenience, problems are grouped according to these circumstances: natural factors, land use, use of wildlife, and management limitations.

Natural Factors

Loss of habitat occurs through nature's processes, sometimes suddenly but more often slowly enough for animals to adjust. Given time, meadows may become brushlands, and brushlands become forests. For example, the great 1947 Kenai burn, a huge wildfire on the Kenai Peninsula, allowed thousands of acres of young willow, aspen and birch to replace mature forests with prime food, and stimulated a boom in moose numbers. But after 30 years the prime food plants have grown out of reach or have been eaten up; the prime moose habitat is gradually being lost, and the number of moose the area can support has declined. Similar situations have occurred throughout much of Southcentral and Interior Alaska, as modern, efficient fire suppression techniques have reduced the frequency and extent of burning. On the other hand, natural and man-caused fires have affected wildlife populations, such as caribou, red squirrels, and spruce grouse, that are dependent on long-established (climax) vegetation.

There are other examples: ponds or sloughs used by beavers may gradually fill in with silt and dead plant remains, and either become too shallow or develop a wide "beach" of sedges and grasses that makes food gathering a dangerous proposition, and the beavers quit using the ponds.

Sometimes the animals cause their own problem. The Nelchina caribou herd grew so large that it decreased its own food supply by eating and trampling more than the plants could produce. An important part of the caribou habitat was lost, and will not recover for many years. But, to repeat, these are all examples of relatively long-term changes, and while great changes may occur in numbers of the species affected, the change each year may be moderate.

In a few cases, change may be rapid and catastrophic. A much earlier fire on the Kenai Peninsula apparently destroyed the caribou habitat then available. Caribou disappeared from the Kenai, and did not return until transplanted by man 60 to 70 years later. The 1912 eruption of Katmai was a catastrophe that quickly eliminated much wildlife habitat on the Alaska Peninsula, and the 1964 earthquake caused the ocean floor to rise several feet in some areas of southcentral Alaska, dramatically

affecting all marine life, including marine mammals and waterfowl.

Another major, natural limiting factor, or problem, for wildlife is weather. Alaska's climate is often harsh and there are numerous examples of the limiting effects of weather on wildlife. In the winters of 1971, 1972 and 1974 unusually cold weather caused sea ice in the Bering Sea to extend hundreds of miles south of its usual limit; sea otters were trapped, unable to feed and float as they normally do, and many died. Winters of prolonged, unusually deep snow have caused major die-offs of moose at Yakutat, and in Southcentral and Interior Alaska. In some cases 50 percent or more of the moose may have died, mainly because it became too difficult to get around in search of food.

Hard snow crusts formed by unusual winter rain have caused grouse to die from freezing, because the birds were unable to burrow in the snow at night to sleep. Similar crusts caused by the bright spring sun have at times aided wolves in pursuit of moose. In some years, frozen or wind-blown snow crusts may prevent caribou from feeding on parts of their winter range; crusts or deep snow may affect sheep similarly.

Mid-winter flooding or unusually great depths of overflow ice have driven beavers from their houses, much to the benefit of passing wolves or wolverines which find beavers easy prey on land. Severe spring floods may drown beaver kits, calf moose, and other young-of-the-year. Of course, the effect of any of these events depends on their severity, how long they last, and whether or not they strike an especially vulnerable spot in the species' annual cycle of living.

There may be times when weather is so severe that animals (especially young ones) die outright from exposure, but usually, as in the examples above, bad weather makes it so hard for animals to use some critical part of their habitat that they die from starvation, with a little extra "push" from a combination of various lesser factors such as disease or parasites, predators, and accidents.

Food supply, or nutrition, is a crucial factor not only during hard winters, but at other times as well. Ample food of good quality is especially important to pregnant and nursing females, whose food needs are greatly increased. A lack of proper food may result in weak offspring which may be susceptible to disease, or be caught by a predator. Some young may not even be born, or may be born dead. In fact, if the female has been undernourished prior to breeding season, she may not conceive when she mates, or perhaps she will have fewer offspring than normal.

Moose, deer, and caribou depend on "fattening-up" during the summer in preparation for a rugged rutting season and a long winter. Males lose most of their fat during the rut, and are actually in only fair condition when winter comes. If winter weather is particularly severe, or winter food is scarce, males are more likely to die than females. Calves and very old animals are even more susceptible.

As more is learned about wildlife nutrition, it becomes evident that food quality is as important as quantity. Some species of food plants are more nutritious than others, some parts of plants are more nutritious than other parts, and in general younger plants are more nutritious than older plants. A bunch of brush is not necessarily a bunch of good wildlife food!

Predation. If the moose, caribou, sheep, grouse or other species have managed to survive all the other natural hazards of life so far discussed, there is no time to be smug, because there may be a bear, wolf, weasel, hawk or some other predator looking for its next meal! When prey species (those normally eaten by another species) are at low numbers, in poor condition, or have trouble escaping because of deep snow or lack of

suitable habitat, predators can eat enough prey to reduce or hold down numbers of their prey. The effects may be short-term, or they may extend over several decades, depending on the species involved and the circumstances. There usually is little doubt that prey numbers will eventually recover, but in the meantime few of the prey species may be available for the remaining predators, scavengers, or for various uses by people. For example, in recent years, severe winter weather has been an important cause of declining moose numbers in Interior Alaska. In the Tanana Flats, near Fairbanks, hunting and predation contributed to this decline. Hunting has been almost completely eliminated to encourage the recovery of the moose population, but so far no recovery is in sight. Wolves have been one of the major factors preventing moose numbers from rapidly recovering, and in the Tanana Flats, their depredations may accelerate and deepen the moose decline to very low numbers. The situation prompted wolf control programs in an effort to allow moose to recover more rapidly. Predators are rarely the sole reason for declines of wildlife populations, but under certain circumstances they can be a primary cause for depression of prey numbers.

There are additional natural hazards for wildlife. Accidents and disease sometimes kill wildlife, but often these hazards are either caused or promoted by other hazards. For example, a hard winter or late break-up may cause more accidents, because animals are in poor condition and more accident-prone.

In summary, a variety of natural mortality factors affect wildlife populations; these factors usually are interrelated, and their impact varies from negligible to considerable. Wildlife managers must know what these factors, or problems, are, and either devise ways of reducing them, or tailor management to allow for effects of these hazards.

Land Use

Land ownership was pretty simple before Alaska became a state. There were a few military reservations, and a large petroleum reserve. A handful of large National Parks, Monuments and extensive Wildlife Refuges existed, plus large National Forest holdings in Southeastern Alaska and smaller ones in Southcentral Alaska. Most of Alaska, though, was public domain, uncommitted to any special uses.

Times changed, the State of Alaska was given the right to select 104 million acres as part of its dowry from the federal government, and before long the question of Alaska Native Land Claims arose. In 1971 the Alaska Native Claims Settlement Act gave Alaskan Natives the right to select approximately 40 million acres of land in Alaska, and also provided for inclusion of up to 80 million acres in National Parks, Refuges, Forests and Wild and Scenic Rivers. Native selections were recently completed and are awaiting certification. Various proposals have been made for how the 80 million acres, called "d2" lands, should be assigned to the government agencies involved, and Congress has to make the final decisions by December 1978.

However those final decisions turn out, lands in Alaska will be in a crazy-quilt pattern of private, state, and (several) federal agency ownerships. The rights, regulations and rules of the various owners will make resource use of all kinds much more complex, and generally more restrictive than ever before. For wildlife management to contribute effectively to the well-being of wildlife species, and to provide for continued use of wildlife in various ways, some major problems must be addressed.

Perhaps the most basic problem is that even as demands for use of wildlife increase, the amount of land available for public use will decline, simply because the amount of land in private ownership will increase.

Land granted to native groups will be private land. Like any landowner, native groups will place their own interests first, and the lands granted to them are their main resource in becoming economically self-sufficient. Self-sufficiency may be based on resource development, subsistence use, or both, but whatever combination develops, public access to wildlife on those lands will no longer be a right, and opportunities to use wildlife will decrease.

Some state-owned lands may go into private control, too, through sale or lease. This would also decrease opportunity for public access to wildlife. By statute, one Alaskan has as much right to use wildlife as another, but, also by law, the landowner can regulate trespass on his own land as he sees fit.

The dilemma of increasing demand for wildlife use is only a little less complicated on public lands where constraints of private ownership are not in effect. In substantial portions of the 80 million acres of d2 lands under consideration by Congress, wildlife uses such as hunting, trapping, observing, or otherwise enjoying wildlife may be severely restricted or prohibited. Loss or severe restriction of these uses in large areas of federal domain is in itself a problem for those desiring to hunt and trap, or use wildlife in other ways, but the problem is compounded because the demand for these uses is not likely to go away. Rather, it will shift to other areas still available for these uses. Wildlife management programs then must cope with this concentrated demand and the stress it places on resources of a reduced land area.

With the many future owners of Alaska's lands and their diverse interests, a great challenge will be to achieve agreement on management that will benefit wildlife no matter whose land they're standing on. Many species will regularly cross property boundaries, and it will be very important that habitat preservation or manipulation and other management measures undertaken for the benefit of wildlife are a truly cooperative venture among landowners.

Development of Alaska's natural resources has spurred interest in Alaska ever since the first Russian ship groped its way through the storms and fog to find and claim "The Great Land." The history of development in Alaska is really more a chronicle of exploitation, crammed with a thousand shaky schemes to make men rich and sprinkled with a few that succeeded. Alaska survived, more by its vastness, remoteness, and by chance than by the enlightenment of men. Alaska is still vast but it is no longer remote, and its future condition as an unique environment for wildlife and for people depends upon the attitudes and actions of society much more than in the past.

Resource development, such as logging, mining, oil extraction, dam construction, and other activities are often viewed as the beginning of the end for wildlife. This is not always the case, but such resource uses do present potential problems to wildlife, wildlife habitat, and wildlife management because they often involve rapid and substantial habitat changes that persist for long periods of time. To most people, the change most immediately obvious when development occurs is a loss in aesthetic quality. Development involves change, and with few exceptions people view such change as an aesthetic loss. Although it is not mentioned in the following discussion, the degradation of aesthetic quality is a problem common to all forms of development.

Logging practices in Southeastern Alaska have been a source of concern to wildlife (and fisheries) biologists for years, and recently became national news when a court decision banned clear-cutting. Modern logging in Southeastern Alaska usually involves clear-cutting of mature forests because that is the most economical method in areas of even-aged trees where few or no roads exist, the country is rugged, and forests are a kind of jungle. "Clear-cutting" means cutting all timber on a selected

piece of ground. The ground cover vegetation is pretty well cleared also, by heavy equipment used in logging.

Although shrubs of various kinds grow up in clear-cuts, there is some question of how beneficial they may be to deer, particularly in large clear-cuts, where deer may be reluctant to go far from the edge of timber, or deep snow prevents them from doing so. Clear-cuts provide new deer browse (primarily in snow-free periods) for 15 to 20 years, but after that little food is available. Effects of clear-cuts on other species are even less well known. Where logging occurs next to salmon streams, siltation, stream blockage, and higher water temperatures may reduce or eliminate the stream's suitability for spawning or for young salmon and for other aquatic life, and may indirectly affect brown bears, black bears, and numerous furbearers that feed along these streams. Bald eagles nest in trees along the beaches, and they apparently require virgin timber for nesting. Even in very old clear-cuts that now have trees, eagles apparently do not nest.

Logs are usually stored in floating rafts which are held in sheltered bays, or estuaries, where freshwater streams mingle with the ocean. Estuaries are prime "nurseries" for many marine invertebrates and fishes, and pollution from logs and bark that is soaked or worn off can seriously affect the marine life of estuaries. Log rafts often scrape around the shallow bottom in response to tide or wind, and this too damages the habitat so important to young marine life. Thus, various birds and mammals that feed on the marine life of estuaries can be affected by what seem at first glance to be remote and unrelated events.

Logging in other parts of Alaska has not been extensive since the gold-rush days, but it is increasing in response to both domestic and foreign demand. Not much is known about effects of logging in these areas. Although logging was intensive in many places in the early days, no one paid much attention to its effects on wildlife. It may be that logging in Interior and Southcentral Alaska, can, with careful planning, benefit certain wildlife species without doing great harm to others.

Mining for many years has been synonymous with habitat destruction in parts of the U.S. where open-pit mines were developed. Alaska has had little of such methods, although scores of creek bottoms have been turned upside down by placer mining and dredging for gold. Now, 10 to 60 years after most gold mining shut down, it's hard to say what the impact has been or what it will amount to when another 50 years have passed. Much silt in numerous streams may have taken its toll on salmon and grayling, but impacts on wildlife are not well known. If extensive gold mining began once more, certainly habitat losses would result, but the importance of the losses is hard to predict.

In some cases roads or trails opened to reach mineral claims or mines have created erosion, thawing of permafrost and slumping, or other damage to habitat. Although some individual cases may do minimal damage, the accumulated damage may become significant, particularly if a great increase in mining should occur.

In the past, roads and trails built by and for miners provided access for commerce of the day. Some of these routes became roads which today allow thousands of wildlife users to reach new or different areas. The results have been both good and bad. Wildlife users were able to disperse to enjoy different areas and perhaps less crowding, but in certain areas the added hunting pressure was undesirable and proved detrimental to some big game species. Should new access be created by a future surge in mining, wildlife managers will have to be prepared to cope with the possibility of too much access by highly mobile hunters and other recreationists.

Impoundments, or lakes created by man-made dams are another form of

development that creates wildlife management problems. In general, the greatest problem caused by dams and their lakes is simply loss of the wildlife habitat to flooding. Few dams have been built in Alaska thus far, and relatively little habitat damage has occurred. Two proposed dams, however, illustrate the potential.

The Rampart Dam proposal was made in the early 1960's. With a dam near Rampart, on the Yukon River, the Yukon Flats would have been flooded, with the impoundment reaching nearly to the Canadian border. Ft. Yukon and several smaller villages would have been displaced along with several million acres of prime waterfowl, furbearer and big game habitat. Electric power was the purpose of the dam, and it was finally decided that the dam was not a good investment considering the returns it would bring. For wildlife resources of the state (and the nation), it was a fortunate decision. There is no way that production of wildlife in other areas could have been increased enough to make up for the losses that would have resulted from such a massive loss of prime habitat.

The "Devil's Canyon", or Susitna Dam, is a project currently being seriously considered. Its purpose is also the generation of electric power. A pair of dams would be built on the upper Susitna River where the river flows through a deep, relatively narrow valley. Habitat loss would be small compared to the Rampart Dam proposal, yet valuable wintering areas for moose and migration routes of caribou would be flooded, and increased human access would probably result. The effects of flood control on wildlife habitat below the dam are poorly understood, but it is known that periodic flooding is one of the main events that keeps river bottoms fertile and productive.

"Transportation corridor" is a currently-used phrase for a place to put roads, pipelines, electric lines or other systems for moving people, material or energy. Numerous transportation corridors for various anticipated uses have been proposed in Alaska. The best known such corridor in Alaska today is the Trans-Alaska Pipeline corridor, with its roads, camps, pipes and storage tanks.

For wildlife management, the problems of transportation corridors include habitat loss and disturbance of wildlife at critical times, but probably of more importance is how to regulate access and resource use next to the corridor, and how to insure that the pipeline, road or whatever may be built, interferes as little as possible with normal animal movements and behavior. While a single corridor through an area may have limited impact on wildlife, multiple corridors would very likely create much more serious problems by compounding the smaller influences of individual corridors.

Urbanization and related effects of an increasing human population, such as sprawling suburbs, private recreation property, roads, and fences, probably create more problems for wildlife and wildlife management than is commonly appreciated. Loss of wildlife habitat to urban expansion is often not very obvious, until comparisons are made with 5, 10 or 20 years past.

The amount of habitat lost in the Anchorage area over the last 10 years is startling, and can be appreciated only by comparing aerial photographs from 10 years ago and now. The same is true of the Fairbanks area, and to a lesser extent it is true of many smaller communities and roadside areas as well. In addition to habitat loss, disturbance by increased vehicle traffic, additional people, and more dogs and cats, places greater difficulties before wildlife as they attempt to find and use habitat once available to them but now gone or surrounded by "barriers." Conflicts between wild animals and people in urban and suburban areas often result in the elimination of the animals. Under such circumstances, wildlife numbers cannot help but decline.

A second impact of urban growth is the effect upon adjacent recreation areas. Urban dwellers characteristically look longingly to the country, and if possible they will buy recreation property somewhere near their homes. Again, the Anchorage area is a good example; many privately owned recreation lots have sprung up in the Matanuska Valley. Where formerly old homesteads and random fires created clearings that produced abundant winter food for moose, now private owners carefully guard their quota of maturing forest which they understandably treasure. The resulting reduction in winter range may have strong and long-term negative impact on the number of moose in the Matanuska Valley. Although it is a wildlife management problem, there may be no solution, at least within the choices presently available to the manager.

Pollution has only recently become a household word, even though it has long been a common problem. Alaskans are fortunate in having few serious pollution problems, but they do occur. Perhaps the most important source of pollution with respect to wildlife is oil development and transportation.

The effects of oil (or its by-products) may be direct, as when oil products spilled on lakes, rivers or oceans immobilize birds, ruin their waterproofing, or poison them. Oil spills are now infamous for the problems they have created for waterfowl and marine birds.

Indirect effects are more subtle, and in the long run they may be more important. Oil products can upset natural systems by killing or crippling small organisms upon which larger forms feed, or by similarly affecting young stages of larger forms. Either way, there's potential for impacts on game or food fishes, shellfish, waterfowl, sea birds and marine mammals. The indirect impacts of just a single spill are poorly understood, yet the potential for repeated spills exists and is probably increasing. Although more is being learned about the effects of oil spills, and more effort is now made to clean them up, the chief problem seems to be how to avoid them in the first place.

Use of Wildlife

Of all the problems of wildlife management, none are more perplexing to the wildlife manager, nor stir the emotions of the public like wildlife uses. People who would not blink an eye if Hoover Dam were plunked in the middle of Alaska, reservoir and all, are ready to fight if cow moose hunting is suggested! And how many years has it been since the "wolf controversy" didn't warm up the Alaskan winter and save a thousand souls from cabin fever? The list of wildlife issues that bring out the best, or the worst, in people seems endless. Alaskans have a personal and proprietary interest in wildlife, and as many views on wildlife uses as there are feathers on a falcon.

Is that a problem? No, and, yes. No - the public has the last word on how wildlife should be managed and their interest and input is essential if management is to turn out as they want it. But, yes - not everyone can be satisfied. Then, too, there are some people whose views are strictly self-serving, and who contribute more to the problems than to solutions.

Before a manager can think about how wildlife will be used and who will use it, he has to consider whether use can occur in the first place. For use to occur, wildlife populations must be maintained at levels where they can provide use; losses to natural factors must be considered and habitat must be maintained (land use).

To be used, wildlife must also be accessible. In many parts of Alaska little use occurs simply because people can't get to the animals. An increase in private land and some federal lands, discussed earlier, will

make wildlife even less available to the public. Everyone will feel more restricted as the human population and demands on wildlife grow, while wildlife populations and the lands where they can be used remain the same or shrink. What can be done?

There are a number of alternatives being used by other states where these kinds of problems are much more advanced than in Alaska: 1) increase access to remote areas; 2) make the public pay for access to private lands; 3) increase the number of animals in high use areas by means of habitat manipulation techniques; 4) accept more crowded conditions on public lands and at the same time reduce the success of the consumptive users; 5) limit the number of people who can use public lands to maintain satisfactory use experiences; and 6) rotate user groups on the same area (called "time and area zoning"). Most likely all of these alternatives eventually will be used in various combinations in Alaska. Increased restrictions on use seem inevitable.

The biggest problem of use is that of allocation or "who gets what." The public is made up of many interest groups who wish to use and enjoy wildlife in their own way; all have pretty much the same rights to do so, but there isn't enough wildlife to go around. There are many examples of user groups: the "locals" and the "outsiders," consumptive users and nonconsumptive users, recreational, "subsistence" and commercial users, residents and nonresidents, hunters and anti-hunters, majorities and minorities, and let's not forget the "haves" and the "have-nots."

One of the first questions to be settled is "who is which?" Is the man that kills a walrus and sells its ivory a subsistence user or a commercial user? Is a city dweller who hunts moose for meat a recreational hunter or a subsistence user? Is a hunter who photographs wildlife more a consumptive or nonconsumptive user?

If and when you can tell one user from another, the next point to consider is what each user's level of need is and how much use is adequate to satisfy it. Where should the priorities be? Physical need? Economic survival? Recreational enjoyment? There are few easy answers.

Although there are many instances of conflicting demands, one major problem which has befuddled nearly everyone is how to identify and fairly and adequately allocate resource uses between recreational and subsistence users. The State Constitution says that wildlife is "reserved to the people for common use," which means all Alaska residents have equal rights to use wildlife. However, many people living in the bush on low cash incomes depend more on wildlife (and other resources) for part of their livelihood than do urban-oriented people with regular jobs. The supply of wildlife is limited, so when the number of hunters increases, or when numbers of wildlife decline, somebody is going to return from the hunt empty-handed. The subsistence users are most severely affected, so it seems reasonable to give them some preference in use of wildlife. This has been done to some extent by adjusting seasons and bag limits to favor residents of a particular area, by a reduced fee (25¢) for hunting, fishing and trapping licenses for families with an income of less than \$3,600, by regulating use of airplanes or vehicles, and various other techniques. Recently the Board of Game was given the power to establish subsistence use areas if it is shown that recreational hunting will prevent subsistence needs from being met. In such areas regulations specifically favoring subsistence users (but not legally barring others from use) could be adopted.

Economic conditions in the state are changing, and more rural residents are earning substantial incomes which enable them to purchase more of their needs. The distinction between a subsistence user and a recreational user is often very fuzzy and is becoming more so. There is actually a broad spectrum of what is called subsistence use, that ranges from

nearly total dependence on natural resources to very little use. Just where to draw the line establishing what combination of resource use and wage earning qualifies as subsistence use and what does not is difficult. Then, too, many Native groups as well as other Alaskan residents have expressed the view that subsistence is not simply an economic matter, but a lifestyle and cultural necessity also, even though they have willingly abandoned many traditional means (a cultural element) of obtaining such subsistence.

This has complicated the problem further in that while the subsistence user's dependency on the resource is still very real, the impact of his use on wildlife has changed markedly from what it once was. Instead of spears and bone fishhooks, he now uses high-powered rifles and gillnets, and he now travels by powerboat, snow machine and aircraft. In short, he now has much the same impact on wildlife populations that his "recreational" counterpart does, and in some cases, a much greater impact. The result has been harvests of some species in certain areas which have been in excess of people's needs, too large for the species to support on a continued basis, or both.

Conflicts between other user groups at times assume major proportions. Take the wolf controversy as an example. There are some who feel "the only good wolf is a dead wolf." Others blindly extol the virtues of wolves under any circumstance while ignoring their "faults." Surely there is a balanced approach possible, a middle ground, but sometimes it seems it is a "no man's land" and the wildlife manager is square in the middle! The result: costly, time-consuming court suits at the expense of the resources involved and the public.

The general problem of hunters versus anti-hunters is not likely to be solved overnight. Because both groups share an enthusiasm for wildlife and a basic concern for its welfare, as well as similar rights to enjoy their preferred wildlife use, the wasted energies of unproductive confrontations could be far better used to benefit both interest groups and the wildlife resource. Certainly this is one more area to pursue "detente."

What does the future hold? Increased demands and more conflicts, certainly. It will be a challenge to avoid the unfortunate polarization of Alaskans that seems to accompany conflicting interests. As competition increases, parochialism will become even more obvious in the attempt to retain local jurisdiction. Overlaps in advisory committee, borough, village council and state and federal agency jurisdictions may create chaos unless some integrated workable system for allocation is developed.

From past experience, it is clear that whatever uses or combinations of uses are provided for, actions are necessary to ensure that overuse is avoided. There are many technical considerations. Should hunting of females be allowed, and if so, under what circumstances? Should predator control be used, and under what circumstances? What measures must be taken to avoid overhunting? Should vehicles be restricted? Should hunter numbers be limited? Seasons closed? How can illegal hunting best be detected and controlled?

Under some circumstances, illegal hunting or trapping can be an especially critical problem. In an area with intensive legal hunting, a large illegal kill can force curtailment of legal uses, and in situations where wildlife populations are at low levels, illegal kills can tip the balance and cause the populations to decline.

Enforcement of hunting, trapping, and fishing regulations is primarily the responsibility of the Division of Fish and Wildlife Protection, in the Department of Public Safety. However, most Fish and Game biologists are also deputized. Even so, the total number of enforcement officers is relatively small and consequently enforcement coverage of the state

is thin because of the state's size and because of the seasonal need to concentrate enforcement efforts on crucial problem areas.

Additional factors complicate the problem. Over such a large area it is extremely difficult to keep track of thinly scattered, highly mobile hunters. Also, many hunters are from out of state and are able to avoid prosecution by leaving Alaska before the violation is discovered or before a "hard" case can be put together. Contributing importantly to indifferent disregard for game regulations is the lack of meaningful penalties for convicted violators. The Alaska court records show a long history of suspended sentences and "slap on the wrist" penalties that have had little effect, except perhaps to encourage continued violations. Recently there has been some improvement in sentencing of violators and a continuation of this trend is most desirable.

Management Limitations

One final category of problems, here called management limitations, is perhaps the most important of all because it affects the capabilities of the Department of Fish and Game in solving all those other problems heretofore discussed, and hence its ability to meet its responsibilities to the resource and to the public. These limitations have to do with the Department's relationship to other agencies, the Legislature, and the public.

Both the state and federal governments have wildlife resource management responsibilities, but the objectives of each are not always in concert. Federal agencies such as the National Park Service, the Fish and Wildlife Service, the Forest Service and the Bureau of Land Management have been around for a long time. Their actions are sometimes ponderous, slowed by massive bureaucracies, governed by long-standing policies and inflexible guidelines, administered by officials far removed from Alaska, and influenced by a national public with concerns which sometimes differ markedly from those of Alaskans.

To be sure, there are advantages to such a slow-but-steady system, the chief of which is perhaps that it is less subject to fickle or irresponsible management actions or local political influences. But there are as many instances where inaction is as damaging as the wrong action, and in Alaska, where changes are occurring at breakneck speed and where unique situations demand special considerations, innovative approaches to resource management are needed.

Alaska, as other states, has traditionally exercised jurisdiction over its resident wildlife species, including those on most federal lands within the state. Wildlife within national parks, however, is managed by the federal government in that national parks are traditionally closed to hunting and trapping. Federal wildlife refuges are generally open to hunting, but various regulations control use of airplanes, all-terrain vehicles and snow machines, and otherwise influence the distribution, numbers, and access of recreationists. Thus these regulations essentially become part of the State regulations affecting wildlife use. As more federal reserves are dedicated by Congress, additional rules and regulations will undoubtedly come into effect.

In addition, State jurisdiction over most species of birds, marine mammals and endangered species has been superseded by federal regulations made pursuant to national legislation and international treaties. Use of any species so affected is allowed only under the guidelines established by the federal government. Waterfowl hunting regulations must fit the general framework of federal regulations and be approved by the Secretary of the Interior. Management of marine mammals was withdrawn from the State by the Marine Mammals Protection Act of 1972, but under provisions of that act walrus management (subject to federal approval) was returned

to the State. Management of other marine mammals may follow the same costly and circuitous route. Federal laws protecting endangered species and some groups of birds also set some restrictions on State wildlife management.

Land use policies of federal and state agencies and of private landowners strongly affect management of wildlife. The Department of Fish and Game owns very little land. As a result, it is most often only advisory to other agencies on matters such as land use planning, habitat protection or manipulation, land disposal, and access regulation. In some cases this arrangement has been a stumbling block to various management efforts.

Funding largely determines what and how much the Division of Game can accomplish, not only by limiting the amount of work that can be conducted, but also by limiting the number of biologists on the staff (and therefore the time each man can devote to different tasks). Everyone knows a dollar doesn't go far in Alaska, and for the Game Division the mileage has been getting worse. Why? Because budgets have not kept pace with inflation or need. Each year more and more money goes to pay for "fixed costs" (salaries, rents, and equipment) and less and less is left for "operations" - (transportation, supplies, and contractual services).

One important problem arising from the small staff available is that not all parts of the state receive the attention they should. Although field offices are maintained in many of the state's larger communities, additional field staffing is required in various areas where the mushrooming need for more and better quality information on wildlife has become apparent.

In addition, unprecedented demands on the staff have resulted from the interaction between State and federal agencies on such matters as "d2" lands, marine mammal management, Outer Continental Shelf oil leasing, Coastal Zone Management, oil pipeline impacts and various other matters, all of tremendous importance to the future welfare of wildlife in Alaska.

Because there is so much to do, some things can be done well and others don't get done at all. One of the casualties of the "crunch" has been activities directed at keeping the public fully informed as to the status of wildlife, the reasons behind certain regulations, and, in general, what the Game Division is up to. The result? A serious credibility gap which has had far-reaching impacts on many Department programs.

Information and education activities aren't the only ones to suffer. Research activities needed to acquire badly needed information on wildlife have been cut back, and many survey and inventory programs are reduced to the "bare bones." Inadequate information is available about some species such as furbearers and unclassified wildlife because all the attention is focused on "problem" species such as caribou, moose, wolves and bears.

The cry for money is a chronic complaint among government agencies and it rarely catches a sympathetic ear. Nevertheless, the problems of funding are acute for the Game Division and they impose serious limitations on the Division's capability to meet its responsibilities.

Control of the Department's budget is only one of several ways the Legislature affects wildlife programs. Each year, legislation is passed which affects wildlife and its use either directly by governing use, or indirectly by influencing other land uses which in turn impact wildlife.

Because legislation is generally relatively inflexible and permanent (unlike fish and game regulations which are annually reviewed and revised, or policies which can be changed on short notice), legislation directly affecting wildlife is valuable and necessary to long-term direction and

continuity in wildlife programs if it is carefully considered, addresses matters of broad scope and provides a framework within which regulations may be promulgated and management can remain flexible. In contrast, detailed and specific legislation directed at regulation of individual programs removes the "elbow room" needed by managers to cope with dynamic wildlife situations. Once enacted, laws are infrequently repealed and by their very existence become traditional. Such "fixtures," if undesirable, reduce options and therefore the effectiveness of managers.

Legislation not directed at wildlife also can have significant secondary impacts on wildlife. Legislation affecting classification of lands for agriculture, private ownership, or state parks can be a detriment or sometimes may benefit wildlife through changes in, or protection of, habitat. Also, such measures, and others which influence settlement and transportation, affect utilization of wildlife by changing its accessibility.

The Division of Game operates within the general set of administrative operating rules and regulations, and legislative and fiscal schedules common to all State agencies. These assorted processes of State government all affect wildlife management programs to various degrees.

Finally, the public affects the things wildlife managers do by influencing actions of elected and appointed government officials including legislators, governors, commissioners, and members of the Board of Game. It is the actions of such officials which set the bounds on what professional managers can do.

Because wildlife managers act in the public interest as custodians of the public's resource, they welcome and encourage public interest and involvement in management decisions. There are times, however, when public sentiment can impede sound management, sometimes threatening the resource itself, but more often reducing or eliminating reasonable utilization. Popularity is not always synonymous with public interest.

We have already said something about the problem of identifying the various "publics." Everyone knows that with most issues there is a vocal minority and a silent majority, and the perceived public desire may not necessarily be the real broad-based public opinion. Yet it is the perceived public opinion that sways elected and appointed government officials, whose actions have the dual motivations of seeing to the public interest and of staying in office. Also, the public, or segments of it, are sometimes subject to emotionalism and rapid polarization over issues, and government officials sometimes react with corresponding brevity. The result: actions of the moment, in response to limited, special, and/or short-lived interests, having long-term consequences on the entire public body.

With wildlife management, as with politics, everyone seems to be an expert on the subject. However, while use and enjoyment of wildlife are common to all, the expertise required to manage wildlife is not. The problem comes in balancing scientific professionalism with public involvement. The public should understand that wildlife management must be based on biological and ecological principles and that it should be conducted with the highest standards of professional scientific expertise. Wildlife managers in turn should be responsive to changing public attitudes concerning wildlife and its use, and managers should be more cognizant of their custodial role. Essentially it is a problem of communication, in both directions. It is hoped that the information and proposals contained in these Alaska Wildlife Management Plans will be the basis of an improved mutual understanding and effective communication.



PART II:

INDIVIDUAL SPECIES MANAGEMENT PLANS

This section contains every individual species management plan located in the Northwestern Alaska Region. The plans are arranged by species alphabetically, and each species is introduced by a general description of that species in the region.

All individual plans are titled and numbered for easy reference to the maps provided with this booklet. Use of the maps will help in locating the areas described under "Location" in each individual plan.

Because wildlife in Alaska has long been managed according to administrative regulatory units called "Game Management Units", familiar to many Alaskans, most location descriptions indicate which Game Management Unit or Units the plans are located in or use some Game Management Unit boundaries as individual plan area boundaries. A Game Management Unit map has been included with the color-coded wildlife plans maps to help in understanding the precise location of proposed areas.

the 1990s, the number of people in the UK who are aged 65 and over has increased by 1.5 million, and the number of people aged 75 and over has increased by 1.2 million (Office of National Statistics 1999).

There is a growing awareness of the need to address the needs of older people in the community. The Department of Health (1999) has published a strategy for older people, which sets out the government's commitment to improve the health and social care of older people. The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment.

The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment. The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment.

The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment. The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment.

The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment. The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment.

The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment. The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment.

The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment. The strategy is based on the following principles: (1) older people should be able to live independently in their own homes; (2) older people should be able to participate in the community; (3) older people should be able to access the services they need; and (4) older people should be able to live in a safe and secure environment.

BLACK BEARS IN NORTHWESTERN ALASKA

Black bears (*Ursus americanus*) are relatively uncommon in Northwestern Alaska. They are absent or sparsely distributed on the Seward Peninsula and in the Noatak River drainage. Some occur in the Unalakleet, Ungalik and Koyuk River drainages, but the species is most abundant in the Kobuk and Selawik River drainages. The population appears to be increasing and expanding to the north and west.

In those areas where bears occur, they are associated primarily with forested habitat. Black bears prefer open forests rather than dense stands of timber, and the highest densities of black bears generally occur in areas having interspersed vegetation types. Semi-open forested areas with an understory of fruit-bearing shrubs and herbs, lush grasses and succulent forbs are especially attractive to black bears. Extensive, open tundra areas are generally avoided.

In the spring black bears are frequently found in moist lowland areas where early growing green vegetation is available. Horsetail is a major food item from May to mid-July. During the summer and fall spawning salmon are eaten whenever available. Berries are also an important food item in late summer and fall, and bears move into alpine and subalpine areas where berries are plentiful.

Little information is available regarding natural controls on black bear populations. Populations in Northwestern Alaska appear to fluctuate in numbers from year to year. Deep, long-lasting snows are thought to cause mortality of adults and cubs by slowing emergence of hibernating bears from dens and delaying availability of new green vegetation after emergence. Abnormally cold and snowless winters may also cause increased denning mortality. Berry crop failures may be related to subsequent losses of wintering bears if animals enter the dens underweight. Such mortality may cause significant year-to-year fluctuations in bear numbers. Some bears are killed by other bears and occasionally by wolves, but the importance of such losses is unknown. Parasites and diseases do not cause significant mortality. One parasite of concern to man, *Trichinae*, is present in some bears and is transmissible to man when raw or partially cooked bear meat is eaten. Available information indicates little cub mortality through the first eight months of life. Cubs are precocious; some orphans as young as five months of age have survived without maternal care.

Black bears in Northwestern Alaska are used primarily for domestic utilization of meat and skins by local residents. Some recreational hunting of black bears occurs, usually incidental to hunts for other big game species. Despite traditionally liberal hunting seasons and bag limits, the harvest of bears remains relatively small. Recreational hunters seek bears shortly after the bears emerge from hibernation when the hides are of excellent quality. Hide quality deteriorates as the winter hair is shed and rubbed spots appear, and therefore most sport hunting ceases by mid-June. Sport hunting of bears resumes in September when hides have improved in quality and continues until bears den for the winter. Local hunters do not place a great value on the skin, and bears are therefore killed whenever they are encountered. The harvest of males is greatest in spring because they leave the den before females and because females accompanied by cubs are protected by regulation. The proportion of females in the fall harvest is greater in comparison to the spring harvest due to a greater availability of sows that have become separated from grown cubs.

PROBLEMS

- * Black bears rapidly accustom themselves to the presence of humans and the ready source of food that human habitations and activities provide. Open garbage dumps and the excesses or indulgences of humans at recreation sites and campgrounds quickly make nuisances of bears who become dependent on such sources of food. Many nuisance bears become a threat to human safety and property and must then be destroyed or otherwise removed. Proper garbage disposal and refraining from feeding "tame" bears are necessary to avoid eventual confrontations that endanger human life and lead to destruction of the bears.

1. INTERIOR-WESTERN ALASKA BLACK BEAR MANAGEMENT PLAN

LOCATION

Game Management Units 9, 12 and 17-26 except for the Prospect, Minto-Murphy Dome and Upper Birch-Preacher-Beaver Creeks Black Bear Management Plan areas.

PRIMARY MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting black bears.

SECONDARY MANAGEMENT GOAL

To provide for an optimum harvest of black bears.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Encourage recreational hunting of black bears to achieve greater utilization of the black bear resource.
2. Regulate season timing, methods and means of taking and bag limits to provide for local use.
3. Regulate access and methods of hunter transport, if necessary, when in conflict with management objectives for other species.
4. Increase public awareness of black bear behavior to reduce adverse bear-human interactions.

THE SPECIES

Black bears are widely distributed in the boreal forest and forest-tundra fringe habitats of interior and western Alaska. Although bear densities are relatively low in comparison to south coastal Alaska, the Interior-Western area includes the most extensive contiguous black bear habitat in the state. Black bears are largely absent north of the Brooks Range, on the Seward Peninsula, the Yukon-Kuskokwim Delta, and the Alaska Peninsula south of the Naknek River. However, populations appear to be expanding their range south on the Alaska Peninsula and west on the Seward Peninsula. Black bear numbers may be declining on the lower and middle reaches of the Kuskokwim and Yukon River drainages but are at relatively high levels or increasing in the upper Yukon and Tanana drainages and in the Northwestern portion of the range. Five thousand to 6,000 black bears are estimated to occur in the Interior-Western area. However, because bears are very difficult to enumerate no systematic censuses have been conducted. Representative lowland river bottom areas where bear densities are greatest include the upper Kuskokwim, Yukon, and Tanana Rivers, the Kobuk and Selawik drainages in the northwest, and the upper Mulchatna, Chilikadrotna, and Lower Cook Inlet drainages.

Human use of black bears differs over the large geographic area in Interior-Western Alaska. Domestic utilization by local residents is the dominant use over most of the area. Most bears taken by local domestic users are taken for food and to a lesser extent for skins. Bears are taken when available throughout the year. Bears are shot by waterfowl and muskrat hunters in the spring. In the fall bears are shot by berry pickers. In the summer bears are killed when they appear at fish camps or fish wheels. Many of these bears are shot and abandoned, since some

bush residents consider black bears nuisance animals. Domestic use appears to be declining and is currently light to moderate over the area. Aside from bears shot on an opportunistic basis, relatively little hunting is directed specifically at black bears. Boats are the chief means of transport for bush residents who do hunt black bears.

Recreational hunting for black bears frequently occurs near human population centers. Resident sport hunters are active along road and trail systems, although many utilize aircraft, all terrain vehicles, or riverboats to reach less accessible locations. The black bear is usually relegated to a lower status than given other big game species. Interest in black bear hunting is increasing, perhaps due in part to increasing hunting restrictions on other big game species. Some guides, have focused increased attention on black bears as sport animals in the foothills of the Alaska Range and in the Lake Clark Pass and Cook Inlet areas.

Recreational and domestic harvests over the Interior-Western area have had little influence on black bear populations. Accurate harvest information is difficult to obtain because skin or skull sealing is not required in much of the area. However, total harvest for the entire area probably does not exceed 400 bears. Many areas have the potential to support much larger harvests. Despite liberal hunting seasons and bag limits since statehood harvests have remained low. Industrial and urban development have resulted in increased bear-human interactions and an increase in the number of bears destroyed in defense of life and property.

Nonconsumptive use of black bears is restricted to bear populations immediately adjacent to urban population centers. Except where they gather to exploit locally abundant sources of food, black bears in the Interior-Western region are too sparsely distributed to provide for significant levels of nonconsumptive use.

PROBLEMS

- * Some private lands are currently posted against public trespass, and conveyance of land into private ownership under terms of the Alaska Native Claims Settlement Act may restrict public access for hunting in additional large tracts. The Department should solicit the cooperation of private landowners to facilitate progressive management of black bears. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act.
- * The proposed additions of land into federally administered parks, wildlife refuges, wild and scenic rivers and national monuments under terms of ANCSA encompass substantial portions of black bear range and will affect state management of black bears in these areas. If these areas are established by congress, the Department should solicit cooperation of the respective land management agencies to allow public use of the lands for hunting.
- * Continuing agricultural, industrial, energy and mineral resource development, along with urban and suburban expansion, will result in a loss of black bear habitat and cause an increase in bear depredations, with attendant increases in the destruction of animals in defense of life and property. The Department will identify important habitat areas and request habitat protection measures of the appropriate land management agencies. The Department will also insist on compliance with state regulations on sanitation and garbage disposal in remote camps.
- * Due to manpower and funding restrictions, data on population status and harvest levels of black bears have been limited. As harvest levels and interest in black bears increase, the Department should expand the current limited sealing requirement to a greater area of the region.

IMPACTS

- * Black bear populations will sustain greater harvests than in the past, and hunting effort and spatial distribution of the harvest may become more concentrated as a result of the Alaska Native Claims Settlement Act. More restrictions on access, seasons and bag limits may have to be imposed in local areas if overharvest occurs.
- * Since many bears are taken incidentally to hunting for other species, management and regulations relating to these other species will impact the black bear harvest. It may become necessary to restrict black bear hunting in some areas to avoid conflicts with management priorities for other big game species.

BROWN BEARS IN NORTHWESTERN ALASKA

Brown bears (*Ursus arctos*) were once classified into a large number of species and subspecies, but the brown bears of North America and Europe are now considered members of one species by most taxonomists. Bears over the greater part of North America fall under one subspecies, *U. a. horribilis*. No reproductively isolated populations are known to exist in Northwestern Alaska. Most laymen and scientists designate bears found near coastal areas as brown bears, especially in the southern half of Alaska, while those found inland and in the northern half of Alaska and the remainder of North America are called grizzly bears.

Grizzly bears can be found throughout the country from the Seward Peninsula and the land bordering Norton Sound to the southern edge of the Brooks Range. Higher densities occur in the mountains, foothills and valley bottoms than on the lowlands near the coast or on the Seward Peninsula. Abundance of grizzlies in this region may vary seasonally depending on available food sources. Although detailed population data are not available, general observations and limited survey work indicate low to moderate population levels. On a region-wide scale, grizzlies appear to be as numerous as they have ever been, but in localized areas some decline in abundance may be occurring.

All habitat types in Northwestern Alaska are used by grizzly bears but the most important are the alluvial valley bottoms near river courses. During the spring these areas are used as travel routes after the bears leave winter dens, especially by males in search of moose or caribou carion. The soil thaws earliest in the mountains and foothills and bears forage along the valley bottoms for roots of Eskimo potato (*Hedysarum*) or other vegetation. Berries from the previous fall which remained intact through the winter are another spring food sought in valley bottoms and nearby slopes. In some portions of Northwestern Alaska from early summer until late August, grizzlies disperse from river valleys to the alpine, foothill and coastal plain areas where they feed on vegetation, primarily *Equisetum*, grasses and sedges. In other areas, where salmon are available, bears may congregate near rivers and feed on salmon extensively. During late August to mid-September, the grizzlies return to the river valleys to search out berries and dig for roots.

In northeastern Alaska where the denning characteristics of a similar population of bears are known, den sites are generally found on steep south-facing slopes which are vegetated, well-drained and where permafrost is deep enough to allow den construction. Historical records indicate that the habitat in Northwestern Alaska has changed little until recent times. However, there is a great potential for reduction of available habitat by oil and gas exploration and development and resultant transportation corridors and construction activities.

Little information is available regarding natural controls on brown bear populations or the degree of population fluctuations. Except for dental and skeletal disorders, the diseases reported for brown bears are remarkably few. Grizzly bears apparently possess an unusual ability to withstand infections and to recover from fractures, many of which are caused by fighting. Cannibalism and other intraspecific strife may cause significant mortality. *Trichinella spiralis* is the best known parasite infecting bears because it is transmissible to man in raw or partially cooked bear meat; however, it is of minor significance to infected bears.

In Northwestern Alaska, the grizzly bear is at the northern limit of its range. The period during which food is available in summer is short, and reproductive potential may be low. Accordingly populations may be more susceptible to the pressures of human development and sport hunting than they are in some other regions. At this latitude in northeastern

Alaska, bears do not produce their first litters until they reach an average age of about 10 years. In the same region litter size ranges from one to three cubs, with an average of 1.8 and the mean interval between litters is about 4 years.

In accessible, inhabited areas, human activities are doubtless the most significant source of mortality. Sport hunting is presently the most important mortality factor, but there is also a high mortality of nuisance bears near human habitations. Problems arise when bears are attracted to camps or garbage dumps, where they may eventually endanger human safety.

Recreational uses of brown bears predominate in Northwestern Alaska although domestic utilization continues to some extent. Sport hunting is the primary use and the Noatak and Kobuk valleys in the southern Brooks Range are the most important hunting areas. After the mid 1940's trophy hunting of grizzly bears gained rapidly in popularity. Bear hunting in this area was quite limited until the early 1960's. As hunting pressure increased, regulations affecting season lengths became more restrictive to avoid excessive harvests. Guided hunters have had the highest success rates due to the efficiency of their hunting methods. It is expected that the trend of increased hunting pressure will continue. Nonconsumptive use will also increase especially in the Noatak and Kobuk River drainages.

PROBLEMS

- * Well-intentioned concern by a national public hampers effective management of the species and threatens future use by recreational hunters. One misconception is that because grizzly bears are threatened in one portion of their range, they are threatened in all areas. Also, some people believe that distinct, and therefore unique, subpopulations of brown bears exist which need absolute protection. Management of bear populations and use of bears must continue to be based on scientific evidence. True taxonomic relationships and the fact that brown bears in most parts of Alaska are still relatively abundant provide sound support for continued beneficial uses, both consumptive and nonconsumptive.
- * The eventual survival of the brown bear does not depend on the designation of vast tracts of "unspoiled wilderness." Conflicts with bears in large national parks indicates that beyond merely providing space for bears, man must come to understand bears - their requirements, behavior, and their place in ecosystems, and then apply this knowledge in land use decisions. The value of brown bears as a renewable resource should be acknowledged and considered in land use classification. Important brown bear habitats must be preserved by exclusion of incompatible development, and in areas where humans and bears co-exist, proper precautions should be observed to avoid confrontations. Proper disposal of garbage is of singular importance in this regard.

1. BROOKS RANGE BROWN BEAR MANAGEMENT PLAN

LOCATION

Game Management Unit 26; that portion of Game Management Unit 23 draining into the Noatak River above Maiyumerak Creek; and those portions of Game Management Units 24 and 25 lying north of a line from Norutak Lake due east to the Alatna River, down the Alatna River to its confluence with the Koyukuk River, up the Koyukuk and South Fork of the Koyukuk River to Fish Creek, up Fish Creek to the Game Management Unit 25 boundary to the headwaters of the West Fork of the Chandalar River, then down the West Fork of the Chandalar River to the confluence with the East Fork of the Chandalar River, then up the East Fork of the Chandalar River to its confluence with Lush Creek, then a direct line eastward to Bob Lake and the Christian River, down the Christian River to its confluence with Otter Creek, up Otter Creek to its headwaters, then south to the headwaters of Thluichohnjik Creek and down Thluichohnjik Creek to its confluence with the Sheenjek River, then up the Sheenjek River to the southern boundary of the Arctic Wildlife Range, then eastward along the Arctic Wildlife Range boundary to the Alaska-Canada border.

MANAGEMENT GOAL

To provide an opportunity to hunt brown bears under aesthetically pleasing conditions.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain brown bear hunting seasons.
2. Limit the harvest to less than the annual increment until the population can support a larger harvest.
3. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.
4. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

The Brooks Range area supports fewer bears per unit of area than more favorable range situated to the south. The long winters and short, cool summers which occur in the region limit plant growth on which the bears depend. Growth rates of individual bears are slow and population production is relatively low. Rates of natural mortality in this region also appear to be low. Deaths in winter dens have been recorded as have deaths caused by other grizzlies, usually young animals or females which were attacked by adult males.

Brooks Range grizzly bears are relatively small and there are few "record class" bears in the population. However, the remote character of the region and the possibility of hunting in an area where few other persons are encountered definitely increase the appeal of the area to hunters.

Most bears reported killed by hunters in Game Management Units 23-26 are taken in the area included in this management plan. A possible exception may occur in Unit 23, where much of the harvest occurs along the Kobuk and lower Noatak River drainages. During 1975, sport hunters reported a

total kill of 69 grizzlies in Units 23-26. This figure has only been exceeded twice since 1961 when 74 were killed in 1970 and 89 were killed in 1973. Hunting pressure has steadily increased in the area since 1961. Season length has been shortened considerably, but the number of bears killed has remained static or increased. Despite closure of the spring season in 1974 and poor weather during the fall season, the number of bears presented for sealing (34), did not decrease appreciably from the mean hunter-take for the previous 10 years when generally longer seasons prevailed. During 1975, when both spring and fall seasons were open, harvest again increased to the high levels reached in 1970 and 1973.

Over the last 15 years, an average of 60 percent of the bears killed have been taken by nonresidents. This proportion has been increasing in recent years and in 1975 was 67 percent. Most of the remainder of the harvest is by non-local Alaska residents, primarily during the spring season. Area residents occasionally take bears for domestic use, but the reported kill for such purpose is low. Indirect commercial use, in the form of guiding hunters, is important in the Brooks Range and contributes to the livelihood of an increasing number of guides.

Hunting is distributed throughout the area during spring and fall seasons but overharvest may occur locally along well used routes of air travel. Domestic use by local residents occurs primarily near villages or along accessible rivers.

Although riverboats are utilized to some extent, aircraft provide the majority of the access to hunting areas. The availability of landing sites on gravel bars throughout the area has played an important role in the harvest of the grizzly population. During both spring and fall seasons, river valleys receive high use from grizzlies. Because the stunted vegetation in these areas provides little cover, and landing sites are abundant, the bears are very vulnerable.

PROBLEMS

- * Easy access to the area by aircraft may result in overharvest in widespread areas and may not be consistent with the maintenance of aesthetic hunting conditions. Regulation of the number of hunters and methods of access may resolve these problems.
- * Portions of the area will be selected under the terms of the Alaska Native Claims Settlement Act. Private landowners may prohibit public trespass for hunting. The Department should solicit the cooperation of private landowners to facilitate progressive management of brown bears. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act.
- * Increased development associated with mineral extraction and exploration may increase access into the area and increase the possibility of bear-man encounters. Critical bear habitat should be identified and resource development planned to minimize bear-human contact.

IMPACTS

- * Land use which would adversely affect critical habitat for grizzly bears or the wilderness character of the area may be restricted.
- * Once the grizzly population reaches maximum density seasons may be liberalized to distribute hunting pressure throughout a longer period of time.

- * The bear population will be maintained near the habitat carrying capacity.
- * The number of hunters will be limited by permit.
- * Controls on methods of hunter transport or areas of access will improve the aesthetic quality of hunters who do participate.
- * Guiding operations will be affected by limits on hunter numbers and controls on access.
- * Constraints on resource development and associated construction in critical bear habitat areas may increase costs of development.

3. NORTHWESTERN ALASKA BROWN BEAR MANAGEMENT PLAN

LOCATION

All of Game Management Unit 23 except for the drainages of the Noatak River above Maymerak Creek, and the drainages into Kotzebue Sound west of and including the Buckland River.

MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting brown bears.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Harvest up to the annual increment of brown bears by hunting.
2. Maximize productivity of the brown bear population by maintaining a sex ratio in the harvest of 150 males per 100 females.
3. Control the number and distribution of hunters, if necessary, to prevent local overharvest of brown bears.
4. Encourage land use practices that maintain the wild character of the area.

THE SPECIES

Because of the diversified habitat, the large area, and the lack of data it is difficult to determine the number of brown/grizzly bears in northwestern Alaska. Although the history of the population is not well known, it appears that bears were common during the 1950's after increasing from low numbers resulting from heavy hunting during the early part of the 20th century. During the 1960's, guides offered combination hunts for both grizzly and polar bears. This practice resulted in an increased grizzly harvest. When polar bear hunting by non-natives became illegal in 1972, fewer guides offered spring grizzly hunts in the area. The grizzly population has since increased and will probably continue to increase if hunting pressure remains at current levels.

Natural mortality is unknown but is believed greatest in young bears as a result of predation by other bears. Observations of sows with cubs suggest productivity is high.

The habitat is of high quality, despite the arctic climate. Most major rivers and associated tributaries support large numbers of chum salmon. Berries and other edible plants are common, and stands of spruce or large willow provide extensive cover. Although grizzly bears do not usually attain a large size (the average adult hide will square 8 feet), the area is noted for producing quality trophies.

From 1961 through 1975, the reported annual harvest averaged 15 bears. However, the actual kill is higher because rural hunters rarely comply with sealing requirements. The Northwestern Alaska Native Association (NANA) listed the subsistence take of grizzly bears in the early 1970's as 80 per year. Because the demand for grizzlies by local residents is presently low, the average harvest is estimated at 60 bears annually. Annual harvests over the last 15 years may have approached 100 animals, however. Seventy-eight percent of the recorded kill has consisted of males. Except for the springs of 1971 and 1972, spring and fall hunting has been allowed every year since statehood.

Local residents currently account for approximately 85 percent of the harvest. Some rural hunters hunt grizzly bears for food, but bears are

taken incidental to other activities. Also they are often shot indiscriminately because many local residents consider them nuisances.

Sixty-two percent (155) of 251 bears sealed since 1961 were taken by nonresidents. Guiding in the area may again be increasing since bears have become more abundant. Although the harvest has been equally divided between spring and fall, guides prefer to hunt during spring hunting because bears are easier to find at that time.

Local hunters commonly use boats to take bears on the Kobuk or Noatak Rivers in summer and early fall. Sport hunters depend on aircraft for access, especially when they are hunting the tributaries of the Noatak and Kobuk Rivers. Most hunting effort occurs on the Kelly, Kugururok and lower Noatak Rivers in the fall and on the Squirrel, Salmon, and Wulik Rivers in the spring.

PROBLEMS

- * Little is known of grizzly bear population size, composition and annual recruitment. The Department should solicit public assistance in documenting grizzly bear abundance. If harvests of bears increase, annual spring surveys should be initiated.
- * Non-compliance with seasons and regulations is common. Enforcement by the Department of Public Safety should be increased, and Department of Fish and Game employees should assume a more active role in enforcement. Reasons for voluntary compliance with seasons and regulations should be actively conveyed by the Department to the public.
- * The commercial fishing industry is expanding. If salmon are over-harvested, bear numbers may decline. Fishing areas critical to grizzly bears should be identified and protection of those fish stocks assured.
- * Much of Northwestern Alaska contains extensive mineral deposits. Large-scale mining efforts would have adverse impacts on grizzly bear populations by habitat degradation and bear-human interactions. Critical grizzly bear habitat should be identified soon and recommendations made to minimize potential problems. Important habitat must be preserved by excluding incompatible development. Regulations regarding garbage disposal and feeding bears at development sites should be rigorously enforced.
- * Public use and state management of grizzly bears may be affected when a large portion of the area is incorporated into the federal refuge and park systems as provided by the Alaska Native Claims Settlement Act. Additional large areas will transfer to private ownership. The Department should seek agreements with appropriate federal agencies to insure that management flexibility is retained on public lands. The Department should solicit the cooperation of private landowners to facilitate progressive management of brown bears. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act.

IMPACTS

- * Local residents will have to compete with increasing numbers of other hunters for use of the grizzly bear resource. As hunting effort increases, local residents will receive a smaller proportion of the harvest.
- * More restrictive seasons, bag limits and methods and means of hunting may be imposed as hunting effort increases. The number and distribution of hunters may be controlled by permits.

4. SEWARD PENINSULA BROWN BEAR MANAGEMENT PLAN

LOCATION

Game Management Unit 22 and that portion of Game Management Unit 23 draining into Kotzebue Sound west of and including the Buckland River drainage.

MANAGEMENT GOAL

To provide for an optimum harvest of brown bears.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain an optimum population of brown bears in the area.
2. Harvest no more than the annual increment to the brown bear population.
3. Encourage greater utilization of the brown bear resource.
4. Control the number and distribution of hunters, if necessary, to prevent local overharvest of brown bears.

THE SPECIES

The Seward Peninsula has a relatively small population of brown/grizzly bears. Low bear density is probably due to limited food supplies. Low bear density makes comprehensive surveys impractical but a general impression of relative abundance can be obtained from: (1) counting tracks in the spring after the bears emerge from hibernation; (2) reports of fisheries biologists counting salmon in summer; and (3) recording incidental sightings.

Historical records indicate that grizzly bears have occupied the Seward Peninsula for several hundred years. During the early 1900's, encounters between gold prospectors and bears were common and resulted in a substantial reduction of the bear population. Grizzlies were killed because they were a threat to miners and their possessions, and as a source of food. Bears began to slowly increase in numbers as the number of miners decreased. Bear populations are probably still increasing and may continue to increase if hunting pressure remains at the current level.

Natural mortality rates are unknown, but are probably relatively high among young animals as a result of predation by other bears. Observations of sows with cubs suggest annual recruitment is approximately 10 to 20 percent. In the immediate future, bear population size will be influenced by availability of food, principally salmon, and most importantly, by hunting pressure.

The annual grizzly bear harvest has averaged two bears for the past ten years and was highest in 1974 with ten. Considerable non-compliance with sealing regulations occurs in rural villages and the actual harvest may approximate 20 to 25 bears per year. A subsistence survey in the early 1970's indicated a harvest of 61 bears for all villages within the Bering Straits Regional Corporation. This figure may be high, especially since demand for grizzly bears by local residents is low. However, in past years the total harvest may have approached 50 animals. There have

been an annual spring and fall hunting seasons since statehood, except the springs of 1971 and 1972. Seventy-two percent of the recorded kill has been males.

Most bears have been taken from one of the three road systems near Nome and from boats along major rivers. Snowmachines and aircraft have become popular recently, especially in spring. The Kuzitrin, Koyuk, Buckland, Niukluk and Kwik River drainages receive the greatest hunting pressure. Coastal areas where bears concentrate to feed on carrion are also heavily hunted.

Local residents currently account for about 90 percent of the annual harvest, and rural subsistence hunters probably take more than 75 percent of this total. Most kills are made while hunters are engaged in some other outdoor activity. With the relative ease of hunting bears due to the open terrain and lack of brush, guides have become more active on the Seward Peninsula. Hunting pressure by guided hunters will likely increase. Of the 40 bears sealed since 1961, six were taken by nonresidents on guided hunts. Four of these were taken in 1974 and 1975.

PROBLEMS

- * Little is known of grizzly bear population size, composition and annual recruitment. The Department should solicit public assistance in documenting grizzly bear abundance. If harvests of bears increase, annual spring surveys should be initiated.
- * Non-compliance with seasons and regulations is common. Enforcement by the Department of Public Safety should be increased, and Department of Fish and Game employees should assume more active roles in enforcement. Reasons for voluntary compliance with seasons and regulations should be actively conveyed by the Department to the public.
- * The commercial fishing industry is expanding. If salmon are over-harvested, bear numbers may decline. Fishing areas critical to grizzly bears should be identified, and protection of those fish stocks assured.
- * Grizzly bears are frequently destroyed when they encroach on reindeer grazing lands. The Department should work closely with reindeer herders to minimize conflicts. Regulations imposing conditions for destruction of bears that threaten life and property should be rigorously enforced. Operators contemplating introducing or expanding domestic herds should understand that occasional, limited bear depredations must be accepted.

IMPACTS

- * Spring hunting may be limited by permits or terminated if harvests continue to increase.
- * Local residents may find fewer bears if hunting by nonresidents and other residents increase in the area.
- * Acceptable increases in hunting effort should reduce conflicts between bears and livestock owners.

WOLVES IN NORTHWESTERN ALASKA

Wolves (*Canis lupus*) occur throughout Northwestern Alaska although they are more abundant in the eastern portion of the region. Information regarding the distribution and abundance of wolves during the early part of this century is limited, but evidence suggests that wolves were present at lower densities prior to 1940 than those presently observed. This is probably due in large part to the absence of moose, which did not establish significant populations in the area until about 1930, and also to the low numbers of caribou present during this time. Since the 1930's wolves have been relatively abundant in the region east of the Seward Peninsula. During the late 1940's and 1950's the U. S. Fish and Wildlife Service conducted extensive wolf control programs in Northwestern Alaska to protect domestic reindeer herds. These programs reduced numbers of wolves over much of the area. Control efforts were much reduced in the late 1950's but have continued through the present on the Seward Peninsula. As a result wolves are rare in this area. Wolves are present in the remainder of the region at densities ranging from about one wolf per 50 to one wolf per 100 square miles.

Wolves usually occur in packs which may consist of parents and pups of the year, young of the previous year, and often other adult animals. The social order in the pack is characterized by a dominance hierarchy with a separate rank order among females and males. Fighting is uncommon within packs except during periods of stress. Dominance order is maintained largely through ritualized behavior. In the Northwestern Region pack sizes usually range from 6 to 10, although packs of 20 individuals have been seen. The range of a pack may include over 1,000 square miles. However, where food resources are optimal wolves may subsist in areas as small as a few hundred square miles. During winter in the Northwestern Region, packs may at times abandon their usual range due to the temporary absence of their major prey species, the migratory caribou. Even with adequate food, ranges of packs often overlap. During early summer when pups remain at dens most adults center their activities around dens. This reduces their mobility although adults may travel 20 miles or more from dens while hunting. Active dens are usually at least 15, and often 25 or more miles apart.

The diet of wolves in Northwestern Alaska varies according to season, location, and prey species available. Caribou are the major prey although moose are important in some areas and Dall sheep are occasionally taken in the northern part of the region. During winter these big game species constitute almost the entire diet of wolves. During summer young ungulates make up the major portion of the diet. Small animals such as voles, lemmings, ground squirrels, snowshoe hares, beaver, and occasionally birds and fish are important supplements. Generalizations about wolf-prey interactions are difficult to make because of differences between areas and prey species. Evidence from various studies of wolf-prey relationships suggests that the effect of wolf predation is largely conditional upon the relative densities of predators and prey, and the size and reproductive potential of the prey species populations. The effect of wolf predation can range from one of minor significance in which wolves remove far less than the annual recruitment to the prey population, to one in which wolves can retard prey population growth or reduce a prey population by removing the annual recruitment or more.

Studies of wolf populations indicate the high reproductive potential of wolves is seldom realized. Several factors may regulate wolf population levels either through reduced productivity or direct mortality. These include reduced fertility, social inhibition of breeding, malnutrition and starvation (especially among pups), cannibalism and other forms of intra-specific strife, disease, accidents and predation. The importance of these factors varies. Various studies of wolf ecology suggest that food supply is a primary determinant of wolf densities. When prey are

abundant or easily taken wolves exhibit increased productivity, giving birth to more, larger litters of pups, and more pups survive their first year of life. Conversely, when food is scarce, fewer, smaller litters are produced, and mortality of pups because of starvation and cannibalism increases. Natural mortality is greatest during the first year of life. Fifty to sixty percent of the pups born each spring die within eight months.

Wolves may compensate for human utilization by increased production and survival of young. In some cases wolves can compensate for a harvest of 50 percent of the autumn population. Excessive human exploitation, however, can reduce wolf populations. In Northwestern Alaska, where wolves in many areas are vulnerable to aerial hunting techniques, intensive human exploitation in previous years was a major factor affecting wolf population levels.

The treatment of wolves in Alaska has changed greatly during this century. In 1915, Alaska's first territorial legislature established a bounty on wolves. Prior to 1960 there were no restrictions on the taking of wolves. From 1948 until 1959 the federal government conducted intensive wolf control operations in many parts of Alaska using poisons, aerial shooting and trapping. In 1959 the State assumed management authority for wolves. In 1960 the use of poisons was discontinued. In 1963 the Board of Fish and Game classified wolves as both furbearers and big game animals. Regulations governing methods of harvest, seasons and bag limits were promulgated, thus providing additional protection for wolves. In 1968 the legislature authorized the Board of Fish and Game to abolish bounties and bounty payments were suspended in all but three Game Management Units in Southeastern Alaska.

The nature of the human use of wolves in Northwestern Alaska has also changed a great deal during this century. Prior to the 1930's a relatively small number of wolves was taken by residents for domestic use in the manufacture of various types of clothing. In recent years the number of wolves harvested has increased due to the use of aircraft and snow machines in hunting and also because of some increase in the number of wolves in the area. Since 1962 the reported annual harvest for the region has averaged about 100 wolves and ranged from 29 to 205, with the largest harvest occurring in 1967-68. Prior to the elimination of aerial hunting in 1972, the majority of wolves were taken with the aid of aircraft. Many wolves are now taken by hunters who use aircraft to land near them to shoot with a rifle. Many wolves are also taken by hunters who use snow machines to track the animals. The open nature of much of the terrain in Northwestern Alaska makes these techniques very effective. At present many wolf pelts enter the commercial market, but a large number are also used domestically for parka ruffs, boots, mittens and trim.

PROBLEMS

- * Increasing human demands on moose and caribou populations that are declining or already at low levels and the effect of wolf predation in retarding recoveries of these populations creates a serious management dilemma. The reduction of wolf numbers to encourage an increase in the number of ungulates is not easily accomplished given the controversial nature of the wolf and the practical problems in achieving significant reductions in wolf populations. The wolf evokes powerful sentiment from both those who see it as a destroyer of game coveted by man and those for whom it is a symbol of wilderness. Both opinions are powerfully expressed through political and legal channels and both influence the management of wolves in Alaska. Opposition to wolf control programs is widespread, especially on the national level, and it promises to remain a serious obstacle to wolf control programs, especially those involving

aerial hunting, no matter how well the action is justified in terms of the future welfare of both ungulate and wolf populations. The role of wolves as predators and their effect on ungulate populations must be accurately conveyed to the public. Recent studies have shown many earlier assumptions regarding beneficial or inconsequential effects of wolf predation to be simplistic or limited in application. Responsible management of wolves must consider the complex interrelationships of predator and prey, the welfare of each, and the beneficial uses of both that can be derived by man.

- * Illegal aerial hunting of wolves in Northwestern Alaska continues to be a problem. Lack of escape cover for wolves in some areas and the high value of wolf pelts are incentives to illegal activity. In addition, the remote nature of the area makes enforcement of protective regulations difficult. Increased enforcement efforts and more severe penalties for the illegal use of aircraft in hunting could alleviate some of the problem.
- * The reindeer industry on the Seward Peninsula is incompatible with the presence of a resident population of wolves in that area and a continuing control effort by the U. S. Fish and Wildlife Service will probably be necessary as long as the industry exists.

1. ALASKA WOLF MANAGEMENT PLAN

LOCATION

Entire state except Game Management Units 7, 14C (see West Chugach Wolf Plan location description), 15, and national parks or other areas closed to all hunting and trapping.

PRIMARY MANAGEMENT GOAL

To provide for an optimum harvest of wolves.

SECONDARY MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting and trapping wolves.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain wolf trapping seasons and bag limits consistent with suitable wolf population levels during periods of pelt primeness.
2. Maintain wolf hunting seasons not necessarily limited to the period of pelt primeness, with restrictive bag limits.
3. Promote efficient and humane trapping methods.
4. Maintain wolf:ungulate ratios that will allow for ungulate reproduction adequate to sustain ungulate populations, wolf populations and human utilization of each.
5. Promote public understanding of the interrelationships of wolves with other wildlife species in the northern environment.
6. Encourage public viewing, listening, and photography of wolves in a wilderness setting.
7. Increase public awareness of wolf behavior to reduce adverse wolf-human interactions.

THE SPECIES

Wolves occur throughout mainland Alaska and on many islands in Southeastern Alaska. Although wolf abundance varies greatly between areas and from year to year, Department estimates indicate a statewide fall wolf population of 8,000 or more. Southeastern Alaska has historically supported the greatest wolf densities in the state. Wolves are common or abundant on the Southeastern mainland coast from Yakutat Bay south and moderate on islands south of Cape Fanshaw. Track sightings and wolf-killed deer on 1,168 square-mile Revillagigedo Island between 1970 and 1972 indicated about 125 wolves, approximately 1 wolf per 10 square miles. Wolf numbers there have since declined; winter aerial surveys between 1973 and 1975 indicated a winter population of between 30 and 40 animals. Wolves are rare on the mainland coast between Icy Cape and Yakutat Bay and absent from Admiralty, Baranof and Chichagof Islands. Wolves in Southeastern Alaska generally reach greater densities on islands, perhaps because deer are important wolf prey on islands and are more abundant and vulnerable than mountain goats, the primary mainland wolf prey.

South of the Alaska Range, historical accounts of wolf numbers in the Nelchina and Copper River Basins date from the early 1900's. Wolves were reported to be abundant around 1900 but declined to low numbers by 1907 and were uncommon until the late 1920's. Wolves were apparently numerous during the 1930's and 1940's until a federally-administered wolf control program reduced wolf numbers considerably. This program lasted from 1948 until 1953 in the Nelchina Basin and until 1955 in the Copper River Basin. An estimated 12 wolves remained in the Nelchina Basin in 1953. Wolf hunting and trapping were prohibited in the Nelchina Basin between 1957 and 1965-66. Wolves in the Nelchina had increased to approximately 450 animals by 1965, a density of 1 wolf per 55 square miles. Wolves were less numerous in the late 1960's but had again increased by 1972. In 1976, estimates of wolf density in the Nelchina Basin are approximately 1 wolf per 70 square miles, and densities in the Copper River Basin may be comparable. Wolves are much less numerous in the Copper River Delta, and a resident population did not become established there until about 1971. By 1975 an estimated 20 wolves occupied an area east of the Copper River. Wolf numbers in the Matanuska and lower Susitna River Valleys are unknown, although wolf pack sizes, which may be directly related to abundance, have increased from an average of 2.5 wolves per pack in 1972-73 to 4.4 in 1973-74 and 5.2 in 1974-75. Packs west of the lower Susitna River averaged 4.4 wolves in 1972-73, 2.0 in 1973-74 and 5.9 in 1974-75. The general increase in average pack size suggests an increasing number of wolves, but these data are inconclusive because few packs were counted in some years.

Wolves occur throughout lower Cook Inlet and the drainages of Bristol Bay, including Unimak in the Aleutian Islands. Wolf densities in Southwestern Alaska are unknown, but populations appear to be comparatively low on the Alaska Peninsula. Wolves are more numerous from the Lake Clark area west to the foothills of the Kilbuck Mountains. Wolves are most abundant where both caribou and moose occur, and in these areas appear to be increasing in numbers.

The broad expanse of Interior Alaska north of the Alaska Range to the Brooks Range is probably the most important wolf habitat in the state. Although there are few wolves in the Yukon-Kuskokwim Delta and on the Seward Peninsula, wolf densities in the rest of the region are the greatest in the state, except for Southeastern Alaska. Wolf densities from the middle Koyukuk River south to and including the drainages of the Kuskokwim River ranged between 1 wolf per 40 square miles to 1 per 80 square miles during 1971 through 1975. The Holitna River area and tributaries of the upper Kuskokwim support the greatest number of wolves in the southern part of the region. Wolves are also abundant in areas of the Nowitna and Innoko Rivers and along the middle Yukon. Although far less numerous on the Yukon-Kuskokwim Delta, wolves have been recorded within the city limits of Bethel in recent years. Wolf populations in the Koyukuk, Tanana and Upper Yukon drainages are in excellent condition, presumably because the region supports diverse ungulate populations. Within this broad interior region, wolves have increased since the late 1950's when control activities, including shooting from aircraft and poisoning, were discontinued. Intensive wolf surveys have been done only in a 7,000 square-mile area south of Fairbanks to the Alaska Range which corresponds to Game Management Subunit 20A, and there only since 1973. Surveys in the winter of 1975-76 indicated a wolf population in excess of 200 animals prior to removal of wolves from the area, a density of 1 wolf per 35 square miles. Whether wolf density estimates derived from Subunit 20A can be applied to the rest of the area is uncertain, although wolves south of Delta Junction have also been increasing in recent years and current densities probably equal those recorded for Subunit 20A. Wolves also appear numerous in the Tanana Hills and from the White Mountains north to the southern slopes of the Brooks Range, but densities have not been documented.

Northwestern Alaska and the North Slope also support wolves, but densities are generally lower than south of the Brooks Range. Wolves occur as far north as the Beaufort Sea, reaching greatest abundance in the foothills and mountains of the Brooks Range in the southern portion of the region. Wolves were scarce in the Arctic in the early 1900's, perhaps a reflection of low caribou numbers. By the 1930's, both caribou and wolves had substantially increased and continued to increase until the early 1950's. Federal wolf control efforts and public aerial hunting resulted in a sharp decline in the wolf population, and by the late 1960's wolves again became scarce in the Arctic. Wolves have subsequently increased following closure of the area to public aerial hunting in 1970. Wolf densities in 1975 varied from 1 wolf per 60 square miles to 1 wolf per 120 square miles for a total North Slope wolf population of approximately 600 animals. Populations in Northwestern Alaska are less well known, but are probably similar to North Slope densities. Wolves are most abundant in this region in the drainages of the Koyuk, Shaktoolik, Ungalik, and Unalakleet Rivers. They also appear to be increasing in number in this region.

Little is known of wolf natural mortality except in a general way and in localized areas where wolves have been studied intensively. Natural controls of wolf numbers seem to stem mainly from vagaries of prey abundance and availability. Low prey abundance leads to poor wolf pup survival and perhaps a decline in the proportion of breeding females. Natural mortality rates may be affected considerably by human exploitation. Canadian investigations of nonhunted wolves reported lower pup survival and a lower proportion of females producing pups in comparison to Alaska's wolves, indicating that increased mortality due to one factor may be compensated for by lower losses to other causes. Some wolves undoubtedly suffer injuries, perhaps occasionally death, while pursuing large ungulates. A substantial decline in wolf populations between 1907 and 1925 throughout Interior Alaska has been attributed to diseases such as mange, rabies and distemper, reportedly introduced by domestic sled dogs.

The status of wolf habitat can presently be viewed only in terms of the habitat of important wolf prey species. Hooved mammals are the major source of food for wolves over much of Alaska, although small mammals, such as voles, lemmings, ground squirrels, hares, and beavers are occasionally important dietary supplements in summer. Moose are the most important prey species in much of Interior Alaska although wolves also take caribou and Dall sheep. Wolves on the North Slope rely heavily on caribou, with moose and Dall sheep being less important. Deer and mountain goats are the most important prey species in Southeastern Alaska: deer on islands and mountain goats on the mainland. Moose have been declining in numbers over much of Alaska as a result of a decade of recurring harsh winters and decreasing quality and quantity of moose browse. Caribou, also important in wolf diets, have decreased in some areas from high population levels in the mid-1960's. These declines have occurred in some areas as a result of range overuse due to trampling and overgrazing. Improved techniques in fire suppression and prevention by state and federal agencies have probably been detrimental to moose but have probably aided caribou. In Southeastern Alaska, clearcut logging practices are altering much of the climax deer winter range and may result in fewer deer and ultimately fewer wolves. U.S. Forest Service plans call for logging almost all commercial grade timber in Southeastern Alaska, and the second-growth, closed-canopy vegetation that will follow will decrease the quality of wolf habitat. Wolf habitat has been little altered by human expansion in the remainder of Alaska, except in the vicinity of settlements. Much of the Interior is currently economically unsuitable for industrial or agricultural development. Despite the recent and perhaps continuing increase in the number of wolves over the much of the state in the last decade, the status of ungulate populations indicates that wolf numbers will decline somewhat over the next few years. Moose populations seem to be increasing along the lower reaches of the Yukon and Kuskokwim Rivers, and wolves there are likely to become more common.

The increases in wolves during the past decade are probably related to a substantial reduction in efforts at organized predator control, bans on poisons, and more restrictive regulations on wolf hunting, specifically on shooting wolves from the air with shotguns.

Wolf harvest data are derived from a combination of bounty records, aerial permit reports, and since 1971, a mandatory sealing requirement on all wolves taken. The harvest data are considered reasonably complete although some people have taken wolves without collecting bounties and others may not comply with sealing requirements. A gap in data exists from 1969 when bounties were largely discontinued to 1971 when the sealing requirement was initiated. The known wolf harvest by hunters and trappers in Alaska has averaged 921 wolves annually since 1959. The fewest wolves reported taken were 221 in 1959-60 and the most were 1711 in 1967-68. A reported 1,090 wolves were killed during the 1974-75 regulatory year. About 38 percent of the wolves harvested since statehood were taken in east-central Alaska. Southeastern Alaska from Icy Bay south, comprising about 6 percent of the state's land area, has produced more than 13 percent of the reported annual harvest. The wolf harvest has generally consisted of slightly more males than females. Pups comprise 40 to 50 percent of the kill each year.

Snow must be deep enough to allow tracking of wolves from the air and for aircraft landings if wolf harvests are to be significant. There is an unknown degree of noncompliance with the statewide wolf sealing requirement. In remote areas less than half of the wolves taken in some years may be reported, often because pelts are used locally. Illegal aerial hunting also occurs except in Southeastern Alaska where it is impractical due to the heavy forest cover. Since bounties are still paid on wolves from Icy Bay south, the unreported harvest there is probably small, although some bounty collectors may falsely state where the animals were taken.

The intensity of consumptive use of wolves varies considerably. Hunting and trapping pressure is comparatively light in the western portion of the state. Hunting pressure on wolves seems high in eastern and central Alaska, but it is doubtful whether the current kill is significantly impacting wolf numbers. Wolves in eastern Alaska have apparently increased since aerial hunting was prohibited in 1971 despite growing public interest in trophy wolf hunting and rising value of wolf pelts. Wolf numbers in the Nelchina and Copper River Basins appear to have fluctuated independently of harvests. Ground hunting and trapping are the only feasible methods of taking wolves in Southeastern Alaska. Harvests may, at times, have exceeded 50 percent of the population on Revillagigedo Island, but there is no evidence that the harvests have permanently reduced wolf numbers. On the North Slope, wolves were significantly suppressed by aerial hunting until the region was closed to aerial hunting in 1970. Wolf numbers north of the Brooks Range subsequently increased. It appears that continued aerial wolf hunting can reduce wolf numbers where open terrain affords the animals little escape cover. The number of wolves taken annually statewide is generally dependent on winter snow conditions.

Hunting and trapping seasons for wolves have remained liberal since statehood. Poisons were banned in 1960, and with their classification as big game animals in 1963, wolves received additional protection from regulations on seasons and bag limits. Aerial hunting permits were issued during the 1960's and early 1970's, but were suspended in 1972. Wolves in the Nelchina Basin were protected from 1957 through June, 1966. Current hunting regulations stipulate a limit of two wolves over most of the state with an August through April season; there is no closed season or limit on wolves in Southeastern Alaska. Trapping seasons generally extend from October or November through March or April with no limit on the number that can be taken. Since 1972 most wolves have been taken by ground shooting (44 percent) or by trapping (41 percent).

Trapping success by individuals is generally low since many are inexperienced trappers. The majority of wolves harvested are taken by comparatively few people. A combination of aerial spotting and shooting after landing is becoming increasingly common. A few wolves are killed by hunters incidentally to hunting for other big game species. Most are harvested between December and March, with March the most important month. Most people taking wolves are resident Alaskans. While nonresident guided hunts are becoming more popular, and nonresident trapping occurs extensively on military lands, the number of wolves taken by nonresidents is small. Wolves are sought primarily for the commercial value of the pelts in northern and western Alaska. Over the rest of the state a combination of recreation and commerce motivates wolf hunters and trappers. In Southeastern Alaska, trapping and hunting of wolves seems to occur primarily for recreational purposes, since wolf fur quality there is generally poor. Access to wolf hunting areas is primarily by airplane. Snowmachines, both for hunting and checking traplines, are important means of access in areas without roads and near remote villages. Most wolves in Southeastern Alaska are taken with traps set along beaches where the lines can be checked by boat or plane.

East-central Alaska, bordered on the north by the Brooks Range and on the south by the Alaska Range, produces the most desirable trophy wolves in the state. Wolves there are generally larger, and their pelts are often light gray, the color most preferred for trophies and by furriers. Wolves in Southeastern Alaska, though still sought for trophies, are generally smaller and darker and have shorter, more coarse and less dense fur than Interior wolves.

The number of people that enjoy seeing, hearing, or otherwise experiencing wolves in Alaska each year is unknown. Relatively few people see wolves except from aircraft. A growing number of people are frequenting remote areas during summer months, however, and incidental nonconsumptive use may be increasing. The northern Brooks Range, where the open terrain facilitates long-distance observation, may offer some of the best opportunities for the nonconsumptive use of wolves in Alaska.

PROBLEMS

- * A substantial portion of wolf range in Alaska has been selected by local residents under terms of the Alaska Native Claims Settlement Act. Once title to public lands is conveyed to private ownership, public use on such lands may be restricted or prohibited. The Department should solicit the cooperation of private landowners to facilitate progressive management of wolves. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act.
- * Substantial land areas will be placed in parks, monuments, wild and scenic rivers, and wildlife refuges, all under federal jurisdiction, under terms of the Alaska Native Claims Settlement Act. Extensive portions of these federally-administered areas may be closed to hunting and trapping or such use may be limited by access restrictions. The Department should seek cooperation from the appropriate federal agencies to allow hunting and trapping to continue within these areas.
- * Adverse wolf-human interactions have occurred more frequently in recent years, particularly at pipeline construction camps and along the Trans-Alaska Pipeline Haul Road. Several people have been bitten by wolves that have grown accustomed to humans. Most of these animals have subsequently been destroyed, primarily to test for rabies. In most instances, private company regulations specifically prohibit feeding wild animals and these regulations should be strictly enforced. The Department may consider additional regulations to discourage adverse interactions.

- * Wolf prey populations over much of the state are declining or are currently at low levels. Predation by wolves may conflict with human use of prey species in some areas. Wolf hunting and trapping should continue with liberal seasons and bag limits. If it is established that predation is causing declines or maintaining low densities of prey species, the Department may consider more liberal methods and means of harvesting wolves. Should public hunting efforts prove incapable of lowering the wolf population to relieve predation pressure on prey species, the Department should consider direct control by Department employees for a limited specified period and to meet specific objectives.
- * The reduction of wolf numbers to encourage an increase in the number of ungulates is not easily accomplished given the controversial nature of wolves and the practical problems associated with achieving significant reductions in wolf populations. All wolf control efforts by the Department should be justified on the basis of substantial data and only after it has been shown public hunting and trapping harvests will not achieve the stated management goals. The role of wolves as predators and their effect on prey populations must be accurately conveyed to the public. Recent studies have shown many earlier assumptions regarding the beneficial or inconsequential impacts of wolf predation to be simplistic or limited in application. The Department must convey to the public all aspects of wolf biology in an objective manner; the public must understand that responsible wolf management will consider the complex relationships between predator and prey, the welfare of each and the beneficial uses of all resources that can be derived by humans.
- * Domestic livestock may be established or reintroduced by private landowners in areas that currently support wolves. Demands for predator control will be forthcoming from the domestic livestock industry. Hunting and trapping harvest should be the primary means of suppressing problem wolves, and control actions, if necessary, will be directed at specific animals. The cost and responsibility of such control will be the responsibility of the industry and only as authorized under conditions of the state-issued permit. The Department should indicate to persons contemplating introduction of domestic livestock that some level of wolf predation must be accepted as a normal operating risk.
- * Wolves in parts of Interior and Arctic Alaska are subject to illegal aerial hunting, and a proportion of people inhabiting rural areas are not complying with sealing regulations. Such activities make it difficult to accurately assess annual harvests and population parameters. An increased enforcement effort by the Division of Fish and Wildlife Protection and a more active enforcement role by the Department of Fish and Game, coupled with more severe penalties for offenders, could alleviate some of the problems.
- * Recurring wildfires are generally beneficial to browse plants important to wolf prey species. Fire suppression and prevention efforts by state and federal agencies have improved to the point that habitat quality and quantity for moose are declining in some areas. The Department should identify critical habitat areas and make recommendations to the appropriate agencies regarding the possible beneficial aspects of fires in specified regions.
- * Extensive logging activities in Southeastern Alaska may result in a decline in deer and mountain goat populations with a subsequent decline in wolves. The Department should make recommendations and seek agreements with appropriate management agencies to minimize adverse logging impacts on wildlife.

IMPACTS

- * Wolves will not be eliminated from any region and will continue to be a viable part of Alaska's wildlife.
- * The reduction of wolf populations in some areas of Alaska by limited permit aerial hunting by the public or by organized control efforts by the Department will allow a faster recovery of depressed ungulate populations.
- * Selective reductions of wolf populations will decrease the opportunity for use of wolves by hunters, trappers and nonconsumptive users in some areas.
- * Regulations governing harvest will be manipulated to maintain desired population levels of wolves. In general, liberal hunting and trapping regulations and seasons will continue, although restrictions on sport hunting may be imposed to make wolf hunting compatible with hunting regulations stipulated for other big game species.

CARIBOU IN NORTHWESTERN ALASKA

Northwestern Alaska is seasonally occupied by the majority of the Western Arctic barren ground caribou (*Rangifer tarandus granti*) herd in late fall, winter and early spring. Some caribou are present in the region in all seasons of the year. The herd was estimated to contain 300,000 in 1964 and 242,000 caribou in 1970. Survey efforts in 1975 suggest a sizeable reduction to perhaps 100,000 caribou, and similar efforts in 1976 revealed a population of only about 50,000.

A relatively obscure population of wild reindeer/caribou that winters east of the Andreafsky River in the Western Region of Alaska may occasionally range into the Northwest Region. Several hundred animals that may belong to this group, occupy the area at the head of the Unalakleet River and South Fork of the Nulato River, at least seasonally. These animals warrant further study. Additionally the Seward Peninsula contains the bulk of Alaska's reindeer herds. Several hundred stray animals from these reindeer herds occupy portions of the Seward Peninsula such as the head of the Kuzitrin River.

Although caribou utilize a variety of habitats throughout the year, much of their time is spent on alpine and Arctic tundra. Timbered areas are used extensively as winter ranges but are abandoned as the snow melts. An important habitat requirement of caribou populations is a suitable calving area. Calving grounds generally constitute a "center of habitation" for populations, and their occupation is the most consistent facet of otherwise vacillating and unpredictable movement patterns. The characteristics which distinguish calving areas are not well known but probably relate to such factors as availability of green vegetation following snowmelt, ease of movement and high visibility. With few exceptions, calving areas are above timberline. The Western Arctic herd's calving area is north in the Arctic Region.

Almost any vegetated habitat type can serve as caribou winter range, but the greatest use is made of timbered areas, especially spruce-lichen associations. With teeth adapted for eating soft, leafy vegetation, caribou in winter are dependent on lichens, grasses, sedges, and decumbent shrub vegetation. Lichens are slow-growing plant forms requiring up to 100 years for development of stands than can provide forage in significant quantities. Caribou utilize extensive areas for winter range, often using different areas in successive years as an adaptation to the very slow regrowing capability of lichen ranges. The wide-ranging characteristic of caribou is one of the mechanisms evolved by the species to adapt to limitations of the arctic environment.

Caribou depend upon climax vegetation; conditions favoring progression of vegetation through the successional series to climax stages, or the maintenance of climax vegetation favor caribou. In Northwestern Alaska fires and overgrazing by reindeer have depleted some caribou ranges. Extensive fires have occurred in the Kobuk River valley. Lichens in these areas have not totally recovered.

Despite their physiological and morphological adaptations for coping with the arctic environment, caribou populations have always fluctuated numerically. Some areas in the state with few or no caribou have well-worn trails of large populations in the past. Among many interrelated natural factors limiting caribou population growth, weather and predation are important factors operating directly on small populations, while weather, disease and emigration induced perhaps by social stress are important to large populations. If reproduction exceeds mortality, production of young can rapidly outstrip predation and spectacular herd growth may occur on good ranges. Equally spectacular declines may occur when the carrying capacity of the range is exceeded. Density related stress may cause emigration to new ranges, and reduced food quality and

quantity and increased disease may serve to lower calf production and survival.

The most critical time for caribou is the period just prior to and during calving. For those caribou that have survived the winter, the availability of new forage is most important in meeting increased energy demands of migration to calving areas and of calving itself. Deep snow during spring can stress caribou. Newborn calves are susceptible to large scale mortality if severe weather strikes during the short one week period when calves are born. Predation on calves and weather induced calf mortality determine in large part whether population increases or decreases. In infected populations, brucellosis and a retained placenta condition can reduce the number of viable young born.

Caribou in Northwestern Alaska have long been important for domestic use. Some inland villages away from marine resources developed a culture centered around caribou. Today the cash economy has spread to all villages but domestic use of caribou still contributes significantly in enhancing the standard of living. From the early 1960's through the present, over 10,000 caribou have been used for domestic use annually. The number taken depends greatly on where spring and fall migrations of the Western Arctic Herd occur. Prior to 1969 a sizeable portion of the domestic use was for dog food, then the primary source of land transportation. Since then snow machines have largely replaced the dogs and have greatly facilitated the harvesting of caribou. River boats are the only other method of access that accounts for many animals. Aircraft are used in taking a minor portion of the harvest.

Very little sport hunting has occurred in this region in the past, primarily because of the remoteness of the area. There appears to be a growing interest in the area by sport hunters. Aircraft will continue to be the primary method of transportation for recreational hunting because of the logistics involved.

PROBLEMS

- * Caribou in Northwestern Alaska are faced by the prospects of considerable industrial growth from the petrochemical industry, mining, construction of transportation systems, and a sizeable growth in human population. Aside from the inevitable increase in demands on the caribou resource by consumptive and nonconsumptive users, the most important consequences of development will be alteration of habitat and disturbance of caribou during critical periods. The long-term effects of dissecting the caribou range with transportation corridors and the probable construction of gas and oil pipelines or similar projects are impossible to predict, but almost certainly will mean constricted and reduced caribou populations in the future. Disturbance of calving caribou by construction, transportation or other developmental activities may cause substantial mortality, and disruption of critical migrations may result in fragmenting of populations. Impacts of development and conflicting land uses on caribou must be minimized to the greatest extent possible by comprehensive land use planning and scheduling development activities where and when caribou are least affected.
- * Consumptive use of Northwestern caribou, historically below productive capacities of these populations, is now affecting the status of at least one important population, the Western Arctic herd. Although caribou populations must be maintained if domestic use of caribou is to be satisfied, excessive harvests and resistance to regulated use may result in substantial declines in caribou numbers. Recreational harvests in the region have been relatively minor but may increase as access improves and resource development brings new people into the area. Competition among consumptive users will increase, and

will be further intensified by creation of national parks or other management systems where consumptive use is excluded or limited. Use of Arctic caribou populations must be equitably allocated among the various users, and harvest levels must be controlled under the sustained yield principle if consumptive use is to be maintained.

- * Predation is at times detrimental to the welfare of caribou populations when caribou populations are small and predator populations are large. Human utilization of small caribou populations requires restriction of take to annual surpluses or less, thereby bringing use by humans into competition with use by predators. To the extent that competing uses are not compensatory, predator populations must be managed in addition to human utilization to insure the maintenance and enhancement of caribou populations.

3. WESTERN ARCTIC CARIBOU MANAGEMENT PLAN

LOCATION

That portion of Game Management Unit 22 lying north of the Shaktolik River; all of Game Management Unit 23; those portions of Game Management Units 24 and 26 lying west of the Dietrich Caribou Management Plan area; and that portion of Game Management Unit 25 lying west of a line drawn from the headwaters of Fish Creek due south to the Yukon River.

PRIMARY MANAGEMENT GOAL

To provide for an optimum harvest of caribou.

SECONDARY MANAGEMENT GOAL

To provide an opportunity to hunt caribou under aesthetically pleasing conditions.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Harvest no more than 5% of the population until the Arctic herd reaches 200,000 animals; thereafter harvest the annual increment.
2. Regulate hunting seasons, bag limits and methods and means of taking caribou to provide for local use.
3. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.
4. Discourage establishment of reindeer grazing on historical caribou range.
5. Discourage land use practices that adversely affect caribou habitat.

THE SPECIES

From the 1940's to the early 1970's the western arctic caribou herd was the largest in Alaska. In 1963, the herd was estimated at 300,000 animals. A photo-census conducted in 1970 resulted in a minimum estimate of 242,000 caribou. A 1975 survey of post-calving aggregations yielded a tentative estimate of 100,000 caribou. Although caribou may appear to be abundant seasonally in some portions of the herd's 140,000 square mile range, the population is continuing to decline. No single factor appears to be responsible for this decline, but one important contributing factor has been the low proportion of young which survive to become yearlings. This proportion has dropped from 19 percent in 1970 to 8 percent in 1975. Since it is these animals which replace the adults which are lost from the population through natural and hunting-related mortality, such a decrease in their numbers has had serious consequences. Without drastic changes in the factors which cause mortality, the herd will continue to decline. Even if the present rates of survival of calves to yearling age increases to the level observed in 1970, the present herd size would not be able to produce the number of caribou necessary to sustain the amount of predation and hunting which now occurs. Predation is believed to be the most important natural mortality factor. Wolves, bears, wolverines, golden eagles and foxes prey on caribou but the highest kill is probably by wolves. An estimated 15,000 caribou per year may be killed by wolves, based on wolf density estimates of one wolf per 110 square miles. Wolf densities and predation are

highest in the southern portion of the caribou range where the majority of the animals have wintered during the last two decades. If wolf predation does account for as many animals as these rough estimates project, it would be a significant contributing factor in the caribou herd decline.

Range conditions do not appear to be a limiting factor. The habitat utilized by caribou in both winter and summer ranges appears to be in good condition and still able to support greater numbers than now exist. In addition the physical condition of caribou taken by local residents has been good, and initial calf production has been high. Both of these factors indicate good habitat condition.

The western arctic herd has received heavy use by native residents throughout history. The average annual kill since 1963 has been about 25,000 caribou, varying from 20,000 to 29,000. Most of these animals are taken as they pass villages during the spring or fall migrations or when animals spend the winter near settlements. Since the kill is largely dependent upon availability of caribou close to villages which is in turn dependent on migration routes and wintering areas, the kill near any particular settlement may fluctuate widely from year to year. During fall migration prior to the rut, adult bulls are often preferred. After this time cows or young bulls are taken when a choice is available. The total effect on the population is a reduction in the proportion of bulls. Hunting by local residents is primarily done with the aid of snow machines, although boats are sometimes used. Dog teams were the primary means of transportation until the late 1960's, but are rarely used today.

Past regulations have reflected the dependency of local people upon caribou for domestic use. From 1959 to 1976, there were no closed seasons or bag limits. In 1976 a limit of 15 caribou per year, closure of short portions of the season and prohibition of commercial sale of caribou were imposed to reduce total hunter kill.

Recreational harvests by persons not living in the area have probably not exceeded 1,000 caribou in any one year, and a more realistic estimate probably would be 300 animals, in either case a negligible proportion of the total kill. A majority of recreational hunting has been by guided nonresidents, but within the last five years an increasing number of resident hunters have been traveling to the area to hunt. Most of the access to the area by recreational hunters has been provided by aircraft. Though adult bulls in this area do not have exceptionally large antlers, the remote character of the region and the possibility of selecting trophies from large numbers of caribou increase the appeal to recreational hunters of hunting in the area.

PROBLEMS

- * Development of oil reserves on Naval Petroleum Reserve #4 may occur on or adjacent to the calving grounds of the western arctic herd. This could result in abandonment of this critical habitat or in disturbance which would adversely affect calf survival. These problems may be resolved by establishment of a critical habitat area including the calving grounds or by restriction of human activities to those times of the year in which caribou are not calving or migrating to or from the area. Resource development must be managed to prevent alteration of habitat which would adversely affect range conditions in the area.
- * Construction of pipelines to transport oil from the area could result in the obstruction of free movement by migrating caribou. The state should establish and enforce stipulations assuring unimpeded movement of caribou.

- * Interest in reindeer husbandry is increasing. Reindeer grazing is generally incompatible with maintaining free-roaming caribou. The Department should work closely with other State and Federal agencies involved and with Native groups to insure that reindeer grazing is limited to areas of no competition with caribou.
- * With the decline in population size and reduced yearling recruitment, the present levels of hunting and predation will result in even lower population numbers. The amount of hunter-related mortality such as wounding could be reduced by the improvement of hunting practices and elimination of wastage, factors which may account for 20-30 percent of the total kill by domestic users. In addition, the total hunter kill will have to be reduced and some measures may have to be taken to reduce predation if the herd is to recover.
- * Increased access into the area may result in additional harvests above sustainable levels. Restrictions of methods of access may be necessary.
- * A portion of the area used by the western arctic caribou herd will be selected under the terms of the Alaska Native Claims Settlement Act. Private landowners may prohibit public trespass for hunting. The Department should solicit the cooperation of private landowners to facilitate progressive management of caribou. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act.

IMPACTS

- * Limitation of the caribou kill to 5 percent of the population until the herd again reaches 200,000 will result in a reduced number of animals which are available for domestic use by local residents. In part, this impact may be lessened if wounding and wastage rates are reduced.
- * Resource development may be constrained in certain areas or during certain times of the year.
- * Management to allow the herd to increase to its former abundance may require a temporary decrease in wolf numbers.

DALL SHEEP IN NORTHWESTERN ALASKA

In Northwestern Alaska Dall sheep (*Ovis dalli*) inhabit the DeLong Mountains from Howard Pass to the western Wulik Peaks. Distribution is not continuous and sheep populations may be separated by several drainages. The influences of coastal weather may make habitat in Northwestern Alaska marginal for Dall sheep. The total population in the region is estimated to be about 1,500 sheep.

Dall sheep are usually found in alpine habitat. During summer they occupy relatively large areas. Mineral licks are an important component of sheep habitat in summer. Many important mineral licks are known throughout the Brooks Range, but few have been identified in Northwestern Alaska. Sheep, especially ewes with lambs, will frequently travel several miles to use mineral licks where they eagerly eat the mineral rich soil. The exact nature of sheep dependence on mineral licks is not fully understood. The use of mineral licks also serves to intermingle otherwise discrete populations and is of importance in maintaining genetically healthy herds.

Winter ranges are the third critical component of Dall sheep habitat. Winter ranges are characterized by windblown ridges or slopes. These ranges usually occur at the mouths of tributaries along major drainages where prevailing winds clear winter snow from forage. A herd occupying many square miles of summer habitat may be restricted to, and limited in size by, a winter range of relatively few acres. Some herds occupy winter ranges which are several miles from their summer ranges and migrate between the two. These seasonal migrations often include side trips to utilize mineral licks, and are the ingrained tradition of each population. Sheep are extremely loyal to their traditional summer ranges, winter ranges and mineral licks and appear on these ranges at about the same time each year.

Predation in Northwestern Alaska does not appear to be a major factor in limiting sheep numbers, however occasional situations arise where predation may depress sheep numbers. Wolves are the main predator on sheep, but wolverines, bears and sometimes eagles have been known to take sheep.

Dall sheep in Northwestern Alaska are used for nonconsumptive wilderness values and for consumptive recreational and domestic utilization. In recent years the recreational harvest in Northwestern Alaska has averaged less than 20 rams and hunter success has averaged about 50 percent. About half of the harvest has been by nonresident hunters. Domestic use of Dall sheep has played a minor but continuing role; such use has been limited and nontraditional. It is difficult to assess the future trends of hunter pressure and harvest in Northwestern Alaska, but hunter effort will probably increase.

PROBLEMS

- * Expanding human land use may adversely affect sheep through the alteration of important habitat or through disturbance of sheep use of critical areas. Mineral licks, winter ranges, lambing areas, and migration routes are particularly susceptible to damage or interference from such activities as mining, construction in transportation and utility corridors, and development of alpine recreation sites. Critical habitats must be protected from alteration or undue disturbance.
- * Increases in numbers of hunters, development of access, and improved transport methods have reduced availability of legal rams, even in

once-remote and lightly hunted areas. In some locations most legal rams are removed annually. In some areas the average size of rams available to hunters has decreased. In addition to reduced hunter success, increased hunting pressure has lowered the quality of the hunting experience. Management measures to regulate hunter density and distribution, and to increase the number of legal rams available to hunters should receive greater emphasis.

- * The small, isolated nature of sheep populations in Northwestern Alaska makes these populations especially vulnerable to uncontrolled harvest situations. Enforcement of regulations limiting harvests to allowable levels and to specified sheep population segments and the cooperation of local residents will be necessary to maintenance of current sheep populations in the region.

3. SOUTHERN BROOKS RANGE SHEEP MANAGEMENT PLAN

LOCATION

Game Management Units 24, 25 and that portion of 23 which includes the drainages of the Noatak River above its confluence with Mayumerak Creek.

PRIMARY MANAGEMENT GOAL

To provide an opportunity to hunt sheep under aesthetically pleasing conditions.

SECONDARY MANAGEMENT GOAL

To provide an opportunity to take large sheep.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control the number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.
2. Limit the harvest of rams to no more than the annual increment of three-quarter curl rams.
3. Discourage land use practices that adversely affect the wilderness character of the area.

THE SPECIES

Sheep which inhabit this large area exist in discrete populations each of which has its well-defined traditional ranges. The entire extent of the area included in this plan has never been completely surveyed for Dall sheep so the actual number of animals present is not known. Based on limited aerial surveys, the number of Dall sheep in this area is estimated to be at least 7,500. There is little doubt that Dall sheep numbers fluctuate and that there may be declines or increases in the future, but these fluctuations are not expected to be extreme. Unless exceptionally adverse conditions occur, sheep population numbers will probably continue to fluctuate near present levels.

Most natural mortality is caused by weather and predation. The influences of predation are not known, but are thought to be minimal under normal conditions. The influences of weather are most apparent in lamb production and sometimes result in the loss of a lamb crop. Where hunter pressure is light, as it has been in much of the southern Brooks Range, weather influences on trophy production are not readily seen because of the standing stock of trophies on the range. In much of the southern Brooks Range trophy availability is good. This high availability of trophies results from the presence of lightly hunted populations containing relatively large numbers of old rams. A few areas with good access have received high hunter pressure in the last few years.

The southern Brooks Range has received an increased amount of use in the 1970's, but the number of hunters appears to have leveled off in the past 2 to 3 years at about 200 hunters per year. These hunters harvest about 115 rams per year. About 65 percent of the hunters are residents and they take about 55 percent of the harvest. In the past few years there has been a trend toward increased hunting by residents in the area. About 1,000 man days are spent hunting sheep in the southern

Brooks Range each year. Some domestic utilization by local residents occurs in the area, but it is limited and represents the opportunistic taking of sheep rather than an actual dependence on them as a food item. Nonconsumptive utilization of sheep in the southern Brooks Range occurs, but the extent to which it is incidental to other activities is not known. Many big game guides and outfitters have interests in this vast area. They are responsible for about 45 percent of the Dall ram harvest each year. Some guide operations have permanent facilities in the area.

PROBLEMS

- * Important Dall sheep habitat including mineral licks, lambing areas and winter ranges may be adversely affected by resource development. Mining and prospecting activity has been present in the area for many years, but recent developments have stimulated increased interest in utilization of non-renewable resources. The Department should identify important sheep habitat and should encourage regulation of resource development to minimize adverse impacts to sheep habitat.
- * The lack of enforcement of hunting regulations for residents of the area presents a potential for abuse. As demands on sheep in the area increase, the allowance for unregulated use will decrease. Enforcement of existing regulations will be necessary to avoid excessive use of sheep and to assure all users equal opportunity under the law.
- * Establishment of proposed "4 systems" areas such as the Noatak National Ecological Range, Gates of the Arctic National Park, and the additions to the Arctic National Wildlife Range may exclude or limit hunting in the southern Brooks Range. Additional large tracts of land will be transferred to private ownership under terms of the Alaska Native Claims Settlement Act and such lands may be closed to public hunting. Exclusion of hunting in some areas will result in concentrations of hunters in other areas, causing deterioration of aesthetic hunting conditions. Increased hunting pressure is also expected when the pipeline Haul Road is opened for public use. The Department will attempt to maintain public hunting over as wide an area as possible by participating in land use planning and coordinated management with other agencies. The Department should solicit the cooperation of private landowners to facilitate progressive management of sheep. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act. Densities of hunters may be controlled by use of permits.

IMPACTS

- * Hunter density will be limited by permits when crowded hunting conditions occur.
- * Large rams will be available to hunters.
- * Methods of hunter transport will be limited to those necessary for access to the hunting area.
- * Utilization of the sheep resource by some big game guides will be restricted to the extent that clients can obtain permits.
- * Viewing and photographing sheep in wilderness surroundings will be enhanced.
- * Resource development activities may be limited in time or area and expense of operations may be increased.

4. WESTERN BROOKS RANGE SHEEP MANAGEMENT PLAN

LOCATION

The portion of Game Management Unit 23 draining into the Kobuk River and the drainages into the Noatak River below Mayumerak Creek.

MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting sheep.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, distribution of hunters and methods of hunter transport if necessary to distribute hunting pressure through the area.
2. Discourage land use practices that adversely affect sheep habitat.

THE SPECIES

Sheep in this area can be separated into three distinct geographical populations: those in the drainages of the upper Kobuk River; those in the Baird Mountains south of the Noatak River; and those in the DeLong Mountains, north of the Noatak River. The total sheep population in the area is estimated to be 700. While the Kobuk drainage appears to be good habitat, it contains relatively few sheep. The area has not been thoroughly surveyed, but it is estimated to support only 150 animals. The Baird Mountain region is sparsely populated, with most sheep occurring in the western portion. A cursory survey in 1974 revealed 44 sheep, but the area is estimated to contain 150. Sheep inhabit a relatively large area in the DeLong Mountains from the Wulik River in the west to the Nimiuktuk River in the east, but density is low. The area is estimated to contain 400 animals.

Presently sheep are about one-half their former numbers in the Western Brooks Range. Information indicates that the sheep population began to decline in the early to mid-1960's and has continued to do so. The decrease does not seem to be a result of hunting alone, but more likely is a combination of several factors. These include range conditions, weather, predation and subsistence hunting.

A fall survey in 1974 revealed that lambs comprised about 24 percent of the population in the Western Brooks Range and 17 percent in an area near the upper Kobuk River. For the population as a whole natural mortality is estimated to be about 6 to 9 percent annually.

It appears that sheep distribution has shrunk during the last three decades. Although the causes are uncertain, sheep habitat in the Western Brooks Range is marginal, perhaps because of its proximity to the arctic coastal environment. When sub-populations are extirpated, recolonization apparently occurs very slowly. Even with good lamb survival it is not likely that the population will expand quickly.

Considering the size of the land mass, hunting pressure has been relatively light, but due to the limited number of aircraft landing sites, pressure has been high in localized areas. The greatest number of hunters have concentrated on the main tributaries of the Noatak River in drainages of the Eli, Kelly and Kugurorok Rivers. Reported annual harvests in the area have averaged about 8 rams for the last 10 years. In recent years

there has been a slight increase in hunting pressure which is not entirely reflected in the harvest statistics because hunter success has been lower. Local residents have taken most of the harvest, but a few nonnatives using the services of a guide have also been successful. Wheeled or float-equipped aircraft have been the transportation means used most often, in about equal proportions. Average walking distance from the point of landing to where the sheep were killed has probably averaged less than five miles. Hunter success has been greater than 60 percent for both residents and nonresidents.

Twenty or thirty years ago local hunters probably killed 3 to 4 times (or more) as many sheep as did recreational hunters. With few exceptions this kill occurred outside the legal hunting season and included all sheep regardless of age or sex. This practice continues today but now domestic use more nearly equals the recreational harvest. The vast majority of this kill still occurs outside the open season, usually when the sheep are on their wintering grounds and can be reached with the aid of a snowmachine. The greatest number of sheep taken by domestic hunters come from the drainages of the Wulik, Kivalina, and lower Noatak Rivers.

PROBLEMS

- * The practice of taking sheep outside established seasons and bag limits hinders any sound management program. Enforcement efforts should be increased, and the Department should explain to local domestic hunters the reasons for established regulations and the necessity for all users to comply with them.
- * Much of the area has not been surveyed, and necessary data are lacking on sheep numbers, composition, and distribution. The Department should increase survey and inventory activities to acquire information necessary for management.
- * The western Brooks Range is highly mineralized, and will probably receive increased attention from mining interests. Development could be detrimental by disturbing sheep at critical times or adversely affecting important sheep habitat. The Department should closely monitor exploration and development and should recommend measures to minimize adverse consequences of resource development.

IMPACTS

- * Regulations which may be implemented to distribute hunting pressure more evenly may limit the freedom of individuals to hunt when and where they choose.
- * Hunting pressure can be expected to increase.

MOOSE IN NORTHWESTERN ALASKA

Moose (*Alces alces*) are distributed throughout Northwestern Alaska from the Brooks Range to Norton Sound and from Walker Lake to Point Hope and Cape Prince of Wales. In forested areas, such as the middle and upper Kobuk River and its tributaries, they are widely distributed during spring and summer. However, during winter they tend to congregate in shrub and tree stands along major rivers and streams. In treeless areas, such as most coastal areas and the western Seward Peninsula, moose are most closely associated with streamside shrub communities. During summer they may disperse onto the tundra and uplands where forage occurs. During fall and winter they are restricted to shrub communities along streams and rivers.

Moose were apparently rare in the Kobuk and Noatak River drainages and were definitely absent from the Seward Peninsula and coastal areas of the Chukchi Sea during the late 1800's and early 1900's. Their numbers have gradually increased along the Kobuk and Noatak Rivers during the past 50 years, corresponding roughly to their increase in the Brooks Range. Moose are recent inhabitants of the Seward Peninsula and northern coastal areas. They were occasionally seen in the western Seward Peninsula during the 1950's, and have become particularly numerous during the past 10 to 15 years. Over 3,000 moose currently occur on the Seward Peninsula. South of the Seward Peninsula small groups of moose have been resident for some time along streams where the treeline extends to the coast.

In the past, the moose harvest on the Seward Peninsula and in the Norton Sound area has been low. Between 1963 and 1972 the total annual reported kill was less than 70 animals, while between 1973 and 1975 the annual reported kill has ranged from 136 to 222. The moose harvest in the Kotzebue Sound area, including the Kobuk and Noatak drainages has also been low. Total reported harvest during 1974 and 1975 was 104 and 76 moose, respectively.

Many moose taken for domestic utilization by local residents are not reported. Consequently harvests by all hunters may approach 700 per year. Most recreational hunters are residents of Nome and Kotzebue. Riverboats are used extensively on the major rivers and aircraft provide access to more remote areas.

PROBLEMS

- * In many areas of Northwestern Alaska where winter habitat is limited, moose appear to be near a critical balance with their food supply. Harvest regulations must assure that moose do not overpopulate their range. However, the decline of caribou populations in the area may result in greater hunting pressure on moose. Harvests must be closely monitored and regulations adjusted to prevent overharvest of moose.
- * Opposition to female moose hunting has existed in Alaska for several years. Antlerless moose hunts by permit or during a special season have been conducted with varying degrees of acceptance and criticism. Unfortunately, recent declines in moose populations in some areas of Alaska strengthened opposition to antlerless hunts and culminated in passage of a bill preventing antlerless hunts unless otherwise authorized by the local advisory committee. Antlerless hunting is, however, a useful management tool, and efforts must be continued to explain the benefits of retaining this management option.

5. SEWARD-KOBUK-NOATAK MOOSE MANAGEMENT PLAN

LOCATION

Game Management Unit 22 except for the Nome Area and the Granite Mountain Moose Management Plan areas; Game Management Unit 23 except for the Granite Mountain and the Upper Noatak-Kobuk Moose Management Plan areas.

PRIMARY MANAGEMENT GOAL

To provide for an optimum harvest of moose.

SECONDARY MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting moose.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Harvest the annual increment to the moose population.
2. Control the number and distribution of hunters, if necessary, to distribute hunting pressure through the area.
3. Maintain a post-hunting season population sex ratio of at least 20 bulls per 100 cows.
4. Harvest antlerless moose to attain the desired population size and structure.
5. Manipulate habitat in selected areas to increase carrying capacity for moose.
6. Discourage land use practices that adversely affect moose habitat.

THE SPECIES

Recent historical records indicate moose did not occur in northwest Alaska prior to 1900. During the mid-1930's, a few moose moved into the area, probably originating from Yukon River drainages. Gradual increases in moose populations occurred, most noticeably during the 1960's, concurrent with greater compliance with game regulations. By the 1970's, they had expanded into most areas of suitable habitat, and subpopulations increased dramatically. An example is the drainages of the Kuzitrin River on the Seward Peninsula where observed moose numbers increased from 142 in 1972 to 526 in 1975. In spring, most moose are found along the major river systems and it is possible to count a high percentage of the actual population. The minimum number of moose observed in a portion of the area in 1975 and 1976 was 1,630 moose, but the total may exceed 3,000 animals.

The average age of moose in this area is relatively low, but large older bulls are common in some areas, especially in the northern portion. In several survey areas bulls with antler spreads in excess of 40 inches represented nearly half the males present. Calf production and survival appear to be good. Winter and spring surveys indicate 25 percent of the population consists of moose less than 1 year old. With a population of about 3,000 animals, the area can support an annual harvest of at least 750 moose. Wolves are scarce on the Seward Peninsula and are not a significant mortality factor there. Elsewhere in the area the wolf population appears high and increasing. Wolves in this region prey

largely on caribou, but some moose are also taken, and wolf predation on moose may increase in the future.

The winter browse in many river drainages will be unable to sustain further increases in moose numbers. Along such rivers as the American and Kougarak, overbrowsing is already a problem. Willow forage is limited to annual production, and some stands are overbrowsed to the point that annual growth has been reduced by half. There is ample willow browse in the foothills and higher elevations, but in late winter it is usually unavailable because of deep snows. Unless moose are carefully managed, serious range deterioration is likely, with long-term detrimental effects on moose populations.

Moose were unavailable to local hunters until recent years, and consequently they traditionally have not been hunted by natives residing in coastal villages. Recently, however, villagers, including those that have historically depended on marine mammals and caribou, are placing greater reliance on moose for meat. The importance of moose for domestic use and for recreational hunting will undoubtedly increase.

The reported annual kill for the Seward-Kobuk-Noatak area has averaged about 140 moose in past years but recently has exceeded 200. The actual number killed is probably much higher, but the number is uncertain because of noncompliance with harvest reports. The total harvest is estimated at 600 or more annually. Longer seasons in 1973 and 1974 with liberal antlerless seasons resulted in greater hunter participation and larger harvests. Local residents kill 90 percent or more of all moose taken. More than 50 percent of the moose harvested on the Seward Peninsula are taken from one of three roads radiating from Nome. Road-based hunters take moose primarily in the drainages of the Kuzitrin, including the Kougarak, Pilgrim, and Moxapaga Rivers. Hunters also use the middle Kiukluk River for access. The most prevalent hunting method is to search for game while driving along roads. Off-road vehicles and river boats are also becoming popular as means of access. Hunters using aircraft (most based in Nome or Kotzebue) take about 20 percent of the harvest generally in areas inaccessible by other means. Aircraft hunters usually take moose from the upper Kiukluk or American Rivers on the Seward Peninsula and from the Noatak River or Kobuk tributaries north and west of Kotzebue. Boat hunting is popular on the major river systems and half or more of the harvest is taken in this manner.

Most moose are killed from August through September prior to freeze-up. When access becomes more difficult with the approach of winter, the kill drops off sharply. A few moose are taken after November with the aid of snowmachines, but interest is not high because many residents do not find moose palatable after the onset of the rut. Although hunters are currently removing about 15 percent of the total population, hunting pressure is not evenly distributed throughout the area. Where access is difficult, hunters are taking less than 5 percent of the population. In other areas where access is easier, the harvest may be as high as 30 percent.

PROBLEMS

- * Accurate harvest data are lacking in many areas because of non-compliance with the harvest ticket reporting. The Department must convince regional and village leaders that knowledge of actual harvest levels is necessary if their domestic needs are to be met. The Department should promulgate an active information program to publicize the need for compliance with game regulations.
- * Although moose are currently under-harvested in most areas, overharvest may occur in the future due to their vulnerability to hunters transported by snowmachines after freeze-up. If necessary the

Department will recommend restrictions on methods of hunter transport to avoid localized overharvests.

- * A portion of the area has been nominated for inclusion under federal management by one of four federal resource agencies. Hunting or access for hunting may be limited or prohibited on some of these federal lands. The Department should work closely with the various federal agencies to develop cooperative mutually acceptable management programs.

IMPACTS

- * Concentrations of hunters in accessible areas may occur.
- * The proportion of large-antlered moose in the area will decline.

6. UPPER NOATAK-KOBUK MOOSE MANAGEMENT PLAN

LOCATION

That portion of Game Management Unit 23 which includes the drainages of the Noatak River above its confluence with Maiyumerak Creek and the drainages of the Kobuk River above its confluence with the Mayneluk River.

PRIMARY MANAGEMENT GOAL

To provide an opportunity to hunt moose under aesthetically pleasing conditions.

SECONDARY MANAGEMENT GOAL

To provide an opportunity to take large-antlered moose.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control the number and distribution of hunters, if necessary, to maintain aesthetic hunting conditions.
2. Maintain a post-hunting season population sex ratio of approximately 40 or more bulls per 100 cows.
3. Maintain the moose population slightly below the carrying capacity of the habitat.
4. Harvest antlerless moose, if necessary, to maintain the population at desired levels.
5. Habitat in selected areas may be manipulated to increase its carrying capacity for moose.
6. Oppose land use practices that adversely affect the wild character of the area.

THE SPECIES

Recent historical records indicate moose were absent in the area prior to 1930. The first animals probably emigrated from the Yukon River into the upper drainages of the Kobuk and then gradually spread to the Noatak river. They increased in the Kobuk area during the 1960's and appear to have stabilized in the last few years. The Noatak moose population increased more slowly, probably as a result of physical barriers to immigration and lack of suitable winter habitat. The moose population in the Noatak area is probably still below carrying capacity. An aerial survey in the spring of 1975 revealed 128 moose in the upper Kobuk. The following year 98 moose were seen after covering about 1/8 of the upper Noatak. The total moose population in both areas is estimated to exceed 400 animals, and may be as high as 1,000.

Calf production and survival appears reasonably good. Calves slightly less than 1 year old comprised about 19 percent of the spring, 1976 population. The area could probably support a harvest of at least 80 moose per year. Natural mortality factors are not well known. Winter habitat on the Kobuk appears secure due to the diverse distribution of browse species and abundant cover. Winter browse on the Noatak is

generally limited to areas along rivers and streams and is subject to overutilization.

Hunting pressure is light. Less than 40 moose are taken annually despite liberal hunting seasons, which generally extend from August through December. The area could support a substantial increase in harvests with no detrimental effects to the population. Most of moose are probably taken by the use of aircraft, but float trips are popular on the Kobuk and a few are taken in this manner. Most of the harvest occurs during the first two months of the season. However, a few moose are killed by hunters using snowmachines following freeze-up. Due to the area's remoteness, few meat hunters use the area on a regular basis. Most of the annual harvest is taken by recreational hunters.

PROBLEMS

- * Most of the area has been nominated for inclusion under federal management by one of four resource agencies as provided for by the Alaska Native Claims Settlement Act. These federal agencies may prohibit or restrict hunting. The Department should attempt to establish a close working relationship with federal agencies to develop cooperative, mutually-acceptable management agreements.
- * Accurate data are lacking on population size, composition, annual recruitment and predation losses on which management decisions can be based. The Department should obtain initial baseline data as soon as possible and monitor the area regularly.
- * Much of the area is inaccessible, and it will be difficult to obtain a uniform distribution of hunters. If the area is to retain its undeveloped character, this problem will unavoidably persist. Construction of limited access landing strips may be considered by the Department if crowding of hunters at existing points of access or localized overharvests of large bulls occur.

IMPACTS

- * Local domestic hunters will be more restricted seasonally in their use of the resource, and they will be competing with hunters from other areas of the state.
- * Hunting pressure and annual harvest are likely to increase.

9. NOME AREA MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Unit 22, all drainages into the Bering Sea west of Solomon on the south, and west of the White River drainage into the Imuruk Basin on the north.

PRIMARY MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy moose.

SECONDARY MANAGEMENT GOAL

To provide for an optimum harvest of moose.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Increase the moose population to the carrying capacity of the habitat.
2. Encourage public viewing of moose and enhance viewing facilities.
3. Allow limited harvests of moose when not in conflict with viewing and photography.
4. Discourage land use practices that adversely affect moose habitat.

THE SPECIES

Moose were scarce or absent in the Nome area prior to the 1930's. Since then a few animals have immigrated from adjacent regions, but numbers are still low due to limited habitat. The 1976 overwintering population in the area was 50 moose or less; more animals may be present during summer. The moose population consists primarily of young animals, and females considerably outnumber males.

Most hunting in the area occurs along roads, usually as a secondary activity or while hunters are enroute to other hunting areas. The annual kill has averaged 20 animals or less. Despite the low number of moose, this area is hunted intensively because it is so close to Nome. Most moose are taken after September 1.

Nome is visited by a large number of tourists during summer, and many are avidly interested in viewing wildlife. Viewing and photography are important uses whenever moose are accessible along the road system and reported locations of animals may attract scores of people.

PROBLEMS

- * As development of petroleum and mineral resources occurs, the human population will increase with a resulting loss of valuable habitat. Comprehensive land use planning should be initiated to encourage orderly development and allow for protection of critical wildlife habitat.
- * Nonconsumptive use will probably increase, with impacts of disturbance and harassment of wild animals. Regulations controlling periods and duration of use as well as activities during use may be required.

- * Community residents may find it difficult to value a viewing area when most are predominately hunters. Considerable noncompliance with regulations that prohibit hunting may result. The Department should publicize positive benefits of the area and increase contacts with hunters in the field.

IMPACTS

- * Short hunting seasons during winter will reduce the opportunity for local residents to hunt in the area.
- * Moose density and the proportion of bulls in the population should increase.
- * An area where people can readily view moose will attract increased use by tourists and residents and may increase revenues to the local economy.

10. GRANITE MT. MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Units 22 and 23, the drainages of the Koyuk River above its confluence with Willow Creek, the drainages of the East Fork of the Koyuk River above its confluence with the Koyuk River, the drainages of the Buckland River above its confluence with Kilulikpuk Creek; the drainages of the Tagagawik River upstream of latitude 66° 10' 7".

PRIMARY MANAGEMENT GOAL

To provide an opportunity to hunt moose under aesthetically pleasing conditions.

SECONDARY MANAGEMENT GOAL

To provide an opportunity to take large-antlered moose.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access and methods of transport, if necessary, to maintain aesthetic hunting conditions.
2. Control the number and distribution of hunters to distribute hunting pressure through the area.
3. Maintain the moose population below the carrying capacity of the habitat.
4. Maintain a post-hunting season population sex ratio of approximately 40 or more bulls per 100 cows.
5. Harvest antlerless moose, if necessary, to attain the desired population size and structure.
6. Oppose land use practices that adversely affect moose habitat.

THE SPECIES

The Granite Mountain moose population evidently originated from animals that immigrated to the area during the 1930's from drainages of the Yukon River. The population increased in subsequent years, reaching its greatest density during the early 1960's. Moose currently occupy all suitable habitat in densities approaching the maximum that the range can sustain. Aerial surveys in the spring of 1975 indicated at least 400 and possibly more than 600 moose occupy the area. Calf production and survival through the first year has been good; surveys indicate about 20 percent of the population is slightly less than 1 year old. Antler growth is rapid; bulls 6 years old often carry antlers with a spread of 60 inches. Nearly half of the bulls carry antlers with 40-inch spreads or larger. Rapid antler growth and a high proportion of young animals generally indicate excellent range condition. Moose winter habitat is restricted to major river valleys in the area and overbrowsing has occurred locally. Predators are scarce and are probably not causing significant moose mortality.

Moose harvest levels can only be estimated, but hunting pressure on the Granite Mountain moose population is low. No more than 50 moose are taken by hunters annually; calf production and survival rates indicate

the population could sustain a harvest of at least 100 animals per year. Most moose are taken along rivers prior to freeze-up by hunters using light aircraft for transportation. Most animals are taken along the Buckland and Koyuk Rivers; the Tagagawik River is relatively inaccessible and seldom hunted. Shallow water generally precludes river boat travel. Residents of Buckland, Koyuk and Selawik occasionally hunt moose using snowmachines after freeze-up, but few animals are taken since the meat is considered less palatable after the breeding season.

PROBLEMS

- * The recreational hunting harvest may be too limited to control moose numbers and may lower the bull:cow ratio to an undesirable level. The Department may recommend addition of winter hunting seasons to achieve management goals.
- * Much of northwestern Alaska contains substantial mineral deposits, and a number of mining companies are currently exploring in the Granite Mountain area. Exploration and subsequent development of mineral resources could result in unaesthetic hunting conditions. The Department should monitor mining activities and provide guidelines to minimize adverse impacts.
- * A portion of the Granite Mountain area may be transferred into one of the four national resource systems as provided for by the Alaska Native Claims Settlement Act. Federal administrators may establish management policies different from this proposed plan. The Department should attempt to develop cooperative management programs with the appropriate federal agency.

IMPACTS

- * The proportion of bulls with large antlers should increase.
- * Hunting regulations will reduce the freedom of use to which local residents are accustomed.
- * Management under the proposed goals may attract additional use by residents from other parts of the state.
- * Domestic requirements of local residents will be satisfied during late-season hunts when restrictions effective during earlier aesthetic hunts are relaxed.

MUSKOXEN IN NORTHWESTERN ALASKA

Populations of muskoxen (*Ovibos moschatus*) in Northwestern Alaska are limited to the Seward Peninsula and to the coastal area in the Cape Thompson-Pt. Hope vicinity. This species, extirpated from its original range on Alaska's Arctic Slope in the mid 1800's was reintroduced into Alaska with a transplant of 31 Greenland muskoxen to Nunivak Island in 1935 and 1936. The purpose of the transplant was to provide a nucleus herd from which muskoxen could be taken to reestablish populations over their historic ranges in Alaska, as well as to provide for recreational, scientific and agricultural utilization of the animals.

In March 1970, 72 muskoxen were transported from Nunivak Island to Northwestern Alaska and released, 36 on the Seward Peninsula near the Feather River and 36 at Cape Thompson. The animals released on the Feather River divided into small groups and remained in the general area of the release for several months and then started a northward movement. By 1974 most of these muskoxen had established themselves on the northern part of the Seward Peninsula between Teller and Shishmaref. These animals have apparently divided into two main groups, one of about 12 animals using the area between Brevig and Wales, the other of about 17 animals occupying an area near Ear Mountain. Observations indicate that several other smaller groups and a few single animals may be in this area. By 1974 it appeared that these animals were holding their own with no apparent increase in numbers.

Less is known about the animals released at Cape Thompson. This vast and remote area is difficult to survey. A few observations by Eskimos at Pt. Hope and Kivalina placed this herd at about 17 adults and 3 calves by 1974. Four of these animals were sighted near Kivalina, the remainder in the Pt. Hope area. In 1976 the population numbered 25 animals.

PROBLEMS

Predation by wolves and brown bears may be a factor in preventing the increase of these small nucleus populations of muskoxen.

2. NORTHWESTERN ALASKA MUSKOX MANAGEMENT PLAN

LOCATION

All of Game Management Units 22 and 23.

MANAGEMENT GOAL

To provide an opportunity to hunt muskoxen under aesthetically pleasing conditions.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Establish a viable population of muskoxen on mainland Alaska ranges.
2. Allow removal of bull muskoxen that are in excess to those required for continued population expansion.
3. Control access, number and distribution of hunters and methods of hunter transport to maintain aesthetic hunting conditions.
4. Encourage scientific studies of muskoxen.

THE SPECIES

Muskoxen were introduced into the area in 1970 when 36 animals were released near the Feather River on the Seward Peninsula and an additional 36 muskoxen were released near Cape Thompson, southeast of Pt. Hope. Success of the transplants was hampered by several factors. Most of the animals were immature and therefore not immediately capable of producing young. The absence of older animals also reduced potential herd stability. At the time of release holding pens were not available, consequently the muskoxen had no opportunity to become conditioned to their surroundings nor to form any sort of herd bond; many animals wandered off by themselves. Of the original 72, nearly half disappeared. At least one was killed by a grizzly bear and four others fell through ice and drowned.

Muskoxen have become established in two areas. In 1976, one herd to the east of Pt. Hope contained 25 animals; the second, on the western end of the Seward Peninsula contained 30 muskoxen. Taking into account stragglers that have been reported at other distant locations, the total estimated population may exceed 70 animals. Approximately 25 calves have been produced since the introduction, but attrition seems to nearly equal reproduction. Although it appears the introduction may be successful, additional transplants are planned to boost the population above the critical "threshold" level.

Presently there is no legal hunting of muskoxen allowed in the area and none is likely for the next few years. Use of muskoxen for the most part has been limited to viewing by local residents who are curious about the unfamiliar animals. Initially, use of snowmachines to approach muskoxen contributed to the wide dispersal of the animals. At least two muskoxen were killed by hunters when they were apparently "mistaken" for some other animal, one near Kiana in 1972 and one near Selawik in 1975. Until the muskox population attains a sufficiently large size to support hunting, nonconsumptive uses will predominate.

PROBLEMS

- * Conflicts arising from range utilization by both muskoxen and reindeer may occur as the muskox population increases. Reindeer herding occurs throughout most of the Seward Peninsula. If conflicts between muskoxen and reindeer occur, interactions between these species may be reduced by close cooperation between the Reindeer Herders Association, the Department, and federal agencies responsible for allocating use of public lands.
- * Opposition to hunting of muskoxen may be expected from people who view the muskox as a rare species requiring complete protection or who question the aesthetics of hunting muskoxen and from people who would prefer to domesticate muskoxen for use in cottage industries. Hunting of muskoxen is a beneficial and justifiable use, the value of which has been demonstrated with Nunivak Island muskox. Domestication of muskoxen as the sole use of the species or in situations which may interfere with management of wild muskox populations will be opposed by the Department.
- * The lack of natural barriers to movement of muskox over large areas coupled with the small size of the population causes fragmentation of groups and consequent decreases in reproductive performance of the population. Losses to natural mortality may also increase with fragmentation of groups.

IMPACTS

- * Eventual expansion of muskox populations over former historic ranges is anticipated and will be encouraged.
- * An opportunity to participate in recreational hunting of muskoxen in Northwestern Alaska will be available to the public for the first time in this century.

FURBEARERS IN NORTHWESTERN ALASKA

All species of furbearers*** common to Alaska occur in the Northwestern Region. Mink, otter, muskrat, and red and arctic foxes reach high levels of abundance in this region. Wolverine, lynx, beaver, marten and other species common to upland and alpine habitats are less abundant than in other northern Alaska areas. Coyotes are uncommon to rare in much of the region and do not inhabit the western portions of the Seward Peninsula or the lower portions of the Noatak, Kobuk, and Selawik River systems. Beaver and lynx populations are expanding their historical ranges in the region, with beaver moving into the northern portion of the region and lynx becoming established on the Seward Peninsula. The Noatak, Kobuk and Selawik floodplains are noted for their high quality mink and muskrat. Furbearers on St. Lawrence Island are limited to arctic foxes and ground squirrels.

Little overall change in furbearer habitat has occurred in Northwestern Alaska. Some long-term climatic change may be affecting vegetation, as reflected in expanding distributions of moose, beaver and snowshoe hares. Wildfire has had relatively little influence in this region although portions of the Kobuk and Selawik valleys have burned. Mining activities have affected some riparian habitat on the Seward Peninsula. Effects of mining activities on furbearers are unknown. Most of the region is highly mineralized and future habitat disturbance seems inevitable.

Most human use of furbearers in this region is consumptive. The degree of use varies with the abundance, market value, and traditional utilization of various furbearer species. Relatively high human use appears to be limiting wolverine density and distribution. In addition to high pelt prices, wolverines are valued for local use in the manufacture of parka ruffs. In recent years high market prices have led to intensive trapping of arctic and red foxes. By contrast, relatively poor market conditions and a general decrease in dependence upon furbearers as a source of income have led to minimal harvests of mink and muskrats. Long established traditions, market conditions and trapping regulations have limited the use of furbearers to the season from October to May when pelts are prime, although some species are taken at other times. Beaver are used for food as well as fur, and may be taken when pelts are not prime. Squirrels have also been used for food and garments, but are unavailable in the winter.

Some viewing and photography of furbearers occurs in the region, primarily by tourists. Arctic and red foxes, and ground squirrels provide for the majority of nonconsumptive use.

PROBLEMS

- * Pressure to ban leg-hold traps has come about as a result of public awareness of the inhumane potential of these devices when improperly set and infrequently checked. Prohibitive legislation may result in the loss of important commercial and recreational utilization of the furbearer resource. The Department should promote efficient and humane trapping methods to ensure the opportunity to participate in trapping.
 - * Outbreaks of rabies in foxes periodically endanger humans and domestic animals. Increased development and the attendant influx of people to the region will result in greater potential contact with foxes. Increased trapping or control efforts around population centers and development sites may be necessary. Public education is needed to inform people of the hazards of rabies.
- *** A list of furbearer species considered in these plans follows this regional account.

- * An expanding beaver population in the region may impact on the fisheries resources by creating barriers to movements of spawning fish. Problem areas will need to be identified and trapping efforts encouraged in such areas to minimize conflicts with fisheries.
- * Underharvested furbearer populations are a significant economic loss to the area. Efforts to properly utilize all furbearer populations could provide substantial benefits.
- * The proliferation of reindeer grazing may stimulate the demand for fox control. The influence of foxes on reindeer fawn survival should be evaluated to establish criteria for control efforts.

LIST OF FURBEARERS IN NORTHWESTERN ALASKA

	<u>Common Name</u>	<u>Scientific Name</u>
Canids	Coyote	<i>Canis latrans</i>
	Red Fox	<i>Vulpes vulpes</i>
	White (Arctic) Fox	<i>Alopex lagopus</i>
Felids	Lynx	<i>Lynx canadensis</i>
Mustelids	Mink	<i>Mustela vison</i>
	Land Otter	<i>Lutra canadensis</i>
	Marten	<i>Martes americana</i>
	Wolverine	<i>Gulo gulo</i>
	Weasel	<i>Mustela erminea</i>
Rodentia	Beaver	<i>Castor canadensis</i>
	Muskrat	<i>Ondatra zibethicus</i>
	Snowshoe Hare	<i>Lepus americanus</i>
	Arctic Hare	<i>Lepus arcticus</i>
	Marmot	<i>Marmota caligata</i>
	Red Squirrel	<i>Tamiasciurus hudsonicus</i>
	Ground Squirrel	<i>Citellus parryi</i>

1. GREATER ALASKA FURBEARER MANAGEMENT PLAN

LOCATION

Entire state except Game Management Units 7, 14 and 15 and national parks or other areas closed to all hunting and trapping.

PRIMARY MANAGEMENT GOAL

To provide for an optimum harvest of furbearers.

SECONDARY MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting and trapping furbearers.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Promote efficient and humane trapping methods.
2. Maintain trapping seasons and bag limits during periods of pelt primeness, consistent with population levels.
3. Maintain hunting seasons on selected furbearer species, with seasons not necessarily limited to the period of pelt primeness and with restrictive bag limits.
4. Maintain restrictive trapping seasons and bag limits on beaver based upon current beaver population levels.
5. Encourage proper preparation and handling of furbearer pelts to maximize fur values.
6. Close areas well suited for viewing and photography of furbearers to hunting and trapping or otherwise restrict use, if necessary.
7. Discourage land use practices that adversely affect furbearer habitat.

THE SPECIES

The species of furbearers addressed in this plan include wolverine, marten, mink, beaver, muskrat, lynx, land otter, coyote, red and arctic foxes, short-tailed and least weasels, arctic ground squirrel, red squirrel, marmot and raccoon. The wolf has been treated separately.

Many of these species have wide distribution in the state; consequently most are represented to some extent any given area. The arctic slope, the Aleutian Islands, and many islands in the Bering Sea, the northern Gulf of Alaska, and Southeastern Alaska have relatively few species present although large numbers of any one species may occur. On a number of islands furbearers are present as a result of past introductions from fur farming or from efforts to establish harvestable populations. Each individual species may vary in abundance according to habitat preferences and availability of food. There is little information available on numbers, distribution, or utilization of the various species. Much of what is known is acquired from fur export reports, some field observations and reports from trappers.

Furbearer population levels and trends depend primarily on the abundance of food. Most species such as wolverine, otter and beaver rely on a

variety of prey species or on a relatively stable vegetative food source are less subject to fluctuations than those furbearers such as lynx and arctic fox are dependent on a single or only a few prey species. At times diseases cause significant reductions in furbearer populations. Rabies, mange, and distemper affect fox populations, beavers are subject to endemic hemorrhagic disease, and in Southeastern Alaska, nutritional steatitis affects those mustelids that feed on rancid fish fat. Those species which occupy aquatic or riparian habitats, particularly beaver, muskrat, and mink are subject to flooding or "glaciering" conditions. A number of the smaller furbearers including weasels, muskrats, squirrels, and marmots are prey to larger furbearers or other mammalian and avian predators.

Commercial and domestic utilization are the most important uses of furbearers in much of Alaska. Some recreational trapping and nonconsumptive use occurs near urban centers, but viewing and photography are limited to relatively few species whose habits provide opportunities for observation. Most furs are sold but some are retained for domestic use in parkas, mukluks, or as trim for garments. Wolverine, muskrat, and beaver are the species most used in the domestic manufacture of garments, but almost all species are utilized to some extent, particularly when the furs are not in prime marketable condition. Beaver, muskrat, ground squirrels, and to a limited extent lynx and red squirrels are also used as human or dog food.

Furbearer trapping seasons and bag limits have remained relatively unchanged since statehood. Seasons have generally been timed to coincide with periods of pelt primeness. Liberal seasons and bag limits have had little effect on populations of most species of furbearers except for small localized areas of overharvest associated with ease of access. The vulnerability of beavers to intensive trapping and that of wolverines in tundra regions to tracking by snowmachine has resulted in depressed populations of these species in some areas. In most areas of the state and for most species harvests are regulated primarily by abundance and availability of furbearers, and by market values. At low levels of abundance or in inaccessible areas, trapping effort usually ceases when it becomes unprofitable; then the high reproductive potential of most species rapidly restores populations to carrying capacity. Trapping is done primarily to supplement income derived from other sources. Few full-time professional trappers operate in the state.

Snowmachines are the most commonly used mode of transport for trapping or hunting furbearers, although aircraft are also used extensively. Snowmachines are the standard means of transport at all bush communities and provide rapid and efficient coverage of large areas surrounding settlements. Aircraft are useful for trapping in areas far from human habitation and are also used as an aid in locating and shooting foxes and wolverines from the ground. In Southeastern Alaska, boats are the primary transport means for trappers because most trapping activity occurs along the beach fringe.

Wolverine occur throughout mainland Alaska and on some islands in Southeastern Alaska. Population densities are variable depending on suitable habitat and, in some western and northern areas, on the degree of harvest. Wolverines are most abundant in interior Alaska and least abundant in southcoastal areas. Sparse populations exist over most of Southeastern Alaska, with moderate numbers in the Stikine, Taku, Chilkat, Yakutat and gulf coast areas. Wolverines are generally abundant over the remainder of the state, particularly in forested and alpine habitats. Densities are relatively low on portions of the arctic slope, northwestern coastal tundra areas, and on the Yukon-Kuskokwim Delta.

In comparison to other furbearers, wolverine never attain high densities, due in part to their large territorial requirements and apparently low

reproductive rate. Wolverine have catholic food habits; much of their food is scavenged and a dependable source of carrion may be important in maintaining populations.

More than 800 wolverine are harvested each year by hunters and trappers. Southcentral Alaska and the Yukon River drainage yield the largest harvests with about 250 and 200 wolverine, respectively, taken there. Although sealing (marking) of wolverine skins is required, some skins are used domestically for parkas, ruffs and garment trim and are not reported; consequently, reported harvests are minimum numbers. Trapping is the most common method of taking wolverines in forested areas, such as in Interior and Southcentral Alaska while in the open country of Western and Arctic Alaska or in alpine areas ground-shooting from snowmachines or with the aid of aircraft predominates.

Use of wolverine varies between areas. In Western and Arctic Alaska, most wolverine are in high demand for domestic use in garments and few are sold commercially. Most skins never leave the villages. Coastal villagers acquire pelts by bartering with Interior residents or purchasing from commercial furriers. In Interior and Southcentral Alaska most skins are sold commercially with a few kept for domestic use.

Regulations and remote wilderness areas provide some measure of protection for wolverine populations. Where lack of cover renders the animals vulnerable to tracking with mechanized vehicles, local extirpation may occur, especially near settlements. High prices for pelts and the demand for local use of skins for garments provides continuous incentive to trappers and hunters. In forested areas with relatively low wolverine densities the species is not actively sought and many that are taken are caught in wolf sets.

Marten occur throughout most of the state but are absent north of the Brooks Range, on the Yukon-Kuskokwim Delta, and the Alaska Peninsula. Marten were introduced to Prince of Wales and Baranof Islands in 1934 and to Chichagof and Afognak Islands in the early 1950's; they are abundant on Admiralty Island, but are otherwise absent from most of the islands in Southeastern Alaska, Prince William Sound, and the Kodiak Archipelago. Marten distribution coincides with that of climax spruce forests. Their dependence on mature spruce habitat makes this species particularly susceptible to forest fires and clearcut logging practices. In northern Interior Alaska extensive burns have resulted in reduced populations of marten over large areas. Much good habitat is still present in Interior Alaska, however, and marten are abundant over the area as a whole. Marten populations are lower south and west of Interior Alaska; marten in Western and Southeastern Alaska are less abundant than in past years.

In good marten habitat, population densities may be as high as four animals per square mile. Although males occupy a larger home range than females, neither generally range over an area greater than one square mile, except during the breeding season or in mountainous terrain where marten may undertake seasonal altitudinal movements due to changing food availability. Microtine rodents constitute the main source of food for marten although a variety of prey is utilized, depending on availability. The red squirrel is a minor item in their diet. Berries may be an important food in late summer and fall.

Past marten harvests have fluctuated widely, but in the period from 1962 to 1972 averaged about 8000 per year. In 1973 the harvest increased to about 18,000. The price of marten fur, a primary determinant of trapping effort on the species, increased from \$30 to \$40 per pelt in 1973. Current prices of \$40-50 are incentive for continuing intensive trapping effort. Harvests in Interior Alaska have been relatively low (2000-3000 per year) despite high marten densities; here low trapping effort is

probably a result of the availability of other employment in the area. Currently, Southeastern and Western Alaska have the largest harvests, with each area exporting 4000 or more pelts per year in recent years. Most marten trapped are sold commercially. A few are kept in Western Alaska for domestic use as garment trim and on slippers.

Mink are common throughout the state except for the Kodiak Archipelago, the Aleutian Islands, the off-shore islands of the Bering Sea, and most of the Arctic Slope. Mink are usually associated with riparian habitats - streams, ponds, marshes, and salt water beaches and their diet reflects the variety of food species available there; small mammals, birds, fish, and insects and other invertebrates are eaten. Southeastern Alaska and the northern Gulf of Alaska Coast-Prince William Sound area have relatively stable, high density mink populations, distributed primarily along the coastal fringe where their food supply including a variety of small mammals, marine invertebrates and fish, is diverse and abundant. Mink populations in interior Alaska areas are characterized by lower densities and greater fluctuations than southcoastal populations as a result of seasonal or unstable food sources, and lower productivity of freshwater habitats. Microtine rodent populations typically fluctuate drastically and are a primary factor affecting mink abundance. An abundance of mice or hares in upland areas will sometimes prompt mink populations to expand inland in search of prey.

In 1976, mink population levels were variable over most of Alaska excluding Southeastern. Mink in northern interior areas and in Northwestern Alaska were relatively abundant and increasing. Over most of the remainder of the state, mink were moderately abundant, having declined somewhat from high levels in the mid-1960's. Populations were low in some parts of the central interior such as the Tanana River drainage.

Factors controlling mink population levels are not well known. Food availability is probably the major factor. In some areas spring flooding may reduce populations by drowning young mink in dens. In southcoastal areas nutritional steatitis may be important; it was a significant mortality factor to mink raised commercially in past years.

Traditionally mink have been one of the most important commercially trapped species of furbearers in the state. Reduced pelt prices, increased levels of employment, and availability of welfare, have resulted in reduced trapping effort in many areas in the past decade, and mink are currently underharvested over much of the state. Western Alaska, particularly the Yukon-Kuskokwim Delta, has always been an important mink producer. Delta mink are not only much larger than in other parts of Alaska but they are more uniform in color which, in combination, contribute to consistently higher prices. Large harvests also occur in Southeastern Alaska where climatic conditions are less of a deterrent to trapping than to the north. Elsewhere in the state harvests are variable, depending as much on the abundance of mink as on current market values. In some locations such as near Fairbanks and along the Copper River Highway near Cordova interest in recreational trapping is high despite price or abundance considerations. The majority of trapping effort, however, continues to be commercial in nature. Most mink trapped are sold to outside buyers. A few are retained for use as garment trim on slippers, gloves, hats and parkas.

Beaver are presently distributed over most of mainland Alaska from the Brooks Range south to the middle of the Alaska Peninsula and into Southeastern Alaska. Beaver are rare in much of Prince William Sound, and in Southeastern Alaska are now abundant only in the Yakutat forelands and some of the major mainland river drainages. They are present in low numbers on many Southeastern Alaska islands. In Southwestern Alaska there has been a general decline in the beaver population north of the Kvichak watershed, particularly near settlements. Beaver are abundant in remote areas and are increasing there because of reduced wilderness trapping. Populations are also high and increasing on the Alaska Peninsula and southwest of

the Kvichak watershed. Beaver were introduced to islands in the Kodiak area in the 1920's and are now well established in suitable habitat on Kodiak, Afognak, Raspberry and several other islands. Beaver populations in Interior and Western Alaska are moderate to high and generally increasing except in the lower Yukon-Kuskokwim area where overtrapping has occurred. Very few beavers were present in Northwestern Alaska prior to the 1930's, but since the 1950's the populations there have been increasing and expanding into the Selawik and lower Kobuk drainages.

Distribution and abundance is a reflection of habitat availability except in areas where overtrapping has occurred. The most productive beaver habitat is characterized by a dependable water supply with little fluctuation in stream flow and by willow, aspen, cottonwood, or birch vegetation. Beavers are found from sea level to elevations of 4000 feet; they are absent on treeless tundra bordering the Arctic Ocean and the Bering Sea, and on the Aleutian islands. Populations fluctuate naturally in response to availability of food in localized areas. In some years high water levels force beavers out of lodges where they become vulnerable to predation. Endemic hemorrhagic disease can reduce populations when they attain high densities.

Beavers are unique in the degree to which their presence modifies riparian habitats. Beaver dams stabilize watersheds, reducing flooding and silting. Raising of water tables and impoundment of water alters vegetative cover and provides aquatic and riparian habitat for many species of wildlife. Although some species of fish benefit by increased production of fish food, dams often create serious barriers to spawning anadromous fish.

Beginning with the 18th century Russian fur trade, beavers have been one of Alaska's most important furbearers. Heavy utilization of beaver in early territorial days led to a period of scarcity in the early 1900's, but populations have recovered and are now at moderate to high levels in many areas. Although prices of beaver pelts have not risen as dramatically as other furs, beavers remain an important furbearer in Alaska.

Trapping pressure varies between areas. The largest harvests come from the lower Yukon-Kuskokwim River drainages where about 3500 beavers are taken annually. Trapping is also heavy in the Bristol Bay drainages where more than 1600 beavers are taken each year. A declining salmon industry in that area has resulted in increased trapping effort. Harvests in Interior and Southcentral Alaska are relatively small; poor prices, low limits on take and relatively high employment rates contribute to low trapping effort. Trappers on Kodiak Island annually take about 200 beavers, but the traditional low prices offered for coastal beaver pelts discourages effort there. Southeastern Alaska trappers also take about 200 beavers per year, mostly from the mainland; harvests tend to fluctuate widely between years.

Most beaver trapping occurs near human settlements by local inhabitants. Because beaver are easily overtrapped, concentrated trapping near villages and along road systems results in overharvests and depletion of local populations. This is especially evident in Southwestern Alaska where beaver are five times as abundant in remote locations as compared to areas near villages. The percentage of beavers less than one year old (kits) in the harvest is also indicative of harvest pressure. Up to 30 percent of the harvest near some Southwestern and Western Alaska villages are kits, as contrasted to 10 percent kits or less on the average in more remote areas.

Beavers are trapped mainly for commercial use, but in some areas such as Western and northern Interior Alaska they are also used for human and dog food. Pelts, particularly those from kits, may be used domestically for garment trim on hats, mittens and slippers. Beaver castors are used as a perfume base and are valuable to trappers as a component of scent lures.

Beavers are one of the few furbearer species that provide for nonconsumptive use. Much viewing and photography take place not only near the larger human settlements, but also in "bush" areas.

Muskrats occur throughout all of the Alaska mainland south of the Brooks Range except the Alaska Peninsula west of the Ugashik Lakes. The species was introduced to Kodiak Island in 1929 and later to Afognak and Raspberry Islands, but is absent from most other Alaskan islands. The densest muskrat populations are found in five areas: the Yukon Flats surrounding Fort Yukon, Minto Flats, Tetlin Lakes, the Yukon-Kuskokwim Delta and the Selawik-Kobuk-Noatak area. Four fifths of the annual muskrat harvest comes from these areas. Muskrat abundance elsewhere in the state varies depending on localized wetland habitat conditions. In Southeastern Alaska, muskrats have never been abundant and are currently present in fair numbers only near Haines, Juneau, and the Stikine River. Muskrats were once very abundant on the Copper River Delta but are now relatively scarce throughout the northern Gulf of Alaska coast. Populations over most of the remainder of the state are generally at moderate levels, down from higher densities of past years.

Muskrats are vulnerable to unfavorable weather conditions affecting their wetland habitat. Populations are reduced by winter kill when the ice becomes too thick and animals are forced into limited forage areas or emigrate. In years of heavy snow, muskrats are flooded out in the spring. Losses to predation and starvation increase under such situations. Reduced muskrat populations in many areas of Alaska can be attributed to adverse winter and spring conditions of recent years.

Hunting and trapping have relatively little effect on muskrat populations. The species is highly productive (about 15 young produced annually per adult female) and capable of repopulating depleted habitats rapidly. Heavy harvests can be sustained if habitat conditions remain good. A relatively small proportion of the total good muskrat habitat is hunted or trapped, usually only areas of high density populations within three or four miles of major streams and lakes. Unhunted areas act as reservoirs of breeding stock.

Although the open season for harvesting muskrats extends from November into June, most are taken in the last six weeks of the season. Eighty percent or more of the muskrat harvest is taken by shooting with small caliber rifles; trapping is usually considered too time consuming.

In the 1950's, muskrats ranked first in numbers of furbearers harvested in Alaska, and was among the first four in total value. Low prices combined with increased employment and availability of welfare are responsible for current greatly reduced harvest efforts, although recent pelt price increases may increase harvests. Most muskrats are taken for commercial sale of fur, but some are utilized domestically for food and for parkas and trim on boots and slippers. In Western and Northwestern Alaska domestic use exceeds commercial use. In northern Interior Alaska muskrats are an important food in the spring. Muskrats also provide some nonconsumptive use, particularly near human population centers to which they readily adapt, but observation of muskrats is much less than that of the more conspicuous beavers.

Lynx occur throughout Alaska except on the Aleutian Islands, the islands Lynx are relatively uncommon along the northern Gulf Coast and in Southeastern of the Bering Sea and some of the islands of Prince William Sound and Southeastern Alaska. The lynx is primarily an inhabitant of the northern boreal forest where it feeds largely on snowshoe hares. It occasionally occurs on the tundra beyond treeline, and in starvation years it ventures

far out onto the tundra in search of arctic hares, lemmings, and ptarmigan. Lynx are relatively uncommon along the northern Gulf Coast and in Southeastern Alaska, being present on the larger river systems where they have emigrated from interior populations.

Population estimates are not available but lynx were very abundant over much of their range in Alaska from about 1971 to 1974. Currently lynx are present in low numbers and are still declining. Like snowshoe hares, lynx populations fluctuate greatly with a 10-year periodicity in abundance. The amplitude of lynx population fluctuations is very great as indicated by records of exported pelts. Population highs are not synchronous throughout Alaska and broad two to four year peaks of catch probably reflect consecutive population peaks in different areas. In increasing lynx populations the females breed in the first year of life and almost 100 percent of the females conceive. Large litters and high survival of kits is common. After snowshoe hare populations decline, female lynx may not breed during their first year, the number of kits produced is reduced, and those kits that are born have low survival rates.

Lynx fur has again become popular for parkas, coat trim, jackets, hats and muffs after a long period of unpopularity. High prices in recent years have resulted in intensive trapping effort. Harvests during the recent period of peak abundance were about 2000 to 2500 annually, half of which came from Interior Alaska. Trapping effort is centered around villages and along road systems and the majority of the harvest is by local residents. Most pelts are sold but some are kept for domestic use. The meat is edible and is occasionally used for human and dog food.

Land otters are most abundant in the Southeastern Alaska and Prince William Sound coastal regions, and in the Yukon-Kuskokwim Delta, although they are found throughout the state except on the Aleutian Islands, islands of the Bering Sea, and the arctic coastal plain east of Point Lay. Land otter populations are relatively stable, especially in coastal areas where marine food is always abundant. Shellfish, crustaceans, insects, fish, frogs, birds, small mammals and vegetable matter are all eaten. Parasites and disease are not normally important mortality factors. Flooding in the spring sometimes drowns young otters in dens.

Land otters are probably utilized more in the Southeastern and Southcentral coastal areas than in Interior Alaska. Overtrapping is usually not a factor affecting populations, but temporary reductions in local populations can be effected by an efficient trapper. From 1000 to 2000 land otters are taken annually, most near villages or communities in Southeastern Alaska, Prince William Sound and the Yukon-Kuskokwim Delta. Land otters are an important furbearer on the Kodiak Archipelago where 200-250 are taken and sold locally. Pelt prices affect trapping effort because otters are difficult to catch and to skin. Most otter hides are sold commercially, but in the Northwestern area they are often used domestically for trim on garments and slippers. Otter hides that are used domestically are usually those which are taken late in the season and are less than prime. Land otters often provide excellent viewing opportunities, especially around coastal towns where they are often seen in the harbors.

Coyotes apparently first arrived in Alaska about 1915. A rapid population expansion occurred, with the center of abundance first in the Tanana Valley around 1930 and later in Southcentral Alaska. At the present time coyotes occur as far west as the Alaska Peninsula and the north side of Bristol Bay, and are rare north of the Brooks Range. While not especially abundant, coyotes are common in many areas, particularly in the drainages of the Tanana, Copper, Matanuska and Susitna Rivers, and on the Kenai Peninsula. Populations may become locally abundant periodically.

Although snowshoe hares may be important prey in some areas and at certain times, coyotes are catholic in their food habits. The diversity of their foods and their adaptability to a variety of habitats including those affected by man are probably factors which have allowed them to compete successfully against indigenous wolf populations.

Relatively few coyotes are trapped and those which are taken are usually caught incidental to trapping for fox, lynx, and wolf. A few coyotes are taken by sport hunters. Most coyotes are sold commercially. Some are used for parka ruffs and mittens. Prior to 1969 there was a statewide bounty of \$30 for coyotes. No bounties have been paid since 1969.

Red foxes occur over the entire state except for some of the islands of Southeastern Alaska and Prince William Sound. The species is native to Kodiak Island but on many of the other islands where it occurs it was introduced by fox farming operations in the early 1900's. Red foxes are most abundant south of the arctic tundra although they are present in Arctic and Northwestern coastal tundra regions where their distribution overlaps that of arctic foxes. The best red fox habitat appears to be in Interior Alaska and on the coastal areas south of Norton Sound, including the Alaska Peninsula. Red fox populations along the northern Gulf of Alaska coast and in Southeastern Alaska are sparse, with most foxes occurring in the major mainland drainages which connect to interior areas.

Red fox populations fluctuate in response to availability of food. Fluctuations of snowshoe hare and rodent populations will cause the fox populations to fluctuate also. Fox populations in interior areas of the state are currently declining due to low hare numbers. In coastal areas such as Kodiak Island and the Alaska Peninsula, red foxes feed on carrion on the beaches and are not so dependent on small mammal populations; populations in these areas are therefore more stable. Fox populations are affected by diseases such as rabies, mange and distemper.

Red foxes are one of the more important furbearers in the state. In the last two to three years the value of their pelts has increased greatly, which may result in increased trapping pressure; however, foxes are probably not overtrapped anywhere in the state. The estimated red fox harvest in 1973-74 was 14,580.

Silver and cross foxes, color variations of the red fox, are in high demand for wall mounts. Most red foxes taken are sold commercially, but some are used domestically for garments including parkas, ruffs, hats, and trim. In some areas such as McKinley National Park, the North Slope Haul Road and other roads and trails, red foxes provide substantial enjoyment to viewers and photographers. The species readily becomes accustomed to the presence of humans and once so conditioned can be observed at close range.

Arctic or white foxes are found in Alaska along the coast from the Aleutian Islands north. On the mainland (except the lower Alaska Peninsula) and St. Lawrence and Nunivak Island the white color phase predominates while on the Pribilofs and most of the Aleutians west of Unalaska, the blue phase predominates. Blue foxes were transplanted to the Pribilofs, Aleutians and many other islands.

Arctic foxes are noted for their extreme fluctuations in population levels. Periodic peaks in arctic fox populations occur approximately every four years in Alaska, Canada and Greenland and are tied to cyclic fluctuations in small rodent abundance. Arctic foxes have a high reproductive potential, breeding at one year of age and averaging four to eight pups

per litter. Apparently there is a reduced production of pups during periods of food scarcity. Studies in Canada show that mean litter size varied directly with lemming numbers. Although microtine rodents are the primary prey, arctic foxes are highly efficient predators on the eggs and young of waterfowl, and are an important factor governing the nest locations of seabirds.

Considerable variation exists in the yearly harvest of Alaskan arctic foxes. Since pelt prices have remained relatively stable the size of the annual harvest has been most affected by cyclical abundance of foxes. The average annual harvest between 1912 and 1963, (derived from the number of furs exported) was 4,072 white fox pelts. Between 1968 and 1974 the annual harvest averaged 2,369 pelts. Arctic foxes are the most important furbearer north of the Brooks Range because they are the only furbearer that occurs in large numbers. Approximately 40 percent of the arctic fox harvest comes from the arctic slope. The highest catch per unit of area, however, comes from the Bering Sea islands where about 30 percent of the harvest is taken. Most Alaskan white fox furs are sold and utilized outside of Alaska.

Short-tailed weasels, also known as ermine, are present throughout Alaska except for the Aleutian Islands west of Unimak Island and the offshore islands of the Bering Sea. Least weasels, have a similar range except that they are not found in Southeastern Alaska south of Glacier Bay, the mountains in the southeastern corner of Southcentral Alaska, nor on Kodiak Island. The ermine favors wooded or brushy terrain with some topographic relief whereas least weasels prefer damp, marshy habitat with its high microtine populations. Ermine are seldom numerous anywhere within their range. The smaller least weasel is sparsely distributed throughout its range except in some years of peak rodent populations.

Weasels are voracious predators that take a variety of rodents, young snowshoe hares, young birds, eggs, fish and earthworms. When live prey is scarce weasels utilize carrion and berries or other vegetable matter. Weasels are not selective among prey species but take them in direct proportion to their abundance and availability. Weasels in turn fall prey to raptors and other carnivorous furbearers.

Most weasels are now taken incidental to trapping for other species. Weasel pelts are sold although their value is low. Some skins are used for trim on parkas and slippers and in the manufacture of tourist items.

Arctic ground squirrels are found in well drained tundra areas throughout Alaska from sea level to the uplands. They are most abundant in mountainous terrain. Ground squirrels live in colonies where there are loose soils on well-drained slopes, vantage points from which the surrounding terrain can be observed, and bare soils surrounded by vegetation in early stages of succession. Colonies in high areas or well drained slopes are least affected in the spring by water from melting snow. Hibernation protects ground squirrels from the low temperatures of winter, and lasts as long as seven or eight months. Ground squirrels feed on a variety of food including seeds, roots and bulbs, plant stems and leaves, mushrooms, insects, carrion and bird eggs. Quantities of seeds and vegetation are stored in underground chambers. Ground squirrels are an important food source for raptors, weasels, foxes, wolverines and grizzly bears.

Residents of the Arctic Slope, northern Interior Alaska, and Northwestern Alaska trap, snare and shoot ground squirrels and use them for food and parkas. Ground squirrels are an important food supplement for these people in the spring soon after the squirrels emerge from hibernation. Local residents extract fat and oil from squirrels by boiling and eat the fat along with the lean meat of other animals. Elsewhere in the

state, utilization of the arctic ground squirrel fur is much less than other furbearers. Nonconsumptive use of ground squirrels occurs in alpine areas but except for park areas and upland campgrounds, observation of ground squirrels is usually incidental to other outdoor activities.

Red squirrels are found over most of Alaska where white spruce are present. These squirrels are abundant in the Interior, especially along river bottoms with abundant stands of white spruce. They are highly dependent on white spruce seeds as a food source; squirrel populations fluctuate in response to spruce cone abundance, with sharp declines when spruce cone failures come in consecutive years. Squirrels will utilize spruce buds in winters when there are no cones, but there may be severe attrition in the squirrel population. Red squirrels may have some effect on the scattering of spruce seeds, aiding reforestation.

Red squirrels are prey for a variety of predators including marten, fox, lynx, and many raptors. They are also hunted and trapped by man, mostly for recreation, with some utilization for food, fur, and trap bait. Some are taken in traps set for other species. The hides are worth about 50¢ to \$1.50 each and the fur harvest is insignificant. Many red squirrels are shot as nuisances around human dwellings as they can be destructive to insulation if they gain access to a building. Red squirrels are one of the most commonly observed small mammals in Alaska. Viewing and photography are significant uses in campgrounds, waysides and other recreation sites.

Northern flying squirrels are a relatively little-known species which inhabits the boreal forest in Interior, Southcentral, and Southeastern Alaska. The species is rarely seen due to its nocturnal habits. Flying squirrels eat a variety of seeds, fruits, and other vegetable material and scavenge on carrion. This proclivity for meat results in flying squirrels often being caught in traps set for other species. The fur is of no commercial value.

Hoary marmots are present throughout most of the mountainous regions of Alaska, but are generally absent from the lower regions such as the Seward Peninsula, the Yukon-Kuskokwim Delta, the North Slope, and the lower Alaska Peninsula. None are present on the Kodiak Island group or the outer islands in the Southeastern Alaska group. Hoary marmots prefer the precipitous sides of canyons and valleys where boulders are large and have accumulated to a depth sufficient to give subsurface protection.

Marmots are sometimes trapped and the fur used for parkas. If the pelts are taken in the fall while they are prime and softly furred they make a fine garment. There is not much commercial use of marmot fur, however, and little information is available on the harvest. Marmots may be seen in some of the national parks, notably Mt. McKinley National Park, and provide opportunities for interesting viewing and photography.

A closely related species, the woodchuck is present in eastern Interior Alaska, in a small area lying between the Yukon and Tanana Rivers east of Fairbanks to the Alaska-Yukon border. Woodchucks prefer open woodlands and thickets, near fields and clearings on dry soil. They have a very spotty distribution in Alaska.

Raccoons have been released by private individuals in Southeastern Alaska in the past, and a small population has become established. Only occasional sightings are reported.

PROBLEMS

- * Pressure to ban leg-hold traps has come about as a result of public awareness of the inhuman potential of these devices when improperly set and infrequently checked. Prohibitive legislation may result in the loss of important commercial and recreational utilization of the furbearer resource. The Department should promote efficient and humane trapping methods to ensure the opportunity to participate in trapping.
- * Loss of habitat is potentially a serious problem for furbearers. Presently the most significant loss is that occurring through successional changes in vegetation resulting from fire suppression activities. Normally wild fires benefit furbearers by creating favorable habitat for prey species such as snowshoe hare and microtine rodents. Establishment of hardwood species along waterways after coniferous vegetation is burned is also a significant benefit to beavers. The control of wildfire should be discouraged except when resources with a superior value will be destroyed by the wildfire or where domiciles or property damage are the major consideration. Close liaison should be maintained with the various fire control agencies to assure that public energies are not expended unnecessarily in the control of wildfire.

Oil pollution has not affected habitat on a significant scale but it has the potential of serious and extensive damage to aquatic, riparian, and marine coastal furbearer habitats. Outer Continental Shelf oil extraction and transport will almost certainly result in some detrimental pollution of coastline habitats, and accidental onshore spills will impact riparian habitats. Stringent precautions must be observed in oil development activities to minimize adverse impacts. Oil spill containment and cleanup capabilities must be improved.

Other resource and human development activities also result in loss of furbearer habitat. Large scale water impoundments and clearcut logging affect large areas and important habitats for some species. Placer mining and dredging, gravel removal, urbanization and construction of transportation and utility corridors all have localized impacts which when taken together add up to significant long-term habitat alteration. Important furbearer habitats should be identified in conjunction with proposed developmental activities so that possible may be considered which minimize detrimental effects to furbearers.

- * The generally underharvested fur populations in the northern portion of Alaska are a significant economic loss to the state. Many furbearer populations are capable of much larger harvests than they are now sustaining. Some species of furbearers are not harvested because there is no traditional use of a particular species. The formation of marketing associations would tend to provide a higher and more stable market for all furs and offset the unstable marketing conditions which now result in substantial economic loss. Development of an extension training program directed to the proper care and handling of pelts would also tend to increase the value of the harvest and increase utilization of furbearer populations. The Department probably would not initiate fur marketing associations or furbearer extension programs, but would cooperate with educational and other agencies to enhance the value of furbearers.
- * Overharvesting of the furbearer resource occurs primarily on beaver and wolverine. There is a potential for overharvest of other species (possibly otter, mink and marten), but the high market conditions which would stimulate an overharvest are not likely to occur. Beaver are easily overharvested because they establish fixed colonies which are accessible and susceptible to repeated

trapping. Overtrapping of beaver is a recurring problem in some areas, particularly the lower Yukon-Kuskokwim River drainages and the northern Bristol Bay drainages. Wolverine are particularly vulnerable in the Northwestern and Arctic regions in the winter when they are easily tracked and pursued on snowmachines. High pelt prices and a strong domestic demand provide incentive for heavy trapping and hunting pressure on wolverine. Restrictive regulations where required to protect the resource should be implemented. Season closures in some areas may be the only viable solution to the overharvest of wolverine. Successful implementation of harvest restrictions will depend on the cooperation of resource users and on increased enforcement of regulations.

- * Significant loss of public trapping opportunity may occur from the exclusion or prohibition of public trapping on extensive land areas conveyed to private ownership or federal limited use status under terms of the Alaska Native Claims Settlement Act. The Department should advocate strong consideration of continued consumptive use of furbearers on all categories of federal lands and should solicit the cooperation of private landowners to facilitate progressive management of furbearers. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act.
- * As land available for public trapping diminishes, competition for available areas will increase, resulting in increased conflicts between trappers as well as heavy pressure on furbearer resources. Some restrictions on harvest may be necessary to protect the resource. Some trapper conflicts may be alleviated through better communication and agreements among trappers, and through trapper education efforts. Theft of traps and trapped animals may be curbed to some extent by enforcement activities, but trappers themselves must aid in the policing of their own activities.
- * High market values for several species of furbearers will stimulate increased trapping effort. Existing information on distribution, population trends and habitat requirements for many furbearers is inadequate for management at higher intensities of trapping pressure or for assessment of the consequences of habitat alteration. The Department should seek adequate funding and attempt to develop needed inventory techniques.
- * Accidental trapping of dogs near populated areas results in posting of private land against trespass and increases public anti-trapping sentiment. Increased awareness of the problem by trappers should be encouraged as well as increased community controls on free-roaming dogs.
- * Some furbearers, particularly foxes, are known to carry diseases which are harmful or lethal to other wildlife and humans. Rabies is the most common disease which reaches epidemic proportions. *Echinococcus multilocularis* is carried by the foxes on St. Lawrence Island and Trichinosis is also carried by several species of furbearers. Trapping and hunting of both red and white fox should be encouraged in areas which have a potential to produce high fox populations which are prone to rabies outbreaks. Hygienic techniques should be encouraged to prevent the transmission of parasites and diseases from furbearers to humans, particularly in areas where these problems are known to exist. To prevent Trichinosis proper handling and cooking of all furbearer meat to be consumed by humans and domestic animals should be encouraged.
- * Beaver chronically cause problems by blocking road culverts with dams and by flooding or cutting down trees on private property. Blockage of streams by beaver dams also prevents movements of

spawning anadromous fish. The Department should encourage public trapping of beaver in areas where damage to public and private property is chronic, and where important salmon spawning streams are blocked. Public utilization of beaver in problem areas is preferable to Departmental control efforts. The Department should also encourage appropriate design and construction considerations in public and private road building projects.

- * Red squirrels cause more damage to human property than any other furbearer by destroying insulation, damaging human food caches and general destruction of many different items such as mattresses, sleeping bags, etc. Information on controlling squirrel damage should be consolidated into a publication which would be made available to anyone needing assistance.

IMPACTS

- * Furbearer population levels will continue to fluctuate, primarily in response to prey availability and quality of habitat.
- * Abundant trapping opportunities for local residents will continue to be available. Some trapper congestion and competition may occur in easily accessible areas.
- * Increased harvests of available furbearer populations, improved handling, and improved marketing in the Interior and northern areas of the state could increase the economic value of the fur harvest 50 percent above the present economic value, or about \$500,000.
- * It may be necessary to close the beaver trapping season entirely in areas of overharvest or effectively enforce a very restricted season. This would eliminate or reduce the present harvest level by 50 percent depending upon the degree of restriction imposed. Within three to five years the harvest could be increased, compensating for the loss of harvest in years of severe restriction or total closure.
- * A total closure on wolverine may be initiated in large areas of Northwestern and Arctic Alaska until populations increase to the point where they can sustain larger harvests. Future harvests would be conducted under conditions which are more rigidly controlled than at present.
- * Sealing requirements for beaver and wolverine will continue and harvest reports or sealing requirements for additional species will probably be implemented.
- * Loss of trapping opportunity in areas established exclusively for nonconsumptive use will be insignificant.
- * Dissemination of information to prevent beaver and squirrel damage could result in a considerable savings to the public.
- * Beaver populations in urban areas will be reduced below the carrying capacity of the habitat to prevent property damage.
- * Knowledge of furbearer population status, habitat requirements, and utilization will increase.
- * Coordination of development activity with various conservation agencies would minimize the adverse impacts of development on furbearer habitat.
- * No loss of nonconsumptive use opportunity will occur, nor will proposed management adversely affect existing habitat, other species in the area or other recreational uses of the land.

SMALL GAME IN NORTHWESTERN ALASKA

GROUSE AND PTARMIGAN

Rock ptarmigan (*Lagopus mutus*) and willow ptarmigan (*L. lagopus*) and spruce grouse (*Canachites canadensis*), all members of the family Tetraonidae, are the gallinaceous species occurring in the Northwestern Region. Game birds are absent from St. Lawrence and Little Diomed Islands. Rock and willow ptarmigan occur throughout the Northwest region where suitable habitat exists. Spruce grouse are absent from the western two-thirds of the Seward Peninsula and the tundra in the vicinity of Pt. Hope, but otherwise occur where suitable habitat exists.

Although various tetraonid species overlap in geographical distribution, each displays a marked preference for certain habitat types. Spruce grouse are found most commonly in white spruce-birch communities and black spruce associations. In mountainous portions of this region, breeding habitats of the two species of ptarmigan are separated altitudinally. Willow ptarmigan breed close to timberline, often partially within the fringe of coniferous woodland, and also along stream courses in shrub communities, generally between elevations of 2,000 and 2,800 feet. Rock ptarmigan breed from timberline to approximately 3,500 feet in habitat ranging from brushy stands of dwarf birch less than four feet tall to areas above the limit of upright woody vegetation. In the lower, coastal portions of this region the differences between rock and willow ptarmigan habitats are poorly understood.

Unlike forest grouse, ptarmigan in mountainous portions of Northwestern Alaska move downward in October to their winter ranges. The sexes segregate during this seasonal habitat shift. Male rock and willow ptarmigan remain near the breeding grounds throughout the winter, while the females move up to 100 miles to brushy subalpine or timbered winter range. The birds funnel through river valleys and low mountain passes during this fall movement and again when returning to their breeding grounds in March.

Tetraonids have evolved so that each major vegetative type in Alaska provides habitat for one or more species at some period of the year. Disturbances such as burning, timber removal and agriculture produce vegetative changes that decrease the habitat quality for certain species while favoring others. In Northwestern Alaska little such habitat disturbance has occurred. Consequently, man's activities have had no significant impact on the distribution or abundance of tetraonids in this region.

Inland populations of the various Alaskan tetraonids demonstrate marked, generally synchronous, fluctuations with seven to nine years elapsing between peaks. In maritime situations, such as over much of the Northwestern Region, population fluctuations probably occur, but they are thought to be erratic and not necessarily in phase with those of inland habitats. Due to the lack of knowledge regarding factors governing population fluctuations, management programs aimed at stabilizing tetraonid densities from year to year are not feasible at present. Since the major upland game species in this region occupy mature or climax vegetation types, habitat manipulation is not considered a feasible technique for increasing carrying capacity.

Gallinaceous birds are important prey for avian and mammalian predators. The number of grouse and ptarmigan taken by predators not only varies according to their abundance, but also with predator densities and availability of buffer species such as snowshoe hares. Even in years when grouse and ptarmigan sustain relatively heavy losses to predators, their long-term population trends are not significantly altered.

Therefore, the use of these species as prey is compatible with the various human uses.

Grouse and ptarmigan have received only light to moderate harvest by sport and "subsistence" hunters in the Northwestern area. Harvests probably fluctuate with tetraonid abundance and have little influence on regional population trends. Although some individuals may hunt specifically for grouse and ptarmigan, a significant amount of the harvest occurs incidental to big game hunting. Like hunting, nonconsumptive uses such as observation and photography have been light in the past, and for the most part, consumptive and nonconsumptive uses are compatible.

HARES

Both the snowshoe hare (*Lepus americanus*) and the tundra hare (*L. arcticus*) occur in Northwestern Alaska. The tundra hare is found in coastal tundra areas and is periodically abundant on the Seward Peninsula. The status of tundra hare populations is undetermined and it is probably one of the least known mammals of Alaska. Fluctuations in population levels occur similar to those of the snowshoe hare. Tundra hares were abundant on the Seward Peninsula in 1971 and 1972.

The snowshoe hare occurs inland along rivers throughout Northwestern Alaska. The upper drainages of the Kobuk and its tributaries support moderate populations of snowshoe hares, while the lower, treeless valleys of the Kobuk and Noatak are more suitable for tundra hares. Snowshoe hare populations suffered a mild "crash" two or three years ago throughout most of the northwest and now (1976) are starting their recovery.

Cyclic fluctuations in snowshoe hare populations seem to be most extreme in the central portions of the snowshoe's range. The Interior Region historically has experienced extremes in hare density with 1500 or more per square mile being reported during population peaks. Present densities of snowshoe hares in Northwestern Alaska are unknown. The abundance of hares in local areas may vary greatly, and even in periods of low population levels local areas of abundance will occur in optimum habitat. As populations increase hares spread into less desirable habitat, and when populations decline, they disappear from these areas. The decline may be abrupt, or it may be gradual and occur over a period of 3-4 years.

Snowshoe hares occupy a variety of habitats, although certain types seem to be preferred, or will support a higher density of hares. Hares can be found in subalpine areas, brush lands, white spruce-birch communities and scrubby black spruce stands. The more open aspen and birch communities with brushy understories of willow, alder, highbush cranberry and wild rose, and streamside areas with willows seem to be optimum habitat for snowshoe hares.

The preferred habitat for the tundra hare is brushy tundra and windswept rocky slopes, with alder thickets and willows along the low wide river valleys near the coast.

Habitat disturbances such as wildfire and clearing of timber usually benefit snowshoe hares, since regrowth of herbaceous and woody species provides cover and food. However, increased fire control is decreasing prime habitat for hares. Climax communities of dense spruce do not provide suitable brushy understories for snowshoe hares.

In years of high snowshoe populations, girdling of trees and shrubs over large areas. This may kill trees and shrubs and reduce the amount of available browse for several years.

The snowshoe hare is an extremely important prey species for several predators. Lynx depend almost entirely on snowshoe hares for food in

Northwestern Alaska. Lynx seem to be extending their range into the habitat of the tundra hare, and may be preying on these this species, as well as on ptarmigan in the region. Both red foxes and wolves also depend to a great extent on hares. Several species of raptors utilize hares as a major part of their diet.

The cyclic nature of snowshoe hare populations makes management programs designed to stabilize hare populations difficult. Too many factors are involved in these population cycles for man to have much effect. Hunting pressure on hares increases as populations increase and hares become more available, but as hare populations decline, there is correspondingly less interest in hunting them. Also, hunting pressure is concentrated along roads and trails and around human population centers; over vast areas the animals are not hunted by man.

When snowshoe hares are abundant, domestic utilization and recreational harvests may be fairly high in very localized areas. Most hunters are residents. Most hunting occurs in the fall, but hare hunting is popular all winter long when populations are high. On moderate winter days, many people enjoy going out for a few hours to hunt hares as a form of winter recreation, combining it with skiing, snow machining, or snowshoeing. Hares are used as human and dog food, and as bait for traps. The hides are sometimes used for mittens and blankets. So little is known about tundra hare populations that it is hard to evaluate the effects of hunting pressure on these populations. A few recreational hunters from urban centers such as Anchorage and Nome hunt for these large hares, and natives hunt them for meat, often by herding and clubbing them. Historically, hides from arctic hares were exported for the fur trade.

PROBLEMS

- * Increased human populations in Northwestern Alaska will result in increased hunting pressure on all species, including small game. Small game will become more important to the hunter as opportunities to hunt larger game species become more limited. Little is known regarding hunting effort and success in the Northwestern Region. In the future, programs designed to yield information on harvest characteristics should be instituted.

1. ALASKA SMALL GAME MANAGEMENT PLAN

LOCATION

Entire state except national parks or other areas which are closed to all hunting.

PRIMARY MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting small game.

SECONDARY MANAGEMENT GOALS

To provide for an optimum harvest of small game.

To provide an opportunity to view, photograph and enjoy small game.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Achieve greater utilization of the small game resource by encouraging wider distribution of hunting pressure and identifying species that are lightly utilized.
2. Encourage public viewing and photography of small game.
3. Regulate or eliminate hunting seasons to minimize disturbance in areas especially suited for viewing or photographing small game.
4. Discourage land use practices that adversely affect small game habitat.

THE SPECIES

Small game species addressed in this management plan are blue, spruce, ruffed and sharp-tailed grouse; willow, rock and white-tailed ptarmigan; and snowshoe, arctic and European hares. Small game populations fluctuate considerably in successive years, and little is known of annual population status except in relatively small, localized areas. A feature common to most Alaskan small game populations is a recurrent cycle of abundance and scarcity. In most instances, a complete cycle lasts 8 to 12 years. Populations of the various species appear to fluctuate in phase over most of Alaska, although local pockets of animals may remain at high numbers while populations are declining elsewhere. Coastal populations seem to exhibit less drastic oscillations than populations in the interior. Blue grouse, found only in Southeastern Alaska spruce-hemlock forests, occur in relatively stable numbers. The three species of ptarmigan in coastal parts of their range exhibit erratic, rather than cyclic, population fluctuations. Grouse and ptarmigan populations in Interior and parts of Southcentral Alaska were high during 1960 to 1962-63 and again in 1968 to 1970. Hare populations followed a similar pattern, including less drastic, more erratic fluctuations in numbers in coastal areas.

Factors causing the oscillations in small game numbers are not well understood, although weather, food, predation and diseases probably all play a role, with different factors varying in significance during different stages of the cycle. The general synchrony of small game population fluctuations suggests that some major extrinsic factor, perhaps weather, is the cause for population cycles. Natural mortality

rates for all small game species are very high, perhaps reaching 80 percent in some years. Severe winters and wet, cold springs which adversely impact nesting success and chick survival may be the main sources of grouse and ptarmigan mortality. Snowshoe hare abundance may be related to available food supplies as well as weather.

Small game habitat has been little affected by human activity over most of the state, although some habitat has been lost or altered by urbanization and agriculture near Anchorage and in the Matanuska-Susitna Valley and by extensive logging in Southeastern Alaska. Logging activities and fires may enhance habitat for hares and ruffed and sharp-tailed grouse, while reducing suitable habitat for spruce and blue grouse and willow ptarmigan. Rock and especially white-tailed ptarmigan breed at higher elevations than willow ptarmigan, and their habitat has probably been little altered by human activity.

Recreational hunting by Alaskan residents is the primary use of small game with most harvested animals retained for domestic consumption. Most small game hunting occurs along established road systems close to human population centers, although some hunters employ snowmachines in winter and boats in summer and fall to reach more distant areas. A few hunting parties travel by plane to remote regions specifically to hunt small game. Most small game hunting in remote areas, however, is incidental to quests for big game and serves mainly to supplement camp rations. Nonresident hunters contribute little to the small game harvest. Hunter effort and harvest levels of small game depend mainly on small game abundance and accessibility. The high natural mortality and fecundity rates of small game populations preclude hunting as a significant limiting factor. Small game hunting seasons and bag limits have changed little since statehood. The only significant change was a shortening of seasons and summer closures to small game hunting in Chugach State Park near Anchorage.

Nonconsumptive uses of small game vary significantly between areas. Most viewing and photography occurs adjacent to major human population centers, such as in Chugach State Park near Anchorage, along the roads, trails and footpaths in Chugach National Forest and the National Moose Range on the Kenai Peninsula, and the Twelvemile and Eagle Summits on the Steese Highway. Besides being an important hobby of many urban-area residents, viewing and photography of small game occur incidental to other outdoor pursuits, such as berry-picking, skiing, snowshoeing, hiking, and mountain climbing. Although most nonconsumptive users are Alaska residents, nonresidents also enjoy small game, particularly in Interior Alaska along roads leading to and near Mt. McKinley National Park.

Ptarmigan are the most common and popular gamebirds in Alaska. Willow and rock ptarmigan are distributed throughout the state. White-tailed ptarmigan are restricted to the Alaska Range and mountainous areas to the south including the Cook Inlet area, the Kenai Peninsula, the coast of Prince William Sound and the Gulf of Alaska, and Southeastern Alaska. Rock and willow ptarmigan make extensive altitudinal migrations in spring and fall, while white-tailed ptarmigan generally remain at higher elevations throughout the year. Willow ptarmigan occur in willow-grown flats and foothills near timberline during summer and fall and move to lower riparian areas in winter. Rock ptarmigan breed above timberline to about 3500 feet, and white-tailed ptarmigan occur as high as 5000 feet. Comparatively little ptarmigan habitat has been altered or destroyed in Alaska, although greater efficiency in fire suppression may be having an impact on willow and rock ptarmigan wintering areas.

Willow ptarmigan are the most frequently encountered gamebird because they are most abundant and they winter at lower elevations. The magnitude of harvest is unknown, but hunting effort varies considerably from year to year depending on bird abundance. Some of the most popular recreational

ptarmigan hunting areas include the Copper River Delta, lands adjacent to the headwaters of the Little Susitna River, the Isabel Pass area, Eagle and Twelvemile Summits on the Steese Highway, Mt. Fairplay and, on Kodiak Island, the Upper Station Lakes and Tugidak Island. In Southeastern Alaska, the most used ptarmigan hunting areas are near Haines, Juneau, Ketchikan, and along beach and river systems from Yakutat to the Alsek River. Ptarmigan hunting is most intensive in late winter after snow depths at high elevations have forced birds to move down. Ptarmigan are an important year-round source of food for rural residents in much of northern, western and interior Alaska and are taken whenever available. The extent of domestic utilization by local residents is dependent on cyclical ptarmigan abundance; when birds are scarce relatively little effort is expended to procure them. Observation and photography of ptarmigan occurs year-round and are popular whenever and wherever the birds are accessible. Many people also view ptarmigan incidentally to other outdoor activities.

Grouse are less abundant and less conspicuous than ptarmigan, although spruce grouse are widespread and at times locally abundant. Blue grouse are common in spruce-hemlock forests of Southeastern Alaska but their range extends only as far north as the Dangerous River. Sharp-tailed and ruffed grouse are distributed through Interior Alaska in a broad band that approximates the drainage of the Yukon River, although these species also occur in areas south of the Alaska Range. Ruffed grouse are present in Southeastern Alaska. Ruffed grouse have an affinity for hardwood trees and replace spruce grouse where aspen and birch stands occur in the predominantly spruce forests. The sharp-tailed grouse prefers transitional habitats between forests and tundra or grasslands. Spruce grouse are the most widespread and numerous of Alaskan grouse, present in spruce-birch and spruce-hemlock forests over most of the state. Little information is available on abundance, except on a comparative basis. Whereas ruffed and sharp-tailed grouse probably benefited from widespread wildfires that occurred earlier in the century, spruce grouse have probably benefited from forest fire prevention now provided by federal and state agencies.

Most grouse hunting is by Alaska residents for recreation and domestic use. The magnitude of harvest is unknown. Hunting effort declines substantially when grouse populations decline. Grouse are typically hunted along road systems in fall and early spring when the birds are gathering grit. Spruce grouse have been relatively common along the Steese Highway between Mile 120 and 148, near Manley Hot Springs, between Ester and Nenana on the Nenana Road near Fairbanks, along the Alaska and Taylor Highways near Fortymile, near Glennallen, and on many secondary roads on the Kenai Peninsula.

In Southeastern Alaska spruce and ruffed grouse occur in such low numbers that they are usually taken by hunters only incidental to quests for other species, usually big game. Blue grouse, however, are subject to intensive local hunting from mid-April to mid-May when "hooters" (territorial males) are conspicuous; most of the blue grouse harvest consists of males. Most grouse hunting occurs adjacent to major road systems.

Grouse viewing and photography are primarily by Alaska local residents, although an increasing number of nonresidents, usually summer tourists, are important nonconsumptive users in state and national parks and along major road systems. Comparatively few people seek grouse specifically for viewing and photography, but they are clearly important adjuncts to some outdoor activities such as hiking, camping, fishing etc.

Hares are probably the most important small game in Alaska. Three species occur in the state. Snowshoe hares and arctic hares are indigenous species. European hares are introduced. Native hare populations are extremely cyclic in inland areas of the state; hare numbers may vary by

factors of 100 or more between years. Snowshoe hares reach their greatest density about every 10 years, with catastrophic population declines during intervening periods. Coastal populations of arctic and snowshoe hares seem less cyclic and exhibit erratic population oscillations. Hare population fluctuations have been documented since the late 1800's in Alaska. Hares were abundant in Interior Alaska in 1885, probably during the mid-1890's, in 1905, from 1913 to 1915, in 1924, in 1935, from 1946 to 1947, in 1954, in 1963, and finally around 1970. Hare numbers were again at low levels by the mid-1970's. Less is known of arctic hares, but their numbers seem to show a similar pattern. European hares have been established by the release of domestic hares on a number of islands including Umnak and Hog in the Aleutians, and Middleton Island in Prince William Sound. The Middleton Island transplant of three females and one male in 1954 increased to at least 6000 by 1960 and the population is currently at about that level, although drastic fluctuations in numbers have occurred over the last 15 years. The Alaska Game Commission authorized a transplant of snowshoe hares to Kodiak and Afognak Islands in 1934. The transplant was successful, and snowshoes were subsequently released on Woody and Long Islands and later on Popoff Island in the Shumagin group. Most hare habitat has probably been little altered by human activity, although improved efficiency in fire suppression and prevention by state and federal agencies may have reduced some hare habitat. Habitat requirements of hares appear flexible but most often consist of streamside willows, dwarf birches, and brush thickets. Hares are widespread during population highs. Urban sprawl and livestock grazing are probably having adverse local impacts on hare numbers in some areas.

Snowshoe hares are probably the most popular small game species in Alaska. Most use is recreational hunting for food. Most hares are harvested by local residents although nonresidents take hares incidentally to quests for big game. Areas adjacent to roads and waterways are most heavily hunted. Access to hunting areas is often by walking, but more hunters are employing boats, all-terrain vehicles and snowmachines to reach distant areas. A few hunting parties travel by plane to remote regions exclusively to hunt hares. Hunting effort varies with population fluctuations, being intense when hares are abundant and limited when they are scarce. Snowshoe hares are less common in Southeastern Alaska and provide a limited amount of recreational hunting near Juneau, Haines, and Skagway. Villagers in remote areas make extensive domestic use of hares. Most hare hunting occurs in fall and winter. Hares are also popular with nonconsumptive users, particularly near urban areas. Although many people wishing to view hares often blame hunting for low numbers during years of hare scarcity, the high reproductive and natural mortality rates make the impact of losses due to hunting insignificant.

PROBLEMS

- * Much of the small game habitat bordering the state's highway system has been selected by Alaskan natives under terms of the Alaska Natives Claims Settlement Act. Once title to public lands is conveyed to private ownership, public use of such lands may be prohibited. The Department should solicit the cooperation of private landowners to facilitate progressive management of small game. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act. The Department should also maintain close liaison with native corporations and make recommendations on land use practices which benefit wildlife.
- * The proposed inclusion of land, about 80 million acres, into Federally-administered parks, wildlife refuges, wild and scenic rivers, and national forests under the terms of the Alaska Native Claims Settlement Act will affect public use and state management of small game in

these areas. Hunting may be prohibited, limited or otherwise these areas. Hunting may be prohibited, limited or otherwise affected. If these areas are established by Congress, the Department should solicit cooperation of the respective land management agencies to allow public use of the lands for hunting. Seasons and bag limits and methods and means of hunting may require adjustment to conform with federal regulations.

- * Alteration or loss of small game habitat due to logging, expansion of residential areas, industrial and mineral development and fire suppression will affect numbers of small game in some accessible areas that receive heavy hunter use. The Department should identify important small game habitat and make recommendations on land use practices. The Department will also propose and encourage habitat improvement by the various land management agencies.
- * Many areas of the state receive little or no use due to problems of access. The Department may consider encouraging wider distribution of use by providing information to the public regarding small game populations that are not being utilized. In some cases, the Department may recommend providing additional routes of access.
- * Due to manpower and funding restrictions, data on population status and harvest levels of small game are not gathered. In some cases, no methodology exists for the routine censusing of small game. The Department should seek adequate funding to develop needed inventory techniques.
- * Hunting adjacent to roads and near urban centers may pose public safety hazards, and local opposition to hunting may develop and result in restrictions such as closed areas. The Department should anticipate such conflicts and, where appropriate, limit hunting by time and space zoning. The Department will generally oppose efforts to effect closures except where a clear need exists.
- * As small game hunting near urban centers increases, conflicts with nonconsumptive users will occur in a few accessible locations where small game are traditionally observed. Intensive local harvests of ptarmigan in the spring can reduce the summer population of birds available for observation. Three areas of potential conflicts are the Eagle and Twelvemile summits on the Steese Highway north of Fairbanks, the Mt. Fairplay area on the Taylor Highway, and the Donnelly Dome - Paxson area along the Richardson Highway. Restrictions on hunting in these areas may be necessary, especially in the spring, if hunting significantly reduces the birds available for nonconsumptive use during the summer.
- * Although small game populations generally increase or decrease independently of hunting, many people believe that population lows are caused by overharvest. The Department should inaugurate an active educational program on small game population cycles and dynamics.
- * Many small game hunters regularly dress and clean the animals they have bagged along highways and leave the offal and skin or feathers on the road right-of-way. Other people often find such practices offensive. The Department should discourage such practices by an active and vigorous educational program or, if appropriate, consider regulations that would prohibit careless and thoughtless disposal of animal remains.

IMPACTS

- * Small game populations will continue to fluctuate with or without hunting.
- * Some hunter congestion and competition may occur in easily accessible areas.
- * Restrictions on hunters may be imposed in areas of high nonconsumptive use of small game.
- * Distribution of hunting pressure and harvest may be improved.
- * No loss of nonconsumptive use will occur, nor will proposed management adversely affect existing habitat, other species in the area, or other recreational uses of the land.

WATERFOWL IN NORTHWESTERN ALASKA

Northwestern Alaska annually supports over 3/4 million nesting ducks and over 70,000 geese.* Several million additional waterfowl utilize habitat in this region on their way to and from North Slope, Canadian and Russian breeding grounds. Waterfowl habitat in the region is in relatively pristine condition since industrial and developmental activities have been limited in the area.

Nesting habitat is limited by the mountainous character of much of the region. Major production areas include the Kobuk River Valley-Selawik Lakes-Noatak River Valley complex, and the Imuruk Basin on the Seward Peninsula. Waterfowl production in this area, as in many areas of Alaska, is strongly influenced by weather. Late snow cover and cold weather during some springs result in poor production, while "early" springs usually result in fairly good duck and goose production.

Breeding duck densities in the river valley complexes at the head of Kotzebue Sound average 44 birds per square mile over 5,350 miles of habitat. Annual breeding duck populations average 104,500 dabblers, 129,200 divers, of which 44,200 are nongame ducks. The fall flight averages about 400,000 ducks. On the Seward Peninsula breeding duck densities average 64 birds per square mile over 3,850 square miles of nesting habitat. Breeding duck populations average 102,400 dabblers and 83,200 divers of which 29,900 are nongame ducks. The fall flight averages about 410,000 after production of young. Other numerous but small pockets of nesting habitat occur throughout the region but remain unsurveyed. These areas produce thousands of additional ducks.

The annual fall flight of geese from Northwestern Alaska includes about 25,000 lesser Canada geese, 30,000 white-fronted geese and a few thousand brant and emperor geese. In addition summer concentrations of up to 20,000 nonbreeding emperor geese annually molt on St. Lawrence Island, and several thousand molting white-fronted geese and about 10,000 lesser Canada geese occur near the headwaters of the Noatak River. Lagoons east of Nome and the series of lagoons on the north side of the Seward Peninsula are important to migrant waterfowl, and provide the only large sheltered waters between the Yukon Delta and the North Slope. Large concentrations of brant and pintails are common on the lagoons during spring and late summer. Snow goose colonies present in the Shishmaref area around 1900 apparently were eliminated by the reindeer industry. Whistling swans are fairly common throughout the region where suitable habitat exists. The total fall flight of whistlers is perhaps 10,000 birds.

Waterfowl in Northwestern Alaska are utilized primarily for local domestic purposes. Domestic utilization occurs at every town and village in the region but is most important in coastal villages. The Land Use Planning Commission for Alaska estimated about 42,000 ducks, 15,000 geese and about 6,000 eggs were taken by residents in the area in 1974.

Some sport harvest of waterfowl occurs in Northwestern Alaska, primarily near Nome. Although hunting is excellent in many locations, especially along the coast, hunters are limited by a short season--usually 2 or 3 weeks--before freezeup. During the past four seasons sport harvests have averaged 2,460 ducks and 665 geese. Most ducks harvested are probably pintail while most geese are black brant.

Nonconsumptive use of waterfowl is primarily limited to village residents and tourists. Guided tour groups of bird watchers from the other states visit Nome and Kotzebue each year. Nonconsumptive and recreational

* A list of waterfowl species considered in these plans follows this regional account.

consumptive use is expected to increase as human population grows in the region. Significant changes in the amount of domestic utilization are not anticipated.

PROBLEMS

- * Pollution of coastal waters by oil and oil industry-related contaminants poses a threat to waterfowl and waterfowl habitat. Both Outer Continental Shelf (OCS) and near shore drilling could result in spills which would devastate waterfowl habitat and bird populations. Baseline quantitative and qualitative data on coastal bird habitats, bird numbers and relationships between birds and habitat are needed before oil impacts occur to provide rational recommendations for future OCS lease areas, recommendations for future oil spill cleanup facilities and to document the effects of contamination for mitigation purposes. Ongoing federally funded state and federal OCS bird studies are designed to identify and quantify the effects of these problems.
- * Native domestic utilization of black brant in Northwestern Alaska and in other parts of Alaska is probably causing a decline of the brant population. Although spring use of waterfowl is prohibited under provisions of the Migratory Bird Treaty Act, federal and state enforcement agencies have been lenient, because of traditional Native dependency on this resource. Enforcement of federal and state laws should be concentrated on species requiring protection, and cooperation of local residents should be sought to direct domestic utilization away from species whose stocks are declining. Annual determination of domestic harvest levels is desirable for all waterfowl species and necessary for selected species. Renegotiation of the Treaty with Canada and Mexico to provide for recognition of traditional domestic use of waterfowl, where biologically justified, is a possible solution to the dilemma. However, undesirable aspects of renegotiation and reluctance of Canada to open renegotiations make such action improbable.

LIST OF WATERFOWL SPECIES IN ALASKA

<u>Common Name</u>	<u>Scientific Name</u>
Dabbling Ducks	
Aleutian Common Teal	<i>Anas crecca nimia</i>
American Widgeon	<i>Mareca americana</i>
Baikal Teal	<i>Anas formosa</i>
Black Duck	<i>Anas rubripes</i>
Blue-Winged Teal	<i>Anas discors</i>
Chinese Spot Bill	<i>Anas poecilorhynchos sonorhynchos</i>
Cinnamon Teal	<i>Anas cyanoptera</i>
European Widgeon	<i>Mareca penelope</i>
European Common Teal	<i>Anas crecca crecca</i>
Falcated Teal	<i>Anas falcata</i>
Gadwall	<i>Anas strepera</i>
Garganey	<i>Anas querquedula</i>
Green-Winged Teal	<i>Anas crecca carolinensis</i>
Mallard	<i>Anas platyrhynchos</i>
Pintail	<i>Anas acuta</i>
Wood Duck	<i>Aix sponsa</i>

LIST OF WATERFOWL SPECIES IN ALASKA

	<u>Common Name</u>	<u>Scientific Name</u>
Diving Ducks	American Goldeneye	<i>Bucephala clangula americana</i>
	Barrow's Goldeneye	<i>Bucephala islandica</i>
	Bufflehead	<i>Bucephala albeola</i>
	Canvasback	<i>Aythya valisineria</i>
	Common Pochard	<i>Aythya ferina</i>
	Greater Scaup	<i>Aythya marila</i>
	Lesser Scaup	<i>Aythya affinis</i>
	Redhead	<i>Aythya americana</i>
	Ringneck	<i>Aythya collaris</i>
	Ruddy Duck	<i>Oxyura jamaicensis</i>
	Tufted Duck	<i>Aythya fuligula</i>
Sea Ducks and Mergansers	American Common Merganser	<i>Mergus merganser</i>
	American Common Scoter	<i>Oidemia nigra</i>
	Harlequin	<i>Histrionicus histrionicus</i>
	Hooded Merganser	<i>Lophodytes cucullatus</i>
	King Eider	<i>Somateria spectabilis</i>
	Old Squaw	<i>Clangula hyemalis</i>
	Pacific Common Eider	<i>Somateria molissima</i>
	Red-Breasted Merganser	<i>Mergus serrator</i>
	Smew	<i>Mergus albellus</i>
	Spectacled Eider	<i>Lampronatta fischeri</i>
	Steller's Eider	<i>Polysticta stelleri</i>
	Surf Scoter	<i>Melanitta perspicillata</i>
	Western White-Winged Scoter	<i>Melanitta deglandi</i>
Geese	Aleutian Canada	<i>Branta canadensis leucopareia</i>
	Cackling Canada	<i>Branta canadensis minima</i>
	Dusky Canada	<i>Branta canadensis occidentalis</i>
	Lesser Canada	<i>Branta canadensis parvipes</i>
	Vancouver Canada	<i>Branta canadensis fulva</i>
	Bean	<i>Anser fabalis</i>
	American Brant	<i>Branta bernicla</i>
	Black Brant	<i>Branta nigricans</i>
	Emperor	<i>Phalacrocorax auritus</i>
	Ross's	<i>Chen rossi</i>
	Lesser Snow	<i>Chen hyperborea</i>
	White-Fronted	<i>Anser albifrons</i>
Swans	Trumpeter	<i>Olor buccinator</i>
	Whistling	<i>Olor columbianus</i>
	Whooper	<i>Olor cygnus</i>

1. NORTHERN ALASKA WATERFOWL MANAGEMENT PLAN

LOCATION

Game Management Units 18 and 21-26 except the Paimut Waterfowl Management Plan area.

PRIMARY MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting waterfowl.

SECONDARY MANAGEMENT GOAL

To provide for an optimum harvest of waterfowl.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain waterfowl hunting seasons and bag limits that reflect climatic conditions.
2. Regulate, within the constraints of federal regulations, methods and means of taking, season timing and bag limits, if necessary, to provide for local use of waterfowl.
3. Obtain, maintain and improve hunter access to waterfowl hunting areas.
4. Encourage viewing and photography of waterfowl.
5. Discourage human activities that disturb or harass waterfowl during critical nesting or migration periods.
6. Enhance waterfowl habitat in high use areas to increase utilization of habitat by waterfowl, and discourage land use practices that are detrimental to waterfowl habitat.

THE SPECIES

Northern Alaska provides extremely important habitat for millions of North American waterfowl. More than 3,000,000 ducks and 400,000 geese nest in the area annually. Fall migrations to the south number more than 6,000,000 ducks, 900,000 geese, and 60,000 whistling swans. Of the total fall waterfowl flight from Alaska, the northern area contributes about 75 percent of the ducks and 90 percent of the geese. Important breeding areas in the Northern Alaska area include the Yukon-Kuskokwim Delta, Imuruk Basin and lower Kobuk-Selawik-Noatak Valleys in western coastal Alaska; the Yukon Flats and the Koyukuk and Innoko River Valleys in the Interior; and to a lesser extent the Arctic coastal plain and barrier islands.

Domestic consumption by local residents is the dominant use of waterfowl throughout the Northern Alaska area. Although residents of all towns and villages in proximity to waterfowl habitat utilize waterfowl, the greatest use occurs along the coast. The majority of use is illegal and occurs in the spring when newly arrived birds are a source of fresh meat. Intensive use of eggs in some areas also occurs. Although recent accurate estimates of domestic use are not available, rough estimates place annual domestic utilization at 125,000 ducks, 110,000 geese, and over 60,000 eggs. By far the greatest use occurs around villages in the lower Yukon and Kuskokwim drainages, including the Yukon Delta, followed

by northwestern Alaska villages. Boats, float travel and snow machines are the primary means of access for local residents.

Very little recreational waterfowl hunting takes place over most of Northern Alaska because the majority of waterfowl areas are long distances from major population centers and because early freeze-up limits the time available for sport hunting to a few weeks. Sport hunting near large communities or by relatively few hunters who utilize aircraft to reach distant hunting locations is very limited. Nonconsumptive uses, such as viewing and photography, are almost nonexistent except in areas close to communities or as an incidental use to other outdoor activities. Few changes in waterfowl use patterns are expected in the next five years.

The following is a list of specific locations within the Northern Alaska area where use by waterfowl and/or use of waterfowl is important. These areas are not discussed in other management plans, but are places where regulation of human use or habitat protection is desirable. For each area the applicability of management guidelines is indicated.

Area	Management Guideline No.					
	1	2	3	4	5	6
Yukon River Flats	X	X	X		X	X
Kanuti Flats	X	X	X		X	X
Lower Koyukuk Valley	X	X	X		X	X
Howe Island	X				X	X
Egg Island	X				X	X
Spy Island	X				X	X
Thetis Island	X				X	X
Bug Island	X				X	X
Pt. Barrow Spit	X	X	X	X	X	X
Coastal lagoons - Barrow to Camden Bay	X	X		X	X	X
Shishmaref Lagoon	X	X			X	X
Lopp Lagoon	X	X			X	X
Safety Lagoon	X	X			X	X
Coastal waters off Clarence	X	X			X	X
Rhode NWR (and State Refuge)						
Coastal waters off Arctic NWR (and State Refuge)	X				X	X
Coastal waters off Cape Newenham NWR (and State Refuge)					X	X
Coastal waters - Pt. Lay to Wainwright	X	X			X	X
Coastal waters in Kotzebue Sound	X	X			X	X

PROBLEMS

- * Pollution of coastal waters by oil or oil industry-related contaminants poses a serious threat to waterfowl and waterfowl habitat in northern Alaska. Both Outer Continental Shelf and near-shore drilling could result in spills which would devastate waterfowl habitat and bird populations. Baseline quantitative and qualitative data on coastal bird habitats and bird numbers, and relationships between them are needed to provide rational recommendations for O.C.S. lease areas and oil spill cleanup facilities and to document the effect of habitat contamination for mitigation measures. Ongoing federally funded state and federal O.C.S. bird studies will identify and quantify the effects of these problems.

- * The removal of gravel from Arctic Coast barrier islands for roads or drilling pads could cause a loss of nesting habitat and a loss of protection for the inshore lagoons if the islands are destroyed. Equipment noise and increased aircraft use in construction or drilling activities may adversely affect nesting and staging of waterfowl. The use of rolligons and similar A.T.V.'s during periods of thaw will alter water run-off patterns and could result in pollution of rivers and lakes. Better quantitative and qualitative data on bird concentration areas, effects of gravel removal from islands, and other effects of human disturbance are needed to provide rational recommendations and stipulations on land use to protect waterfowl resources.
- * Native domestic utilization of waterfowl on the Y-K Delta and in Northwestern Alaska appears to be adversely affecting black brant and Pacific Flyway white-fronted goose (Y-K Delta only) populations. Domestic utilization elsewhere in Alaska and probably Canada is also contributing to the brant population decline. Although spring use of waterfowl is prohibited under provisions of the Migratory Bird Treaty Act, federal and state enforcement agencies have been lenient, in recognition of traditional Native dependency on this resource. Enforcement of federal and state laws should be concentrated on species requiring protection. Cooperation of local residents should be sought to direct domestic utilization away from species whose stocks are declining. Domestic harvest figures on an annual basis are desirable for all waterfowl species and necessary for declining species. Renegotiation of the treaty with Canada and Mexico to provide for recognition of traditional domestic use of waterfowl, where biologically justified, is a possible solution to the dilemma created by the Migratory Bird Treaty Act. However, undesirable aspects of renegotiation and reluctance of Canada to open renegotiations make such action improbable.

IMPACTS

- * On all areas waterfowl bag and possession limits commensurate with local climatic conditions will be pursued, and methods to achieve additional harvest of selected species during the spring and summer months will be investigated.
- * All areas listed are recognized as important waterfowl use and/or human use areas and any future development or habitat alteration must recognize waterfowl requirements.
- * Control of use will generally be greater in high use areas rather than low use areas. However, in all cases the minimum controls possible will be applied to achieve the desired balance between the resource and different user groups.

MARINE MAMMALS IN NORTHWESTERN ALASKA

The Bering and Chukchi Seas, comprise are one of the richest areas in the northern hemisphere in terms of biological productivity, even surpassing many places in the tropics. Nutrient-rich water from the Yukon River is distributed throughout the Bering and Chukchi Sea by prevailing northerly currents, providing the nutrient basis for supporting a myriad of marine organisms in a complex food web. At the upper trophic levels are a variety of marine mammal species* whose total number is conservatively estimated to exceed 2 million animals. Principal species found in the area during some time in their annual cycles are sea lion, walrus, polar bear, fur seal, four species of ice-associated phocid seals (ringed, bearded, spotted, and ribbon), bowhead, grey, minke, and belukha whales, as well as other less numerous species of whales and porpoises.

To some extent all species are seasonally migratory, usually moving north in the spring to occupy previously "virgin" feeding area and then retracing their path in the fall to suitable winter habitat in warmer southern waters. Distribution and numbers of marine mammals are continually shifting. The Bering Sea supports more animals in the winter and the Chukchi Sea receives the most intensive use during the summer.

The diversity and large numbers of marine mammals were a contributing stimulus to the exploration and settlement of Western and Arctic Alaska beginning in the early 1700's. The history of early utilization is one of unchecked exploitation rather than conservation. Many species were reduced to low numbers, particularly whales and walrus, and some species were extirpated in local areas. Within the last fifty years, most have become abundant following reduced harvests and better protection. Ringed, spotted and bearded seals, whose populations were never heavily exploited, have remained relatively stable through the years.

Residents living along the Northwestern Alaska coast traditionally have depended on marine mammals for their essential domestic needs. Although Eskimo cultures have changed markedly in the last few decades, marine mammals still play an important role in the local economy. They are used for food and provide a variety of raw products for the arts and crafts industry.

Passage of the Marine Mammal Protection Act in 1972 limited all marine mammal hunting to Alaska Natives and imposed a moratorium on non-native users. The Act remains in effect today, but restrictions on use are being reviewed on a species by species basis as each marine mammal population is fully enumerated and proposed use is justified biologically. In April 1976, walrus became the first species for which management authority was returned to the State of Alaska, and for which use by non-natives was again allowed. In the future other marine mammals of the area may be used in more diversified ways.

WALRUS

Historically, the Bering, Chukchi, Beaufort, and east Siberian Seas supported about 200,000 walrus. They were first hunted heavily on a commercial basis by whalers, starting around 1868. At one point in the early 20th century there may have been less than 50,000 walrus remaining in the population. Following cessation of commercial hunting at the turn of the century, and increased protection in the 1960's, the walrus population increased significantly. Today it is estimated at 200,000 animals. Despite an apparent decline in productivity and a Soviet-American kill in excess of 5,000, the populations seems to be increasing slowly.

* A list of the marine mammal species considered in these plans follows this regional account.

Wintering largely in the central and northwestern Bering Sea, generally many miles from the Alaskan mainland, the majority of the population begins a northward migration in late March and April. Females with young are usually the vanguard, followed later by bulls and barren cows. The height of the nursery herd migration enters Bering Strait in late May and early June, and reaches the Northern Chukchi Sea by mid-July. Most of the bulls pass into the Chukchi Sea by the last of June. Most of the population goes west along the Soviet coast, and the remainder moves northward toward Point Hope. Eventually the walrus disperse along the southern polar ice in the east, and frequently congregate in large herds, on land, in the west. Some travel into the Beaufort Sea as far east as the Canadian border. In September or early October the most northern migrants begin moving south. Walrus arrive near St. Lawrence Island in November. Some walrus remain in the Bering Sea, particularly in Bristol Bay and the Gulf of Anadyr, throughout the summer months.

The annual retrieved harvest of walrus by Alaskans has averaged about 1,600, but has shown a marked increase since passage of the Marine Mammal Protection Act which eliminated protective measures on females. Because most of the walrus population funnels through Bering Strait, villages in that vicinity often take more than one-half the annual harvest. The villages that are consistently successful (Gambell, Savoonga, Little Diomed, and Wales) usually take 100 or more animals. The harvest throughout all Northwestern Alaska often approaches 90 percent of the total statewide kill.

Walrus are used for human consumption, dog food, boat coverings and rawhide. Today the most important use of walrus in many communities is as a source of raw ivory for carvers. Often the sale of carvings may contribute more than 50 percent of the cash in the local economy.

Prior to 1972, guiding of sport hunters was a means of providing extra cash in some villages. In the future, sport hunting may become more important. In April 1976, the U.S. Fish and Wildlife Service waived the moratorium on walrus established by the Marine Mammal Protection Act and returned management to the State of Alaska. Under State regulations nonnatives will be eligible to take walrus on a permit basis.

PACIFIC BEARDED SEAL

Exact determination of the size of the bearded seal population is difficult because like other ice-associated phocid seals they are widely distributed and difficult to enumerate.

The population currently appears to be stable and near carrying capacity. The total Bering Sea-Arctic Ocean population is estimated to be 300,000. Soviet estimates place the population at over 450,000 bearded seals including the entire Pacific population.

Adult bearded seals rarely venture far from ice, but juveniles often remain in ice-free areas during the summer. In late winter and early spring, bearded seals occur from the southern edge of the ice pack in the Bering Sea north to the solid cover of the polar pack ice. Most, however, are south of Bering Strait. Seldom do they use shore-fast ice. They prefer the moving pack ice, and undertake a general movement away from land with the onset of winter. Bearded seals commonly haul-out on ice, but do not normally come ashore. As the ice disintegrates and moves northward, bearded seals follow its retreat and by late summer are distributed along the edge of the polar pack ice. Most of the population summers along the southern edge of the polar ice pack. They move south in the fall, and usually enter the Bering Sea, starting in November. Because they prefer bottom dwelling organisms such as crabs, shrimps, clams, and amphipods, bearded seals do not compete with man for commercially valuable fishes, crustaceans, or mollusks.

The crude birth rate for bearded seals is 22 percent. Annual recruitment to age one is at least one half of this figure. Conservatively, the population probably can withstand a harvest of 6 to 7 percent per year, or 18,000 seals. Present take by Soviet and Alaskan hunters is about 4,000 bearded seals, but hunting loss is high and probably the true kill is more than double the number actually retrieved. The population appears to be stable, indicating that the total annual mortality, including harvesting, is about equal to recruitment.

Because of their large size, high quality meat and blubber, and strong durable skin, the bearded seal has always been important in the economy of coastal residents. In the last few years, many changes have occurred in the Eskimo's way of life as they move closer to a cash oriented economy. The necessity for taking marine mammals has decreased, but hunting bearded seals is a tradition still pursued with enthusiasm in many communities. After spring whaling, hunters in Northwestern Alaska look forward to the "oogruk" season, hoping to acquire enough meat to last them through the entire year. The annual harvest from this area is 1,000 seals or less. Shishmaref, Gambell, Savoonga, Stebbins, and Kotzebue are villages which generally take the most bearded seals and are most dependent on their meat. Shorebased hunting is not likely to seriously affect population status. The greatest threat to the security of the bearded seal stems from environmental pollutants which result from off-shore mineral and energy resource development.

RINGED SEAL

The ringed seal is the most widely distributed ice-inhabiting seal of the Bering and Chukchi Seas. Although population status is difficult to determine exactly, its habit of utilizing land-fast ice and its behavior of hauling out on ice during long spring days helps determine relative abundance. The population appears to be high and stable and is estimated to contain a minimum of 250,000 animals in areas of land-fast ice alone. The total ringed seal population of the Chukchi and Beaufort Seas exceeds one million.

In Northwestern Alaska most of the ringed seal are found in areas covered by extensive land-fast ice in winter, although it is not uncommon to find juveniles anywhere in ice covered areas. Ringed seals migrate in the spring, following the retreat of the pack ice. Except for some juveniles, most seals spend the summer in the northern Chukchi sea, and may travel over 600 miles to reach it.

The diet of ringed seals is variable depending on season, location, and depth of water, but the predominant items consumed are zooplankton in the form of mysids, amphipods, euphausiids and shrimps. They seldom compete with man for food, but commonly take small fish such as saffron cod, polar cod and sculpin.

Recent harvests by Alaskan hunters have been around 5,000 seals annually, and the total harvest including the Soviet kill is estimated to be between 8,000 and 10,000. Annual gross recruitment to the population is about 25 percent. Seven to eight percent would constitute a safe level for a sustained yield harvest.

Because the ringed seal is seasonally the most numerous species of seal, it is the mainstay in the diet of coastal Eskimos. While archaeological evidence points to the reliance of many Eskimo settlements on a diversity of marine mammals, the ringed seal was probably the key element in supporting people during winter. Ringed seals provided not only meat, but oil for heat and light, and skins for warmth. Since coastal residents have adopted a cash oriented economy and are now able to obtain non-native food through the winter, the importance of ringed seal has decreased. The harvest is only 1/2 to 1/3 of what it was in the early 1950's.

Today seals are used mainly as a food and clothing supplement. Only in a few communities such as Gambell, Savoonga and Pt. Hope is there a concerted effort to hunt them in winter, and most seals are taken in spring when weather conditions are better. Of the four species of seals taken in Northwestern Alaska, ringed seals account for more than half the annual harvest.

To date, man has not altered ringed seal habitat greatly. While some contamination of food webs by pesticides and heavy metals has been documented, the effects have apparently been minimal, and probably have not altered carrying capacity of habitat in recent years. However, off-shore development of mineral and energy resources is imminent. Unless the proper environmental restraints are exercised, serious problems could develop which would have a marked impact upon the ringed seal population.

SPOTTED SEAL

The spotted seal is found seasonally from the Aleutian Islands north to the Beaufort Sea. The population is estimated at 200,000 to 250,000 individuals, but the census technique is based largely on indirect methods. Soviet biologists feel the actual number is closer to 450,000, including the population of the Okhotsk Sea.

Spotted seals are seasonally dependent upon sea ice for the birth and nurture of their pups. Prior to parturition in late winter, the entire population inhabits the southern edge of the pack ice, usually in the central Bering Sea. As spring break-up progresses, most seals follow the northward retreat of the pack ice, and gradually move toward land (including islands) where intermittent rest and feeding may occur. During the ice-free summer and early fall, they are found along the entire coast of northern Alaska. A substantial portion of the population spends all or part of the summer in northern waters. With the approach of winter they begin moving south, usually preceding the formation of heavy pack ice. Most of the population winters outside northwestern Alaska waters in the southern Bering Sea.

Diet of the spotted seal varies depending on season and location; primary food species are pelagic, demersal and anadromous fishes. Because spotted seals often feed on fish sought for commercial purposes, notably salmon, problems have occurred with fishermen who compete for the same resource. Due to their migratory nature, the impact of spotted seal predation is minimized somewhat when the seal moves north in the late spring. Natural mortality among adults is probably low. They are infected by a variety of internal and external parasites, but the effects of this form of pathology are unknown. Some spotted seals are undoubtedly taken by killer whales and polar bear, but hunting by humans is probably the greatest single mortality factor.

The annual harvest of spotted seals by both American and Soviet hunters is 7,000 or less, more than one-half of which are taken by Soviets. Annual gross recruitment to the population is about 25 percent. Seven to eight percent would constitute a safe level for a sustained yield harvest of up to 17,500 spotted seals annually. Since a large portion of the population winters south of Norton Sound, residents of Northwestern Alaska seldom have the opportunity to take spotted seal until the spring migration. About half the harvest occurs during June and July, when the seals are moving north, and the remainder are killed in the fall migration, usually during September and October. Spotted seals are considered less palatable than ringed or bearded seals and are usually used for dog food. The skins are often made into pokes (floats), and are also prized for making garments. Spotted seals were eagerly sought in the 1960's when fur prices were high and the State offered a bounty. The harvest then was two to three times its present level. A reduction in the price of seal skins and passage of the Marine Mammal Protection Act greatly reduced the harvest.

RIBBON SEAL

Ribbon seals are distributed in two groups: one in the Bering-Chukchi Sea and the other to the west near Russia in the sea of Okhotsk. Due to the lack of physical barriers there is probably some degree of interchange between the two populations, but to what extent has not yet been determined. No satisfactory method of accurately censusing ribbon seals has been developed to date. Based on relative indices of abundance, the Bering-Chukchi population of ribbon seals is currently less than maximum; this results from a brief period of intensive commercial exploitation by Soviets during the 1960's. Recovery has taken place due to the implementation of restrictive quotas, and recent estimates indicate the population is now between 80,000 and 100,000 seals. The total Alaskan harvest is usually 100 seals or less.

Ribbon seals are seasonally pelagic, but depend on the sea ice for birth and nurture of their pups. In the late winter and early spring, the entire population is concentrated along the southern edge of the pack ice in the Bering Sea. Following spring break-up, of sea ice there is a moderate movement north associated with dispersal of the pack ice. However, few seals pass north of Bering Strait; most remain in the Bering Sea during the summer. The principal foods are pelagic and demersal fishes, but also include small marine organisms, such as shrimp.

Although ribbon seals were hunted extensively by the Soviets for the their skins, they have played a minor role in the Alaskan economy. Due to their pelagic nature and limited distribution, the harvest of ribbon seals seldom exceeds 10 animals in Northwestern Alaska. Because of their distinctive markings most ribbon seals are used for clothing; meat has usually been of secondary importance. Since the population is relatively low and their distribution does not favor an extensive shore-based harvest, it is unlikely these seals will be taken in large numbers by Alaskan hunters in the near future. However, increased commercial sealing by foreign governments could again depress the population. The main threat in the immediate future seems to be environmental pollution from the development of off-shore mineral and energy resources.

SEA LIONS

Sea lions occur in Northwestern Alaska only in a few places, usually as stragglers. In winter an extensive ice pack and cold temperatures limit their distribution to areas further south. During ice free months, a small number migrate into the central and northern Bering sea, but it is unlikely there are any established summer colonies. On occasion seal lions have been reported at St. Lawrence Island, but it is rare to find animals north of this latitude. Utilization by coastal residents is low. The total annual kill, including hunting loss, is estimated at less than 10.

Whales and Porpoises

The belukha is the most abundant whale species occurring in the Bering and Chukchi Seas, although population status is not well known. The total Alaskan population is estimated to be at least 16,000 animals and probably more than 5,000 migrate seasonally through Northwestern Alaska to the Arctic Ocean. Belukha are gregarious animals both when traveling and feeding. Herds of 100 are common and as many as 1,000 in a single group have been observed during migration. Small groups of 2 to 15 whales, usually led by a large male seem to be the most common group size. All belukhas north of the Aleutian Islands appear to be migratory to some extent. A few belukha winter in the Northwestern Alaska waters, but most move through during the spring migration from southern areas. Timing of migration is dependent on ice conditions, but the onset is

usually in late March or early April. Some groups may travel only a few hundred miles while others may cover a distance of 1,000 miles to their summering areas. Some groups may return to the same local area in ice-free portions of the northern Bering Sea and Arctic Ocean each summer, concentrating in shallow areas and estuaries. Young are born from May through July, often during migration. Some belukhas may return to the same calving area each year, and this homing behavior may have led to the extirpation of local groups in the past. As waters freeze in the fall belukhas migrate south where leads are abundant or the area is ice free.

Belukhas concentrate in estuaries when food species such as smelt or salmon smolt are abundant. Studies have shown that large numbers of salmon smolt are eaten by belukhas as they migrate to sea, and a lesser number of adult salmon are consumed when they ascend the rivers to spawn. As belukhas have been seen many miles up the Yukon River, it is thought they may significantly impact fish populations in some major river drainages in Northwestern Alaska. Belukhas also eat crabs, squid, clams, shrimp, and small cod.

Belukhas were historically taken by Northwestern coastal Eskimos for meat, oil, muktuk and other domestic needs. However, due to the relatively small, dispersed population (compared to other marine mammal species) and because these whales were only available on a seasonal basis, the annual harvest was never high. Hunters from a few communities (such as Buckland and Kotzebue) located near estuaries often took 100 or more. In such cases their local economy was more dependent on whale products.

Today the harvest in Northwestern Alaska is estimated to be 150 belukhas or less, most being taken in Norton or Kotzebue Sound. Dependency on belukhas is decreasing due to the transition to a cash economy, as well as other forms of cultural change. Muktuk, dried meat, and oil of belukhas are used primarily as dietary supplements. Several other species of whales and porpoises are found in Northwestern Alaska, but most occur only on a seasonal basis. During the last half of the 19th century a commercial whaling industry thrived on the larger whales, primarily the bowhead, although minke, grey and sei whales were also taken.

From 1867 to 1929 Alaska exported over \$14 million dollars of whale oil and whalebone (baleen), most of which came from the Arctic. Because of unregulated harvests, whale stocks were significantly reduced by 1900, and the United States whaling industry in the Bering Sea declined as a result. However, commercial whaling by foreign countries continues on a reduced scale today. Increased protection has resulted in population increases of most species, although they have not attained their former numbers.

Coastal Eskimos killed whales prior to the advent of the American whaling industry, and they intensified their efforts when whale products brought high prices in the late 1800's. After the decline of the commercial industry, whaling by Eskimos continued, and some whales have been taken every year since the turn of the century.

Natives residing in Northwestern Alaska kill 10-20 bowhead whales annually. Pt. Hope, Gambell and Savoonga are the most successful whaling communities. Oil, muktuk, and meat are the products utilized, but recently the increased demand for articles of native handicraft has increased the value of baleen and whale bones. Further, whales are sold on a limited commercial basis when muktuk and meat is obtained in excess of community needs.

Since most species of the larger whales feed on plankton or ocean fishes not currently of interest to man, few human conflicts have occurred. Porpoises feed on several species of commercially valuable fish such as cod, herring and flounder, in Alaska. Competition between porpoises and

man has been greatest on the high seas fisheries, and many are killed accidentally when they become tangled in fishermen's nets.

Because of their pelagic habits and seasonal distribution small whales (other than belukha) and porpoises have been of little importance in supplying food for coastal residents. A few are taken annually, usually on an incidental basis.

Whales and porpoises in Alaska are protected by one or more federal laws and by international treaty or law. These laws and conventions include the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, the International Whaling Convention signed in 1946, and the International Convention of Trade in Endangered Species of Wild Fauna and Flora.

POLAR BEAR

Polar bears found in Northwestern Alaska comprise the Chukchi Sea population. This population is found in the Chukchi Sea west and south of a line extending northwest from Pt. Lay. The southern limit of common occurrence of the Chukchi Sea population is the Bering Strait with bears occasionally reaching St. Lawrence Island in some winters. Polar bears begin to move south as the Chukchi Sea freezes in the fall and as heavy ice is carried south by prevailing northerly winds. Members of this population migrate north in the middle of March. Their range in the summer is the southern edge of the ice pack. This population numbers about 5,000 bears with about one-third, or 1,700 bears, found on the Alaska side of the dateline. Within this area distribution and abundance varies seasonally in any given location particularly in response to changing ice conditions. Although definitive data are lacking, it appears that populations are probably stable and near the maximum level the habitat can support.

Polar bears concentrate in areas of available food, often where currents keep ice in motion causing open leads or newly frozen leads. Seals, congregate in these leads where they maintain breathing holes and are vulnerable to bear predation.

Denning areas are critical habitats for polar bears. The Chukchi Sea population is probably associated with the denning area on Wrangell Island off the coast of Siberia. Present information indicates that some denning occurs on the Alaskan mainland coast. Some denning may also take place on the drifting sea ice, but these dens are subject to ice breakup. The land and shorefast ice provides stable conditions for denning and bears tend to select snow-filled gullies and cutbanks as desirable sites. In late October and November pregnant females come on shore to go into winter dens where the cubs are born. During the denning period males will also come ashore in search for beach carrion or other food but do not den. Denning lasts until late March or early April when the bears move back out onto the sea ice to begin feeding on seals.

Very little information on natural mortality factors is available. Polar bears have no natural predators and no known diseases or serious parasites. Few bears in the wild live beyond 25 years of age.

Historically, Eskimos from all coastal villages killed polar bears. Some skins were used for sale or barter and others, particularly cubs, yearlings and two-year-olds, were used for garments. In the late 1950's and early 1960's sport hunters using aircraft began to kill significant numbers of polar bears. Most hunts in this area were based in Kotzebue, Teller and Pt. Hope. Aerial hunting was curtailed by the requirement for permits in 1971 and 1972 and in November of 1972 the passage of the Marine Mammal Protection Act (MMPA) banned all hunting of polar bears except by Alaskan natives. The average annual harvest of polar bears in Alaska during the late 1960's was about 250 per year with about two-thirds coming from the Chukchi Sea population. Fifty to 60

bears have been taken annually by natives in Alaska since 1972 and in most cases the meat was consumed. Until 1974 regulations promulgated under terms of the MMPA did not permit polar bear skins to be tanned commercially. Because Natives did not have a ready market for the sale of raw products some waste occurred. Presently the MMPA does not place restrictions on the number, age or sex of polar bears taken by Natives for subsistence purposes. The number of bears taken annually by Natives varies widely depending upon the distribution of bears and response to changing ice conditions. Although data do not indicate an increase in bear populations since passage of the MMPA, some change in distribution of bears in the last two years has occurred. More bears occur near shore. This may be related to cessation of aerial hunting, resulting in an increase in the number of bears or a tendency for them to move closer to coastal villages. However, the most important factor seems to be the recent changes of sea ice conditions.

The State of Alaska has requested the return of management jurisdiction over nine species of marine mammals including polar bears. Until this occurs the use of bears will continue to be restricted to Natives residing along the north coast. The harvest is not expected to vary appreciably from the present pattern. If management of polar bears is returned to the State of Alaska the State would probably allow recreational hunting by ground transportation only. Sport hunting under these controls would not remove as many bears as were previously taken with the aid of aircraft. Less than 100 bears per year would probably be taken in this region by recreational hunters. Return to State management would have the additional advantage of allowing Natives to realize economic return from animals and from services furnished to recreational hunters.

PROBLEMS

- * The problem of environmental contaminants and their impacts on the marine ecosystem is a major concern for all species of marine mammals and will certainly become more critical as resource development progresses in the north. The threat posed by petrochemical pollution resulting from the exploration, extraction and transportation of oil and natural gas is of primary concern. Marine mammal populations may be seriously impacted by reduction of primary production and its effects on marine food webs, by direct losses of invertebrate and vertebrate food species, by direct ingestion of toxic substances and by loss of insulative quality of fur. Other contaminants have entered the northern marine ecosystem primarily from sources outside of Alaska. Significant accumulations of several pesticide residues and of mercury have been detected in several species of marine mammals. The effects of these contaminants on marine mammals are unknown. Based on the observed effects on humans, the impact could be very serious. All resource development and utilization with the potential for contamination of the marine ecosystem must be carefully regulated to minimize introduction of pollutants and consequent effects on marine food systems. Use of pesticides and industrial waste processing in Alaska must also be closely controlled.
- * The Marine Mammal Protection Act of 1972 established a moratorium on all consumptive use of marine mammals except for traditional uses by Alaskan Natives. It also removed management authority for marine mammals from the State of Alaska. The Act in effect eliminated some rational, beneficial human uses of marine mammals. Marine mammals have the capability to support significant, beneficial, sustained use. All species utilized by United States Nationals and managed by the State of Alaska prior to 1972 existed as healthy, productive stocks. In April of 1976 walrus management was returned to the State. This sets an important precedent for the return of other marine mammals to State management. The State should continue to press for return of management authority for those species which it has the capability to manage.

- * Several species of marine mammals compete with man for fisheries resources. To date, such competition has taken the form of depredations on netted fish and also has resulted in the destruction of some fishing gear. Conflicts between fishermen and marine mammals are likely to increase as human utilization of fisheries intensifies. Reduction of fish stocks is certain to impact populations of marine mammals which are approaching or have achieved carrying capacity levels. Development of new or expanded fisheries will affect some species not now impacted. The reverse is also true: levels of human utilization of fisheries may be limited by intensive use of fish stocks by marine mammals. Since affected species of marine mammals are limited to shallow waters in their foraging activities, much potential conflict may be eliminated by zoning certain commercial fishing activities to deeper waters. In some situations, conflicts may require reduction of some marine mammal populations in specified areas.
- * Human activity including movement of people, operation of equipment or harassment by low-flying aircraft can result in desertion of traditional haul-out areas. Of particular importance is disturbance during critical pupping periods which can result in abandonment of pups. Areas of importance to marine mammals for hauling out or pupping need to be protected by regulations which will minimize disturbance.
- * Coastal residents do not depend on marine mammals to the extent they once did; nevertheless, it is necessary to recognize that a partial subsistence economy still exists of which marine mammals are an integral part. Management programs must be designed to insure marine mammals are allocated in sufficient numbers to satisfactorily meet subsistence requirements.
- * Marine mammals occurring in the Bering-Chukchi Sea are harvested by several foreign countries whose management policies may differ from those of the United States. If marine mammal species are to be managed on a truly comprehensive, coordinated basis, international cooperative agreements will have to be formulated between all parties concerned.

LIST OF MARINE MAMMAL SPECIES IN NORTHWESTERN ALASKA

	<u>Common Name</u>	<u>Scientific Name</u>
Seals	Bearded Seal	<i>Erignathus barbatus</i>
	Spotted Seal	<i>Phoca vitulina</i>
	Northern Fur Seal	<i>Callorhinus ursinus</i>
	Ringed Seal	<i>Phoca hispida</i>
Whales	Belukha Whale	<i>Delphinapterus leucas</i>
	Bowhead Whale	<i>Balaena mysticetus</i>
	Finback Whale	<i>Balaenoptera physalus</i>
	Gray Whale	<i>Eschrichtius gibbosus</i>
	Humpback Whale	<i>Megaptera novaeangliae</i>
	Killer Whale	<i>Orcinus orca</i>
	Minke Whale	<i>Balaenoptera acutorostrata</i>
	Narwhal	<i>Monodon monoceros</i>
Porpoises	Dall Porpoise	<i>Phocoenoides dalli</i>
	Harbor Porpoise	<i>Phocoena phocoena</i>
Other Marine Mammals	Pacific Walrus	<i>Odobenus rosmarus</i>

1A. BERING-CHUKCHI-BEAUFORT SEAS SEAL MANAGEMENT PLAN

LOCATION

In Game Management Units 17, 18, 22, 23 and 26, all waters of the Bering, Chukchi and Beaufort Seas and the adjacent land areas with the exception of the following: Bering Sea State Game Refuge, Hazen Bay State Game Refuge, Chamisso Island State Game Refuge, Sledge Island, and Besboro Island.

PRIMARY MANAGEMENT GOAL

To provide for an optimum harvest of seals.

SECONDARY MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy seals.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Harvest seals in numbers which will meet the requirements of coastal residents.
2. Regulate hunting seasons, bag limits, and methods and means of taking seals to provide for local use.
3. Accomodate the desire for recreational hunting for seals.
4. Encourage viewing and photography of seals.
5. Protect seals from adverse impacts of resource development.
6. Minimize disturbance on seal hauling grounds.
7. Encourage consideration of the requirements of seals in the management of seal food species.

THE SPECIES

Four species of ice-inhabiting hair seals occur in the Bering, Chukchi and Beaufort Seas. The total population is estimated at a minimum of 850,000 seals, and probably exceeds one million. Estimated minimum population by species is as follows: ringed seal 250,000; bearded seal 300,000; spotted seal (ice breeding only) 200,000; and ribbon seal 100,000.

Trends in abundance have been difficult to monitor since no satisfactory method of censusing seals has been developed. However indirect methods and relative indices of abundance indicate that populations of ringed, spotted, and bearded seals are high and probably stable. The ribbon seal population is relatively low following rather extensive commercial exploitation, principally by Russians during the 1960's. In recent years, Soviet regulations have accorded increased protection to this species.

Rates of natural mortality are unknown, although pup mortality appears to be relatively high, particularly for ringed seals where birth lairs are subject to destruction from moving ice and predation from polar bears. All species of seals may abandon pups under continued harassment. Polar bears, and killer whales kill a number of seals. The age structure

of the population reveals that individuals of most species are capable of attaining the age of 20 years or more. After one year of age natural mortality appears to be relatively constant at a low level in each age class. Although distribution is dependent on habitat requirements (often ice conditions), most seals undertake an annual migration or redistribution following the advance and retreat of the pack ice. Usually, the tendency to migrate is less pronounced in young seals.

Each of the four species exploits a slightly different ecological niche. Their distribution commonly overlaps, but each species usually is found in distinct geographical areas or habitat types. Ribbon seals tend to be pelagic in the summer and follow the "inner" ice edge in the winter. Spotted seals inhabit the "outer" ice edge in winter and remain near coastal areas or islands during the summer. Adult ringed seals are found predominately near areas of land-fast ice in the winter and in the broken polar ice of the Chukchi Sea in summer. Bearded seals prefer moving ice in the winter, usually south of Bering Strait, and the broken floes of the polar ice (over shallow water) in summer.

Ribbon seals are sleek speedy swimmers depending largely on fish; spotted seals are also fish eaters but favor the near shore varieties; ringed seals forage on zooplankton, shrimp, copepods, and other small marine organisms and bearded seals are bottom feeders relying mostly on crabs, small bottom fish, and mollusks.

Traditionally, seals were used by Alaska residents for food, oil, dog food, boat coverings, clothing and other practical items. A bounty, primarily to increase the local economy, was paid on seals taken north of 58 degrees North latitude from the early 60's until June of 1972. Natives presently depend on seals for some products, but the prevalence of cash has reduced this dependence. Prior to 1972 a few seals were taken by sport and recreational hunters, but these factions never accounted for more than 10 percent of the harvest in northern Alaska.

Until passage of the Marine Mammal Protection Act (MMPA), seals were hunted throughout the year with no limit. The Act permitted Eskimos, Indians and Aleuts to continue harvesting but nonnatives could not hunt seals or possess raw seal products. At no time in the last 15 years has the harvest of the northern seal species by Alaskans been responsible for a population decline.

The annual harvest of the four species of seals in Alaskan waters by American hunters since 1972 has been 7,000 to 9,000. This represents a substantial reduction from the early 1960's when the harvest averaged about 18,000 per year. A moderate decline in utilization related to cultural changes occurred in the latter part of the 1960's. However, the most pronounced impact on seals occurred with the passage of the MMPA. Since nonnatives could not possess raw products, this legislation restricted the sale of raw seal skins which had brought needed revenues to the villages. Hunting incentive was reduced because of a decreased demand for seal skins, and a decreased need for seal meat.

Recent studies indicate that the composition of the annual harvest is 62 percent ringed, 25 percent bearded, 12 percent spotted, and 1 percent ribbon seals. The seasonal distribution of the harvest is partially dependent on ice and other weather conditions. However, ringed seals are taken predominately from late winter through spring, bearded seals from April through July, spotted seals from June through October, and ribbon seals sporadically throughout the year. The composition of seal harvests is usually weighted in favor of males, which may reflect behavioral patterns rather than actual sex ratios in the population.

Seals are usually hunted on foot, by boat or a combination of both. Foot hunters usually walk to a suitable lead and wait for seals to surface, while boat hunters may pursue seals in open water or locate

seals resting on ice or land. Although winter hunting has been popular, the majority of seals are presently killed in spring during breakup or in fall before freeze-up.

PROBLEMS

- * Activities associated with oil and gas exploration, extraction, transportation, and refining and other industrial activities may alter seal habitat or result in direct mortality of seals. Excessive disturbance can cause abandonment of hauling areas. Several scheduled Outer Continental Shelf oil and gas lease areas are situated within important seal habitats. The Department should identify areas of critical seal habitat and encourage studies of habitat requirements and food chain relationships of seals. The Department should encourage regulation of industrial activities to minimize impacts on seals.
- * Foreign fishing fleets may compete with seals for certain fish stocks. Excessive fishing may lower seal carrying capacity. The Department should encourage population studies of major seal food species and request that those stocks be managed in a manner that will maintain the seal population.
- * The wide distribution of seals and the environment in which they live make population censuses difficult. The Department should continue to promote research programs which will provide this information.
- * Regulations of the U. S. Department of Commerce, under the Marine Mammal Protection Act of 1972, prohibit the taking of seals by nonnatives and restrict commercial uses. This has resulted in the unnecessary loss of income to coastal residents. The Department should continue to press for return of seal management authority to the State of Alaska and reinstate regulations allowing all citizens who have a need to take seals and to sell the byproducts, rather than encourage their waste.

IMPACTS

- * The sustenance requirements of coastal residents will be met.
- * If management authority for seals is returned to the State, recreational hunters will probably share in the harvest in the future.
- * Some increase in the harvest can be expected.
- * Access and number of users may be limited in sensitive areas such as hauling grounds.
- * Guiding services may increase in coastal villages.
- * The sale of seal products may increase.

1B. BERING-CHUKCHI-BEAUFORT SEAS WALRUS MANAGEMENT PLAN

LOCATION

Within Game Management Units 18, 22, 23 and 26, all waters of the Bering, Chukchi and Beaufort Seas and the adjacent coastline with the exception of the following: Bering Sea State Game Refuge, Hazen Bay State Game Refuge, Chamisso Island State Game Refuge, Sledge Island and Besboro Island.

PRIMARY MANAGEMENT GOAL

To provide for an optimum harvest of walrus.

SECONDARY MANAGEMENT GOAL

To provide an opportunity to take large walrus.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain a maximum annual retrieved harvest of 3,000 walrus or less, of which the majority will be allocated to local residents dependent on walrus for food.
2. Regulate hunting seasons, bag limits and method and means of taking walrus to provide for local use.
3. Achieve less wasteful use of walrus and walrus products.
4. Accommodate the desire for recreational hunting for walrus.
5. Encourage viewing and photography of walrus.
6. Discourage off-shore development that might adversely impact walrus.

THE SPECIES

Present estimates place the Bering and Chukchi walrus population at about 170,000 individuals and slowly increasing. There has been an apparent decline in productivity, perhaps associated with depletion of major food species in wintering areas. The walrus population was estimated to contain about 200,000 animals prior to the 1850's. Whalers began taking walrus for oil and ivory around 1868, and during the next two decades severely reduced the population with annual harvests which occasionally approached 40,000. Commercial hunting continued into the 20th century on a reduced scale. During the late 1920's and 30's walrus probably reached their lowest level. With the cessation of commercial exploitation, hunting was primarily by local Natives, and the population began to slowly recover. By the early 1950's the population had increased to more than 50,000 walrus. At that time there was a slight revival in commercial utilization as the demand for ivory increased. Annual native harvests increased, but the population continued its rapid growth. After 1961 herd productivity improved as a result of a regulation limiting the take of females. In the late 1960's the Russians imposed a quota system which reduced annual harvests and further assisted population growth. The walrus population may currently be nearing carrying capacity, although it continues to increase one to five percent per year, depending on the magnitude of annual harvests. Recent trends of harvest and use of walrus by Alaska Natives may pose a serious conservation problem.

Walrus may migrate 2,000 miles from their wintering areas in the Bering Sea to their summer range in the Arctic Ocean. The northward spring migration usually begins in March, but its timing is partially dependent on weather and ice conditions. The migration indicates some distinct patterns with parturient females and those supporting young calves migrating first, followed later by bulls and barren cows. During the fall migration the order is reversed although the sexes may be more mixed.

In recent years calf production seems to have decreased. This may be a response to a reduced food supply or other density-dependent factors. Some natural mortality of walrus results from trampling by stampeding animals disturbed after hauling out in large concentrations.

To date walrus habitat has remained relatively unaffected by man's activities. Proposed offshore development may pose a threat in the future. Studies indicate the walrus may have reduced the carrying capacity of their range by over-utilization of preferred species of clams in a portion of their wintering areas (predominately south of St. Lawrence Island).

Coastal natives take 95 percent or more of the annual harvest. Walrus were traditionally used to supply a variety of products, such as skin coverings for boats, harpoon lines, dog food, oil, meat, and ivory for carvings. The walrus is still important in providing some of these items on a reduced scale. However, ivory has become an important element in the transition to a cash oriented economy. Villages near Bering Strait may obtain up to 90 percent of their income from the sale of raw or carved ivory. The increased demand for ivory has resulted in walrus being taken in excess of the numbers required for food by Eskimo communities, leading to considerable waste.

Although at least 42 villages have taken walrus in the past, most of the annual kill is taken at 15 sites. Four villages usually take over 70 percent of the total annual kill. In the last 15 years the annual retrieved harvest has been approximately 1,600 animals, of which an average of 20 percent have been females. The actual kill including hunting loss is usually from 1 to 2 1/2 times the retrieved kill, depending on the experience of the crew and the hunting conditions. The total annual Alaska kill has averaged a little over 3,000; about 90 percent of the annual kill occurs between May and July, about 4 percent in winter, and about 6 percent in fall.

Prior to the Marine Mammal Protection Act in 1972 which prevented nonnatives from taking marine mammals, less than 100 walrus were taken by sport hunters. While this had a minor impact on the harvest, guiding sport hunters became a major source of income to the villages. In some villages such as Gambell and Savoonga it may have contributed up to 20 percent of the income during May and June. In April 1976 walrus management authority was returned to the State of Alaska and hunting by nonnatives again became legal.

Most walrus are killed with the aid of a boat, usually while the animals are hauled out on ice. A few walrus may occasionally be shot from the ice edge while the hunter is on foot. In the ice free months walrus may be hunted in open water. Animals are usually first wounded so they can be approached closely, harpooned, and dispatched without loss.

PROBLEMS

- * The number of ivory carvers is increasing every year in response to demand for ivory products. This encourages wasteful hunting practices. The Department should maintain strict control on the purchase and sale of raw ivory, discourage wasteful hunting practices and encourage

alternate income-producing uses of walrus such as guiding sport hunters and photographers.

- * The high wounding and sinking loss is a waste of a valuable resource. The Department will encourage improvement of hunting methods to reduce loss.
- * Offshore oil development may adversely impact the marine ecosystem. The Department should identify areas of critical walrus habitat and encourage studies of habitat requirements of walrus and elements in their food chain. The Department should encourage regulation of offshore activities to minimize impacts on walrus.

IMPACTS

- * The walrus population will probably continue to grow slowly until it reaches or exceeds the carrying capacity of its habitat.
- * Regulations will be established providing preference of use for coastal residents depending on walrus for food.
- * More restrictions may be placed on hunting methods and means, seasons and bag limits as required for the conservation of walruses.

1c. BERING-CHUKCHI-BEAUFORT SEAS BELUKHA MANAGEMENT PLAN

LOCATION

In Game Management Units 9, 10, 18-19, 21-23 and 26, all waters of the Bering, Chukchi and Beaufort Seas and all waters draining into them.

MANAGEMENT GOAL

To provide for an optimum harvest of belukha whales.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain belukha hunting seasons and bag limits to accomodate local needs.
2. Minimize conflicts with fisheries by use of nonlethal techniques of belukha control.
3. Where appropriate limit human activity that might cause abandonment by belukhas of critical habitat.
4. Encourage consideration of the food requirements of belukhas in fisheries management.

THE SPECIES

Belukha whales are common along the Alaska coast as far south as Bristol Bay. They are gregarious and may travel in groups of hundreds of whales. Belukhas often ascend rivers. In shallow rivers such as the Kvichak they often travel as much as 30 to 40 miles upstream on very high tides. In deep rivers such as the Yukon, they may travel upstream beyond the tidal influence. Belukhas are occasionally sighted at Nulato, 450 miles upstream on the Yukon River.

Belukhas in the Bering, Chukchi and Beaufort Seas are considered to be one population. The Bristol Bay component is estimated to total 1,500 animals, while observations and aerial and vessel sightings indicate that the Bering, Chukchi and Beaufort Seas component must be comprised of at least 8,000 individuals. The total population may be substantially larger than 9500, however. The population has never been subjected to heavy rates of exploitation and is believed to be near the carrying capacity of its habitat.

Studies in Kvichak Bay have demonstrated that belukhas can be significant predators on salmon and may compete with man for this resource. The Department has developed a technique of transmitting killer whale sounds underwater to repel belukhas from key areas to minimize their impact on salmon populations.

Belukhas in Alaska have never been subjected to heavy rates of exploitation. Belukhas have traditionally been used as a source of meat, muktuk and oil for both humans and dogs in certain villages on the Bering Sea and Arctic Ocean coasts and along rivers that belukhas periodically ascend. The decrease in numbers of sled dogs (a result of the introduction of the snow machine), the availability of alternate commercial food sources through the development of a cash economy, and welfare measures such as food stamps have greatly reduced the demand for belukha products. This is particularly true in the southern portions of the belukha's range. From Norton Sound north, belukhas are still taken regularly in some

communities. The recent average annual harvest of belukhas has been 150-300 animals. Some additional loss of animals killed but not recovered occurs. The number of belukhas killed by hunting is small in relation to the population size.

PROBLEMS

- * Activities associated with resource development, industry and concentrated human settlement may result in direct mortality of belukhas, or they may alter beluga habitat. The Department should identify areas of critical belukha habitat and encourage studies of habitat requirements of belukhas and elements in their food chain. The Department should encourage regulation of human activities to minimize impacts on belukhas.
- * Conflicts between belukhas and commercial fisheries may occur. Where such conflicts are clearly demonstrated and significant, the Department should use nonlethal methods (such as the use of underwater sound transmissions) to minimize these conflicts.
- * The Marine Mammal Protection Act of 1972 prohibited the taking of belukhas by all individuals except Eskimos, Indians and Aleuts. The Department should continue to press for return of belukha management authority to the State of Alaska and promote regulations that would permit all individuals to harvest belukhas.

IMPACTS

- * Opportunities to harvest belukhas will probably continue to exceed the demand.
- * Belukha populations will remain at or near carrying capacity.
- * Opportunities to view and photograph belukhas will remain high.
- * Conflicts with fisheries should be minimized with little impact on the belukha population.

2. SLEDGE-BESBORO ISLANDS WALRUS MANAGEMENT PLAN

LOCATION

In Game Management Unit 22, Sledge Island 20 miles west of Nome and Besboro Island 24 miles northeast of Unalakleet.

PRIMARY MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy walrus.

SECONDARY MANAGEMENT GOAL

To provide an opportunity for the scientific and educational study of walrus.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Establish sanctuaries in the northern Bering Sea where human disturbance to walrus on land can be minimized.
2. Prohibit hunting for walrus within a 3 mile radius of Sledge and Besboro Islands.
3. Encourage public observation of walrus when this activity is consistent with the protection of hauling grounds.
4. Promote scientific studies on walrus hauling grounds when appropriate.

THE SPECIES

Present estimates place the Bering and Chukchi walrus population at about 170,000 animals. Commercial exploitation from the late 1800's to the early part of the 20th century reduced the population to less than 40,000. Since then it has recovered to its present level and appears to be slowly increasing. The annual retrieved harvest has averaged about 1,600 animals while the total Alaska kill exceeds 3,000.

Females produce one calf every two or three years. The rate of natural mortality is unknown, although it is suspected to have increased in recent years. The adult mortality rate is estimated at less than five percent due largely to accidents, disease, and predation by killer whales.

The walrus undertakes an annual migration from the Arctic Ocean in summer to the central Bering Sea in winter. Throughout its range walrus utilize hauling grounds which serve as resting and feeding areas as well as gathering points for social interaction. Islands on the migration route and those which afford sanctuary are used most often, although such locations are limited. Some sites may be utilized by over 10,000 animals at the same time.

In 1971 over 1,000 walrus used Sledge Island as a summer resting area, but they moved north after continued harassment by hunters. Since 1971, the island has been used sporadically as a hauling ground. Although Besboro Island is less ideally situated, it has also been used as a hauling ground. Walrus return to islands that have been afforded protection from hunting (Walrus Island and Big Diomedes) each year in increasing numbers.

Although hunting has been the dominate use of the walrus, scientific study has been important in determining the role of the animals in the marine ecosystem. Viewing is becoming more popular as the marine mammals receive increasing national publicity. Walrus using Sledge or Besboro Island as a hauling ground could be viewed by undertaking a relatively short boat ride from Nome or Unalakleet, respectively.

PROBLEMS

- * Implementation of this plan will depend on compliance with regulations by hunters who have traditionally hunted on these islands. The Department should encourage compliance by explaining the purposes of regulations, to the hunters, the role of the islands in attracting walrus to the area and the potential economic opportunities for guiding and transporting viewers, photographers, and scientists.
- * Excessive human disturbance can cause abandonment of hauling areas. If disturbance becomes excessive the Department should implement controls on access and activities of viewers to the islands.

IMPACTS

- * Use of Sledge and Besboro Islands as hunting areas or bases for hunting would be lost. However, hunting opportunities in the surrounding area may be enhanced if the islands serve to attract and hold walrus in the area for longer periods.
- * If walrus use the islands on a regular basis, they will attract a large number of nonconsumptive users which in turn will increase the local economy.
- * These walrus viewing areas will be an asset to both the public and scientific community.

UNCLASSIFIED GAME IN NORTHWESTERN ALASKA

LAND AND SHORE BIRDS

Alaska, despite its large size, has a comparatively limited variety of birds as a result of the rather uniform character of the habitats occurring in the state. Only 325 species have been recognized as occurring in Alaska. About half of the total are waterbirds, a relatively high proportion in comparison to most other states and indicative of the extent and importance of marine and freshwater habitats. About 170 species are landbirds, roughly divisible into groups inhabiting tundra, interior forest and coastal forest habitats. Less than one-fourth of the species occurring in Alaska are permanent residents of the state. The majority of species are new-world forms which migrate to Alaska to breed. In addition a few old-world species breed in Alaska and about a dozen species migrate to or through, but do not breed in, the state.

Nongame birds of Northwestern Alaska occupy a variety of habitats including spruce, spruce-birch and birch-poplar forests, streamside alder and willow thickets, tundra, and sedge-grass marshes. About 58 species of nongame birds occur in Northwestern Alaska, with about 11 species staying year-round. The region achieves some faunal distinction by its proximity to the Bering Straits, which results in a number of Asiatic species such as dotterels, Kennicott's arctic warblers and red-spotted bluethroats visiting Alaska during the summer. The interface between sub-arctic forest and arctic tundra in the northern portion of this region results in an abrupt transition zone where the range of many bird species terminates. The extensive waterways, lakes and marshes are occupied by more than 20 species of swallows, shorebirds, cranes, loons and grebes. Small passerine species that use the alder-willow thickets along rivers and streams include tree sparrows, Wilson's and yellow warblers and yellow wagtails. The interior spruce-birch forest and forest edges harbor typical forest species such as ruby-crowned kinglets, fox sparrows, slate-colored juncos and black-poll and myrtle warblers. Common tundra species include snow buntings, lapland longspurs, golden plovers and the ubiquitous savannah sparrows. Ravens, gray jays and redpolls are the most common permanent residents.

Little use of nongame birds occurs in the region except in the vicinity of Nome where bird watching is enjoyed by increasing numbers of visitors in the summer. In addition, many species of nongame birds that breed in Northwestern Alaska migrate seasonally and extensive observational and photographic use of these populations may occur in other areas of North America. Besides direct use, many outdoor activities are esthetically enriched by the sight and sound of nongame birds.

SEABIRDS

During summer months the islands and coastal habitat of Northwestern Alaska support millions of nesting seabirds. St. Lawrence, Little Diomed and King Islands, and Cape Lisburne on the mainland all maintain breeding colonies of 1 million or more birds. Colonies containing 50,000-1,000,000 birds occur at Cape Thompson, Fairway Rock, Bluff, and Cape Denbigh. Principal nesting species are pelagic cormorants, northern fulmars, glaucous gulls, black-legged kittiwakes, common and thick-billed murrelets, and 8 species of small alcids. Numbers vary with the seasons. Spring migrations tend to follow leads or cracks in the ice with resultant concentration of birds at such places. The distribution of birds in summer is centered around colonies. Nonbreeding shearwaters and fulmars tend to concentrate around upwellings where food sources are greatest. Little data is available to determine exact population trends, but seabird numbers are known to fluctuate in Northwestern Alaska.

Nesting habitat requirements vary between species. Principal requirements appear to be isolation, steep seaside cliffs or grassy slopes, and a limited amount of predation or other disturbance. Presence of abundant food resources within feeding range is also a critical factor. Huge colonies occur where these factors are concurrent on a large scale.

Cliff nesting species include cormorants, kittiwakes, and many alcids. Murres and glaucous gulls utilize cliff ledges by preference but also nest on exposed ground. Puffins and auklets use either crevices among rocks or burrows in steep banks. Crevice and burrow nesters tend to be crepuscular or nocturnal in their return to the nest and feed at greater distances from the colony than do cliff nesters.

Seabirds of Northwestern Alaska breed later than birds in more southerly colonies; egg laying reaches a peak in June rather than May. High summer oceanic productivity provides abundant food which supports rapid growth of nestlings. The principal food of cormorants and alcids is small fish such as cod and capelin. For some species like the horned puffin, these are augmented by squid, crustaceans, and mollusks. Crested, least and parakeet auklets are plankton feeders. Gulls and jaegers are scavengers that also prey on eggs and nestlings of other species of birds. Numerous small alcids provide abundant prey for peregrine falcons. Nesting birds, particularly burrow and crevice-nesters, also fall prey to foxes and mustelids.

Natives have traditionally used seabirds as an important source of food in the spring. Eggs are still being collected for food, but the degree of use is diminishing. Relatively few adults are taken. Nonconsumptive use by viewers and photographers is increasing.

Seabirds have proved susceptible to chronic oil pollution. As many as 400,000 die each year in the Atlantic from this cause. Pelagic birds may provide valuable data as biological monitors of marine habitat degradation, particularly from oil pollution.

RAPTORS

Raptors* which occur in Northwestern Alaska include the golden eagle, osprey, rough-legged, marsh and sharp-shinned hawks, goshawk, gyrfalcon, peregrine falcon, merlin, kestrel, and short-eared, snowy, great-horned, and boreal owls. Except for the goshawk and gyrfalcon, raptors are present in the Northwestern Region as summer residents only. There also have been records of a few eagles overwintering. Migration times vary among species and with seasonal weather patterns, but summer residents generally arrive in the region in May and leave during August and September.

Goshawks, gyrfalcons and snowy owls appear to be at moderate densities, although marked fluctuations in abundance occur over time. These fluctuations are often localized and are thought to occur in response to changes in prey abundance. Although comparative data from earlier periods are not available, general observations suggest that, except for the endangered peregrine falcon, migratory species occurring in Northwestern Alaska are currently at moderate levels of abundance. Breeding populations of ospreys, greatly reduced in eastern and southern North America, do not appear seriously low at this time in Alaska. Most osprey breeding populations in Northwestern Alaska occur along the Kobuk River system.

Peregrine falcon numbers apparently have declined from former levels. The species is presently found in very low numbers in Northwestern Alaska. This decline has coincided with the documented declines of peregrine falcons throughout the world and is thought to be primarily the result of chemical contamination. Because of marked declines in other portions of the continent, remaining peregrine populations in Northwestern Alaska are of importance in maintaining viable populations.

* A list of raptor species considered in these plans follows this regional account.

Some of the highest gyrfalcon densities in Alaska are found in the Northwestern Region, especially in the western half of the Seward Peninsula. The numerous large rock outcrops in this area provide excellent raptor nesting habitat. An abundance of other nesting bird species, ground squirrels and other small mammals provide a ready supply of prey species for the gyrfalcons. Gyrfalcons, rough-legged hawks, golden eagles and ravens utilize similar nesting habitat and all of these species commonly occupy the same or adjacent nesting sites over the course of a few years. More than 165 nest sites are known and more than 300 are estimated to have been active over the entire peninsula in recent years.

Raptors range widely in hunting activity, using a combination of vegetation types as foraging habitat during the nesting season. Nevertheless, the various species display marked preferences for particular types of nesting sites. Ospreys select lowland forests along river or lake systems as nesting habitat. Golden eagles, gyrfalcons and rough-legged hawks prefer to nest on cliffs. The kestrels and owls, except for the short-eared owl, are principally tree-nesters, and are found throughout forested regions. The peregrine falcon nests on cliffs along major river systems. The marsh hawk and short-eared owl are the only consistent ground nesters in the Northwestern Region. Both of these species select open areas for nesting, but unlike marsh hawks, nesting short-eared owls occur in tundra and forested habitats. Except for gyrfalcons which remain in tundra areas throughout the year, resident raptors range widely in the winter over all major habitat types in search of food.

Raptors do not have high reproductive potentials and, like many other predators, exist at relatively low densities. Given adequate nesting conditions, raptor abundance depends primarily on the abundance and condition of the prey populations. The diet of raptors as a group in Northwestern Alaska varies seasonally and encompasses a wide array of species including birds, mammals, fish and insects. The abundance and distribution of these prey species are important, and diseases or harmful residues carried by these species are of prime concern. Many of the common diseases carried by domestic fowl and by wild gallinaceous birds are known to be transmissible to raptors. Pesticide residues have been cited as the primary factor responsible for declines in peregrine falcon numbers, not only in Alaska, but throughout the world. Because little work has been done with migratory raptor species in Alaska other than Peregrines, it is not certain whether toxic chemical residues have seriously depressed populations of these species. Findings presently available indicate that residues are not significantly affecting resident gyrfalcon populations.

Observation, photography and enrichment of wilderness experiences are recognized by the Department as the primary uses of raptors. However, the taking of a limited number of goshawks, gyrfalcons and kestrels under a tightly regulated falconry permit system is compatible with nonconsumptive uses. The number of persons interested in raptors for falconry purposes has been low in the past and has included Alaska residents, nonresidents and aliens. There has been a slight increase in interest during the last five years. The number of permits issued in 1974 was less than 30, but the demand for birds to be used for falconry is expected to increase. The white color phase of the gyrfalcon is one of the most prized birds of prey by falconers.

SMALL MAMMALS

Distributions of small mammal* populations in Northwestern Alaska are relatively poorly known. About 12 species are found including the house mouse and rat, both introduced species associated with human habitations. Of the indigenous species, the collared and brown lemmings, the tundra

* A list of small mammal species considered in these plans follows this regional account.

and red-backed voles, and the common and tundra shrews are distributed throughout the Northwestern Region mainland. Two additional species of voles also occur in the region. The Alaska vole is found throughout the region north of Norton Bay, while the meadow vole is found south of the Noatak River and north of the Buckland River. In addition to the red-back vole, St. Lawrence Island also has one species of lemming and one species of vole which are unique to the island. Other small mammals include the meadow vole and the vagrant dusky shrew.

Habitat requirements are as varied as the number of species found in this group. The lemmings require treeless tundra, while other species such as the common shrew or red-backed vole are adapted to a variety of habitats such as marshy, grassy, or forested areas.

Due to the high reproductive capacity of many of these species, the main factor limiting numbers is the availability of food. Voles and lemmings in particular are noted for rhythmic fluctuations in numbers, generally with 3 to 4 years between peaks. The slow-growing vegetation in alpine or tundra habitats is rapidly exhausted by dense microtine populations, resulting in population "crashes" or movements.

Small mammals are an extremely important source of food for many terrestrial and avian predators. Most carnivorous furbearers utilize rodents as food and when populations of these small mammals are high they form a significant part of the summer diet of foxes, wolves and bears. Avian predators such as jaegers and many raptors utilize rodents.

PROBLEMS

- * Many migratory bird species are exposed to contamination by chemical pollutants, especially insecticides and herbicides. Such compounds may seriously affect populations, either by causing direct mortality or by lowering reproductive success. Decreased populations of peregrine falcons resulting from chemical residues found outside Alaska are well documented. While other Alaskan raptors, seabirds and other nongame birds do not currently appear to be seriously affected by chemical residues, migrant species may experience declines in the future. Use of pesticides and other potentially harmful compounds is limited in Alaska at this time. Strict measures should be taken to control the future use of such chemicals within the State.
- * Concentrations of seabirds in colonies and around marine food sources make them especially vulnerable to oil pollution. Oil development provides a potential for tremendous losses of seabirds from large oil spills, and seabird losses to chronic low-level pollution are possible. Baseline data on colonies should be gathered, and surveys of dead or affected birds on beaches should be conducted to provide comparative data for assessment of oil impacts.
- * Ocean floor mining operations for gold, platinum and other heavy metals may alter productivity of near shore waters through siltation, and thereby affect seabirds directly or indirectly dependent on planktonic production for food. Mining may also disturb bluff and cliff nesting seabirds. Mining should be regulated so as to minimize impacts on seabirds.
- * Cliff nesting seabirds are susceptible to disturbances that cause egg and nestling losses. Nonconsumptive use will continue to increase with a corresponding increase in disturbance. Colony trends should be recorded. If numbers decline in high use areas, numbers and activities of visitors should be restricted.

- * Critical nesting habitat must be preserved if raptor populations are to be maintained in the future. Disturbances at nest sites during critical stages of the nesting seasons such as the egg laying, incubation and early brooding phases, have probably been the major cause of direct, human-induced reproductive failure. Therefore, protection of raptor nesting habitat must include the following: 1) physical preservation of the nest sites; 2) preservation of the general nesting areas including feeding habitat; and 3) protection of the nesting areas from excessive human disturbance.
- * The extremely high value placed on the endangered peregrine falcon and on gyrfalcons by falconers and collectors around the world creates incentive for illegal traffic in these birds. Laws and regulations must be stringently enforced to minimize illegal use of raptors. Falconry is a legitimate and sporting method of hunting, and its practice poses no threat to the raptor resource when decisions regarding the number of raptors to be used annually for this purpose are based on the sustained yield principle.

LIST OF RAPTOR SPECIES IN NORTHWESTERN ALASKA

	<u>Common Name</u>	<u>Scientific Name</u>
Eagles	Bald Eagle	<i>Haliaeetus leucocephalus</i>
	Golden Eagle	<i>Aquila chrysaetos</i>
	Osprey	<i>Pandion haliaetus</i>
Hawks	Goshawk	<i>Accipiter gentilis</i>
	Sharpshinned Hawk	<i>Accipiter striatus</i>
	Rough-legged Hawk	<i>Buteo lagopus</i>
	Marsh Hawk	<i>Circus cyaneus</i>
Falcons	Gyrfalcon	<i>Falco rusticolus</i>
	Peregrine Falcon	<i>Falco peregrinus</i>
	Merlin (Pigeon Hawk)	<i>Falco columbarius</i>
Owls	Great Horned Owl	<i>Bubo virginianus</i>
	Snowy Owl	<i>Nyctea scandiaca</i>
	Hawk Owl	<i>Surnia ulula</i>
	Long-eared Owl	<i>Asio otus</i>
	Short-eared Owl	<i>Asio flammeus</i>

LIST OF SMALL MAMMALS IN NORTHWESTERN ALASKA

	<u>Common Name</u>	<u>Scientific Name</u>
Shrews	Common Shrew	<i>Sorex cinereus</i>
	Tundra Shrew	<i>Sorex tundrensis</i>

Rodents

Collared Lemming
Brown Lemming
Red-backed Vole
Meadow Vole
Tundra Vole
Alaska Vole
House Mouse
Rat
Porcupine

Dicrostonyx groenlandicus
Lemmus trimucronatus
Clethrionomys rutilus
Microtus pennsylvanicus
Microtus oeconomus
Microtus miurus
Mus musculus
Rattus norvegicus
Erethizon dorsatum

1A. ALASKA RAPTOR MANAGEMENT PLAN

LOCATION

The entire state of Alaska.

PRIMARY MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy raptors.

SECONDARY MANAGEMENT GOAL

To provide an opportunity for scientific and educational study of raptors.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Protect raptor populations from unnatural disturbance and harassment.
2. Discourage resource utilization that may adversely impact raptor nesting, roosting and feeding areas.
3. Develop public appreciation of raptor importance in the ecosystem.
4. Encourage viewing and photography of raptors.
5. Promote scientific studies of raptors.
6. Provide for limited utilization of selected raptor species for falconry.

THE SPECIES

About 22 species of hawks, falcons, eagles and owls occur regularly within the state. Detailed population data for raptors are lacking. Accurate censuses of raptors are difficult because of the secretive behavior of many species, and the wide distribution but low density of most species.

International concern has resulted from the worldwide decline of the endangered peregrine falcon. Alaska and northern Canada provide the last extensive nesting populations of peregrines in North America. Population estimates for Alaska range from 175 to more than 300 nesting pairs. However, much of the potential nesting habitat has not been surveyed and the population may be even larger.

Kestrels, marsh hawks and short-eared owls are seasonally among the most abundant raptors. Conspicuous species such as rough-legged and Swainson's hawks, and great-horned owls are probably most commonly observed. Southcentral Alaska supports the greatest variety of species due to the diversity of habitats present in the region.

While raptor habitat throughout Alaska has remained relatively stable, populations have fluctuated annually, largely in response to other environmental factors. Local habitat changes have occurred in areas of urban development, agriculture, or transportation corridors and have, in addition to disturbance associated with human activity in such areas, reduced local raptor populations, particularly nesting populations.

Viewing, photography and enrichment of wilderness experience are significant, but unmeasurable uses of the raptor resource. With increased human

population growth in Alaska these uses will increase. Use of raptors for falconry has not been a common practice in Alaska, although a few individuals do practice the sport. Alaskan peregrine falcons and gyrfalcons have been taken for use by falconers in other parts of the world; however, with protection under the Endangered Species Act and the Migratory Bird Treaty Act, protection or closely controlled utilization of raptors in Alaska was effected. Currently, use of goshawks is allowed under the terms of a permit. At least one species of raptor, the snowy owl, is utilized for domestic consumption by residents of Northwestern and Arctic Alaska.

PROBLEMS

- * Disturbances at nest sites during critical stages of the nesting season such as egg laying, incubation and early brooding stages, have probably been the major cause of direct, human induced reproductive failure. In view of increased human activity throughout the state, critical habitat, particularly that associated with nesting raptors, must be preserved if raptor populations are to be maintained in the future. Identification of important raptor habitats and quantitative population information are required for meaningful management decisions. Multi-agency collaboration would be the most effective approach.
- * Of special concern is the accumulation of pesticide residues in raptors and their prey. Although pesticides are used to a very limited extent in Alaska, raptors are subjected to contamination from contaminated prey that migrates into Alaska and from contaminated prey consumed in southern wintering areas. Over a period of time these residues concentrate within raptor tissues and eventually reach levels sufficient to reduce reproductive success. Decrease in eggshell thickness, a symptom of such contamination, has been documented for peregrine falcons nesting in Arctic Alaska. National and international efforts to reduce environmental burdens of implicated chemical contaminants must be encouraged.
- * Indiscriminate shooting of raptors occurs near human population centers. Public attitudes toward raptors must be improved by increasing public awareness of the value of raptors.

IMPACTS

- * Increased interest in raptors by nonconsumptive users may necessitate strict controls governing the season, duration and types of activities during periods of use. This may be especially true when photography or viewing of nesting raptors is involved.
- * Falconry will continue to be allowed on selected species under provisions of a closely controlled permit program. The delineation or management of critical habitat for raptors may alter management of other wildlife species and restrict or inhibit resource development in selected areas.
- * Critical nesting habitat will be protected through specific land classification procedures.

1B. ALASKA BALD EAGLE MANAGEMENT PLAN

LOCATION

Entire state of Alaska.

PRIMARY MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy bald eagles.

SECONDARY MANAGEMENT GOAL

To provide an opportunity for scientific and educational study of bald eagles.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Encourage public awareness of bald eagle ecology.
2. Discourage resource utilization that may adversely impact bald eagle nesting, roosting and feeding areas.
3. Protect bald eagles from unnatural disturbance and harassment.
4. Identify areas best suited for viewing, photography and scientific study of eagles and encourage their wise use.
5. Discourage viewing and photography during critical nesting periods.

THE SPECIES

The highly productive coastal zone areas of Southeastern Alaska, the Gulf of Alaska, and the southwestern coast to the Aleutian Islands support the largest populations of bald eagles in North America. Eagles are also found along major inland drainages of Western and Southcentral Alaska, although not in the densities present in coastal areas. Numbers of eagles within the state vary seasonally. Summer populations exceed 50,000 birds, but migrations reduce the total substantially by winter. Spawning cycles of several fish, primarily salmon and herring, cause spectacular concentrations of eagles in some coastal streams and spawning grounds. Noteworthy concentration areas include the lower drainages of the Chilkat and Stikine rivers, and coastal shorelines near Klawock and Craig.

Nesting pairs are distributed throughout the species' range. Surveys in Southeastern Alaska have revealed at least 1,709 eagle nests with less than 50 percent of the habitat surveyed. Additional nesting concentrations occur in Prince William Sound, the Kodiak Archipelago and along some Aleutian Island sea cliff habitat.

In the past, persecution of eagles by commercial fishermen was predicated on the belief that eagles had significant adverse impacts on the salmon fishery. At one time bounties on eagles were offered to provide incentive for their reduction. Since 1953 the bald eagle has received complete protection under law, and populations in Alaska have remained healthy. Nonconsumptive uses include viewing and photography, especially at feeding concentration sites. In addition, scientific studies of eagles in Alaska provide ecological bases of comparison for evaluating status and trends of endangered bald eagle populations in other parts of the country.

PROBLEMS

- * With increasing recreational viewing and photography of eagles, greater disturbance and harassment can be expected. Nonconsumptive use that is not detrimental to bald eagles should be encouraged, but at the same time measures should be taken to limit numbers and activities of users during critical nesting periods.
- * Pollution of coastal tidelands and estuaries by oil or oil industry-related contaminants poses a critical threat to bald eagles and their habitat. Massive Outer Continental Shelf oil development and tanker traffic in Prince William Sound, Bristol Bay and the Aleutian Islands could devastate coastal habitat in the state if all possible precautions are not taken. Baseline quantitative and qualitative data on coastal bird habitats are needed before oil impacts are made in order to provide rational recommendations for future oil spill cleanup procedures and to document the effects of estuary contamination for mitigation measures. Continued efforts by the State, U.S. Forest Service and U.S. Fish and Wildlife Service will identify and quantify the effects of these potential problems.
- * Although bald eagles are protected by law, many are killed by ignorant or misinformed people. The Department should encourage greater public understanding and appreciation of the values of eagles. Strict enforcement of existing protective laws by federal and state agencies should be maintained.
- * Logging of forests on private lands, not subject to Forest Service requirements protecting eagle nest trees in national forests, may result in the loss of nesting habitat in some areas. Private logging interests should be encouraged to safeguard eagle nest trees on private lands. The Department should cooperate with federal agencies in identifying existing eagle nest sites.
- * Alaskan bald eagles, like other raptors, are susceptible to chemical contamination of the environment. Those eagles which migrate south for the winter are subject to greater contamination than birds resident within Alaska. Although present levels of contaminants are probably low in Alaskan birds, increased use of pesticides or herbicides in the state could have serious detrimental effects on eagles. Future use of such chemicals in Alaska should be closely controlled.

IMPACTS

- * Delineation and management of critical eagle habitat areas may restrict resource development activities within such areas.
- * Controls on numbers and activities of nonconsumptive users will become necessary to protect eagles in some areas as user numbers increase.

5. SERPENTINE HOT SPRINGS GYRFALCON MANAGEMENT PLAN

LOCATION

In Game Management Unit 22, all drainages of Hot Springs Creek above its confluence with the Serpentine River.

PRIMARY MANAGEMENT GOAL

To provide an opportunity for scientific and educational study of gyrfalcons.

SECONDARY MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy gyrfalcons.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Encourage scientific and educational studies of raptor ecology.
2. Protect raptor populations from unnatural disturbances and harassment.
3. Discourage land use practices that are detrimental to raptor nesting habitat.
4. Allow limited viewing when it does not disturb nesting raptors or conflict with scientific studies.

THE SPECIES

The drainages around Serpentine Hot Springs support a relatively high density of breeding gyrfalcons. At least 15 known raptor nesting sites, most of which are gyrfalcon sites, exist in a 10-square mile area near the springs. Surveys in 1975 revealed at least two breeding pairs of gyrfalcons; as many as 6 pairs have used the area in the past. Rough-legged hawks, golden eagles, and other raptors have also established active eyries in the vicinity.

The area has received relatively heavy human use in the past from miners and recreationists. A building was erected on the premises to lodge guests, and, although it is in need of repair, the hot springs continue to receive some use, particularly in the winter months. Summer use is restricted because access can only be gained by light aircraft or all-terrain vehicles. The limited human use of the area has not created any serious habitat degradation, but construction of a road to the site would adversely impact nesting habitat.

Little if any consumptive or nonconsumptive use of falcons has occurred in the area. Several years ago birds were killed because they were considered a nuisance, but that practice has largely ceased. In the late 1960's this area was included in a raptor investigation to learn more about distribution, numbers, breeding success, and other life history parameters.

PROBLEMS

- * With increasing human populations in Nome and Kotzebue, an increase in recreational use of the Serpentine Hot Springs is expected. This will result in disturbance and harassment of nesting raptors, particularly if a road is constructed allowing unlimited summer

access to the springs. Construction of a road or development of existing mining claims in the area also could adversely affect nesting raptors through alteration of habitat and disturbance. Critical nesting sites and important raptor habitat should be identified and human activities should be controlled near such locations to minimize adverse impacts on raptors.

- * Enforcement of regulations protecting raptors has been limited in the past. With increasing human use in the area, the potential for indiscriminate shooting of raptors and illegal removal by collectors or falconers will increase. Increased enforcement efforts will be required, and the public must be made more aware of the role and value of raptors in the northern ecosystem.

IMPACTS

- * Increased knowledge of raptor ecology should result from scientific studies in the area.
- * Protection of nesting raptors may require modifications and/or limitations of mineral extraction and recreational development.
- * Intensive scientific studies may require restriction or severe limitation of persons who wish to view falcons.

6. IRON CREEK GYRFALCON MANAGEMENT PLAN

LOCATION

In Game Management Unit 22, the entire drainage of Iron Creek above its confluence with the Pilgrim River.

PRIMARY MANAGEMENT GOAL

To provide an opportunity for scientific and educational study of gyrfalcons.

SECONDARY MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy gyrfalcons.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Encourage scientific and educational studies of raptor ecology.
2. Protect raptor populations from unnatural disturbances and harassment.
3. Discourage land use practices that are detrimental to raptor nesting habitat.
4. Allow limited viewing when it does not disturb nesting raptors or conflict with scientific studies.

THE SPECIES

The Seward Peninsula is noted for its high density of breeding raptors during spring. Over 165 raptor nest sites that have been active within the past five years have been located in drainages flowing into the Bering Sea and Norton Sound on the southern half of the Peninsula. Eyries are scattered throughout the peninsula, although raptors concentrate in relatively high numbers in a few places containing suitable habitat. Iron Creek supports a large number of gyrfalcons as well as other raptors. Numerous bluffs and rocky outcrops where more than 13 pairs of raptors have selected nest sites are located along a fifteen mile stretch of the creek. Four nesting pairs of gyrfalcons were present in 1973, and at least two active nest sites were present in both 1974 and 1975. Rough-legged hawks and golden eagles have also established active eyries along the creek.

Weather usually is the major factor in nesting success, but recently human activity in the area may have affected productivity by increased disturbance. Iron Creek was once heavily mined, but later was abandoned and remained relatively undisturbed until the summer of 1975, when an old mining lease was reactivated. Portions of the creek were used as a route for hauling materials to another mining claim several miles distant. Although the nesting bluffs themselves have not been altered, disturbance to eyries and habitat degradation to the surrounding tundra has occurred.

Until recently, use of gyrfalcons along Iron Creek has been limited. Some nestlings may have been illegally removed from nests in recent years, since unexplained disappearance of nestlings has occurred close to the road systems. The lower portion of Iron Creek is less than 2 miles from the nearest point of highway access.

In the late 1960's a study was conducted as part of an area-wide investigation to study distribution, numbers, breeding success and life history of raptors. With increasing mineral exploration and the high density of raptors along Iron Creek, the area has a high potential for studying effects of human activities on nesting success of gyrfalcons and other raptors. Accessibility of gyrfalcons from roads on the Seward Peninsula has drawn an increasing number of amateur ornithologists to the area, and viewing is expected to increase in the future.

PROBLEMS

- * Development of mineral resources within the Iron Creek drainage could create excessive disturbance to nesting raptors. Cooperative land use planning efforts should be continued to minimize adverse impacts of resource development.
- * Enforcement of regulations protecting raptors has been limited in the past. With increasing human use in the area, the potential for indiscriminate shooting of raptors and illegal removal by collectors or falconers will increase. Increased enforcement efforts will be required as well as efforts to increase public awareness of the role and value of raptors in the northern ecosystem.

IMPACTS

- * Increased knowledge of raptor ecology should be derived from scientific studies in the area.
- * Mineral extraction and recreational development may be restricted or modified to protect nesting raptors.
- * If an intensive scientific study is undertaken, persons who wish to view falcons may be restricted or severely limited.

10. NOME AREA ORNITHOLOGICAL MANAGEMENT PLAN

LOCATION

In Game Management Unit 22, that portion of the Seward Peninsula draining into Norton Sound and the Bering Sea between and including Canyon Creek on the north and the Solomon River below its confluence with the East Fork on the south.

MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy birds.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Discourage land use practices that are detrimental to avian habitat.
2. Encourage public viewing and photography and enhance viewing facilities.
3. Control the distribution and activities of viewers and photographers to maintain viewing opportunity.

THE SPECIES

The Nome area contains a variety of habitats which provide suitable nesting conditions for 180 or more species of birds. Coastal marshes, wet and dry tundra and shrub communities are found within the area. The wide diversity of birds includes several old world species which have a limited range in Alaska and are considered rare in North America. Included among these are the red-spotted bluethroat, European wheatear, Kenicott's arctic warbler, Alaskan yellow wagtail, and the dotterel.

Prior to the 1960's local residents used birds largely as a source of food and secondarily as a material for garments. Waterfowl, ptarmigan, and shorebirds were killed in that order of preference for food and clothing. However, their value as food has recently diminished.

An increasing number of professional and amateur ornithologists have visited the Seward Peninsula in recent years to view and study birds. Most viewers arrive in May and June when birds are establishing nesting territories. Suitable viewing locations are reached by one of three road systems radiating from Nome. Sea bird rockeries on Sledge Island (located 20 miles west of Nome) are also becoming popular with bird watchers.

PROBLEMS

- * Loss of bird habitat will occur as human populations and resource developments expand. Planning for orderly development and preservation of critical wildlife habitat should be initiated. Studies should be encouraged to identify habitat requirements and levels of tolerance to disturbance of species found in the area.
- * As the human population expands indiscriminant shooting of nongame species can be expected to increase. Efforts should be initiated to increase public appreciation of the nongame birds.
- * Nonconsumptive use will continue to increase causing increased disturbance and harassment and loss of viewing opportunity in accessible areas.

IMPACTS

- * Interpretive and transport services will probably develop as the number of viewers increases.
- * Protection of the nongame birds and their habitat will result in restrictions of numbers and activities of users during nesting periods.
- * Delineation and management of important habitat may restrict some resource development.
- * Increased visitation to the area will bring more revenue to the community as the area becomes better known for its ornithological opportunities, but increased visitation may also burden community services.

16. ALASKA SEABIRDS MANAGEMENT PLAN

LOCATION

Entire state of Alaska

PRIMARY MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy seabirds.

SECONDARY MANAGEMENT GOAL

To provide an opportunity for scientific and educational study of seabirds.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Encourage public viewing and photography of seabirds.
2. Encourage scientific and educational studies of seabird ecology.
3. Discourage resource utilization practices and human activities that adversely impact seabird nesting, roosting and feeding habitat.
4. Develop public awareness of seabird ecology.
5. Protect seabirds from unnatural disturbance and harassment, particularly at colonies during critical nesting periods.
6. Allow utilization of seabirds for traditional domestic use.

THE SPECIES

Over 40 species of seabirds migrate through, breed on, or visit Alaska's coastline and adjacent waters. Approximately 24 species are known to breed in Alaska, usually in colonies ranging from a few hundred to a million or more birds. Most of the large colonies are located on islands in the Bering Sea or in the Aleutian Islands, but sizeable colonies are located wherever precipitous sea cliffs occur along the mainland coast from Cape Lisburne to Southeastern Alaska. The most abundant nesting species are murre, murrelets, gulls, kittiwakes, fulmars, and petrels. Several species of auklets, puffins, and cormorants, though not as numerous as some other species, are widely distributed. Seabird populations in Southwestern and Southcentral Alaska exhibit greater species diversity than those found in the remainder of Alaska because of greater diversity of favorable habitats.

In addition to millions of nesting seabirds, many millions more utilize pelagic waters off Alaska as summer feeding grounds. Of these, slender-billed and sooty shearwaters are the most numerous.

Seabirds migrate south as winter approaches and populations in Alaskan waters become much reduced from those of summer. Many birds, however, overwinter in ice-free waters, and substantial numbers are found in and south of the Aleutian Islands.

Historically, seabirds have provided food and clothing to coastal native people in the state. Traditional use of seabird eggs and adult birds, principally auklets, puffins and murre, has been greatest along the Northwestern and Western Alaska coast. Limited domestic use of seabirds

occurred in Southeastern and Southcentral Alaska. Consumptive utilization has decreased in the past 10 to 20 years as coastal residents have adopted a cash economy.

Nonconsumptive use is now becoming the dominant use of seabirds. As the potential impact of energy resource development on these species has become apparent, scientific surveys of Alaskan seabirds are being conducted throughout the state. Studies of seabird distribution, population sizes, and habitat requirements should increase knowledge about these species. Seabirds may eventually serve as biological indicators of the health of marine environments.

Viewing and photography are becoming major activities at seabird nesting colonies in the more accessible waters of the state. The more conspicuous colonial nesters such as gulls, murres, and kittiwakes support the most use, but less numerous or more secretive species such as puffins, cormorants, auklets, and murrelets are receiving increased attention. Fortunately, many seabird colonies are protected from habitat alteration or undue disturbance by their inclusion in the National Wildlife Refuge System. These areas receive additional protection under the state's refuge and sanctuary system.

PROBLEMS

- * Pollution by petroleum related contaminants poses a serious threat to seabirds using Alaska's coastline and marine waters for nesting, feeding or resting. Outer Continental Shelf (OCS) oil development and tanker traffic could result in large oil spills or chronic pollution which would devastate seabird habitat and kill millions of seabirds. Baseline quantitative and qualitative data on coastal seabird habitats and colony location, size and composition are needed to properly interpret population fluctuations and impacts of oil development. These data are necessary to provide rational recommendations for future OCS lease areas, recommendations for future oil spill cleanup facilities and to document the effect of estuary contamination. Stringent controls on oil development and associated human activities will be necessary to minimize environmental hazards.
- * Commercial fishing is an unknown factor with potentially adverse consequences for seabirds. Some seabirds prey on commercially-valuable fishery stocks, and conflict and competition between seabirds and commercial fishermen may become intense. Excessive exploitation by foreign fishing fleets may have reduced the range of at least one species (ancient murrelet). Japanese gillnet fisheries have directly caused seabird losses as high as 10,000 birds per day from birds being entangled in nets. Local seabird populations may be unable to sustain such losses indefinitely. The 200-mile foreign fishery limit recently passed by Congress should substantially reduce seabird loss, especially during the breeding season.
- * Seabirds are susceptible to disturbances that lead to nest abandonment and nestling or egg loss. Nonconsumptive use of seabirds will continue to increase with a corresponding increase in disturbance. Reduced reproductive success and a decline in colony sizes, especially near urban centers, may result unless measures are taken to protect habitat and to control numbers and activities of human visitors.
- * Introduction of furbearers and rats on Alaska islands has resulted in the elimination or serious reduction of seabirds nesting on those islands. Future proposals for introductions of any exotic animals to any islands must be carefully evaluated for possible consequences to indigenous wildlife.

- * In some areas, ocean floor mining, coastal dredging, or gravel removal may alter coastline habitat or alter productivity of near shore waters through siltation, adversely affecting seabirds and other marine life. Mining and dredging or gravel removal activities should be regulated to minimize adverse impacts on the marine ecosystem.

IMPACTS

- * Some limitations on access, periods of use, and activities of visitors to seabird colonies will be required to reduce disturbance to colonies subject to frequent human visitation.
- * Traditional consumptive domestic use will continue but is expected to decrease as lifestyles change.
- * Expansion of biological knowledge of seabird species will provide an additional monitoring tool for interpreting man's impact upon the marine environment. Such capabilities may dictate changes in the patterns of use of other resources.
- * Increased demands for nonconsumptive use may foster development of interpretive and user transport services.

