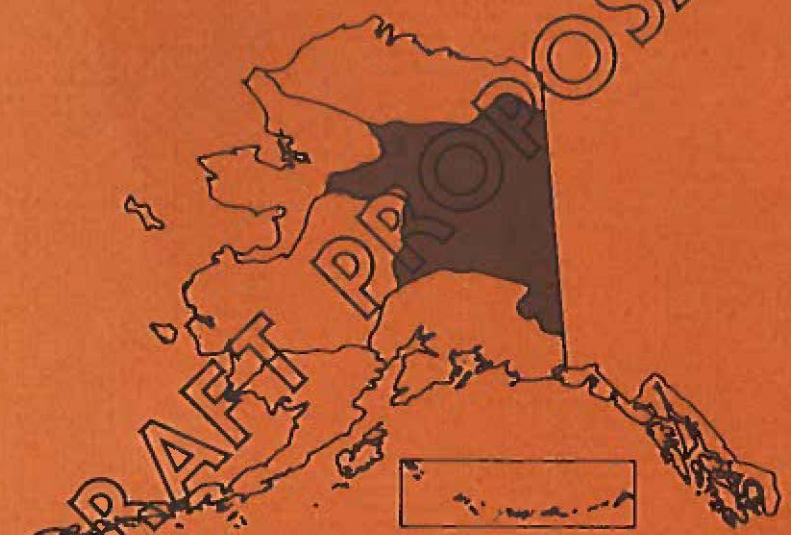
ALASKA WILDLIFE MANAGEMENT PLANS



INTERIOR 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

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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

Robert A. Rausch, Director
Division of Game

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WILDLIFE MANAGEMENT IN ALASKA

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 forseeable 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 accomodated 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 interspersion 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 has 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 extoll 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 bureacracies, 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 Interior 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.

BLACK BEARS IN INTERIOR ALASKA

Black bears (*Ursus americanus*) are widely distributed throughout Interior Alaska. Although bear densities are not as high as in the southcoastal areas of the state, the Interior region provides a larger area of suitable habitat.

The areas in which black bears occur coincide closely with the distribution of forests but seasonal variations in habitat use are apparent within this vegetation zone. Spruce and spruce-birch forests form extensive black bear habitat in Interior Alaska. 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 understory composed of fruit-bearing shrubs and herbs, lush grasses and succulent forbs are particularly attractive to black bears. Extensive, open tundra areas are generally avoided.

In 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 some use of spawning salmon occurs but opportunities for such use are limited. Berries are 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. Interior populations appear to fluctuate widely 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. 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 probably do not cause significant mortality. One parasite of concern to man, Trichinae, is present in some bears and is transmissable 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 Interior Alaska are used primarily for recreational hunting for skins and meat. Some bush residents utilize black bears for domestic purposes whenever bears are available. Despite traditionally liberal hunting seasons and bag limits, the harvest of bears remains relatively small. Black bears have long been considered nuisance animals, particularly during years in which populations have been high and bear-human encounters more frequent. Greater interest in black bears as game animals has been evident in recent years, particularly as opportunities to hunt other species have become more limited.

Black bear hunting is popular in spring when they are one of the few species of big game that can be legally taken south of the Yukon River. 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. 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.

Sport hunting of bears resumes in September when hides have improved in quality and continues until bears den for the winter. Black bears provide considerable use at this time, but many of the bears harvested are taken incidental to hunts for other species. 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.

2. PROSPECT BLACK BEAR MANAGEMENT PLAN

LOCATION

In Game Management Units 24 and 25, the area bounded on the west by the south fork of the Koyukuk River from its confluence with Fish Creek to its confluence with John R. Creek, then northwest to the Middle Fork of the Koyukuk River to the North Fork of the Koyukuk River, then the North Fork of the Koyukuk River from its confluence with the Middle Fork of the Koyukuk River to its confluence with Glacier River, then Glacier River, Roy Creek, and upper Hammond River; on the north by the crest of the Brooks Range; on the east by the north fork of the Chandalar River downstream to Quartz Creek, then south to Big Spruce Creek, Twin Lakes and the South Fork of the Koyukuk River to its confluence with Granite Creek, then south along the hydrographic boundary between the South Fork of the Koyukuk River and the Hodzana River; and bounded on the south by Fish Creek.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain a spring and fall black bear hunting season.

2. Control access, number and distribution of hunters and methods of hunter transport to maintain aesthetic hunting conditions.

3. Encourage public viewing and photography of black bear.

4. Increase public awareness of black bear behavior to reduce adverse bear-human interactions.

THE SPECIES

Black bears are distributed through the timbered portion of the area and are very abundant in the southern half of the area. Censuses of bears are difficult since they spend most of their life in or near forests; therefore no censuses have been attempted. However, bears may be viewed more easily during particular seasons. In spring many bears move to open grass flats to feed on new shoots. In fall when the berries ripen, bears move up to the slopes near and sometimes above timberline to feed. Occasionally bears become very abundant. During 1963-64 and 1970 bears were reported as common over much of interior Alaska, although no specific information on bear abundance in this area during those years is available. The reason for these periodic "highs" and specific factors regulating bear populations are unknown.

Bears in interior Alaska tend to be small but occasionally a record book bear is taken. The harvest by hunters is low and bears are abundant in the area; hunters who are selective should be able to find large bears. The quality of the pelt is important when considering trophies. Pelts are prime only during the period from late fall through early spring.

Accurate harvest data and the intensity of use of the area by black bear hunters is not available, because the mandatory sealing requirement does not extend north of the Yukon River. The area's remoteness and inaccessibility undoubtedly discourage hunters from hunting solely for black bears. A closure to the taking of big game within five miles of either side of the pipeline also reduces black bear harvests. Resident and nonresident hunters in the Brooks Range are attracted by the moose, caribou, sheep and grizzly bear hunting opportunities, and probably take black bears incidental to other hunting. Little if any guiding activity solely for black bears occurs. It is anticipated that accelerated use of the area by hunters and non-hunters will result in an increase in the number of legal sport kills and bears taken in defense of life and property.

PROBLEMS

* If the road to Prudhoe Bay is opened to public use, development would result in increasing bear-human conflicts. Bears will be shot in defense of life and property, decreasing the number available for hunting and observation. Proper food storage and garbage disposal procedures should be emphasized in public information programs and appropriate regulations enforced to improve compliance.

* A large portion of the area is proposed to be incorporated into the National Park and Refuge systems. These changes will certainly place increasing restrictions on hunting opportunity and may exclude it. The Department should work closely with land managing agencies to develop management agreements that will maintain public hunting opportunity in concert with other recreational land and wildlife uses.

IMPACTS

* Localized overharvests along the road and trail systems will be reduced and the number of bears will remain relatively high throughout the area.

* The proposed plan will insure an opportunity for high quality hunting experiences after the Haul Road opens, but this will be at the expense of some freedom to hunt when, where, and how the individual chooses. Areas adjacent to highways typically have relatively high hunter densities and low densities of big game, but this area will offer unique opportunities for quality hunting and viewing experiences in an area with highway access.

* Guides will find it more difficult to book black bear hunters if at some time in the future permits are needed to control numbers of hunters.

3. UPPER BIRCH-PREACHER-BEAVER CREEKS BLACK BEAR MANAGEMENT PLAN

LOCATION

In Game Management Unit 20 the drainages of Birch Creek above the confluence of Birch Creek with the South Fork of Birch Creek, the drainage of Big Windy Creek, the drainage of Preacher Creek above its confluence with Loper Creek on the south and the North Fork of Preacher Creek on the north, and the drainage of Beaver Creek above its confluence with Moose Creek, including the drainage of Moose Creek.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.

2. Maintain spring and fall black bear hunting seasons.

3. Discourage land use practices which will adversely affect the wild character of the area.

THE SPECIES

Black bears are distributed throughout the area although they evidently are not particularly abundant. No estimates of numbers of bears have been attempted in this area since they spend much of their life in forested country which makes accurate censuses difficult. However, bears may be seen more easily during certain seasons. In spring many bears move to open grass flats to feed on new shoots, and again in fall when the berries ripen, bears move up to the slopes near and sometimes above timberline to feed. Occasionally bears become very abundant. During 1963-64 and 1970 bears were reported to be common over much of interior Alaska. The reason for these periodic "highs" and specific factors regulating bear populations are not well known. The highs in bear populations seem to correlate with years of poor berry crops. It has been speculated that bears may appear more abundant because they spend more time in these years searching for food in low country where they come in contact with people rather than dispersing into the hills during late summer and fall.

Based on sealing information, this area supports a relatively light harvest of bears. In 1974, two bears were reported taken from the eastern portion, while seven bears were taken in 1975. Four of the latter were harvested in the Beaver Creek Drainage. This small harvest probably is an indication of the light hunting pressure for bears rather than a reflection of bear abundance. Beaver and Birch Creeks receive some recreational use in the summer months when water levels are high enough to allow sport fishermen to navigate these streams; however, the area does not appear to attract people who are specifically interested in hunting black bears.

Birch Creek is accessible from the Steese Highway where the road crosses the river at two locations. Trails heading south from the Steese Highway at Eagle Summit terminate near ridgetops along the north drainages of Birch Creek. The Pinnell Mountain hiking trail, approximately 24 miles in length, extends from Twelve Mile Summit to Eagle Summit north of the Steese Highway. The Portage Creek road provides access to alpine areas near Circle Hot Springs. The headwaters of Beaver Creek are accessible from Mile 55 Steese Highway on the 6-mile-long Nome Creek Trail. Further access to Beaver Creek is available from the White Mountains Trail, originating from Mile 27 Elliott Highway and terminating at Beaver Creek. Many of these access points are usable for all-terrain vehicle travel only during snow-free periods in summer. Snow machine access is feasible along these trails from October through mid-April. Aircraft access to Beaver Creek occurs at a landing strip on the western end of the White Mountains as well as via float-equipped aircraft along suitable segments of the river.

PROBLEMS

* The increasing urban population of nearby Fairbanks will result in more users frequenting the area. Hunting pressure will also increase when moose and caribou populations recover, providing further attraction to the area. At some point user density will reach a level that is not compatible with maintaining aesthetically pleasing conditions. The number of users may have to be regulated to maintain quality hunting in the area. Present access points may have to be restricted and/or additional ones created in order to distribute use over the whole area, thus allowing additional use without sacrificing quality experience. Adjustments of season timing for different species in the area or use of permits to control numbers of hunters may be necessary to avoid crowding of hunters. The use of vehicles that disfigure the land may have to be prohibited or restricted to established trails on the fringe of the area.

* Gold prices are attracting miners back to the small and marginally profitable claims in the area. Their activities detract from the wilderness character of the land and their presence results in increased human-bear encounters that result in destruction of bears in defense of life and property. Game regulations which influence the use of the land affect people only when hunting. Therefore, successful retention of wilderness characteristics depends primarily on land management policies adopted by other State and Federal agencies. Efforts should be expanded to inform miners of bear behavior, of the need to properly dispose of garbage that attracts bears to camps, and to discourage the killing of bears before all other means of alleviating the problem have been exhausted.

* There is potential for large scale development of limestone quarry sites and a cement industry in the White Mountains area. This development may conflict with wildlife values in the area.

* The proposed Federal classification of both the Birch Creek and Beaver Creek systems as Wild and Scenic Rivers could result in restrictions on user access in the area and on hunting activities where they may conflict with nonconsumptive users. The Department will attempt to maintain public hunting in as much of the area as possible.

IMPACTS

* The establishment of spring and fall seasons based on pelt primeness will reduce the length of the season during which bears may be taken.

* The bear population will not be adversely affected in terms of the availability of legal animals or productivity of the population.

* The number of persons who may use the area during the black bear season may be limited by permit. Zoning of the area will allow for other compatible uses; when moose, grizzly bear, sheep and black bear seasons coincide, similar restrictions on hunter density will apply to all users, while use by small game hunters and fishermen would be controlled seasonally (May 15-September 30) only in terms of mechanized access and transportation corridors.

* Mechanized access restrictions of this plan will prevent further environmental degradation of the Eagle Summit area, while maintaining the ecological integrity of the Preacher-Beaver Creek alpine areas.

4. MINTO-MURPHY DOME BLACK BEAR MANAGEMENT PLAN

LOCATION

In Game Management Unit 20, the area bounded on the south by the Tanana River and the Alaska Railroad, on the east and north by the Murphy Dome Road, Murphy Creek, the Chatanika River, and the Elliot Highway, and on the west by the hydrographic boundary separating the drainages into the Tolovana River from the drainages into the Tanana River below its confluence with the Tolovana River.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.

2. Maintain spring and fall black bear hunting seasons.

3. Discourage land uses which will adversely affect the wild character of the area.

THE SPECIES

Black bears are distributed throughout the area and are relatively abundant. No estimates of numbers of bears have been attempted in this area since they spend much of their life in forested country which makes accurate censuses difficult. However, bears may be seen more easily during certain seasons. In spring many bears move to open grass meadows in Minto Flats and along the major rivers to feed on new vegetation. During late summer and fall the bears generally move to open hillsides to feed on ripened berries.

Occasionally bears become very abundant. During 1963-64 and 1970 bears were commonly seen over much of the Interior and particularly in the area of Murphy Dome. The reason for these periodic "highs" and specific factors regulating bear populations are unknown. The highs in bear populations seem to correlate with years of poor berry crops. It has been speculated that bears may appear more abundant because they spend more time in these years searching for food in low country where they come in contact with people rather than dispersing into the hills during late summer and fall.

Bears in Interior Alaska tend to be small but occasionally a record book bear is taken. The quality of the pelt is important when considering trophies. Pelts are prime only during the period of late fall through early spring. The proportion of trophy bears in the population is not known. However, the rate of harvest of bears by hunters in this area is probably as high as anywhere in interior Alaska, and the likelihood of finding a large bear here may be correspondingly lower than in some other areas. But, since bears are relatively abundant, hunters have the opportunity to be selective.

The area is popular as a black bear hunting area. Analysis of harvest data for 1974 and 1975 indicate the drainages of the Tatalina, Tolovana and Chatanika Rivers lying within this area supported a large portion of the total kill in Game Management Unit 20. During 1974, 25 bears (17 males, 8 females) were taken from this area. Nine of these bears were taken by hunters who hunted specifically for bears; the remainder were shot either in defense of life and property or incidental to other recreational pursuits (fishing, moose or duck hunting). Fifty-two percent of these bears were taken prior to June 30. In 1975, thirty-three bears were taken, consisting of 24 males and 9 females. Fifteen bears were taken by hunters who hunted specifically for bears. Sixty-nine percent of the harvest occurred prior to June 30. The proportion of the bear population taken by hunters is unknown, but the number of large bears in the 1975 harvest indicates that the bear population has not been subjected to overhunting (36 percent of the bear skulls which were measured totalled 17 inches or greater).

Hunting pressure has been almost exclusively by residents who either float the Chatanika or Tolovana Rivers, fly into Minto Flats, or merely drive the Elliott Highway. Portions of the area are easily accessible from the road and trail network along Murphy Dome and the Elliott Highway after spring breakup and prior to snowfall in October. The Chatanika and Tolovana Rivers are generally navigable from June through mid-September. Float-equipped aircraft are capable of landing in ponds and sloughs of Minto Flats from mid-May through September. Several enterprising hunters have realized the value of establishing bait stations for bears, consisting of piles of domestic meat scraps which are checked periodically. Although the village of Minto lies in the northcentral portion of the area, little domestic use of the bear resource appears to occur. Residents of the immediate Fairbanks area are realizing the recreational value of the black bear both as a source of meat and for hide quality.

PROBLEMS

* Public hunting opportunity will be reduced in the area as land ownership patterns change. Expanding residential areas near Fairbanks will place more land into private ownership. Use of firearms in populated areas may become a public safety hazard requiring prohibitions on discharge of firearms. Public access across and use of private lands for hunting may be excluded by landowners. Native land selections in the Minto Flats area will substantially increase private land holdings in the area. 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.

* Heavy use of Minto Flats during the waterfowl hunting season will undoubtedly conflict with the aesthetics of black bear hunting in the vicinity of the Flats. Because waterfowl hunting is a very important use of the Minto Flats area some allowance for conflicts should be made. Bear hunters should be encouraged to hunt in other sections of the Minto-Murphy Dome area during the waterfowl hunting season if the presence of waterfowl hunters detracts from their hunting experience.

* Increased residential development will increase the number of potentially dangerous bear-human encounters and will result in the removal of nuisance animals. The Department should encourage proper disposal of garbage and storage of food at cabin sites and around residences and should disseminate information on avoiding encounters with bears.

* Lack of compliance with black bear sealing requirements hampers efforts to acquire harvest data necessary for proper management of the species. The need for harvest information and how it is used by the Department should be conveyed to the public. Increased enforcement efforts may be necessary to assure acceptable compliance with regulations.

IMPACTS

* The size or productivity of the population will not be adversely affected. Current regulations prohibiting the taking of cubs or sows accompanied by cubs will remain in effect.

* Localized harvests will continue to occur along the Elliott Highway, Murphy Dome and the Chena and Chatanika Rivers. Emigration of bears into these areas from less accessible and lightly hunted areas should maintain an adequate number of bears for sustained harvests.

* Establishment of spring and fall seasons based on pelt primeness will reduce the hunting opportunity available to those persons who may encounter bears either intentionally or incidentally during the period mid-June through August.

* Hunters utilizing traditional areas and methods may be limited to designated roads and trails to accommodate non-mechanized access into the area.

* Restrictions on methods of transport along the road and trail system along the Elliott Highway and Murphy Dome will not limit waterfowl hunters at Minto. River system corridors along the Goldstream, Tolovana and Chatanika Rivers will remain open to enhance the aesthetic values of bear hunting in the area, while allowing for sport fishing and moose hunting.

BROWN BEARS IN INTERIOR 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 Interior 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 occur throughout Interior Alaska. Higher densities occur in the mountains, foothills and mountain valleys than in the forested lowlands. In any locality the abundance of grizzlies may vary seasonally depending on available food sources. Densities of grizzlies on the south slope of the Brooks Range are low, varying from 1 bear per 50 square miles in areas of preferred habitat to 1 bear per 100 square miles when the entire habitat used in considered. South of the Yukon River, from the alpine areas of the Alaska Range to the lowlands of the Yukon, population figures are not known. In general terms, grizzlies range in abundance from low to moderate densities. On a region-wide scale, grizzlies appear to be as numerous as they have been in the past, but declines in abundance may be occurring in some areas, notably on the south slope of the Brooks Range.

Along the south slope of the Brooks Range, all habitat types are used by grizzly bears but the alluvial valley bottoms near river courses are the most important. 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 carrion. The soil thaws earliest in the mountains and foothills and bears forage along the valley bottoms in these areas 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 alpine and subalpine habitat. From early summer until late August grizzlies tend to disperse from river valleys to the alpine, foothill and coastal plain areas where they feed on vegetation, primarily *Equisetum*, grasses and sedges. During late August to mid-September, the grizzlies return to the river valleys to search out berries and dig for roots. Throughout the rest of Interior Alaska, habitat requirements for grizzlies are not as well known but they do live mainly in alpine and subalpine habitat. With some exceptions salmon are not available in the numbers which occur in coastal areas. Interior bears are more dependent on semi-aquatic and riparian vegetation, berries, terrestrial carrion, and small and large mammals. They may also be prone to frequenting garbage dumps. Bears appear to need large expanses of preferred habitat because they are at the top of the mammalian food chain and occur in relatively low densities over large areas. 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 this area 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. Brown 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. *Trichanella 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 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. Bears are killed when they are attracted to camps or garbage dumps, and endanger human safety. In some portions of Interior Alaska, the reproductive potential of grizzlies is low and therefore they may be very susceptible to over-hunting. Generally, grizzlies do not reach sexual maturity until they are 6 years of age although some apparently don't successfully rear young until age 10 or 11. Also, their litters are small and the interval between successful production of young may be from three to four years. The survival of young varies, but in some areas it is low.

Recreational uses of brown bears predominate in Interior Alaska although domestic utilization continues to some extent. Sport hunting is the primary use with the Southern Brooks Range and Alaska Range being the most important hunting areas. After the early 1940's trophy hunting of grizzly bears gained rapidly in popularity. Bear hunting in Interior Alaska was quite limited until the early 1960's. As hunting pressure increased, regulations affecting season lengths became more restrictive to avoid excesive 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 throughout the area.

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 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.

2. UPPER YUKON-PORCUPINE BROWN BEAR MANAGEMENT PLAN

LOCATION

That portion of Game Management Units 24 and 25 lying south of the Brooks Range Brown Bear Management Plan area.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain spring and fall brown bear hunting seasons.

2. Limit the harvest to the annual increment of brown bears.

THE SPECIES

The abundance of brown/grizzly bears in this region is low, but may vary seasonally depending on available food sources. The density of bears may reach 1 bear per 100 square miles in localities of preferred habitat but when considering the entire area, a density of 1 bear per 150 square miles is more appropriate. On this basis, the upper Yukon-Porcupine area may support a minimum population of 410 grizzlies.

Specific habitat utilization by grizzlies in this area is poorly known. Grizzlies are regularly found throughout alpine, sub-alpine, and river valley habitat and occur sporadically in the forested lowlands. Except for the habitat lost during the construction of the trans-Alaska pipeline, there have been few instances of habitat change in the area.

The area is not known for producing large grizzlies and few people are attracted to the area specifically to hunt bears. Probably no more than 10 bears are killed annually. However, there may be a substantial number of grizzlies taken but not reported by local residents.

Most kills by recreational hunters are probably made incidental to moose hunting rather than the result of a hunt specifically for grizzlies. The length of the season has been shortened considerably since 1968. During 1970, 1972, and 1974 either or both of the fall and spring seasons were closed as a result of excessive harvest in the adjacent Brooks Range area.

Most of the kill in the Yukon-Porcupine area is made by local hunters using river boats. Some resident hunters from outside the area use aircraft or occasionally river boats to reach hunting areas. Guiding is not an important activity.

The relatively low level of use which occurs now does not appear to be adversely affecting the grizzly bear population in this area. No sizable increase in hunting pressure is anticipated in the near future. However, once the pipeline haul road is opened to the public as far as the Yukon River, hunting pressure will undoubtedly increase in that vicinity. An increasing amount of nonconsumptive outdoor recreation such as boating, photographing, hiking is expected to occur. The presence of grizzlies in the area definitely will increase the appeal of these activities to many of these users.

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 resource extraction and exploration will result in increased bear-human encounters. Proper storage of food and disposal of garbage should be encouraged to minimize conflicts with bears.

IMPACTS

* Little change in bear populations or their use will occur as a result of proposed management.

6. UPPER BIRCH-PREACHER-BEAVER CREEKS BROWN BEAR MANAGEMENT PLAN

LOCATION

In Game Management Unit 20, the drainages of Birch Creek above the confluence of Birch Creek with the South Fork of Birch Creek, the drainage of Big Windy Creek, the drainage of Preacher Creek above its confluence with Loper Creek on the south and the North Fork of Preacher Creek on the north, and the drainage of Beaver Creek above its confluence with Moose Creek, including the drainage of Moose Creek.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.

2. Maintain spring and fall brown bear hunting seasons.

3. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

Brown/grizzly bears are present in the area, but no data are available on population numbers or trends, productivity or survival. The rolling terrain offers extensive areas of alpine habitat suitable for denning and conducive to the growth of berry producing plants.

Most grizzly bears are taken incidental to other activities or hunts for other species. Harvests of bears have been light. Between 1969 and 1975 only 13 bears were reported taken in or near the area. Six of these were taken along the Steese Highway, the only road access through the area. The remaining seven were taken in more remote locations, six by hunters utilizing aircraft and one by canoe. Twelve bears were taken in fall hunts and one was taken during the spring. There were eight males and five females in the harvest. Resident hunters accounted for all of the harvest. Guiding for bears is negligible, although the area has the potential for producing large bears. Skulls of three bears taken between 1969 and 1975 averaged 24 5/8 in total measurements. Hunting seasons were gradually shortened from a total of 154 days in 1961 to a total of 22 days in 1971. The present season totals 42 days. There have been both spring and fall seasons each year except for 1970 and 1971.

Access is limited due to the undeveloped nature of the area. Consequently hunting pressure has been light. In recent years caribou movement patterns have changed and they no longer frequent the area. Moose numbers have also declined. Thus, many hunters who formerly entered the area seeking moose and caribou no longer do so and encounters with grizzly bears have diminished accordingly. Hunters gain access by landing light aircraft on or along Beaver Creek, by canoeing down Birch Creek, or by driving off-road vehicles along the cat trail to Beaver Creek and along the short mining access roads along the Steese Highway. Some hunters hike along the ridge system from several points on the Steese Highway.

PROBLEMS

* The increasing urban population of nearby Fairbanks will result in more users frequenting the area. Hunting pressure will also increase when moose and caribou populations recover, providing further attraction to the area. User density eventually will reach a level that is not compatible with maintaining aesthetically pleasing conditions. The number of users may have to be regulated to maintain quality hunting in the area. Present access points may have to be restricted and/or additional ones created to distribute use over the the whole area, thus allowing additional use without sacrificing quality experience. Adjustments of season timing for different species or use of permits to control numbers of hunters may be necessary to avoid crowding of hunters. The use of vehicles that disfigure the land may be prohibited or restricted to established trails on the fringe of the area.

* Gold prices are attracting miners back to the small and marginally profitable claims in the area. Their activites detract from the wilderness character of the land and their presence results in increased human-bear encounters that result in destruction of bears in defense of life and property. Game regulations regarding use of the land affect people only when hunting. Therefore, successful retention of wilderness characteristics depends primarily on land management policies adopted by other State and Federal agencies. Efforts should be expanded to inform miners of bear behavior, of the need to properly dispose of garbage that attracts bears to camps, and to discourage the killing of bears before all other means of alleviating the problem have been exhausted.

* There is potential for large scale development of limestone quarry sites and a cement industry in the White Mountains area. Such developments would conflict with wildlife values in the area and probably would be opposed by the Department.

* The proposed Federal classification of both the Birch Creek and Beaver Creek systems as Wild and Scenic Rivers could result in restrictions on user access and on hunting activities that might conflict with nonconsumptive users. The Department will attempt to maintain public hunting in as much of the area as possible.

IMPACTS

* The average age of bears will remain relatively high.

* Disturbance to the wilderness character of the area will be minimized. Constraints placed on resource development activities may increase costs of operations.

* Off-road vehicle restrictions will affect few hunters since few hunters presently use off-road vehicles in the area.

* Some reduction of bear hunting opportunity may occur either through establishing a permit system or by shortening or deleting the favored fall season.

* Establishment of an aesthetic hunting area with large bears may attract greater interest from hunters and guides.

* Restrictions designed to protect the environment and to maintain aesthetic conditions during the time periods in which quality hunting of big game species is proposed will also affect nonconsumptive users of the area. Recreation at other times of the year would not be affected unless it were to result in destruction of the habitat.

7. YUKON-TANANA BROWN BEAR MANAGEMENT PLAN

LOCATION

Game Management Unit 12, and Unit 20 excluding the Central Alaska Range and the Upper Birch-Preacher-Beaver Creeks Brown Bear Management Plan areas, and Mt. McKinley National Park.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain brown bear hunting seasons.

2. Encourage recreational brown bear hunting on caribou calving ranges.

THE SPECIES

The occurrence of brown/grizzly bears throughout the area is variable. While grizzly surveys have not been conducted, casual observations and harvest levels suggest that bears are generally abundant. High densities of bears have been observed in the headwaters of the Chena and Salcha Rivers during surveys of calving caribou but whether bears are attracted to caribou calving grounds is unknown.

No major changes in the quantity or quality of the habitat have occured in recent years and in general bear habitat is in good condition. Some small alterations have occurred, caused by forest fires, (which are probably beneficial to the species) and developmental activities by man. However, these changes are minor and have had little impact on the bear population. Increased encounters between people and bears have occurred with increased human development in the area. In recent years approximately four bears have been killed in defense of life and property.

Hunting seasons for grizzly bears have varied in length and timing since statehood, but the Yukon-Tanana area generally has had liberal seasons. In recent years a month-long fall season and a two-week spring season have been allowed. Most of the bears harvested have come from areas south of the Tanana River, primarily the north slopes of the Alaska Range, and the Mentasta, Wrangell and Nuzotin Mountains. During the period 1969 through 1972, 76 bears were taken in this southern portion of the area while 20 were reported taken between the Tanana and Yukon Rivers. Many of the bears killed north of the Tanana River come from east of the Salcha River. Ages of bears killed indicate present harvest levels are not limiting population growth.

About three-fourths of the harvest is by Alaska residents, and many of the bears taken are killed incidentally to hunts for other species. Relatively few bears are killed in the spring. Most nonresident hunting activity occurs in the southeastern portion of the area.

Access is lacking in much of the area north of the Tanana River except along the Steese and Taylor Highways and by riverboat along some of the larger rivers. There are few airstrips and these generally are poorly maintained. South of the Tanana River, aircraft, off-road vehicles and horses provide access into hunting areas.

Little nonconsumptive use of bears occurs except where bears are attracted to food sources near human habitations. Some observation of bears, for example, occurs at the Ft. Greely dump.

PROBLEMS

* Public hunting on or access across private lands may be prohibited on large tracts of land conveyed to Native ownership under terms of the Alaska Native Claims Settlement Act. Hunting opportunity may also be eliminated, reduced or otherwise affected if areas proposed for inclusion into federal "four systems" classification are established. Most significant in terms of elimination of hunting would be the establishment of the Wrangell-St. Elias National Park. Restriction of public access on military lands at the headwaters of the Chena and Salcha Rivers is also a possibility. The Department should attempt to maintain public hunting opportunity in as many areas as possible by advocating legislated provisions allowing hunting in federal parks and refuges and by entering into cooperative management agreements with federal agencies. 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 human activity and development in bear habitat will increase the frequency of potentially dangerous human-bear encounters, and destruction of bears in defense of life and property. Proper food storage and garbage disposal practices should be encouraged. To the extent possible, bears in problem areas should be taken by recreational hunters.

* Grizzly bears are vulnerable to local overharvests in areas where hunter access is good. Restrictions on hunting seasons or methods and means may be necessary in some areas to reduce harvests. Restrictions would not be imposed in areas where human-bear conflicts have been a problem or are likely to occur in the near future.

IMPACTS

* Little change will occur from present patterns of use. Some increase in hunting pressure will occur around populated areas, and localized crowding of hunters may occur in accessible hunting areas.

8. CENTRAL ALASKA RANGE BROWN BEAR MANAGEMENT PLAN

LOCATION

Game Management Unit 20A and that portion of Game Management Unit 20C south of the Tanana River and west of the Totatlanika River.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.

2. Maintain brown bear hunting seasons.

3. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

The Central Alaska Range area currently supports a relatively dense brown/ grizzly bear population. The greatest number of bears occur in the alpine and subalpine portions of the Alaska Range and adjacent foothills. Movements of grizzlies north of Mt. McKinley Park are from denning areas to floodplains and river bars in April and early May, then to alpine areas in late May, dispersal to berry producing areas in late July and finally to denning areas in October and November. Two critical habitat areas, Toklat Springs and Moose Creek, are utilized by spawning chum salmon and consequently attract large numbers of bears in October and November. The area north of the park is used more frequently by single and subadult bears than it is by sows with cubs. Other seasonal concentrations of bears have been noted on the calving grounds of the Delta caribou herd between the Delta River and Dry Creek during May and June.

Minimal loss of prime grizzly bear habitat has occurred through development, fire or succession. Intensive development of coal in the Healy and Lignite Creek drainages has resulted in the formation of a mining community at Usibelli and a myriad of roads in the vicinity of the coal pits. Mining activity in the Kantishna District, which probably peaked in the 1960's, may have resulted in some habitat loss. Recent wildfires have altered a small portion of sub-alpine habitat lying between the East Fork of the Little Delta River and Buchanan Creek.

The harvest of bears for the period 1969-1975 has averaged 18 bears per year. Of the 125 bears killed, 72 were males. During the 1974 and 1975 seasons a greater proportion of the harvest consisted of females. Hunting season length and timing has varied since statehood in different portions of the area. Harvests of bears during spring seasons, when held, have been small in comparison with fall season harvests. For example, in 1974 and 1975 more than 80 percent of the bears killed were taken in the fall. Although the level of harvest has not adversely affected the availability of legal bears, recruitment to the population will be reduced if the trend to more females in the harvest continues.

The area has produced old bears in sufficient numbers during the period 1970-73 to maintain a high trophy potential for the area. For example, 18 bears (42 percent of the male harvest) 8 years or older were taken from the area during this 4 year period. Three of six male bears taken from this area in 1975 met minimum Boone and Crockett scores.

This portion of the Alaska Range received heavy use by guides in the late 1960's and early 1970's when liberal seasons for other big game species allowed for productive combination hunts. About 16 guides utilized the area from the Delta River westward along the Alaska Range north of McKinley Park. Declining numbers of moose and caribou, decreased availability of legal Dall sheep rams, and more restrictive seasons have reduced the area's potential for guided hunts. There are now approximately five guides active within this area. Most bears taken on guided hunts are from the Yanert and Toklat River areas, the latter attracting bears during salmon spawning periods.

Aircraft has been the principal means of access for bear hunting in this area, despite the regulation prohibiting the taking of bears the same day a person is airborne. Numerous strips and wide gravel bars enable hunters to reach alpine and subalpine habitat. In addition, the area is accessible by off-road vehicles along the Bonnifield, Rex, Terry and Stampede Trails. Guided hunts with the aid of horses are presently conducted in the upper Wood and Yanert areas.

PROBLEMS

* Development of known mineral deposits and potential water storage and power sites will detract from the aesthetic qualities of the area and reduce available bear habitat. Expansion of development of coal fields to the east from the Healy and Lignite Creek drainages may result in further habitat loss. A copper mining claim in the foothills of the Alaska Range at Dry Creek, if developed, could pose similar though less extensive conflicts. The Department should discourage development that adversely affects important bear habitat and should recommend actions that maintain the aesthetic appeal of the area.

* Military use of military lands lying between the Little Delta and Delta River may conflict with the aesthetics of the area through environmental degradation and presence of military personnel and mechanized equipment during hunting seasons. Access into the area is occasionally restricted due to military activity. The Department should recommend constraints on military activity which impair aesthetic values of the area or adversely affect bears. Military requests for authority to utilize areas outside military reservations should be carefully evaluated for potential problems.

* Claims by private individuals to aircraft landing strips developed on public lands reduce use of strips by the general public. The legal status of landing strips not located on patented land should be made available to hunters and general public use of these sites should be encouraged. The Department will discourage development of additional private landing strips on public land.

* Ground vehicle use of the foothill area adjacent to the Rex and Bonnifield Trails has resulted in noticeable environmental degradation. A state proposal for a transportation corridor linking the Richardson Highway with Kantishna would increase use of the area and increase the potential for overharvests while detracting from the aesthetics of the area. Increased human use will increase potentially dangerous bear-human encounters and result in destruction of bears in defense of life and property. A permit system may be needed to control hunter density, off-road vehicle use and hunter access corridors.

Appropriate measures for avoiding encounters with bears, in particular the proper disposal of garbage, should be recommended.

* Probably the most serious restraint on implementation of this plan is the proposed extension of McKinley Park. Much of the area of this plan lying west of the Nenana River would be encompassed by the proposed 1.6 million acre extension north of the present park boundary. Hunting in the proposed area would be prohibited, and substantial loss of grizzly bear hunting opportunity would occur.

  A Cooperative Planning and Management Zone east of the present park boundary has been proposed. The Alaska Land Commission would have jurisdiction over Federal lands in this area. Efforts should be made to perpetuate hunting opportunities in this zone, as well as to assure public access across Cantwell village selections lying within it.

IMPACTS

* Bear seasons when pelts are prime will provide for distribution of hunter effort over time.

* Restrictions on methods of hunter transport and access will be the major changes over traditional use patterns in the area.

* Regulations will designate access corridors beyond which off-road vehicle use will be prohibited.

* The number and distribution of hunters will be controlled by permit if hunter crowding occurs or the age of harvested bears falls below desired levels.

WOLVES IN INTERIOR ALASKA

Wolves (*Canis lupus*) have been recorded throughout Interior Alaska at varying levels of abundance from the days of early settlement. Although information reflecting wolf occurrence during the early part of this century is limited, evidence suggests that wolves were abundant prior to about 1920. Between 1920 and 1925 wolves were extremely scarce over much of the Interior, and it is thought that disease was the most likely cause for the decline. Wolves gradually increased after 1925 and have continued to be moderately abundant in most parts of the Interior. Predator control and aerial hunting by private individuals during the 1950's and 1960's maintained relatively low local populations during this period. Presently the density of wolves in Interior Alaska varies from approximately one wolf per 40 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 Interior 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. 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 the Interior Alaska varies according to season, location, and prey species available. Moose are the major prey, for wolves in much of the Interior Region although Dall sheep and caribou are also taken, the latter being especially important in the northern and eastcentral portions of the region. During winter, these big game species constitute almost the entire diet of wolves. Snowshoe hares are an important supplement during some years. 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.

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 human use of wolves in the Interior Region has also changed during this century. Prior to the 1960's the major incentive for wolf hunters and trappers was the bounty, because wolf hides were of relatively low value. During the 1960's the value of pelts increased markedly and, in combination with bounty payments, resulted in increased efforts to take wolves. Even with the elimination of the bounty in 1968, the value of pelts, which has continued to increase, has provided a significant economic incentive for people to hunt and trap wolves. Since 1962 the reported annual harvest of wolves in the Interior has averaged 385 and ranged from 214 to 746 wolves with the largest numbers taken during the winters of 1966-67, 1967-68 and 1971-72. Prior to the elimination of aerial hunting in 1972 aerial hunters accounted for about 40 percent of the harvest each year, with trappers taking the majority of wolves. Trapping is presently the most important consumptive use of wolves. A small number are also taken each autumn by guided and unguided nonresident hunters incidental to hunts for other big game animals.

Most wolf pelts from the Interior enter the commercial fur market, although many are used domestically in the manufacture of various types of clothing, or are sold locally, often to tourists.

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 Interior 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.

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 recommedations 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 INTERIOR ALASKA

Interior Alaska contains the year round habitat of the Delta and Macomb Plateau barren ground caribou (*Rangifer tarandus granti*) herds and is seasonally occupied by several other populations. The Delta herd occupies the north slopes of the Alaska Range between the Alaska Railroad on the west and the Richardson Highway on the east. This herd, which may have arisen as a remnant of the large Fortymile herd in the early 1930's, numbered from 300-1,500 caribou from the 1930's through 1957, then increased to more than 5000 animals by 1964. Since the severe winter of 1970-71 the population has declined rapidly and presently numbers less than 2,000.

The Macomb Plateau herd occurs on the north side of the Alaska Range east of the Delta River and west of the Glenn Highway. This population is estimated to include about 1,000 animals and has been stable for several years.

The Fortymile and Chisana herds spend most of the year in Interior Alaska but also range into adjacent Canada. The Fortymile herd presently numbers about 5,000 and inhabits the Tanana Hills between the Tanana and Yukon Rivers. A review of this herd's population fluctuations during this century dramatizes the wide fluctuation in numbers that all herds in the state have experienced. During the early 1900's the herd was increasing and reportedly reached a peak of around 500,000 in the 1930's. By the early 1940's this large herd had declined to possibly only 10,000 caribou. It then increased steadily until the mid 1950's when it numbered 50,000. Since then it has declined to present low levels of about 5000 caribou.

The Chisana herd, like the Delta herd, may have arisen from remnants of the large Fortymile herd in the 1930's. The herd may have numbered up to 3,000 caribou until the 1960's; current estimates place the herd size at about 1,000 animals. This herd ranges in the Nutzotin Mountains.

The McKinley herd ranges primarily on the north side of the Alaska Range in the vicinity of McKinley Park. It numbered 20,000 to 30,000 in 1941 before declining. By the early 1960's approximately 10,000 caribou were still present. Since 1966 a rapid decline has been noted and currently 1,000 to 1,500 caribou remain.

The two great Arctic caribou herds seasonally occupy a portion of Interior Alaska. The Western Arctic herd's winter movements bring it into this region from the lower Koyukuk River eastward to Wiseman and the western tributaries of the Chandalar River. This herd reached a low level in the late 1800's and then increased through the 1900's and in 1970 contained at least 242,000 caribou. Current observations suggest that a substantial decline occurred from 1970 to 1976 and the herd may presently number about 50,000.

The Porcupine herd occurs in the Interior Region during part of the year. In most years substantial numbers winter in the upper tributaries of the Porcupine and Chandalar Rivers. Spring and fall migrations occur through the region. When last censused in 1972 the herd numbered around 100,000. The herd is presently stable or slowly increasing.

Ideal barren-ground caribou range consists of extensive alpine or arctic tundra areas. Spring, fall and summer demands are met by these areas. Here calving and breeding occurs, relief from insects is possible on wind swept ridges and high quality tundra or alpine forage is available. These same areas often furnish winter needs, but timbered areas, if available, are often used extensively for winter range. In this region alpine tundra areas normally occur above 3,000 feet in elevation. This

vegetation zone normally contains the calving habitat, which is an important habitat requirement of caribou populations. Calving grounds comprise the "center of habitation" for the herd. The calving area is the most consistent facet of otherwise vacillating and unpredictable movement patterns in caribou herds.

Almost any vegetated habitat type can serve as caribou winter range, but if available, timbered areas, particularly spruce-lichen communities, are used most extensively. 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 plants requiring up to 100 years for development of stands that 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 Interior Alaska fires and overgrazing by caribou have depleted some caribou ranges to below their potential carrying capacities. Both of these factors have been advanced as contributing to the dramatic declines suffered by the Fortymile and McKinley herds during this century.

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 most calves are born. Predation on calves and weather induced calf mortality determine in large part whether populations increase or decrease. In infected populations, brucellosis and a retained placenta condition can reduce the number of viable young born.

Caribou in several Interior Alaska herds have never experienced intensive sport hunting use. The Western Arctic, Porcupine, Chisana and McKinley herds have never received heavy sport hunting because of their relative inaccessibility, and until the past few years there were sufficient numbers of caribou in the more accessible Fortymile, Nelchina and Delta herds to satisfy most of this demand. However, potential for a rapid increase in sport hunting of these herds exists. The two Arctic herds have had a long history of domestic use by natives and were important food sources at various times for whalers, trappers, miners and other early day explorers of northern Alaska. Reported harvest from the Chisana herd has never exceeded 50 animals per year. Most of these are taken incidental to sheep hunting by hunters utilizing aircraft and horses for transportation. Low harvests of the McKinley herd in the

past several years have occurred primarily by residents of Kantishna and sport hunters hunting near the Stampede Trail on the northeast corner of McKinley Park. Because the population is still declining, harvests will likely be curtailed in the near future.

The Fortymile herd has a history of more intensive sport hunting than any other in the region. The majority of the harvest in the past resulted when the herd crossed the Steese or Taylor Highways. Harvests varied from fewer than 100 to as many as 2,400 per year from 1950-1972 depending upon the timing of the caribou crossing. Restrictive season closures were adopted in 1973 and the reported harvest during the past three years has not exceeded 50 per year. Because of the "boom and bust" population levels the herd has experienced in this century, it has played varying roles in meeting domestic demands for caribou by residents within the herds' range.

The Delta and Macomb Plateau herds are relatively accessible to the population centers of the region. Sport harvests since the late 1960's were fairly intense until the season on the Delta herd was entirely closed in 1974. Use of the Delta herd will be curtailed until the population has a larger recruitment of young caribou. The Macomb herd occurs in a restricted access area; most harvest is by resident hunters with horses and by backpackers.

PROBLEMS

* Caribou in interior Alaska are faced by a growing human population and development. Aside from the inevitable increase in demands on the caribou resource by consumptive and nonconsumptive users, the most immportant consequence of development will be alteration of habitat. Construction of the pipeline Haul Road will likely stimulate construction of arterial roads to mineral deposits and possibly to communities to link them to the road network. This will not only cause an influx of potential users of caribou but will likely divide the previously continuous caribou habitat so that less range may be utilized. The possibility of creating barriers to migrating caribou may have devastating long term impact on large herds. Much suitable caribou range which has been intermittently used in the past may never be occupied again. Impacts of necessary development and unavoidable 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.

* Increasing development and more intensive land use will mean a greater probability of fire. Loss of caribou range due to fire may have serious adverse consequences for affected caribou populations. Important caribou ranges must be identified and prevention and suppression of fires must be given high priority in management of those lands.

* Predation is at times detrimental to the welfare of caribou populations when caribou populations are small and predator populations are large or where human utilization of 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.

1. PORCUPINE CARIBOU MANAGEMENT PLAN

LOCATION

That portion of Game Management Unit 25 east of a line drawn from the headwaters of Fish Creek due south to the Yukon River; that portion of Game Management Unit 26B lying east of the Dietrich Caribou Management Plan area; and Game Management Unit 26C.

PRIMARY MANAGEMENT GOAL

To provide for an optimum harvest of caribou.

SECONDARY MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting caribou.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Regulate hunting seasons, bag limits and methods and means of taking caribou, if necessary, to provide for local use.

2. Limit harvests to the annual increment of caribou.

3. Encourage fire suppression on caribou winter ranges.

4. Discourage resource development that impedes free passage of migrating caribou.

THE SPECIES

The Porcupine herd currently ranks as one of Alaska's largest populations of barren-ground caribou. Although some animals probably remain in Alaska throughout the year, the majority of animals in the Porcupine herd spend only the spring and summer months in the state.

From 1900 to about 1940, the herd apparently increased in size and expanded its winter range westward into the central Brooks Range. A decline in numbers occurred following a population peak in the mid-1940's, probably due to emigration to the Arctic herd and/or across the Mackenzie into the Northwest Territories. Herd size probably increased in 1957 and 1964 with substantial immigrations of animals from the Fortymile herd involving some 20,000 caribou in 1964. Animals from the Porcupine and Arctic herd occasionally overlap on winter ranges in the vicinity of the Kanuti Flats and during spring migration in the Dietrich-Atigun area, indicating that Porcupine caribou may cross the pipeline corridor. Significant numbers of caribou from this herd sometime winter in the east-central Brooks Range, from the Colleen River to Chandalar. In addition, when caribou from the Porcupine herd winter near the Yukon River, there may be an interchange with the Fortymile herd. Calving occurs in the arctic foothills and coastal plain from the Canning River eastward into Canada.

Reliable estimates of herd numbers were not available until 1972, when a photo-census revealed a minimum herd size of 100,000 caribou. At that time initial calf production was a minimum of 55 calves:100 cows, and surveys the following October indicated a calf:cow ratio of 30:100. These figures indicated the herd was moderately productive and that in 1972 numbers were stable or increasing slightly. Surveys in July 1975 indicated excellent initial calf production with 53 calves:100 cows. In 1973 the bull:cow ratio was 57:100.

Historical records indicate that domestic (subsistence) utilization of this herd has been the primary use. No permanent settlements existed north of the Brooks Range between Barrow and Herschel Island prior to 1900, although temporary coastal settlements were common. Eskimos from villages at the eastern edge of the herd's range in Canada probably relied, at least partially, on caribou. Villagers along the Yukon River from Stevens Village to Eagle, as well as Arctic Village, Chandalar and Venetie utilized caribou but had alternate food sources (fish, moose and sheep).

The earliest non-native users of this herd were whaling crews in the Arctic Ocean. In the last half of the 19th century, whalers may have harvested 4,000-6,000 caribou annually when wintering groups of animals were available along the coast. Trappers, prospectors and traders moved into the upper and middle Yukon drainages during the early 1900's, but their impact on the caribou harvest was probably not as significant as the whalers'. Domestic use by whites was insignificant after the 1930's while harvest by natives was probably greatest in the late 1960's before dog teams were replaced by snow machines.

Liberal seasons and bag limits (no closed season, no limit) for the region north of the Yukon River have been maintained since statehood. Due to the remote areas from which current harvest occurs (both in Canada and Alaska) and the lack of harvest ticket reporting requirements, sport and domestic harvest data are difficult to obtain. Crude estimates derived from observations by biologists and interviews with resident hunters in 1972 and 1973 indicate a harvest of approximately 5,500 animals was taken from this herd between spring 1972 and spring 1973, of which 1,500 were taken by Alaskan village residents. Estimates for 1975 and 1976 indicate some 4,000-6,000 caribou may have been taken, 1,000 by residents of Arctic Village, Venetie and Chalkyitsik. Domestic needs of local users were apparently satisfied, as animals were being shipped to residents of Fort Yukon. At the current level of harvest, herd numbers will probably increase slightly with the rate of calf production and survival observed the past several years. There is no evidence that other mortality factors (disease, poor range condition and predation) are exerting a significant effect on this population.

PROBLEMS

* Four construction projects underway or proposed in Alaska or Canada (Trans-Alaska oil pipeline, El Paso natural gas line, Arctic Gas Natural gas line, Dempster Highway) may influence the movements, size and productivity of the porcupine caribou herd. The Department should monitor herd movements and make appropriate recommendations on construction modes and project activities to minimize adverse impacts on caribou. Major migration routes and calving grounds should be protected by critical habitat designation or other special land classification.

* Reliable harvest data are not presently available. Efforts should be made to periodically monitor the number of animals taken in Canada and Alaska. Status of the herd should be monitored through biennial sex and age composition surveys.

* Conflicts may develop between recreational and subsistence hunters if movement patterns of the herd place it in less remote areas. Restrictions on hunting seasons, bag limits and methods and means of taking caribou may be imposed to provide for local use.

* Lands withdrawn for native claims, Gates of the Arctic National Park, Yukon Flats National Wildlife Refuge and extension of the Arctic Wildlife Range may prohibit or severely restrict hunting opportunities over much of the herd's range. The Department

should seek agreements with appropriate agencies to allow hunting to continue on federal parks and refuge lands and it 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.

* Due to inadequate enforcement capability, there may be a lack of compliance with the current wanton waste law. The Department should play a more active role in regulation enforcement.

* With the decline in the Western Arctic caribou herd, more hunting pressure may be directed to the Porcupine herd. Increased restrictions on seasons, bag limits, and methods and means may be necessary to prevent overuse of this herd.

IMPACTS

* Domestic utilization of this herd is still the most important use, both in Canada and Alaska, and appropriate seasons and bag limits will be continued as long as harvests do not exceed the annual increment to the herd.

* Local domestic users of the resource will continue to take most of the harvest from this herd, specifically the villages of Venetie, Chalkyitsik, Barter Island and Arctic Village.

* Productivity and size of the population will not be adversely affected as long as major changes in the sex composition of the harvest do not occur and harvest levels do not increase appreciably.

* Hunter densities and aesthetic considerations will not receive priority consideration, as there will be minimal restrictions on methods and means of hunting.

* Where aesthetic goals for moose, sheep and grizzly bear in the Brooks Range are jeopardized by high caribou hunter density or unrestricted methods of hunter transport, further restrictions may be imposed on caribou hunters.

2. DIETRICH CARIBOU MANAGEMENT PLAN

LOCATION

In Game Management Units 24 and 25, the area bounded on the west by the south fork of the Koyukuk River from its confluence with Fish Creek to its confluence with John R. Creek, then northwest to the Middle Fork of the Koyukuk River to the North Fork of the Koyukuk River, then the North Fork of the Koyukuk River from its confluence with the Middle Fork of the Koyukuk River to its confluence with Glacier River, then by Glacier River, Roy Creek, Upper Hammond River, the Itkillik River to its confluence with the Colville River, and the Colville River to the Arctic Coast; on the north by the Arctic Coast; on the east by the Sagavanirktok River to its confluence with the Lupine River, then the Lupine River to the Game Management Unit 25 boundary, then west and south along the boundary to the headwaters of Fish Creek; on the south by Fish Creek.

PRIMARY MANAGEMENT GOAL

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

SECONDARY MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters, and methods of hunter transport to maintain aesthetic hunting conditions and to maintain desired harvest levels.

2. Encourage public viewing and photography of caribou.

3. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

The number of caribou in this area has declined during recent years. Approximately 5,000 caribou are residents, although some migrating animals from the Western Arctic and Porcupine herds migrate through the area.

Factors regulating the population size are poorly understood. Sport and domestic hunting is light and predation is moderate at this time. In contrast, both hunting and predation have played a significant role in reducing the Western Arctic herd which in turn has decreased the total number of caribou utilizing the Dietrich area.

Presently, hunting pressure is light in this area since aircraft provide the only means of access for recreational hunting. Domestic use of caribou in the area by hunters from Wiseman, Nuiqsuit and Barrow is low.

PROBLEMS

* A significant loss of habitat is occurring in the area as a result of industrial development. Habitat loss occurs in two forms: 1) physical destruction or alteration by construction; and 2) avoidance

of potentially available habitat because of man-made structures and activities in the area.

* If the Alyeska Haul Road is opened to the public hunting pressure will increase sharply and overharvesting of caribou populations could result. Management of caribou must consider the status and requirements of both the resident herd and migratory animals from the Arctic or Porcupine herds. Limitations on numbers of hunters and restriction of roadside hunting may be necessary to maintain desired harvest levels.

* A portion of the management area lies within the proposed Gates of the Arctic National Park. If land ownership is transferred to the National Park Service, recreational hunting may be prohibited and domestic use of caribou restricted. However, management by the National Park Service will benefit the nonconsumptive users.

* The wilderness character of the area may easily be lost by development or unrestricted land use. Hunting regulations which influence the use of the land affect people only when hunting. Therefore, successful retention of wilderness characteristics depends primarily on land management policies adopted by other State and Federal land management agencies.

IMPACTS

* Methods of off-road transport will be restricted and numbers of hunters will be limited.

* Restrictions will be placed on numbers of hunters, bag limits, hunting seasons and forms of transportation to achieve a sustained harvest without adversely affecting the herd.

* Emphasis will shift toward recreational use of wildlife and away from domestic use.

* Nonconsumptive users will also be affected by off-road transport, restrictions, but greater aesthetic experiences will be available than in other roadside areas in the state.

* Restrictions on modes of transportation and limits on the numberof hunters will reduce guiding operations in the area.

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 negligble 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.

5. FORTYMILE CARIBOU MANAGEMENT PLAN

LOCATION

That area bounded on the east, north and west by the Game Management Unit 20 boundary and on the south by the northern boundaries of the McKinley, Delta, McComb Plateau and Chisana caribou management plan areas.

PRIMARY MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting caribou.

SECONDARY MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Allow for limited harvests until the population increases to a maximum of 20,000; thereafter harvest the annual increment.
2. Maintain a minimum population of 5,000 caribou.
3. Maintain a minimum post-hunting season population sex ratio of 25 bulls per 100 cows.
4. Encourage public viewing and photography of caribou and enhance viewing facilities.
5. Encourage fire suppression on caribou calving grounds and selected wintering areas.
6. Discourage land use practices that adversely affect caribou habitat.

THE SPECIES

The Fortymile caribou herd has undergone wide fluctuations in abundance over the past fifty years. During the early 1900's the herd was probably increasing in size, reaching its peak numbers (estimated at 1/4 to 1/2 million animals) in the 1920's. These caribou occupied a much larger range than they do today. At that time they utilized country north of the Yukon River, made yearly migrations near Nenana, Fairbanks and Circle, and wintered as far east as Dawson and Whitehorse and as far south as the Alaska Range and Nelchina Basin.

The population began to decline in the 1930's and its numbers may have reached a low of only 10,000 animals during the early 1940's. It then increased to approximately 50,000 caribou by the early 1950's, but again began declining in numbers and by 1969 likely numbered no more than 20,000 animals. In 1973 the herd was estimated to have declined further to 5,300 animals and it probably contains fewer caribou today (1976).

The Fortymile herd now calves south of the Steese Highway along the headwaters of the Chena and Charley Rivers and Birch Creek. In the past when the herd was larger, calving occurred in the White Mountains. Summer range includes the high country between the Steese and Taylor Highways. Fall migrations often take the caribou east across the Taylor Highway and on into Canada. Traditional wintering areas lie along the Alaska-Canada border.

Causes of the major decline during the 1930's are only speculative. The initial reason for the population decline may have been diminished range quality, resulting from the tremendous grazing pressure applied by the large numbers of caribou, and possibly the destruction of range by frequent wildfires. It is unlikely that hunting could have initiated the decline. Nonetheless, domestic use by miners and natives may have accelerated the decline once it had begun.

Declines since the 1950's have been attributed in part to emigrations of caribou from the herd. Large numbers of caribou are known to have left the Fortymile herd in 1957 and 1964, joining the Porcupine herd wintering nearby in Yukon Territory. Quite likely other major unrecorded emigrations occurred. Losses to hunting have also contributed to herd reductions. Recreational hunters along the Steese and Taylor Highways killed an estimated 5,080 caribou in 1970-1972 before more restrictive regulations in 1973 reduced annual harvests to less than 100 caribou. Despite almost total elimination of the harvest, the herd remains at a very low level.

Tok and Taylor Highway residents have long depended upon the Fortymile caribou herd to provide a significant portion of their protein diet. By far the majority of the harvest has traditionally been by area residents, but after 1971 a greater number of Alaskans from Anchorage, Fairbanks and Delta participated in the harvest. This was in large part caused by the decline and subsequent season and bag limit restrictions placed on the Nelchina caribou herd. Residents of Southeastern Alaska also hunted the herd when caribou were present along the highway during the hunting seasons. With the highly restrictive seasons and bag limits now in effect nearly all the harvest is by local residents. Some effort is put forth by nonresidents or residents from other areas of the state, but this is primarily road hunting, and little success is achieved. Off-road vehicles or aircraft and up-to-date knowledge regarding caribou movements are essential for successful caribou hunting, since much of the time the herd is normally located long distances from the road systems. Successful hunters generally utilize the Kechumstuck off-road vehicle trail or the short, unimproved airstrips at Molly Creek or Joseph near the headwaters of the Fortymile River, or one of the several strips located along the Seventymile River. Opportunities for roadside viewing and photography of caribou occur usually in October when the fall migration brings the Fortymile herd across the Taylor Highway.

PROBLEMS

* The Fortymile caribou population continues to decline despite imposition of severe hunting restrictions. Predation by brown bears and wolves is believed to be the single most important factor responsible for large losses of caribou calves during their first six months of life. The Department should continue investigations into possible factors limiting or reducing the population, identifying those factors subject to control and effecting necessary remedial actions where possible.

* Public hunting may be restricted on lands located in the Upper Fortymile River country between Mt. Harper and Mt. Veta (including the Molly Creek drainage), selected by Natives under terms of the Alaska Native Claims Settlement Act. 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.

* Conflicts between viewers and hunters may arise when caribou are adjacent to the road systems during the hunting season. Some restrictions on roadside hunting in important but limited viewing

areas may be implemented to allow concurrent uses. Interpretive signs should be erected at various points along the Taylor Highway to allow more public understanding and awareness of the Fortymile caribou herd. Through a cooperative effort with the Department of Highways and BLM pullouts, parking areas, and campgrounds should be constructed when needed.

IMPACTS

* Restrictive seasons would continue until the herd recovers sufficiently to permit an increased harvest by the public.

* As the herd expands and seasons become more liberal, a greater percentage of the public would be able to participate in the harvest without being forced to utilize more expensive forms of transportation (ORV's and aircraft) as is now the case.

* Roadside hunting will not be permitted in important viewing areas, particularly the summit area between 96 and 105 mile, and sections of highway between South Fork and Walker Fork. Off-road vehicle useage may also be controlled in these viewing areas.

E. CHISANA CARIBOU MANAGEMENT PLAN

LOCATION

That portion of Game Management Unit 12 lying east of the Nabesna Glacier and river, and south of the Alaska Highway.

MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting caribou.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain limited harvests to allow for an increase in the caribou population.
2. Encourage fire suppression on caribou calving grounds and selected wintering areas.
3. Discourage land use practices that adversely affect caribou habitat.

THE SPECIES

The Chisana caribou herd occupies the area between the White River and Chisana, eastward to approximately the U. S.-Canada border. No sex and age composition data are available, nor has a census been conducted. The herd is estimated to contain approximately 1000 animals. No traditional calving areas are known, however post-calving groups have been sighted in June and July on the alpine hills between Chisana and the Ptarmigan-Bray Lakes area. This population appears to be stable. Some range disturbance has occurred as a result of mining efforts, but the total effect has been insignificant. A large amount of spring-summer-fall range is available. Little is known concerning abundance or quality of winter range.

In recent years annual harvests have ranged between 35 and 50 animals. Although some hunting effort is directed specifically at caribou, most sport hunting is done in conjunction with sheep and grizzly bear hunting. A number of guides operate throughout the area; most specialize in sheep hunting, with caribou normally being taken as a bonus animal. Except for a few residents of Chisana, virtually no domestic hunting occurs on this herd. The area is accessible only by aircraft (floats or wheels), off-road vehicles or horses. Because of the herd's inaccessibility, viewing opportunities are quite limited.

PROBLEMS

* Mining activities could cause serious disturbances in calving areas. This could lead to calf abandonment and be a significant mortality factor. Attempts will be made to delineate traditional calving grounds, if any, and document use on those currently in use. Through agreements with governmental regulatory agencies, mining restrictions could be placed on calving areas through time zoning to minimize disturbances.
* Lack of knowledge concerning movements, distribution, and population size of the Chisana caribou herd makes management difficult. Increased survey and inventory efforts directed toward the Chisana herd should provide information so that allowable harvest levels and impacts of other land uses can be determined.

IMPACTS

* Harvests of Chisana caribou will be reduced if the population shows any indications of declining.

7. MACOMB PLATEAU CARIBOU MANAGEMENT PLAN

LOCATION

In Game Management Unit 20, the area bounded on the north by the Tanana River, on the east by the Slana-Tok Highway, on the south by the crest of the Alaska Range, and on the west by the Richardson Highway.

MANAGEMENT GOAL

To provide for an optimum harvest of caribou.

OBJECTIVES

1. Maintain limited harvests to allow for an increase in the caribou population.
2. Maintain a minimum population of 350 caribou.
3. Control access, number and distribution of hunters and methods of hunter transport to distribute hunting pressure through the area and to maintain the harvest at desired levels.
4. Maintain a minimum post-hunting season population sex ratio of 25 bulls per 100 cows.
5. Discourage land use practices that adversely affect caribou habitat.

THE SPECIES

Approximately 1,000 caribou occur along the north slope of the Alaska Range between the Richardson and Glenn Highways. Upper areas of all the major drainages flowing into the Tanana River contain caribou. The area between the Johnson River and Robertson River, known as the Macomb Plateau, contains a fall concentration which numbers about 500 animals. Little is known about the movements and population fluctuations of this herd. However, the population may be a remnant of the Delta herd. Presently, calf production and survival are low possibly due to severe winters and predation by grizzly bears and wolves.

Use by recreational hunters is high on part of the Macomb Plateau. Other portions of the area receive less hunting pressure and produce fewer caribou because of more difficult access. An average of 37 caribou has been taken each year since 1971, and hunter success has averaged about 35 percent.

Transportation means are varied. About 50 percent of the animals harvested are taken by hunters using horses, 35 percent by hunters with ATV's and aircraft and 15 percent by walk-in hunters. Access restrictions to motorized vehicles during the caribou season on the Macomb Plateau have been in effect for two years and have significantly reduced harvest levels. One-half of the hunters using the area live in the Delta Junction area, 25 percent come from Fairbanks, and 25 percent come from the rest of the state, particularly the Anchorage area. Access routes to Macomb Plateau include two horse trails originating from the Alcan Highway and one lake large enough for float planes. Access to the remaining area originates from highways bisecting the area, bush landing strips, and ATV, horse and foot trails. Differences in accessibility result in a poorly distributed harvest. Caribou on the Macomb Plateau comprising only 35 percent of the population sustain 60 percent of the harvest as a

result of easy hunter access. Caribou receive light hunting pressure in other areas.

PROBLEMS

* Poor calf survival may be due to predation. Increased harvests of predators may be encouraged on Macomb Plateau caribou range.

* Large tracts of private land on the Plateau contain a large portion of the caribou range, and landowners may limit public hunting access in the future. 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.

* Proposals to create a wild or wilderness area on state land from the Macomb Plateau to the Delta River may result in limitations of hunter transport methods that would preclude hunter access. The Department should seek agreements with appropriate land management agencies to ensure that hunting could continue if the proposal is approved.

* Unequal hunter distribution has resulted in overharvest in some areas and underharvest in other areas. Permit hunts in specific drainages may be implemented to distribute the kill. The heavy harvest sustained on the Plateau could be reduced by requirements to use primitive weapons such as black powder firearms or bows and arrows. Such an action would also reduce conflicts with other users of caribou.

IMPACTS

* The restriction of hunting by permit will promote distribution of the harvest and reduce localized overharvest on the plateau.

* The restriction and discouragement of livestock grazing within the area may lead to the development of other lands for agricultural and livestock use.

* Hunter success will decline in the area as more hunters participate.

8. DELTA CARIBOU HERD MANAGEMENT PLAN

LOCATION

In Game Management Unit 20, the area bounded on the south by the crest of the Alaska Range; on the east by the Richardson Highway; on the north by the Tanana River, the North Star Borough boundary, and a line extending the southernmost Fairbanks North Star Borough boundary due west to the Nenana River; and on the west by the Nenana River.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions, and to maintain desired harvest levels.

2. Harvest less than the annual increment of caribou until the population reaches 4,000; thereafter harvest the annual increment.

3. Maintain a minimum post-hunting season population sex ratio of 35-40 bulls per 100 cows.

4. Encourage fire suppression on caribou calving areas and winter ranges.

5. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

The Delta caribou herd currently numbers about 1,500-2,000 animals and is declining. Efforts to evaluate the status of this population were begun in 1969. At that time the herd numbered approximately 5,000 animals. Calf production and survival in the Delta herd have generally been low. Few newborn calves are seen on traditional calving grounds near the headwaters of Delta Creek, and composition data indicate that less than 10 percent of the calves born in 1973 and 1974 lived to 17 months of age. Approximately 80 percent of the population is older than 6 years, and since caribou rarely live past 12 years, the population will likely disappear by 1980 unless calf production and survival increase.

Reasons for the herd's poor reproductive success are unknown. Pathological or nutritional factors may be affecting the female segment of the population, resulting in failure to produce viable calves which can survive more than a few weeks. Wolves and grizzlies are abundant on caribou range, although their impact on caribou has not been evaluated. Bears frequent pre-and post-calving concentrations of caribou in May and June, while wolves are numerous on caribou winter range.

The quality of the Delta caribou range has not been evaluated. Recent wildfires have destroyed a small portion of winter range lying between the East Fork of the Little Delta River and Buchanan Creek. Earlier large populations which overgrazed their range may have contributed the presently reduced herd size. The poor reproductive success of this herd cannot be blamed on too few bulls; bull-cow ratios remained near 30:100 from 1971 to 1976.

The Delta herd formerly produced large trophy bulls, several of which qualified as Boone and Crockett records. Because old animals predominate in the population, trophy bulls are still available.

Liberal hunting seasons (August 10 - March 31) and bag limits (3 caribou) allowed for intensive hunting pressure and harvest until 1973 when the limit was reduced to one caribou. From 1969-73, 1,874 caribou were removed by hunting. Two-hundred-thirty-three animals were taken from August 10 - September 30 before the season was closed in 1973. The harvest in 1973 was the lowest since the 1969-70 season when 225 caribou were harvested. The shortened season in 1973 eliminated winter hunting by residents. In an attempt to slow the herd's decline, the season remained closed in 1974 and 1975.

Resident harvest varied from 64 to 75 percent of the total kill. Hunter success declined steadily since 1970. The trend in hunter success paralleled the population decline of the Delta herd. The average number of caribou taken per successful hunter dropped from approximately 1.5 in previous years to 1.0 in 1973 as a result of the bag limit reduction from 3 to 1. Since 1969 the percentage of bulls in the harvest was about 70 percent. The selection of bulls by hunters is partly responsible for the relatively low observed bull:cow ratio.

Areas occupied by the Delta herd were readily accessible to hunters throughout the time of liberal seasons prior to 1973. About 60 percent of the bull harvest and 57 percent of the cow harvest occurred before October. Weather and snow conditions during March provided easy access into areas inhabited by caribou (specifically Gold King and Little Delta River), resulting in 23 percent of the harvest occurring at that time.

Guided hunting was prevalent in the late 1960's and early 1970's when 14 guides operated in the area. However, this number has declined to four or five who now guide for sheep, moose, and brown bears in the area.

PROBLEMS

* A total hunting closure has served to slow the rate of decline. Natural mortality is still greater than calf production and survival. Reproductive, nutritional and pathological studies should be undertaken by the Department to isolate causes of the poor reproductive success of this herd. Sport hunting will remain closed until the herd begins to increase.

* Environmental degradation due to unrestricted vehicle travel in portions of the Alaska Range detracts from the aesthetic qualities of fall caribou hunting. Military ownership and use of the Oklahoma Range lying between the Little Delta and Delta Rivers may conflict with aesthetic appeal of the area due to habitat alteration and presence of military personnel and equipment. Areas at the headwaters of Delta Creek are occupied by pre- and post-calving caribou groups; military use of this area during May-July may increase newborn calf mortality due to disturbance by aircraft. The Department should impose access restrictions in some areas and seek cooperation from the Department of Defense to limit activities that adversely impact the Delta caribou.

* Numerous coal leases, mining claims and mineral and gravel deposits lie within critical winter range of caribou. Further development of these materials will result in habitat loss and reduced aesthetic quality of the area. Critical caribou habitat should be identified and steps taken to limit further habitat deterioration.

IMPACTS

* The Delta herd may continue to decline regardless of future management. Until productivity and calf survival results in population growth, hunting seasons will remain closed.

* Hunter density and harvest will be regulated by permits and season timing, when hunting is again allowed.

* Commercial guiding interests in the area may be affected by allocation of permits issued to nonresidents.

* Mechanized ground transportation will be limited to established trails, while hunters utilizing aircraft may be limited to designated airstrips.

9. MCKINLEY CARIBOU MANAGEMENT PLAN

LOCATION

In Game Management Unit 20, the area bounded on the south by the north boundary of Mt. McKinley National Park, on the west by the southwest boundary of Game Management Unit 20C, on the north by a line drawn due east from Wien Lake to the Nenana River, and on the east by the Nenana River.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.

2. Harvest less than the annual increment of caribou until the population recovers substantially.

3. Maintain a minimum post-hunting season sex ratio of 35-40 bulls per 100 cows.

4. Encourage fire suppression on caribou winter ranges.

5. Discourage land use practices which adversely affect the wild character of the area.

THE SPECIES

Accurate information on current size of this herd is not available. A major decline occurred between 1941 when the herd contained an estimated 30,000 caribou and 1963 when 12,000 may have been present. Recent observations by Park Service and Fish and Game personnel indicate that the herd has undergone a further decline. Currently about 500 animals spend the summer and early fall within the Park. This suggests the herd may now number only about 1,000-1,500 individuals. Emigration of animals may have occurred from the McKinley herd to adjacent groups occupying the Tonsona River, Happy Valley and Ptarmigan Pass areas. During March, 1973, an estimated 1,000 caribou were in these areas. Recent Park Service surveys indicate that relatively few caribou winter within the Park. Four-hundred-fifty animals were located between the headwaters of Moose and Boundary Creeks in 1974, and approximately 600 animals were located in the Bull River-Foggy Pass area in July 1975. Some calving may also occur within Park boundaries. Fewer than 500 caribou have recently occupied traditional winter ranges between the Nenana and Kantishna Rivers and Lake Minchumina and other areas west of the Park (Tonzona River) probably support only 1,000 caribou.

The condition of the range and its relationship to natural mortality has not been evaluated. Wolves and grizzly bears are abundant within and immediately adjacent to the Park boundary and could be contributing to the population decline.

Hunter harvests have removed relatively few animals from the McKinley herd. Prior to 1970-71, the annual harvest was approximately 20 animals.

In 1971-72, the kill increased to 85, due to the availability of caribou along the Stampede Trail north of McKinley Park. Between 1973 and 1975, the annual harvest averaged nine caribou. Harvest tickets are not required for areas west of the Park, and hunters regularly take caribou in the foothills of the Alaska Range in the drainages of the Tonsona and Little Tonsona Rivers. These animals are considered part of the McKinley herd. About 50 to 100 of these caribou are taken annually, principally by guided hunters or by fly-in hunters from Anchorage.

Liberal seasons and bag limits for caribou in interior-arctic Alaska existed from statehood through the 1972-73 season. For the McKinley herd, a three caribou bag limit and a 4-7 month season were allowed. Restrictions to reduce harvests on other caribou herds in 1973 also applied to McKinley caribou. Since 1974, a bag limit of one caribou and a hunting season from August 10 to September 20 have been in effect for the McKinley Herd.

PROBLEMS

* Production, survival and sex composition data on the McKinley caribou herd are unavailable. Cooperative studies with the Park service should be undertaken to evaluate the current status of the herd.

* Reliable harvest data are lacking for portions of the herd which are hunted in Game Management Unit 19 where harvest tickets are not required. In addition, there may be a lack of compliance with harvest report requirements by domestic users of this herd in more remote portions of Unit 20. An expansion of areas where caribou harvest tickets are required may be necessary. The Department should conduct a vigorous campaign to solicit compliance with harvest report regulations.

* The 1.7 million acres proposed for the north extension of the Park under provisions of the Alaska Native Claims Settlement Act will remove additional lands from hunting. Vehicular access will be prohibited in any extension to the Park, and domestic users at Minchumina, Telida and Kantishna may lose traditional hunting areas.

* A proposed upgrading of the trail from Healy to Stampede for mineral development and the proposed road from the Anchorage-Fairbanks Highway to Kantishna and McGrath would detract from the aesthetics of hunting in the area. Prohibitions on roadside hunting and limitations on the use of all terrain vehicles for hunter transport may be established.

IMPACTS

* Restrictive hunting seasons and bag limits will remain in effect until the herd increases.

* Hunting season timing may be changed to maintain the desired population sex ratio.

* Environmental degradation will be minimized.

BISON IN INTERIOR ALASKA

During historic time bison (*Bison bion*) in Interior Alaska originated from a 1928 transplant from Montana to the Big Delta area. The animals thrived, growing to a herd of more than 500 during the early 1950's. Subsequently the herd declined because of overpopulation of its range, and then began slowly increasing again. Removal of animals by hunting has stabilized the population in recent years. In 1975 the herd numbered about 300 bison. The Delta herd has been the source of all other herds established by transplant in other areas of Alaska.

Bison are grazing animals requiring grasses, sedges, forbs, but also some browse for forage. Such vegetation in Interior Alaska is largely limited to riverbars, streamside bluffs or similar alluvial or aeolian deposits, shallow ponds in glacial moraines and to recently burned areas. Wet sedge meadows are utilized after the surface freezes in the fall. Availability of winter forage is the most critical natural factor affecting the Delta bison herd. In the fall the Delta herd migrates downstream from its summer range along the Delta River to the Delta Junction area to winter in burns and agricultural areas. During late winter the bison again move, this time to the sedge covered ponds within a 50-mile radius of Delta and then begin a leisurely movement toward the summer range.

Starvation during winters having deep crusted snow is thought to be the primary cause of natural mortality, with calves of the year especially vulnerable. Predation has not been an apparent cause of losses, possibly because bison are especially rugged and aggressive in their own defense. Observed natural losses to other causes have been negligible.

Carefully controlled sport hunting has been used successfully to stabilize the Delta herd. The harvests have been predetermined and the hunts have been controlled by permit. Most Delta bison hunters are Alaska residents mainly from Anchorage and Fairbanks.

PROBLEMS

* Suitable year-round bison range is extremely limited in Interior Alaska. The loss of any component of existing range to human development or use by domestic livestock would have a deleterious effect on the Delta bison herd's welfare. The existing bison ranges should be placed in a land classification that will preclude other, conflicting uses. Bison numbers must be managed to maintain the herd in balance with the long term productivity of winter habitat. Range enhancement through fertilization, burning, or seeding may be economically and practically feasible. Any transfer of bison range to private parties may markedly complicate or preclude management of herd size or habitat enhancement projects.

1. DELTA BISON MANAGEMENT PLAN

LOCATION

In Game Management Unit 20, that area bounded by Delta Creek on the west, the Gerstle River and the Healy River on the east, the Goodpaster River on the north, and the Game Management Unit 13 boundary on the south.

PRIMARY MANAGEMENT GOAL

To provide for an optimum harvest of bison.

SECONDARY MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain a pre-calving population of 250 bison, depending upon availability of suitable habitat, with an adult sex ratio of 45 bulls per 100 cows.

2. Control the number and distribution of hunters to distribute hunting pressure through the area and to maintain the harvest at desired levels and composition.

3. Encourage public viewing and photography of bison and enhance viewing facilities.

4. Improve carrying capacity of selected areas for bison through habitat improvement programs.

5. Encourage land use practices which enhance bison habitat.

THE SPECIES

Delta bison originated in Alaska from a transplant in 1928 from Montana to the Big Delta area. The animals thrived, growing to a herd of more than 500 during the 1950's. Subsequent population fluctuations due to the severity of winter and availability of forage have resulted in a present herd of 300 animals. The Delta bison herd is the largest in the state and has been the source of animals transplanted to all other herds throughout Alaska. Presently, the Delta bison herd is productive (70 calves per 100 cows and 80% yearling survival). Herd size has been stabilized through the removal by hunting of annual increases. Considering the high yearling survival, predation in its various forms does not appear to be a major mortality factor. Mortality exclusive of the legal harvest results in an 8 to 10 percent loss per year and includes losses to drowning, accidents, predation, illegal kills and vehicle-bison collisions.

Prior to the advent of agriculture in the Delta area lack of winter range was a severe problem. Heavy mortality in extreme winters was not uncommon. Forest fires in the 1940's and 1950's created sufficient winter range to allow the herd to expand, but as the burns became less useful because of vegetative changes, the capability of the area to support bison declined. Since 1960 agriculture has increased in the Delta area and its effect on the bison has been dramatic. Calf production and survival through the yearling age are at high levels and the physical condition of overwintering bison is good.

Hunting of Delta bison begins at the end of September after the harvest of agricultural crops, and continues through mid November. Hunting is controlled by permit. Approximately 3500 people have applied for 50 bison permits each year. Participation by permittees has been high and hunter success has been 100 percent. Conditions of the hunt have generally required permitees to be accompanied by a Department representative. At current population levels, 35 to 50 bison of either sex are taken each year. Harvests have reduced the proportion of bulls in the herd to about 40 per 100 cows. Most of the old, large bulls have been removed from the herd.

Bison are relatively accessible to hunters using highway vehicles. The majority of the hunters come from the Fairbanks and Anchorage areas. Local residents usually receive 8 to 10 percent of the bison permits. Very few nonresidents have taken bison from the Delta herd. Virtually no professional guiding activities have been involved in Delta bison hunts.

In addition to hunting, Delta bison provide for considerable viewing and photographic opportunities for residents and visitors alike. During the fall and winter, roadside observation of bison is possible on highways near Delta. Summer observations require use of binoculars and spotting scopes because bison are on summer range across the Delta River from vantage points on the Richardson Highway.

PROBLEMS

* Suitable open winter range for bison is limited in extent and is threatened with potential reduction in the near future. Currently, bison spend four or five months on unfenced agricultural lands for fall and winter forage. Early fall use of agricultural land by bison result in crop depredations and may cause landowners to fence their crops. Fencing to avoid crop depredation or to operate a livestock operation will result in a serious loss of winter habitat. Contemplated state land use for agricultural development will increase conflicts with farming and livestock production. Pipeline related development and human population expansion will further reduce the range available to bison. Establishment of State Bison Range should be considered. A State Bison Range would go far in providing open winter range for bison and reducing conflicts of bison with agricultural interests. The Department of Fish and Game should attempt to persuade operators of large farms in the Delta area not to fence or else to open their gates after harvest and allow bison free access to the fields until the establishment of Fish and Game lands for the purpose of providing bison winter range. The Delta River summer range and calving area should also be secured as part of the management scheme for bison. A cooperative agreement or land transfer to allow habitat development on lands presently owned by the military or other Federal agencies will reduce the dependency of bison on lands developed for agriculture, transportation and urban growth. Crop depredations can be reduced by holding animals on the summer range as long as possible with the use of artificial salt licks and habitat improvement measures. Bison arriving on farm lands before the crops are harvested can be herded to reduce crop damage.

* Predation is not considered an important mortality factor at present, however, the high number of wolves in the area now preying on other species could possibly shift pressure to the bison as present prey populations decline. Management of predator populations on bison range may become necessary if predation becomes excessive.

* The Delta herd enjoys a relatively disease-and parasite-free existence, but the herd would be susceptible to diseases introduced by domestic livestock. Because domestic livestock are present on the bison winter range precautions must be taken not to introduce diseased livestock to the area.

* Access to private and federal land for hunting may be a future problem. Presently, good cooperation from the military and private landowners allow hunting on most of the lands in question. The development of a bison range that would allow hunting on Department controlled lands could alleviate any problem of this nature in the future.

IMPACTS

* The bison herd would be maintained through public hunting at approximately its present level.

* The establishment of a State Bison Range and the implementation of habitat improvement programs would significantly reduce crop depredations.

* Some land otherwise available for sale to private ownership may be retained by the State.

* Viewing facilities would be established or improved with the establishment of a State bison range.

* Habitat rehabilitation would enhance conditions for other species inhabiting the area. Moose winter range and sharp-tailed grouse habitat would be increased by controlled burns. Agricultural practices would increase migratory waterfowl feeding areas.

DALL SHEEP IN INTERIOR ALASKA

In Interior Alaska Dall sheep (*Ovis dalli*) are found in the Tanana Hills, White Mountains, Mentasta Mountains and the north side of the Alaska Range and
Wrangell Mountains. Sheep are also continuously distributed along the south slope of the Brooks Range from the Canadian border west to the Schwatka Mountains. Alaska Range sheep are continuous in their distribution from the Muldroe Glacier in Mt. McKinley National Park eastward to the Mentasta Mountains and along the north side of the Wrangell Mountains to the Canadian border. In the Tanana Hills sheep occupy the alpine areas of Glacier Mountain, the headwaters of the Charley River, Twin Mountain, West Point, Mount Sorenson and the headwaters of the Salcha and East Fork of the Chena Rivers. In the White Mountains sheep are found in the vicinity of Mount Victoria, Mount Schwatka, Mount Prindle and Lime Peak.

Recent surveys have established minimum numbers of Dall sheep in Interior Alaska as follows: Mt. McKinley Park 900, the Alaska Range from McKinley Park to the Delta River 4200, the Alaska Range from the Delta River to the Tok-Slana cutoff 2300 and the Mentasta Mountains and north side of the Wrangell Mountains 3700. The south slope of the Brooks Range is thought to contain at least 7500 sheep.

No well documented population fluctuations have been observed in Interior sheep populations except for those in Mt. McKinley Park. Park populations experienced drastic reductions in 1929 and 1932 as a result of unusually severe winters. Since that time the population appears to have fluctuated about a mean of about 1000 sheep. No Interior sheep populations are currently known to be expanding, and it is thought that sheep numbers in the region, while subject to fluctuations, are comparitively stable at about current numbers.

Dall sheep are usually found in alpine habitat. During summer, they occupy relatively large areas of their annual range and remain almost entirely above brushline. Sheep in the Tanana Hills and White Mountains, however, occupy habitat which is lower in elevation. These sheep are often seen near spruce forests and apparently descend to valley bottoms in order to obtain water. Mineral licks are an important component of sheep summer habitat on many Interior sheep ranges. Many important mineral licks are known throughout the Alaska Range and Brooks Range. Some have been located in the White Mountains and northern Wrangells. 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 Dall 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. Dall 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 the Alaska Range and Wrangells 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, lynx and sometimes eagles have

been known to take sheep. The terrain of the Tanana Hills and White Mountains is less rugged than that of the Alaska Range and Wrangell Mountains and consequently may not provide sheep with frequent escape possibilities. Consequently, it is thought that predation, particularly by wolves, may play a more important role in these areas than further south. Little is known of predation in the Brooks Range.

Sheep were formerly hunted for market in the Alaska Range, but the current uses of sheep are primarily for recreation. Sheep in Mt. McKinley Park in the Alaska Range are used exclusively for viewing, photography and associated nonconsumptive wilderness values. In other parts of Interior Alaska sheep are used for recreational hunting as well as for nonconsumptive values. Traditionally only rams with horns of 3/4 curl or greater have been legal game during an August-September season. For the last 4 years sheep hunters have spent an average of about 5,000 man days per year hunting for sheep in Interior Alaska. The number of hunters has averaged about 1,150 and the number of rams harvested has averaged about 450 over this period. Resident hunters comprise about 77 percent of the hunter effort and have a success ratio of about 31 percent. Nonresident hunters have a success rate of about 67 percent, perhaps reflecting the benefit of the mandatory presence of a guide. Recreational hunting pressure in the Interior is expected to increase in proportion to increases in human populations. Domestic use of Dall sheep has never played a significant role in the Interior Region. Some domestic use is traditional in the Brooks Range, but sheep are not a major food item.

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.

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.

5. WHITE MOUNTAINS SHEEP MANAGEMENT PLAN

LOCATION

In Game Management Unit 20, that area included in the drainages of Preacher Creek upstream from its confluence with the north fork of Preacher Creek, Beaver Creek upstream from its confluence with Moose Creek, and all drainages into Beaver Creek which lie south of a line drawn from Why Lake to Three Sleep Point.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access and methods of transport to maintain aesthetic hunting conditions.

2. Control hunter numbers and distribution, if necessary, to distribute hunting pressure through the area.

3. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

In the White Mountains area Dall sheep occupy approximately 534 square miles of alpine habitat in the vicinity of Mount Victoria, Mount Schwatka, Mount Prindle, Lime Peak, Cache Mountain and the White Mountains. The population numbers about 285 animals and is geographically isolated from other sheep populations. Sheep occur in small, widely scattered groups throughout the range.

Habitat is limited by the low elevations and encroachment of surrounding spruce forests on the alpine tundra. Sheep often travel through forested areas either to reach water in the valley bottoms or to reach other suitable sheep habitat. The necessity of traversing forested areas, as well as the scarcity of rugged escape terrain in the alpine areas, makes these sheep more vulnerable to predators; however, data on mortality factors and rates are not available. The area is drier than other sheep range due to the light annual snowfall and dry interior climate and the rapid drainage provided by the porous sandstone and limestone substrate. Two other requisites for sheep habitat are available: mineral licks and windblown slopes during the winter. The Tanana Hills-White Mountains area has potential for sustaining high densities of sheep; however, the present density of 0.5 sheep per square mile is among the lowest in Interior Alaska. There is no indication that sheep have overutilized the range. Although annual survey data are lacking, observations indicate that the population is stable.

Composition and productivity information was gathered at the Mt. Schwatka mineral lick during 1973 and 1974. Productivity was low with only 33 lambs per 100 ewes in 1973 and 23 per 100 in 1974. However, lamb survival in 1973 was excellent; there were 30 yearlings per 100 ewes in 1974. Information on productivity is not available either for preceding years at Mt. Schwatka or for the rest of the area. The small amount of hunting that has taken place during recent years has probably not affected productivity or availability of legal rams. Human exploitation and development have not occurred to any appreciable extent, providing a wilderness situation that is virtually undisturbed. However, some loss of sheep habitat may be occurring due to natural plant succession.

The area has the potential for producing trophy sheep. The average ages when rams attain 3/4-curl and full-curl horns are 5.7 years and 8.8 years, respectively. Average horn measurements at these ages are 27.0 inches and 35.9 inches, respectively. Horn growth data from throughout Interior Alaska suggest that low sheep density may correlate with high trophy quality.

Human use of this sheep population has been light. Harvest reports for which specific locations are noted show that only three sheep were taken in 1975, three in 1974 and one in 1973. The numbers of hunters afield were 10, 5 and 8, respectively. Thus, hunter success varied greatly, ranging from 12 to 60 percent. Most hunters have been residents and 90-100 percent of the harvest is taken by residents.

Liberal hunting seasons and bag limits prior to 1942 were followed by progressive restrictions which closed the area to sheep hunting from 1949 through 1954. In 1955 the present season of August 10 through September 20 was initiated. The legal bag limit since then has remained one 3/4-curl or larger ram per year.

User access is primarily by aircraft, despite the scarcity of landing sites. One unimproved strip near Lime Peak provides the closest access to sheep. Two private strips and several gravel bars along Beaver Creek are within walking distance of sheep habitat. In addition, float planes can land on small lakes north of Mt. Schwatka or on Beaver Creek near Victoria Creek during some years. Ground access is primarily from the Steese Highway; however, it is possible to approach the area via two trails to Beaver Creek from the Elliott Highway. The Steese Highway is closer to sheep range and has three mining access roads suitable for off-road vehicle use.

PROBLEMS

* Loss of habitat may be occurring due to natural succession. Fire in adjacent climax conifer and deciduous forests would benefit the area by retarding the encroachment of forest upon the alpine areas.

* Predation is a greater potential problem here than in most sheep ranges due to the scarcity of escape cover and the movements of sheep through forest situations to reach water, mineral licks or other patches of alpine habitat. The impact of wolf predation should be assessed periodically.

* Access by ground vehicles will destroy the wild character of the area and may not be compatible with the goal of maintaining aesthetic hunting conditions. Off-road vehicle use of the area has not been extensive to date and should be restricted in the future.

* Little is known of the current status of the sheep population. Periodic sex and age composition surveys should be conducted to determine the level at which the population could be harvested and the density of hunters that can be sustained.

* Potential gravel and mineral deposits and two water storage sites may lead to development that is not compatible with the wilderness character of the area.

IMPACTS

* Present use of the area is compatible with proposed management; however, increased demands on the sheep population in future years may result in regulations to restrict the number of hunters allowed in the area and their method of transport.

* Users entering the area to view, fish or hunt wildlife will be faced with the same restrictions as sheep hunters.

6. TANANA HILLS SHEEP MANAGEMENT PLAN

LOCATION

In Game Management Unit 20, all drainages flowing into the south bank of the Yukon River between Circle and Eagle, all drainages of the North fork of the Fortymile River above its confluence with the Middle Fork of the Fortymile River, all drainages of the Salcha River above its confluence with Stone Boy Creek, all drainages of the North Fork of the Salcha River above its confluence with Rick's Creek, all drainages of the Chena River above its confluence with Wolf Creek, and all drainages into the South bank of the Coulombes Fork of Birch Creek and Birch Creek, south of the Steese Highway crossing and south of the Steese Highway between that point and Circle.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access and methods of transport to maintain aesthetic hunting conditions.

2. Control hunter numbers and distribution, if necessary, to distribute hunting pressure through the area.

3. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

Dall sheep occupy about 1,420 square miles of alpine habitat in the Tanana Hills of eastern Interior Alaska. The most important sheep range is near the headwaters of the Charley and Seventymile Rivers, the East Fork of the Chena River, Birch Creek and the North Fork of the Fortymile River. About 285 Dall sheep occur in the Tanana Hills in small, scattered bands. There is evidently little interchange between sheep bands, and the population as a whole is isolated from other Alaska sheep populations. Local sheep bands often have distinctive coloration. Glacier Mountain sheep have black or dark-colored tails and frequently have dark hairs interspersed in their otherwise white coats. The genetic history of these populations and reasons for their distinct coloration are unknown. Tanana Hills Dall sheep habitat is limited because of the area's comparatively low elevation. Spruce forests encroach on sheep alpine habitat, and there are few rugged and steep rock outcrops typical of sheep range elsewhere in Alaska. Sheep often travel through timber to water and adjacent alpine areas. Numerous mineral licks and broad expanses of mountain slopes that are blown free of snow in winter, provide sheep easy access to forage. The area generally receives less precipitation than most other sheep ranges in Alaska. The effects of human activities in the Tanana Hills have been insignificant, and the area remains virtually an undisturbed wilderness. Some loss of sheep habitat may be occurring as a result of natural vegetation succession.

Although survey data are generally lacking, sheep numbers appear to be stable in the Tanana Hills, and there is no indication that the range is overgrazed. Aerial surveys of Glacier Mountain sheep indicate that rams with horns of three-quarter curl or larger constitute about 20 percent

of the population. An average of 18 percent of ewes have been accompanied by lambs in mid-summer on Glacier Mountain. The Tanana Hills area in general appears capable of sustaining high sheep densities, although current estimates of sheep per square mile of habitat (0.20) is the lowest on record for interior Alaska.

The rate of ram horn growth in the Tanana Hills indicates that the area is potentially capable of producing trophy sheep. Horn growth rate, although slower than for Wrangell Mountains sheep, is faster than for rams occupying the Brooks Range. The ages of ram with three-quarter and full-curl horns average 5.7 and 8.8 years, respectively, in the Tanana area. Horn measurements at these ages average 26 and 35 inches, respectively. Studies elsewhere in Alaska indicate that rapid horn growth is correlated with low sheep density.

Sheep losses to natural causes are unknown. Tanana Hills sheep may be vulnerable to predators due to the scarcity of steep slopes for escape and because they must traverse wooded areas.

Human use of Tanana Hills Dall sheep has been limited. An average of about 17 hunters per year reported killing three rams in 1975, nine in 1974 and none in 1973. Hunting success has varied from 0 to almost 50 percent. Sheep in the Tanana Hills occasionally move long distances and may not return to the same areas in successive years. These erratic movements may account partially for the considerable annual variation in hunting success. Most sheep hunters who use the Tanana Hills are Alaskan residents. Ninety percent or more of the Dall sheep harvest has been by residents. Planes are the most common means of access to the Tanana Hills, but few landing sites are available. There are improved airstrips along rivers, but these are generally too far from the sheep bands for practical use by hunters. Light aircraft can land on some ridges. Hunters also enter the area via the Charley River and by walking from the Taylor Highway starting at American Summit. Use of motorized vehicles or pack animals for transportation of hunters, hunting gear or game taken has been prohibited in the Glacier Mountain Management Area since 1971. Most hunters reach Glacier Mountain by embarking at Mile 140 of the Taylor Highway and walking ridgetops to the Management Area, a distance of about 20 miles. The current season of August 10 through September 20 and bag limits of one ram with three-quarter curl horns or larger date from 1955. The limited number of sheep taken from the area has had an insignificant impact on herd productivity. The number of three-quarter curl and larger rams has been significantly reduced in some local areas, such as Twin Mountain.

PROBLEMS

* Problems related to hunter access may develop in future years. Increased use of ORV's could adversely affect the area's wilderness character and could be incompatible with management goals to provide aesthetic hunting. Logistical support for guided hunts may lead to greater air traffic in the area. Difficult and limited means of access, however, currently cause hunters to concentrate. The Department may consider developing means and points of access to equitably distribute hunters that would not alter the wilderness aspect of the Tanana Hills. The Department will also encourage guiding efforts that are consistent with management goals and will regulate undesired activities. Two proposed highways, from Circle to Eagle via the north side of the Tanana Hills and from Fairbanks to Eagle through the Salcha and Seventymile River drainages could lead to increased use of the area. If these roads are constructed, the Department will consider more restrictive regulations to maintain the area's aesthetic qualities. The Department will also make recommendations regarding placement and construction of the highways to reduce adverse impacts on Tanana sheep.

* Little is known of the status of sheep populations in the Tanana Hills. Periodic sex and age composition surveys should be conducted to determine the allowable harvest and the density of hunters that the area could sustain.

* Gravel and mineral deposits and water storage sites may lead to development that is incompatible with the area's wilderness character. Asbestos mining may occur in the Glacier Mountain area. A proposed dam on the Yukon River at the mouth of Woodchopper Creek would back water into the Charley River drainage to the detriment of sheep that frequent the river bluffs. Critical habitat, including sheep migration routes, travel lanes, and mineral lick sites, should be immediately identified by the Deparment. The Department may recommend legislative action to protect important sheep habitat in the area.

* The proposed Charley River Wild and Scenic River area and Native Regional Deficiency withdrawals may lead to restrictions on use of portions of the Tanana Hills. The Native Regional Corporation may select from lands in the vicinity of Mount Sorenson, Arctic Dome, Mount Eldridge and Glacier Mountain. 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. Cooperative agreements with appropriate federal agencies should be sought to allow hunting to continue in the Charley River area if that proposal is approved.

* Predation on Dall sheep is potentially more serious in this area than elsewhere due to the lack of escape cover and the proximity of timber. The impact of wolf predation should be assessed periodically.

* Loss of sheep habitat is occurring due to natural vegetation succession. Fire in adjacent forests would probably benefit sheep by retarding forest encroachment on alpine areas.

IMPACTS

* Current use of the Tanana Hills is compatible with proposed management. Greater demands on sheep in future years, however, may require restrictions of the number of hunters and their methods of transport.

* Users of the area for viewing, fishing or other activities will be affected by the same restrictions imposed on hunters.

7. WRANGELL-MENTASTA MOUNTAINS SHEEP MANAGEMENT PLAN

LOCATION

The Wrangell and Mentasta Mountains in Game Management Unit 12 and that portion of Game Management Unit 11 lying to the east of Boulder Creek and north of Mt. Wrangell.

MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting sheep.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain minimal restrictions on hunter access and methods of hunter transport.

2. Maintain the sheep population in balance with its habitat, if possible.

3. Discourage land use practices that adversely affect important sheep habitat.

THE SPECIES

The Wrangell-Mentasta Mountains contain some of the best sheep habitat in Alaska, and as a result some of the largest sheep populations are located in this area. An estimated minimum population of 6,500 sheep inhabit the area. Sheep populations of highest density appear to occur near Wiki Peak near Ptarmigan Lake in the Wrangells and from Noyes Mountain southeast to the Nabesna River in the Mentasta Mountains.

Production of lambs appears to be high throughout the Wrangell-Mentasta Mountains, although survival rates to two years of age are generally unknown. Limited surveys indicate fluctuations in lamb survival rates from year to year. Recognizable rams comprise between 17 and 32 percent of various populations in the area.

The Wrangell and Mentasta Mountains have long been popular sheep hunting locations. Annual harvests have ranged from about 120 to 225 sheep, with about 70 percent of the kill occuring in drainages of the Nabesna River and in the vicinity of Ptarmigan Lake. In recent years approximately 400 hunters have reported hunting in the area. Three-fourths of the hunters are residents, and their success rate is about 33 percent. Nonresident hunters who are required to employ guides, have a hunting success of 75 percent.

Harvests have reduced the percentage of legal rams in the population and the availability of large horned rams. This is particularly obvious in the Nabesna River drainage and part of the Wiki Peak area, both of which support most the sheep harvest. However, there are portions of the area that receive little hunting pressure and have a relatively large number of large horned rams in the population. As hunting pressure increases it is expected such areas will receive more hunter effort and will exhibit corresponding reductions in proportions of large rams.

Hunter access is primarily by means of aircraft and all terrain vehicles, although horses are used in the Chisana and White River drainages and, around Beaver Creek. All terrain vehicles are used in the Mentasta Mountains, particularly on the southwest side; aircraft are the common

access vehicle in other areas. A limited number of airstrips are available in the Wrangell-Mentasta Mountains, although some gravel bars are adequate for airstrips. Access in some areas, such as glacial regions and much of the Wrangells north of Beaver Creek, is limited to walking. Access from the road system is confined to the Mentasta Mountains where hunters walk from the Nabesna Road.

PROBLEMS

* Establishment of a Wrangell-St. Elias National Park may substantially reduce hunting opportunity in the area by restricting or eliminating sport hunting or excluding certain access means. The Department should advocate continued sport hunting in this important hunting area to the extent that it does not conflict with other important uses of the area.

* An expansion of mining activity in the Chisana area could result in excessive disturbance to sheep and possible abandonment of some range. The Department should delineate areas and advocate protection for critical sheep habitat, and propose limitations on resource development to minimize impacts on sheep through agreements and coordination with the land managing agencies.

IMPACTS

* The proportion of large rams in the populations will decrease, but productivity of populations will remain high.

* Without regulation crowded hunting conditions may occur in areas with good access.

8. TOK SHEEP MANAGEMENT PLAN

LOCATION

In Game Management Units 12 and 20, the area known as the Tok Management Area.

PRIMARY MANAGEMENT GOAL

To provide an opportunity to take large sheep.

SECONDARY MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Limit the harvest of rams to those with full-curl horns.
2. Control the number and distribution of hunters to distribute hunting pressure through the area and to maintain the harvest at desired levels.
3. Control access and methods of hunter transport to maintain aesthetic hunting conditions.
4. Harvest ewes to maintain the sheep population in balance with its habitat.

THE SPECIES

An estimated 1650 sheep inhabit the Tok area. Productivity of the population and survival of lambs are high. Surveys in 1975 indicated 40 lambs per 100 ewes and 32 yearlings per 100 ewes. Rams with three-quarter curl horns or larger comprise about nine percent of the population (150). The population is capable of producing large numbers of large rams in a relatively short time. It is not unusual to find eight-year-old rams that have full-curl horns. Based on studies of other Alaskan sheep populations, about 50 rams may enter the full-curl category annually. Little is known of the relative importance of natural mortality factors or condition of the range. Based on observed lamb production and survival rates, the range seems in good condition. The sheep population is probably increasing throughout the Tok area.

The Board of Fish and Game created the Tok Management Area in 1974 to provide hunters with an area containing large-horned sheep and uncrowded, high-quality hunting conditions. The eastern end of the Alaska Range was chosen for its healthy, growing sheep population, good accessibility by various transportation modes including walking, and a low number of guides using the area. The regulations included ewe hunting to provide for control of the sheep population size and adjustment of the sex ratio. The population appeared capable of producing 30 full-curl rams annually and regulations were promulgated to achieve this harvest. In 1974, 60 permits were issued for rams and 60 were issued for ewes. Only five rams and nine ewes were taken, a success of 8 and 15 percent, respectively. In 1975, 120 ram permits were issued, resulting in 29 successful hunters out of 67 permittees who actually hunted. No ewes were harvested during 1975, although 10 permittees reported hunting.

Transportation into the area has been by air, foot, off-road vehicles and horses, with most people using aircraft or walking. Off-road vehicles have been popular along the Tok River, where horses have also been used to a limited extent. Some small, gravel bar airstrips are present in the Robertson and Johnson Rivers; in the Tok drainage only 2 or 3 such strips are present. There are no landing areas (for wheel-equipped planes) in the Dry Tok River drainage. Burnt Lake, in Sikosina Pass, can also be used by float planes. Most walk-in hunters use the Yerrick Creek-Sheep Creek-Clearwater Creek areas. This section receives fairly heavy foot traffic along with pressure from off-road vehicle and aircraft users via the Tok River. Hunters in the Dry Tok must hike from Burnt Lake or use horses or off-road vehicles. The Tok area has traditionally been used by Alaska residents. Four guides used the area prior to establishment of permit restrictions. Now only one guide regularly hunts there, although others are free to do so provided their clients possess permits. Nonresidents are restricted to no more than 10 percent of the available permits under current regulations.

Sheep can frequently be observed during May and early June from the Tok Cutoff between Mile 91 and Mile 85 as the animals feed on new vegetation along the cliffs bordering the highways. Few animals are located here at other times of the year, however.

PROBLEMS

* Misuse of certain transportation modes, primarily aircraft and off-road vehicles, has resulted in competition between and complaints from a number of hunters. While many would like to see all transportation modes except walking disallowed in the Tok area, the area is too large for such a restriction and many portions would remain unhunted while other sections would receive excessive pressure. The Department may establish transportation corridors and designated landing areas. This does not eliminate the problem of unethical use of aircraft for spotting or hazing or disturbing other hunters but such practices would be reduced.

* A number of hunters who formerly hunted in the Tok area before special management was invoked resented the restrictions imposed by a permit system and have continued to hunt there without permits. Increased enforcment efforts are required to curtail noncompliance with regulations.

* Public and political opposition to the hunting of ewe sheep may force cancellation of either-sex hunts and hinder current research programs in the area. The Department should conduct a public relations program to explain the benefits to be derived from either-sex sheep harvests.

IMPACTS

* Proposed management is essentially that which exists on the area currently. No major changes in characteristics of use or effects on the sheep population are expected.

* Some regulation of transport method should achieve a better distribution of the harvest and reduce conflicts between hunters.

9. DELTA SHEEP MANAGEMENT PLAN

LOCATION

Game Management Unit 20D and that portion of Game Management Unit 20A lying east and south of McGinnis Glacier and Creek.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Regulate access and methods of hunter transport to accomodate walk-in hunters.
2. Control number and distribution of hunters, if necessary, to distribute hunting pressure through the area.
3. Limit the harvest of rams.
4. Allow ewe harvests, if necessary, to maintain the sheep population in balance with its habitat.
5. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

Dall sheep in the Delta area number approximately 1500 animals. The population size appears stable, despite high production and good survival of lambs to yearling age (usually indicative of a growing population). Sheep habitat is apparently in good condition. Predation may be limiting population growth in the area. The proportion of rams in the population has been reduced by hunting and now stands at about 7 percent. Legal ram recruitment may be reduced, at least for the 1976 season, due to the severe winter of 1970-71.

Since 1968 an average of 191 hunters have taken an average of 51 sheep per year in the Delta area. Hunting success has averaged 27 percent annually. More than 90 percent of the hunters are Alaskan residents. About half of the hunters come from Fairbanks, 20 percent from Delta Junction, and 20 percent from other areas in Alaska. From 1971 to 1974 use of the area was equally distributed between walk-in hunters and vehicular users by imposing restrictions on the use of vehicles during the latter part of the season. In 1975 vehicular access was prohibited and only walk-in hunters now use the area. Currently sheep in the remote and inaccessible areas such as July Creek and the Johnson, Gerstle and Little Gerstle Rivers sustain only 19 percent of the harvest while sheep in the accessible Granite Mountains and the Alaska Range adjacent to the Richardson Highway support 81 percent.

Hunting has affected the availability and size of rams in the population. Average horn size of rams harvested has declined from 35.2 inches in 1968 to 30.6 inches in 1975. Hunting effort or success would have to be reduced if an increased proportion and size of rams in the population is desired.

PROBLEMS

* Mineral exploration and development on or near mineral licks or other important sheep habitat could have a detrimental effect on the sheep population. Coal development near the Gold Creek sheep lick is a possibility. Mineral licks should receive critical habitat designation. Mining activities on important winter ranges, lambing areas, and travel routes should be regulated to minimize adverse impacts to sheep.

* The introduction of disease and parasites by domestic animals, particularly domestic sheep, may develop with more agriculture in the Tanana Valley. Other wild ungulates such as moose and caribou, predators such as wolves and coyotes, and scavengers such as ravens, could carry diseases from domestic stock to the wild sheep population without domestic sheep encroaching on Dall sheep range. Extended quarantines for incoming livestock and more comprehensive disease testing would reduce that threat. Grazing permits for lands on or adjacent to sheep range should not be allowed.

* Illegal kills are a constant problem in the area. Ram losses to illegal hunting probably average 10 percent of the legal harvest per year. More intensive enforcement is required to reduce illegal take.

* During the sheep hunting season, a vehicle parking area shortage exists along the Richardson Highway and creates traffic safety problems. More off-highway parking areas would reduce the danger to motorists.

IMPACTS

* Limitations on the number of rams harvested will increase the average size of rams in the population.

* Distribution of hunters through the area by means of permits will reduce congestion of hunters.

* Vehicular restrictions will apply to hunters of other species in the area.

* Mining activity may be regulated in the mineral lick areas and other important sheep habitat.

* Domestic livestock use of sheep range will be discouraged.

10. CENTRAL ALASKA RANGE SHEEP MANAGEMENT PLAN

LOCATION

That portion of Game Management Units 20A and 20C bounded on the east by the Delta River downstream from McGinnis Creek, on the north by the Tanana River, on the west by the Nenana River and on the south by the crest of the Alaska Range as far east as McGinnis peak down the western limit of the McGinnis Glacier and the north bank of McGinnis Creek to the Delta River.

MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting sheep.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to distribute hunting pressure through the area and to maintain the harvest at desired levels.

2. Discourage land use practices that further degrade the wild character of the area.

THE SPECIES

Sheep which inhabit the Central Alaska Range exist in discrete populations, each of which has its well-defined traditional ranges. Based on aerial surveys, the number of sheep in the area is estimated to exceed 5,000. In the past numbers of sheep were probably much lower than they are now. Sheep populations in the area probably followed similar patterns of fluctuation to those of McKinley Park sheep which experienced drastic reductions in 1929 and 1932. Current densities of Dall sheep are high but the sheep are lower in vigor and size than almost anywhere else in the state. It is not known whether this is inherent in the sheep or a result of poor range conditions. At the present time populations are either stable or in a slight decline which is probably related to weather patterns of recent years. The sheep-habitat interactions present in the Central Alaska Range are not ideal for producing trophies; in fact, this area is among the poorer trophy production areas in Alaska.

Most natural mortality of sheep is caused by weather, predation, and disease. Predation influences are not known, but are thought to be minimal under normal conditions. The influences of weather are most apparent in production of lambs, and sometimes adverse winters result in the loss of a lamb crop. Population structure and the number of harvestable rams in the population are influenced by the weather events of five to six years before. It is not unusual to have poor lamb survival every five or six years.

Sheep in the central Alaska Range have been heavily hunted for the last nine years. Hunter numbers have ranged from 220 in 1968 to 312 in 1972 and have averaged about 225. An average of about 110 sheep are killed each year. This harvest is about two percent of the total population. Recently the percent of legal rams in the herd has been low, near three percent. Horn length has decreased over the last 8 years from an average of 34 inches to an average of 32 inches, and average age of sheep harvested has declined from about 8 years of age to about 6 years of age. All these measures indicate that hunter pressure in the area is intense.

About 1600 man days of recreation are expended annually by sheep hunters in this area and the average man days for each sheep harvested is 13.1 days. Use of the hunting area is primarily by resident hunters (about

80 percent) who reside in interior Alaska. Guiding effort is significant in the area and guided hunters usually take about 30 percent of the harvest even though they comprise only about 20 percent of the hunters. There is little nonconsumptive use of Dall sheep in the area except for the Healy-Lignite closed area. The hunting season has been unchanged in the area since statehood, and most of the harvest occurs early in the hunting season. There is no subsistence hunting in the area although some users hunt primarily for sheep meat. The heavy exploitation of rams in this area has lead to fewer available trophies, compounded in recent years by the poor lamb production of five to seven years ago. Virtually all sheep hunting is with the aid of aircraft. Some guides use horses, but clients usually are flown to base camp. Some off-road vehicles are used and established trails exist.

PROBLEMS

* Only limited mining and prospecting activity has occurred in this area, but the frequency of such activities is greatly increasing. Development of additional coal deposits, particularly in the western end of the area, and of numerous gravel deposits will lead to habitat degradation. Some environmental damage is also noticeable from the unregulated use of off-road vehicles. The Department will discourage unregulated mining activity and will advocate confining off-road vehicles to existing traditional routes of access to prevent habitat destruction. It is important to protect the Dall sheep mineral licks from disturbance and development. These licks serve as centers of Dall sheep movement and dispersion and are essential to their continued well being.

* Claims by private individuals to aircraft landing strips developed on public lands reduce use of strips by the general public. The legal status of landing strips not located on patented land should be made known to hunters and general public use of these sites should be encouraged. The Department will discourage development of additional private landing strips on public land.

* Cantwell native land selections made under terms of the Alaska Native Claims Settlement Act and establishment of a McKinley cooperative planning and management zone may result in restrictions on hunter access and use of the Yanert River. 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. The Department will cooperate with other state and federal agencies on mutually compatible management of the proposed McKinley cooperative planning and management zone east of the existing Park boundary, but not to the exclusion of compatible beneficial uses.

IMPACTS

* Ram abundance will continue to fluctuate with the success of each lamb crop. Rams will continue to be harvested at ages close to the age when they become legal.

* Lamb production will continue at about present levels.

* Restrictive regulations would be limited to those required to prevent further degradation of the sheep habitat.

* The Healy-Lignite closed area near the Usibelli coal mine will continue to provide the opportunity to observe and photograph sheep under winter conditions.

* The goal of maximizing the opportunity to hunt Dall sheep may prohibit simultaneous seasons with moose and grizzly bears in cases where management of these species requires uncrowded hunting conditions.

MOOSE IN INTERIOR ALASKA

Moose (*Alces alces*) are distributed throughout Interior Alaska, occurring in a wide variety of habitats, ranging from climax communities of upland shrubs and lowland bogs, to shrub communities in old burns and along streams. Stands of coniferous and deciduous trees also may be important in many areas.

Since their arrival in Interior Alaska more than 175,000 years ago, moose, like all species, have fluctuated in numbers. The status of moose populations during the early 20th century is uncertain. Historical records and comments by early hunters and trappers suggest that moose existed in at least low to moderate numbers. They gradually increased in abundance in the late 1940's, 1950's and early 1960's, reaching a maximum around 1965. Since that time their numbers have generally declined to the present low levels.

The growth of moose populations during the 1940's and 1950's was due to a combination of events. The most important factor was probably a large increase in habitat caused by a large number of natural and man-caused fires, and developments such as homesteading, mining and construction. Regrowth of shrubs important in the diet of moose in these disturbed areas greatly increased their food supply. Moose on a high quality diet frequently have high reproductive success, and during the years between 1956 and 1964, a high proportion of cows gave birth to calves which survived through the summer.

Two other factors contributed to population growth from late 1940 to early 1960. During this period, predator control reduced wolf populations and minimized wolf predation on moose. Secondly, relatively mild winters during this interval contributed to high overwinter survival of calves and adults during most years.

Since 1965, widespread and generally synchronous declines in moose populations have occurred throughout much of Interior Alaska, due to a low recruitment of young animals into the breeding adult population and to a continuous mortality among adults. Several factors have contributed to the declines. Severe winters during 1965-1966, 1966-67 and 1970-71 resulted in high mortality of moose. Deep winter snows aggravated shortages of available browse resulting from excessive moose population levels in prior years.

In addition to severe winters, predation was a major cause of reduced populations of moose and the principal mortality factor since 1971. Wolves have remained moderately abundant over the period of moose decline; wolf numbers were supported in part by abundant hare populations in the early 1970's. When hares declined in 1972-73, the impact of wolves on moose populations became progressively greater. Although wolves take adult moose, the effects of predation have been most marked by the loss of calves.

While hunting has been a significant cause of adult moose mortality in heavily hunted areas, it was not a major factor contributing to region-wide declines. Moose populations in lightly hunted and even unhunted areas have experienced similar population reductions. For example, moose in large areas of the Chena River and Beaver Creek drainages are very lightly hunted, and they too have low numbers of calves and have experienced sharp population declines in recent years. Further, unhunted moose populations in McKinley Park are also apparently experiencing similar declines.

Although deteriorated range conditions were probably a major factor causing moose declines in the 1960's, neither poor range conditions nor disease are likely factors contributing to recent moose declines in Interior Alaska. Although quantity and quality of moose range are probably lower today than during the 1950's and 1960's, the habitat appears to be capable of supporting considerably more moose than are present today. Although the influence of disease on moose mortality has not been closely examined, general observations in Alaska and western Canada suggest that disease is not a significant mortality factor among either calves or adults in these areas.

Moose have long been one of the most important game species in Interior Alaska, initially providing for the subsistence needs of natives, early settlers, prospectors and explorers. For the past two decades they also have supported relatively intensive recreational utilization, and they remain an important source of meat for many bush residents.

Most recreational moose hunting occurs in those portions of Interior Alaska that are accessible by road or off-road vehicle trails, along major rivers with boat access or where suitable landing sites enable use of aircraft. Small harvests are reported for large areas with difficult access. Most of the reported harvest comes from the Tanana River drainage, particularly the foothills of the central Alaska Range and the Tanana Hills near Fairbanks. In the early 1970's about 2,000 moose were reported taken each year. Declines in moose populations, reductions in hunting seasons and elimination of antlerless moose hunts have reduced moose harvests. About three-fourths of the moose hunters in this area are Alaska residents. Nonresident hunters on guided hunts take moose in combination with other species. Most guiding activity is in the Alaska Range and the southern slope of the Brooks Range.

The numbers of moose taken for domestic utilization by bush residents is unknown since much of the harvest is not reported. Domestic use is localized near villages, such as along the Yukon and Koyukuk Rivers and near outlying bush residences.

PROBLEMS

* Although wolf populations in some areas may be declining, wolves will continue to further depress moose populations until a normal balance between predator and prey is restored, and moose can begin to increase. This process will take several years, depending upon the rate of wolf population declines, severity of winters, etc. If wolf numbers are reduced by control programs in selected areas, the recovery rate of moose populations should be increased. However, this recovery will still require several years. Meanwhile moose hunting will be sharply restricted to assure that it does not further depress populations.

* Resource exploration and development and growth of human populations will restrict moose habitat. Efforts must be made to protect critical habitat and assure free access by moose to these habitats. Further, the ecological value of wild fire must be more widely accepted, and fires in suitable areas which may result in new moose range should not be suppressed.

* 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 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.

2. DIETRICH MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Units 24 and 25, the area bounded on the west by the south fork of the Koyukuk River from its confluence with Fish Creek to its confluence with John R. Creek, then northwest to the Middle Fork of the Koyukuk River to the North Fork of the Koyukuk River, then the North Fork of the Koyukuk River from its confluence with the Middle Fork of the Koyukuk River to its confluence with Glacier River, then by Glacier River, Roy Creek, Upper Hammond River, the Itkillik River to its confluence with the Colville River, and the Colville River to the Arctic Coast; on the north by the Arctic Coast; on the east by the Sagavanirktok River to its confluence with the Lupine River, then the Lupine River to the Game Management Unit 25 boundary, then west and south along the boundary to the headwaters of Fish Creek; on the south by Fish Creek.

PRIMARY MANAGEMENT GOAL

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

SECONDARY MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access and methods of hunter transport to maintain aesthetic hunting conditions.

2. Control the number and distribution of moose hunters, if necessary, to distribute hunting pressure through the area.

3. Encourage public viewing and photography of moose.

4. Discourage land use practices that will excessively disturb the wilderness character of the area.

THE SPECIES

Moose are not particularly abundant in this area. On the north side of the Brooks Range small, isolated moose populations exist in the larger drainages where streamside willow is abundant. These populations range in size from 35 to 150 moose and total only 300-400 moose. Observations suggest these populations are doing well, but because of restricted habitat they are not expected to increase. On the south side of the Brooks Range moose are widespread in all drainages but exist in low densities. Based on limited data collected by game biologists and hunters, the survival of calves appears poor, which suggests that the moose population may be declining.

The trophy potential of bull moose in the Dietrich area is relatively high. Presently, there is a high proportion of old bulls in the population. Antler growth rates of these bulls is near the average for Alaskan moose.

Accurate estimates of harvest are not available because of the ineffectiveness of the harvest reporting system in the bush. Although in some portions of the area the harvest relative to the population size may be fairly high, the total harvest is considered low.

Recently the reported kill for the Brooks Range has steadily increased despite reduced hunting seasons and bag limits. Industrial development in northern Alaska continues to attract attention and people to this area. The residency of hunters currently utilizing the Dietrich area is not available, but for the much larger northern Alaska area about 75 percent of the hunters have been Alaskans and 25 percent non-Alaskans. The substantial number of nonresidents reflects the importance of guiding in the area. Domestic use of moose in the Dietrich area is low since few people reside there. There is some nonconsumptive use of wildlife, primarily during summer in the mountainous portion. Present public access is limited to aircraft and boats.

PROBLEMS

* Resource development will cause new problems for moose populations. Habitat loss is occurring from Prudhoe Bay oil development and its associated pipeline through the Brooks Range. Direct habitat destruction results from roads, pipe pads, and construction camps, though these disturbances may create new range. Indirect loss of habitat may occur if potentially available range is not utilized because of avoidance to man-made structures or activities. Additionally, secondary development of other industries will occur when the road is opened to the North Slope, further contributing to habitat degradation. Development should be regulated to minimize adverse impacts on moose.

* Moose in the area are particularly vulnerable to hunting because of the relatively open habitat and their tendency to concentrate along rivers and creeks during fall and winter. If Alyeska's Haul Road is opened to the public the pattern of access and the number of hunters will change dramatically, and harvests could easily become excessive. Regulations commensurate with expected changes in hunter distribution and numbers are necessary.

* Many land use practices that adversely affect the wilderness character of the area are not subject to regulation by the Department. Hunting regulations which influence the use of the land affect people only when hunting. Successful retention of wilderness characteristics depends primarily on land management policies adopted by other State and Federal land managing agencies.

IMPACTS

* Quality hunting experiences will be maintained, but the number of hunters participating will be limited.

* Opportunities for observing moose in an accessible wilderness setting will be maintained.

* Hunting seasons will be relatively long and mechanized off-road vehicles will be restricted. For the immediate future the number of hunters will be limited by their success in taking moose and by the allowable harvest of moose.

* Restrictions on modes of transportation and limits on the number of hunters will reduce guiding operations in the area.

7. SOUTHWESTERN BROOKS MOOSE MANAGEMENT PLAN

LOCATION

That portion of Game Management Unit 24 lying west of the Dietrich Moose Management Plan area, and north of a line beginning at 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.

PRIMARY MANAGEMENT GOAL

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

SECONDARY MANAGEMENT GOAL

To provide for an optimum harvest of moose.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.

2. Regulate hunting seasons, bag limits and methods and means of taking moose, if necessary, to provide for local need in areas of traditional use.

3. Maintain an average age of 6 years or more in the harvest of bull moose.

4. Maintain a post-hunting season population sex ratio of 35-40 bulls per 100 cows.

5. Harvest antlerless moose, if necessary, to attain the desired moose population size and structure.

6. Discourage land use practices that adversely affect the wilderness character of the area.

THE SPECIES

Based on limited survey data in the upper Koyukuk drainage and reports of residents in the area, a low density of moose probably exists west of the pipeline corridor. Calf survival appears to be low compared with the North Slope of the Brooks Range; calf percentages in the population are comparable to low proportions observed along the upper Yukon and Tanana drainages.

The total Unit 24 harvest has averaged 70 moose for the period 1970 to 1974. The harvest is well distributed throughout the upper Koyukuk drainage, with the majority of the harvest occurring near timberline. Some domestic hunting occurs, primarily from Bettles and Anaktuvuk Pass, but the area overall is used little by domestic hunters because few people live in the area. Guiding activity in this region is directed primarily toward Dall Sheep and grizzly bear, although some moose hunts are conducted. Several guides are currently active in the area, and their numbers will probably increase as Brooks Range hunts become more popular.

Access is primarily by aircraft, although snow machines and river boats or canoes could be utilized in certain instances. Few established airstrips are available, although sand and gravel bars provide some landing areas.

PROBLEMS

* Portions of the area will be selected under the terms of the Alaska Native Claims Settlement Act. Private landowners may prohibit public use of their lands for hunting. The Department should solicit the cooperation of private landowners to facilitate progressive management of moose. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act.

* Accurate data are lacking on population size, composition, annual recruitment, predation losses and harvest levels on which management decisions can be based. The Department should obtain initial baseline data as soon as possible and monitor the area regularly. Improved compliance with harvest report requirements should be obtained by explaining to local residents the need for and use of such information.

IMPACTS

* Little change from present use patterns will occur in the near future. When improved access or increased numbers of hunters adversely affect the moose population or the primitive nature of the area, restrictions on methods of transportation would maintain desired attributes of the area.

* Satisfaction of local domestic dependency on moose will be emphasized by adjustments of season timing.

8. SOUTHEASTERN BROOKS MOOSE MANAGEMENT PLAN

LOCATION

That portion of Game Management Unit 25 lying north of the West Fork of the Chandalar River to its confluence with the East Fork of the Chandalar River, 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, the Christian River to its confluence with Otter Creek, Otter Creek, Thluichohnjik Creek to its confluence with the Sheenjek River, the Sheenjek River to the southern boundary of the Arctic National Wildlife Range, and the Arctic National Wildlife boundary to the Alaska-Canada border.

PRIMARY MANAGEMENT GOAL

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

SECONDARY MANAGEMENT GOAL

To provide for an optimum harvest of moose.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.

2. Regulate hunting seasons, bag limits and methods and means of taking moose, if necessary, to provide for local need in areas of traditional use.

3. Maintain an average age of not less than 6 years in the harvest of bull moose.

4. Maintain a post-hunting season population sex ratio of 35-40 bulls per 100 cows.

5. Harvest antlerless moose, if necessary, to attain the desired moose population size and structure.

6. Discourage land use practices that adversely affect the wilderness character of the area.

THE SPECIES

Reports from guides who utilize the area east of the pipeline indicate moose are sparsely distributed within a 70 mile radius of Arctic Village. On the upper Coleen, Wind, and Sheenjek Rivers from Shoulder Mountain to its headwaters, moose are relatively abundant during fall. On the Koness River moose appear to be sparsely distributed. In the East Fork Chandalar drainage moose are relatively sparse north of Wichenthraw Mountain. Data regarding sex and age composition, productivity and mortality are lacking. Due to the limited habitat, [available] moose populations in this area probably cannot withstand a high degree of exploitation. The total reported harvests in Game Management Unit 25 have varied from 58 to 153 moose. The actual harvest has probably been considerably larger because many rural residents fail to report their moose kills. However, most of the moose taken in Unit 25 are killed

south of the Southeastern Brooks Area. Some domestic hunting occurs, primarily from Arctic Village, but the area overall is used little by domestic hunters because few people live in the area. Guiding activity in this region is directed primarily toward Dall Sheep and grizzly bear, although some moose hunts are conducted. Several guides are currently active in the area, and their number will probably increase as Brooks Range hunts become more popular.

Access is primarily by aircraft, although snow machines and river boats or canoes could be utilized in certain instances. Few established airstrips are available, although sand and gravel bars provide some landing areas.

PROBLEMS

* Portions of the area will be selected under the terms of the Alaska Native Claims Settlement Act. Private landowners may prohibit public use of their lands for hunting. The Department should solicit the cooperation of private landowners to facilitate progressive management of moose. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act.

* Data are lacking on population size, composition, annual recruitment, predation losses and harvest levels on which management decisions can be based. The Department should obtain initial baseline data as soon as possible and monitor the area regularly. Improved compliance with harvest report requirements should be obtained by explaining to local residents the need for and use of such information.

IMPACTS

* Little change from present use patterns will occur in the near future. When improved access or increased numbers of hunters adversely affect the moose population or the primitive nature of the area, restrictions on methods of transportation would maintain desired attributes of the area.

* Satisfaction of local dependency on moose for food will be emphasized in adjustments of season timing.

13. KANTISHNA RIVER MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Unit 20C, the drainages of the Kantishna River.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access and methods of hunter transport to maintain aesthetic hunting conditions.
2. Control the number and distribution of hunters to distribute hunting pressure through the area.
3. Maintain a post-hunting season population sex ratio of at least 25 bulls per 100 cows.
4. Harvest antlerless moose to attain the desired moose population size and structure.
5. Discourage fire suppression on potential moose habitat.
6. Increase carrying capacity of selected areas for moose through habitat improvement.

THE SPECIES

The density of moose in the Kantishna River area appears relatively low. Changes in moose abundance have probably followed a pattern similar to that of moose in adjacent areas where they have declined significantly during the past decade. No detailed studies on moose have been conducted in the Kantishna drainage, therefore little is known about the factors that influence them. The Kantishna drainage is generally low quality moose habitat composed primarily of spruce forest with some deciduous forest in areas that have recently burned.

In response to declining moose populations and increasing hunting pressure, moose hunting seasons in Interior Alaska have been shortened considerably in recent years. However, the harvest from the Kantishna River population has declined only slightly, due to increasing hunter interest in the area. Reported annual harvests for the area have averaged 19 moose since 1969 and ranged from 6 during 1972 to a high of 35 in 1973. The actual kill probably averages well in excess of 25 moose per year because harvest estimates based on voluntary reports substantially underestimate harvest by bush residents and do not include illegal take. Harvest levels are relatively light compared to the number of moose in the area. However, if the population is declining, the impact of present harvest rates on the population will increase.

Most hunters utilizing the area during the past six years have been Alaska residents, which suggests little big game guiding activity. The extent of domestic use of moose is unknown, although there are some residents in the area who probably utilize moose as their primary source of meat.

Riverboats and aircraft provide the primary means of access to the area. The Kantishna River and its major tributaries are ideal for boating. They offer about 300 miles of navigable waterway and many additional miles suitable for float trips. Numerous lakes and gravel bars provide for access by airplane.

PROBLEMS

* Little is known of moose abundance, seasonal distribution, or mortality rates of calves and adults in the Kantishna drainage. Periodic censuses should be conducted to determine proper harvest levels.

* This population of moose is probably undergoing a natural decline in size; if so the reasons for the decline must be determined to prescribe the management required to reverse this decline. Habitat improvement should be conducted if it can be done without significant disruption to other species or the wilderness characteristics of the land. Until the moose population begins to increase, hunting should be reduced to a conservatively low level.

* Much of the Kantishna drainage is dominated by black spruce forest which is of relatively low value to moose. Decreased fire suppression activities by the Bureau of Land Management would allow a greater portion of the area to regenerate into higher quality moose range.

* Unrestricted access by ground vehicles will destroy the wilderness characteristics of the area and will not be compatible with the management goal. Off-road vehicle use of the area has not been extensive so far and should be regulated in the future. Game regulations which influence the use of the land affect people only when hunting. Successful retention of wilderness characteristics depends primarily on land management policies adopted by other State and Federal agencies.

* Future development of gravel and mineral deposits may impair the wilderness character of the area. The Department should recommend appropriate measures to minimize adverse effects of resource development.

* Two highways are proposed in the south and central portions of the area which, if constructed, would change the pattern of access and increase hunting pressure in the area. Additional restrictions on hunters would be necessary to maintain uncrowded hunting conditions.

* A proposed expansion of Mt. McKinley National Park into the southern part of the area may result in the loss of hunting in the affected area. Increased hunting pressure in areas remaining open to hunting may require additional restrictions to maintain harvests within allowable levels.

* Land disposition under the Alaska Native Claims Settlement Act will increase the amount of private land in the area, and much of this land may be posted against public use. The Department should solicit the cooperation of private landowners to facilitate progressive management of moose. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act.

IMPACTS

* Aesthetic hunting conditions will be maintained.

* The moose population should increase and more older bulls will be available to hunters.

* Some hunters may not be able to hunt the area every year under a permit system.

* For nonconsumptive users, the proposed plan offers few restrictions, and opportunities for aesthetic wilderness experiences will be enhanced.

* Guiding activity may increase in the area as recognition of aesthetic hunting conditions and presence of large moose attracts greater hunter interest.

14. YUKON-TANANA MOOSE MANAGEMENT PLAN

LOCATION

That portion of Game Management Unit 24 not included in the Southwestern Brooks and the Dietrich Moose Management Plan areas; that portion of Game Management Unit 20 not included in the Kantishna River, Beaver Creek, Fairbanks, Chena-Salcha, Charley River, Central Alaska Range, Donelly-Clearwater, and Gerstle Moose Management Plan areas; and that portion of Unit 12 not included in the Sixtymile Butte and Little Tok Moose Management Plan areas.

PRIMARY MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting moose.

SECONDARY MANAGEMENT GOAL

To provide for an optimum harvest of moose.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Increase carrying capacity of selected areas for moose through habitat improvement.

2. Maintain the moose population at the carrying capacity of its habitat.

3. Control methods of hunter transport and develop hunter access to distribute hunting pressure through the area, if necessary.

4. Maintain a post-hunting season population sex ratio of no less than 20 bulls per 100 cows.

5. Harvest antlerless moose, when necessary, to attain the desired moose population size and structure.

6. Regulate hunting seasons, bag limits and methods and means of taking moose to provide for local use.

THE SPECIES

Moose populations in much of this large area are at relatively low levels and continue to decline from the higher numbers present in the late 1960's. The area has received only sporadic survey coverage. Data are not available on a detailed, comparative basis for the whole area or a long period of time. In general moose are most abundant where willow stands are plentiful as in recently burned areas on river bars. Islands in the Yukon River are important habitat. Much of the area is not good moose habitat and moose occur in low densities. Suppression of wildfires during the past decade has inhibited the creation of new moose browse habitat. Vegetational changes on existing moose ranges have reduced the carrying capacity of the habitat over wide areas and is the primary factor responsible for declining moose populations. Heavy, area-wide winter mortality of moose occurred during severe winters in 1970-1972. Wolf predation has depressed moose populations further in some portions of the area by greatly reducing calf survival. Heavy hunting pressure has also contributed to declines of moose in accessible areas.

In the drainage of the Koyukuk River, particularly downstream from Hughes where better moose habitat exists, periodic surveys from 1954 to 1968 indicated high proportions of calves (about 20 percent) in the population. Following severe winters and spring floods in 1970 and 1971, the population declined and the proportion of calves was reduced to 8 to 11 percent. Heavy hunting and trapping of wolves in the Koyukuk region has helped reduce calf mortality in recent years.

Because of less favorable habitat and greater human utilization by villagers along the river; moose populations along the Yukon River between Tanana and Eagle probably never approached those observed in the Koyukuk drainage. Limited surveys in 1975 along the Yukon River above Tanana indicated low moose densities and moderate to poor survival of calves. Moose were most abundant on the islands in the Yukon River. The best habitat along the Yukon was located between the Kandik and Nation Rivers. Very few moose were observed along the Porcupine, Sheenjek and Coleen Rivers.

Moose south of the Yukon River and in the Tanana River drainages show the same pattern of declining populations and low proportions of calves. To the east in the vicinity of the Taylor highway, populations are low in both hunted and unhunted areas. November surveys in recent years have indicated less than 25 calves per 100 cows and low percentages of yearlings. Bull/cow ratios have varied from 5 to 45 bulls per 100 cows, depending on the hunting pressure experienced in different places. Except for the lower Salcha river where high proportions of calves have stabilized the moose population, the Tanana River drainages and the country around Fairbanks have declining populations. Production and survival of calves has been low, resulting in insufficient recruitment to the population to replace losses to hunting and predation. Proportions of bulls in accessible populations show the effects of hunting, with sex ratios ranging from 14 to 37 bulls per 100 cows, down from 50-60 bulls per 100 cows in the 1960's.

Harvest information is based primarily on harvest reports received from hunters, but figures derived from harvest reports are minimal estimates because many rural residents fail to report their kills. In recent years from 500-1000 moose have been taken annually. In 1973 a record harvest of 1193 moose was reported. Harvests included antlerless moose in much of the area south of the Yukon until 1974 and north of the Yukon through 1975. Regulations have become more restrictive in recent years with reductions in hunting season length of 11 to 62 days and bag limits north of the Yukon from two moose to one per year. The greatest hunting activity and moose harvest has occurred in the drainages of the Tanana River and the Fairbanks vicinity where approximately 70 percent of the reported harvest has been taken. Harvests in rural areas has been light except near villages and along roads and major rivers. Hunter success has declined significantly in all locations south of the Yukon River as a result of reduced availability of moose, shortened hunting seasons, and increased numbers of hunters. Competition among hunters has been heavy in such traditional hunting locations as the Taylor highway, the Salcha, Goocpaster, and Yanert Rivers, Beaver Creek, Nome Creek, Minto Flats and the Stampede Trail. North of the Yukon River hunter success has remained relatively high (more than 50 percent successful). Harvests have been fairly well distributed through the upper Koyukuk and the Chandalar drainages and in recent years, the easternmost drainages of the upper Yukon River. The Sheenjek, Porcupine, Kandik and Nation Rivers have experienced increases in hunting pressure.

More than 75 percent of the hunters have been Alaska residents, and the majority of these residents have been from interior Alaska urban centers. Nonresidents have been most heavily represented north of the Yukon (19 to 24 percent of hunters) and in the vicinity of Fairbanks (about 20 percent of hunters). Little guiding activity directed specifically to moose has occurred. In the upper Tanana River drainages and in the

Alaska range, guided hunters take moose in conjunction with their sheep hunts.

Much of the area has poor access. Hunting activity is concentrated along road and trail systems and on major rivers. Highway vehicles and all-terrain vehicles are dominant methods of hunter transport in the vicinity of the Taylor Highway, and near the road system radiating from Fairbanks. Use of riverboats predominates along the Yukon River and major tributaries, and along portions of the Tanana River. Aircraft are an important means of access to the upper Koyukuk drainages and to some remote areas south of the Yukon, but their use is limited over large areas by the lack of suitable landing sites.

PROBLEMS

* Absence of favorable moose range over a large portion of the area and gradual deterioration of existing range will limit growth of the population. The Department recognizes the need for creation of suitable moose range through habitat improvement, although implementation of this management tool is restricted by federal, military and native land withdrawals. Cooperative habitat improvement efforts with other State and Federal resource management agencies should be encouraged. Fire suppression should be discouraged in moose habitat, as long as threats to human life and property are insignificant.

* Substantial portions (11.7 million acres) of the Yukon-Tanana area have been proposed as additions to National Forests, Wildlife Refuges and Wild and Scenic Rivers under provisions of the Alaska Native Claims Settlement Act. If these areas are established, federal management might restrict State management authority over fish and wildlife resources. Restriction of hunting or hunter transport methods and allowance of land uses incompatible with moose management objectives may seriously affect hunting opportunity in the area. If proposed areas are established, the Department should enter into cooperative management agreements with the agencies involved to ensure management under mutually acceptable objectives.

* Large tracts of land will be conveyed to private ownership under terms of the Alaska Native Claims Settlement Act. Public use or access across private lands may be excluded by village and regional corporations. The Department should solicit the cooperation of private landowners to facilitate progressive management of moose. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act.

* Limited hunter access results in localized hunter concentrations and overharvests along roads, trails, and other points of access. Construction of new roads and bush airstrips will temporarily reduce problems associated with hunter congestion and increase harvests of underutilized moose populatons.

* Lack of accurate harvest information from rural hunters makes determination and regulation of allowable harvests difficult. Information and education programs in villages within this area should be expanded to inform domestic users of the need for more precise harvest information.

* Wolf predation on moose is intense in some areas and will continue to depress moose populations and delay their recovery even if moose habitat conditions improve. Studies to accurately determine the impact of wolf predation on moose should be initiated. Reductions of wolf populations will be encouraged through increased public hunting and trapping in areas where predation on moose is excessive.

IMPACTS

* Restrictive hunting seasons and bag limits will remain in effect until moose populations recover to former levels. Additional restrictions may be necessary if populations decline further or bull/cow ratios fall below 20/100.

* Hunter densities will remain high in accessible areas.

* Hunter success is expected to remain low.

* Antlerless moose hunts will not be reinstated until such time as calf production and survival and moose population growth make application of such management appropriate.

* If habitat rehabilitation through controlled burning or non-suppression of wildfire is implemented, moose populations should increase. Burned areas will have an unpleasing appearance until they become revegetated.

* Reductions of wolf populations in selected areas should improve survival of moose calves and result in increasing moose populations.

15. BEAVER CREEK MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Unit 20C, the drainages of Beaver Creek above its confluence with Moose Creek, including the drainage of Moose Creek.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport to maintain aesthetic hunting conditions.
2. Maintain the moose population slightly below the carrying capacity of its habitat.
3. Maintain an average antler spread of not less than 40 inches in the harvest of bull moose.
4. Maintain a post-hunting season population sex ratio of not less than 30 bulls per 100 cows.
5. Harvest antlerless moose, if necessary, to maintain the desired moose population size and structure.
6. Discourage fire suppression in potential moose habitat.
7. Discourage land use practices which adversely affect the wild character of the area.

THE SPECIES

The density of moose in the proposed management area is relatively low. An approximate estimate of the total number is 400-500. Aerial surveys indicate that mortality of calves is high. Conclusive evidence indicating the causes of low calf survival is not available. The abundance of wolves relative to moose suggests that predation is one of the major factors limiting calf survival. Recruitment of young animals to the Beaver Creek moose population appears lower than mortality of adults, resulting in a population decline.

The habitat is dominated by spruce forest with fairly extensive stands of willow along rivers and creeks which provide winter browse. Early successional stages of habitat following wildfires are commonly utilized by moose during early winter but represent only a small portion of the moose habitat in the area.

In response to declining moose populations and increasing hunting pressure, moose hunting seasons in Interior Alaska have been shortened considerably in recent years. However, the harvest from the Beaver Creek population has remained about the same because of increasing hunter interest in the area. Estimates of total harvest by hunters average 20-25 moose per year or approximately 5-7 percent of the estimated moose population. Moose of the Beaver Creek drainage appear to have average potential for producing trophy size antlers when compared with other areas in Alaska. The effect of hunting during recent years has been to accelerate the otherwise natural decline of moose in the area.

Hunters utilizing the area during the past six years have been almost exclusively residents. Little guiding activity occurs there. Access is gained primarily by aircraft and off-road vehicles utilizing trails from the Steese and Elliot Highways. Access points have tended to concentrate hunters in specific areas, resulting in high harvest rates in small areas. An example is the upper reaches of the Beaver Creek drainage accessible by the heavily used Nome Creek Trail leading off the Steese Highway.

PROBLEMS

* This population of moose is undergoing a natural decline in size. The reasons for the decline must be determined and if alteration of the ecosystem can be made to favor moose without significant disruption to other species or the wilderness characteristics of the land, then alterations should be made.

* Hunter interest in the Beaver Creek area has resulted in localized crowding of hunters and reduced availability of mature bull moose. Hunters should be distributed through the area and limited in number to reduce current harvests of moose.

* Unrestricted access by ground vehicles will destroy the wilderness characteristics of the area. Off-road vehicle use of the area has not been extensive to date and should be regulated in the future. Game regulations which influence the use of the land affect people only when hunting. Therefore, successful retention of wilderness characteristics depends primarily on land management policies adopted by other State and Federal agencies.

* Potential gravel and mineral deposits and two water storage sites may lead to development that is not compatible with the wilderness character of the area. There is potential for large scale development of limestone quarry sites and a cement industry in the White Mountains area. This development would conflict with wildlife values in the area and might be opposed by the Department.

* The proposed Beaver Creek wild and scenic river area and one native allotment may result in restrictions on use of portions of the area by hunters and increased use of areas remaining open to public hunting. The Department will attempt to maintain public hunting in as much of the area as possible.

IMPACTS

* High quality moose hunting in the upper Beaver Creek drainage will be maintained.

* Participation of hunters will be limited by permit.

* Use of mechanized vehicles may be restricted to designated access corridors.

* Nonconsumptive use in a wilderness setting will be enhanced.

16. CHENA-SALCHA MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Unit 20, the drainages of Birch Creek above the confluence of Birch Creek with the South Fork of Birch Creek, except for the drainages of the North Fork of Birch Creek and Harrison Creek; the drainage of Big Windy Creek; the drainage of the East Fork of the Chena River upstream from and including the Munson Creek drainage; and the drainage of the North Fork of the Salcha River.

PRIMARY MANAGEMENT GOAL

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

SECONDARY MANAGEMENT GOAL

To provide an opportunity to hunt large-antlered moose.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.

2. Maintain an average antler spread of 50 inches in the harvest of bull moose.

3. Maintain a post-hunting season population sex ratio of not less than 35-40 bulls per 100 cows.

4. Discourage fire suppression in potential moose habitat.

5. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

This area consists of low rolling mountains topped by alpine habitat. Lower elevations are covered mostly with spruce forest except for bands of willow along the valley bottoms and deciduous regrowth in areas that have burned. Moose are seasonally abundant, occurring in greatest numbers during the fall and early winter. Highest densities are found on the old burns where browse is abundant. By late winter few moose remain in these headwater areas due to the deep accumulation of snow.

Survey data are available for only the East Fork of the Chena River (4 years) and the North Fork of the Salcha (1 year); consequently knowledge of the population status is limited. The number of moose seen per hour of aerial survey time in the East Fork has dropped progressively from 63 in 1970 to 10 in 1975, suggesting a declining population.

Deep snow and wolf predation are the primary factors affecting the size of moose populations in interior Alaska. Unusually deep snow accumulation during the winter of 1970-71 resulted in poor overwinter survival in areas near Fairbanks. A sharp decline in the number of moose seen in the East Fork survey area suggested that high mortality occurred there also. Wolves prey on moose throughout this area, although their effect on the moose population is unknown. Systematic wolf surveys have not

been conducted, and therefore density and distribution of wolves is unknown. Wolves have been seen, however, during moose surveys in the area and trappers report killing 51 wolves in the area over the past 5 years, 30 of which were taken during the 1974-75 season.

Productivity and survival of moose have not been assessed except for scattered fall composition counts. In November 1975 calves comprised 15-16 percent of the moose population in the East Fork of the Chena River and the North Fork of the Salcha River. Expressed as a calf/cow ratio, this represents approximately 26 calves per 100 cow moose. In the East Fork, where surveys have been conducted in prior years, this ratio has varied from 21 to 27 calves per 100 cows since 1971. The ratio was 32 calves per 100 cows in 1971, prior to the severe winter.

Research in the Tanana Flats, approximately 70 miles southwest of the Chena-Salcha area, revealed that up to 94 percent of the cow moose two years of age or older were pregnant in May of 1975. If this figure applies to cow moose calving in the Tanana Hills, then roughly 73 percent of the calves were lost during the first six months. This would suggest that high calf mortality exists in the Tanana Hills, comparable to that documented for the Flats. Both areas have shown a steady decline in moose numbers.

Rejuvenation of moose browse is largely dependent on naturally occurring wildfires. A 90 square mile burn on the East Fork of the Chena River and a 110 square mile burn on the North Fork of the Salcha have provided excellent habitat for moose. Elsewhere there is little browse available; mature spruce forest predominates over most of the area.

Only two moose from the Tanana Hills have been entered in the Boone and Crockett record book. However, the area has potential for producing large moose, since antlers approach trophy size at 11-12 years of age. Since 1967, 10-20 percent of the harvest has consisted of bulls 10 or more years old. Some 6 year old males can be expected to have antler spreads in excess of 60 inches and by age 7 an occasional bull may reach 70 inches. However, over one-third of all 8 to 12 year old moose measured have had less than 55 inch antler spread and probably would not have grown large antlers.

Poor access has resulted in minimal hunting activity. Harvests have been very light, probably never exceeding more than six animals per year. Characteristics of the harvest, although not available specifically for the Chena-Salcha area, may have been similar to surrounding, more accessible areas where harvests and hunter success have declined 66 percent from 1969 levels. Ninety percent of the hunters have been residents and they have taken 85 percent of the harvest. No guiding operations are known to exist in the Chena-Salcha area proper. The area has been subject to season reductions on bulls and deletion of antlerless moose seasons applicable to surrounding areas, instituted in response to rapidly declining moose populations in much of interior Alaska. The present bulls-only season is September 1-20 and November 1-10.

Access has been limited due to the absence of off-road vehicle trails and landing strips for light aircraft. The area is far enough from existing roads that overland access is difficult and time consuming. A cat trail runs up the East Fork of the Chena River approximately 25 miles to the vicinity of Van Curlers bar, but before freeze-up it is passable only by tracked vehicles. A trail also follows the ridge parallel to the Salcha River for about 45 miles to the vicinity of The Butte. This trail is passable by 4-wheel drive vehicles most of its length, but terminates short of reaching the North Fork. There are no vehicle trails into upper Birch Creek, but highway access to the headwaters permits users to float the drainage by canoe. Aircraft access is extremely limited in the fall due to the shortage of gravel bars, lakes or airstrips. During the winter access is vastly improved; light aircraft

on skiis can land in several areas and snow machines can easily traverse the back country.

PROBLEMS

* Presently the moose population of this area appears to be steadily declining, concurrent with moose numbers elsewhere in interior Alaska. Information is lacking concerning wolf densities, distribution, and the impact of wolf predation on moose in this area. Wolf control is an option that may be considered if predation on moose conflicts with human utilization of the resource. However, wolves are an integral part of the wilderness character that this plan proposes to perpetuate and their presence contributes to aesthetically pleasing conditions.

* Bull moose may converge on the headwater areas during the fall after passing through more accessible areas where hunting is more common. Therefore, management in adjacent areas to maximize the opportunity to hunt may reduce the availability of large-antlered moose in this area. Further, it is difficult to determine overwinter mortality in this area when the moose observed during fall surveys may not be the same animals observed during the spring calving period. Data are needed to document seasonal moose movement patterns along these drainages. Adjustments in seasons may be necessary in adjacent accessible areas to maintain large antlered moose in the Chena-Salcha area.

* Fire suppression efforts have been detrimental to moose range. Some winter browse is perpetuated by naturally-occurring wildfires. To insure adequate browse in the future, some limited burning must be allowed. In particular, Birch Creek has little available browse and moose would benefit from fires in this area.

* Birch Creek has been proposed for inclusion in the Wild and Scenic Rivers System. Federal management of the area might restrict methods of hunter transport or limit hunting in favor of other recreational uses. Federal management objectives may preclude burning to regenerate moose browse. Management agreements that will maintain hunting in the area should be developed.

* A large segment of the area is presently under military jurisdiction (Yukon Command Training Center). This includes portions of both the East Fork of the Chena River and the North Fork of the Salcha River. Continued military use may conflict with the aesthetic appeal of the area due to the presence of equipment and personnel and environmental degradation caused by training operations. In the past, military use has not extended into the northeast end of the reservation where these rivers originate. Close cooperation between the Department of Fish and Game and the military will be necessary to insure a quality hunting area.

* Mining claims exist near Van Curler's bar on the East Fork of the Chena and along the north side of Birch Creek. Current high gold prices may result in a resurgence of activity that could be detrimental to the aesthetics of the area. Mining on a small scale may be consistent with management goals. The Department should recommend measures to minimize the effects of mining on the appearance of the area.

* At present most of this area is untracked by mechanized vehicles, but increased use of mechanized transport by hunters in general and restrictions in other areas may result in increased use of such vehicles in the Chena-Salcha area. Indiscriminate extensions of ATV trails should be discouraged. Vehicular use may have to be

restricted to existing trails if environmental degradation becomes apparent. Regulation of vehicle ground loading may be one way in which damage to the land can be minimized. Noise level requirements for vehicles using the area would make them more compatible with aesthetic values.

IMPACTS

* Not all hunters who wish to hunt in the area will be allowed to do so.

* Areas burned to rehabilitate moose browse will have a temporary displeasing appearance.

* Access to the area will remain limited and restrictions on mechanized transport will affect all recreational users of the area.

* Constraints on mining or other resource development may increase costs of development operations.

17. CHARLEY RIVER MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Unit 20C, all drainages of the Charley River below the confluence of its east and west forks.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Control access and methods of hunter transport to maintain aesthetic hunting conditions.
2. Control the number and distribution of hunters to distribute hunting pressure through the area.
3. Maintain a post-hunting season population sex ratio of at least 25 bulls per 100 cows.
4. Harvest antlerless moose, if necessary, to attain the desired moose population size and structure.
5. Discourage fire suppression on potential moose habitat.
6. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

Little data are available on this moose population. Only a few surveys have been conducted, usually in conjunction with counts on caribou. While the Charley River offers summer and fall moose habitat, winter range is lacking in both quality and quantity except in the lower 5 miles of the drainage. Moose which spend the summer and fall in the Charley River drainages winter along the Yukon River.

Hunter access to the Charley River is primarily by river boat. The river is difficult to negotiate in the upper reaches, particularly during times of low water flow, but access to the lower reaches is not particularly difficult for experienced boatmen using proper equipment. The harvest from this area is very small, with most animals coming from that portion of the drainage near the Yukon River. No airstrips or all-terrain vehicle trails are available on the lower half of the river and float planes are able to utilize only the lower few miles of river, and then only during years of adequate water flow. Usually the river is not suitable for float plane use.

PROBLEMS

* The Charley River has been proposed for inclusion in the Wild and Scenic Rivers System and also as a National River under National Park Service administration. Future federal management of the area may restrict methods of hunter transport and limit hunting in favor of other recreational uses of the drainage. Management agreements affecting wildlife and its use should be developed that will maintain hunting in the area.

IMPACTS

* Significant changes from existing conditions will not occur as a result of proposed wildlife management. Should access to the area develop and cause substantial increases in hunting pressure, limitations on numbers of hunters would be implemented.

18. SIXTYMILE BUTTE MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Units 12 and 20C, Township 21 North, Range 12 East; Township 21 North, Range 13 East; Township 20 North, Range 12 East, Section 1-18; and Township 20 North, Range 13 East Section 1-18, Tanacross Quadrangle.

MANAGEMENT GOAL

To provide an opportunity to take large-antlered moose.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Harvest less than the annual increment of moose until the population increases to the carrying capacity of its habitat; thereafter maintain the moose population near the estimated carrying capacity of the habitat.

2. Control the number and distribution of hunters to distribute hunting pressure through the area.

3. Maintain an average age of 6 years or more, in the harvest of bull moose.

4. Maintain a minimal post-hunting season population sex ratio of 35 bulls per 100 cows.

5. Harvest antlerless moose, if necessary, to maintain the desired moose population size and structure.

6. Discourage fire suppression on potential moose habitat.

THE SPECIES

The Sixtymile Butte area appears to be the preferred rutting habitat for moose inhabiting lowland country surrounding the Butte. The Butte is approximately 3500 feet in elevation, and subalpine willow is the dominant vegetation. The primary wintering area for this population is in the drainage of the West Fork of the Dennison, where dwarf birch and willows provide adequate winter browse on the valley bottom.

At the present time (1976) moose calf survival is low, resulting in little or no recruitment into the population. The reasons for poor calf survival are unknown but predation by wolves and brown bears is suspect.

Bull/cow ratios have declined in recent years as a result of hunting, from approximately 45-50 bulls per 100 cows to the current ratio of 25-30 bulls per 100 cows. The population was virtually unhunted in the 1960's due to its inaccessibility, but in the early 1970's a Tok area guide built an all-terrain vehicle trail to the Butte and hunting pressure rapidly increased by both resident and nonresident hunters. Within two years, many of the large bulls were harvested.

PROBLEMS

* Predation on moose calves by wolves and brown bears is suspected to be responsible for poor survival of calves and resultant low population recruitment rates. The Department should investigate the reasons for low calf survival. If predation is determined to be a major factor, adjustments in hunting and trapping seasons and bag limits on predators should be made to encourage increased utilization of these species in the area.

IMPACTS

* Controls on numbers of hunters through the use of permits or registration hunts will reduce the number of individuals that will be allowed to hunt in the area.

* Increased bull/cow ratios will improve opportunities to take large bull moose.

19. LITTLE TOK MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Unit 12, the drainages of the Little Tok River above its confluence with Trail Creek.

PRIMARY MANAGEMENT GOAL

To provide an opportunity to take large-antlered moose.

SECONDARY MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Harvest less than the annual recruitment of moose until the population approaches the carrying capacity of its habitat.

2. Control the number and distribution of hunters to maintain aesthetic hunting conditions and to maintain desired harvest levels.

3. Maintain a post-hunting season population sex ratio of approximately 35 or more bulls per 100 cows.

4. Harvest antlerless moose to maintain the desired moose population size and structure.

5. Discourage fire suppression in potential moose habitat.

THE SPECIES

The moose population in the Little Tok management area appears stable, but little is known of its size. The proportion of bulls in relation to cows declined between 1968 and the mid-1970's. In 1974, the bull-cow ratio was 22 bulls per 100 cows. Calf-cow ratios obtained in late fall aerial surveys have ranged between 15 and 24 calves per 100 cows. The effect of predation and other causes of natural mortality is unknown. Wolf and grizzly bear populations are at moderate levels. Winter range is the most critical element of moose habitat in this area.

The annual harvest of moose has averaged about 35 animals. The area has produced large-antlered bulls in the past, but greater hunting effort in recent years has significantly reduced the number of large bulls. Nonresident use of the area has traditionally been high, but resident use, both local and nonlocal, has increased in recent years. Much of the nonresident moose hunting effort has been in conjunction with sheep and brown bear hunting. At least six guides or transporters make use of the area, and much of their business is with nonresidents.

Access to the Little Tok moose population is primarily by off-road vehicles via the Bear Valley Trail or Little Tok Trail. A few local residents use two unimproved airstrips near Birch Creek for access by light airplanes.

PROBLEMS

* Bull-cow ratios are currently much below the desired goal of 35 bulls per 100 cows. Recent reductions in season length should increase the proportion of bulls and further restrictions will be imposed if appropriate. A limited-permit cow harvest may also be employed to achieve the desired sex ratio.

IMPACTS

* The number of hunters using this area will be restricted by permit.

* Limitations on number of hunters will reduce guiding activity in the area.

20. GERSTLE RIVER MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Unit 20D, the Gerstle River drainage above the Alaska Highway.

MANAGEMENT GOAL

To provide an opportunity to take large-antlered moose.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain the moose population near the estimated carrying capacity of its habitat.
2. Control the number and distribution of hunters to distribute hunting pressure through the area.
3. Maintain an average age of 6 years or more for bull moose in the harvest.
4. Maintain a post-hunting season population sex ratio of 35 bulls per 100 cows.
5. Harvest antlerless moose, if necessary, to maintain the desired moose population size and structure.
6. Discourage fire suppression on potential moose habitat.
7. Increase the carrying capacity of selected areas for moose through habitat improvement.

THE SPECIES

Up to 300 moose may occupy the higher inaccessible elevations of the Gerstle drainage. Moose surveys in the area indicated 6 calves per 100 cows, suggesting poor calf production or survival. Observed bull:cow ratios have been 34 bulls per 100 cows. Poor winter range condition and heavy predation are probably responsible for low numbers of calves. Winter range at lower elevations is intensively used. One large burn on the winter range is no longer productive for moose browse.

Current harvests are relatively light due to difficult access. Twelve bulls were taken in 1974 and 1975, while the hunting season was closed from 1971 to 1973. Hunter effort is heavy at lower elevations and along existing trails but hunter success is low. All hunting is recreational, with 80 percent of the hunters originating from the Delta Junction and Ft. Greely area. The remaining hunters are primarily residents from other parts of Alaska. Few nonresident hunters use the area, and little guiding activity occurs. Access is usually via the Alcan Highway, and all-terrain vehicles, four wheel drive vehicles, horses and aircraft are used for transportation in the area.

PROBLEMS

* Loss of winter range is perhaps the greatest threat to animals using the area. Moose habitat is limited, and most animals winter in an old maturing burn west of the Gerstle River. Periodic controlled

burning of large tracts of land would greatly increase the carrying capacity of the area.

* The area is small and the moose population is vulnerable to overharvests. To maintain the desired age structure of bulls in the harvest, the number and distribution of hunters should be controlled.

* Access to part of the area is presently controlled by the military and civilian use is excluded. The Department should seek a cooperative agreement with the military providing for civilian use of military lands in the area.

IMPACTS

* Moose browse rehabilition by the use of controlled fires should significantly increase the area's capacity to support moose.

* Burned areas will have a displeasing appearance until vegetation regrowth occurs.

* Control of hunter numbers and distribution will prevent localized overharvest. Permits will be issued specifying the areas to be hunted by each permit holder.

21. DONNELLY-CLEARWATER MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Unit 20D, that area bounded on the west by the Delta River; on the north by the Tanana River; on the east by the west bank of Clearwater and Sawmill Creeks south to the Alaska Highway, then west along the Alaska Highway to the Richardson Highway, then south along the Richardson Highway to Jarvis Creek to the Game Management Unit 13 boundary; on the south by the Game Management Unit 13 boundary.

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. Encourage public viewing and photography of moose and enhance viewing facilities.

2. Encourage land use practices that improve moose habitat.

3. Allow limited moose harvests if viewing opportunity will not be adversely affected.

THE SPECIES

Moose densities in this area are unknown, but numbers of moose vary seasonally. An average of 40 moose were taken annually by hunters during the early 1960's, but the population declined in subsequent years, and hunting has been prohibited since 1971. The population decline was probably due to a decrease in quantity and quality of habitat resulting from land clearing for agriculture, roads and housing, and encroachment by spruce, mature aspen and birch on a burned area which was excellent moose winter range until the early 1960's. Predation is currently contributing to poor moose calf survival.

Most people viewing Donnelly-Clearwater moose are residents of the Delta and Ft. Greely area, but resident and nonresident use is increasing along the Richardson and Alcan Highways during summer.

PROBLEMS

* The number of moose is apparently continuing to decline in the Donnelly-Clearwater area. Unless present habitat conditions are altered, either by fire or by artificial means of habitat rehabilitation, moose may never be abundant in the area again. The Department should rehabilitate browse habitat.

* The area is very accessible to people. Snowmachine use in winter and vehicle use in summer create conditions that present substantial increases in the number of moose. The Department may propose restrictions on vehicle use in the area.

* Moose depredation on agricultural crops has been significant in past years. Should moose increase, depredations undoubtedly would also increase. Under such circumstances, the Department would recommend limited permit hunts for moose in the area.

IMPACTS

* Moose numbers may increase if the Department conducts browse rehabilitation by controlled burning on state and federal lands. Burned areas will have an unpleasing appearance for a few years following fires.

* If moose depredation becomes a problem, the Department may establish limited-permit hunting seasons.

22. FAIRBANKS MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Unit 20B, that portion of Goldstream drainage upstream from Spier Creek; that portion of the Chena drainage west of Dark Hollow and Smallwood Creeks, and downstream from the confluence of Smallwood Creek and the Little Chena River; the Chena drainage west of the Transmitter Site Road and south of the Chena Hot Springs Road; drainages of the north bank of the Tanana River from Rosie Creek to Moose Creek and along the north bank of Moose Creek to the Transmitter Site Road.

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. Encourage public viewing and photography of moose and enhance viewing facilities.

2. Allow limited either-sex harvests if reductions of the moose population are necessary to reduce crop depredations and road kills and to attain the desired moose population size.

3. Maintain the moose population slightly below the carrying capacity of its habitat.

THE SPECIES

Observations of moose and the incidence of road kills and nuisance complaints indicate a minimum of 150 moose utilize the Fairbanks area in winter. Although habitat alteration resulting from road and trail development and expanding residential areas has temporarily increased the capacity of the area to support moose, the moose population is declining. Numbers of moose declined substantially following the 1970-71 winter when most of the calf crop and many adults succumbed to deep snow of long duration. Low increments to the population due to poor calf production and survival since 1971 have prevented the population from increasing. Predation by wolves has probably been the primary natural mortality factor affecting moose within and adjacent to the area. Wolves are regularly trapped or shot in defense of property on the lower Chena River, Rosie, Moose and Goldstream Creeks, and they have killed many dogs in the area in recent years.

The moose population has a low proportion of bulls (10 percent or less) as a result of the high rate of bull harvest, and most bulls remaining in the population are less than 5 years old. The area was closed to moose hunting in 1975 because of the low proportion of bulls and also because of extensive residential development. Reported harvests of bulls for 1974, 1973, and 1972 were 28, 68, and 35, respectively. Most moose were taken by local residents utilizing highway vehicles. Some moose were taken along the Chena River by hunters using boats.

Urban expansion of the Fairbanks area has changed use patterns from recreational hunting to nonconsumptive utilization. Roads and trails

once used by hunters are now part of existing or planned subdivisions. Public safety requirements and demands for viewable wildlife as an integral part of the community preclude moose hunting except under closely controlled conditions.

PROBLEMS

* Although some man-caused habitat alterations have improved the capacity of the area to support overwintering moose, other existing and proposed developments will result in substantial habitat loss. The Chena River Flood Control Project lying between the Chena and Tanana Rivers will create a 300-400 acre impoundment and an 8 mile dike (approximately 20 feet high) extending from the Chena River to Moose Creek. The project includes areas used by moose for wintering and calving, and may disrupt traditional moose movements through the area. Additional habitat loss is expected with construction of a 40-acre refinery in the North Pole area. The Trans-Alaska Oil Pipeline will affect moose distribution and movements along the pipeline right-of-way. Realignment of the Steese Highway and creation of a new road from the Chena Hot Springs Road to the Richardson Highway will create additional habitat loss and increase the incidence of moose mortality from collisions with vehicles. Expanding residential areas will encroach upon areas utilized by moose, as subdivisions along Badger and Chena Hot Springs Roads, Sheep Creek, Murphy Dome and Chena Ridge are established. Much of the loss of habitat to urban and industrial development will be unavoidable, and a reduced moose population in the Fairbanks area is inevitable. However, in some situations development can accomodate some habitat requirements of moose through design modifications or mitigation measures. The Department should identify important moose habitat in development plans and should recommend measures to minimize adverse impacts on moose.

* The potential for illegal killing of moose is high because of the ready accessibility of moose to a large number of people. Active enforcement of game regulations and more severe penalties for persons convicted of violations are necessary.

* Road kills are common in this area. Availability of browse on roadsides attracts moose in winter, increasing the probability of accidents. Traditional moose movements occur in winter and late spring in the vicinity of Birch Hill, Mile 1-6 Chena Hot Springs Road, Mile 1-15 Richardson Highway, and Farmers Loop Road where the frequency of moose-vehicle collisions is high. Moose crossing areas should be designated by signs to alert motorists, and safe speed limits should be posted.

IMPACTS

* Although moose density in this area will not approach past levels, sufficient numbers of animals will remain for viewing and photography by local residents and nonresident tourists.

* Individuals who have traditionally utilized this area for moose hunting will lose the opportunity to use the area on a regular basis.

* Moose numbers will be maintained below the carrying capacity of the area.

* Closely regulated either-sex harvests will reduce agricultural depredations by moose and the incidence of moose-vehicle collisions.

23. CENTRAL ALASKA RANGE MOOSE MANAGEMENT PLAN

LOCATION

In Game Management Unit 20 the area bounded on the south by the crest of the Alaska Range, on the east by the Richardson Highway, on the north by the Tanana River, the North Star Borough southern boundary, and a line extending the North Star Borough boundary due west to the Nenana River, and on the west by the Nenana 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 access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.

2. Maintain a post-hunting season population sex ratio of 35-40 bulls per 100 cows.

3. Harvest antlerless moose, when appropriate, to attain the desired moose population size and structure.

4. Discourage fire suppression on potential moose habitat.

5. Increase carrying capacity of selected areas for moose through habitat improvement.

6. Discourage land use practices that adversely affect the wild character of the area.

THE SPECIES

Aerial moose surveys and general observations indicated increasing moose numbers in the late 1950's and large moose populations in the period 1960-1965. This rapid population growth resulted from favorable long-term effects of mild winters, abundant fall-winter range following wildfire, low hunting pressure, and predator control. Severe winters with long-lasting, deep snow in 1965-1966 and 1966-1967 may have reduced the moose population to less than 50 percent of the level present in 1964. Improved survival increased moose numbers in 1968 and 1969, but a substantial reduction in the population occurred during the severe winter of 1970-71. As a result of increased hunter harvest of moose from 1970-73 and low survival of calves resulting from predation and other natural mortality from 1971-75, the population has failed to increase to the level which the range could support. The density of wolves in the area has been high in recent years (one wolf per 23 square miles in 1975, prior to removal of wolves by trappers and by the Department), and wolves have probably been the primary factor responsible for observed low calf survival rates. Brown and black bears are also abundant in the area and have undoubtedly contributed to moose mortality. The moose population is currently maintained at a depressed level solely by non-

hunting losses. Although precise estimates of moose numbers are unavailable, a "best guess" estimate of numbers, derived from aerial moose sex and age surveys, was about 2500 moose in 1975.

The Central Alaska Range has long been an important moose hunting area in Interior Alaska. The numbers of hunters increased rapidly from 639 in 1969 to 1515 in 1973. A shorter season with some restriction on the use of aircraft decreased the number of hunters to 1266 in 1974. Liberal hunting seasons on bulls and cows were in effect until 1974 when the season was reduced to 52 days for moose of either sex. In 1975 only a 10-day bulls-only season was allowed, substantially reducing hunting pressure. Although guides are active in the area, only about one fourth of all hunters are nonresidents. Most of the resident hunters come from the Fairbanks area.

Liberal hunting seasons, large numbers of hunters and high success rates resulting from good accessibility of the hunting area resulted in large harvests through 1974. From 1963 to 1970 an average of 222 moose were taken annually, of which 30 percent were females. From 1971 to 1974 the average kill rose to 478, of which 44 percent were females. Although more than half the harvest occurred prior to freeze-up, increased use of mechanized transport after 1970 increased harvests during November and substantially raised total kills. About half the total reported harvest in 1973 and 1974 came from the Gold King-Japan Hills and the Wood River, although hunters were also able to travel over much of the Tanana Flats from access points at Fairbanks, Ft. Wainright, the Richardson Highway, Nenana and Clear.

Moose in this area must reach five or six years before they produce what would be considered "trophy" size antlers of 50 inches in spread. Those in the 10 to 12 year old category are probably of maximum trophy potential, after which antler size does not increase. Between 1949 and 1964, seven bulls which met minimum Boone and Crocket scores were harvested. The outlook now for trophy size animals recruited to the population is not promising, because calf production and survival since 1970 has been poor. Calves which would have reached trophy status from 1976-1980 have not survived in substantial numbers.

PROBLEMS

* High hunter densities and unrestricted use of all terrain vehicles have detracted significantly from hunting aesthetics and have resulted in localized overharvests of moose. Ground vehicle use of the foothill area adjacent to the Rex and Bonnifield Trails has resulted in noticeable environmental degradation. A state proposal for a transportation corridor linking the Richardson Highway with Kantishna would increase use of the area and increase the potential for overharvests while detracting from the aesthetics of the area. A permit system is needed to control hunter density, off-road vehcile use and hunter access corridors.

* Claims by private individuals to aircraft landing strips developed on public lands reduce use of strips by the general public. The legal status of landing strips not located on patented land should be made available to hunters and general public use of these sites should be encouraged. The Department will discourage development of additional private landing strips on public land.

* Development of known mineral deposits and potential water storage and power sites will detract from the aesthetic qualities of the area, reduce available moose habitat and interfere with traditional moose movements. Expansion of coal fields to the east from the Healy and Lignite Creek drainages may result in further habitat loss. A copper mining claim in the foothills of the Alaska Range

at Dry Creek, if developed, could pose similar, though less extensive conflicts. The Department should discourage development activities that adversely affect important moose habitat and should recommend actions that maintain the aesthetic appeal of the area.

* Military ownership and use of about 800 square miles of the area may conflict with hunting aesthetics through alteration of habitat and presence of military personnel and mechanized equipment, and may adversely affect moose during critical calving periods. Military maneuvers are also conducted on non-military lands with similar effects. The Department should recommend constraints on military activity which impair aesthetic values of the area or adversely affect moose. Military requests for authority to utilize areas outside military reservations should be carefully evaluated for potential problems.

* Heavy predation on moose calves by wolves has been the primary factor responsible for low moose population recruitment rates in recent years. Low numbers of yearling moose entering the population have not offset mortality of adults to hunting and natural mortality. Hunter harvests of moose should continue to be severely curtailed and limited to bulls only until such time as the moose population attains levels present in the 1960's. Hunting and trapping of wolves should be encouraged, and Department programs to effect a more desirable wolf:moose ratio in the area should be continued until recovery of the moose population or until public use of wolves is capable of maintaining desired wolf populations.

IMPACTS

* Restrictions on numbers of hunters by permit and on methods of hunter transport and access will be the major changes over traditional use patterns in the area. Regulations will designate access corridors beyond which off-road vehicle use will be prohibited.

* Maintenance of reduced wolf numbers in this area will allow for subsequent increase in the moose population.

* Recovery of the moose population is not expected to be dramatic; harvest levels will be kept low until the desirable number of moose are present.

* Antlerless seasons will be allowed only when carrying capacity of the area is reached and recruitment exceeds losses to predation and recreational harvest.

* Most guides will not be affected by restrictions on mechanized ground vehicles, but some loss of clientele will accompany limitation of hunter numbers.

* Black bear hunting may be restricted when such use affects aesthetics of moose hunting in the area.

FURBEARERS IN INTERIOR ALASKA

Almost all species of furbearers* common to Alaska occur in the Interior Region. A notable exception is the arctic fox. Beaver, otter, mink and muskrat are the most prominent species in riparian and aquatic habitats. Wolverine, lynx, coyote, red fox, marten, weasels, squirrels and marmots are common in upland forest and alpine habitats.

Population levels and trends of carnivorous furbearers are often closely tied to relatively few prey species or even to a single prey species. The abundance of lynx can often be predicted from snowshoe hare population trends. Marten, weasels, red foxes and coyotes are largely dependent on small rodent abundance. However, red fox and coyote abundance may also be related to snowshoe hare populations.

The herbivorous furbearers do not appear capable of seriously damaging their food supply. Although beavers are capable of over-utilizing their immediate food supply, this rarely results in major population fluctuations because the effect is not simultaneous over large areas. At any given time a substantial percentage of the beaver population in any drainage is emigrating into new habitat as occupied habitat becomes less productive. Muskrat population fluctuations, though not well understood in Alaska, are related to productiveness of their habitat. Beaver, muskrats, squirrels and marmots are subject to significant levels of predation by other furbearers.

The most important influence on Interior furbearer habitats has been wildfire, particularly in forested or brushy areas. Establishment of early stages of vegetation following a fire produces favorable habitat for many species of small rodents, snowshoe hares, and beavers. High populations of rodents and hares in turn benefit the carnivorous furbearers. Increasingly effective fire suppression over the last 20 years has resulted in a considerable increase in the acreage dominated by more advanced (but less productive) stages of vegetation.

Human consumptive use of furbearer populations throughout the Interior Region is highly variable and generally depends on the abundance and current market value of the various species. In some locations trapping effort is expended on beaver and wolverine regardless of market conditions. Beaver are sought for food as well as fur, and beaver trapping is a traditional spring activity in many areas. Wolverines are in high demand for local use as parka ruffs. Beavers are generally more heavily trapped than other furbearer species. Lynx have been heavily trapped in past years because of their relatively high market value. Wolverine also have a high market value but are less vulnerable to trapping than lynx.

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. Consumptive use of red squirrels, ground squirrels and marmots occur at other seasons because these species are used for food and because ground squirrels and marmots hibernate during the winter.

A diminishing percentage of the fur harvest is being taken by the traditional wilderness trapper who derives a substantial proportion of his annual income from trapping. Trapping now radiates from population centers. Trapping pressure in remote watersheds for the smaller furbearer species will continue to decrease unless fur prices rise dramatically.

Nonconsumptive use of furbearers occurs near population centers and along the road and trail systems. The most commonly observed and photographed furbearers are beavers, red squirrels and ground squirrels. Red squirrels abound throughout most of the Interior and provide almost unlimited viewing opportunity in campgrounds, waysides and other recreational

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

sites. Ground squirrels are also numerous in some recreational areas. Beavers are available for viewing on fishing streams and at stream road crossing. Most other furbearers are nocturnal or secretive in nature and provide limited viewing opportunities.

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.

* Beavers chronically cause problems by blocking road culverts with dams or by flooding or cutting down trees on private property. Blockage of some streams by beaver dams also presents barriers to migrating fish which may affect their survival or reduce salmon escapements. The Department should encourage trapping of beavers in areas where damage to public and private property is chronic, and where streams important to spawning salmon or other species of fish are blocked. The Department should also encourage appropriate design and construction considerations in public and private road building projects.

* Underharvested furbearer populations are a significant economic loss to the area. Efforts to properly utilize all furbearer populations could provide substantial economic benefits.

* Development activities are occurring at a rapid rate in Interior Alaska. It is impossible to predict long term trends in furbearer populations or their utilization by humans. Development activities should be monitored to prevent unnecessary destruction or loss of furbearer habitat.

LIST OF FURBEARERS IN INTERIOR ALASKA

	Common Name	Scientific Name
Canids	Coyote	*Canis latrans*
	Red Fox	*Vulpes vulpes*
Felids	Lynx	*Lynx canadensis*
Mustelids	Mink	*Mustela vison*
	Land Otter	*Lutra canadensis*
	Marten	*Martes americana*
	Wolverine	*Gulo gulo*
	Weasel	*Mustela rixosa*
		Mustela ermina
Rodentia	Beaver	*Castor canadensis*
	Muskrat	*Ondatra zibethicus*
	Snowshoe Hare	*Lepus americanus*
	Marmot	*Marmota caligata*
	Red Squirrel	*Tamiasciurus hudsonicus*
	Ground Squirrel	*Citellus parryii*
	Flying Squirrel	*Glaucomys volans*

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 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 occassionally 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 occassional 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. Hygenic 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 INTERIOR ALASKA

GROUSE AND PTARMIGAN

Spruce grouse (*Canachites canadensis*), ruffed grouse (*Bonasa umbellus*) and sharp-tailed grouse (*Pediocetes phasianellus*) and rock ptarmigan (*Lagopus mutus*), willow ptarmigan (*L. lagopus*) and white-tailed ptarmigan (*L. leucurus*), all members of the family Tetraonidae, are the gallinaceous species inhabiting the Interior Region. Within this region white-tailed ptarmigan are restricted to relatively high elevations of the Alaska Range, but the other species occur throughout the region where suitable habitat occurs.

Although there is considerable overlap in geographical distribution of the various tetraonid species, each displays a marked preference for certain habitat types. Spruce grouse are found most commonly in white spruce-birch communities and black spruce associations. Ruffed grouse inhabit upland aspen and birch communities and streamside willow stands. Sharp-tailed grouse occupy a variety of habitat types including sub-alpine brushlands, sparsely timbered black spruce bogs, mature birch woodlands, regenerating hardwood forests and open fields.

In Interior Alaska breeding habitats of the three species of ptarmigan are separated altitudinally although some overlapping occurs. Willow ptarmigan breed close to timberline, often partially within the fringe of coniferous woodland, and also along stream courses in riparian 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. White-tailed ptarmigan breed at elevations of 3,500 to 5,000 feet. They occupy rough terrain where vegetation forms a low, sparse cover interrupted by boulder fields, talus slopes, ledges and glaciers.

Unlike forest grouse, ptarmigan 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 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. In some years flocks numbering hundreds of birds move through Anaktuvuk and Isabel Passes, and there are probably similar seasonal concentration areas for birds in other areas. The degree of sexual segregation among white-tailed ptarmigan is not known.

The 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. Spruce grouse and ptarmigan tend to occupy mature or climax habitats. Conversely, disturbed communities provide ruffed and sharp-tailed grouse habitat. In the Interior fire has been a prevalent factor producing and maintaining ruffed and sharp-tailed grouse habitat. Favorable habitat resulting from burning lasts for up to sixty years, but, because of this relatively short time span, the maintenance of grouse habitat for these species involves a regime of repeated burning. Recent trends in fire control, particularly in the vicinity of human population centers, may be resulting in a decline in the amount of habitat for these species. Ruffed grouse habitat near cities in the Interior is also being rapidly lost as a result of its use as building sites. Elsewhere in the Interior habitat alterations as a result of human development have not been widespread, and changes that have occurred probably benefited tetraonids.

Inland populations of the various Alaskan tetraonids demonstrate marked, generally synchronous, fluctuations involving seven to nine years between peaks. These patterns are evident over large geographical regions, but the abundance of a given species on a local area may vary from the general pattern at any given time. During the last 15 years Interior grouse populations were high during the periods 1960-62 and 1968-70. Low grouse densities occurred in 1963-65 and again in the early to mid 1970's. Similarly, ptarmigan were abundant in 1961-63 and 1969-71, and scarce in 1964-66 and in the early to mid 1970's.

Due to lack of knowledge regarding the factors governing population fluctuations, management programs aimed at stabilizing tetraonid densities from year to year are not feasible at present. Habitat management has not been attempted in Alaska, but ruffed and sharp-tailed grouse populations would probably respond to habitat manipulation. Higher densities of these species could probably be attained in some years through intensive habitat manipulation although it is doubtful if "cyclic" lows could be prevented. If increased densities of self-sustaining populations of ruffed or sharp-tailed grouse are desired, the intensive habitat management approach is definitely preferred over the usually unsuccessful techniques involving captive breeding, stocking and transplanting.

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 Interior. Although bird populations can probably withstand repeated harvests amounting to 40 percent of the fall population, hunting pressure and harvest will probably continue to fluctuate with tetraonid abundance. Most hunters are Alaskan residents, and the distribution of hunting pressure is primarily restricted to access routes and areas in close proximity to human population centers. Most grouse hunting occurs from early September through October. Ptarmigan hunting follows the same pattern during autumn but, in addition, a moderate amount of hunting occurs during March and April. Although some individuals may hunt specifically for grouse and ptarmigan, a significant amount of the harvest occurs incidental to big game hunting. Past harvest have had little if any influence on overall abundance, but interest in grouse and ptarmigan hunting is expected to increase along with accelerated human population growth. This increased hunting pressure will probably continue to be exerted in relatively localized, traditional hunting areas. Like hunting, nonconsumptive uses such as observation and photography have been light in the past, but an increase should also be expected. For the most part consumptive and nonconsumptive uses are presently compatible. This situation is expected to continue where grouse are involved, but there is a possibility of conflicts between nonconsumptive users and spring ptarmigan hunters in the future.

HARES

The snowshoe hare (*Lepus americanus*) is the only hare occurring in Interior Alaska, being common throughout the area wherever suitable habitat occurs. Densities are influenced by cyclic fluctuations in population levels averaging 10 years between peaks. In the Interior Region hare populations were high in 1960-62 and 1970-72 and low in the mid-1960's and mid-1970's. Fluctuations have been fairly synchronous throughout the area but have tended to peak first in the more northern part. Peaks occurred in the Yukon Flats in 1970-71, in the Fairbanks area in 1971-72, and in the McKinley area in 1972-73. These cyclic

fluctuations seem to be most extreme in the central portions of the snowshoe's range. The Interior Region historically has experienced extremes in hare density equal to any reported elsewhere. During population peaks, densities have averaged 1,500-2,000 per square mile, or even higher, with reports of up to 30,000 per square mile existing in the literature. 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.

Habitat disturbances such as wildfire and clearing of timber usually benefit the snowshoe hare, 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 willow and other browse plants, and to a lesser extent spruce saplings, occurs over large areas. Such girdling can seriously reduce the amount of available browse for a number of years and may affect moose populations as well as the hares themselves.

The snowshoe hare is an extremely important prey species for several predators. Lynx depend almost entirely on snowshoe hares for food and populations of lynx fluctuate with hare populations, with high and low points in lynx populations following those of hares by about one year. In years of low hare numbers, few if any lynx kittens are raised. Both red foxes and wolves also depend to a great extent on hares. Raptors such as the great horned owl and the goshawk utilize hares as a major part of their diet, and their numbers are influenced by the snowshoe hare populations.

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 other than by modifying the habitat. Hunting pressure on hares increases as populations increase and hares become more available. But, as hare populations decline and they become harder to find, there is correspondingly less interest in hunting them, and hunting then has little effect on the natural population cycle. 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 harvest 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 the snowshoe hare 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 fragile, but are sometimes used for mittens and blankets.

PROBLEMS

* Hunting pressure upon the upland game bird resource in the Interior is expected to increase. The most critical aspect of increased pressure is that exerted in the spring on ptarmigan populations. Areas of concern are those where roads or trails permit easy access during the spring to areas where ptarmigan migrations concentrate birds or to ptarmigan breeding habitat such as Eagle and Twelve-Mile Summits on the Steese Highway, Mount Fairplay on the Taylor Highway, Isabel Pass on the Richardson Highway, Windy and Broad Passes on the Anchorage-Fairbanks Highway and much of the area along the Denali Highway. Local spring harvests have little impact on populations over major geographical areas, and due to the mobility of birds in the fall, probably have little influence on hunter success the following autumn in these areas. Nevertheless marked increases in spring hunting pressure in these areas could greatly reduce local populations the subsequent summer, and, if repeated annually, could virtually eliminate nonconsumptive use of the resource at these localities. Therefore, programs to identify areas of high hunter use will be needed in the future. Once identified, hunting pressure and success, particularly in the case of spring ptarmigan hunting, should be closely monitored.

* Ruffed and sharp-tailed grouse distribution is spotty in the Interior, and existing habitat is being lost through intensive fire control and construction in the more populous regions. The possibility of habitat manipulations aimed at maintaining habitat for these species should be seriously considered in the future.

* Snowshoe hares will become more important to the hunter as opportunities to hunt larger game species become more limited. The effects of hunting on local populations of hares should be evaluated and regulated if necessary. Hunting pressure should be distributed so as to avoid heavy hunting congestion in a few small, popular hunting areas.

* During times of abundance, snowshoe hares are often regarded with little respect by the hunter, and sometimes hunters shoot more than they intend to use, wasting game simply because it is readily available. Emphasis on use of the hare as a human food and of its place as an ecologically important game animal may help to avoid this problem. Hunter education is needed in this area.

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 berrypicking, 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 Popof 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 Donelly 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 INTERIOR ALASKA

Interior Alaska annually supports millions of breeding waterfowl* and other birds which are enroute to or from breeding grounds in northern and western parts of Alaska and Canada. Major breeding and migration concentration areas are the Yukon Flats, Minto Flats, Tetlin area, Tanana Valley and the upper Koyukuk River Valley. However, thousands of small river and stream valleys which flow into the major rivers in the region, have substantial nesting duck and goose populations. Wintering waterfowl are rare, but a few birds are present where open water exists.

Breeding habitat Interior Alaska is limited by the mountainous character of much of the region. Most waterfowl habitat is located in the major river valleys. The broad Yukon Flats, formed by the Yukon and Porcupine Rivers, is the state's most productive area for ducks. An estimated 1,073,600 ducks annually nest on the flats. Of these 49 percent are dabbling ducks and 51 percent are divers. Of the divers, a relatively small percent are nongame species. Most of the 26,000 old squaws (nongame) annually counted in late May are migrating and do not nest in the area. The breeding duck population averages over 99 birds per square mile in 10,800 square miles of habitat. This density is the highest in Alaska and equals that found in prime habitat in southcentral Canada and the northcentral U.S. The annual fall duck flight from the flats is an estimated 2,019,900 birds.

The Tanana Valley including the Tetlin and Minto areas, and the Lake Minchumina area have in total an estimated breeding duck density of about 67 birds per square mile. The total annual breeding duck population from these areas exceeds 300,000 birds and the fall flight, after production, is over 560,000 ducks. Species composition is 46 percent dabblers and 54 percent divers.

The upper Koyukuk Valley contains about 3,000 square miles of waterfowl habitat and an annual breeding duck population of 97,000 birds, or over 32 ducks per square mile. Species composition is similar to other areas except for a larger percentage of nongame ducks. The total annual fall flight is estimated at over 175,000 ducks.

White-fronted and lesser Canada geese nest in this region. Lesser Canadas are found primarily on islands in the Yukon River, on the Yukon Flats, in the Minto area, in the Lake Minchumina vicinity and in the Tanana Valley from Fairbanks west. The total fall flight of Canada geese from the region is conservatively estimated at 6,000 geese. White-fronts are found primarily on Minto Flats, the Yukon Flats and in the Koyukuk Valley. The total fall flight is estimated to be 15,000 geese.

Trumpeter swans are found throughout the central Tanana Valley and in lesser numbers in the Lake Minchimina area and the upper Koyukuk Valley. Fall flights from Interior Alaska contain 750-1,000 trumpeters. Whistling swans do not nest in this region.

Waterfowl production in Interior Alaska is influenced primarily by flooding and weather. Flooding occurs periodically, and is most influential on the Yukon Flats, Minto Flats and in the Koyukuk Valley. During years of widespread flooding, duck production is reduced. However, flooding is probably beneficial in the long term as ponds are "scoured" and new fertile silt is deposited. In years with "late" springs, production is less than in years when snow and ice cover disappear early in the season. Waterfowl habitat in this region, like most of Alaska, is in excellent condition. The lack of industrial or resource development activities has allowed habitat to remain in unaltered condition.

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

Waterfowl in Interior Alaska are utilized both for domestic and recreational hunting. Local residents take an estimated 3,500 geese and 15,000 ducks for domestic use annually. Swans are also taken in small numbers. Although hunting seasons are adequate, the opportunity for sport hunting is limited by the early freeze-up of Interior hunting areas. Hunters are limited to about 30 days of hunting before cold weather and ice drives the birds south.

About 20 percent of all Alaskan sport hunters live in Interior Alaska. About 17 percent of the state's total hunter use days, 19 percent of the duck harvest and 8 percent of the goose harvest occur here. Over 85 percent of the duck harvest is made up of pintails, mallards, widgeons, shovelers and green-winged teal. Canada and white-fronted geese comprise almost the entire goose harvest. The locations of major hunting activity and waterfowl harvest are: Minto Flats, Salchaket Slough, Eielson AFB, the Delta area, Healy Lake and the road system near Tok. Minto Flats is the most popular hunting area; it is accessible by road, boat, and aircraft. Other areas of lesser activity are reached mainly by automobile and boat. A significant amount of waterfowl hunting occurs in conjunction with moose hunting in areas accessible only by aircraft, such as the Yukon Flats and the Koyukuk River Valley.

Nonconsumptive use of waterfowl is greatest at the Fairbanks Wildlife Management Area during spring waterfowl migration in late April and early May, where fields cleared of snow attract large numbers of ducks and geese. Many people take advantage of the opportunity to view waterfowl. Nonconsumptive use occurs in other areas near towns and villages and along the road systems wherever concentrations of birds occur.

Both sport hunting and nonconsumptive use is expected to increase as human population increases. The average annual number of hunter days during the past four years has been 9,200. By 1980, an anticipated 12,000 days spent hunting will annually occur in the Interior region. Domestic utilization is not expected to change markedly.

PROBLEMS

* New native landowners and other private landowners will probably impose varying degrees of trespass restrictions on hunters. The Minto Flats, Delta area, Yukon Flats and Tetlin area will be the most affected. The State should secure ownership of as much good waterfowl hunting land as possible to insure good waterfowl hunting opportunities in the future.

* Construction of dams could eliminate important waterfowl habitat in Interior Alaska. For example, a dam at Rampart would eliminate habitat for over 2 million ducks and geese. Dams on other streams would be less devastating but could result in significant losses. The Department must work closely with the Fish and Wildlife Service and other resource agencies to insure that waterfowl resources are adequately considered in review of dam proposals and that all feasible mitigation measures are adopted if dams are constructed.

* Local encroachment on waterfowl habitat is probable by highway and airport construction, industrial and urban development, upland oil and gas exploration and subsequent development. Key waterfowl and human-use areas must be given adequate protection through land use regulations, safeguards in development, or mitigation measures.

LIST OF WATERFOWL SPECIES IN ALASKA

	Common Name	Scientific Name
Dabbling Ducks	Aleutian Common Teal	*Anas crecca nimia*
	American Widgeon	*Mareca americana*
	Baikal Teal	*Anas formosa*
	Black Duck	*Anas rubripes*
	Blue-Winged Teal	*Anas discors*
	Chinese Spot Bill	*Anas poecilorhyncha zonorhyncha*
	Cinnamon Teal	*Anas cyanoptera*
	European Widgeon	*Mareca penelope*
	European Common Teal	*Anas crecca crecca*
	Falcated Teal	*Anas falcata*
	Gadwall	*Anas strepera*
	Garganey	*Anas querquedula*
	GreenWinged Teal	*Anas crecca carolinensis*
	Mallard	*Anas platyrhynchos*
	Pintail	*Anas acuta*
	Wood Duck	*Aix sponsa*
Diving Ducks	American Goldeneye	*Bucephala clangula americana*
	Barrow's Goldeneye	*Bucephala islandica*
	Bufflehead	*Bucephala albeola*
	Canvasback	*Aythya valisineria*
	Common Pochard	*Aythya ferina*
	Greater Scaup	*Aythya marila*
	Lesser Scaup	*Aythya affinis*
	Redhead	*Aythya americana*
	Ringneck	*Aythya collaris*
	Ruddy Duck	*Oxyura jamaicensis*
	Tufted Duck	*Aythya fuligula*
Sea Ducks and Mergansers	American Common Merganser	*Mergus merganser*
	American Common Scoter	*Oidemia nigra*
	Harlequin	*Histrionicus histrionicus*
	Hooded Merganser	*Lophodytes cucullatus*
	King Eider	*Somateria spectabilis*
	Old Squaw	*Clangula hyemalis*
	Pacific Common Eider	*Somateria mollissima*
	Red-Breasted Merganser	*Mergus serrator*
	Smew	*Mergus albellus*
	Spectacled Eider	*Lampronetta fischeri*
	Steller's Eider	*Polysticta stelleri*
	Surf Scoter	*Melanitta perspicillata*
	Western White-Winged Scoter	*Melanitta deglandi*
Geese	Aleutian Canada	*Branta canadensis leucopareia*
	Cackling Canada	*Branta canadensis minima*
	Dusky Canada	*Branta canadensis occidentalis*
	Lesser Canada	*Branta canadensis parvipes*
	Vancouver Canada	*Branta canadensis fulva*
	Bean	*Anser fabalis*
	American Brant	*Branta bernicla*
	Black Brant	*Branta nigricans*
	Emperor	*Philacte canagica*
	Ross's	*Chen rossi*
	Lesser Snow	*Chen hyperborea*
	White-Fronted	*Anser albifrons*
Swans	Trumpeter	*Olor buccinator*
	Whistling	*Olor columbianus*
	Whooper	*Olor cygnus*

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.

	Management Guideline No.					
Area	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[1]	X
Shishmaref Lagoon	X	X			X	X
Lopp Lagoon	X	X			X	X
Safety Lagoon	X	X			X	X
Coastal waters off Clarence Rhode NWR (and State Refuge)	X	X			X	X
Coastal waters off Arctic NWR (and State Refuge)	X				X	X
Coastal waters off Cape Newenham NWR (and State Refuge)	X				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.

2. SOUTHERN ALASKA WATERFOWL MANAGEMENT PLAN

LOCATION

Game Management Units 1-17, 19 and 20 except the areas included in the Izembek, Port Moller, Port Heiden, Cinder River, Pilot Point, Egegik, Naknek River, Minchumina, Fairbanks, Potter Point, Jim-Swan Lakes, Chickaloon Flats, Kenai and Kasilof Flats, Fox River Flats, Controller Bay, Copper River Delta, and Mendenhall Wetlands Waterfowl Management Plan areas.

MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting waterfowl.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain waterfowl hunting seasons and bag limits that reflect climatic conditions.

2. Control waterfowl hunting seasons and bag limits, methods and means of taking, and methods of hunter transport, if necessary, to distribute hunting pressure.

3. Control hunter access and methods of transport, if necessary, to minimize disturbance or harassment of waterfowl.

4. Obtain, maintain and improve hunter access to waterfowl hunting areas.

5. Encourage viewing and photography of waterfowl.

6. Discourage human activities that disturb or harass waterfowl during critical nesting or migration periods.

7. 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

Southern Alaska annually provides resting and feeding habitat for millions of waterfowl enroute to or from Northern Alaskan, Canadian or Russian breeding grounds. Spectacular concentrations of migrating ducks, geese and swans occur in areas such as southern Bristol Bay, Cook Inlet, and Prince William Sound. Although breeding populations in the Southern Alaska area are not nearly as large as those to the north, over one-fourth of the fall duck flight and over 10 percent of the fall goose flight from Alaska originates from the area. About 900,000 ducks, 90,000 geese, 11,000 whistling swans, and 2000 trumpeter swans nest in such areas as lower Bristol Bay, Yukon Flats, Minto Flats, the Tanana and Kuskokwim Rivers, the Susitna and Nelchina basins, and the Copper River Delta. Southeastern Alaska has no large areas suitable for nesting waterfowl; however, approximately 60,000 Vancouver Canada geese are year-round residents and about 110,000 ducks nest there in the many tideflat and stream delta areas. Essentially all of Alaska's wintering waterfowl occur in Southern Alaska. Coastal areas from the south side of the Alaska Peninsula south to Southeastern Alaska are used by wintering birds with Kachemak Bay, Prince William Sound and the many bays and inlets of Southeastern Alaska being particularly important as wintering areas. Southeastern Alaska alone supports an estimated 2,000,000 wintering waterfowl.

Recreational waterfowl hunting is the dominant use over most of the area. Although freeze-up limits the time waterfowl are available in interior areas, hunters in some coastal areas are able to hunt for a major portion of the season. Hunters in Southeastern Alaska, Kodiak and Aleutian Islands make use of the full 107 day hunting season. Over 93 percent of Alaska's recreational duck harvest, 88 percent of the goose harvest, and about 95 percent of the total sport hunter days occur in the Southern Alaska area.

The following list of areas are specific locations within the Southern 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 control 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	7
Southeastern Alaska							
Behm Canal	X			X		X	X
Berner's Bay	X			X		X	X
Brown's Cove	X			X		X	X
Chickamin R. Flats	X			X		X	X
Chilkat River	X			X	X	X	X
Marten R. Flats	X			X		X	X
Smeaton Bay	X			X		X	X
Sandborn Canal	X			X		X	X
Traitor's Cove	X			X		X	X
Unuk R. Flats	X			X		X	X
Walker Cove	X			X		X	X
Wilson R. Flats	X			X		X	X
Farragut Bay	X			X		X	X
Big Salt Lake	X			X		X	X
Calder Bay	X			X		X	X
Exchange Cove	X			X		X	X
Fish Egg Island Area	X					X	X
McFarland Island Area	X					X	X
Mud Bay	X			X		X	X
Portage Bay	X			X		X	X
Portillo Channel	X			X		X	X
Port Real Marina	X			X		X	X
Port Refugio	X			X		X	X
Red Bay	X			X		X	X
Salmon Bay	X			X		X	X
Sarkar Lakes	X			X	X	X	X
Sea Otter Sound	X			X		X	X
Shinaku Inlet	X			X		X	X
Staney Creek	X			X		X	X
Suemez Island Area	X			X		X	X
Sweet Briar Lake	X			X	X	X	X
Trocadero Bay	X			X		X	X
Bay of Pillars	X			X		X	X
Blind Slough	X			X		X	X
Colorado Creek	X			X		X	X
Kadake Bay	X			X		X	X
Petersburg Creek	X				X	X	X
Port Camden	X			X			
Rowan Bay	X			X		X	X
Saginaw Bay	X			X		X	X
Tebenkof Bay	X			X		X	X
Security Bay	X			X		X	X
Three Mile Arm	X			X		X	X
Totem Bay	X			X		X	X
Wrangell Narrows	X			X	X	X	X

AREA	Management Guideline No.						
	1	2	3	4	5	6	7
Zimovia Strait	X			X		X	X
Chaik Bay	X			X		X	X
Gambier Bay	X			X		X	X
Hood Bay	X			X		X	X
Favorite Bay	X			X		X	X
Fish Bay	X			X		X	X
Hoohah Sound	X			X		X	X
Kadashan Bay	X			X		X	X
Mitchell Bay	X			X	X	X	X
Neka Sound	X			X		X	X
Pybus Bay	X			X		X	X
Youngs Bay	X			X		X	X
Eagle R. Flats	X			X	X	X	X
Stikine River Delta	X	X	X	X		X	X
Rocky Pass	X			X	X	X	X
Duncan Canal	X			X		X	X
Gustavus Flats	X			X		X	X
St. James Bay	X			X		X	X
Arrons Creek	X			X		X	X
Bradfield River Flats	X			X		X	X
Northern Gulf Coast							
Yakutat SE thru Dry Bay	X			X		X	X
Prince William Sound	X			X		X	X
Portage Flats	X		X	X	X	X	X
Pt. Campbell-Woronzof Flats	X			X	X	X	X
Palmer-Hay Flats Refuge	X	X	X	X	X	X	X
Matanuska Valley	X		X	X	X	X	X
Goose Bay Refuge	X		X	X		X	X
Susitna Flats	X		X	X		X	X
Trading Bay	X		X	X		X	X
Redoubt Bay	X		X	X		X	X
Kodiak-Afognak Islands	X		X	X	X	X	X
Interior							
Nelchina Basin	X			X		X	X
Copper River Valley	X				X	X	X
Delta Management Area	X	X	X	X	X	X	X
Tetlin-Northway				X	X	X	X
Minto Flats	X			X		X	X

Some of the areas listed have exceptionally large concentrations of waterfowl during some or all periods of the year and are considered especially sensitive and important from the standpoint of maintaining undisturbed habitat. These areas include the Stikine River Delta, Rocky Pass, Duncan Canal, Yakutat southeast through Dry Bay, Prince William Sound, Palmer Hay Flats Refuge, Susitna Flats, Trading Bay, Redoubt Bay, Kodiak-Afognak Island, and Minto Flats.

The majority of areas listed receive relatively light use by hunters at present, primarily because of their inaccessibility to population centers. Heaviest hunter use occurs in areas near population centers where a short flight or boat trip or access via the road system puts hunting locations within the physical and financial reach of many urban hunters. The Stikine River Delta, Portage Flats, Palmer Hay Flats, Susitna Flats, Minto, and the Delta Management area all receive high hunter use which may in some cases require more intensive management to better distribute and regulate hunter use.

Most of the nonconsumptive use of waterfowl in Alaska occurs in Southern Alaska at relatively few locations which lend themselves to public viewing due to their proximity to human populations or their good access. These are the Chilkat River, Wrangell Narrows, Gastineau Channel, Eagle River Flats (Juneau), Portage Flats, Palmer-Hay Flats Refuge, and the Matanuska Valley.

Limited domestic utilization by local residents occurs primarily around villages in the lower Bristol Bay area and in some interior areas such as Tetlin and Minto.

PROBLEMS

* Pollution of coastal tidelands and estuaries and other pelagic areas by oil or oil industry-related contaminants poses a serious threat to waterfowl and waterfowl habitat in all coastal areas of Southern Alaska. Spills from massive Outer Continental Shelf (OCS) oil development, onshore support facilities, and tanker traffic along the coast could devastate coastal waterfowl habitats and result in the loss of hundreds of thousands of waterfowl if all possible precations are not taken. Baseline quantitative and qualitative data on coastal bird habitats 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 effect of estuary contamination for mitigation measures. Ongoing federally funded OCS bird projects by the Department and the U.S. Fish and Wildlife Service are designed to identify and quantify the effects of these potential problems.

* Construction of dams could eliminate important waterfowl habitat in interior Alaska. For example, a dam at Rampart would eliminate habitat for over 2 million ducks and geese. Dams on other streams would be less devastating but could result in significant losses, depending on the area. The Department must work closely with the U.S. Fish and Wildlife Service and other resource management agencies to insure that waterfowl resources are adequately considered in review of dam proposals and that all feasible mitigation measures are assured if dams are constructed. In some cases, such as Rampart Dam, the Department should oppose construction on the basis of wildlife damage.

* Timber cutting adjacent to sedge-tideland habitats and log storage near these areas may adversely affect waterfowl and waterfowl habitat. An apparent decrease in waterfowl food production results from bark decomposition in log storage areas. Waterfowl losses have also occurred from pulp mill effluents. Baseline quantitative and qualitative data on coastal bird habitats and bird numbers, and relationships between them are needed to provide rational recommendations to the U.S. Forest Service and logging companies to insure minimum habitat damage.

* Local encroachment on waterfowl habitat is probable through highway and airport construction, industrial and urban development, upland oil and gas exploration and subsequent development. Key waterfowl and human use areas must be given adequate protection through land use regulations, safeguards in development, or mitigation measures.

* The black brant population has been declining for about 15 years. A substantial increase in the harvest of brant is not desirable in the forseeable future. As hunting pressure increases in Southwestern Alaska, restrictions on brant harvests may be necessary.

* New native landowners and other private landowners will probably impose varying degrees of trespass restrictions on hunters. The

Minto Flats, Delta area, Yukon Flats, and Tetlin area will be the most affected. The Department should solicit the cooperation of private landowners to facilitate progressive management of waterfowl. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act. The State should secure ownership of as much of the best waterfowl land and access to it to insure good waterfowl hunting opportunities in the future.

* Use of waterfowl by hunters and nonconsumptive users will continue to increase, especially near urban centers. To prevent corresponding increases in user conflicts, crowding and reduced success, measures must be initiated to enhance habitat, increase access and control user numbers.

* Except for hunting areas in Southeastern Alaska and some lightly hunted coastal areas in Prince William Sound and Kachemak Bay, freezeup limits hunters to 50 days or less of hunting out of a possible 107 day season. Liberalized duck bag limits should be allowed to partially offset reductions in hunting opportunity imposed by climate.

* Ingestion of lead shot by waterfowl in a few areas may be causing substantial loss of birds from lead poisoning. Efforts must continue to identify these areas, measure the impact, and take corrective action if necessary.

IMPACTS

* Appropriate waterfowl seasons and bag limits will be maintained on all areas.

* All listed areas are recognized as important waterfowl use and/or human use areas; future development resulting in habitat alteration may be curtailed in recognition of the waterfowl values.

* 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.

3. FAIRBANKS WATERFOWL MANAGEMENT PLAN

LOCATION

In Game Management Unit 20C, the state-owned land about two miles west of Fairbanks formerly known as Creamers Field, lying between Farmers Loop Road and College Road.

PRIMARY MANAGEMENT GOAL

To provide the opportunity to view, photograph and enjoy waterfowl.

SECONDARY MANAGEMENT GOAL

To provide the greatest opportunity to participate in hunting waterfowl.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Encourage public viewing and photography of waterfowl and enhance viewing facilities.

2. Enhance waterfowl habitat in high use areas to increase utilization of habitat by waterfowl, and encourage land use practices that are beneficial to waterfowl habitat.

3. Discourage human activities that disturb or harass waterfowl during critical nesting or migration periods.

4. Obtain, maintain and improve public access to waterfowl viewing areas.

5. Regulate waterfowl hunting seasons and bag limits, methods and means of taking, and methods of hunter transport, if necessary, to control hunting pressure.

THE SPECIES

The Fairbanks Wildlife Management Area is most noted for its spring concentrations of migrating waterfowl. During late April thousands of ducks and geese use the snow cleared fields. Canada and white-fronted geese, pintails, mallards, widgeons, shovelers, green-winged teal and cranes are the most abundant species. Summer populations of waterfowl are small, primarily because little good brood rearing water exists. However, a limited number of ducks, geese and cranes are known to nest on the area each year. Fall populations of waterfowl concentrating on this area are much smaller than those in the spring, apparently due to lack of water. However, several thousand ducks and several hundred geese and cranes utilize the fields during some autumns.

Thousands of people visit the area during a two-week period in the spring to view the birds. Viewers are primarily residents of the Fairbanks area and include individuals, families and students from the elementary, secondary and college levels. Some years snow is removed from the field immediately in front of the parking area and grain is dispensed to help hold the birds and enhance viewing opportunities. Other human uses of the area include dog mushing, retriever training, skydiving, cross country skiing, hiking, snow machining and hunting. These uses have been slight to date, and because of their seasonal nature, they have not conflicted with waterfowl enhancement and viewing potentials.

PROBLEMS

* Human development along the boundary of Creamers Field is occurring at a very rapid rate, and the human population within the greater Fairbanks area is also increasing rapidly. This accelerated human activity creates an increased demand for use of Creamers Field by various interests. More control on the types, timing and location of various uses must be exercised if conflicts are to be minimized.

* Maintenance of habitat so the area remains attractive to waterfowl requires constant attention to prevent encroachment of brush. This should be accomplished preferably through farming the field area to preclude establishment of woody species while concurrently producing vegetation attractive to waterfowl. Other brush control measures should be undertaken in portions of the field where farming does not occur.

* The amount of waterfowl use on the area both during summer and fall is limited by habitat. Construction of numerous shallow water ponds would significantly increase duck production, fall waterfowl use and subsequently increase the recreational potential of this area, particularly during the summer and autumn.

IMPACTS

* Waterfowl use of the area in the summer and fall would increase, providing greater recreational opportunities for hunters and nonhunters alike.

* The attractiveness of the area would be increased for other bird species such as shorebirds, raptors and passerines.

* Increased control of activities and uses that conflict with waterfowl viewing may be expected.

5. MINCHUMINA WATERFOWL PLAN

LOCATION

In Game Management Unit 20C: T12S, R24W; T12S, R23W; T11S, R24W, Sections 19-36; T11S, R23W, Sections 19-36; T11S, R25W, Sections 1-3, 9-12, 16-18, 22-24, 28-30, 33-36; T12S, R25W, Sections 1-3, 9-12, 16-18, 22-24, 28-30, 33-36, McKinley Quadrangle.

MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Maintain waterfowl hunting seasons and bag limits that reflect climatic conditions.

2. Control access, number and distribution of hunters and methods of hunter transport, if necessary, to maintain aesthetic hunting conditions.

3. Control hunter access and methods of transport, if necessary, to minimize disturbance or harassment of waterfowl.

4. Obtain, maintain and improve hunter access to waterfowl hunting areas.

5. Discourage human activities that disturb or harass waterfowl during critical nesting or migration periods.

6. Discourage land use practices that are harmful to waterfowl habitat.

THE SPECIES

Large spring and fall migrant waterfowl populations occur in the Minchumina area. Probably over 100,000 birds are present each season. The area supports a relatively dense breeding duck population of about 67 birds per square mile. Several thousand ducks and geese reportedly molt on the large lake during mid-summer. Trumpeter swans also breed in this area in low densities, producing a fall flight of 25-40 birds.

Hunting pressure is currently very light. A few local residents and visitors hunt in the fall. Illegal spring hunting is also light in intensity. Access to the area is limited to aircraft. A privately owned commercial operation on the main lake has a small number of overnight facilities to accomodate hunters. However, fishermen and BLM fire crews are the main users of these facilities during the summer. Except for fishermen during the summer and fall, local residents, and BLM firefighters, nonconsumptive use is limited.

PROBLEMS

* Although all lands in the area have been selected by the state and some selections have been tentatively approved, native selections under terms of the Alaska Native Claims Settlement Act overlap state selections. Conveyance of public lands to private ownership may preclude public use of the area for waterfowl hunting. The

Department should solicit the cooperation of private landowners to facilitate progressive management of waterfowl. Easements across private lands to public lands will be sought as provided for in the Alaska Native Claims Settlement Act. In addition, the importance of the Minchumina area for waterfowl and potential human use of waterfowl is such that those lands acquired by the State should be placed under the management of the Department of Fish and Game. If these lands are patented to the State, the Department should seek primary management authority to pursue the goals of this plan.

IMPACTS

* This area will help accommodate people desiring an aesthetically pleasing hunt.

* Public hunting and waterfowl habitat protection would be assured in the future on this excellent waterfowl habitat.

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.

Birdlife in interior Alaska is dominated by those forms characteristic of the dominant interior spruce and birch forest habitats. Among permanent residents of the area are ravens, gray jays, white-winged crossbills, chickadees and woodpeckers. In summer many species migrate north to breed in the area; these include robins, kinglets, flycatchers, woodpeckers, warblers, sparrows and thrushes.

Alpine tundra occurs at higher elevations and several species are found here that are typical of coastal and arctic tundra regions beyond treeline. Lapland longspurs, savannah sparrows, gray-crowned rosy finches, horned larks, upland and golden plovers and common snipe are familiar species.

Thousands of small ponds, lakes and streams and extensive marshy habitats in Interior Alaska provide for the needs of numerous water and shorebirds. In addition to many species of waterfowl, loons, grebes, plovers, yellowlegs, sandpipers, phalaropes, swallows, kingfishers and dippers are common.

In addition to those species which nest or reside there, Interior Alaska is annually visited by large numbers of birds migrating through to Arctic or Western Alaska areas. Many thousands of waterbirds utilize the Yukon Valley as an extension of the Central Mississippi and Atlantic Coast Flyways, enroute to or returning from the coastal or Arctic breeding grounds. The Mississippi Flyway via the MacKenzie Basin in Canada is an important source of many songbirds for Alaska. Many Arctic-nesting birds affiliated with the Pacific Coast Flyway enter the lower Yukon River area and move to the Arctic Slope via Anaktuvuk Pass.

The major human uses of non-game birds are non-consumptive. Birdwatching is a popular recreational activity enjoyed by thousands of Alaskans. Observation and photography of birds occurs primarily along roads and trails and near major communities. In addition to direct use, many outdoor activities are enriched by the sight and song of birds. Scientific study of birds has provided much fascinating and valuable information on animal migrations, ecological relationships, and evolutionary mechanisms.

RAPTORS

Raptors* which occur in Interior Alaska include the bald and golden eagles, osprey, red-tailed, Harlan's, rough-legged and Swainson's hawks, marsh hawk, goshawk, sharp-shinned hawks, gyrfalcon, peregrine falcon, merlin, kestrel, and the great-horned, great-grey, snowy, hawk, boreal and short-eared owls. With the exception of the goshawk and gyrfalcon,

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

the diurnal birds of prey are summer residents on the Interior, although there have been records of a few eagles overwintering in the Interior. With two exceptions, the owls are Interior residents throughout the year. The snowy owl winters in the Interior, while the short-eared owl is a summer resident of this region. Migration times vary among species and with seasonal weather patterns, but summer residents generally arrive in the Interior in April and leave during September.

Resident raptor populations appear to be at moderate densities, although marked fluctuations in abundance occur over time. Eight-fold variations in goshawk breeding densities over a period of four years have been documented in the Interior. These variations are thought to occur in response to changes in prey abundance, and flucuations of similar magnitudes probably occur within populations of other resident raptor species. Although comparative data from earlier periods are not available, general observations suggest that, except for the endangered peregrine falcon, migratory species occurring in the Interior are at moderate levels of abundance. Breeding populations of bald eagles and ospreys, endangered or threatened in eastern and southern North America, do not appear seriously low at this time in Alaska. Important osprey breeding populations occur in the Minto Flats, Northway Flats and Tetlin Lakes areas.

Numbers of two subspecies of peregrine falcons have declined in the Interior over the last 20 years; the only known population approximating its former breeding density occurs along the Yukon River between the Alaska-Canada border and Circle City. 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, peregrine populations on the Yukon, Porcupine and Tanana Rivers of Interior Alaska are of key importance.

Most habitat types in the Interior are utilized by raptors during the breeding season. Raptors range widely in hunting, 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 and bald eagles select lowland forests along river or lake systems as nesting habitat. Golden eagles, gyrfalcons and rough-legged hawks prefer to nest on cliffs. The other buteos, the accipiters, merlins, kestrels and owls (except for the short-eared owl), are principally tree-nesters, and are found throughout forested regions. Of these species, goshawks display marked preference for hardwood forests, while kestrels utilize cavities in trees as nest sites. 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 Interior region. Both of these species select open areas for nesting, but unlike marsh hawks, short-eared owls nest in tundra and forested habitats. Except for gyrfalcons which remain in alpine areas throughout the year, resident raptors range widely over all major habitat types during the winter in search of food. To date, human-caused habitat changes that have occurred in the Interior have not significantly influenced raptor abundance.

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 Interior Alaska varies seasonally and encompasses a wide array of species including insects, fish, birds and mammals. 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 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.

SMALL MAMMALS

About 21 species of small mammals*** are found in Interior Alaska. The house mouse and rat are both introduced species associated with human habitations. Of the indigenous species, the tundra vole, the northern red-backed vole and the common shrew are distributed throughout the Interior Region. Five additional species of voles also occur in the region but are generally limited to habitats south of the Arctic Circle. Three species of lemmings inhabit Interior Alaska: the brown, northern bog and collared lemmings. Brown lemmings are found in all areas except the Tanana Hills and the Alaska Range near the Canadian border. The northern bog lemming is found primarily south of the Arctic Circle, while the collared lemming occupies areas to the north of the Arctic Circle.

The masked, Arctic and pigmy shrews and perhaps also the water shrew inhabit portions of the region in varied patterns of distribution. Other small mammals include the meadow jumping mouse, the collared pika, and the Interior Region's only bat, the little brown bat. The latter ranges north to Fort Yukon, while the collared pika is found from the Tanana River to the Mt. McKinley region.

Habitat requirements are as varied as the number of species found in this group. Species such as the pika, which requires high altitude rock and talus slopes, or the northern bog lemming, which is limited to wet tundra and sphagnum bogs, are rather narrow in their habitat requirements. Others such as the common shrew or meadow jumping mouse 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 the rhythmic fluctuations in numbers generally with 3 to 4 years between peaks. The slow-growing vegetation in alpine 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, coyotes, wolves and bears. Avian predators such as jaegers and many raptors also 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

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

or by lowering reproductive success. Decreased populations of peregrine falcons resulting from chemical residues found outside Alaska are well documented. While other Alaskan nongame bird species 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.

* 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 a great 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 INTERIOR ALASKA

	Common Name	Scientific Name
Eagles	Bald Eagle	*Haliaeetus leucocephalus*
	Golden Eagle	*Aquila chrysaetos*
	Osprey	*Pandion haliaetus*
Hawks	Goshawk	*Accipiter gentilis*
	Sharpshinned Hawk	*Accipiter striatus*
	Red-tailed Hawk	*Buteo jamaicensus*
	Harlan's Hawk	*Buteo harlani*
	Swainson's Hawk	*Buteo swainsoni*
	Rough-legged Hawk	*Buteo lagopus*
	Marsh Hawk	*Circus cyaneus*
Falcons	Gyrfalcon	*Falco rusticolus*
	Peregrine Falcon	*Falco peregrinus*
	Merlin (Pigeon Hawk)	*Falco columbarius*
	Kestrel (Sparrow Hawk)	*Falco sparverius*
Owls	Great Horned Owl	*Bubo virginianus*
	Snowy Owl	*Nyctea scandiaca*
	Hawk Owl	*Surnia ulula*
	Great Gray Owl	*Strix nebulosa*
	Long-eared Owl	*Asio otus*
	Short-eared Owl	*Asio flammeus*
	Boreal Owl	*Aegolius funereus*

LIST OF SMALL MAMMALS IN INTERIOR ALASKA

	Common Name	Scientific Name
Shrews	Common Shrew	*Sorex cinereus*
	Tundra Shrew	*Sorex tundrensis*
	Dusky Shrew	*Sorex obscurus*
	Pygmy Shrew	*Microsorex hoyi*
Bats	Little Brown Bat	*Myotis lucifugus*
Pikas	Pika	*Ochotona collaris*
Rodents	Collared Lemming	*Dicrostonyx groenlandicus*
	Bog Lemming	*Synaptomys borealis*
	Brown Lemming	*Lemmus trimucronatus*
	Red-backed Vole	*Clethrionomys rutilis*
	Meadow Vole	*Microtus pennsylvanicus*
	Long-tailed Vole	*Microtus longicaudis*
	Yellow-cheeked Vole	*Microtus xanthognathus*
	Tundra Vole	*Microtus oeconomus*
	Alaska Vole	*Microtus miurus*
	House Mouse	*Mus musculus*
	Meadow Jumping Mouse	*Zapus hudsonius*
	Rat	*Rattus norvegicus*
	Porcupine	*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 115 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 managment 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.

7. UPPER YUKON PEREGRINE FALCON MANAGEMENT PLAN

LOCATION

In Game Management Units 25 and 20C, all cliffs and bluffs bordering the Yukon River from Eagle to Circle, including the Charley River below the confluence of its east and west forks.

PRIMARY MANAGEMENT GOAL

To provide an opportunity for scientific and educational study of peregrine falcons.

SECONDARY MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy peregrine falcons.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Protect peregrine falcon populations from unnatural disturbance and harrassment.

2. Conduct and encourage scientific and educational studies of peregrine falcons.

3. Discourage land use practices which are detrimental to peregrine falcon nesting habitat.

4. Allow limited viewing when it does not affect nesting success, and when it is not in conflict with scientific studies.

THE SPECIES

This portion of the Yukon River system represents one of the major nesting areas of peregrine falcons in the state. Early surveys in the 1950's indicated that 16 to 20 pairs produced approximately 30 fledged young per year in this section. This sub-population slowly declined throughout the 1950's and 1960's until 1970 when only seven pairs produced 18 young. Recent surveys have indicated that the population has leveled off at this low point. The Charley River, although not intensively surveyed, has a high potential, four to five nesting pairs being found in recent overflights.

Nesting failure appears to be the primary cause of population declines both in this area and throughout most of the species range. Concentrations of organochlorine residues appear to be the major factor affecting nesting failure. High contaminant levels have resulted in addled eggs and eggs with weak shells. Critical levels of some residues may affect nesting behavior of adults resulting in increased abandonment of nests.

Peregrine falcons from this region are migratory and winter south of Alaska. Many of the prey species in this area also winter in southern regions, thus subjecting both predator and prey to accumulation of pesticide residues outside of Alaska. The peregrine is subject to continued accumulation when ingesting contaminated prey while in Alaska. Additional mortality occurs from natural causes such as landslides in nesting cliffs, and adverse weather during nesting.

Nesting and foraging habitats have remained stable throughout this section. Landslides along the Yukon have destroyed some eyries; however, similar slides have also created potential nest sites.

Little human use of peregrines has occurred in the area. Peregrines in the Upper Yukon have been protected from the use or disturbance that populations in more accessible areas have experienced. Although highly esteemed by falconers for centuries, relatively few peregrines were obtained in Alaska for sport. The species now receives complete protection in Alaska and the "Lower 48" under the Endangered Species Act of 1969. The knowledge that peregrines occur in the upper Yukon drainages has added to the wilderness experience of many who use the area. Nonconsumptive use can be expected to increase in the area as access improves. Designation of the Charley River as part of the Wild Rivers system will attract additional users.

PROBLEMS

* Continued chemical contamination of peregrine falcon food sources may preclude local efforts to maintain viable peregrine populations. Intensive monitoring of peregrine populations, and of contaminant levels in prey species should be conducted. National and international efforts to reduce chemical contaminants must be encouraged.

* In view of the precarious balance between production and mortality of peregrine falcons, the consequences of disturbance and habitat alteration are critical to the survival of peregrine populations. Strict stipulations governing human activities of all kinds in important peregrine falcon nesting areas need to be established and enforced. Even scientific studies must be carefully designed to avoid inadvertent losses of birds.

IMPACTS

* As scientific knowledge of peregrine ecology expands, a comprehensive management program will be developed.

* Important production areas may become critical if populations continue to decline. If the Charley River is designated as a Wild River, strict control of recreationists along this tributary and the main Yukon may be necessary to reduce disturbance to nesting birds.

* Controls on public observation and photography of peregrines will increase and opportunities for such uses will be limited to situations which clearly pose no threat to the welfare of peregrine falcon populations.

* Resource development activities will be restricted where they impact peregrine populations either through disturbance of nesting and brooding or alteration of important habitat.

8. TANANA CLIFFS PEREGRINE FALCON MANAGEMENT PLAN

LOCATION

In Game Management Units 20A, 20C and 20D, all cliffs and bluffs bordering the Tanana River between the Yerrick and Salcha Rivers, to include the drainage of the Salcha River below the confluence of Flat Creek.

PRIMARY MANAGEMENT GOAL

To provide an opportunity for scientific and educational study of peregrine falcons.

SECONDARY MANAGEMENT GOAL

To provide an opportunity to view, photograph and enjoy peregrine falcons.

EXAMPLES OF MANAGEMENT GUIDELINES

1. Protect peregrine falcon populations from unnatural disturbance and harassment.

2. Conduct and encourage scientific and educational studies of peregrine falcons.

3. Discourage land use practices which are detrimental to peregrine falcon nesting habitat.

4. Allow limited viewing when it does not affect nesting success and when it is not in conflict with scientific studies.

THE SPECIES

This portion of the Tanana River drainage has suffered a loss of breeding peregrines in recent years. Surveys in 1970 indicated that at least 20 pairs of falcons had previously nested along the entire Tanana River. Very few if any active eyries remain in the area. The elimination of this subpopulation is a result of a combination of factors: disturbance, low productivity and possible behavioral changes. The latter two factors have resulted from pesticide residue build up. Additional mortality undoubtedly resulted from adverse climatic conditions and loss of nest sites due to landslides.

Habitat has remained relatively stable in this section. However, the limited development of agriculture around Delta Junction may have created additional foraging areas. The habitat is presently under-utilized, although utilization will increase if this subpopulation is reestablished. The presence of previously used eyries is important for birds introduced to an area. Elsewhere peregrines have shown preference for nest sites used earlier. The presence of peregrines in the past undoubtedly enhanced the outdoor enjoyment of visitors to the area, and reestablishing the species in this area would be desirable.

PROBLEMS

* The lack of breeding pairs could jeopardize efforts to retain the undisturbed nature of existing nesting sites for future use by peregrine falcons. The importance of nesting habitat, whether

presently occupied or not, to existing peregrine populations, and to possibly expanded future populations must be considered in the management of land uses which may impact nesting habitat.

IMPACTS

* Resource development activities will be restricted where alteration of nesting habitat would otherwise occur.

* If peregrine falcons become reestablished in the area, controls on public observation and photography will be initiated and such uses would be limited to situations which clearly pose no threat to the birds.

11. TWELVE MILE-EAGLE SUMMIT UNCLASSIFIED GAME MANAGEMENT PLAN

LOCATION

In Game Management Units 20B and 20C, that area within one-half mile of the Steese Highway between Mile 83 and 115.

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.

THE SPECIES

This area is characterized by alpine tundra with interspersed spruce-hardwood forest. Plovers, horned larks, lapland longspur, and several species of shorebirds are commonly found in the alpine habitat of this area. One species, the upland plover, although common here is rare throughout much of Alaska. Golden eagles are summer residents and the gyrfalcon is present throughout the year. Forest inhabitants include woodpeckers, finches, thrushes and jays.

The Twelvemile - Eagle Summit area is representative of Interior Alpine tundra habitat and associated fauna. The area is popular among resident Alaskans and out-of-state visitors for it provides an opportunity to view bird species not commonly encountered along much of Interior Alaska's road system.

PROBLEMS

* Sport hunting is prevalent along the highway during periods of high ptarmigan numbers, particularly in alpine areas where birds are numerous. Hunting activities may reduce viewing potential in the area and require that hunting seasons be altered to reduce conflicts.
* Habitat requirements of many species of nongame birds are poorly known. Studies to identify habitat requirements and levels of tolerance to disturbance of species in this region should be encouraged.
* Indiscriminate shooting of nongame birds may occur as human activity increases. Efforts should be initiated to increase public appreciation of nongame birds.

IMPACTS

* As nonconsumptive use of this area expands, spring hunting of small game may be restricted to prevent conflicts with viewing and photography.

MT. MCKINLEY NATIONAL PARK WILDLIFE MANAGEMENT PLAN

LOCATION

Mt. McKinley National Park is located in the central Alaska Range about 180 miles north of Anchorage and 140 miles southwest of Fairbanks. The Park occupies portions of Game Management Units 13E, 16B, 19 and 20C.

PRIMARY MANAGEMENT GOAL

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

SECONDARY MANAGEMENT GOAL

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

EXAMPLES OF MANAGEMENT GUIDELINES

1. Cooperate with the National Park Service in its management of Mt. McKinley National Park according to established National Park Service management objectives including but not limited to:

    * Preserving the natural ecological relationships essential for perpetuation of viable populations of indigenous wildlife.

    * Interpreting the varied ecological features and processes of the park.

    * Providing for maximum appropriate public use and enjoyment of the aesthetic and ecological resources of the park consistent with the preservation of primary resource values.

    * Providing opportunities for nonmanipulative baseline research on essentially undisturbed subarctic ecosystems.

THE SPECIES

The park contains a relatively high diversity and abundance of wildlife species of Interior Alaska. These include Dall sheep, caribou, moose, black and grizzly bears, lynx, foxes, marten, wolverine, beaver, wolves, snowshoe hares, muskrats, ptarmigan, ground squirrels, pikas, marmots, loons and numerous waterfowl, including trumpeter swans.

Dall sheep in Mt. McKinley Park have a recorded history of population fluctuations. The park population experienced drastic reductions in 1929 and 1932 as a result of unusually severe winters. Since then the population appears to have fluctuated about an average of 1,000 sheep.

The McKinley caribou herd ranges primarily on the north side of the Alaska Range in the vicinity of McKinley Park. The herd declined from about 20,000 to 30,000 in 1941 to approximately 10,000 by the early 1960's. Since 1966 a rapid decline has occurred and currently 1,000 to 1,500 caribou remain. The reasons for these declines are not known.

Moose were considered scarce in Mt. McKinley Park in the early 1920's. Moose populations gradually increased for the next 40 years, reaching greatest abundance in the early 1960's. Moose numbers have since gradually declined, but reasons for the decline are not known. A National Park survey in Mt. McKinley Park in 1975 indicated a minimum of 641 moose.

Mt. McKinley National Park was established in 1917. The Alaska Railroad made travel to the Park possible during the early 1920's. In 1922 only seven persons visited the Park. By 1956, 5,300 visitors logged, with most arriving by the Alaska Railroad and small aircraft. In 1957 the Denali Highway was opened making it possible to drive to the park, and 10,700 visitors were recorded. The Parks Highway was completed during 1971, greatly increasing park accessibility. Tourist activity occurs primarily during May through September.

Hiking, fishing, viewing and photographing wildlife and scenery are the primary human uses of the park. Although it is illegal to hunt within the park, a small but unknown amount of poaching occurs.

PROBLEMS

* Natural fluctuations of park wildlife populations may reduce opportunities for public use. One example is the caribou population which is present in the park in greatly reduced numbers although it has been largely unaffected by consumptive utilization. Moose populations apparently are also declining within the park. While such fluctuations are "natural" and therefore desirable within the park, they do affect public use of the park.

* Conflicts with brown bears in campgrounds and occasional bear attacks on park visitors occur. A greater public awareness of brown bear behavior and attention to proper food storage and garbage disposal is required to minimize bear-human confrontations. Consideration of human welfare is essential to the continued beneficial use of the park.

IMPACTS

* Management of wildlife within Mt. McKinley Park is under the jurisdiction of the National Park Service. This plan only recognizes those uses compatible with National Park Service management and does not suggest changes from established uses.

* Increased research on park populations of wildlife will not only benefit park objectives, but also provide valuable comparative data for hunted populations elsewhere.