THE BRISTOL BAY REGIONAL MANAGEMENT PLAN

AND

FINAL ENVIRONMENTAL IMPACT STATEMENT

Volume I

BRISTOL BAY STUDY GROUP • ALASKA LAND USE COUNCIL

THE BRISTOL BAY REGIONAL MANAGEMENT PLAN

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FINAL ENVIRONMENTAL IMPACT STATEMENT

U.S. DEPARTMENT OF THE INTERIOR

Prepared Under the Direction of the Assistant Secretary of the Fish and Wildlife Service with assistance from the Alaska Land Use Council and its Bristol Bay Study Group

ABSTRACT

The Bristol Bay Regional Management Plan
and Environmental Impact Statement

Prepared Under the Direction of the U.S. Fish & Wildlife Service, the Alaska Land Use Council and its Bristol Bay Study Group consisting of representatives of the following:

Alaska Department of Natural Resources
Alaska Department of Fish and Game
U.S. Fish and Wildlife Service (EIS Lead)
U.S. Bureau of Land Management
Aleutians East Coastal Resource Service Area Board
Bristol Bay Borough
Bristol Bay Coastal Resource Service Area Board
Native Interests

Abstract: The regional plan provides a comprehensive and systematic management plan developed cooperatively by the U.S. Department of the Interior and the State of Alaska for the 31 million acre Bristol Bay region as defined by Section 1203 of the Alaska National Interest Lands Conservation Act. This document explains and evaluates a land use plan along with five alternatives that can assist local federal, state and private land managers by providing a broad regional policy framework or resource management strategy for the 31 million acre area. This plan is a guide to future decision making not an absolute. The alternatives remain part of the document to place in context the rational for the chosen plan.

The plan will conserve the fish and wildlife and other significant natural and cultural resources within the region, and provide for the rational and orderly development of economic resources within the region in an environmentally sound manner.

The plan recognizes fish and wildlife habitat and harvest as primary uses in all management units in the Bristol Bay area. In addition, Chapter V of the plan includes management guidelines to further the protection of sensitive fish and wildlife habitat and cultural resource areas. The plan also recommends several land exchanges and cooperative agreements, that would conserve fish and wildlife and cultural resources. The plan also provides for the rational and orderly development of the region's economic resources. The commercial fisheries and recreational resources of the region provide the basis for most of the region's economy. The plan provides for the protection of the resources that support this economy. The plan also identifies oil and gas as a primary use on state and Native lands with high and moderate potential. The plan recommends mineral development on state, BLM and Native lands, and gives direction for transportation related to resource development. The plan recommends the state DNR sell up to 14,000 acres of land for settlement.

Although this plan was developed as a cooperative plan by the State of Alaska and the Department of the Interior for well over

three years, the State withdrew as a cooperator in the implementation of the Cooperative Plan and chose to issue its own Area Plan (September 1984) which is a direct result and accurate reflection of the various decisions reached during the development of this plan. It is intended that this plan and the States Area Plan be linked by a series of agreements to include a Master Memorandum of Agreement that cumulatively provide a Cooperative Plan for the Bristol Bay Region as intended by Congress.

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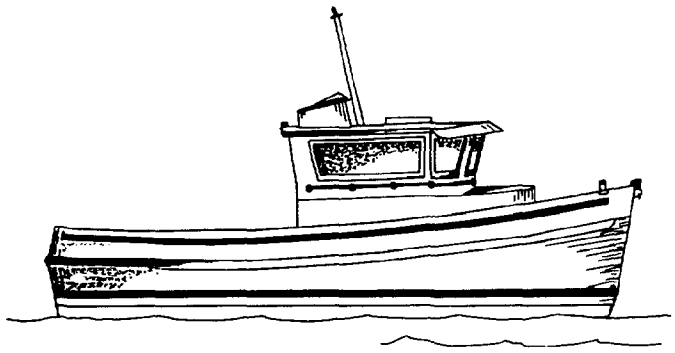


CHAPTER I

Introduction

The Bristol Bay Plan is mandated by Section 1203 of the Alaska National Interest Lands Conservation Act (ANILCA), Public Law 96-487. The law directs that a comprehensive regional plan for the 31 million acres in southwest Alaska be developed with the stated goal of conserving the fish and wildlife and other significant natural and cultural resources of the region while at the same time providing for the rational and orderly development of the economic resources in the region.

Section 1203(c) of ANILCA provides the option for the State of Alaska to participate with the Secretary in preparing the plan. The State of Alaska exercised that option and decided to join in the effort. Governor Jay Hammond communicated that decision to Secretary Watt on February 26, 1981 (attachment #2). Subsequently Secretary Watt and Governor Hammond decided that the Alaska Land Use Council was the appropriate entity to undertake preparation of a cooperative regional management plan for presentation to the Secretary and the Governor for joint consideration and eventual adoption pursuant to authority granted in Section 1203(e) of ANILCA.

The Council undertook the assigned task through a multi-discipline, staff level, work group representing Federal agency, State agency, Native corporation, and local resident interests. After three and one half years of extensive planning and an unprecedented level of public review, in Alaska of the BBCMP, the State of Alaska withdrew from the cooperative planning effort as permitted under ANILCA Section 1203(d)(2). Written notification of the withdrawal by the State of Alaska was delivered from Governor Sheffield to the Secretary on August 6, 1984 (attachment #3). Despite this action, the Department of the Interior is required by ANILCA to prepare a plan for managing the lands in the Bristol Bay region. To fulfill this obligation, the Secretary withdrew the authority for preparing the required plan (attachment #4) from the Alaska Land Use Council and redelegated it to the Assistant Secretary for Fish, Wildlife and Parks. The Alaska Regional Director of the U.S. Fish & Wildlife Service was subsequently assigned responsibility to complete the Department's plan.

In a subsequent letter dated August 30, 1984 from the State of Alaska to the Federal Cochairman of the Alaska Land Use Council (attachment #5) the State requested that the federal government's plan for the Bristol Bay region be worded so as to be binding only on federal lands in the region. The State further requested that any proposed resource allocations and land classifications for State land in the region be only advisory from the Department of the Interior to the State. The State also requested that the Guidelines contained in the plan be compulsory only on federal land. The State of Alaska advised it would then consider

adopting these same management guidelines as appropriate for State lands in the Bristol Bay region by means of the State's Area Plan published and approved in September 1984.

Pursuant to the Secretary's September 4, 1984 letter, the Special Assistant to the Assistant Secretary, FWP and the Fish & Wildlife Service Alaska Regional Director appeared before the Alaska Land Use Council's Land Use Advisors Committee and indicated their intent to proceed with a plan for the Bristol Bay region. They outlined the specific recommendations and changes necessary to comply with ANILCA in light of the State's decision to withdraw from a cooperative plan. These changes were subsequently provided to the Council on September 13m 1984. Their recommendations became the basis for the Council's consideration and final recommendations for the BBRMP to be submitted to the Secretary by the Assistant Secretary for Fish, Wildlife and Parks.

The Study Area

This is a land management plan with alternatives for 31 million acres of State of Alaska, Bureau of Land Management (BLM), and National Wildlife Refuge (NWR) land in the Bristol Bay region.

The boundary of the Bristol Bay study region was established by the Alaska National Interest Lands Conservation Act (ANILCA). This large, diverse region extends from the southeast shoreline of the Kuskokwim Delta as far east as the headwaters of the Mulchatna River and Lake Clark National park and Preserve. The region includes Iliamna Lake and its watershed and all of the Alaska Peninsula and Unimak Island, except for Katmai National Park and Preserve and Aniakchak National Monument and Preserve. On the Pacific shore of the Alaska Peninsula mean high tide defines the boundary of the region, except for those bays that are within the Alaska Peninsula NWR. In Bristol Bay, the three-mile limit defines the seaward boundary of the region.

The 1980 population of the region was 7,815 people, living in generally 38 communities.[1] These communities range in size from the regional economic center of Dillingham, with approximately 1,600 people, to very small, isolated villages where subsistence is the focus of activity. The population of the region has traditionally relied heavily on its biological resources, particularly salmon for their livelihood.

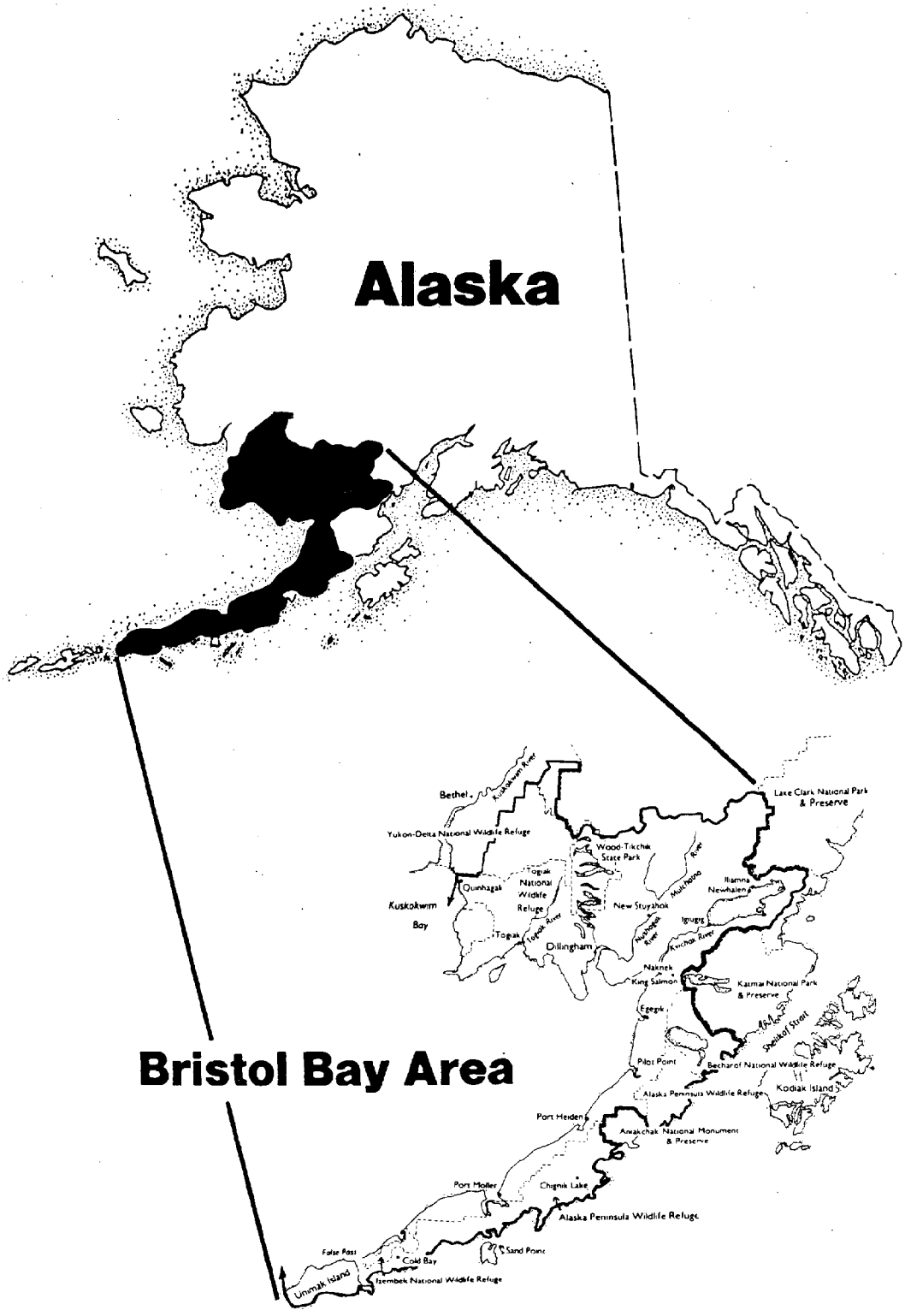
Purpose and Need for the Bristol Bay Regional Management Plan

A report of the Senate Committee on Energy and Natural Resources gave the following description of the fish and wildlife resources of the region and noted one of the reasons for doing a regional management plan:

1. U.S. Census 1980

COOPERATIVE STUDY REGION

Map 1



"Bristol Bay is one of the most biologically productive marine areas in the world. It is a feeding area for millions of seabirds, thousands of marine mammals and countless other marine species. The estuaries that line its shores serve as staging areas for millions of migrating waterfowl. The many rivers and streams that flow into the Bay provide the spawning grounds for 16 percent of the world's red salmon, a fish of national and international significance as well as one of great value to the Alaskan economy.

"The red salmon alone would justify refuge status for much of the Bristol Bay drainage, but the lands are rich in other wildlife as well, particularly on the Alaska Peninsula where caribou, moose and brown bear abound. Establishing refuges on the public lands, however, will not by itself ensure the protection of fish and wildlife habitat.

"The migratory species--be they salmon, birds or caribou--will pass through the waters and lands of the peninsula ignorant of the fact that they are crossing man's boundary lines."[1]

The committee also recognized the region's potential for other resources such as oil, gas, and minerals, and added "economic development in an environmentally sound manner"[2] as one other reason for doing a regional plan.

Section 1203 of ANILCA expressed the intent of Congress that a "comprehensive and systematic cooperative management plan" be prepared for the Bristol Bay region. The purpose of the plan is

- to conserve the fish and wildlife and other significant natural and cultural resources within the region;
- to provide for the rational and orderly development of economic resources within the region in an environmentally sound manner;
- to provide for such exchanges of land among the federal government, the state, and other public or private owners as will facilitate the carrying out of the above purposes;
- to identify any further lands within the region that are appropriate for selections by the state under section 6 of the Alaska Statehood Act and this act;

1. U.S. Senate, 96th Congress, 1st Session, "Report of the Committee on Energy and Natural Resources, "United States Senate, together with additional views to accompany H.R. 39; Nov. 14, 1979; Report No. 96-413, 253.

2. Ibid., 254.

- and to identify any further lands within the region that may be appropriate for congressional designation as national conservation system units.

Section 1203 of ANILCA goes on to say that the plan is to identify the significant resources and the present and potential land uses in the region. It is also required to specify uses that may be permitted in each area within the region and the manner in which these uses will be regulated by the secretary of the interior and the state as appropriate. For the plan to take effect, it must be approved by the Secretary of the Interior.

Planning Organization and Participating Agencies

Study Group. ANILCA gives the Secretary of the Interior the responsibility for overseeing the development of the Regional Plan. The Secretary requested the Alaska Land Use Council, under its cooperative planning responsibilities (Section 1201 of ANILCA) to develop and recommend a plan to his office. The ALUC established the Bristol Bay Study Group (hereafter, ALUC Study Group) to be responsible for developing a proposed plan. Members of the ALUC Study Group, along with the organizations they represented, were:

- Lance Trasky: Alaska Department of Fish and Game
- Bill Beaty: Alaska Department of Natural Resources
- Borge Larson: Aleutians East Coastal Resource Service Area
- Dan O'Hara: Bristol Bay Borough Coastal Management Planning District
- Jerry Liboff: Bristol Bay Coastal Resource Service Area
- William Johnson: Alaska Federation of Natives
- Wayne Boden: U.S. Bureau of Land Management
- Jan Riffe: U.S. Fish and Wildlife Service

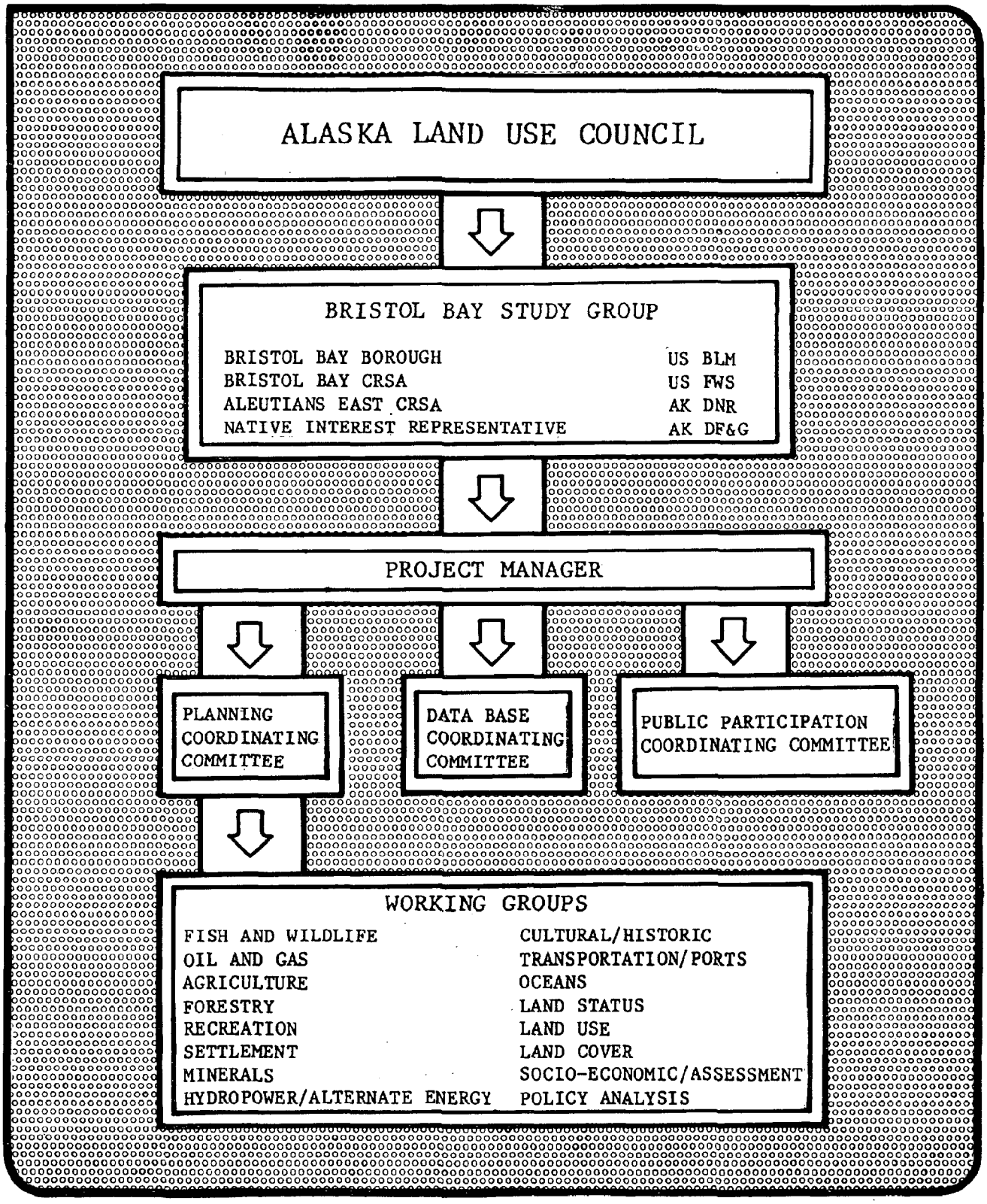
The ALUC Study Group developed an organizational structure and planning methodology for the plan. The organizational structure (Figure 1) shows three committees assigned the tasks necessary to complete the planning process (see Figure 2). Each of these committees included representatives from interested government agencies.

Public Participation Coordinating Committee. Public participation was a primary concern of the ALUC Study Group. The Public Participation Coordinating Committee was given the tasks of 1) informing the public about the plan and what it may accomplish; 2) defining the important public issues in the region so that a plan that was responsive to those issues within the purpose and intent of Congress could be developed; and 3) involving the public in the review of the plan. The issues defined in this process were used to organize the study.

Planning Coordinating Committee. The Planning Coordinating Committee was responsible to the ALUC Study Group for 1) helping

MANAGEMENT STRUCTURE

Figure 1



the Study Group develop its goals for use and conservation of the region's resources; 2) gathering and analyzing resource data; 3) developing land use alternatives to meet the goals; and 4) resolution of developing regional policies and management guidelines to guide potential conflicts between land uses. Setting goals and objectives, data gathering and analysis, and developing regional policies and management guidelines were facilitated by working groups consisting of state and federal agency experts concerned about particular issues. The Oil and Gas Working Group, for example, consisted of representatives from state and federal agencies and was responsible for gathering data on oil and gas as well as making initial recommendations on goals and objectives, alternative management schemes, and policies and guidelines for the development of resource. These recommendations were reviewed and modified by the Planning Coordinating Committee and sent to the ALUC Study Group, which again reviewed them and made revisions.

Data Base Coordinating Committee. The Data Base Coordinating Committee was responsible for 1) converting the large amounts of raw data into a format that could be analyzed by computers; and 2) working with the Planning Coordinating Committee and the working groups in computer-assisted resource analysis. This process resulted in a "computerized" data base for the Bristol Bay region that consists of geographic information about a variety of resources. This data base establishes a record that is time sensitive and must be updated as new information becomes available. It is expected that others, including the state coastal management programs and state/federal cooperative fire management program being developed in the area, will use this data base.

The following is a list of agencies and organizations that participated in preparation of the plan and a brief discussion of their responsibilities in the region.

Alaska Department of Natural Resources (DNR) is the state agency responsible for managing state-owned land and served as the lead state agency for developing the BBCMP. The department used its planning process to develop the area land use plan for state lands in the region.

Alaska Department of Fish and Game (ADF&G) is responsible for managing the state's fish and game resources. The department is expected to help in implementing the plan through its management policies and authorities as outlined in the States Area Plan.

Alaska Department of Community and Regional Affairs (DCRA), Municipal and Regional Assistance Division, is responsible for helping local communities and areas of the unorganized borough in developing state coastal management plans and other comprehensive planning programs.

Four state local coastal management districts that fall partly or completely within the plan area are at one stage or another of

developing or implementing local (state) coastal management planning programs. The four districts are 1) the Bristol Bay Borough, 2) the Bristol Bay Coastal Resource Area (CRSA), 3) the Aleutians East Coastal Resource Service Area (CRSA), and 4) the Yukon-Kuskokwim Coastal Resource Area (CRSA). The first three were members of the ALUC Study Group.

U.S. Fish and Wildlife Service (USFWS) manages four national wildlife refuges (Togiak, Alaska Peninsula, Becharof, and Izembek) that are entirely within the area and is developing detailed comprehensive conservation plans under ANILCA 304(g)(1) for each that should be consistent with the this plan as well as appropriate federal laws that direct Refuge Planning Content and Processes. Portions of two other refuges (Yukon Delta and Alaska Maritime) are within the region. The USFWS is also responsible for the management of migratory birds, endangered species, and certain marine mammals in the region. The service is the lead federal agency for the BBRMP and the E.I.S.

U.S. Bureau of Land Management (BLM), Anchorage District Office, is responsible for planning and management of BLM lands in the area. The BBRMP is designed to serve as BLM's Land Use Plan required under Section 202 of the Federal Land Policy and Management Act (1976) and will provide general guidance for management of the BLM lands and resources in the region. The BLM will use the BBRMP also as a guide to the ANILCA 1008 process for leasing and management of the subsurface mineral estate for federal lands within the region. All future BLM planning efforts or resource management activities are intended to be consistent with the BBRMP.

U.S. Minerals Management Service, Outer Continental Shelf Office (MMS-OCS) is responsible for managing the mineral rights in the outer continental shelf of the United States, which extends from three to two hundred miles offshore. Although the OCS manages no land in the area, their decisions about oil and gas lease sales in Bristol Bay and the Bering Sea may affect the region, making it logical that they participate in the plan.

U.S. National Park Service (NPS) manages three national park areas adjacent to the BBRMP area (Katmai National Park and Preserve, Aniakchak National Monument and Preserve, and Lake Clark National Park and Preserve). These lands were excluded from the Bristol Bay Regional plan by Congress but the park service has participated in various stages of the planning process. The NPS should help implement the BBRMP through land exchanges and cooperative agreements. The BBRMP makes recommendations for management or exchange of certain state and Native lands within the boundaries of national parks, preserves, or monuments in the area.

Native interests in the region include the Native regional corporations, village corporations, and local Native residents who are the largest private land owners in the study area. Native corporations are responsible for managing resources on

their land. Because decisions made in the BBRMP by neighboring federal and state agencies may have an effect on Native corporation lands, the Alaska Land Use Council requested that the Alaska Federation of Natives appoint a representative to the ALUC Study Group.

What the BBRMP Accomplishes

If the BBRMP is to effectively mesh the individual interests and responsibilities of those who will live and work under its guidance and within its parameters, it must establish common goals and achieve consensus on land and other resource uses in the region that will meet these goals. By doing this, the BBRMP should ensure that the plans and actions of individual land and resource managers are consistent with the agreed upon goals for the region. The BBRMP not only gives guidance for future actions, it also constitutes a body of consensus regarding certain issues.

Specifically, the approved BBRMP provides guidance on the following:

- State and federal lands that may be offered for sale (Chapter IV).
- State lands that may be put on the five-year oil and gas lease schedule (Chapter IV).
- Federal lands that may be offered for oil and gas leasing under ANILCA 1008 (Chapter IV).
- Additional guidance for USFWS refuge plans (Chapter IV).
- Proposed administrative addition to Wood-Tikchik State Park (Chapter IV and VI).
- State closure of streams and leasehold location for mining in certain areas (Chapter IV).
- Recognition of primary and secondary resource uses and management guidelines for state and federal lands (Chapter IV and V).
- The 11(a)(3) land selection dispute (Chapter VI).
- Reorganization of the refuges on the Alaska Peninsula (Chapter VI).
- Recommended classification of state lands (Chapter VII and Appendix C).
- Federal lands that may be opened to U.S. Mining Laws and the Mineral Leasing Act.
- Identification of transportation corridors (Chapter IV).
- Recommended fish and game research sites (Chapter IV.)
- Land exchanges to be pursued (Chapter VI).
- Land exchanges for future consideration (Chapter VI).
- Potential cooperative agreements (Chapter VI).
- Recommended state selections and relinquishments (Chapter VI).
- Additions to NWRs based on land exchanges (Chapter VI).
- Additions to the region's mineral resource availability through land exchanges (Chapter VI).
- Recommended state legislative additions to Wood-Tikchik State Park (Chapter VI).
- Recommendation for future studies (Chapter VII).
- Establishment of a DNR office in Dillingham (Chapter VII).
- Recommendations for the recognition of primary and secondary land uses and management guidelines on Native corporation and private lands (Private land owners are not legally bound by the plan) (Chapter IV).

- Land use recommendations for state and Native lands within the boundaries of national parks, preserves, or monuments (Chapter IV).

The National Mining and Minerals Act of 1970 charges the Federal government with a "continuing policy to foster and encourage private enterprise in the orderly and economic development of domestic mineral resources, reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security, and environmental needs" including "the reclamation of mined land, so as to lessen any adverse impact of mineral extraction and processing upon the physical environment that may result from mining or mineral activities. For the purpose of this Act 'minerals' shall include all minerals and mineral fuels including oil, gas, oil shale, and uranium." The BBRMP accomplishes the purposes of this Act by recommending that most land be opened to new mineral entry (including all minerals and mineral fuels) and to exploration in order to encourage development and to increase the knowledge of the region's resources. The BBRMP recognizes minerals as a primary use wherever mineral terranes are believed present and as a secondary use on all remaining public lands excluding those areas closed by Federal or State law. Where the oil and gas potential is ranked high (specific to Bristol Bay) it is recognized as a primary use on State and Native lands. Where it is identified as moderate, it is recognized as a secondary use on State, Native and BLM lands. Where oil and gas occurs on national wildlife refuges, oil and gas is recognized as a secondary use.

The BBRMP meets the mineral leasing and management requirements of ANILCA Section 1008. Certain Federal lands may be opened to the Mineral Leasing Act of 1920 subject to consideration of the guidance in the BBRMP and the compatibility determination of the comprehensive refuge plans. Site specific environmental analyses is required before on-the-ground activities are permitted. These analyses should involve further interagency and local coordination as applicable.

To comply with ANILCA Section 810, which addresses subsistence use, Chapter 9, ANILCA Section 810(a) Evaluation of the BBRMP analyzes the proposed land use classification and allocations, policies and guidelines on Federal lands in terms of:

- The effects of the decisions on subsistence uses and needs;
- The availability of other lands for the purposes sought to be achieved; and
- Alternatives which would reduce or eliminate the use, occupancy or disposition of public lands needed for subsistence purposes.

This analysis is found in Chapter 8, Environmental Consequences.

Planning Process

The first step in developing the BBRMP was to recognize the intent of Congress with respect to national issues and identify local issues of concern to the public and agencies in Alaska as well as the study region so that the plan could address them. This was done by an initial legislative historical review and then at a set of local public meetings. Identified issues all related to natural resources and how best to use or allocate those resources. Preservation of fish and wildlife resources and their habitat was a major concern of all participants in the BBRMP as well as Congress. Local people agreed with Congress and were concerned that fish and wildlife resources be protected while allowing for the exploration and development of other resources such as oil and gas, minerals, and alternative energy sources. Analysis by the ALUC Study Group determined that the plan could address all the significant issues by focusing on the following major resources and land uses;

- Fish and Wildlife
- Oil and Gas
- Minerals
- Recreation
- Transportation
- Alternative Energy
- Settlement
- Agriculture
- Forestry

Resource Management units. Because of its size and the uneven distribution of similar resources and land uses within it, the region was divided into management units to allow more reasonable land use planning and management recommendations to be made. The plan alternatives presented in Chapter IV reflect the importance of these units in the planning process. A brief description of how these units were defined and delineated, is helpful in understanding these alternatives.

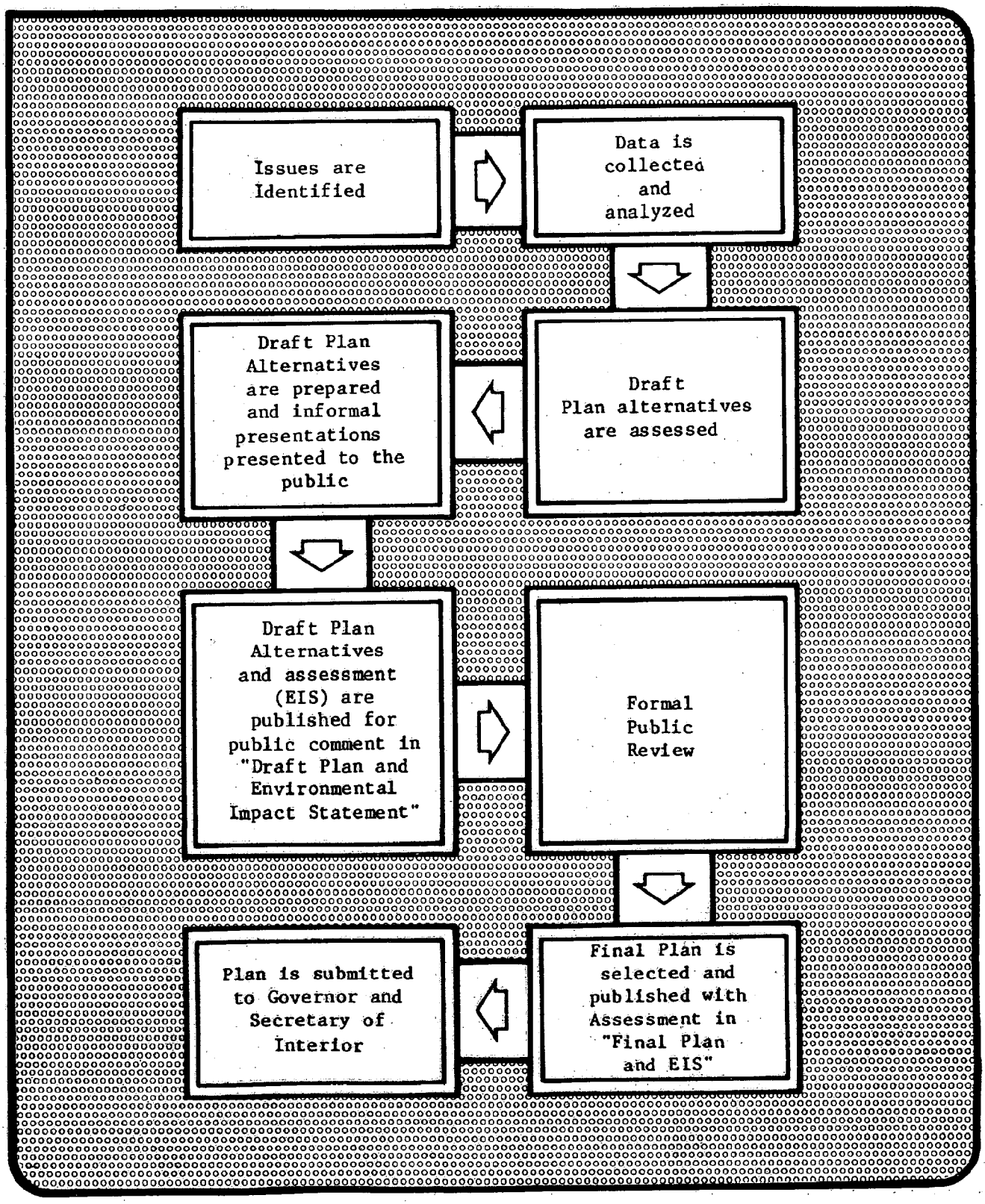
Resource Management units were formed on the basis of river drainages, since these are basic physiographic units and are usually ecologically distinctive. In addition, most communities in the region are located on the coast at the mouths of rivers or along rivers whose drainages provide the main focus for commercial and subsistence activities for local residents.

Once watersheds were mapped, overlays were prepared illustrating the distribution of the various resources, resource potential, land use, and land status. This provided the basis for defining smaller geographic units or making resource management unit boundary adjustments. Few modifications were necessary.

Two units were divided into subunits. Unit 1, consisting of state tide and submerged lands out to the three-mile limit, contains six subunits. These were established because of eco-biological considerations and the State Bristol Bay Fisheries

THE PLANNING PROCESS

Figure 2



Reserve. Unit 20 consists of two subunits, one on each side of Aniakchak National Monument and Preserve.

The following additional criteria were used in creating resource management units:

- Units are generally from 100,000 to one million acres in size.
- Units are generally geographically homogeneous.
- Within each unit, resource values are generally similar.
- Large waterbodies are not partitioned, except in Unit 1, 11 and 12, which bisect Iliamna Lake.
- All portions of a management unit are contiguous.
- Selected State tidelands are included in upland management units, rather than in Management Unit 1.

Resource elements. Base data were gathered and analyzed for agriculture, forestry, minerals, oil and gas, fish and wildlife, settlement, transportation, alternative energy, and recreation. The potential for each resource was determined and used to develop plan alternatives and allocation/classification or management strategies. Where Congress left responsibility for determining allowed uses to the Regional Plan, each resource, except settlement, has its maximum potential represented in one of the alternatives.

Regional Strategies. The ALUC Study Group developed goals and guidelines for each resource to indicate what the plan needed to achieve and how it would be done. The guidelines are detailed in order to assist State, Federal and private land or resource managers, within the discretion allowed each by law or other constraint, to maintain some regional consistency in resolving conflicts between certain land uses.

Alternatives. There are usually several possible ways of reaching resource development and conservation goals. The ALUC Study Group was generally able to agree on the best approach in managing certain lands. This occurred 1) when there were limited possible uses for a unit; 2) when one value was regarded as particularly and obviously of highest importance; or 3) when it was possible for more than one use to occur in an area without undue conflict. In other cases, difficult decisions were made, and some conflicts not easily resolved. The unresolved conflicts required that alternative solutions be developed and public comment sought before a final recommendation was made to the ALUC and the Secretary of the Interior.

Alternative assessment. To fulfill the requirements of the National Environmental Policy Act (NEPA) and to assist decision makers and the public in evaluating environmental impacts of plan alternatives, the development of an Environmental Impact Statement was part of the planning process. The environmental consequences portion of this plan (Chapter VIII) evaluates the impacts of alternatives on selected biological, social, economic, and cultural resources of the region that were identified as

being particularly important during public involvement and scoping. Hypothetical scenarios are presented in Chapter VIII strictly as a basis for impact assessment.

Organization of the Document

The purpose of this document is to present the BBRMP and its five alternatives to the Secretary of the Interior as required by ANILCA. This document reflects the changes approved by the ALUC and the Assistant Secretary, Fish, Wildlife and Parks. The plan is a modification of the Proposed Plan made available for public review and comment from April to June, 1984.

This introduction, which is Chapter I, includes an explanation of why the BBRMP is necessary, how it was developed, and how it is presented.

Chapter II presents an overview of the environment of the region. It focuses on existing landownership which are extremely dynamic and land use. It provides summaries of area resource inventories and this analyses.

The major issues and concerns used to organize the BBRMP are presented in Chapter III. These issues and concerns were identified by various State and Federal agencies and the national as well as local public during public meetings held at the beginning of the planning process in late 1981 and early 1982; they are discussed in more detail in a separate volume entitled Bristol Bay Compendium of Issues, published by the ALUC, April 1, 1982.

Chapter IV contains the proposed plan and alternatives considered for management of the lands and resources in the region. This Chapter also includes a detailed description of the plan for each of the 31 resource management units.

Chapter V presents the plan strategies that were developed using guidance provided by ANILCA and public comments. Goals and guidelines are written for each resource.

Chapter VI details the land pattern modifications that the plan is recommending. These take the form of land exchanges between various participants, state land selections, or additions to or alterations of conservation system units.

Chapter VII describes how the plan should be implemented. It discusses administrative and legislative actions that should occur if the BBRMP is to take full effect, suggests studies and analyses that are necessary, and provides guidance on how the plan should be revised.

Chapter VIII presents an assessment of the impacts of alternatives on the physical, biological, and human environments. These assessments are based, in part, on hypothetical scenarios of future resource use patterns.

Chapter IX is the ANILCA Section 810(a) evaluation of impacts on subsistence prepared by the USFWS and USBLM.

The appendices are important in understanding the management alternatives and how they were formed. Appendix A of the plan and EIS contains maps of each plan alternative and the fish and wildlife resources in the region. These maps present important resource data and also illustrate specific habitats referenced in the plan guidelines that appear in Chapter V. The Fish and Wildlife maps should be reprinted as part of an implementation document following adoption of the plan.

Appendicies B,C,D,E,F and G are bound in a separate document.

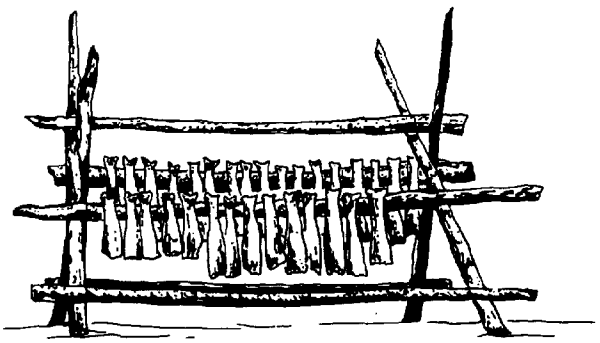
Appendix B contains a list of all papers and publications prepared as part of the BBRMP process. Recommended State land classifications are shown in Appendix C. Appendix D is a list of those individuals who prepared the document. Appendix E contains Section 1203 of ANILCA, and Appendix F is the bibliography.

Appendix G documents the coordination and consultation process. Appendix G also contains a summary of major issues raised at public meetings and in letters from the public regarding the Draft Plan and EIS and response to those issues. Copies of letters are also included.

A list of access sites identified by ADF&G and a list of ADF&G research and management sites are bound and distributed separately from this document and are available through the Alaska Department of Fish & Game, 333 Raspberry Road, Anchorage, Alaska 99504.

CHAPTER II

Affected Environment of the Bristol Bay Area



CHAPTER II

Affected Environment of the Bristol Bay Area

This chapter is a general discussion of the environment and resources of the 31 million acre Bristol Bay regional planning area. More detailed resource inventory data can be found in the publications and papers prepared as background material for the BBRMP listed in Appendix B.

Physical Environment

Topography. The Bristol Bay region's topography is extremely varied, extending from the coastal lowlands of Kuskokwim Bay on the Bering Sea to the Kilbuck and Ahklun mountains, whose summits rise to 2,000-5,000 feet. From these mountain ranges, which are separated by broad, flat valleys, lying in a northeast/southwest alignment, the Togiak River and its tributaries flow south into Bristol Bay, and the Kanektok and Goodnews rivers drain west into Kuskokwim Bay.

The Wood River-Tikchik Lakes system is composed of long, narrow glacial lakes separated by steep-walled mountains ranging in elevation from 3,000 to 5,000 feet. The lakes and rivers of this area drain into Bristol Bay via the Wood, Nuyakuk, and Nushagak rivers.

The Nushagak Hills, Taylor Mountains, and Big River Hills are low, rolling hills that form the northern border of the region. These hills and the Alaska-Aleutian Mountain Range within Lake Clark National Park and Preserve surround the Nushagak and Kvichak river basins, which drain into Bristol Bay. The Nushagak River basin is broad and relatively flat, containing many ponds and lakes that increase in number nearer the coast. The Kvichak River drains Iliamna Lake and all of its tributaries. Iliamna Lake is the largest lake in Alaska, 80 miles long by 20 miles wide.

The Alaska Peninsula consists of coastal lowlands on the Bristol Bay side, from which the terrain rises into the Aleutian Mountains on the Pacific Ocean side. These coastal lowlands are dotted by thousands of small ponds and lakes and laced with rivers that meander into extensive estuaries as they meet Bristol Bay. Naknek, Becharof, Upper Ugashik, and Lower Ugashik lakes are four large bodies of water on the northern peninsula. The peaks of the Aleutian Mountains generally average from 1,000 to 4,000 feet but occasionally rise to volcanic peaks such as Mount Chiginagak (6,900 feet), Mount Veniaminof (8,225 feet), and Mount

Pavlof (8,261 feet). Several other active and inactive volcanoes are also found along the peninsula. The rivers and streams flowing into the Pacific Ocean are generally short and steep, emptying into small bays. The Pacific shoreline is very rugged, with many steep cliffs and offshore spires and islets.

Unimak Island, separated from the Alaska Peninsula by the narrow but treacherous waters of False Pass, is dominated by five volcanoes, including Shishaldin Volcano (9,387 feet) and Isanotski Peaks (8,025 feet). To the west of Unimak Island, Unimak Pass, a deep 10-20 mile wide strait between the Pacific Ocean and the Bering Sea, provides passage for fish, marine mammals, waterfowl, and seabirds, as well as for commercial vessels.

The entire Bristol Bay region arcs around the bay for which it is named, a large and relatively shallow indentation of the Bering Sea. The northeastern reaches of the bay are especially shallow and characterized by extensive tideflats in Nushagak and Kvichak bays.

Geology. Like most of Alaska, the continental landmass of the Bristol Bay region, which includes the Bering Sea shelf and extends southward to the Aleutian Trench, was created by continental drift. Over the past 200 million years, successive pieces of the earth's crust have drifted and accreted to North America, forming the Alaska Peninsula into a kind of continental appendage.

Bedrock, exposed in the Ahklun Mountains, is a jumbled mixture of oceanic crust, basalt, cherty limestone, graywacke, deep crustal rock, and "blueschist"; around Thumb Mountain, it is composed of exotic two billion year-old volcanic breccia, graywacke, and claystone. More recent granitic intrusions are scattered throughout the northern part of the study area, and young lava flows floor the Togiak River Valley.

Foundational rocks of the Alaska Peninsula are obscured, but 400 million year-old limestone in the northern parts of Becharof National Wildlife Refuge indicate the basement to be continental crust, "attached" to the continent about 160 million years ago. At that time, granite was intruded in a curved trend from the Alaska Range to Becharof Lake and, probably, offshore to the Pribilofs; sediments from the eroded granite comprise feldspar-rich sandstones and coal beds. Shales represent further sedimentation in a relatively stationary environment unaffected by continental drift, interrupted some 60 million years ago when volcanoes signaled a pulse of northward movement of the Pacific Plate. Tertiary sediments subsequently formed, with carbonaceous layers, most abundantly on the Bering Sea side and offshore from the mainland. About 10 million years ago the northward movement and subduction of the Pacific Plate along the Aleutian trench apparently accelerated, resulting in the massive outpourings of volcanic rocks that formed the beginning of the present day Aleutian Range.

The Alaska Peninsula and Aleutian Islands chain comprise an area of considerable volcanic and tectonic activity. The Alaska Peninsula has 10 volcanoes that have erupted during historic times and 11 more that are considered to be active. One of these is Novorupta crater in Katmai National Park and Preserve, which erupted in 1912 in the largest volcanic explosion during historic times in North America. There are also six active volcanoes on Unimak Island (Selkregg, 1976). Excluding eruptions in Katmai National Park, 74 volcanic eruptions have been recorded since 1775 on the Alaska Peninsula and Unimak Island. The most active volcanoes in this region in recent years have been Pavlof Volcano, located between Pavlof Bay and Cold Bay, Shishaldin Volcano on Unimak Island, and Mount Veniaminof northwest of Perryville.

Earthquakes are another major geologic phenomenon in Bristol Bay. Tectonic activity along the Alaska Peninsula and Aleutian Islands chain is extremely high. The Aleutian trench, one of the most active seismic belts in the world, parallels the south side of the Alaska Peninsula and Aleutian chain offshore in the Pacific Ocean. The Bristol Bay study region falls within the major seismic zones of Alaska; structural damage caused by earthquakes can be great. Earthquakes of magnitude 6.0 or greater on the Richter scale have been recorded and can be expected to occur in this region in the future.

In studies by Davis and Jacob (1980) and Davies et al. (1981), a segment of the Aleutian arc near the Shumagin Islands south of the Alaska Peninsula was identified as a seismic gap. Using historic and current seismicity data, strong motion accelerograph data, geodetic tilt data, and volcanic activity data, these studies concluded that this is likely to be the site of one or more great (magnitude greater than or equal to 7.75) earthquakes within the next several years or few decades. Because of the high potential for a very great earthquake along the south side of the Aleutian arc, there is a possibility of very strong ground motion and local tsunami heights of approximately 30 meters (Davies, 1981).

Minerals. The potential for mineral development (metallic and coal) in Bristol Bay is largely unknown. For three areas within the region data has been compiled that indicates some minerals may be present. Map 2 shows mineral terranes in Bristol Bay. A mineral terrane is an area or surface over which a particular rock or group of rocks is prevalent and that could contain associations of certain mineral deposits. The northwest portion of the region, Togiak National Wildlife Refuge and the Goodnews Bay area, especially from the Ahklun Mountains west to Kuskokwim Bay, have favorable mineral terranes and known deposits of gold, platinum, and chromium. Presently, Goodnews Bay and Nyac have the only producing mines in the region. The Goodnews area boasts the largest placer platinum mine in the United States. An active placer gold mine operates at Nyac. Historically, most mining activity in the region involved small placer findings. The mountainous areas around eastern Iliamna Lake show potential

mainly for gold, silver, tin, copper, and molybdenum lode type deposits. This potential is based on historical deposit information and limited exploration activity. Mineral potential also exists in the mountainous areas of the Alaska Peninsula. Mineral terrane and chemical anomaly data indicate potential for finding copper, gold, molybdenum, lead, and zinc lode type deposits throughout this area. Bituminous coal resources are known to exist in the mountainous areas of the Alaska Peninsula, in the Chignik area, and from Port Moller to Pavlof Bay. In the past, this coal has been used by the local people for space heating.

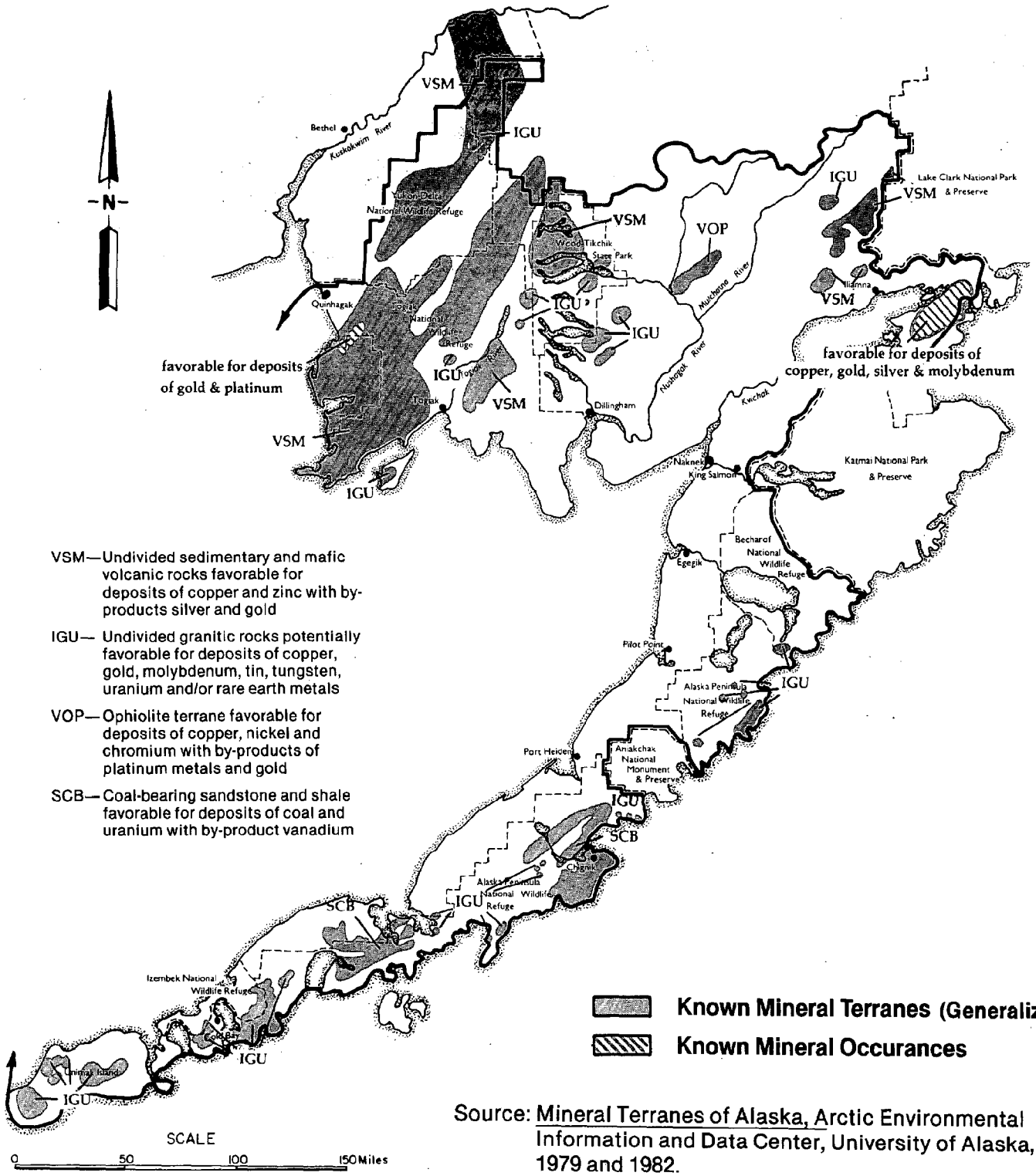
For the remainder of the area, extremely limited data is available to assess the presence of minerals. In fact, exploration for minerals has been minimal in the entire study region. The United States Geological Survey (USGS) has initiated a study of mineral potential on approximately 8.5 million acres of NWR lands legislatively closed to new mineral entry located in areas with historical indicators of mineral presence (the mountains of the Alaska Peninsula and the area of the Ahklun Mountains and westward). More exploration and data collection are needed within the Bristol Bay region before adequate mineral resource developmental potentials can be determined.

Oil and gas. Two oil and gas provinces within the Bristol Bay area have some potential for exploration and possible discovery and development. These are the Bristol Bay Tertiary and the Alaska Peninsula Mesozoic Provinces. Twenty-six wells were drilled at various locations on the Alaska Peninsula between 1903 and 1981 and, while many had oil and/or gas shows, all were plugged and abandoned. The map of oil and gas potential (Map 3) was based on a 1976 assessment of the relative oil and gas potential for all lands within Alaska. The rankings of oil and gas potential shown on this map are specific to the Bristol Bay region. Areas showing the highest potential on this map would, on a statewide scale, be rated as moderate meaning the area has potential for an oil or gas discovery. On a statewide scale, areas like Prudhoe Bay and Cook Inlet receive a rating of high. An assessment in 1982 of the latest data by the Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys, concluded that Bristol Bay lands tend to be gas prone, with any deposit about twice as likely to be gas as oil; however, only small quantities of either resource are considered likely to be present.

Most data indicate that the highest potential for discoveries of oil and gas within the region are in the state-owned tide and submerged lands and adjacent upland areas on the Bristol Bay side of the Alaska Peninsula. The oil and gas basins found in upland areas continue offshore under the state-owned tide and submerged lands and into the federal Outer Continental Shelf (OCS). The National Petroleum Council (December 1981) estimates of undiscovered potentially recoverable hydrocarbons in the St. George Basin show a 47% chance of finding 1.2 billion barrels of oil or 5.6 trillion cubic feet of natural gas, and in the North

Minerals Element

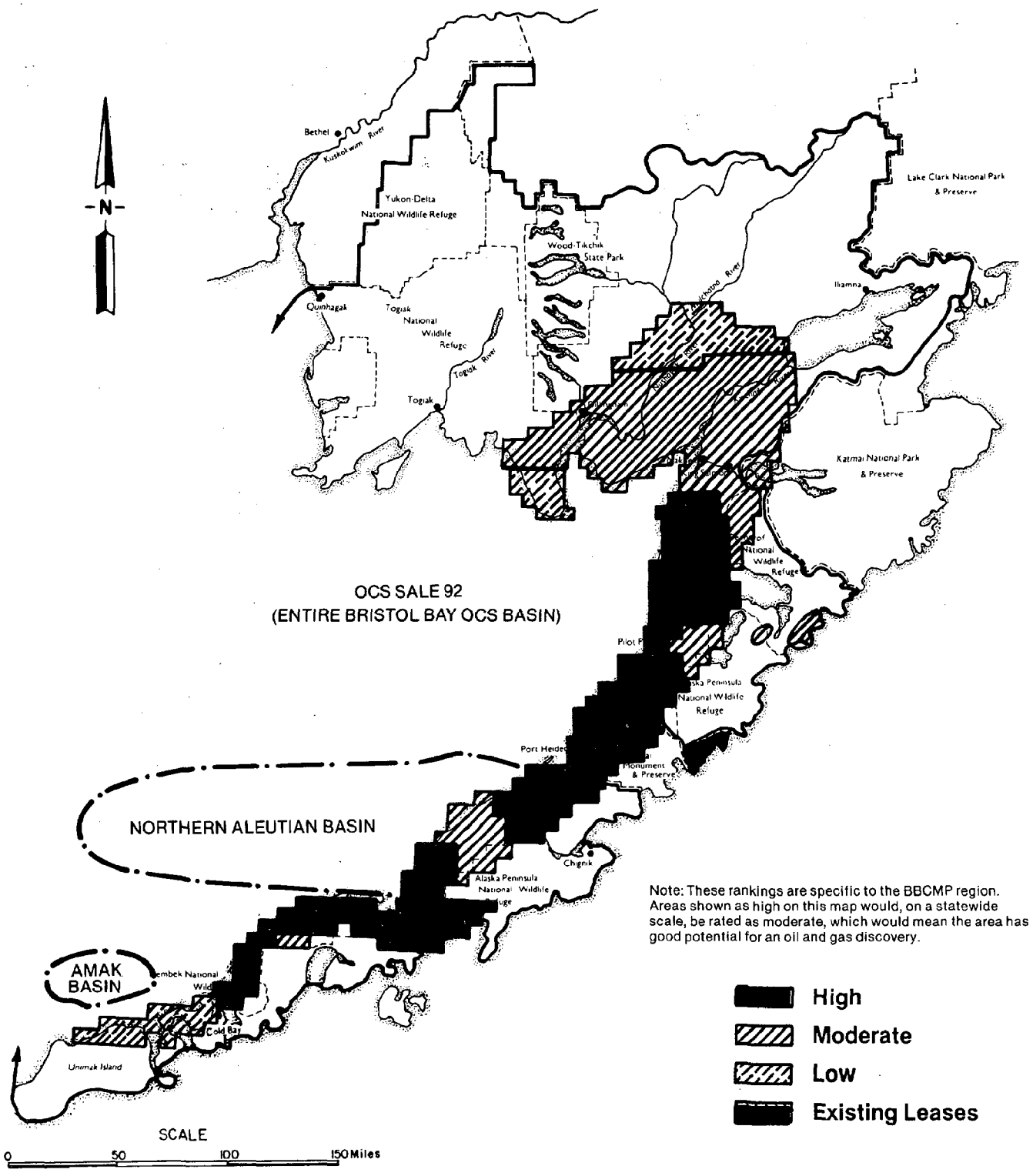
Map 2



Source: Mineral Terranes of Alaska, Arctic Environmental Information and Data Center, University of Alaska, 1979 and 1982.

Oil & Gas Potential

Map 3



Aleutian (Bristol) Basin 47% chance of finding 0.6 billion barrels of oil and 3.9 trillion cubic feet of natural gas. The USGS estimated that the St. George Basin OCS sale area northwest of Unimak Island may hold 1.1 billion barrels of recoverable oil and 3.7 trillion cubic feet of natural gas. These estimates, although based on very limited data, illustrate that there is potential for oil and gas discoveries in the OCS.

Climate. The climate of the Bristol Bay region includes three climatic zones: maritime, continental, and transitional.

The maritime zone includes coastal areas and islands on the south side of the Alaska Peninsula and offshore islands. Average annual precipitation in this zone ranges from 20" to 70" but may be as little as 13" for a leeward, coastal location. The north sides of the Alaska Peninsula are leeward, since most precipitation-producing winds come from the south. Much of the moisture in this northward-flowing air is deposited on windward slopes of the Aleutian Range before reaching leeward coastal villages. Average maximum summer temperatures are in the mid-50's and drop to minimums in the mid to low 20's in winter. Coastal observation sites on the mainland experience a much greater range of extreme temperatures than do island locations. Surface winds in the maritime portion of this region average between 10-20 knots, but extreme winds can approach 100 knots. The maritime zone of Bristol Bay is often cloudy and exposed to frequent storms.

The continental climate zone includes most of the northern and interior parts of the region. It is characterized by relatively warm summers, cold winters, and less precipitation than in the maritime zone. Average annual precipitation is usually less than 20". Average maximum temperatures are in the upper 60's, with winter temperatures between -20° and +6°F. Surface winds are lighter compared to coastal areas, but channeling through mountain valleys results in narrow bands of strong winds in some local areas.

Transitional zone weather, as the term implies, modulates between the maritime and continental zones; its temperature, precipitation, and wind conditions are intermediate to those of the other two zones. Most of the coastal areas along Bristol Bay are in this transitional zone. Temperature extremes most resemble those of the continental zone, while the amount of precipitation and surface winds range between the two, including channeled winds.

Water resources. Bristol Bay and its associated bays, estuaries, and tidelands are among the most productive waters in the world. Tides in the shallow bay are influenced by the strong Bering Sea currents, and a significant portion of the bay's water is exchanged daily. In addition, the many freshwater systems that discharge into the estuary bring with them a rich nutrient load. Only the brackish coastal inner bay, which is more estuarine than oceanic in nature, is actually within the Bristol Bay study area.

Freshwater systems of the area include the following river systems: Nushagak/Mulchatna, Kvichak (which includes the Newhalen River, Iliamna Lake, and Lake Clark), Kanektok, Goodnews, Togiak, Naknek, Egegik (which includes Becharof Lake), Ugashik, Cinder, Meshik, and Chignik. Iliamna, the largest lake in Alaska, has a surface area of 1,115 square miles. Other major lakes include Becharof (450 sq. mi.), Naknek (239 sq. mi.), Upper and Lower Ugashik Lakes (160 sq. mi.), and Lake Clark (143 sq. mi.).

The availability and quality of groundwater varies considerably by location because of the poor reservoir materials in much of the study area and the permafrost in the northern areas. Coastal groundwater is usually highly saline.

Biological Resources

Vegetation

Over 56% of the uplands in the Bristol Bay area is covered by shrub/grass, open heath or grass, or lichen shrub tundra. Another 10% of the area is vegetated by miscellaneous deciduous vegetation such as birch, cottonwood, and tall, low, or dwarf willow. Most of the areas of forest (less than 5% of uplands) occur along major lakes and rivers in the Nushagak-Wood River drainages and in the eastern Iliamna Lake and Lake Clark drainages. Common species include black spruce, white spruce, quaking aspen, balsam poplar, and white birch. Another 7% of the area is marsh/very wet bog or wet bog/meadow. The remaining uplands are lichen or snow covered, barren or indeterminate at this time.

A detailed land cover inventory was conducted for the plan and is discussed in a report entitled Users Guide for Bristol Bay Land Cover Maps (Wibbenmeyer, et al.).

Fisheries

Major nearshore and freshwater species are: Pacific herring (Clupea harengus pallasi); five species of salmon: sockeye (red) (Oncorhynchus nerka), coho (silver) (O. kisutch), chum (dog) (O. keta), chinook (king) (O. tshawytscha), and pink (humpback) (O. gorbuscha); and several freshwater species: arctic char (Salvelinus alpinus), lake trout (S. namaycush), Dolly Varden (S. malma), rainbow trout (Salmo gairdneri), and arctic grayling (Thymallus arcticus).

Herring. Pacific herring move into coastal waters of the Bristol Bay study area between late April and early June to spawn. Rock lined intertidal and shallow subtidal areas interspersed along the Bering Sea and Pacific Gulf of Alaska shores of the study area generally serve as spawning areas, especially if rockweed or

eelgrass is present. The most productive spawning region within the study area is located between Tvativak Bay (just east of Kulukak Bay) and the east side of Togiak Bay. Both adult and juvenile herring are thought to remain in waters within 30 to 35 miles of the coast through late summer to feed on phytoplankton blooms. In August and/or September they begin migration back to wintering areas over the continental slope.

Commercial harvests of herring in Bristol Bay have been strong since the mid 1970's whereas the Pacific shore fishery began its resurgence at the end of the decade. The 1981 exvessel value for Pacific herring in the Togiak Fish District alone was $4.2 million. For the study area as a whole, the 1981 ex-vessel value was in excess of $6.3 million dollars. In addition to its economic value, herring are an important prey for marine mammals, birds, and groundfish.

Salmon. Bristol Bay is world-famous for sockeye (red) salmon with as many as 62 million salmon returning annually to the lakes and rivers of the region. They spawn and spend their early life in the rivers and lakes, principally in the Togiak, Nushagak, Kvichak, Naknek, Egegik, and Ugashik river drainages. Smaller runs occur in drainages along the Alaska Peninsula and north of Cape Newenham. Sockeye salmon generally spawn in freshwater lakes and their tributaries, and the juvenile fish spend their first years in these lakes before migrating to the ocean, where they mature. They return in large numbers to spawn and die in the natal waters in which they originated. The annual migration of sockeye salmon up the coast of the Alaska Peninsula and into the rivers and lakes of Bristol Bay occurs primarily in June and July and is the basis for most of the region's fisheries and economy. The Kvichak River, with headwaters in Iliamna Lake and Lake Clark, is the largest producer of sockeye salmon in the world. The Wood and Nuyakuk rivers also support sizable runs of sockeye salmon, with the Alagnak and Igushik rivers supporting smaller runs. King salmon are found chiefly in the Kanektok, Nushagak, Egegik, Alagnak, Naknek, Togiak, Kvichak and Ugashik rivers. They generally use larger river systems for spawning. Chum, pink, and coho salmon are distributed throughout most of the Bristol Bay streams. The Nushagak and Togiak area streams are the major producers of coho and chum salmon. Streams in the Nushagak River area are the major producers of pink salmon, with occasional strong runs to streams and rivers of the Naknek-Kvichak area. A map of anadromous and fresh water fish streams is included in Appendix A (Map 1).

All five species of Pacific salmon are harvested for commercial and subsistence use in Bristol Bay. The Kvichak system is extremely cyclic in sockeye salmon abundance. The large peak years, spaced five years apart, are separated by years of low production. Presently, the cycle peak is occurring on a four to five year basis (i.e., 1965, 1970, 1975, etc.). Pink salmon are also extremely cyclic and are present in large numbers during only even years.

Arctic char and Dolly Varden. These two separate species of char are both present in streams throughout the Bristol Bay area. They are quite similar in their distribution. Typically, they both inhabit all of the clear freshwater lakes and river systems as well as the glacial streams and brackish intertidal areas of the region. The distributions of these two fish may change from year to year because of high or low water and stream channelization.

Trout. Lake trout are found in a number of deep, oligotrophic (nutrient poor) lakes in the mountainous regions bordering Bristol Bay, and in the tributaries and outlet streams of these lakes. They have also been seen occasionally within the intertidal reaches of the Naknek River. Rainbow trout are native to the area and are found in every major drainage north of Becharof Lake. They occasionally venture into the glacial headwaters of lakes on the Alaska Peninsula. The rainbow trout of the Iliamna Lake and Wood-Tikchik regions attract recreational anglers from around the world. Steelhead, an anadromous rainbow trout, are rare in the Bristol Bay area and are present in only a limited number of stream systems south of Port Heiden.

Arctic grayling. Populations of grayling are found in Bristol Bay drainages from Cape Newenham, on the north of Bristol Bay, to Port Heiden, on the Peninsula. Grayling prefer fairly cold, clear water. The world record arctic grayling caught by hook and line was caught in the Ugashik Narrows of the Ugashik Lakes. Their habitat includes both lakes and flowing waters of various sizes. The eastern region of the Bristol Bay watershed appears to be marginal grayling habitat, as only occasional grayling have been seen there.

Major offshore fish and shellfish resources. Offshore fish include halibut (Hippoglossus stenolepis), sole (various spp), flounder (various spp), and capelin (Mallotus villosus). Shellfish include cockles, softshell, butter, and razor clams; king (Paralithodes camtschatica), tanner (Chionoecetes bairdi), and dungeness (Cancer magister) crabs, and shrimp (Pandalus and Pandalopsis spp).

Halibut are found throughout Bristol Bay. About mid-October they begin moving out of the bay to wintering and spawning grounds, to return in late spring. The entire Bristol Bay area lying east of a line from Cape Sarichef to 57° 15'N, 170°W and then to Cape Newenham has been designated a halibut nursery area by the International Pacific Halibut Commission and is closed to halibut fishing. Sole and flounder occur throughout the bay but are found in large numbers only at the outer reaches of the bay area. Large numbers of capelin have been reported spawning along the northern Alaska Peninsula and near Togiak. Cod are found throughout the bay, but large numbers are found only far offshore near the Bering Sea.

An extensive clam bed of mixed species extends from Port Moller to Ugashik Bay and is estimated to contain as much as 335,000

metric tons of harvestable clams. The general area of maximum abundance for king crabs extends up to 100 miles offshore between Unimak Pass and Port Heiden, on the north side of the Alaska Peninsula. On the south side of the Alaska Peninsula, smaller populations may be found along the western half. Inshore and nearshore waters appear to be the primary spawning and rearing areas. After spawning, they migrate further offshore to deeper water to feed. Tanner crabs inhabit the entire continental shelf south of the Alaska Peninsula from the nearshore zone to a depth of about 260 fathoms. Dungeness crab are found in waters both north and south of the Alaska Peninsula, generally in depths less than 50 fathoms. They tend to concentrate in protected bays and inlets at depths less than 10 fathoms. Shrimp are distributed along the continental shelf. Specific areas of known concentrations are Ivanof, Perryville, Mitrofania, Kuiukta, Chignik, Kujulik, Aniakchak, Nakalilok, Stepovak, Beaver, Pavlof, and Morzhovoi bays, in Unga Strait, and around Sanak Island and the Shumagin Islands.

Birds

Bristol Bay not only provides rich marine life to support millions of seabirds and other waterbirds; it also affords them protected nesting sites. Its productive coastal lagoons and estuaries support large concentrations of migrating waterfowl and shorebirds every spring and fall. Fall numbers are particularly high, since the birds stage in many of the estuaries on the north side of the Alaska Peninsula. Many species congregate in Bristol Bay to molt.

Seabirds. Much of the Bristol Bay coastline and the Pacific side of the Alaska Peninsula provide excellent nesting habitat for approximately two million seabirds in 98 different colonies. Ninety percent of these birds nest on the north side of the bay. Major colonies occur at Cape Newenham, Cape Peirce, Shaiak Island, Amak Island, Puale and Dry bays, and the Walrus Islands. An additional 8-13 million non-breeding seabirds come to feed on the abundant plankton and fish in the summer. Map 4 in Appendix A shows marine bird nesting areas as essential habitat.

Over 70% of the seabirds breeding in Bristol Bay are murres (1,400,000 birds, 20% of all murres in Alaska); most of these are common murres (Uria aalge) , but thick-billed murres (Uria lomvia) are also abundant. Other common breeders are black-legged kittiwakes (Rissa tridactyla) (400,000 birds, 22% of the Alaskan population); tufted (Fratercula cirrhata) (100,000) and horned (Fratercula corniculata) (7,000) puffins; pelagic (Phalacrocorax pelagicus) (16,000), red-faced (Phalacrocorax urile) (5,000) and double-crested (Phalacrocorax auritus) (2,000) cormorants; glaucous-winged gulls (Larus glaucescens) (40,000); pigeon guillemots (Cepphus columba) (2,000); and parakeet auklets (Cyclorrhynchus psittacula) (3,000). Seventeen hundred Aleutian

terns (Sterna aleutica) breed in Bristol Bay, representing about 17% of the entire population of this rare and endemic species.

Waterfowl. Millions of waterfowl and shorebirds transit Bristol Bay twice annually as they migrate from wintering areas all over the Pacific, North America, and Asia. Birds from the North American Pacific flyway and several Asiatic routes funnel through Unimak Pass and the rich coastal environment of Bristol Bay on their way to and from nesting grounds. Izembek and Nelson lagoons; Port Moller; Port Heiden; Ugashik, Egegik, Nanvak, Chagvan, Goodnews, and Jacksmith bays; and Hagemeister Strait provide plentiful food, particularly eelgrass, and protected rest areas for migrating ducks and geese. Waterfowl habitats are identified on map 4 in Appendix A. The waterfowl map shows waterfowl nesting areas and spring and fall concentration areas as essential habitats, and high to moderate use areas as important waterfowl habitats.

With approximately 12,000 tundra (whistling) swans (Cygnus columbianus) (17% of the Alaska population), Bristol Bay is the second most important swan breeding area in Alaska, after the Yukon-Kuskokwim Delta.

Up to 100,000 snow geese (Chen caerulescens), about 40% of the Alaska population, migrate through Bristol Bay, primarily in the fall. Principal staging areas are the Egegik, Ugashik, and Cinder river estuaries. Emperor geese (Chen canagica) winter in bays and estuaries from Port Moller west through the Aleutian Islands. Most of the world's population of emperor geese, approximately 100,000 birds, transit the Bristol Bay side of the Alaska Peninsula. Important staging areas in spring and fall are Izembek, Nelson, Seal Islands, and Cinder River lagoons, and Port Heiden. Large numbers of white- fronted geese (Anser albifrons) breed in the upper reaches of the Kvichak, Nushagak, and Mulchatna river drainages. Many more stage during fall migration on the Nushagak River delta. In the spring, 25,000 white-fronted geese can be found in tidal areas at the mouths of the Naknek, Cinder, Egegik, and Ugashik rivers. Lesser Canada geese (Branta canadensis parvipes) stage in Bristol Bay coastal lagoons in the fall. Nanvak Bay, Ugashik Bay, Cinder River lagoon, Port Heiden, and Izembek Lagoon are the most important staging areas. Over 75,000 lesser Canada geese (30-35% of Alaska's population) use Izembek Lagoon every September and October. Nearly 100% (70,000) of the entire cackling Canada goose (Branta canadensis minima) population stages in Bristol Bay in the fall, primarily at Ugashik Bay, Cinder River, and Port Heiden. Most of the world's population of black brant (Branta bernicla nigricans) (133,000 birds) stage at Izembek and Moffet lagoons from September to November. Smaller numbers also use Ugashik Bay in the fall.

The wetlands of Bristol Bay are estimated to support the production of nearly 600,000 ducks each year. Over a million ducks migrate through the region in the fall. Bristol Bay also supports 18% (267,000) of Alaska's breeding population of diving

ducks and sea ducks. The deltas and bays of the Ugashik, Egegik, and Nushagak rivers are important diving duck habitat.

Bristol Bay contains at least 5% (108,000) of Alaska's breeding population of dabbling ducks. Most species nest in ponds throughout the lowlands. Northern pintails (Anas acuta) are the most common puddle ducks, followed by mallards (Anas platyrhynchos), American wigeon (Anas americana), green-winged teal (Anas crecca), and northern shovelers (Anas clypeata). These species also migrate through Bristol Bay in large numbers, with the most important spring and fall stopover areas for puddle ducks being Izembek Lagoon, Kvichak River, and Naknek, Chagvan, and Nushagak bays.

The majority of the world's population of Steller's eiders (Polysticta stelleri) winter on the north and south sides of the Alaska Peninsula. Over 60,000 Steller's eiders molt in Nelson Lagoon, and tens of thousands molt in other lagoons from July to November. Steller's eiders also congregate on the north side of the peninsula in April-May before migrating to nesting grounds in the Arctic. Vast numbers of king eiders (Somateria spectabilis) winter on the south side of the peninsula. Bristol Bay also has a resident population of common eiders. The region provides important spring and fall staging and molting areas for all three species. Important molting and staging sites for eiders in Bristol Bay are Nelson, Izembek, and Seal Islands lagoons, and Port Heiden.

Raptors. Bald eagles (Haliaeetus leucocephalus) nest along rivers, lakes, and the coastline throughout the Bristol Bay region but are concentrated along the south side of the Alaska Peninsula. At least 1,000 primarily adults occupy the area year-round. Peale's peregrine falcons (Falco peregrinus pealei nest on coastal cliffs throughout the region. Other raptors that take advantage of the large waterfowl, shorebird, rodent, and fish populations in the study area are the rough-legged hawk (Buteo lagopus), goshawk (Accipiter gentilis), sharp-shinned hawk (Acciiter striatus), northern harrier (marsh hawk) (Circus cuaneus), osprey (Pandion haliaetus), merlin (Falco columbarius), gyrfalcon (Falco rusticolus), and golden eagle (Aquila chrysaetos). Short-eared (Asio flammeus), great horned (Bubo virginianus), snowy (Nyctea scandiaca), and northern hawk (Surnia ulula) owls are also present. Nesting and stream feeding areas are mapped as essential habitat for bald eagles, peregrine falcons, and other raptors on Map 4 in Appendix A.

Terrestrial Mammals

Brown bear. The Bristol Bay region contains 5,000-8,000 brown (grizzly) bears (Ursus arctos), perhaps the largest population in Alaska. Bears are found in all habitat types but are concentrated in the coastal lowlands and mountain valleys of the Alaska Peninsula, particularly along salmon-spawning streams in

the summer and fall. Important areas of concentration are Becharof Lake, Meshik River, Cold Bay, and the eastern tributaries of the Ugashik Lakes, Black-Chignik Lakes, and Canoe Bay. The long period of food availability and the abundance and quality of the food, particularly salmon, are responsible for the large size and abundance of these bears. Brown bear distributions are shown on Map 5 of Appendix A. The map shows spring use areas and concentrations along streams as essential habitats for brown bear. Fall use areas, summer use areas, and denning areas are all mapped as important brown bear habitat.

Moose. Moose (Alces alces) are most common in areas with numerous willow and alder-lined streams and immature willow vegetation. They are seldom abundant in Bristol Bay. Within this century, moose have extended their range onto the Alaska Peninsula and are now found as far south as Port Moller. Populations in subunits 9C and 9E, the Alaska Peninsula area, are estimated at 3000 to 3500 moose. Survival of moose calves is low (20 calves/100 cows); bear predation and loss of willow food habitat through plant succession are suspected causes of the low recruitment. Moose distributions are shown on Map 3 of Appendix A, which shows winter use areas to be essential habitat areas. Spring, summer, and fall use areas are mapped as important moose habitats.

Caribou. Once abundant in the northwest portion of the territory, caribou (Rangifer tarandus) have all but disappeared in the Togiak areas within this century. The Mulchatna herd (approximately 26,000 animals), one of Alaska's 13 major caribou herds, ranges east of the Nushagak River and north of Iliamna Lake. The Alaska Peninsula supports another of Alaska's major herds, the peninsula herd, which is composed of three subherds. The largest subherd (15,000-20,000 animals) ranges between the Naknek River and Port Moller. A smaller southern peninsula subherd (6,000-8,000) ranges from Port Moller to Cold Bay. The third subherd of 250 animals inhabits Unimak Island. Caribou distributions are shown in Map 2 of Appendix A. Winter use areas, calving areas, and migration areas have all been identified as essential caribou habitat. Summer use areas are mapped as important caribou habitat.

Caribou range widely across most of the lowlands between Unimak Pass and the Naknek River. Lowlands between Becharof Lake and the Naknek River and the area around and south of Cold Bay are important wintering grounds. The Mulchatna caribou herd winters through an extensive area of lowlands north of the Kvichak River and west and north of Iliamna Lake. The Mulchatna herd generally calves in the upper Mulchatna and Chilikadrotna drainages, north of Lake Clark, and in the Upper Nushagak drainage. The uplands between the Black Hills and the Pavlof Sisters are important calving grounds for the southern peninsula herd. The northern peninsula herd generally calves on the lowland areas between Port Moller and Cinder River. The mountain valleys between Sandy Lake and Port Moller are also occassionally be used for calving.

Other mammals. Small numbers of wolves range throughout the region, feeding on carrion, caribou, moose, and small game. Lynx (Felis lynx) is widespread but scarce. More common furbearers include beaver (Castor canadensis), river otter (Lutra canadensis), mink (Mustela vision), short-tailed (Mustela erminea) and least weasel (Mustela nivalis), wolverine (Gulo gulo), and red fox (Vulpes vulpes). Arctic fox (Alopex lagopus) are scarce. Marten (Martes americana) rarely occur south of Iliamna Lake. Many of these animals frequent the beaches and rocky shores of Bristol Bay, where they feed on carrion, clams, and crabs. Snowshoe (Lepus americana) and Alaskan hares (Lepus othus), hoary marmots (Marmota caligata), and Arctic ground squirrels (Spermophilus parryii) also occur in the area.

Marine Mammals

Sea otters. An estimated 17,000 sea otters (Enhydra lutris) reside in the shallow waters of the Alaska Peninsula from Unimak Pass to Port Heiden; their numbers are periodically reduced when pack ice moves into the area. A more stable population occupies the Pacific side of the peninsula.

Sea lions and seals. The largest concentrations of northern sea lions (Eumetopias jubata) in Alaska occur on the Pacific side of the Alaska Peninsula and on the Bering Sea side from Unimak Pass to Port Moller. Approximately 50,000 may be found year-round on haulout rocks and within 15 miles (25 km) of shore. Five to ten thousand sea lions haulout in Puale Bay. Another 500 live on Cape Newenham and Hagemeister Island. Unimak Pass is a major spring and fall passageway for the highly migratory northern fur seals (Callorhinus ursinus), as they move from wintering grounds in the Pacific to breeding grounds on the Pribilof Islands. Four species of seal (harbor (Phoca vitulina), ringed (Phoca hispida), bearded (Erignathus barbatus), and ribbon (Phoca fasciata)) winter in Bristol Bay along the pack ice edge. Harbor seals are the most common. They haulout at many locations, including Kvichak Bay, Cinder River, Port Heiden, Seal Islands, Port Moller, and Izembek Lagoon. Some of the world's largest haulout areas for harbor seal are located along the Alaska Peninsula. Harbor seals often follow salmon runs into rivers. Iliamna Lake has a resident population of harbor seals, one of the few populations of freshwater seals in the world.

Walrus. Round Island in the Walrus Islands State Game Sanctuary supports the largest walrus (Odobenus rosmarus) haulout in the world (up to 15,000 walrus). Other notable haulouts can be found at Cape Seniavin (3,000 animals), Amak Island, and Port Moller. In the spring, walrus feed in the nearshore waters along the entire northern coast of Bristol Bay. Marine mammal habitat areas are identified on Map 3 of Appendix A.

Whales. About 1,500 beluga whales (Delphinapterus leuca) are estimated to reside in the shallow waters of Bristol Bay all

year. Important feeding and calving habitat is found in the estuaries. In the winter, belugas move out as far as the ice edge. Concentrations of belugas have been observed in the Snake, Igushik, Wood, Nushagak, and Kvichak rivers, feeding on migrating salmon. Killer whales are abundant on the Pacific side of the Alaska Peninsula and are occasionally seen on the Bering Sea side. Harbor (Phocoena phocoena) and Dall's (Phocoena dalli) porpoise are regular inhabitants of Bristol Bay. The endangered gray whale (Eschrichtius robustus) migrates through Unimak Pass, follows the coast of Bristol Bay up to Egegik Bay, and then heads toward Nunivak and St. Lawrence Islands. Approximately 16,000 gray whales follow this route in early spring. They have been observed feeding in Nelson Lagoon and near the Walrus Islands. The southward migration in the fall is more direct from Cape Newenham to near Nelson Lagoon and does not transit Bristol Bay. Three other endangered whales - the fin (Balaenoptera physalus), humpback (Megaptera novaeangliae), and bowhead (Balaena mysticetus) - occur in the western end of Bristol Bay, usually during migration. The former two migrate into and out of the Bering Sea via Unimak Pass. Minke whales (Balaenoptera acutorostrata) occur in low densities in coastal waters through Bristol Bay but are more common offshore in the western two-thirds of the bay. Baird's beaked whale (Berardius bairdi) occasionally occurs in Bristol Bay.

Threatened and Endangered Species

As mentioned above, four endangered whales migrate through Bristol Bay twice a year: gray, bowhead, humpback, and fin. These endangered species are under the jurisdiction of the National Marine Fisheries Service.

The U.S. Fish and Wildlife Service Office of Endangered Species, Alaska Region, advises that species under their jurisdictions that may occur in the Bristol Bay planning area are the American peregrine falcon (Falco peregrinus anatum) and the short-tailed albatross (Diomeda albaturs).

F. p. anatum occurs throughout interior Alaska where suitable habitat is available. Highest densities occur along portions of the Yukon, Tanana, and Porcupine rivers. There is no evidence to indicate that the Bristol Bay region ever supported substantial numbers of peregrine falcons. There is, in fact, little evidence to indicate that F. p. anatum occurs in the region at all. This may be due in part to the lack of intensive surveys directed specifically toward peregrine falcons in that part of Alaska.

F. p. anatum is highly migratory, nesting in Alaska and elsewhere in North America during the summer and wintering as far south as Argentina and Chile. They arrive in Alaska in April or early May and depart in late August or early September. Typically, nesting occurs on a cliff, bluff, or steep cutbank near a body of water

and with adequate prey nearby. Peregrines feed primarily on other birds.

Short-tailed albatrosses were once abundant in the North Pacific (DeGange 1981) and probably were present in the offshore areas of the Bristol Bay region. During the late 19th and early 20th centuries the species was nearly extirpated by feather hunters on breeding grounds. Currently, the total population is believed to number around 250 individuals.

Short-tailed albatrosses are presently known to breed on only one island, Torishma, in the Pacific near Japan. Breeding occurs during fall and winter. During summer, the birds scatter widely over the North Pacific, generally remaining far offshore feeding on squid, small fish, and crustaceans.

There is no evidence to indicate that short-tailed albatrosses are currently present in the Bristol Bay region. Should the species recover to historical population levels, however, it is reasonable to assume that the short-tailed albatross would, at least occasionally, be present in Bristol Bay.

Human Resources

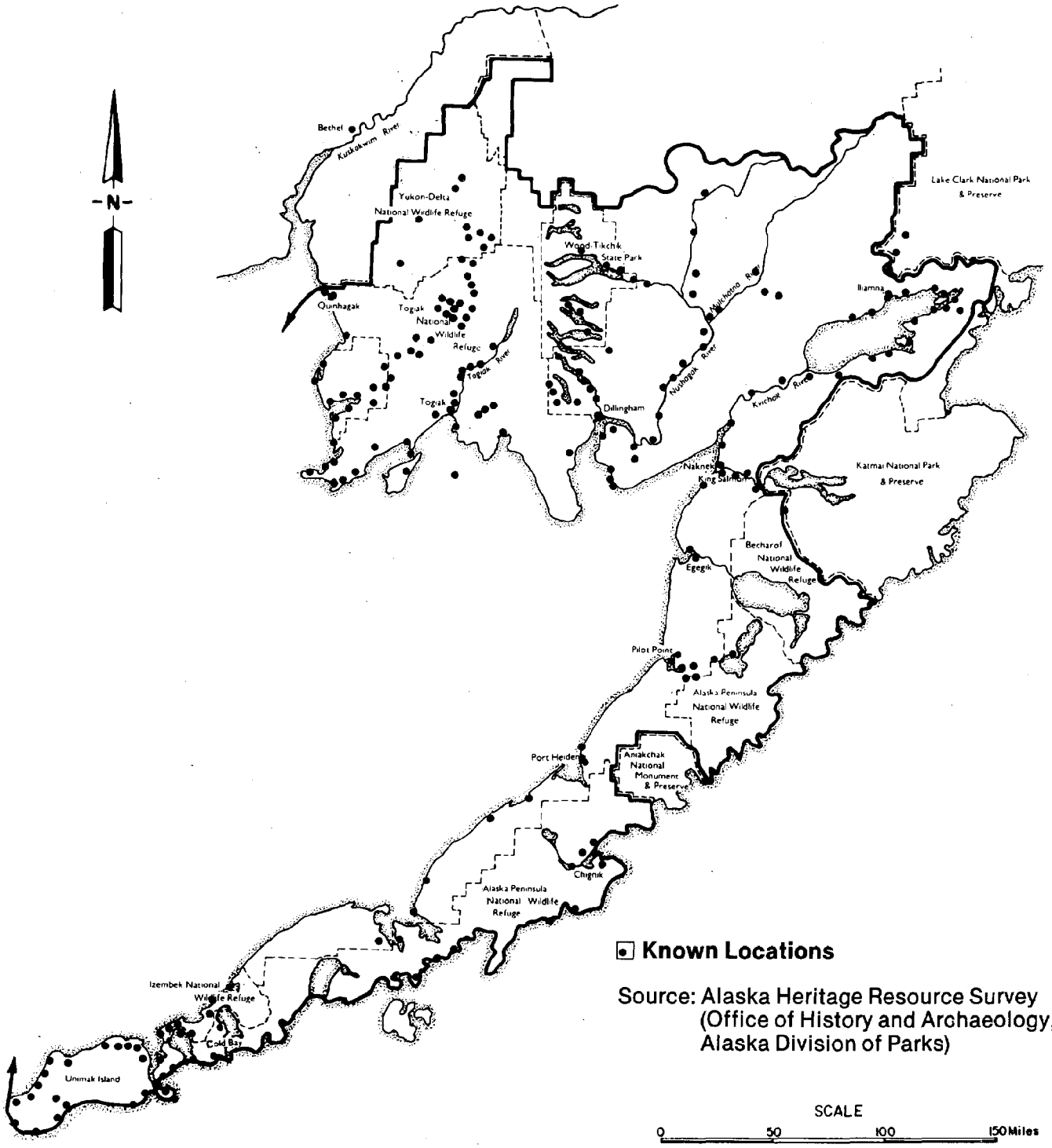
Human History and Cultural Resources

The Bristol Bay region has been inhabited for at least the last 9,000 years. The Native people of the region are very diverse and represent three major groups: The Aleuts on the western end of the Alaska Peninsula, the Tanaina Athapaskan Indians in the vicinity of Lake Clark, and the Yupik Eskimos over the remainder of the region. Cultural influences from the north spread across the Alaska Peninsula around A.D. 800, ending several thousand years of nearly complete isolation. The first outside contact with Natives occurred in the mid 1700's by the Russians, and since then fishing, trapping, and recreation have contributed significantly to the area's development. Much of the traditional dependence on salmon, big game, and marine mammals is still in evidence today in the subsistence culture of many local native and non native residents.

Only limited archeological work has been done in the region to date. However, more than 375 archeological and historic sites are known. Map 4 locates some of these sites. Only one archeological site (Port Moller Hot Springs Village Site) has been listed on the National Register of Historic Places. Historic properties on the register are: Holy Resurrection Church (Belkofski); St. John the Theologian Church (Perryville); St. Nicholas Chapel (Ekuk); St. Nicholas Chapel (Tgingig); St. John the Baptist Chapel (Naknek); St. Nicholas Chapel (Nondalton); Transfiguration of Our Lord Chapel (Nushagak); St. Nicholas Chapel (Pedro Bay); St. Nicholas Church (Pilot Point); and Elevation of Holy Cross Church (South Naknek). Many of the

Historical and Archaeological Resources

Map 4



identified archeological sites in the region are clearly eligible for listing, and will be listed as they are processed. The earliest materials found at archeologic sites date back to about 9,000 years ago, and are part of the American Paleo-Arctic tradition.

Although only a small number of sites in the region have been researched and mapped, projections can be made relative to those areas most likely to reveal additional sites. Specifically, areas along the coast with easy access to freshwater and inland areas near salmon streams are likely to contain more sites than will interior highlands. A map based on a model depicting where such sites would be located was prepared by USFWS and used in assessing the environmental consequences of the alternatives (see Chapter 8).

Social Systems

Population. The Bristol Bay region includes 38 communities with a total 1980 population of 7,815 (U.S. Census). The area contained about 1.9% of Alaska's total population at that time. Dillingham (1,563), the Bristol Bay Borough (1,094), Sand Point (625), Togiak (470), King Cove (460), and New Stuyahok (331) accounted for almost half the population. The population of most smaller villages declined, while the region as a whole showed an increase between 1970 and 1980. In general, there has been a regional population shift from smaller, outlying villages to larger communities, especially Dillingham. The dominant ethnic background is Native (Aleut, Yupik Eskimo, and Indian). The Caucasian population is concentrated in Dillingham, Iliamna, Naknek, King Salmon, Chignik, Sand Point, and Cold Bay. Dillingham is 43% Caucasian, and 57% Native (1980 Census).

Sociocultural systems. Bristol Bay residents have traditionally been oriented to the land, which dominates their culture and way of life. Rapid changes in many social, cultural, and economic factors over recent decades have taken place, affecting residents in varying degrees from community to community. Kinship continues to be a crucial mechanism of social organization, exchange, and interaction, and is involved in behavioral aspects such as selection of fishing crews, and in childcare and mutual assistance patterns. Production and exchange of subsistence goods along kinship lines have persisted despite the gradual trend from the extended family unit to a nuclear family unit.

The single largest employment source for Bristol Bay residents is the fishing industry. During peak salmon harvest seasons, many transient people also enter the region to fish or work in the processing plants. In a few of the larger communities government and support services employment provide permanent jobs for many local residents.

Economy. Bristol Bay's economic structure consists of 1) small village economies with very seasonal cash flows and significant reliance on subsistence and 2) larger, more diversified economies with concentrated populations and steady, year-round employment. These larger villages also see great seasonal economic variation.

Regionally, in 1979, the commercial fishing industry provided 47% of the employment base, the government 33%, and support services 19%. Sixteen percent of the world's salmon harvest occurs in Bristol Bay. The commercial catch of salmon alone for 1981 was about 27.7 million fish, with an ex-vessel value of about $84 million. The 1982 catch is estimated at $250 million. In some cases families from the small fishing villages earn their entire yearly income within three to six weeks. The larger, more economically stable communities provide year-round salary opportunities through government and support and services jobs. The 1980 household income in the region ranged from $3,405 in Goodnews Bay to $55,540 in King Salmon, with a regional average of $27,970 (ISER 1983).

Subsistence. Subsistence uses means the customary and traditional uses by rural native and non native Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade. Very few residents in Alaska Peninsula communities, the Bristol Bay Borough or in Dillingham depend totally on subsistence for their nutritional or economic needs. However, many residents in areas such as Togiak/Kuskokwim, Nushagak River and Iliamna Lake villages are highly dependent upon a subsistence lifestyle, regardless of ethnic origin or birthplace.

The most important subsistence resources are salmon and caribou, taken in substantial quantities by residents of nearly every community. Moose is a third resource of major importance in the Nushagak River, Iliamna Lake, and upper Alaska Peninsula areas. Marine mammals are of major importance to residents of the Togiak/Kuskokwim area. Subsistence use areas by community are shown on three maps in Appendix A.

Infrastructure. The term infrastructure refers to the framework or support system of a community and includes local government, housing, education, electric power, water and sewer services, solid waste disposal, health services, police and fire protection, communication, and local transportation. The infrastructure of the 38 communities in the region varies from practically nothing to a full complement of facilities in the Bristol Bay Borough and first-class cities (including Sand Point, King Cove, and Dillingham). Most of the smaller second-class cities or villages have a very limited infrastructure.

No road access exists from outside the region; airplanes and boats are the only means of access. Only three intercommunity roads exist, but during the winter, travel can occur between communities by snowmachines or all-terrain vehicles. Most communities have at least a small gravel runway for access, but the major air and water transportation centers are at Dillingham, King Salmon, and Cold Bay.

Dillingham has become a transportation, trade, and services center for the region. It has a major airport and is the headquarters of several government agencies. Its support sector includes hardware, general merchandise, food and liquor stores; a lumber yard; movie theatre; pool halls; hotels; restaurants and bars. The regional hospital also is located nearby. Very few of the smaller villages have any of these services. King Salmon and Cold Bay also have major airports and offices of government agencies.

Resource development in the area may require roads, pipelines, or railroads. Most interest in transportation facilities associated with resource development is related to oil and gas or other resource development on the Alaska Peninsula. The Transportation Working Group identified potential transportation corridors in the region, most of which were identified in past studies (see Map 5). The corridors identified in the northern part of the region were considered too general and hypothetical to evaluate. Corridors on the Alaska Peninsula are more constrained by topography and could be more effectively evaluated.

Should commercially developable quantities of oil or gas be found on the north shore of the Alaska Peninsula, in the Bering Sea or Bristol Bay, the shallow, stormy, and in winter, icy waters of the Bay could make it most practical to export oil or gas across the Alaska Peninsula to an ice free deep-water port on the Gulf of Alaska. The topography of the Alaska Peninsula and its southern shoreline substantially limit the routes that should be used for a pipeline and terminal. There are a limited number of passes through the mountains, and there are only certain harbors on the south side that provide adequate depths and shelter for large tankers. Active volcanos and other volcanic features further restrict potential routes. There is also local interest in having roads built across the peninsula.

The following is a brief analysis of the corridors considered by the Transportation working group; Map 5 shows the location of these corridors. Many of these corridors were identified by previous BLM and DNR studies, or more recent work by the U.S. Minerals Management Service, Outer Continental Shelf Office (MMS-OCS). The working group used the BBRMP data base to evaluate these routes and alternative routes.

- False Pass Area - Two corridors were identified by the MMS-OCS in developing scenarios for Bering Sea oil and gas lease sales. The port site for both routes would be on the Ikatan Peninsula on Ikatan Bay. The routes identified are a

submarine route through Bechevin Bay, False Pass and Ikatun Bay, and the second an upland route along Unimak Island to the Ikatan Peninsula. This area is volcanically and tectonically very active, and False Pass is also used by salmon and some marine mammals migrating between the Pacific Ocean to the Bering Sea.

- Bering Sea to Morzhovoi Bay - Also identified by MMS-OCS, this corridor is the shortest cross-peninsula route. The overland route is only 6 miles across very low, marshy wetlands, and the port site would be on either of Morzhovoi Bay's headlands. The port site and anchorage would be exposed to wind and waves, the sheltered portions of the bay are very shallow. The isthmus which separates Morzhovoi Bay from the Bering Sea is essential caribou migrating habitat and the area is essential habitat for waterfowl. The corridor also crosses Izembek NWR Wilderness.

- Izembek to Cold Bay - This corridor was found to be unsuitable by MMS-OCS (and the BBRMP) due to the extremely high wildlife values of Izembek Lagoon and due to physical limitations in the entrance to Cold Bay.

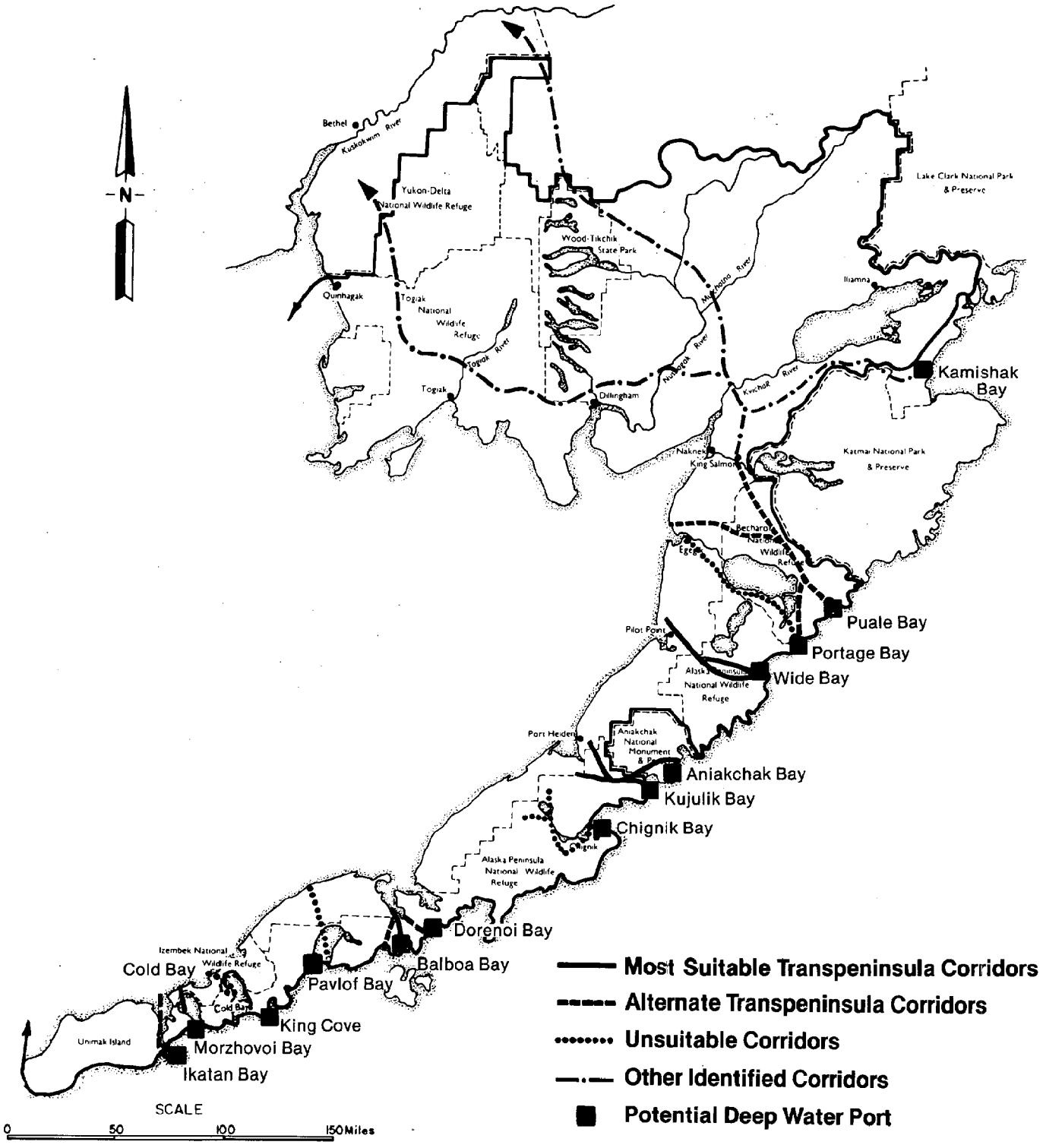
- Bering Sea to Pavlof Bay - This corridor was found to be unsuitable by MMS-OCS (and the BBRMP) due to poor soils, faults, proximity to the Pavlof volcanoes, and wildlife conflicts.

- Herendeen Bay to Beaver, Lefthand and Dorenoi Bays - Five corridor options were identified by the MMS-OCS in this area. These would most likely be used to transport oil and gas via pipeline from the Bering Sea OCS or from the north shore of the peninsula to a deepwater port on the south side of the peninsula. The corridors all begin at the head of Herendeen Bay and follow any of several low passes. The route via Portage Valley to Albatross anchorage on Balboa Bay was found to be the most suitable route of all corridor options on the lower peninsula. The anchorage is one of the best deepwater harbors on the peninsula. The mountainous terrain in this part of the peninsula provides a natural barrier to caribou migrations, however, brown bear populations are high and waterfowl concentrations in the Herendeen Bay-Port Moller-Nelson Lagoon area are among the greatest on the peninsula.

- Port Heiden to Chignik Bay - This route would follow the natural pass created by the Chignik River across the peninsula. This route was found to be unsuitable as any corridor would either follow, or frequently cross, the Chignik River system which supports a large fisheries resource, and because Chignik Lagoon is too shallow for a deep water port. Local residents and landowners (primarily Native Corporations) oppose this route.

Transportation Element

Map 5



- Port Heiden to Kujulik or Aniakchak Bay - This route would follow the Meshik River valley and cross any one of a number of low passes to Kujulik or Aniakchak Bay. The route to Aniakchak Bay is longer and traverses Aniakchak National Preserve. Aniakchak Bay is deeper but more exposed than Kujulik Bay. The Meshik River is essential habitat for brown bear and caribou, and the Pacific Coast has high brown bear concentrations. The transportation working group identified both routes as being suitable given the limited options available for a corridor in the mid peninsula area.

- Pilot Point to Wide Bay - This corridor was identified in past BLM and oil and gas industry studies. The western portion of the corridor crosses expansive coastal lowlands, while the route through the mountains is constrained by 3000-6900 foot peaks. Wide Bay provides excellent anchorage, although its entrance is constrained by shoals. The Ugashik and Dog Salmon Rivers support large fisheries and the brown bear populations in the area are high. This was evaluated as the most suitable corridor in the north peninsula area.

- Egegik to Portage Bay-south shore of Becharof Lake - This corridor was found to be unsuitable due to very high fish and wildlife conflicts and due to proximity to very active volcanic activity in the vicinity of Mount Peulik.

- Egegik or King Salmon to Puale or Portage Bays - Several alternative routes north of Becharof Lake were explored. The overland terrain is relatively dry and undulating. Portage Bay is a good deepwater harbor, although exposed to southeast ocean winds and northwest mountain williwaws of great violence. Puale Bay is more exposed and does not have good anchorage. All corridors pass through designated Wilderness of Becharof NWR, and would have significant environmental conflicts with salmon, caribou and brown bear.

Should commercial quantities of minerals or oil or gas be discovered, more detailed geophysical soil, fish, and wildlife data would be required to determine which are the best routes, what alternatives exist, and exactly where roads, pipelines, terminals, and related facilities should be located. Other considerations should also address economics, technical feasibility, engineering, and existing infrastructure. More detailed discussion of existing transportation systems and future needs can be found in the Rough Draft-BBCMP Transportation Element, prepared by the BBCMP Transportation Working Group, December 1982, and in Potential Southern Alaska Peninsula Pipeline Corridors, A Preliminary Reconnaissance, a special report by Tremont and York, published by the Minerals Management Service, Alaska OCS Region in November of 1982.

The development of major roads not related to resource development is unlikely in the region over the next 20 years. The widely dispersed population of the region, combined with soil

conditions and terrain, make development of a regional road network costly and impractical. The only major new road developments proposed in the region are from Iliamna to Nondalton and King Cove to Cold Bay. Construction started on a pioneer road from Iliamna to Nondalton in 1983. The 15.5 mile long road requires a bridge across the Newhalen River. The 12 mile road from King Cove to Cold Bay has been proposed by local communities. Economic and environmental feasibility studies have not been initiated, and there are no plans for construction at this time.

Settlement. Community expansion and remote residential developments place a demand on communities, Native corporations, and the state and federal governments to provide land for development. The Alaska Native Claims Settlement Act (ANCSA) and Alaska Statehood Act have changed the concepts of landownership in the Bristol Bay region. Village Native corporations and municipalities provide most of the land to meet the needs of growing communities for residential, commercial, or industrial development. Section 14(c)(3) of ANCSA provides municipalities 1,280 acres (more or less) of land from the village Native corporations to accommodate future community needs for land. Native corporations are also providing land to their shareholders, and some have developed or proposed subdivisions.

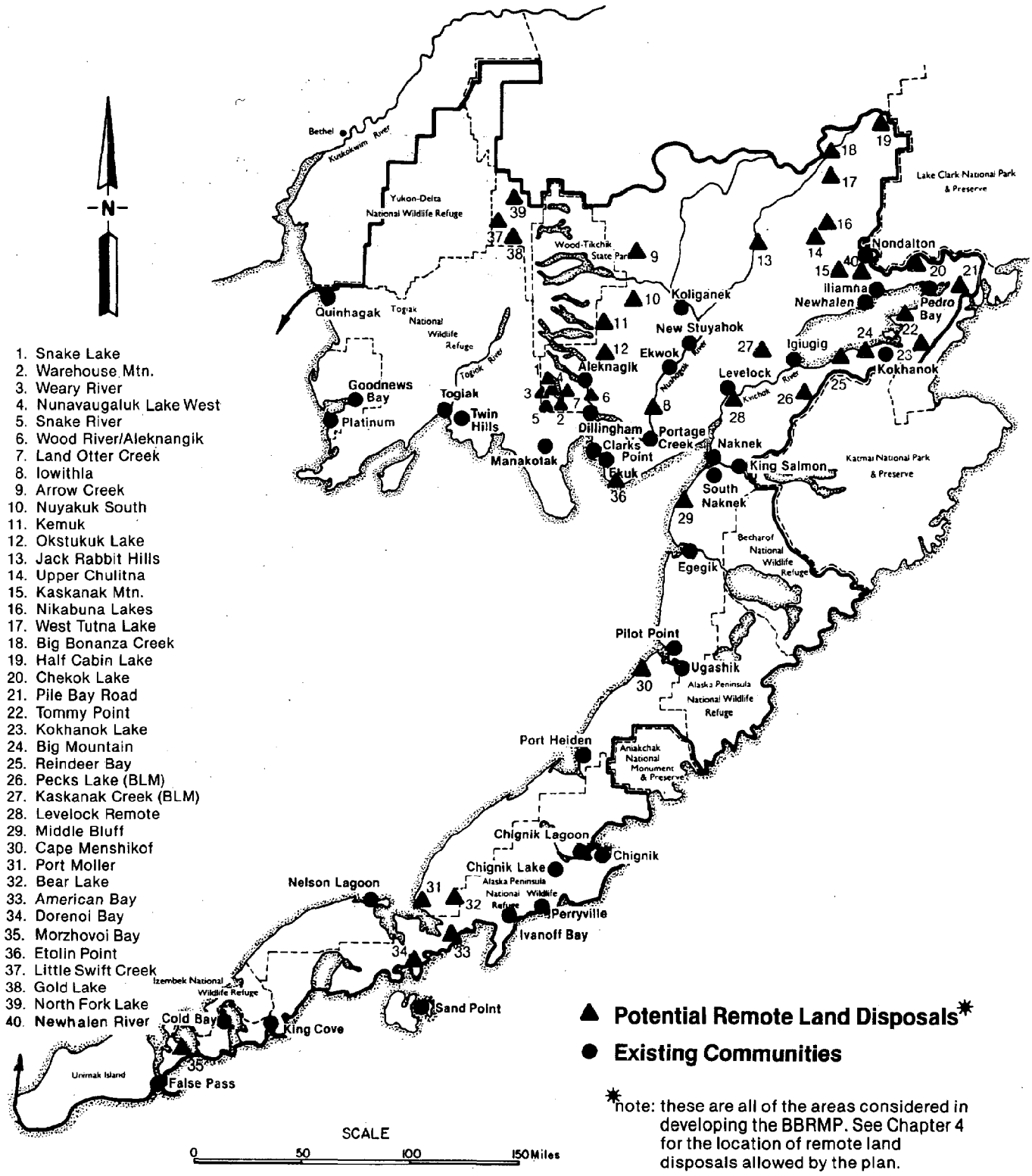
Remote settlement, outside of traditional villages, has been limited in the region. Many lodges and camps were established under the Bureau of Land Management's Trade and Manufacturing Sites program, when most land in the region was federally owned and managed. Only a few homesteads were successfully established, and, with the exception of lodges, there are few year-round residences outside the villages. Many camps and a few lodges are also situated on individual Native allotments. Only one area has been offered for sale for remote settlement under the state's land disposal programs. This area is located near Warehouse Mountain, just outside Dillingham. Existing settlements and possible remote settlement areas are shown on Map 6.

Energy. Energy is a major concern in the Bristol Bay region. Most energy is produced by noncentralized, diesel-power generators. In most smaller villages there are up to three diesel generators of 50 to 150-kw capacity, often owned by the school district, which supplies power to some individual residences. Home heating is mainly by fuel oil, with some use of electric spaceheaters and wood. Three small utility companies supply power to more than one community: Nushagak Electric Cooperative, Inc., supplies Dillingham and Aleknagik; Naknek Electric Association supplies a number of users in the Bristol Bay Borough; and the villages of Nondalton, Newhalen and Iliamna have an electrical cooperative. The cost of power in the Bristol Bay area is five to eight times higher than in urban areas such as Anchorage.

The Alaska Power Authority (APA) and Army Corps of Engineers (COE) have undertaken extensive studies to assess the feasibility

Existing Communities and Remote Settlement Proposals

Map 6



1. Snake Lake
2. Warehouse Mtn.
3. Weary River
4. Nunavaugaluk Lake West
5. Snake River
6. Wood River/Aleknangik
7. Land Otter Creek
8. Iowithla
9. Arrow Creek
10. Nuyakuk South
11. Kemuk
12. Okstukuk Lake
13. Jack Rabbit Hills
14. Upper Chulitna
15. Kaskanak Mtn.
16. Nikabuna Lakes
17. West Tutna Lake
18. Big Bonanza Creek
19. Half Cabin Lake
20. Chekok Lake
21. Pile Bay Road
22. Tommy Point
23. Kokhanok Lake
24. Big Mountain
25. Reindeer Bay
26. Pecks Lake (BLM)
27. Kaskanak Creek (BLM)
28. Levelock Remote
29. Middle Bluff
30. Cape Menshikof
31. Port Moller
32. Bear Lake
33. American Bay
34. Dorenoi Bay
35. Morzhovoi Bay
36. Etolin Point
37. Little Swift Creek
38. Gold Lake
39. North Fork Lake
40. Newhalen River

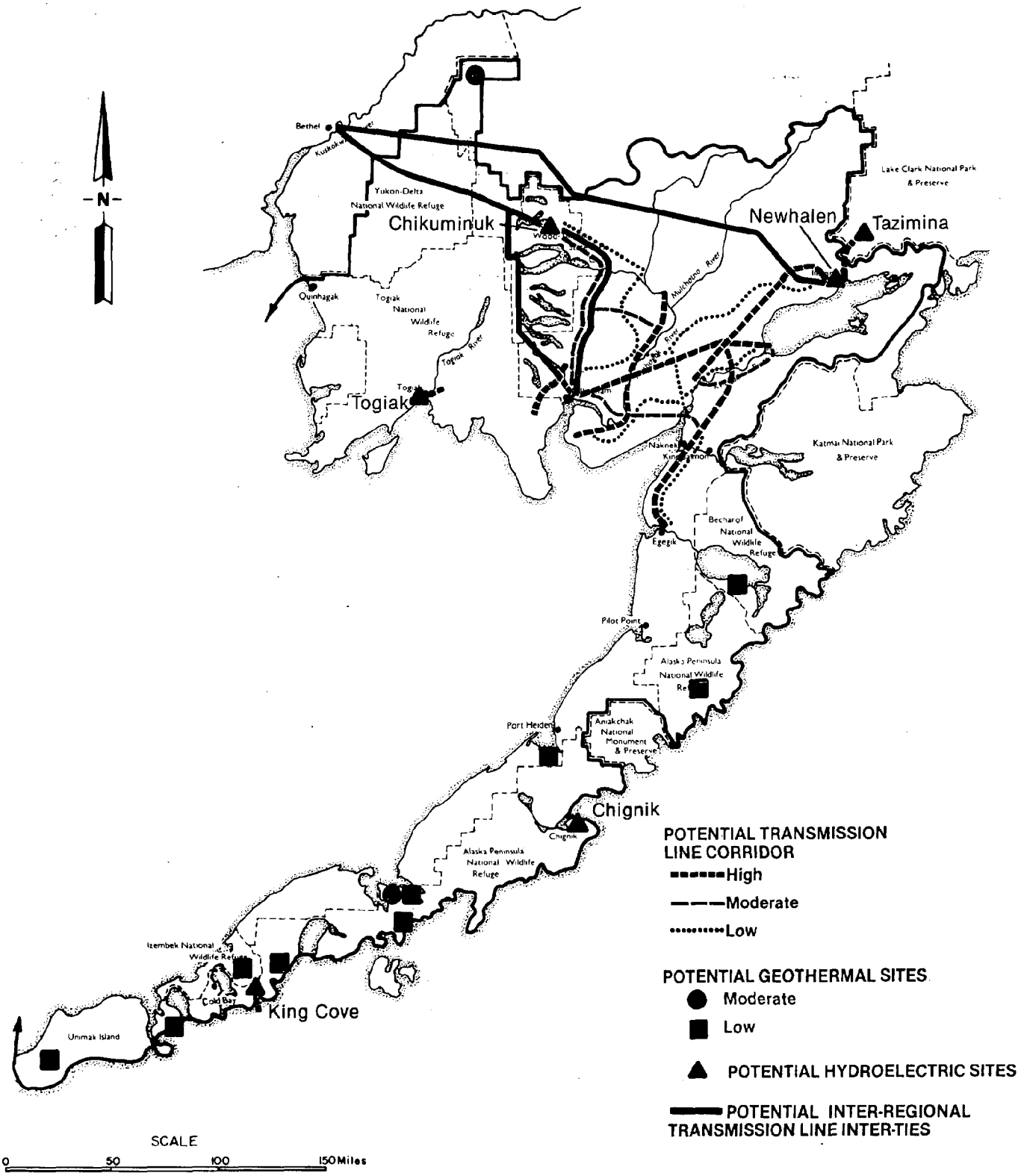
▲ **Potential Remote Land Disposals***

● **Existing Communities**

*note: these are all of the areas considered in developing the BBRMP. See Chapter 4 for the location of remote land disposals allowed by the plan.

Alternate Energies Element

Map 7



of developing alternate sources of energy generation for the region. The APA's studies have focused on a regional hydroelectric system, the most favorable sites being at Chikuminuk Lake in the northern part of Wood-Tikchik State Park and at the Newhalen River rapids (stream diversion) near Iliamna Airport. Potential hydroelectric sites have been identified for small local systems at Chignik (COE), King Cove, and Togiak. Wind may also provide a potential alternate source of energy, particularly on the Alaska Peninsula. Presently, there are some individual electric wind generators operating successfully in the Naknek/King Salmon and Dillingham areas, and other locations in the region are under consideration and planning.

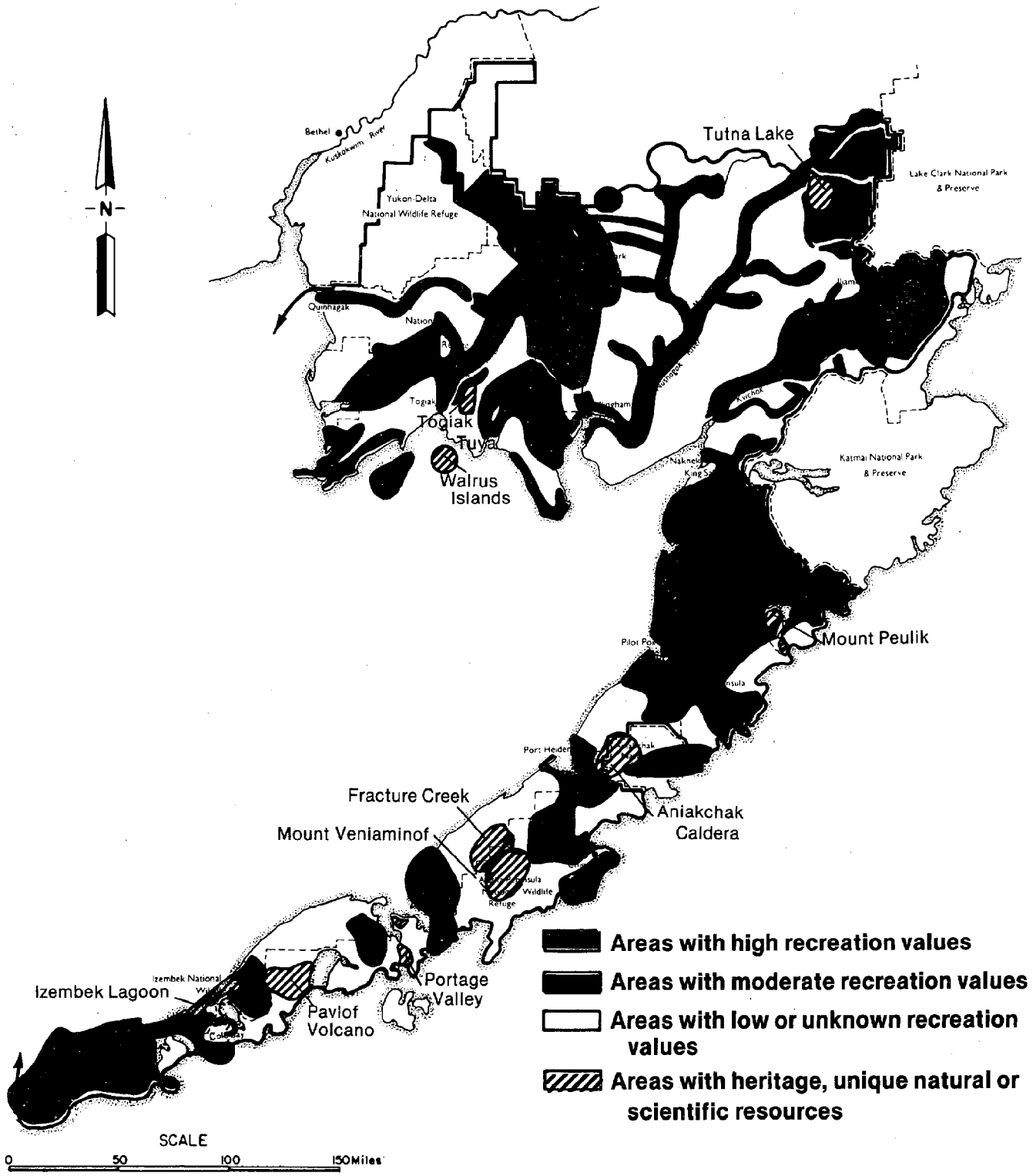
Geothermal energy resources in the Bristol Bay region have been evaluated by State and Federal officials as having only moderate or low development potential. There is very limited detailed knowledge of the various sites; however, they are generally very remote from the existing population centers. Two sites that could have some potential for development are a hot springs near Stanikovich Mountain south of Port Moller. Tsunami hazards and its remote location make development improbable. A hot springs also exists at the head of Ophir Creek located within the Yukon-Delta National Wildlife Refuge and is being utilized by a homestead located there. Map 7 shows potential alternate energy sites and possible hydroelectric sites.

A detailed inventory of existing and alternative regional electric generating systems can be found in the Bristol Bay Regional Power Plan, Detailed Feasibility Analysis, Interim Feasibility Assessment prepared for the Alaska Power Authority by Stone and Webster Engineering Corp., July 1982.

Recreation. The region has long been known worldwide by sportsmen for its trophy fishing and big game hunting opportunities. A number of guiding operations use the Bristol Bay area, with most of the activity concentrated in the spring, summer, and fall months. Sport fishermen in 1980 harvested about 37,000 salmon, and fishing for trophy rainbow trout and grayling is very popular. Sport hunting for big game species such as brown bear, moose, and caribou occurs throughout much of the area. Congressionally designated wild and scenic rivers in the region or in adjacent parks, as well as other non-designated rivers, have become increasingly popular for river floating. The area contains many commercial lodges catering to hunters and fishermen; recreational cabins and campsites are also spread throughout. Maintained and unmaintained airstrips abound, and floatplanes make use of the lakes and larger rivers. The fast growing recreational industry in Bristol Bay is second in economic importance only to the commercial fishery and ADF&G estimates that the industry provides $25 to $40 million a year to the state's economy. Map 8 shows recreational resource values for the region.

Recreation Element

Map 8



Wood-Tikchik State Park is the largest of Alaska's state parks and provides high quality fishing and boating. Three national parks or monuments (Lake Clark, Katmai, and Aniakchak) adjoin the planning area. Katmai National Park and Preserve was established because of its unique geologic and wildlife resources. These parks, the national wildlife refuges and recreational rivers and lakes all attract increasing numbers of recreationists from around the world.

Agriculture. The soils and climate for much of the Bristol Bay area are marginal or sub-marginal for agriculture. Historically, agriculture has not played a significant role in the local economy or residents' lifestyles. Local residents have relied (and to a large extent still do rely) on the harvest of wild animals and plants for their nutritional needs. Local residents do have small gardens in some of the communities. Cool weather crops (potatoes, turnips, rutabagas, and members of the cabbage family) can be grown successfully in a few areas. Based on examination of the soils, climate, slope, and existing vegetation, the only land with a good potential for agriculture exists in river valleys to the northeast of Dillingham. Scattered areas of moderate to low potential exist throughout the Nushagak and Iliamna drainages (see Map 9). Large-scale agriculture is not considered feasible anywhere in the region at the present time. Growing and shipping costs would not be competitive with existing markets.

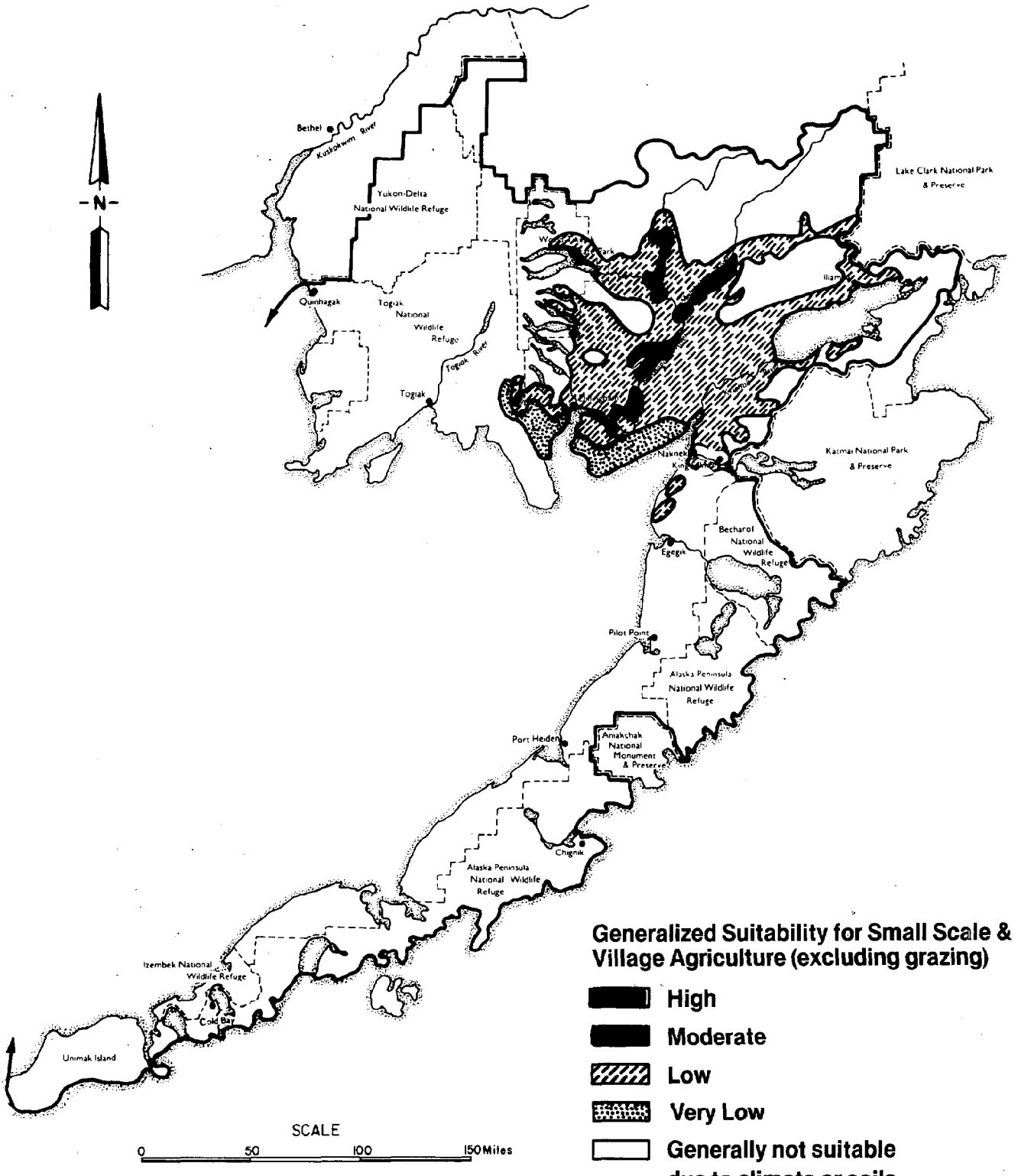
There has been very limited grazing of domestic animals in the area. Much of the land in the region suitable for reindeer grazing is used by existing caribou herds. The only large-scale grazing involves a herd of 350 reindeer on Hagemeister Island. Grazing of sheep and cattle does occur on some of the islands south of the Alaska Peninsula and on several of the Aleutian Islands. Grazing in much of the region of domestic animals, other than reindeer, would probably require the importation of large quantities of supplemental feed and is not considered feasible at this time.

A more detailed analysis of the region's agriculture potential is contained in the Draft Agriculture Element prepared in December 1982 by the BBCMP Agriculture Working Group.

Forestry. Forest resources are sparse; less than 10% of the region is forested. Within the area, forests grow close to large streams, rivers, and in the drier river valley bottoms (see Map 10). Extensive upland mixed forests are found north of Aleknagik, in the Muklung Hills, and east of the Wood River Mountains. These areas are primarily open spruce and birch stands with numerous interspersed bogs. The most valuable forest resources for local use are in the lower Nushagak drainage near New Stuyahok, Ekwok, and Portage Creek. There are some fairly extensive forested areas between Dillingham and Aleknagik. Forests also occur in the Nushagak and Nuyakuk River drainages above Koliganek, along the Mulchatna River, on the eastern shores

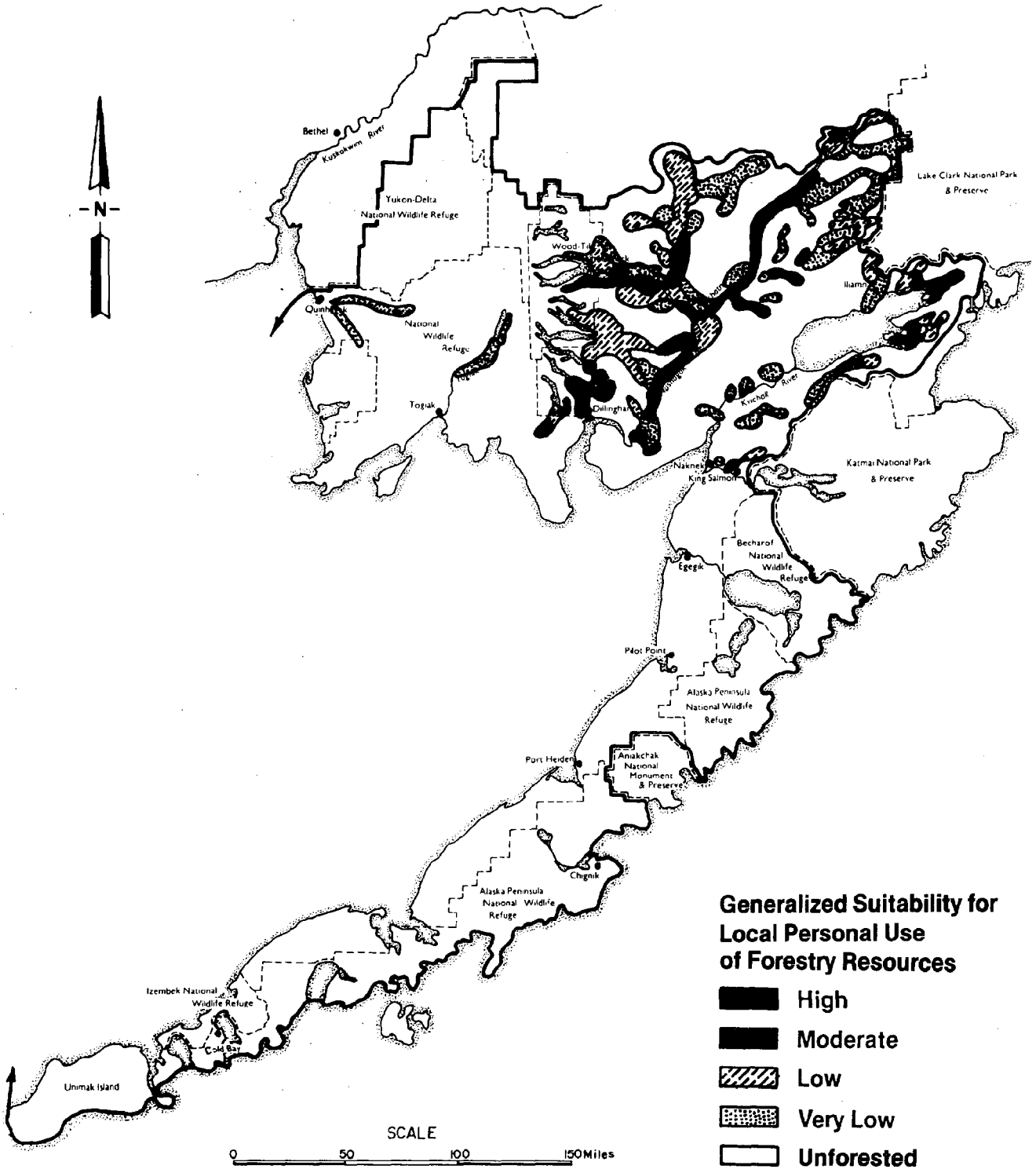
Agricultural Element

Map 9



Forestry Element

Map 10



of Iliamna Lake, and around Lake Clark. The most extensive spruce forests in the region are in the Koksitna and Chulitna River drainages in or near Lake Clark National Park.

Aside from the above areas, forest resources are primarily found in narrow bands along streams and rivers. Although limited in expanse these areas are very important to local residents and seasonal recreational users as sources of fuel and building material.

Forest resources are used by local residents for fuelwood, houselogs, and sawlogs. Many residents rely on wood as a supplemental heating source. Over most of the region forestry resources are insufficient to provide a dependable fuel source for year-round residents. Notable exceptions are the villages of Koliganek, New Stuyahok, Ekwok, Nondalton, and Pedro Bay where wood is the primary source of heat for many residents. No large-scale commercial timber operations exist in Bristol Bay; and due to the nature of the resource, it is not likely that any large commercial timber operations will be developed.

A more detailed analysis of the region's forest resources can be found in the Forestry Element prepared by the Forestry Working Group, December 1982.

Landownership

Table 1 shows the approximate number of acres of land owned or selected by each of the major land managers in the region. Map 11 indicates the location of each manager's land. Most land status information is current as of December 1983. Management unit maps in Chapter IV provide much more detailed landownership information. Although the BLM is conveying land to the Native corporations and the state and adjudicating conflicting land claims, landownership is still unsettled in some areas. Chapter VI includes recommendations for further state land selections, state selection relinquishments, and land exchanges, all of which will affect landownership patterns.

The majority of state-owned and selected lands are in Management Units 5-14 and along the Bristol Bay side of the Alaska Peninsula. Most state-selected lands outside of national wildlife refuges should be conveyed to the state, except for some small tracts that will be conveyed to Native corporations. The plan's recommendations for these state-selected lands assumes they will be managed by the DNR. Chapter VI discusses the status of state selections within refuges. The state also owns the submerged and shorelands under all navigable waterbodies and in Bristol Bay and the Bering Sea out to the three mile limit.

The state legislature has established two game refuges (Izembek and Cape Newenham), five state critical habitat areas (Port Moller, Port Heiden, Cinder River, Egegik, and Pilot Point) and

the Walrus Islands Game Sanctuary, all totalling about 100,000 acres. The Department of Fish and Game has statutory authority to regulate land use activities on both state and private land within these areas by requiring permits for many activities. The state owns most lands within the Walrus Island Sanctuary and the tide and submerged lands of the Izembek and Cape Newenham refuges; however, Native corporations own substantial tracts of land in the Egegik, Pilot Point, Port Heiden, and Port Moller state critical habitat areas. The state legislature also created the 1,428,000 acre Wood-Tikchik State Park. Most of the park is in state ownership, except for numerous small, privately-owned tracts and Native allotments.

The Alaska Native Claims Settlement Act (ANCSA) recognized 39 Native villages or groups in the region entitled to receive land. ANCSA also allowed several of the Aleut village corporations from outside the region to select from federal lands on the Alaska Peninsula. Once these lands are conveyed, the village Native corporations will own the surface rights, and the regional corporations will own the subsurface rights.

Table 1

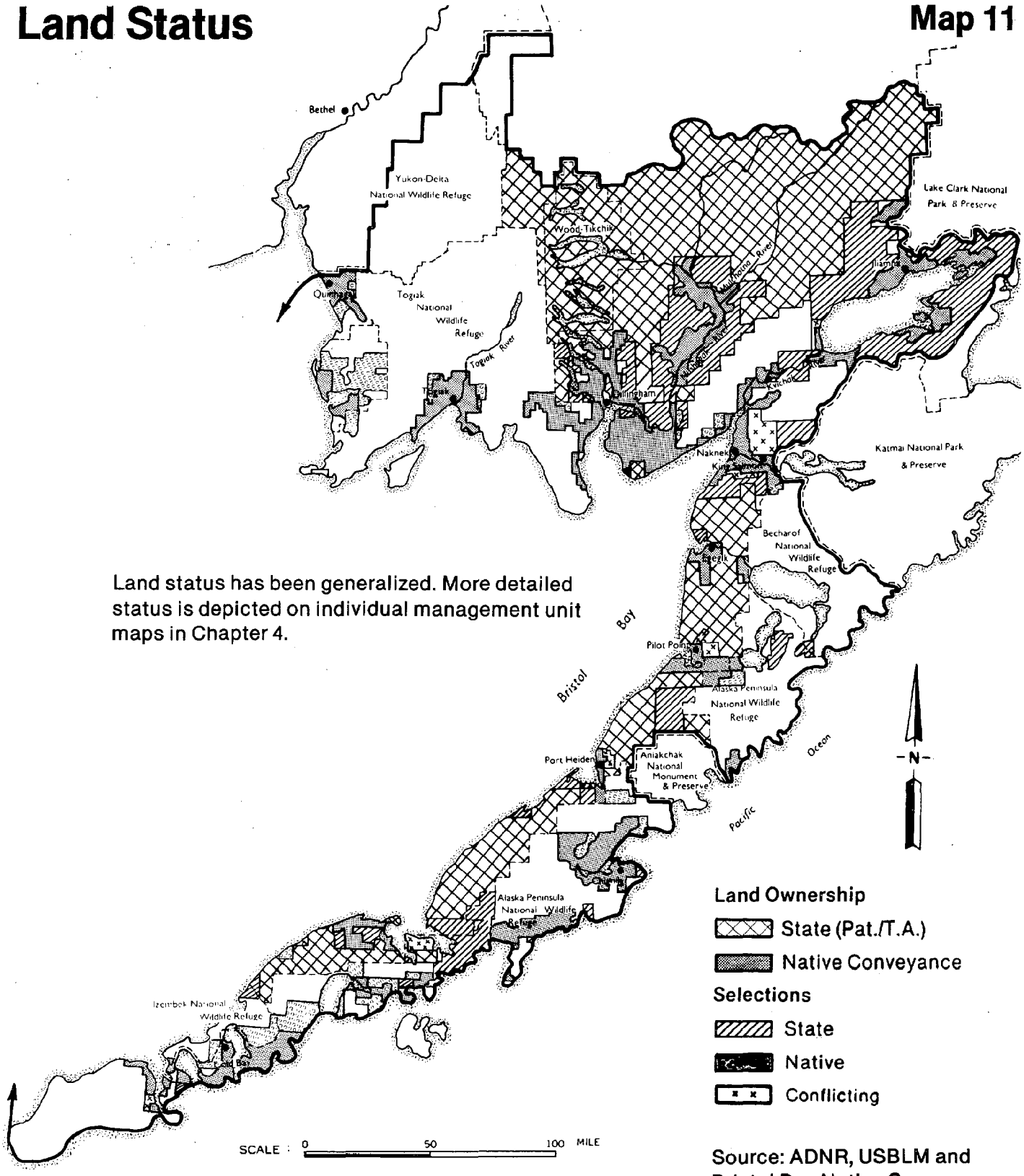
BRISTOL BAY LANDOWNERSHIP IN ACRES

Owner		Approximate Acres
I.	State (excludes shore, tide and submerged lands)	
	A. Patented or Tentatively Approved (TA'd)	9,209,000
	B. Selected	3,740,000
	Total state	12,949,000
II.	Native	
	A. Patented or Interim Conveyed	3,810,000
	B. Selected	760,000
	Total Native	4,570,000
III.	State and Native conflicting selections	240,000
IV.	Federal	
	A. FWS	10,780,000
	B. BLM - with no selections	1,940,000
V.	11(a)(3) State selections on Alaska Peninsula	348,680
	Total land	30,827,000

In addition to subsurface ownership of village land, the Bristol Bay, Aleut, Calista, Koniag, and Cook Inlet regional Native corporations were entitled to select certain lands within the region. The Aleut Corporation has selected considerable acreage on the lower Alaska Peninsula and is also entitled to select

Land Status

Map 11



Land status has been generalized. More detailed status is depicted on individual management unit maps in Chapter 4.

Land Ownership

- State (Pat./T.A.)
- Native Conveyance

Selections

- State
- Native
- Conflicting

Source: ADNR, USBLM and Bristol Bay Native Corp.

8,000 acres of land within some combination of refuges in the Aleut region in exchange for conveying the same amount in subsurface acreage in the Pribilof Islands underlying surface interests now or soon to be owned by the USFWS there. Koniag, Inc., retains certain selections within the Alaska Peninsula NWR and Aniakchak National Monument and Preserve. The Koniag, Inc., selections under ANILCA include only oil and gas rights. Final settlement of Koniag's land selections in the region has been delayed pending the outcome of litigation. Calista and Bristol Bay Native corporation selections are limited mostly to certain historical or archeological sites, but Cook Inlet Region, Inc., has made out-of-region selections of some very small tracts of excess federal lands.

The USFWS also owns the surface estate to various lands on the Alaska Peninsula to which the Aleut Corporation will eventually own the underlying subsurface estate. This situation results from so-called in-lieu selections made under the Claims Act to compensate for subsurface interests the Aleut Corporation did not receive when several Aleut village corporations selected the surface estate to existing wildlife refuges in 1974.

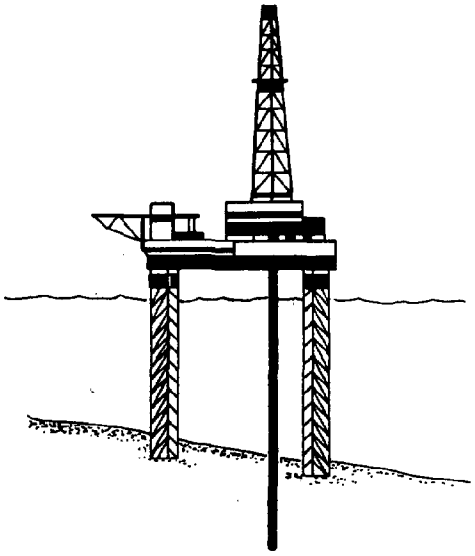
Most village corporations have received interim conveyance of 90 to 95% of their land entitlement. An undetermined amount of the 1,400,000 acres of the remaining Native selected lands will not be conveyed and will remain as federal land or be selected by the state. Most village corporations in this region have relinquished much of their over-selections to help expedite BLM conveyance.

The USFWS lands in the region include all of Togiak, Alaska Peninsula, Becharof, and Izembek NWRs, and parts of Alaska Maritime and Yukon Delta NWR's. Native corporations and the state have inholdings within some of these refuges, particularly the Togiak and Alaska Peninsula NWR's. In ANILCA, Congress designated certain lands within Togiak, Becharof, Izembek, and Alaska Maritime NWR's as Wilderness.

Federal lands shown in white on Map 11 and not labeled as parks or refuges are managed by BLM. Most BLM lands are located to the west of Togiak NWR, near Nyac in the extreme northern part of the region, and southwest of Iliamna Lake. These BLM lands are eligible for selection by the state. The BLM is responsible for managing lands selected by the state or Native corporations until these lands are conveyed to the selector. Native corporations and the state have conflicting selections on 440,000 acres of BLM lands. As BLM completes its land adjudication process for the region, these conflicts will be resolved. The National Park Service manages Lake Clark National Park and Preserve, Katmai National Park and Preserve, and Aniakchak National Monument and Preserve. These lands were excluded from the Regional Plan by Congress.

CHAPTER III

Scoping, Major Issues & Concerns



CHAPTER III

Scoping, Major Issues & Concerns

The Scoping Process

Identifying the issues the plan would address required an open scoping process designed to ensure adequate input from both national and local public and government agencies.

The Alaska Department of Natural Resources (DNR) and the U.S. Fish and Wildlife Service (USFWS) first identified the issues they thought important and asked other agencies to do the same. Then to facilitate both public involvement and scoping, the ALUC's Study Group requested a USFWS employee to manage the activities of the Public Participation Coordinating Committee. This group initiated a public involvement program structured to identify significant national and local issues and ensure adequate public response.

After formal announcement in the Federal Register and introductory statewide publicity, public meetings were held in 15 communities in the region and in Anchorage and Fairbanks over the period from November 16, 1981, to January 16, 1982. These comments were compiled by subject and published in a document as the "Bristol Bay Compendium of Issues."

Three major public involvement efforts ensued. In November and December of 1982, as the various alternatives were developed, the ALUC Study Group publically met with each of the coastal planning boards from the region and with representatives of interest groups to determine if the planning team was considering a reasonable range of alternatives. In several instances, alternatives were modified to include a broader range of options or to reflect suggested public priorities. Summaries of these workshops are available at the U.S. Fish and Wildlife Service in Alaska.

During the period from January through March 1983, the planning team held public meetings in 28 Bristol Bay area villages and in Anchorage. At those meetings management unit recommendations for areas near each village were reviewed, and the alternatives were presented for early public comment. The meetings provided the ALUC Study Group with additional information about public concerns and preferences before they selected the preferred alternative for the draft plan. Records of these meetings are also available at the U.S. Fish and Wildlife Service in Alaska.

In July 1983, a Draft BBCMP and Environmental Impact Statement was made available for a 90 day public review period. In April

1984, a Revised Draft EIS was made available for public review. Four public meetings were held in conjunction with this review and comments were received until June 15, 1984. A summary of issues and comments voiced at public meetings and in letters received during this review is found in Appendix G.

Throughout the planning process, work sessions and Study Group meetings have been open to the public, and several interest groups have followed the plan closely. A detailed summary of the public involvement process is found in Appendix G.

The Issues

The Alaska National Interest Lands Conservation Act (ANILCA) recognized the basic issue in Bristol Bay to be the conservation of natural and cultural resources while providing for economic growth. The specific issues identified during the scoping process developed out of discussions about this basic issue.

Because the scoping process was for both the plan and the environmental assessment of the plan, the agencies and the public raised issues that could be separated into two broad categories: issues concerning land use and issues concerning potential environmental impacts of various land uses and activities.

Land use issues address the current and potential uses of land and resources of the Bristol Bay region. Environmental impact issues serve as the basis for the environmental analyses in Chapter VIII.

Land Use Issues

Fish and wildlife. The fish and wildlife of the region are extra ordinary assets, and the plan must provide for conservation of their habitat and harvest. On this point there seems to be universal agreement. Federal, state, and local governments, sport hunters and fishermen, professional guides, the commercial fishing industry, Native corporations, the oil and gas industry, and individuals from out of state, around the state, and within the Bristol Bay region all attest to the importance of conservation and properly using these outstanding resources. Providing the appropriate degree of protection for fish and wildlife, their habitats, was determined the most significant issue the plan must address.

Oil and gas. The world energy crisis, national goals of energy independence and State energy development programs have aroused interest in searching for oil and gas in "frontier" regions such as the Alaska Peninsula, Bristol Bay and the Bering Sea. Industry and both Federal and State governments rate the region's oil and gas potential as favorable, though no commercial

discoveries have been made. Throughout the scoping process, the energy industry expressed concern that access should be allowed by the plan to areas having oil and gas potential. The state and federal governments and Native corporations all favored allowing oil exploration in the region. Industry also asked that the plan consider provisions for rights-of-way and locations for such production facilities as drilling pads, camps, docks, pipelines, and service roads. The plan thus identifies areas with favorable potential for oil and gas discoveries and proposes alternatives that make areas available for lease consideration.

Outer Continental Shelf (OCS) oil and gas activities in the Bering Sea were identified as a concern by industry and local residents. The OCS, however, was excluded from the study area because ANILCA intended the Bristol Bay Management Plan focus on upland areas. The potential onshore impacts of OCS development, are, nevertheless, an issue for the plan to address.

While some local residents want the economic stimulus of energy development, many have reservations about possible impacts on fish and wildlife. Perceived conflicts with the commercial and subsistence fisheries are an important concern of residents.

Transportation. In order to facilitate development of various resources within the Bristol Bay area, government agencies and the public indicated it may be appropriate to identify potential transportation corridors where roads, pipelines, and other infrastructure features may best be accommodated. Some members of the public also felt it premature to delineate potential transportation corridors when resource development is at this time speculative. Some people have raised objections to specific routes.

Minerals. Some platinum and gold is mined in the Goodnews Bay area, and there is an uncertain level of prospecting for these and other high-value hard rock minerals in several areas within the region. Coal deposits may prove commercially viable in the Chignik and Herendeen Bay areas. Mining interests and some participants in the planning process were anxious that access to areas having known mineral potential remain open and that State policies facilitating mineral development be continued. Mineral development in the region is currently hampered by the high cost of mineral extraction and transportation. Local people; sport, commercial and subsistence fishermen; preservation groups; and government agencies all voiced apprehension that mining, particularly in anadromous streams, would conflict with fisheries.

Settlement. A few people expressed a desire for sales of high quality and accessible land. The State of Alaska has an active remote land sales program, the purpose of which is to provide land for settlement and private ownership. Most people in the region are opposed to State and Federal land disposals because of possible impacts on fish and game resources and on local

lifestyles. This opposition was the primary focus of many village meetings.

Alternate energy and hydropower. Communities in Bristol Bay rely almost exclusively on diesel generators for electric power. Energy costs are high due to the high cost of oil and the inefficiency of the many small-scale systems currently in operation. There is strong local interest in sources of reliable and less expensive power. The Alaska Power Authority and the U.S. Army Corps of Engineers are evaluating several sites to determine their potential for meeting this demand. Most of the large projects being considered, and all of those discussed in the plan, are sources of hydropower. Considerable concern has been voiced regarding the impact of hydropower development on fisheries resources.

Forestry. Despite the limited forest resource in the region, local residents in certain areas are dependent on trees for house logs and firewood. Federal and State agencies and the public both wish to maintain the use of local public forest resources.

Agriculture. Preliminary studies of Alaska's soils and agricultural potential indicated a large area favorable for agriculture in the mid-Nushagak and Mulchatna region. State agencies were interested in exploring this area's agricultural potential, although local residents questioned the feasibility of such development. More detailed soils and climatic research, in part due to this plan, has shown that the area is not presently suitable for large-scale grain or vegetable production. Some areas are suitable for small personal or village gardens, however, and local residents support such use.

Grazing. A few local residents wanted to consider using lands for reindeer grazing. State and Federal agencies, however, were concerned about the potential competition between domestic animals and existing wildlife populations. Reindeer and caribou compete for the same range and, caribou populations could potentially decline as a results of increased competition from reindeer.

Outdoor Recreation. Outdoor recreation is an important regional industry. The region's outstanding natural resources attract many visitors. Guides and lodge owners provide hunting, fishing, and rafting expeditions. While people outside the region are eager to secure public access to the areas with the highest recreational value, local people have reservations about growing recreational use, primarily because they do not want more hunters competing for game and because of existing problems with recreationists trespassing on private lands. Katmai, Lake Clark, and Aniakchak National Parks were excluded from the BBRMP area by Congress; however, use and management of these areas, as well as of Wood-Tikchik State Park, the Alagnak Wild and Scenic River, the Kisaralik and Kanektok Wild and Scenic Study Rivers, and several other recreational rivers were raised as concerns for the plan.

Wilderness. A vast majority of the lands in the Bristol Bay region are wild, comparatively uninhabited, and uncultivated, which are the characteristics required of lands to be included in the National Wilderness Preservation System. Some special interest groups urged planners to undertake wilderness studies on refuge lands mandated in Section 1310 of ANILCA as part of the cooperative planning effort. They did caution, however, that the BBCMP (now BBRMP) should not dictate wilderness recommendations to the USFWS. Development interests are concerned about the vast acreages being studied for possible addition to the National Wilderness Preservation System. Many local people expressed little understanding or interest in wilderness designations. Some are considering it a possible tool to protect traditional lifestyles, but others view it as overly restrictive and impeding progress.

Land patterns. Section 1203 of ANILCA requires the BBRMP to propose land exchanges, additions to conservation system units, and additional state selections in the region. Most of the issues raised regarding land pattern improvements have been generated by particular landowners, based on land management objectives for legislatively designated areas (such as state critical habitat areas or national wildlife refuges). Various Native corporations, the state, and certain interest groups have expressed interest in exchanges that would facilitate land management, resource exploration, and potential development. The interest groups are concerned about the plan's proposed resolution of certain state selections of 11(a)(3) lands on the Alaska Peninsula.

The land use issues gave direction to the Study Group in preparing the range of alternatives discussed in Chapter IV, which provide for alternative patterns of land use in the area. Other significant issues raised but pursued no further in analysis are presented at the end of this chapter, with the reasons they were dropped.

Environmental Concerns

Many environmental impact issues were introduced in public and agency discussions. The impacts of potential development on certain biological species were identified as significant issues. Also identified as significant were issues about potential impacts on human population growth, commercial fisheries, employment and income, and subsistence. Selected issues form the basis for the environmental impact analysis in Chapter VIII.

Impacts on salmon. Bristol Bay is the largest red salmon fishery in the world, and fishing is the most important source of income to the region. The Federal and State agencies and public share concern that any development should have a minimal impact on this resource. Activities such as oil and gas exploration and

development, mining, and construction of transportation systems can affect the short and long-term health of the fishery if they are improperly managed. Public concern particularly focused on the effects of oil and gas and mining on salmon.

Impacts on brown bear. Certain areas within the Bristol Bay region, particularly the Alaska Peninsula, are among the most important brown bear habitat in North America. These animals are important to a broad spectrum of groups. Brown bears are adversely affected by loss of habitat, harassment, and interaction with humans, factors which are often associated with development, settlement or over use for recreation. Most humans are intolerant of bears because of the potential threat to life and property. Brown bear populations in developing areas often experience rapid declines due to this intolerance.

Impacts on caribou. As the most abundant large land mammal in the region, caribou are important to both sport and subsistence hunters. The Mulchatna and Alaska Peninsula caribou herds roam different parts of the region. Although both herds are currently healthy and have long-term viability, concerns about the potential impact of increasing settlement in remote areas and increased developmental activities were expressed often by the public and various agencies. Oil and gas exploration and development in calving grounds and transportation corridors across migration routes were particular concerns.

Impacts on moose. This is another species important to subsistence and sport hunters in the region. Moose populations are generally low to moderate throughout the Bristol Bay region. Many people within and outside the region voiced misgivings about how development and remote settlement might impact this species, whose numbers are according to State officials already somewhat reduced.

Impacts on marine mammals. The bay and its shores are home, at least seasonally, for large numbers of harbor seals, sea otters, walrus, and beluga, killer, and the (endangered) gray whales. Other species are present but less abundant. Traditionally, some of the coastal villages in the Kuskokwim Bay area have relied on marine mammals for part of their subsistence both as food and handy crafts. Concerns about the effects of oil and gas activity and transportation corridors on marine mammals were expressed in villages and by others.

Impacts on waterfowl and shorebirds. The bays, tidelands, estuaries, and lagoons of Bristol Bay provide excellent waterfowl habitat, for which the region is well known. Some areas are important year-round, while others become critical to certain species during their biannual migrations along the Pacific flyway or one of several Asiatic routes. Apprehensions about the possible effects on these birds of oil and gas exploration and development and the construction of transportation corridors to support this development were often expressed.

Impacts on water quality. The importance of fish in the region and the fear that developmental activities might reduce the quality of water critical to their well being constitutes a significant impact issue. Mining and the potential for leaks from oil pipelines were mentioned as particular concerns.

Impacts on population. Although people seemed not to be worried about the prospects of population growth in general, they were apprehensive about the likelihood of intensified competition for the caribou, moose, and other animals important to subsistence and sport hunting as a consequence of the influx of new people. Potential impacts on social services and the demand for housing were also identified as issues. For analytical purposes, it is easiest first to examine the potential impacts on population growth of various activities and then to assess how this growth will affect demand for various resources or services.

Impacts on commercial fishing. Commercial fishing and processing are the main sources of employment for the residents of Bristol Bay. Almost 50% of the full-time jobs held by these residents is related to fishing. The public and State and Federal agencies agreed that potential impacts on commercial fisheries from increased development were major issues. Concern was expressed throughout the region that commercial fishing continue at its present level.

Impacts on subsistence. Many of the people in the region live in small, isolated, socially cohesive communities where subsistence on fish and wildlife resources is a way of life. Subsistence is thus a term that has cultural, as well as economic, significance. In the more traditional villages, strong cultural ties to the land are sustained through subsistence. Many feel that increased levels of remote settlement and development will put pressure on the subsistence lifestyle, and anxieties about this possibility surfaced often in the scoping process. Subsistence lifestyles are not exclusive to Alaska Native peoples but are available and important to all rural residents of the area.

Impacts on employment. Many people in the region, recognizing a need for a more diversified economy, were interested in the various permanent full-time jobs that could be generated by the developmental activities this plan considers. Many wanted to know how many such jobs would be available to the region's residents.

Impacts on outdoor recreation. Recreational hunting and fishing is important in the region, and a vigorous guiding industry relies heavily on healthy animal populations. Recently, non-consumptive types of outdoor recreation have become more popular. The possible impact of increased development on the various forms of recreation concerned many people.

Impacts on historical and archeological resources. The little that is known about historical and archeological resources in the region predicates a long and important history of human

occupation to be explored. Concern that these resources be preserved until scientific investigation can assess their value was frequently encountered within and outside the region.

Impacts on wilderness. ANILCA designates certain lands on Becharof, Togiak, Izembek, and Alaska Maritime National Wildlife Refuges as qualified for inclusion in the National Wilderness System. Some alternatives for this plan identify recommended transportation corridors that may cross wilderness land in Izembek and Becharof NWR, causing concern about the possible impacts on the wilderness area.

Other Issues and Alternatives

Alternatives not included. During the scoping process, several alternatives were given consideration but set aside by the ALUC Study Group. Discussion of why these alternatives were rejected follows.

Early in the planning process, an alternative allowing large-scale agriculture in the region was considered. Preliminary studies by State agencies indicated, however, that the soils and climate in the region would not support large agricultural projects, and the alternative was dropped. This also resulted in dropping an alternative for providing large plots of agricultural lands through the state land disposal program.

Some interest was apparent in large-scale development of forestry in the northern part of the region. This interest decreased, however, when results of a land cover mapping project indicated that the resource could not support major forestry, and the alternative was put aside.

The ALUC Study Group hoped to be able to select an alternative that specified which regional hydropower project was preferred. However, the economic and environmental studies that are necessary before this decision can be made are not yet available; hence, no alternative recommending a specific location for hydropower could be developed.

An alternative for the development of some energy source less potentially damaging to salmon than hydropower was considered. However, no studies have been done that provide enough data to develop a realistic alternative. Alternatives to hydropower are not expected to require a large land or resource base that would necessitate a site-specific recommendation in the regional plan, and therefore, other energy sources were not evaluated.

Alternatives involving large scale land exchanges or reorganization of conservation system units, including some involving lands outside the region, were entertained but dismissed early in the process. An example of an exchange

discussed, but discarded, was exchanging state lands on the Alaska Peninsula to the USFWS in exchange for USFWS lands on the Arctic NWR Coastal Plain (with higher oil and gas potential) or for land in the Kenai NWR (with more access for recreation). It became evident, however, that the state had selected land on the peninsula for its oil and gas potential and wildlife resources and that the USFWS land involved held values that the Interior Department wanted to retain. Neither party was interested enough in giving up large land holdings of this type in order to acquire other lands through exchange. Native corporations were also generally content with their existing neighboring landowners, and were generally not anxious to see such large scale exchanges occur.

Agencies were also reluctant to discuss large scale exchanges of legislatively established state or Federal conservation system unit lands. The USFWS, for example expressed interest in owning all land in State Critical Habitat Areas (SCHA) on the Alaska Peninsula, as USFWS has responsibility to manage migratory birds. The ADF&G and ADNR, however, argued that state legislature intended these areas to be state managed. The public expressed very little interest in exchanges of SCHA lands to USFWS through most of the planning process.

Interest in an exchange of lands in the Togiak NWR surfaced late in the planning process during the review of the draft plan. Although time prevented further study of this issue by the study group, further study of a large exchange involving this area is recommended.

Environmental issues not assessed. There was some anxiety about potential impacts on several fish and wildlife species from developmental activities not addressed in Chapter VIII. These species are shellfish, herring, bottom fish, salmon other than red, fur bearers, raptors, and ptarmigan. Environmental impact analyses were not done on these species because public and agency comments indicated they are not as important in the Bristol Bay region as are those chosen for analysis.

Raptors were not assessed in the analysis, because existing laws provide protection, and it is understood that site specific analysis will be done for developmental activities that may impact these birds. The endangered subspecies of peregrine falcons nest only in a small part of the region. The need to comply with the Endangered Species Act is cited in the management guidelines or in those specific management units where the birds nest.

Concerns were also voiced regarding the impact of this plan on the lifestyle of the region. Rather than address this difficult topic, the analysis focused on the more specific issues of Native and non Native subsistence, commercial fishing, population and employment in order to identify the major impacts on this lifestyle. In an effort to explain the unique nature and

ramifications of the subsistence lifestyle, subsistence was defined to include social and cultural aspects.

Non-planning issues. It would be inappropriate to address, in this document, several issues identified during scoping. One issue of regional concern was a perceived need for additional Native and local participation in the planning process, which was responded to by expanding the Study Group to include a representative of an additional coastal resource service area (Aleutians East CRSA) and a representative of Native interests. People from the Yukon/Kuskokwim area also wished to participate in the planning process. However, most of this area is outside the Bristol Bay region's boundary, and it was felt the existing local and Native ALUC Study Group members could solicit local concerns from the three villages of this region included in the BBRMP area.

The allocation of fish and game populations among Native and non Native subsistence, commercial, and recreational users was another issue of particular concern in the region. State law requires that subsistence users be given priority when there are insufficient fish and game resources to meet all demands. Responsibility for these allocations lies with the fish and game boards in the area. Land use recommendations in the plan should help assure a sufficiency of fish and game for all users; however, this plan will not specifically address these particular allocation issues.

Many concerns about local or site-specific issues were raised during scoping. However, because this is a general plan for a 31 million acre region it was not feasible to address these specific issues, some of which should be dealt with by the more detailed plans being developed by either State or Federal participating agencies after this plan is completed. Specific developmental proposals within the region should receive much more detailed planning, analyses, and environmental impact assessment than is possible here.

Because the map designated by Congress to define the study area was somewhat ambiguous about the marine boundaries, the public and some agencies were interested in planning for the entire bay, rather than for only the state-owned tidelands. The ALUC Study Group decided that the OCS was not intended to be included within the planning area, as Congress intended the plan to focus on upland areas.

During the scoping process, the public and several agencies noted the importance of Unimak Pass to the biology and commerce of Bristol Bay. The ALUC Study Group included Unimak Island and adjacent state-owned tidelands in the study area to assess their resources and to look at potential environmental impacts from oil and gas, transportation, and other development.

CHAPTER IV

Land Use Recommendations and Management Units

CHAPTER IV

Land Use Alternatives

SUMMARY OF LAND USE RECOMMENDATIONS

The following is an overview of the land use recommendations of the Plan. Five alternatives for land use were presented in the draft plan and EIS, and a sixth, the Proposed Plan (Alternative # 1) was included in the Proposed BBCMP (BBRMP) and Revised Draft EIS.

A more detailed summary of the plan is contained in the management unit descriptions that follow this regionwide summary of the plan. Following the management units are the other alternatives considered in the draft plan and Environmental Impact Statements.

The land use recommendations, classifications and management guidelines contained in this Chapter should be implemented on Federal land by the U.S. Fish and Wildlife Service and U.S. Bureau of Land Management upon the Secretary's approval of this plan. Land use recommendations, classifications and management guidelines for state lands are recommendations of the Secretary of the Interior to the State, and shall be implemented through the State's adoption of an Area Plan for state land in the region.

Definitions

Definitions of terms and land uses used in this section of the plan are as follows:

essential habitat: (not to be confused with the formal definition of "critical habitat".) Habitat necessary to support essential life cycle functions of individual fish and wildlife species and provide for the existence and maintenance of local and/or regional fish and wildlife populations. Relative to other geographical areas or habitat designations, essential habitats are the highest valued fish and wildlife areas. Man-induced disturbance and land use changes in essential habitat areas may have severe and immediate impact on local and/or regional populations of fish and wildlife. Within the Bristol Bay area, essential habitat, as depicted on the Fish and Wildlife Distribution Maps, includes: anadromous streams (salmon) caribou calving areas, winter use areas, and migration corridors; brown bear spring use stream concentration areas; moose winter use areas; sea lion haulout areas; walrus haulout areas; harbor seal haulout areas; raptor nesting areas and stream concentration areas; waterfowl spring high use areas and fall high use areas; and marine bird nesting areas.

important habitat: habitat used to support life cycle functions of individual fish and wildlife species are important in

maintaining optimal levels of local and/or regional fish and wildlife populations. On a unit area basis, man-induced development and disturbances in important habitat areas would be expected to have less severe or longer range impacts on local and/or regional populations of fish and wildlife when compared to similar disturbances in essential habitat. Within the Bristol Bay area, important habitat, as depicted on the Fish and Wildlife Distribution Maps, includes: caribou summer use areas; brown bear summer use areas, fall use areas, and denning areas; moose spring, summer, and fall use areas; and waterfowl summer high to moderate use areas.

alternative energy: hydroelectric power, wind power, peat, and geothermal energy are the forms of energy most pertinent to local energy generation in the Bristol Bay region. The plan addresses only hydroelectric projects.

agriculture: refers to the growing of vegetables for home or local consumption, since large-scale agricultural development does not appear to be economically or climatologically feasible within the study area at this time.

commercial and industrial: for the purpose of this plan, these are all uses requiring a plan of operation, lease, development plan, miscellaneous land use permit, contract, or ANILCA Title 11(c) permit.

community expansion: means the sale of private or public land for commercial, industrial or residential development associated with existing communities. Existing communities include all incorporated municipalities and villages recognized under ANCSA. Lands held in trust pursuant to Section 14(c)(3) of ANSCA are considered lands for community expansion, as are any lands within one mile of the Bristol Bay Borough road system.

enclave development: refers to the lease of public lands for self-contained work camps that are used for the life of a project.

feasible and prudent: this phrase is used when the land manager or permitting agency's decision is consistent with applicable laws, sound engineering or management practices and not cause environmental, social, or economic costs that outweigh the overall public benefit gained from general adherance to the intent of the guideline.

A written decision is required to justify a variation from a management guideline modified by the term "feasible and prudent" (see Plan Modification, Chapter VII for detailed explanation).

fish: includes all harvested fish species except blackfish and sticklebacks.

fish and wildlife enhancement: means increasing the quantity of targeted fish or wildlife populations through habitat

manipulation. Habitat manipulation includes, but is not limited to, removal of natural fish blocks in streams, controlled burns, and hatchery programs.

fish habitat: means the marine and fresh waters identified in the Alaska Department of Fish and Game's (ADF&G) Anadromous Fish Stream Atlas or for freshwater fish in the BBRMP Fish Habitat Map, Map 1, Appendix A.

fish and wildlife harvest: the harvest of fish and wildlife species for subsistence, commercial, or recreational purposes.

forestry: the use of timber resources for houselogs, local milling, or firewood, or other local uses. Large-scale commercial forestry potential is limited by the scarcity of forestry resources in the region.

grazing: the use of open range land for the large-scale commercial raising of livestock.

guidelines: Guidance for discretionary actions or decisions made by land managers or regulatory agencies. Guidelines range in their level of specificity and flexibility from simply giving the land manager or regulatory agency general guidance on how a decision should be made or what factors are to be considered, to detailed standards that should be followed when making on-the-ground-decisions. Implementation of all guidelines must be consistent with existing law and federal standards.

land: this designation includes both land and water, and both surface and subsurface resources.

marine waters: means state-owned tide and submerged lands in the study area.

mining: the exploration and development of placer, strip, pit, or underground mining of metallic and non-metallic minerals or coal.

oil and gas: the exploration, development, and production of oil and gas, including all facilities such as service roads, drill pads, flowlines, camps, and all directly and indirectly related facilities associated with oil and gas activities. (Docks and transmission pipelines, however, are considered part of transportation.)

primary use: a primary use is one that is of major importance in a given management unit. Participating agencies should manage their lands to encourage its use, conservation, and/or development. Where a management unit has two or more primary uses that may conflict, the guidelines of the plan or existing regulations or procedures should direct how these potentially conflicting primary uses should to be managed.

recreation: all forms of outdoor public recreational activities, ranging from hunting and fishing to river-floating and snowmachining but specifically excluding organized community recreational programs. Developed public recreational facilities are also encompassed by this term. This term only applies to land management and has no effect on allocation of fish and game. The Boards of Fish and Game are responsible for allocation of fish and wildlife resources between subsistence, commercial and recreational users.

remote cabins: Cabins on state land as defined in AS 38.05.079.

remote settlement: means the sale of state or federal lands outside existing communities to allow private ownership under the state's land disposal programs (e.g. subdivisions, remote parcels, homesites, homesteads) or federal (BLM) disposal programs (e.g. homesteading, trade and manufacturing, homesites, Federal Land Policy Management Act (FLPMA)).

secondary uses: a secondary use is given less managerial emphasis than a primary use because a) it is of lesser importance; or b) its occurrence is very site-specific; or c) the U.S. Fish and Wildlife Service's (USFWS) legal mandates do not recognize this use as primary. In those very site-specific situations where the areas secondary use has higher value than the areas primary use it may take precedence over the primary use. As a general rule, management of a secondary use should recognize and protect primary uses through use of the applicable management guidelines and other applicable regulations or procedures. However, if the application of management guidelines or other regulations or procedures on state land cannot accommodate a secondary use without detrimentally affecting the primary use within a management unit as a whole, it is recommended that the secondary use not be allowed unless appropriate mitigation can be applied to accommodate intent of the unit. Consistent with 304 of ANILCA, refuge plans will determine where secondary land uses are compatible on National Wildlife Refuges (NWR). Other uses not identified as primary, secondary or prohibited should be allowed in the management unit if the use is compatible with the unit's management intent and guidelines and is consistent with state and federal law.

settlement: see remote settlement and community expansion.

should: this word is used to give strong direction and imply a policy and philisophical committment to the intent of the statement. It does allow some discretion by the land manager or permitting agency to deal with contingencies that may not have been identified within the plan. The term implies that the land manager permitting agency will determine the best methods of achieving the same intent consistent with existing law. A written decision is required (for the record) to explain any action or decision that is in variation with a guideline in this plan that uses the term "should."

transportation: oil and gas pipelines, intercommunity roads, railroads, ports, or other major regional transportation systems primarily associated with resource development. Electric transmission corridors are not designated in the plan. Roads, airstrips, airports, or docks associated with community development are not addressed by this plan because of the regional planning scale.

uses not recommended: uses not recommended should not be allowed. Other uses not recommended as primary or secondary should be allowed in the management unit if the use is compatible with the management intent and guidelines of that unit.

wetlands: the term wetlands means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and under normal circumstances do support a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. (33 CFR 323.2(c).)

wilderness: land that has been designated by Congress for inclusion in the National Wilderness Preservation System or that which will be evaluated as to its suitability for possible addition to that system as part of the USFWS refuge planning process. To be included in the system, an area must be undeveloped federal land retained in its primitive character without permanent improvements that is managed to preserve its natural conditions. It offers outstanding opportunities for solitude and may contain national features of outstanding scientific, educational, scenic, or historical value.

wildlife habitat: land and water used by wildlife species during any phase of their life cycle.

The Bristol Bay Regional Management Plan

The Bristol Bay Regional Management Plan (BBRMP) fulfills the provisions set forth in Section 1203(b) of ANILCA which describes the five main purposes of the plan.

The first two requirements of Section 1203(b) state that the plan is:

(1) "To conserve the fish and wildlife and other significant natural and cultural resources within the region, and

(2) to provide for the rational and orderly development of economic resources within the region in an environmentally sound manner."

The plan identifies fish and wildlife habitat and harvest as primary uses in all management units in the Bristol Bay area. In addition, Chapter V of the plan includes management guidelines to guide discretionary decisions toward the protection of sensitive fish and wildlife habitat and cultural resource areas. The plan also recommends several land exchanges, cooperative agreements, and conservation of fish and wildlife and cultural resources.

The plan provides for the rational and orderly development of the region's economic resources. The plan recommends balance by providing for resource development without having development or protection of one resource preclude the use of another economic resource.

The major developed and potential economic resources identified through the exte.sive plan resource inventory are commercial fisheries, outdoor recreation, Native and non Native subsistence, oil an gas, minerals, settlement, agriculture, forestry and hydroelectric power.

Fish & Wildlife

The plan outlines a regional strategy for the conservation of fish and wildlife and other significant natural and cultural resources by identifying fish and wildlife habitat and harvest as primary uses in all 31 management units in the Bristol Bay area. This identification recognizes the region-wide distribution of essential habitat for fish and wildlife important to commercial, recreation and subsistence users. Other uses are also recognized as primary uses of many of these same areas, reflecting consideration of the principle of multiple use land management.

Commercial Fisheries. The commercial fishery is the most important developed economic resource in the Bristol Bay region and provides the basis for most of the economy and the livelihood of the majority of the residents. The region contains the largest red salmon fishery in the world. Overall, more than 10,000 people are employed by the Bristol Bay fisheries annually.

Over 3,500 limited entry or fishing permits have been issued by the State in the salmon and herring fisheries. The average exvessel value for salmon catches (all species) in the study area (1977-1982) has exceeded $150 million annually with the first wholesale value surpassing $250 million in 1982.

In order to provide for the continued rational and orderly development of this renewable resource, the plan recommends to the State, the protection of salmon spawning beds in the lakes and streams of the region within its jurisdiction (see minerals discussion). The plan also recognizes the State's decision to protect the salmon migration path along the coasts of Bristol Bay (see oil and gas discussion). In addition, the plan includes management guidelines to help decision makers assure that other resource development actions do not adversely impact fishery production and sets aside various research management sites to provide for the future management of this fishery.

Subsistence Resources. Subsistence use of fish and wildlife is based on customary and traditional practices of both Native and non Native local rural residents and is a component of the local economy. The most important subsistence resources are salmon and caribou which are used by residents of every community in the Bristol Bay area. The plan recommends protection of these subsistence resources by suggesting to the State various land uses management strategies to protect fish and wildlife habitats and to maintain access to public lands.

Recreational Resources

Bristol Bay contains some of the world's finest sport fisheries. The recreational resources of the area include salmon, rainbow trout, and other sport fish and large game such as caribou, moose, and bear. Wild lands and waterways and spectacular scenery provide opportunities for camping, hiking, canoeing, floating and photography. The fast growing recreational industry in Bristol Bay is second in economic importance only to the commercial fishery and provides $25 to $40 million a year to the State's economy. The rational development of this resource is assisted for through the plan's identification of recreation as a primary use on most public lands, guidelines assisting in the maintenance of recreational resources, a recommended detailed State and Federal recreational development plan for the area, and the identification of numerous access sites that are recommended for public ownership. The plan identifies recreation as a primary use on public lands in management units 3 to 22, 24, 30 and 31 and as a secondary use on most other public lands with recreational value.

Oil and Gas

The Bristol Bay region includes two oil and gas basins that have been sporadically explored during the past 80 years. The state selected several areas on the Alaska Peninsula for their oil and gas potential. It is generally felt that this area has low to

moderate potential for oil and gas discoveries when compared to other areas of the state.

The plan provides for the rational development of oil and gas resources by identifying oil and gas as a primary use on state and Native lands in areas considered to have the most favorable potential for oil and gas discoveries (see map 12). This includes over 3 million acres of state owned land on the Alaska Peninsula south of the Bristol Bay Borough. Oil and gas is identified as a secondary use on lands having moderate and low oil and gas potential, including the Nushagak Peninsula and the Nushagak and lower Kvichak River basins. In addition, oil and gas development has been identified as a secondary use in portions of the Becharof, Togiak and Alaska Peninsula National Wildlife Refuges. Actual determination of refuge areas that may be leased will be based on compatibility determinations in individual refuge plans. Existing wilderness designations on NWR land in management units 2, 4, 5, 15, 30 and 31 prohibits most oil and gas activities.

The plan provides for orderly and environmentally sensitive development by placing priority on upland oil and gas development. The Alaska State Legislature created the Bristol Bay Fisheries Reserve, that includes all shore lands and submerged lands that drain into the area bounded by Cape Menshikof on the south and Right Hand Point to the west, and prohibits surface entry for oil and gas activity in this State area. The plan recognizes the State does not plan to schedule any oil and gas lease sales in the tide and submerged lands of the Fisheries Reserve (Management Subunit 1D). In addition, the plan recognizes that the State is not leasing the tide and submerged lands west and north to Quinhagak, including Togiak and Goodnews Bay, which lie outside the known oil and gas basins, to protect the herring and salmon fisheries (Management Subunits 1A, 1B and 1C). The plan also recognizes that certain bays and lagoons provide essential habitat for fish, waterfowl and marine mammals. For this reason the Plan recognizes the State does not plan to schedule oil and gas lease sales in the Cinder River Estuary, Port Heiden, Seal Islands Lagoon, Port Moller, Herendeen Bay, Nelson Lagoon, Izembek Lagoon, Moffet Lagoon or Bechevin Bay.

The remaining state tide and submerged lands south of Cape Menshikof (Management Subunits 1E and 1F) have been placed by the State's Area Plan in a category that provides for a 10 year (from 1984) delay before leasing. The State has taken this action to provide time to determine what oil and gas resources might be available in the uplands, whether or not OCS areas will be leased offshore, and time to develop technology which the State believes may provide better protection of fishery resources during exploration and development activities.

The plan also provides management guidelines (Chapter V) for oil and gas development to guide discretionary decisions in

developing these vital resources in an environmentally sound manner on the upland areas.

Mineral Exploration and Development

Various known mineral terranes cover parts of the region. However, according to all knowledgeable government and private sources much of the region has not been adequately explored for its mineral potential. A significant portion of the region has been closed to new mineral entry by the United States Congress in its establishment of National Wildlife Refuges and National Parks. Wood-Tikchik State Park was closed to new mineral entry by the State Legislature.

The plan recommends for mineral exploration and development on most uplands that have not been previously closed by state or federal legislation. Minerals has been identified a primary use placed on state and BLM lands in the vicinity of known mineral terranes in the Upper Nushagak (portions of Management Unit 8), Upper Mulchatna (M.U. 9), eastern Iliamna Lake (part of M.U. 10 and all of M.U. 11), Nyac (M.U. 3) and Goodnews Bay (M.U.2) areas. Minerals are identified as a secondary use on the remainder of the available state and BLM lands in the region (see map 13). The plan calls for additional inventory work on mineral potential. The plan outlines provision for access to and across public lands for mineral development purposes.

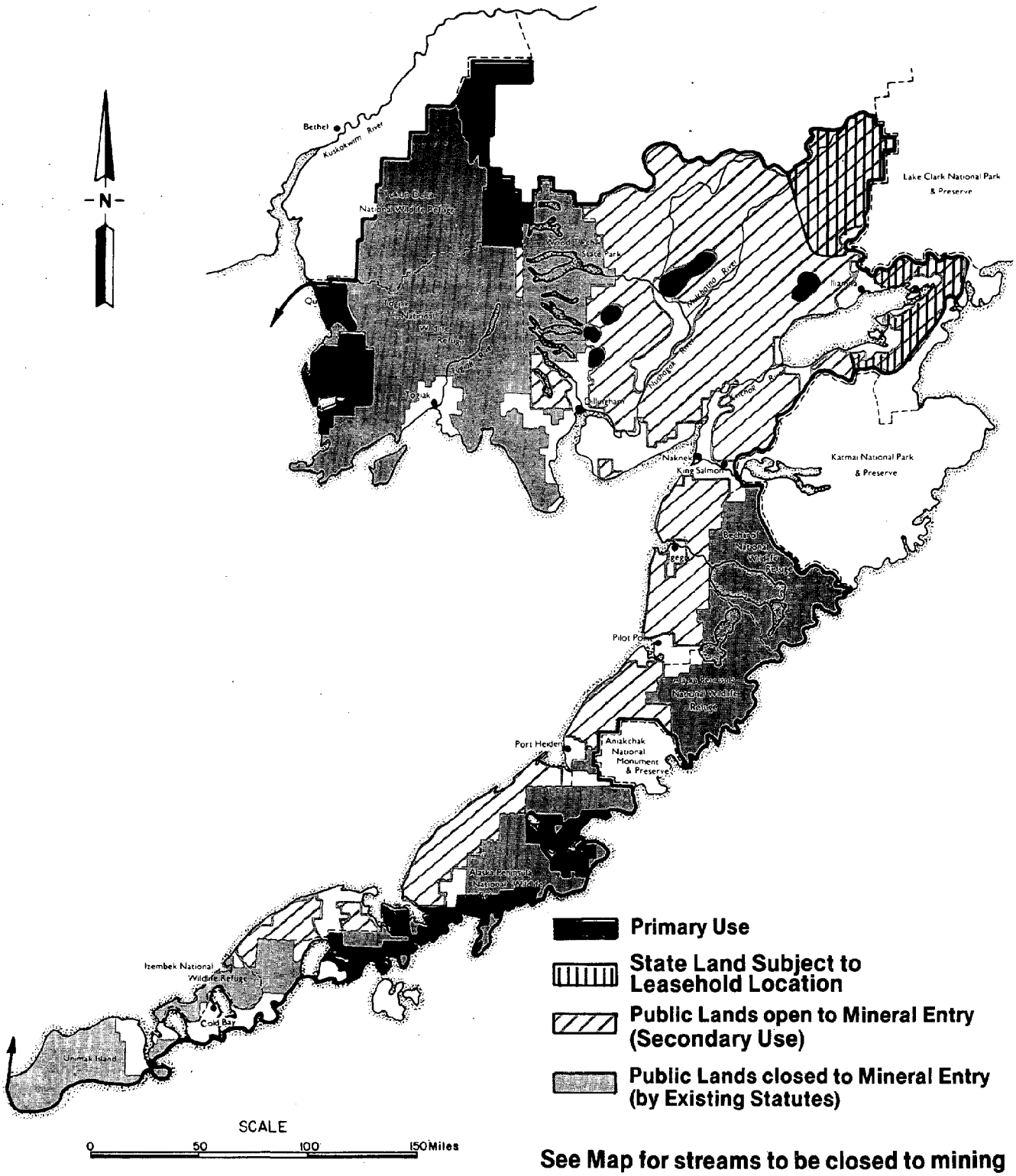
The plan recommends a trade off regarding the existing commercial fishery and recreation resources and possible future mineral development in selected State streams and watersheds. To protect the existing fishery resource, the State DNR closed to new mineral entry the anadromous portion of 64 streams in drainages that provide spawning beds and migration paths for a majority of the Bristol Bay salmon (see maps 14 and 15). These streams also provide some of the finest sport fish opportunities in North America. The State's plan closes those streams where conflicts between mining and other resource values are greatest.

The designated anadromous portion by the State of the following streams (designated pursuant to AS 16.05.870) and any state or state selected uplands 100 feet from ordinary high water (on both sides of the stream) are closed to new mineral entry by the State in accordance with AS 38.05.185:

Nushagak River Drainage
- Nushagak River
- Wood River
- Muklung River (Upper 15 Miles)
- Iowithla River (Upper 15 Miles)
- Kokwok River
- Kenakuchuk Creek
- Kukwuk River
- 325-30-10100-2129-3046-4110 tributary to Kukwuk River
- Klutuk Creek
- Cranberry Creek
- Harris Creek
- Nuyakuk River
- King Salmon River

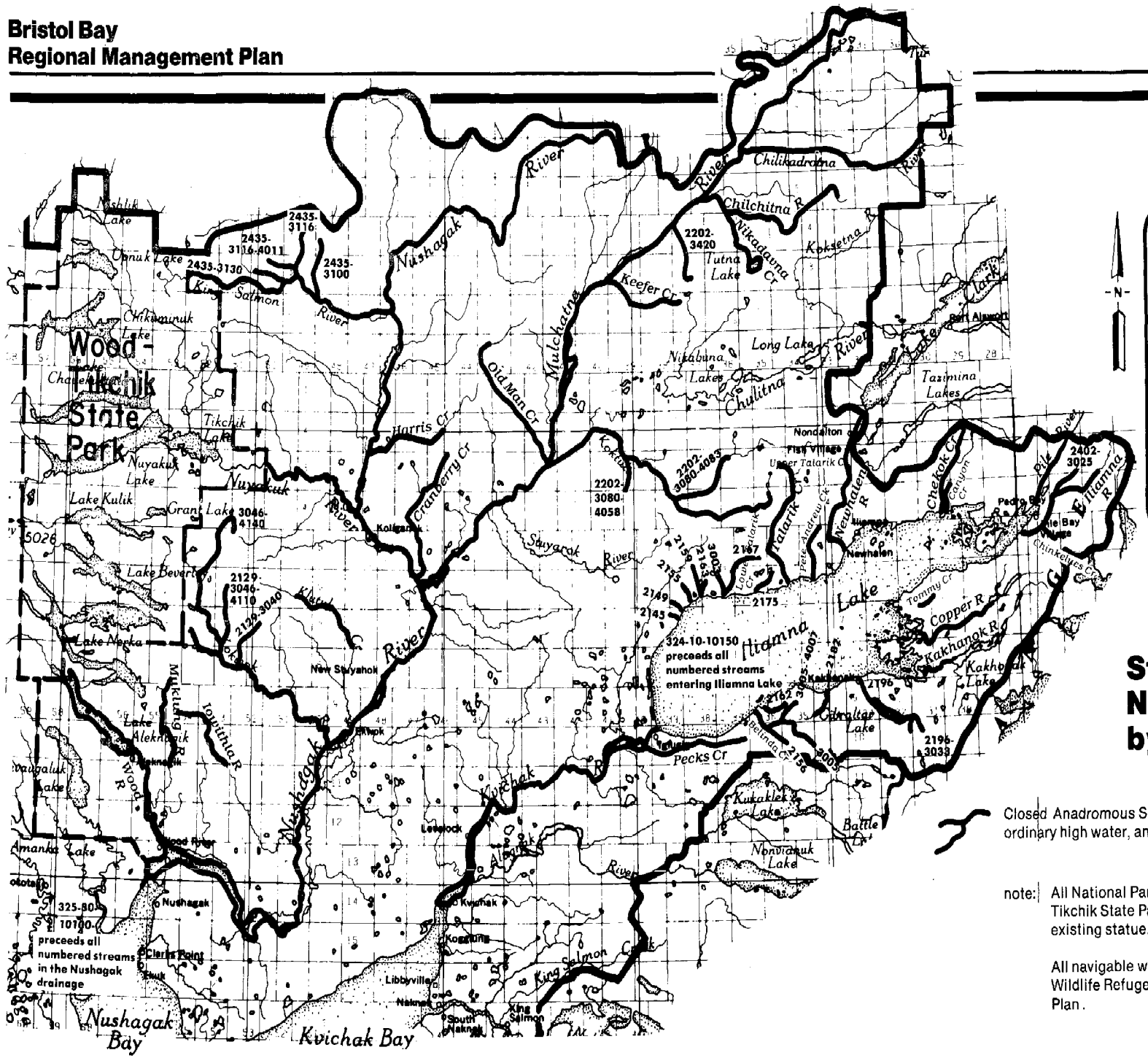
Minerals

Map 13



See Map for streams to be closed to mining by State Plan

Map 14



Streams Closed to New Mineral Entry by State Area Plan

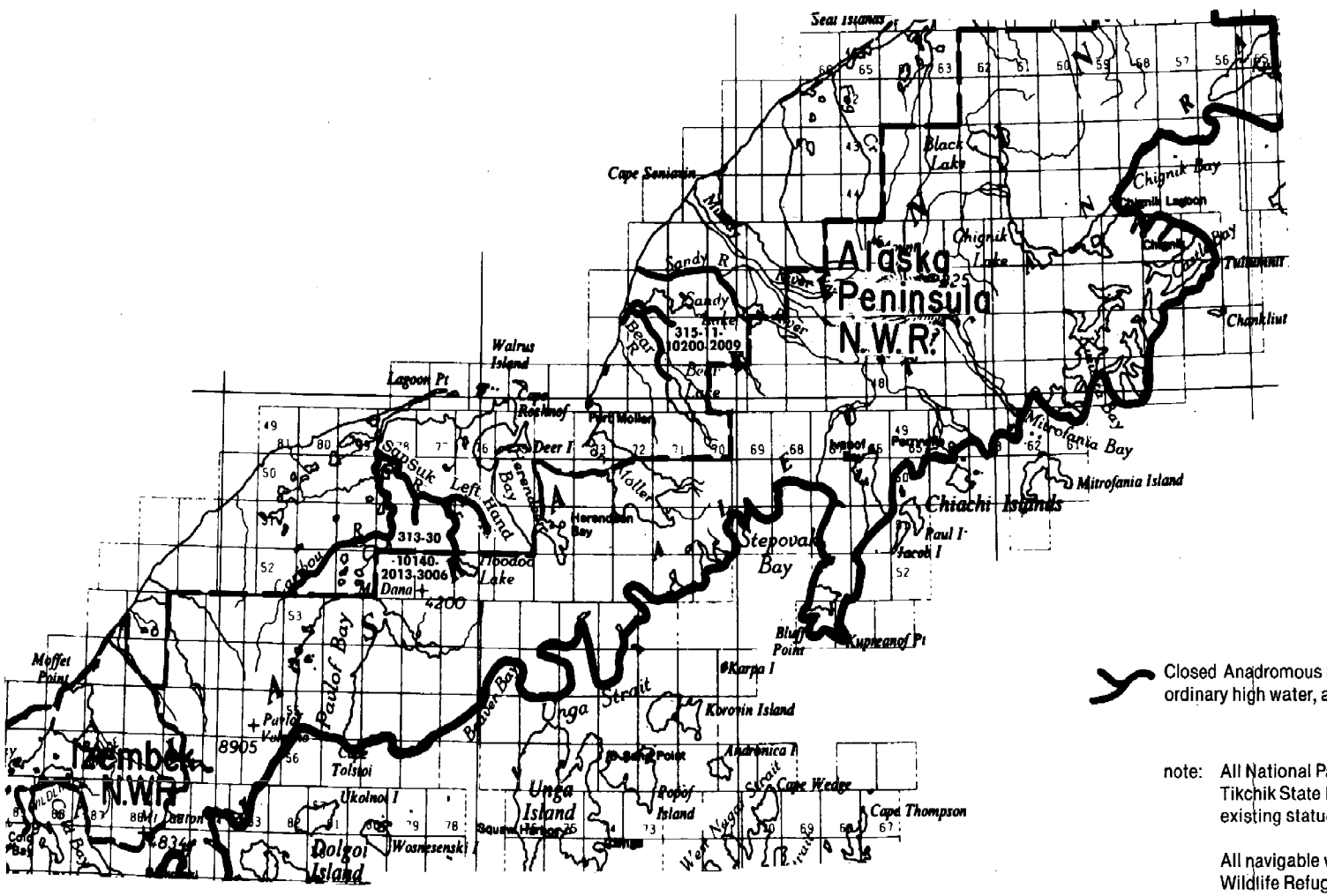
Closed Anadromous Streams, state uplands 100 feet from ordinary high water, and state owned islands to be closed.

note: All National Park, National Wildlife Refuge and Wood-Tikchik State Park land is closed to new mineral entry by existing statue.

All navigable waterways in National Parks and National Wildlife Refuges are closed to mining by the States Area Plan.

Streams Closed to New Mineral Entry by State Area Plan

Map 15



SCALE 1:1,000,000

Closed Anadromous Streams, state uplands 100 feet from ordinary high water, and state owned islands.

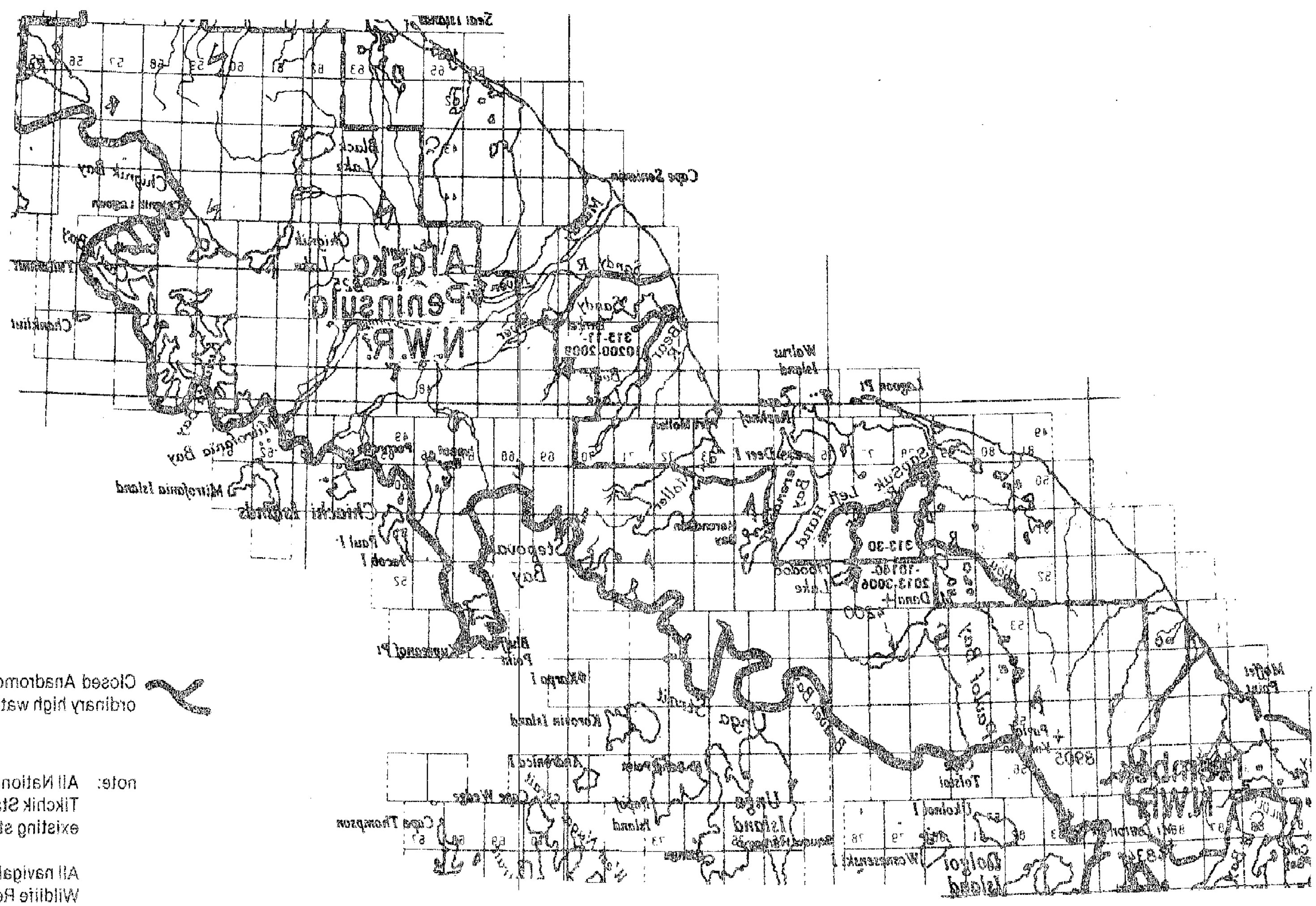
note: All National Park, National Wildlife Refuge and Wood-Tikchik State Park land is closed to new mineral entry by existing statue.

All navigable waterways in National Parks and National Wildlife Refuges are closed to mining in the States Area Plan.

Streams Closed to New Mineral Entry by State Area Plan

Map 15

SCALE 1:1,000,000



Closed Anadromous Streams, state uplands 100 feet from ordinary high water, and state owned islands.

note: All National Park, National Wildlife Refuge and Wood-Tikchik State Park land is closed to new mineral entry by existing statue.

All navigable waterways in National Parks and National Wildlife Refuges are closed to mining in the States Area Plan.

325-30-10100-2435-3100 tributary to King Salmon River
325-30-10100-2435-3116 tributary to King Salmon River
325-30-10100-2435-3116-4011 tributary to King Salmon River
325-30-10100-2435-3130 tributary to King Salmon River
Mulchatna River
Old Man Creek
Koktuli River
325-30-10100-2202-3080-4058 tributary to Koktuli River
325-30-10100-2202-3080-4083 tributary to Koktuli River
Keefer Creek
325-30-10100-2202-3420 tributary to Mulchatna River
Chilchitna River
Nikadavna Creek
Chilikadrotna River

Kvichak/Naknek Drainage
Kvichak River
Pecks Creek
324-10-10150-2145 tributary to Iliamna Lake
324-10-10150-2149 tributary to Iliamna Lake
324-10-10150-2155 tributary to Iliamna Lake
324-10-10150-2159 tributary to Iliamna Lake
324-10-10150-2163 tributary to Iliamna Lake
Lower Talarik Creek
324-10-10150-2167-3003 tributary to Lower Talarik Lake
324-10-10150-2175 tributary to Iliamna Lake
Upper Talarik Creek
Pete Andrews Creek
Newhalen River
Chulitna River
Chekok Creek
Canyon Creek
Pile River
Iliamna River
324-10-10150-2402-3025 tributary to Iliamna River
Chinkelyes Creek
Tommy Creek
Copper River
Kokhanok River
324-10-10150-2196 tributary to Iliamna Lake
Dream Creek
Dennis Creek
324-10-10150-2162 tributary to Iliamna Lake
Belinda Creek
324-10-10150-2156-3005 tributary to Belinda Creek
324-10-10150-2156-3005-4007 tributary to Belinda Creek

North Alaska Peninsula Drainages
Sandy River
Bear River
315-11-10200-2009 tributary to Bear River
Caribou River
Sapsuk River
Lefthead River
Peterson Creek

The Alaska Department of Natural Resources has closed any navigable waterbodies within Togiak, Becharof, Alaska Peninsula and Izembek National Wildlife Refuges and navigable waterbodies in National Parks which drain into Bristol Bay. The upland areas of these refuges and parks were closed to new mineral entry by Congress. These closures will prevent unnecessary conflict with upland management, prevent the filing of undevelopable mining claims and protect fishery and other resources. The streams and lakes to be closed are as follows: Pungokepuk Creek, Quigmy River, Ungalikthluk River, Negukthlik River, Kanik River, Snake River (part), Igushik River (part), Weary River (part), Longhorn Creek (part), Ongoke River (part), Goodnews River, Kanektok River (part), Middle Fork Goodnews River, South Fork Goodnews River, Dog Salmon River (part), Chignik River (part), Black Lake, Alec River, Clark River (part), Meshik River, Lake Clark, Chulitna River, Six Mile Lake, Naknek Lake, Naknek River (part), Nonvianuk Lake, Kukaklek Lake, Nonvianuk River (navigability in question), Alagnak (Branch) River (navigability in question - part), Aniakchak River (navigability in question), Becharof Lake, Upper Ugashik Lake, Lower Ugashik Lake and any additional streams in National Wildlife Refuges and National Parks determined to be navigable by the U.S. Bureau of Land Management.

All sixty-four streams and those within refuges have significant surface uses that may be incompatible with mineral entry. State land in the southern addition to Wood-Tikchik State Park, described in Management Unit 5 and in Chapter 6 is also to be closed to mineral entry.

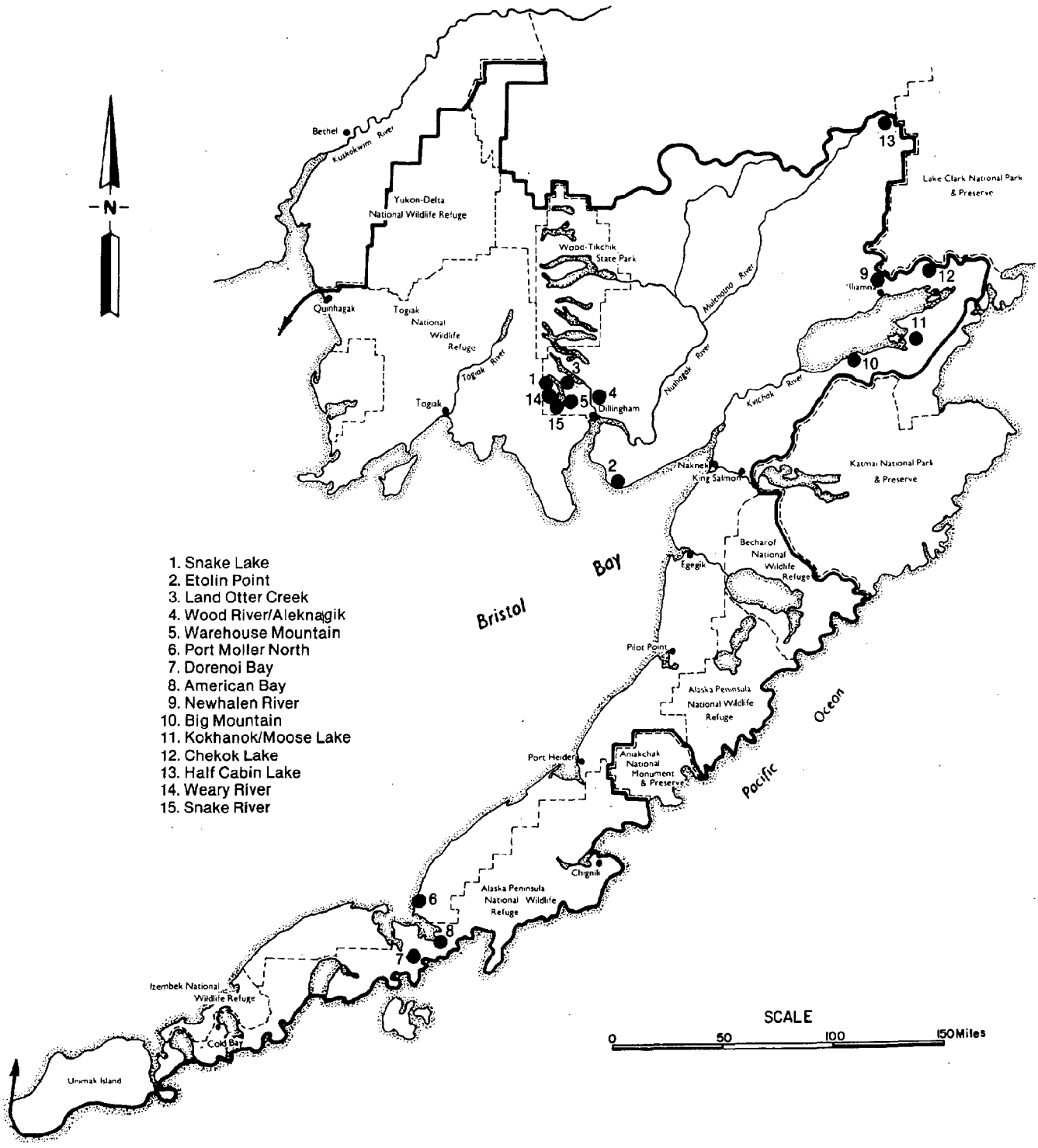
In addition, the plan recognizes that mining activities on State land in the watershed east of Iliamna Lake and in the Upper Mulchatna drainage (all state land in Management Units 9, 10, 11 and part of 12) are subject to the State's leasehold location laws to ensure that mining activities do not adversely affect salmon reproduction. Valid existing mining claims are not affected by these proposals.

Settlement

The plan outlines a strategy for community expansion through the use of community lands and existing private lands (including Native corporation lands). In addition, the plan identifies state land disposals in areas where the land sales should have the least adverse impact on fishery, recreation and subsistence resources. Through extensive analysis of state and BLM lands and public meetings, several areas have been identified (see map 16) as being most appropriate for up to 14,000 acres of state land sales, primarily for recreational purposes, over the next ten years. These disposals are primarily located around the regional center of Dillingham, the Iliamna Lake area, and the southern peninsula area in the vicinity of Port Moller and Cold Bay. This effort represents an attempt to recognize statewide desires to acquire recreational lands in the region, local concerns about the location of such disposals, and at the State's request the need to minimize the demand for additional public services.

Settlement

Map 16



The plan also recommends that DNR sell land in the Iliamna Lake and lower peninsula areas in a specified sequence to minimize the impacts of disposals on local residents. The plan does not necessarily recommend that the DNR sell the full 14,000 acres. If demand for disposals decreases or private land sales increase to meet demand, the state could decrease the amount of land sold.

Specific areas recommended that the State may wish to sell are as follows:

Management Unit 7 - Dillingham Area - Recommend that the State may sell up to 8500 acres from seven (7) disposal areas:

Snake Lake
Land Otter Creek
Warehouse Mountain (re-offering)
Wood River/Aleknagik Road (scattered parcels)
Weary River
Snake River
Etolin Point

Management Unit 9 - Half Cabin Lakes - Recommend that 500 acres should not be sold before 1989.

Management Units 10, 11, 12 - (Iliamna Lake Area) - 3,000 acres recommended to be sold in the following order and should not exceed the listed acreages:

#1 Newhalen River and/or
Chekok Lake - 2 Sites 1,250 Acres
If access to the Newhalen River parcel is unattainable, up to 500 acres could be shifted to other parcels in the Iliamna Lake area. Only 500 acres should be offered at either site in the first disposal.

#2 Kokhanok/Moose Lakes (Not before 1989) 1,000 Acres
#3 Reindeer Bay (Not before 1989) 750 Acres

Management Units 22 and 26 - 1,000 acres between 3 sites, should not exceed 500 acres at the Port Moller site and recommended to be sold in the following order:

#1 American and Dorenoi Bays
#2 Port Moller

Management Unit 30 - Cold Bay - 1,000 acres, most of which should be on land to be acquired from USFWS by exchange.

The plan recommends that DNR issue no more than 50 permits for the construction of trappers cabin throughout the area. The plan recommends against the issuance of remote cabin permits under AS 38.05.079 on any lands in the region.

Transportation

The plan takes steps to guide the development of the region's transportation system when necessary to support resource development.

Specifically, the plan allows for access across the Alaska Peninsula by identifying three preferred trans-peninsula routes (see map 17). These could be used to transport oil or gas from the lease sale areas on the north side of the peninsula or OCS sale areas in the Bering Sea to deepwater ports on the Pacific Ocean and could provide for general transportation and freight transport across the Alaska Peninsula. The plan requires that to the extent legally allowed land managers should avoid actions that may preclude the use of these corridors or potential port sites at their Pacific Ocean terminus. These corridors could be used for pipelines, roads, transmission lines, and transportation or utility systems. A road corridor is also identified from King Cove to Cold Bay. Actual design and construction of transportation facilities across national conservation system units would be subject to the provisions of Title XI of ANILCA and other laws and regulations. The Title XI process could be used to establish alternative routes to those preferred by the Plan through conservation system units.

The following are the general routes identified for these corridors:

Port Moller to Balboa Bay: This corridor runs from the Bering Sea through Portage Valley to Lefthand Bay on Balboa Bay. Several other routes were considered as alternatives to this preferred route, including corridors that terminated at Beaver Bay and Dorenoi Bay. The port site would be on Balboa Bay.

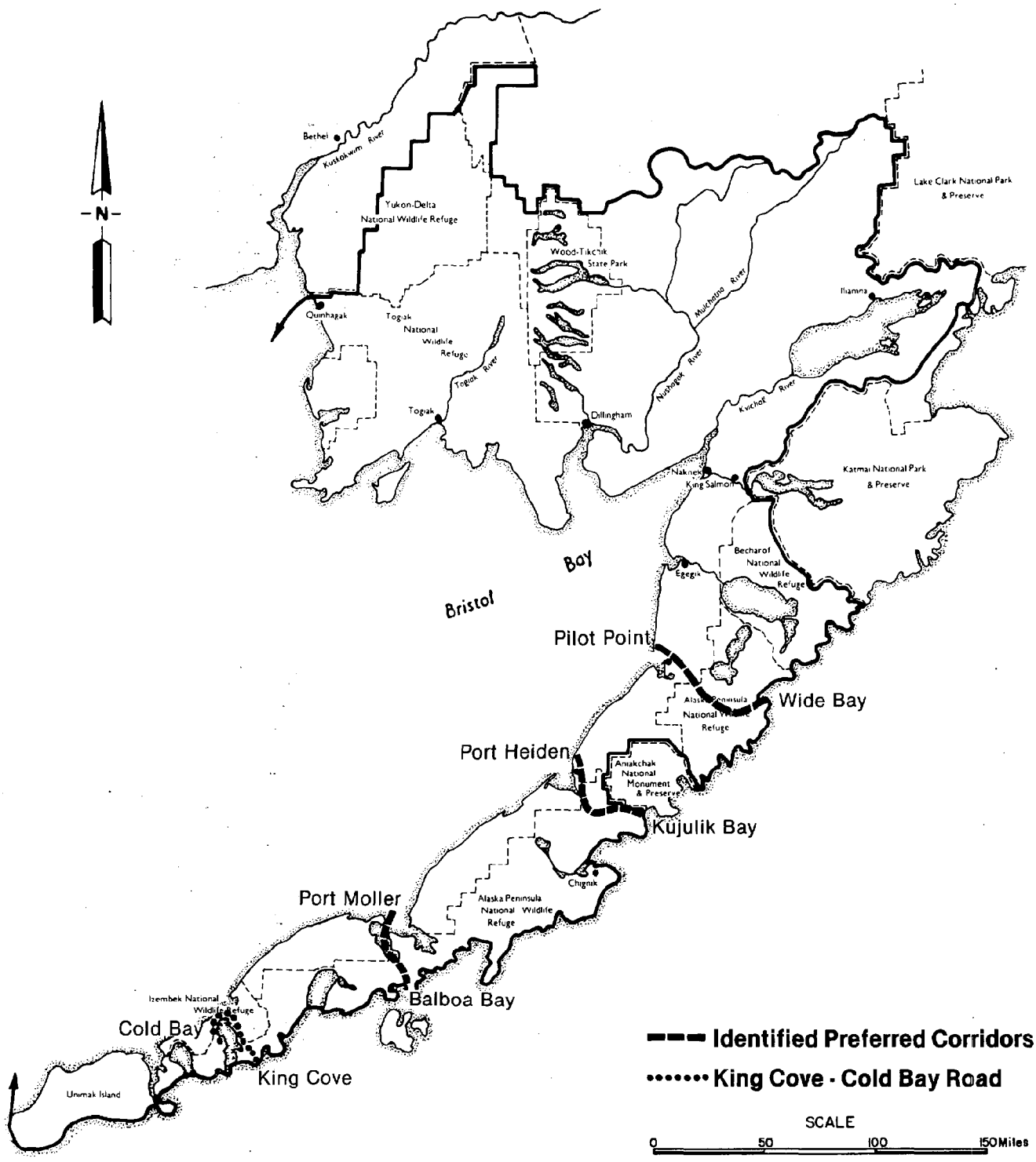
Port Heiden to Kujulik Bay: The corridor begins near Port Heiden, leads southwest to near the base of Aniakchak Crater, and follows the Meshik River Valley. The corridor goes east and then south to Kujulik Bay. This corridor avoids crossing Aniakchak National Preserve. An alternate route (through Aniakchak National Preserve) would run over a low divide in the Aniakchak River Valley to Aniakchak Bay. The port site would be on the north side of Kujulik Bay.

Pilot Point to Wide Bay: The corridor begins near Pilot Point on Ugashik Bay and runs southeast, crossing the Ugashik River near Ugashik village. It continues on the coastal plain north of the Dog Salmon River to south of Ugashik Lake. The corridor continues on past Lone Hill to Wide Bay. The port site would be located on Wide Bay.

King Cove to Cold Bay road: A 32-Mile road to connect the communities of King Cove and Cold Bay could be considered for construction if economically and environmentally feasible.

Transportation

Map 17



The plan also allows for alternate corridors and for connector lines to these corridors, and allows roads and other transportation required to support resource development. The plan discourages intercommunity roads unless local communities want them (see Transportation guidelines, Chapter 5). The plan also identifies transportation (which includes pipelines) as a secondary use in Management Unit 1, most tide and submerged lands of the area.

In order to aid oil development on the Alaska Peninsula, the plan recommends that connecting pipeline corridors up and down the Bristol Bay side of the peninsula be allowed as necessary.

Forestry

Resource analysis completed for this plan concluded that there is not a large scale commercial forestry resource in this region and thus forestry use is reserved for personal or commercial house log, fire wood and construction uses within the region. Forest resources in the Kanektok, Nushagak/Mulchatna, eastern Iliamna Lake and Lake Clark drainages should be managed consistent with land manager's regulations governing such uses.

Agriculture

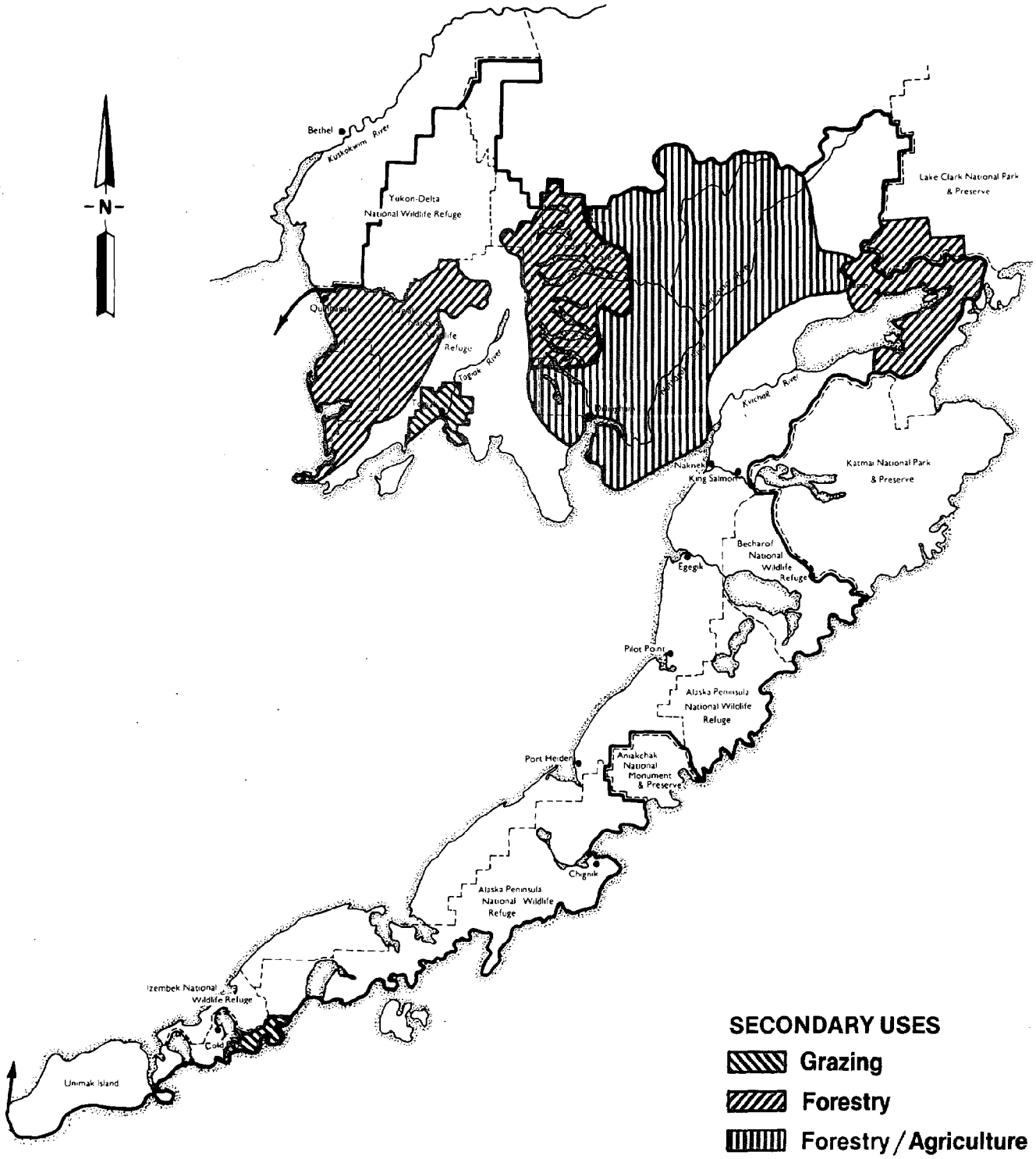
Though a portion of the region was selected by the State of Alaska for its agricultural potential, the resource analysis and U.S. Soil Conservation Service work related to this plan concluded that the region does not have commercial agricultural potential. Consequently, the plan only identifies local agricultural activities to supplement food needs in village areas where cool weather crops can be grown (primarily the Nushagak River villages). Use of most federal lands for large scale grazing is prohibited as large scale domestic livestock or reindeer grazing would compete with existing caribou herds for limited vegetation. Similar prohibitions may be appropriate on most State lands.

Hydropower

At least three alternate hydroelectric power sites are still being examined by the Alaska Power Authority for large hydropower project potential. Since this examination has not been completed, the plan endorses continued study of hydropower options but does not make a recommendation regarding hydropower development. The plan guidelines suggest that any hydropower development not cause a net loss of fish production (see Chapter V). The plan also recommends alternate energy resources, including natural gas, be considered more extensively.

Forestry & Agriculture

Map 18

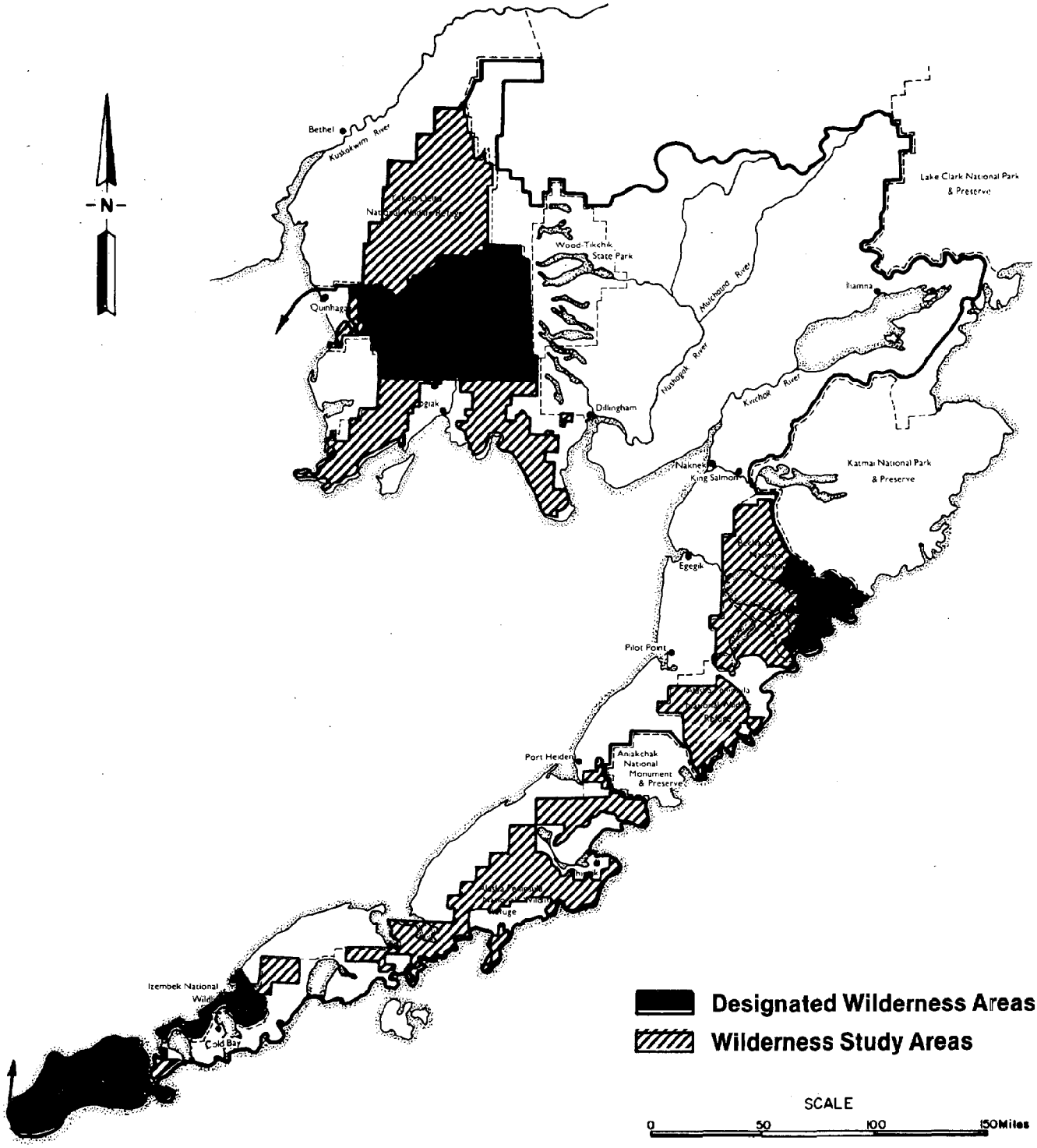


Wilderness

The plan makes no recommendations on additional wilderness proposals. As part of its planning process for the refuges in the Bristol Bay region, the U.S. Fish and Wildlife Service will review non-wilderness refuge lands as to their suitability for possible addition to the National Wilderness Preservation System. This complies with Section 1317(a) of ANILCA, which requires the Secretary of the Interior to review in accordance with Section 3(d) of the Wilderness Act, all non-wilderness refuge lands in Alaska as to their suitability for preservation as wilderness and report his recommendations to the President by 1987. The USFWS will submit the draft refuge comprehensive conservation plans, which will include the wilderness suitability reviews, to the Alaska Land Use Council for their review and recommendations as a part of the refuge comprehensive conservation plan process. Map 19 shows existing designated wilderness areas and wilderness study areas.

Wilderness

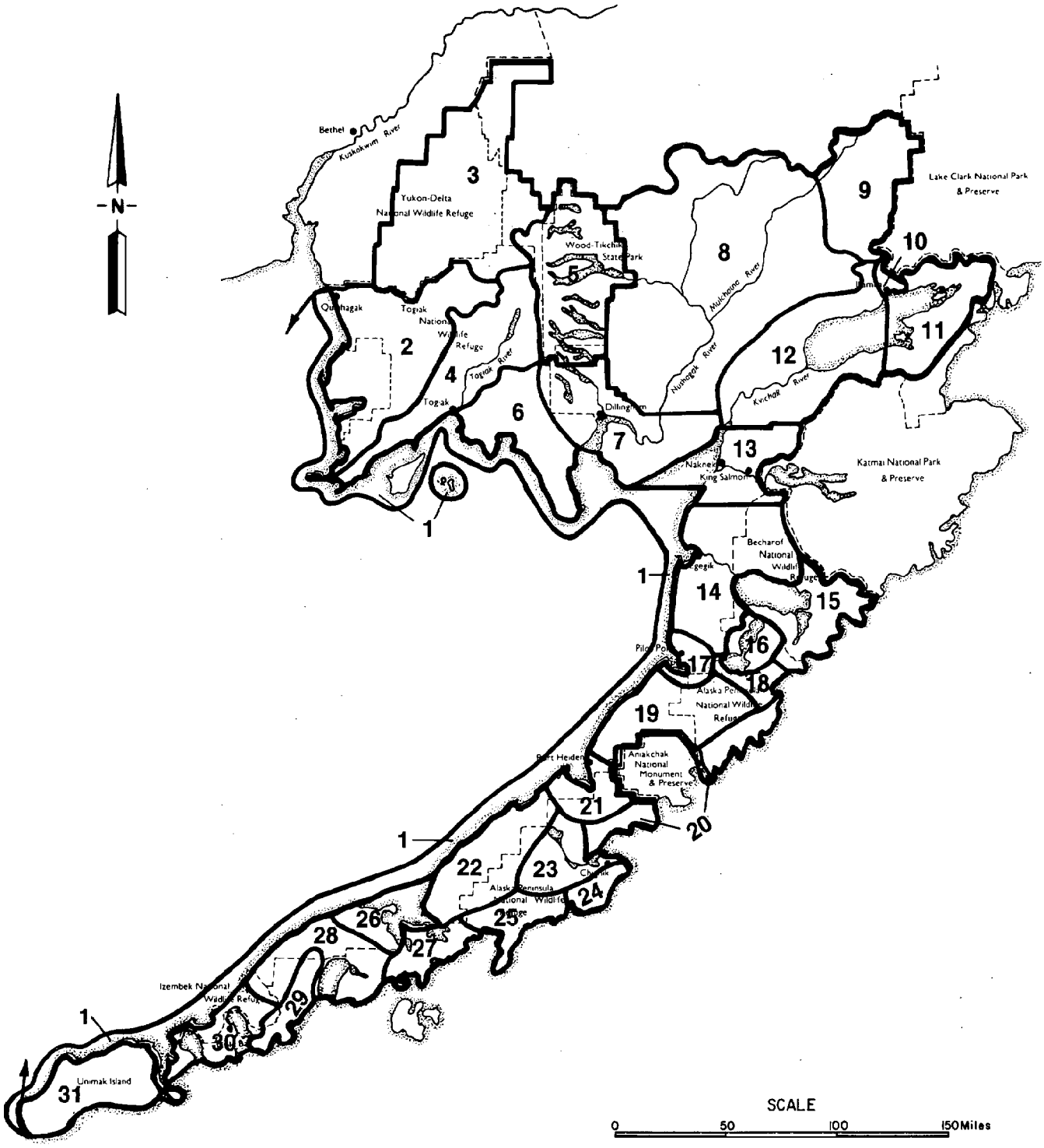
Map 19



Bristol Bay
Regional Management Plan

Management Unit Index

Map 20



Management Units

Unit 1 Tidelands, Submerged State Land, Islands

(Kanektok River to Unimak Pass)

This management unit includes all state-owned tide and submerged lands of the study area, excluding the Bristol Bay Borough, Bechevin Bay, Izembek Lagoon, Herendeen Bay, Nelson Lagoon, Port Moller, and bays on the south side of the peninsula, which are considered part of other management units.

Subunits — This management unit is divided into the following six subunits:

A. Quinhagak to Tongue Point, including Hagemeister Island
B. Tongue Point through Togiak Bay to Rocky Point
C. Rocky Point to the west boundary of the Fisheries Reserve (Kulukak Bay) including Walrus Islands
D. Bristol Bay Fisheries Reserve (Kulukak Bay to Cape Menshikof, including Kvichak and Nushagak bays)
E. Cape Menshikof to Nelson Lagoon (includes Port Heiden)
F. Nelson Lagoon to Unimak Pass

Resource Summary

- The major resource throughout this management unit is salmon, which supports an extensive commercial and subsistence harvest. Herring resources are found mainly in subunits 1B and 1C, supporting a major commercial harvest. Marine mammals include whales, seals, walrus, sea lion, and sea otters. Other wildlife species of importance are waterfowl and seabirds. Part of an oil and gas basin is in subunits 1D, 1E, and 1F, indicating a range of low-to-high potentials.

Management Intent

- This unit should be managed primarily for fish and wildlife harvest and habitat (especially commercial fishing and fish processing) and maintain or enhance public access to these lands and coastal waters.

Primary Land Uses

- Fish and wildlife habitat and harvest, particularly commercial fishing for salmon and herring; subsistence fishing, and subsistence hunting for marine mammals.

Secondary Land Uses

- Transportation (including pipelines).

. Oil and gas exploration and development:

The Department of Natural Resources (DNR) is required by statute (AS 38.05.180(b)) to prepare annually and submit to the legislature a five-year proposal for an oil and gas leasing program. Once a proposed lease sale is placed on this schedule, an analysis of the associated social, environmental, and economic impacts and an assessment of resource potential is made. These analyses and public comments are used by the commissioner of the DNR in deciding which specific areas should be leased.

The State's Area Plan directs that the following areas not be placed on its 5 year lease schedule.

Subunit A - Quinhagak to Tongue Point. Was not placed on the state's five-year oil and gas lease schedule.

Subunit B - Tongue Point to Rocky Point. Was not placed on the state's five-year oil and gas lease schedule.

Subunit C - Rocky Point to Fisheries Reserve. Was not placed on the state's five-year oil and gas lease schedule.

Subunit D - Bristol Bay State Fisheries Reserve (tide and submerged lands within). Was not placed on the state's five-year oil and gas lease schedule.

Subunit E - Cape Menshikof to Nelson Lagoon. State plan allows placement on the state's five-year oil and gas lease schedules, but directs it not be leased before 1994. Does not place lands in Port Heiden, Cinder River estuary, and Seal Islands lagoon on the five-year lease schedule.

Subunit F - Nelson Lagoon to Unimak Pass. The State plan allows placement on the state's five-year oil and gas lease schedule, but directs that it not be leased before 1994. The State Area Plan does not place lands in Izembek Lagoon, Moffet Lagoon, and Bechevin Bay on the five-year lease schedule.

Management Guidelines

The Bristol Bay Coastal Resource Service Area (CRSA) board should consider designation of tide and submerged lands in Nanvak Bay and Seal Islands' lagoon as Areas Meriting Special

Attention (AMSA), as defined by the Alaska Coastal Management Act. Nanvak Bay is essential habitat for migratory waterfowl and shorebirds. Seal Islands' lagoon provides essential habitat for waterfowl, shorebirds, and harbor seals.

- The Aleutians East CRSA board should consider designating Cape Seniavin an AMSA, as defined by the Alaska Coastal Management Act. This area is used by walrus for haulout.

- Reasonable public access should be maintained across and along all public tidelands unless feasible and prudent alternatives exist.

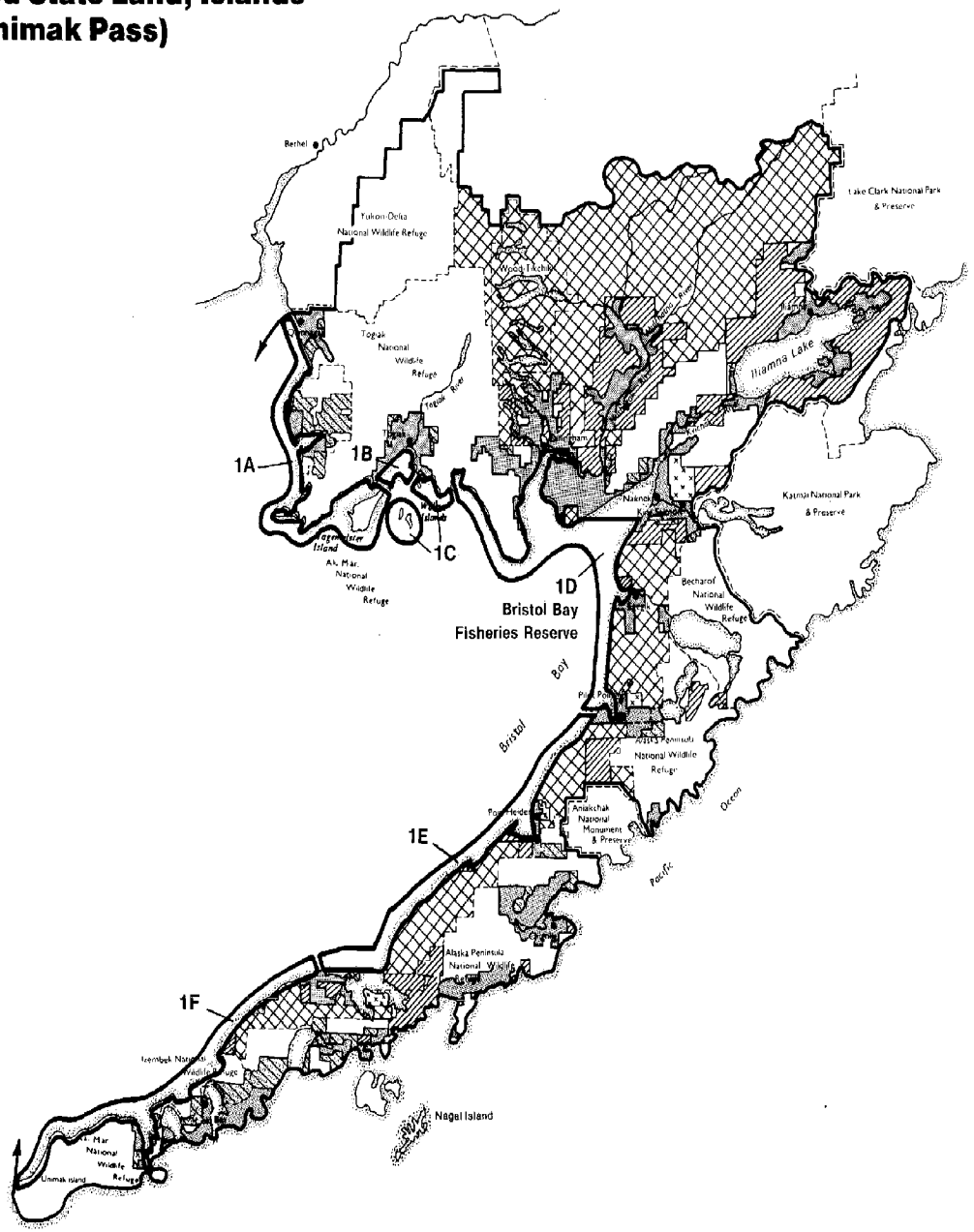
- It is recommended that the reseach and management site on state land on Summit Island, identified by ADF&G, should be reserved for ADF&G use.

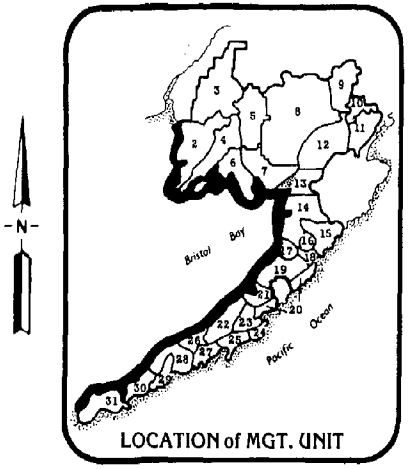
Land Exchanges, Cooperative Agreements

- Cooperative agreements are needed between the DNR and Native corporations that own adjacent uplands to maintain management consistency and provide access for users of state tide and submerged lands (see cooperative agreements in Chapter VI for further discussion).

  It is recommended that the research and management site at Security Cove, identifed by ADF&G, should be reserved for ADF&G's use through a cooperative management agreement with USFWS.

Tidelands, Submerged State Land, Islands (Kanektok River to Unimak Pass)





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

Selections
- State
- Native

LAND USE RECOMMENDATIONS
Primary Use:
Fish & Wildlife
Secondary Use:
Transportation
Oil & Gas

Unit 2 Kanektok, Goodnews

Resource Summary

- The Kanektok and Goodnews drainages support important commercial and subsistence salmon fisheries. The mineral terranes are favorable throughout, indicating a potential for gold, silver, tin, and platinum. Several placer claims are actively mined in this area, including a large platinum mine. This unit also provides essential and important habitat for seabirds, shorebirds, and waterfowl.

Management Intent

- BLM land in this unit should be managed for mining and fish and wildlife habitat and harvest. National Wildlife Refuge (NWR) lands should be managed for fisheries production and harvest, waterfowl habitat protection, wildlife enhancement, subsistence harvest, existing mining activities, and river recreation. Mineral exploration and development on BLM land should follow plan guidelines for mining in and near anadromous fish waters.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Mineral exploration and development on private and BLM lands.
- Wilderness, where congressionally designated.

Secondary Land Uses

- Recreation on public lands along the Goodnews River and the Kanektok River.
- Community expansion settlement at Quinhagak, Goodnews Bay, Platinum, and near active large-scale mineral developments.
- Timber resources should be used for personal uses, such as houselogs and firewood.

Mineral Entry

- Is allowed on BLM lands.
- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

- DNR should close all navigable waterways within Togiak NWR to new mineral entry, including the Kanektok River (part), Goodnews River (part), Middle Fork Goodnews River (part), and South Fork Goodnews River (part).

Land Uses Not Recommended

- Remote settlement.

Management Guidelines

- The USFWS and the ADF&G should jointly develop a strategy to rebuild big game populations.

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

- Inasmuch as most of the Kanektok River is in the wilderness section of Togiak NWR, the ALUC Study Group did not recommend designating it a wild and scenic river, however, it is recognized that special attention will be given the Kanektok River in the Togiak NWR CCP to insure that public use and access problems are adequately managed. This recommendation is consistent with the draft recommendation of the National Park Service's (NPS) Wild and Scenic River Study.

- Calista Corporation, USFWS, USBLM, and ADF&G should study the relative public benefits to be gained from permitting reindeer grazing or the reintroduction of caribou on public lands in Management Units 2, 3, and 4. Based on this study, a recommendation should be made to the appropriate landowners on whether to permit or prohibit either of these activities.

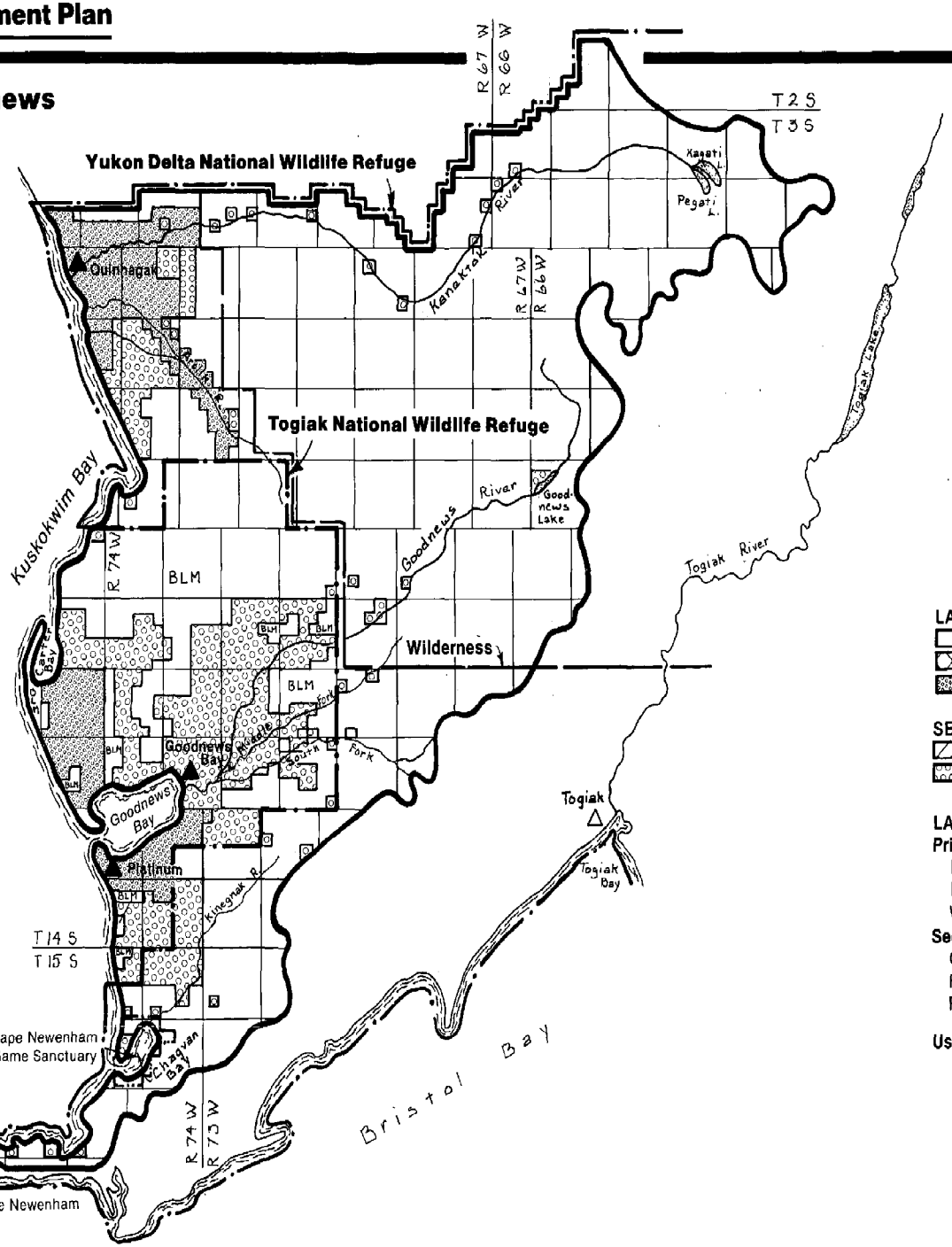
Land Exchanges, Cooperative Agreements, State Selections

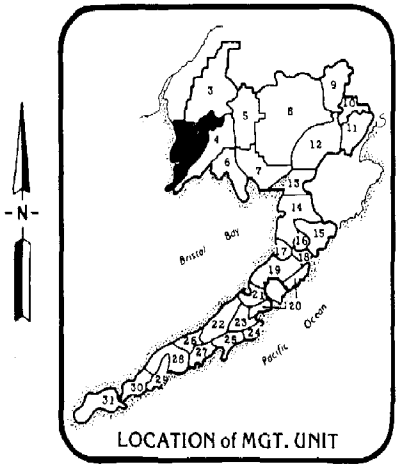
- The plan recommends that ADF&G and Quitsarek Corporation (Goodnews Bay Village Corporation) identify and reserve a research and management site along the Goodnews River, provided that acceptable purchase, lease, or cooperative agreement terms can be developed to satisfy the affected landowners.

- BLM lands near Goodnews Bay are not recommended for state selection, since resource values do not meet state selection guidelines. The BLM should

Management Unit 2

Kanektok/Goodnews





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Minerals on non-refuge lands
- Wilderness, where Congressionally designated

Secondary Uses:
- Community Expansion Settlement
- Forestry for local use
- Recreation on public lands along Goodnews & Kanektok Rivers

Use Not Recommended:
- Remote Settlement

retain land in public ownership open to mineral entry. These lands should remain open to future land selections.

- USFWS and Qanirtuug, Inc. (the Quinhagak village corporation) should establish a cooperative management agreement for land management along the Kanektok River.

Unit 3 Kisaralik, Kwethluk

Resource Summary

- Salmon, which spawn in the rivers of this management unit, are an important resource in the Kuskokwim River region. The Tuluksak, Kisaralik, Aniak, Kwethluk, Eek, and Fog rivers are the major salmon-producing rivers. The mineral terranes are favorable for gold and silver in the northern and eastern portions of the unit. Gold is commercially placer mined in Nyac. The rivers provide recreational potential. The NPS is studying the Kisaralik River for possible inclusion in the National Wild and Scenic Rivers System.

Management Intent

- Manage the area within the Yukon Delta NWR according to the management plan for that refuge. Federal and state lands in the upper Kisaralik/Kwethluk River drainages should be managed for the production and harvest of fish and wildlife and for recreation.

Primary Land Uses

- Mineral exploration and development on state, BLM, and private lands.
- Fish and wildlife habitat and harvest.
- Recreation on public lands.
- Wilderness, where congressionally designated.

Secondary Land Uses

- On BLM lands, FLPMA sales and leases may be used in support of mineral development (see settlement guideline #1, Chapter V).

Mineral Entry

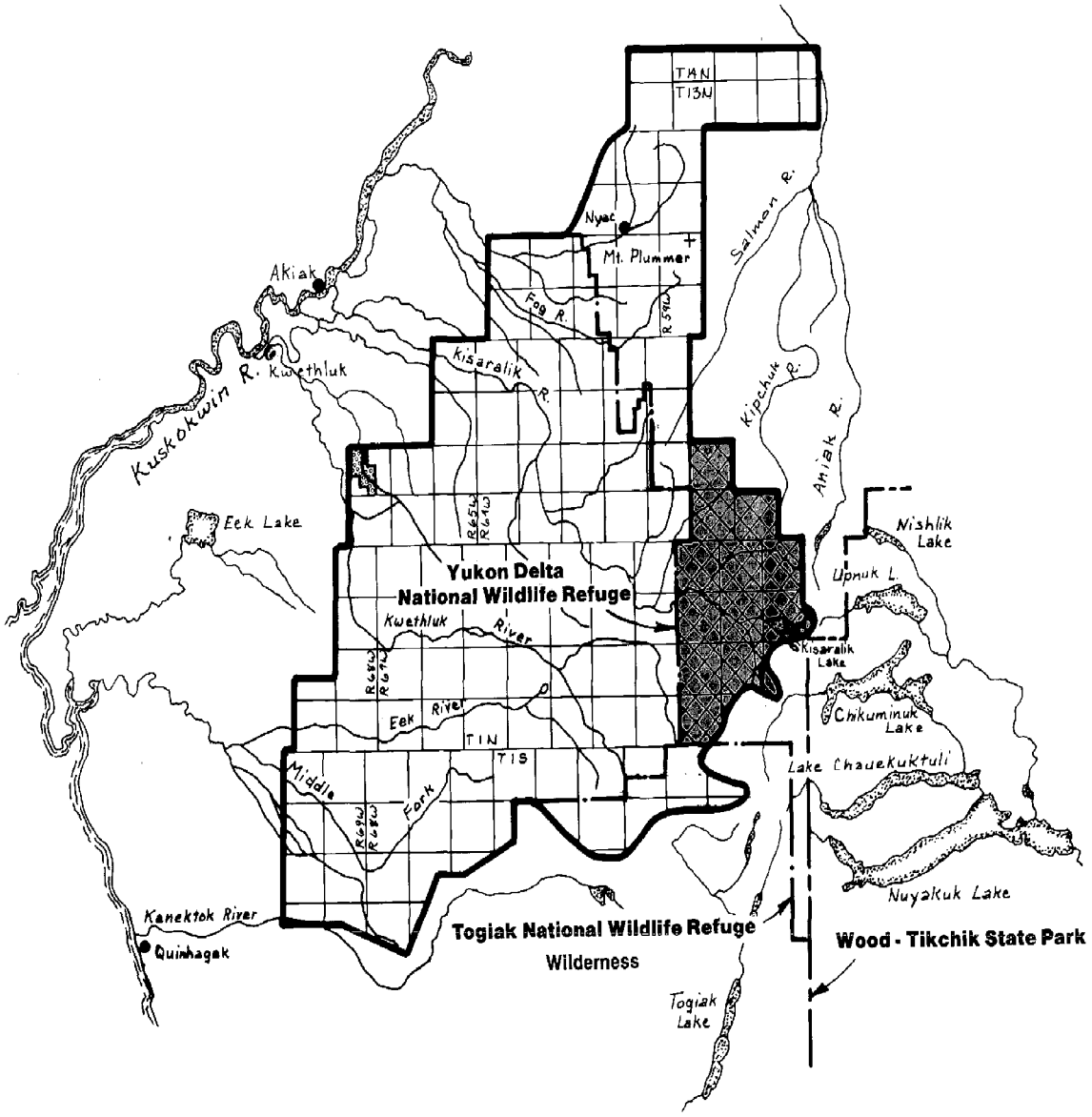
- Should be allowed on all state lands and is allowed on all BLM lands.
- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

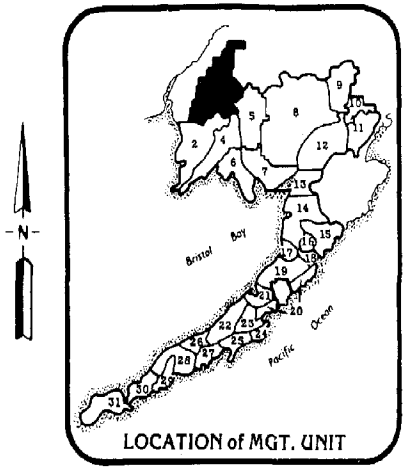
Land Uses Not Recommended

- Remote settlement.

Management Unit 3

Kisaralik/Kwethluk





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

LAND PATTERNS
- Area for Cooperative Agreement

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Minerals on non-refuge lands
- Recreation on public lands
- Wilderness, where Congressionally designated

Use Not Recommended:
- Remote Settlement

Management Guidelines

- The NPS conducted a study of the Kisaralik River for possible inclusion in the National Wild and Scenic Rivers System. The NPS determined that the river was eligible for inclusion in the system, but determined it not suitable. The Assistant Secretary, FWP concurred in this recommendation.

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

- The endangered sub-species of the peregrine falcon (American peregrine falcon) may occur in this management unit. Permits and leases for facilities and activities that are likely to cause disturbance to the endangered peregrine falcons are subject to the conditions of the Endangered Species Act.

- Calista Corporation, USFWS, USBLM, and ADF&G should study the relative public benefits to be gained from permitting reindeer grazing or the reintroduction of caribou on public lands in Management Units 2, 3, and 4. Based on this study, a recommendation should be made to the appropriate landowner(s) on whether to permit or prohibit these activities.

Land Exchanges, Cooperative Agreements: State Selections

- The USFWS and the ADNR should establish a cooperative agreement to ensure protection of the fish and wildlife habitat and recreational resources in the Kisaralik drainage (see cooperative agreements in Chapter VI for further discussion).

Unit 4 Togiak, Cape Newenham

Resource Summary	. This unit supports important herring and salmon fisheries, which provide for commercial and subsistence users. The Togiak River also provides salmon for sport users. Waterfowl is an important wildlife resource for subsistence users in the region. There are also many seabirds in this area. Recreational resource potential is high along the Togiak River, Togiak Lake, and several other rivers.
Management Intent	. Manage this unit for fish and wildlife habitat and harvest and wildlife enhancement.
Primary Land Uses	. Fish and wildlife habitat and harvest. . Recreation on public lands along lakes and rivers. . Wilderness on refuge lands, where congressionally designated.
Secondary Land Uses	. Hydroelectric power on the Kurtluk River. . Community expansion settlement at Togiak and Twin Hills. . Grazing on private land.
Mineral Entry	. ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws. . DNR has closed all navigable waterways within Togiak NWR to new mineral entry, including Togiak River (part), Pungokepuk Creek and Quigmy River.
Land Uses Not Recommended	.
Management Guidelines	. The USFWS and the ADF&G should jointly develop a strategy to rebuild big game populations.

- USFWS refuge managers will continue to educate the public, in order to reduce trespassing by recreational users on Native lands.

- Calista Corporation, USFWS, USBLM, and ADF&G should study the relative public benefits to be gained from permitting reindeer grazing or the reintroduction of caribou on public lands in Management Units 2, 3, and 4. Based on this study, a recommendation should be made to the appropriate landowner(s) on whether to permit or prohibit these activities.

- The USFWS should consider building or permitting public recreational cabins on non-wilderness refuge lands.

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

- State and USFWS lands in the upper Togiak and Wood River drainages are to be managed for fish and wildlife habitat and harvest and public recreation.

Land Exchanges, Cooperative Agreements, State Selections

- The research and management site along the Togiak River, identified by ADF&G, should be reserved for ADF&G's use through a cooperative management agreement with the USFWS.

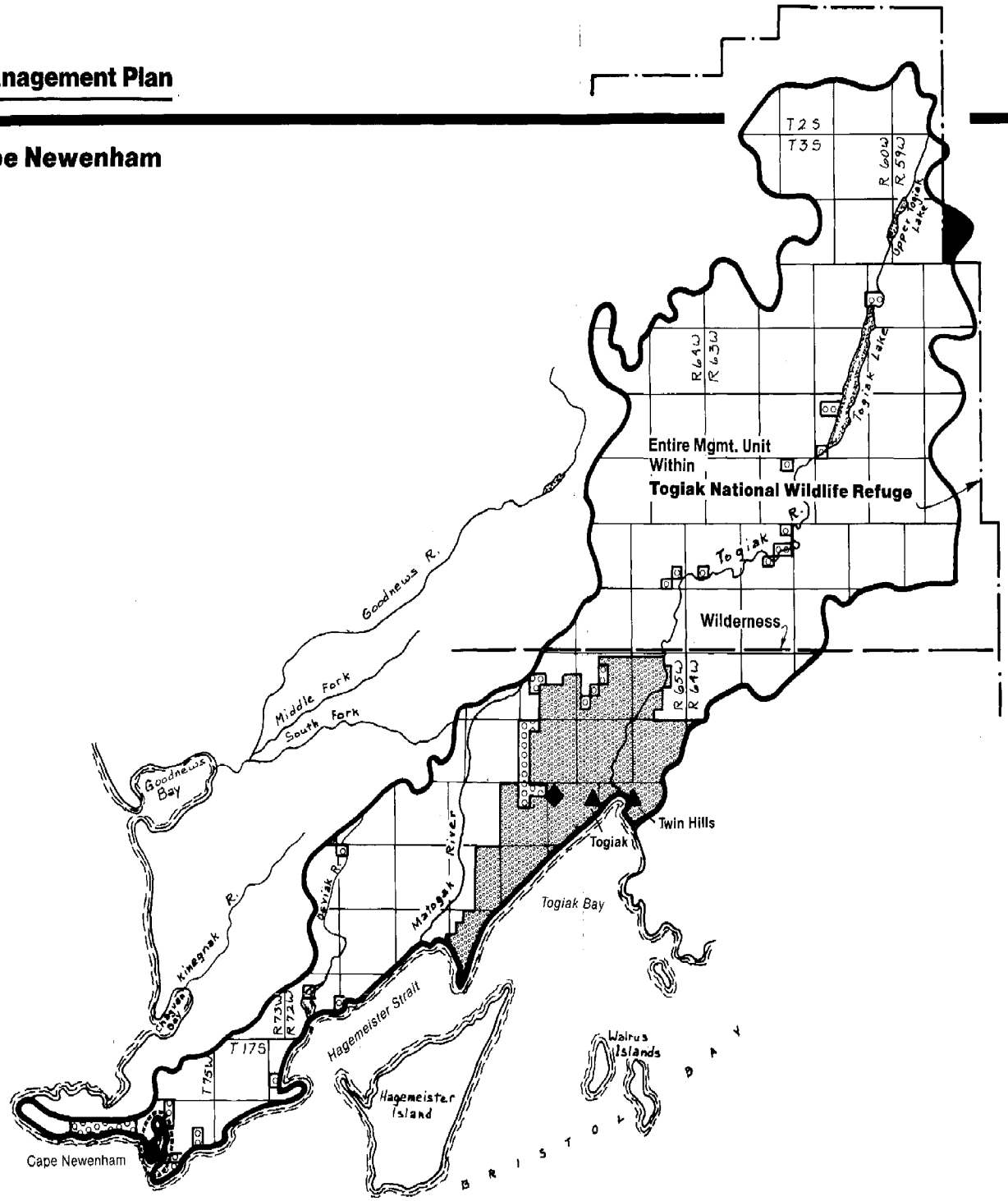
- The USFWS shall address the subject of public use of the Togiak River in the Togiak National Wildlife Refuge Plan.

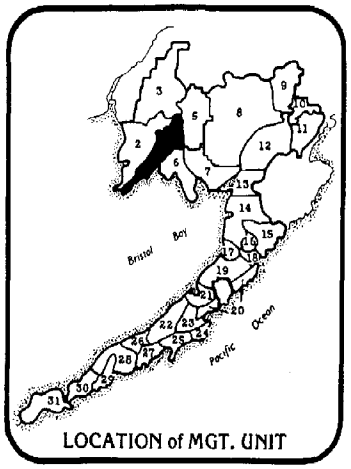
- As part of the Wood Tikchik State Park management plan, the DNR's Division of Parks should evaluate the strip of state land between Togiak NWR and the state park for possible addition to the Wood-Tikchik State Park (see cooperative agreements in Chapter VI for further discussion).

- The research and management site along Gechiak Creek, identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

Management Unit 4

Togiak/Cape Newenham





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Recommended AMSA
- Possible Addition to Wood-Tikchik State Park

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands along all lakes & rivers
- Wilderness, where Congressionally designated

Secondary Use:
- Grazing on native lands
- Potential Hydropower Sites ◆
- Community Expansion Settlement ▲

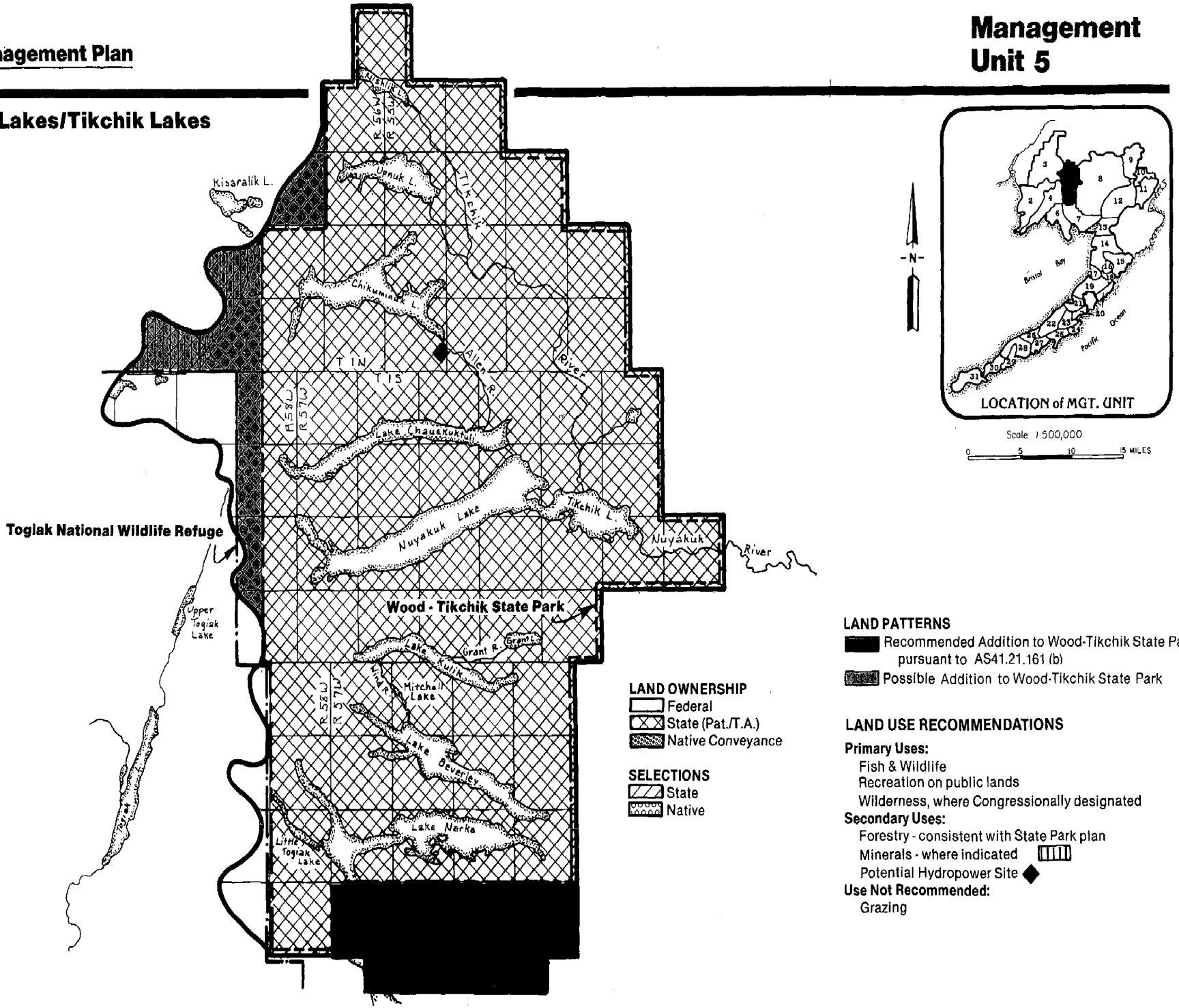
Unit 5 Wood River Lakes, Tikchik Lakes

Resource Summary	. This is an intensive use area for subsistence and sportfishing and for river and lake floating. Recreational resource potential is high, as Wood-Tikchik State Park constitutes most of this unit. Scenic resource values are high. The salmon, trout, moose, brown bear, and some caribou support sport and subsistence users.
Management Intent	. Manage this unit for fish and wildlife habitat and harvest and public recreation. All lands within Wood-Tikchik State Park will be managed as prescribed in AS 41.21.160-167.
Primary Land Uses	. Fish and wildlife habitat and harvest. . Recreation on public lands. . Wilderness, where congressionally designated.
Secondary Land Uses	. Personal use timber harvest consistent with the Wood-Tikchik State Park Management Plan. . Mineral exploration and development outside Wood-Tikchik State Park.
Mineral Entry	. Allowed on state lands outside Wood-Tikchik State Park. . AS 41.21 closes all land and water in Wood-Tikchik State Park to mineral entry. . ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.
Land Uses Not Recommended	. Grazing. . Remote settlement.
Management Guidelines	. Hydropower. The Alaska Power Authority (APA) is studying regional energy development in the area and may develop a hydropower proposal. Chikuminuk

Bristol Bay
Regional Management Plan

Management Unit 5

Wood River Lakes/Tikchik Lakes



Lake, one of the sites still under consideration, is located in this unit. Presently, development of a hydropower project at Chikuminuk Lake is not allowed under the legislation that established Wood-Tikchik State Park (AS 41.21.167).

- State and USFWS refuge lands in the upper Nuyakuk, Nushagak, Togiak and Wood river drainages are to be managed for fish and wildlife habitat and harvest and public recreation.

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

- The research and management sites on state land along the Agulukpak River and at the outlet of Tikchik Lake (Nuyakuk River Fish Pass Investigation), as identified by ADF&G, should be reserved in cooperation with the Division of Parks and Outdoor Recreation for ADF&G use.

Land Exchanges, Cooperative Agreements, State Selections

- As part of the Wood-Tikchik State Park management plan, the DNR Division of Parks, DNR Division of Land and Water Management and the Park Management Council should evaluate the strip of state-owned land between Togiak NWR and the park and other state lands within the park's watershed for possible addition to the park or for a cooperative management agreement (see Chapter VI for further discussion).

- The land near Lake Nerka in T.8S., R.54W.-57W., and N½ 9S., R.55W.-57W., are to be added to Wood-Tikchik State Park. This addition is described in detail in Chapter VI. The DNR, Division of Parks, and the Aleknagik Native Corporation should establish a cooperative management agreement for common land management in those parts of the park addition used by recreationists.

- The USFWS and DNR should explore cooperative management agreements to facilitate the management of lands between Wook-Tikchik State Park and Togiak NWR along hydrographic or watershed boundaries.

Unit 6 Kulukak River, Nushagak Peninsula, Igushik River

Resource Summary

- Salmon and waterfowl resources provide for subsistence, recreational, and commercial users. Recreational resource potential exists primarily in and around Amanka Lake and the Igushik River for fishing and floating. Part of an oil and gas basin is on the Nushagak Peninsula and indicates a moderate potential. Soil resources in a small area near Manokotak indicate some potential for small-scale village agriculture. This unit also provides essential habitat for Beluga whales; there are calving grounds in and around the mouth of the Igushik River.

Management Intent

- Manage this unit for fish and wildlife habitat and harvest.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public lands.
- Wilderness, where congressionally designated.

Secondary Land Uses

- Oil and gas exploration and development on NWR lands, where determined to be compatible with the refuge plan.
- Oil and gas exploration and development on private lands.
- Community expansion settlement at Manokotak and traditional use sites.
- Grazing on private lands.

Mineral Entry

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.
- DNR has closed all navigable waterways within Togiak NWR to new mineral entry, including Ungalikthluk River, Negukthlik River, Igushik River (part), Longhorn Creek (part), and Ongoke River (part) in it's Area Plan.

Land Uses Not Recommended

- Grazing on public lands.

Management Guidelines

- Refuge plans and Native landowners should allow for necessary and appropriate use of uplands adjacent to tidelands used by commercial fishermen. In some areas cooperative agreements or land exchanges may be appropriate.

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

Land Exchanges, Cooperative Agreements, State Selections

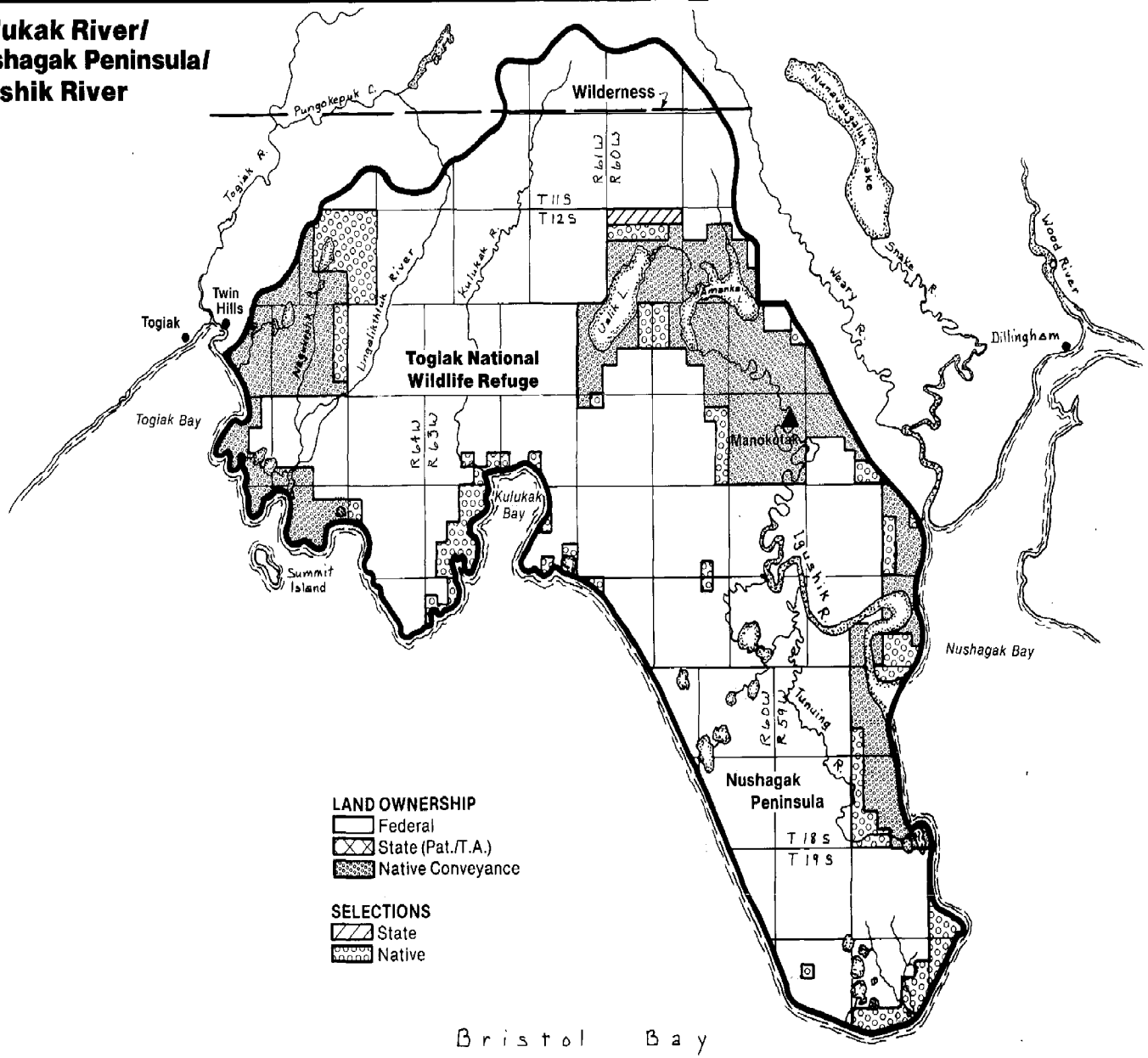
- The research and management sites along the Igushik River (2 sites) and along Metervik Bay, identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

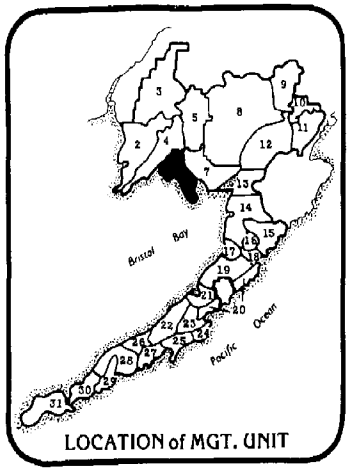
- The state should relinquish its Ualik Lake selection. Although this land does have some fish and wildlife values, it is an isolated block of state land and is difficult for the DNR to manage. No subsurface values have been identified on this tract. USFWS management would achieve the objectives of the plan.

Bristol Bay
Regional Management Plan

Management Unit 6

Kulukak River/ Nushagak Peninsula/ Igushik River





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Wilderness, where Congressionally designated

Secondary Uses:
- Oil & Gas
- Grazing on native lands
- Community Expansion Settlement ▲

Use Not Recommended:
- Grazing on public lands

Unit 7 Dillingham, Snake Lake, Nushagak Bay

Resource Summary

- The Nushagak and Wood rivers support a large salmon run that provides for commercial fishing and fish processing and subsistence use. The lakes and streams are intensively used for recreation. Easy access to and throughout the unit adds to its high recreational values. This unit falls within part of an oil and gas basin considered to have moderate potential. There is some agricultural potential for small gardens around Dillingham. An important local forest resource exists north and northeast of Dillingham. Community expansion potential is high because of the presence of services and other infrastructure around Dillingham.

Management Intent

- This unit should be managed to accommodate increased development while maintaining fish and wildlife habitats. Specific essential fish and wildlife habitats are protected by the State's Area Plan. Commercial fishing is a primary use in this unit. Native corporation subdivisions and other private land should accommodate much of the locally generated demand for community expansion. State land disposals should accommodate community expansion where state lands are suitable and available. State land should also accommodate state and local demand for recreational settlement.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public lands along the Wood River system and the Nushagak River.

Secondary Land Uses

- Oil and gas exploration and development on state uplands, private, and BLM lands.
- Forestry.
- Mineral exploration and development on state and BLM land.
- Remote settlement. The state plans to offer for settlement up to 8,500 acres from the following locations:

.Snake Lake area: vicinity of Snake Lake including: T.10S., R.57W., Sections 5-10, 14-24, 26-28, 30, 34, 35; T.10S., R.58W., Sections 1-5, 8-17, 20-23, 26-29, 33-36; T.11S., R57W., Sections 6, 7, 8, 17; T.11S., R.58W., Section 1.

.Land Otter Creek area: north of Snake Lake Road in T.11S., R.56W., Sections 19 and 20.

.Warehouse Mountain area: in the previously offered remote disposal parcels in T.12S., R.56W., Sections 7-9, 14-23, 26-36.

.Wood River/Aleknagik Road area: state lands in various locations between Dillingham and Aleknagik along the Wood River in T.11S., R.54W.; T.11S., R.55W.; T.11S., R.56W.; T.12S., R.54W.; T.12S., R.55W.; T.12S., R.56W. This includes land east of Wood River, state land between Wood River and the Dillingham-Aleknagik Road, and any land the state acquires within 2 miles of the road.

.Weary River area: in the Weary River Valley in T.11S., R.58W.; T.12S., R58W.; T.12S., R.57W.

.Snake River area: south of Snake Lake in the south half of T.12S., R.57W., Sections 13-36.

.Etolin Point: state land in T.17S., R.54W.; T.18S., R.53W.; T.18S., R.54W.

Mineral Entry

- Is allowed on state uplands, except the following designated anadromous streams and state uplands 100 feet from ordinary high water are closed to new mineral entry:
  - Nushagak River
  - Wood River
  - Aleknagik Lake
  - Nuklung River
  - Iowithla River
  - Snake River (within Togiak NWR)

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

- Remote settlement outside of identified areas.

- Remote cabins.

- Surface entry for oil and gas exploration and development in the state shore and submerged lands, pursuant to AS 38.05.140(f), the Bristol Bay Fisheries Reserve legislation.

Management Guidelines

- DNR should prepare a detailed management plan for state lands in this unit because these lands are close to Dillingham and will receive increased recreational use and pressure for land disposals (see Chapter VII).

- The DNR-DGGS and DOT/PF should identify lands in this unit with sand and gravel potential and DNR should retain ownership of the identified accessible state lands with gravel potential to provide a reliable long-term supply for local use.

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

- Grazing may be permitted on BLM lands where it will not be in conflict with wildlife or wildlife habitat.

Land Exchanges, Cooperative Agreements, State Selections

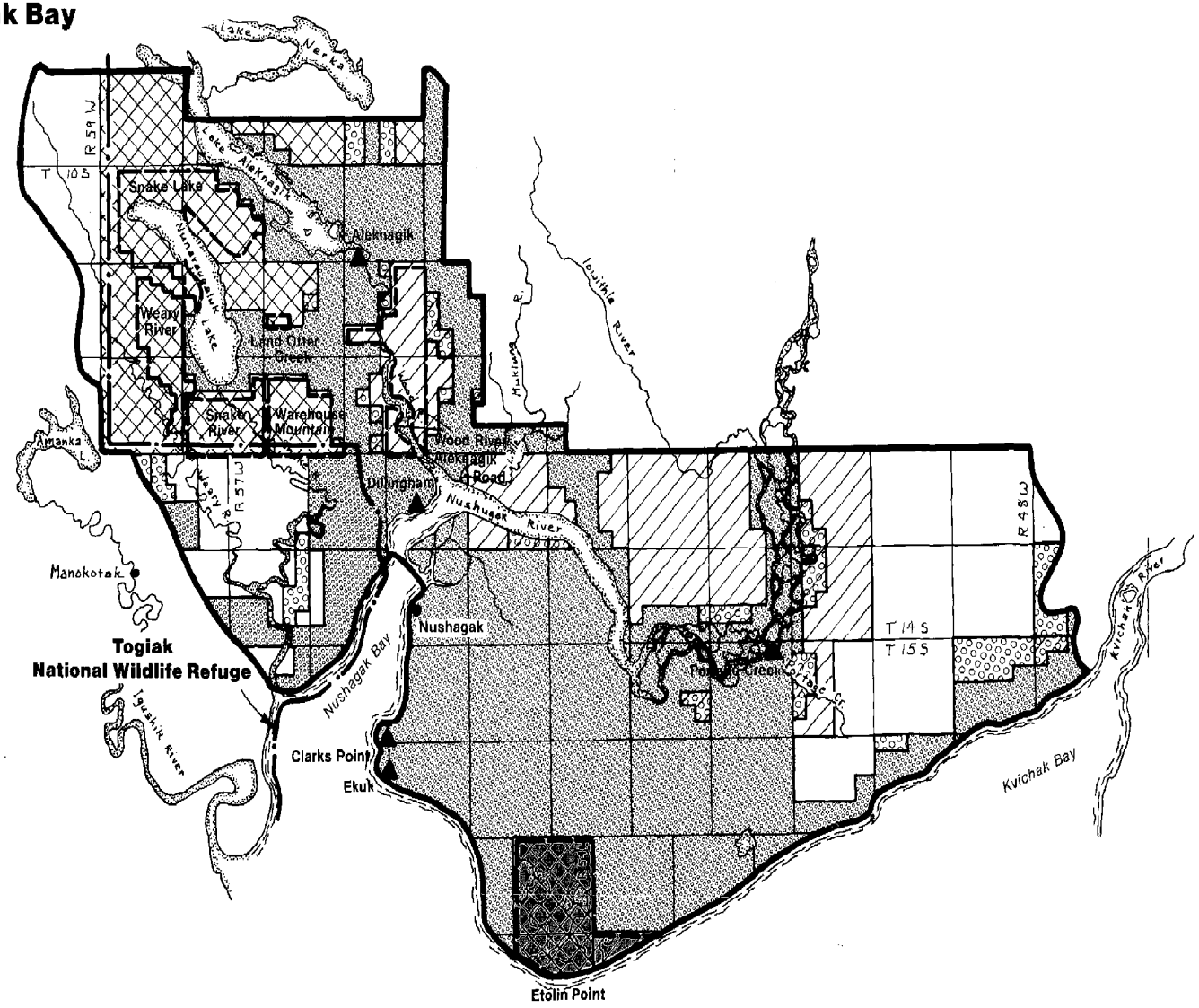
- The research and management sites near the outlet of Aleknagik Lake and along the Agulowok River, Wood River, and Nushagak River, as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

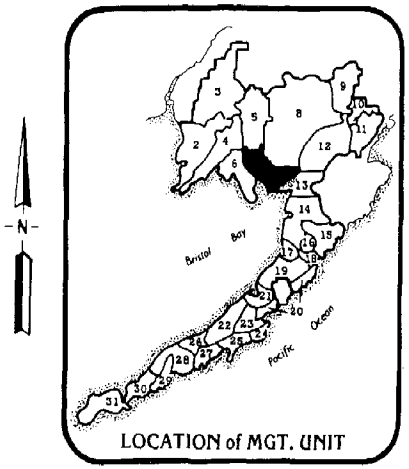
- Etolin Point: The DNR should investigate a land exchange with Choggiung Limited and Bristol Bay Native Corporation (BBNC) because this state selection is surrounded by Choggiung surface lands and BBNC subsurface lands (see land exchanges in Chapter VI for further discussion).

- The DNR should coordinate with the BLM to locate, mark, and manage ANCSA 17B easements.

- The state should not select additional BLM land, as the land does not meet state selection guidelines. These lands remain open for further land selections.

Dillingham/Snake Lake/ Nushagak Bay





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LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Recommended Land Exchange - State to Native Corp.

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Remote settlement
- Community Expansion Settlement ▲

Secondary Uses:
- Oil & Gas
- Village Agriculture
- Forestry for local use

Unit 8 Nushagak, Mulchatna

Resource Summary

- The Nushagak and Mulchatna River drainages support a major salmon resource for subsistence and recreational harvest. Caribou, moose, and some brown bear are also used heavily by subsistence and recreational hunters. Recreational use is most intensive along the Mulchatna, Koktuli, Nuyakuk, King Salmon, Stuyahok, and Mosquito rivers. Part of an oil and gas basin lies in the southern portion of this management unit; a low potential is indicated. Agricultural potential for small village gardens is good in the villages along the Nushagak River. Forest resources along the Nushagak and other major rivers provide important resources for houselogs and fuel.

Management Intent

- This unit should be managed in conjunction with Unit 9 for fish and wildlife habitat and harvest and for recreation.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation, on public lands along the major rivers and streams.
- Mineral exploration and development (where indicated on map).

Secondary Land Uses

- Oil and gas exploration and development.
- Forestry along river drainages.
- Mineral exploration and development on state and BLM lands.

Mineral Entry

- Is allowed on state upland, except the following designated anadromous streams and state uplands 100 feet from ordinary high water which are closed to new mineral entry:

  Nushagak River
  Kokwok River
  Kenakuchuk Creek
  Kukwuk River
  325-30-10100-2129-3046-4110 tributary to Kukwuk River
  Klutuk Creek

Cranberry Creek
Harris Creek
Nuyakuk River
King Salmon River
325-30-10100-2435-3100 tributary to King Salmon River
325-30-10100-2435-3116 tributary to King Salmon River
325-30-10100-2435-3116-4011 tributary to King Salmon River
325-30-10100-2435-3130 tributary to King Salmon River
Mulchatna River
Old Man Creek
Iowithla River (upper)
Koktuli River
325-30-10100-2202-3080-4058 tributary to Koktuli River
325-30-10100-2202-3080-4083 tributary to Koktuli River
Keefer Creek
325-30-10100-2202-3420 tributary to Mulchatna River
Chulitna River

Land Uses Not Recommended

- Surface entry for oil and gas exploration and development in the state shore and submerged lands pursuant to AS 38.05.140(f), the Bristol Bay Fisheries Reserve legislation.
- Remote settlement and remote cabins.
- Grazing on state land (see management guideline for BLM land).
- Large scale agriculture.

Management Guidelines

- Recreational managers (DNR and ADF&G) should educate the public in order to reduce trespassing on Native allotments and private lands.
- Grazing may be permitted on BLM lands where it will not be in conflict with wildlife or wildlife habitat.
- The research and management sites in state lands along the Nuyakuk River (Nuyakuk smolt site), as identified by ADF&G, should be reserved for ADF&G use.

Land Exchanges, Cooperative Agreements, State Selections

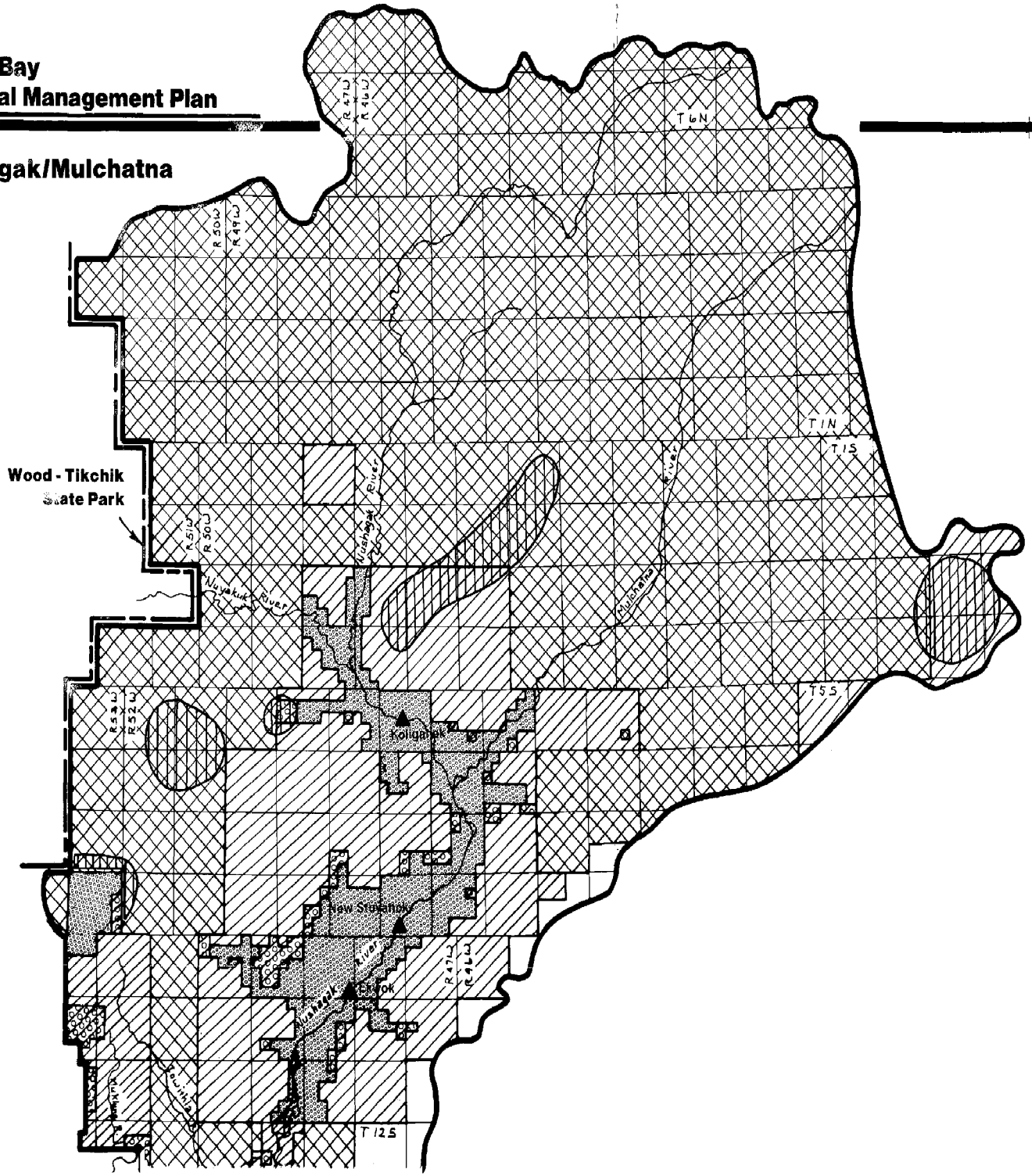
- The research and management sites along the Nuyakuk River (Nuyakuk Tower site), as identified by ADF&G, should be reserved by purchase, lease, or cooperative agreement between the ADF&G and appropriate landowner(s).

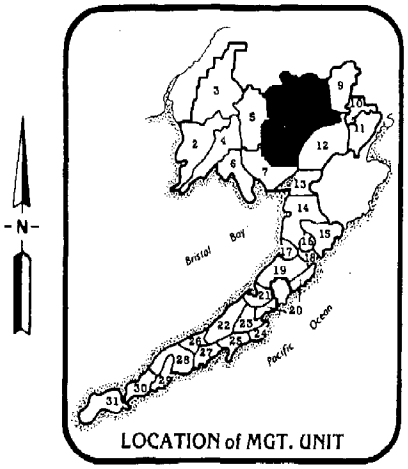
- Kvichak/BLM land: The state should not select BLM land, as these lands do not meet state selection criteria. These lands will remain open for future land selections.

Bristol Bay
Regional Management Plan

Nushagak/Mulchatna

Management Unit 8





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LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Minerals - where indicated

Secondary Uses:
- Forestry for local use
- Oil & Gas
- Community Expansion Settlement ▲
- Village Agriculture

Uses Not Recommended:
- Large Scale Agriculture
- Grazing on public lands

Unit 9 Upper Mulchatna

Resource Summary

- Recreational fishing and hunting are major resource uses in this management unit. Wildlife resources of importance include caribou, brown bear, and moose, which provide for recreational and subsistence users. Mineral terranes are potentially favorable for gold, silver, copper, tin, tungsten, molybdenum, lead, and iron.

Management Intent

- Manage this unit in conjunction with Unit 8 for fish and wildlife habitat and harvest and river-oriented recreation. Mineral exploration and development should be permitted subject to the State's Area Plan.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public lands.
- Mineral exploration and development.

Secondary Land Uses

- Remote settlement. Recommend the state only offer land for settlement in the Half Cabin Lake area, up to 500 acres in T.8N., R.32W., Sections 1-24; T.9N., R.31W., Section 19-36.

Mineral Entry

- Is allowed on state lands subject to leasehold location as required by the State's Area Plan (except those areas listed below).
- The following anadromous streams and state uplands 100 feet from ordinary high water are closed to new mineral entry by the State's Area Plan:
  - Mulchatna River
  - 325-30-10100-2202-3420 tributary to the Mulchatna River
  - Chilchitna River
  - Nikadavana Creek
  - Chilikadrotna River
  - Chulitna River

Uses Not Recommended

- Remote settlement outside of identified areas.
- Remote cabins.
- Grazing on state lands.

- Surface entry for oil and gas exploration and development in the state shore and submerged lands, pursuant to AS 38.05.140(f), the Bristol Bay Fisheries Reserve legislation.

Land Exchanges, Cooperative Agreements, State Selections

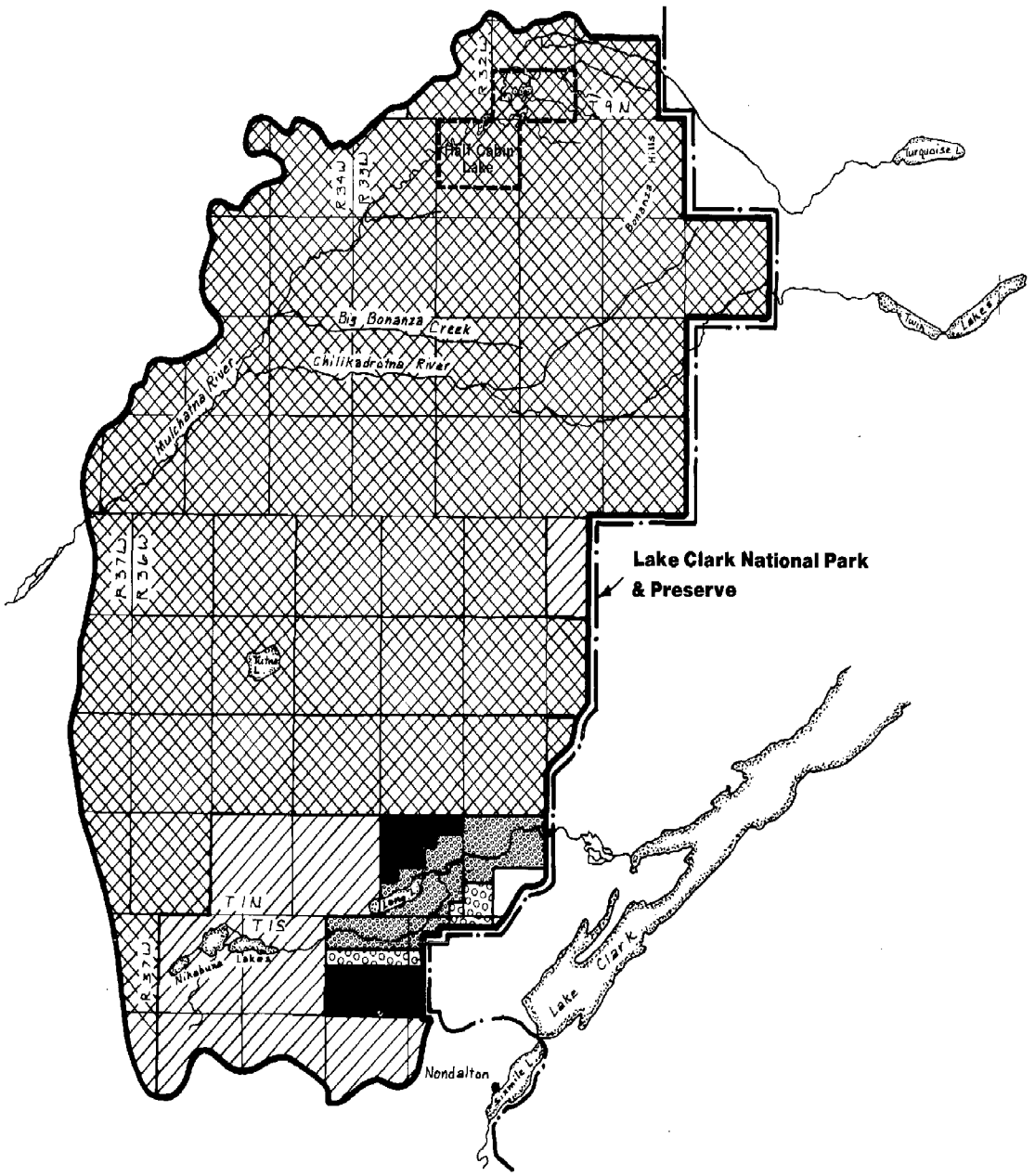
- Land in the upper Chilikadrotna River drainage should remain in state ownership, and a cooperative agreement should be developed with the NPS to ensure management of this area for fish and wildlife, recreation, and mineral exploration and development on state lands (see cooperative agreements in Chapter VI).

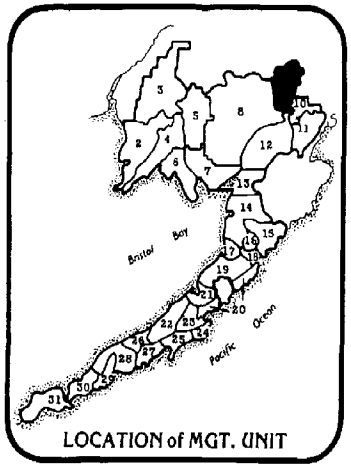
- Lake Clark National Park and Preserve (NP&P). The plan recommends that the NPS and DNR (if determined navigable) ensure traditional access for recreational floaters and hunters to the Chilikadrotna River.

- The state should select the two isolated BLM areas outside the boundary of Lake Clark NP&P (S½ T1S, R34W, and NW1/3 T1N, R33W) (see Management Unit Map and Chapter VI).

Management Unit 9

Upper Mulchatna





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LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Recommended State Selections

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Minerals subject to leasehold location on all state land
- Recreation on public land

Secondary Use:
- Remote Settlement ———

Uses Not Recommended:
- Grazing
- Large Scale Agriculture

Unit 10 Lake Clark, Newhalen

Resource Summary

- The Lake Clark drainage is a major sockeye salmon spawning area, and the fisheries resources are used locally by subsistence and recreational fishermen. Caribou, moose, and brown bear are also important to subsistence and recreational users. Recreational resources include the Newhalen River and Lake Clark. Forestry resources are present in limited areas along Lake Clark. This resource is used for houselogs and heat by some of the villages.

Management Intent

- This unit should be managed for fish and wildlife harvest and habitat. Lake Clark and the Newhalen River should be managed for recreation and fisheries production. Some community expansion is encouraged in the Iliamna, Nondalton, and Newhalen areas.

Primary Land Uses

- Recreation on public lands.
- Fish and wildlife habitat and harvest.
- Mineral exploration and development where indicated (see map).

Secondary Land Uses

- Remote settlement. Recommend the State only offer land for settlement in T.3S., R.33W., Sections 2-11, 15-23, 26-35;and T.4S., R.33W., Sections 2(N½), (excluding lands conveyed to Native corporations and Native allotments) all west of the Newhalen River. The state may offer up to 1,250 acres between this area and Chekok Lake.
- Forestry.
- Mineral exploration and development.

Mineral Entry

- Is allowed on state uplands, subject to leasehold location as required by the State's Area Plan except the Newhalen River and state and BLM uplands 100 feet from ordinary high water was closed to new mineral entry by the State.

Uses Not Recommended

- Surface entry for oil and gas exploration and development in the state shore and submerged

lands, pursuant to AS 38.05.140(f), the Bristol Bay Fisheries Reserve legislation.

- Remote settlement outside of identified area.

- Remote cabins.

- Large scale grazing.

Management Guidelines

- The DNR should lease, purchase, or exchange to acquire sites for public access along the Newhalen River and Iliamna Lake (see land exchanges in Chapter VI).

- The Alaska Power Authority (APA) is studying regional energy development in the area and may develop a hydropower proposal. The Newhalen and Tazimina rivers are possible sites still under consideration. The plan takes no position on development of these power projects. The plan recommends that such a project should result in no net loss to fish (see fish guideline number 8 Chapter V).

- The Alaska DNR should develop a more detailed management plan for state land in Management Units 10, 11, and 12 (see Chapter VII for details).

- DNR should close all navigable waterways within the Bristol Bay drainages of Lake Clark National Park and Preserve to new mineral entry, including Six Mile Lake, Newhalen River and Chulitna River.

Land Exchanges, Cooperative Agreements, State Selections

- The research and management site along the Newhalen River (R.M.1 and R.M.22), as identified by ADF&G, should be reserved by purchase, lease, or cooperative agreement between the ADF&G and appropriate landowner(s).

- Land exchanges or cooperative agreements should be pursued between the Nondalton Native Corporation, BBNC, the BLM, and the NPS to consolidate fragmented landownership patterns in and around Lake Clark NP&P and improve public access to Lake Clark (see land exchanges in Chapter VI for further discussion).

- The DNR, NPS, and local Native corporations should discuss exchanges which would make land available

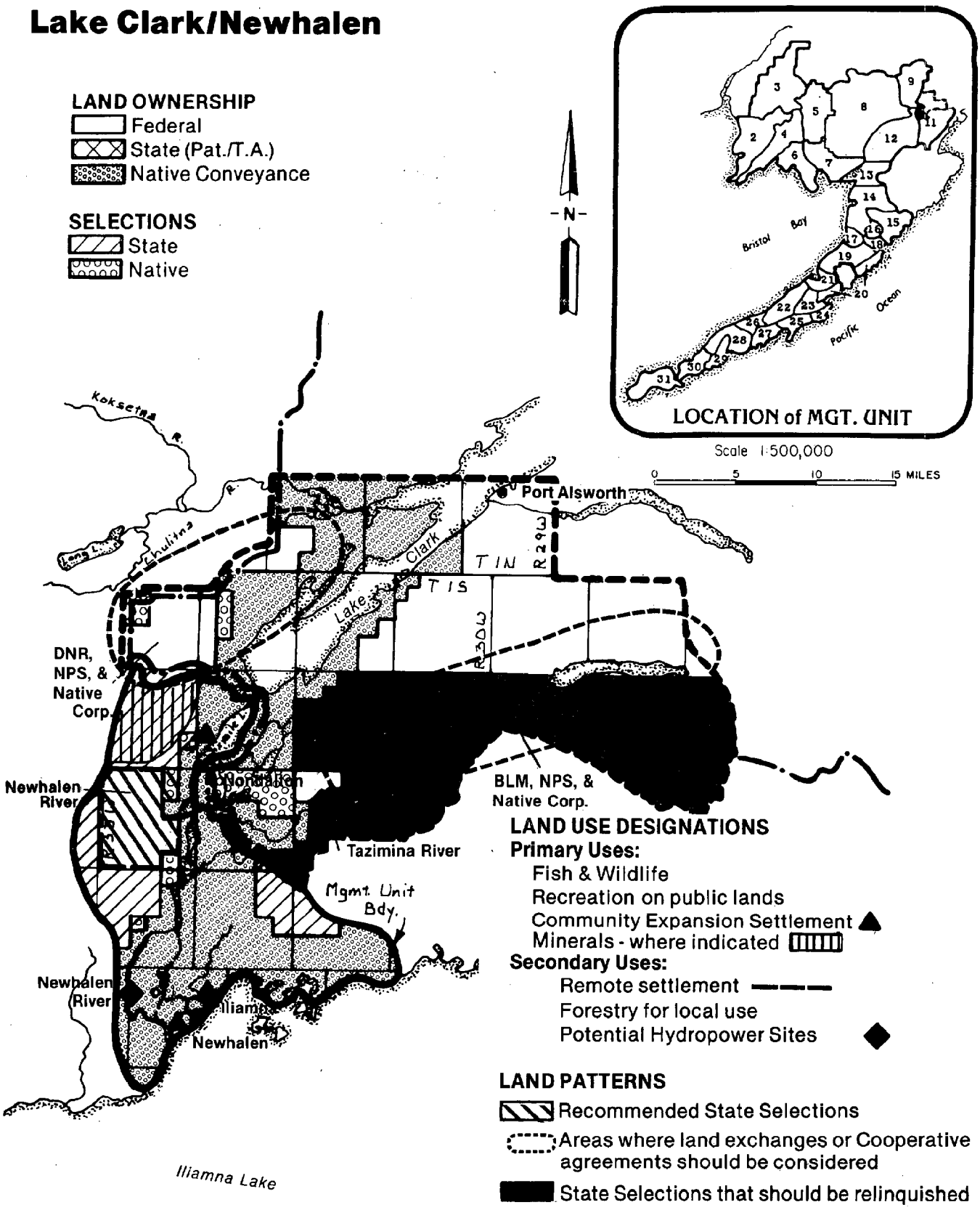
for settlement, including possibly lands in the Tazimina Lakes area.

- The state should select the tract of BLM land immediately west of the Newhalen River (see state selections in Chapter VI for further details).

Bristol Bay Regional Management Plan

Management Unit 10

Lake Clark/Newhalen



Unit 11 Eastern Iliamna Lake

Resource Summary

- Iliamna Lake and its drainage provide a large portion of the salmon resources harvested by the commercial, subsistence, and recreational users of Bristol Bay. Wildlife resources of moose and brown bear are extensively harvested. Recreational potential is high because of the fish and wildlife resources and scenic values. Mineral resource potential includes the possibility of mineral deposits of copper, gold, silver, and molybdenum in the mountainous regions. Forest resources are concentrated along lakeshores and valleys and provide for local use.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest, with an emphasis on fisheries production and recreation.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public lands.
- Mineral exploration and development.

Secondary Land Uses

- Remote settlement. The state may offer land for settlement in the Chekok Lake area: T.2S., R.29W., Sections 21, 22, 27, 28, 29, 32, 33, 34; and T.3S., R.29W., Sections 3, 4, 5, 8, 9, 16, 17; up to 1,250 acres between this and the Newhalen River area, Unit 10. This area should be the first state offering in the Iliamna area. However, if there is a delay in obtaining title to these lands, the state may offer other lands designated for settlement in this plan first. The state may offer up to 1,000 acres of land for settlement in the Kokhanok and Moose Lakes area in T.6S., R.28W., Sections 35, 36; T.7S., R.28W., Sections 1, 2, 3, 10-15, 20-23, 26-34 and T.8S., R.28W., Sections 4-8, 17, 18. The state should retain a 200-foot publically owned buffer along Kokhanok River between Kokhanok and Moose Lakes. At least 50 percent of all public land within 500 feet of the lakeshore and any islands should be retained in public ownership, including at least 50 percent of the shoreline. Where lakefront land is sold, a 100-foot easement should be reserved and a minimum building setback from the shoreline of 150 feet should be required. This disposal should also be

added to the "not before 1989" list so as to allow the recreation study, pending funding, to preceed the disposal.

- Forestry

Mineral Entry

- Is allowed on state lands but should be subject to leasehold location are required by the State's Area Plan (except those areas listed below).

- The following anadromous streams and state and BLM uplands 100 feet from ordinary high water should be closed to new mineral entry:
  - Chekok Creek
  - Pile River
  - Canyon Creek
  - Iliamna River
  - 324-10-10150-2402-3025 tributary to Iliamna River
  - Chinkelyes Creek
  - Tommy Creek
  - Copper River
  - Kokhanok River
  - 324-10-10150-2196 tributary to Iliamna Lake
  - Dream Creek
  - Dennis Creek

Land Uses Not Recommended

- Remote settlement outside of identified areas.

- Remote cabins.

- Surface entry for oil and gas in state shore and submerged lands, including Iliamna Lake, pursuant to As 38.05.140(f), the Bristol Bay Fisheries Reserve legislation.

Management Guidelines

- The DNR should coordinate with the BLM to mark and manage ANCSA 17b easements on Gibraltar Lake and Dream Creek.

- The Alaska DNR should develop a more detailed management plan for state land in Managmenet Units 10, 11 and 12 (see Chapter VII for details).

Land Exchanges, Cooperative Agreements, State Selections

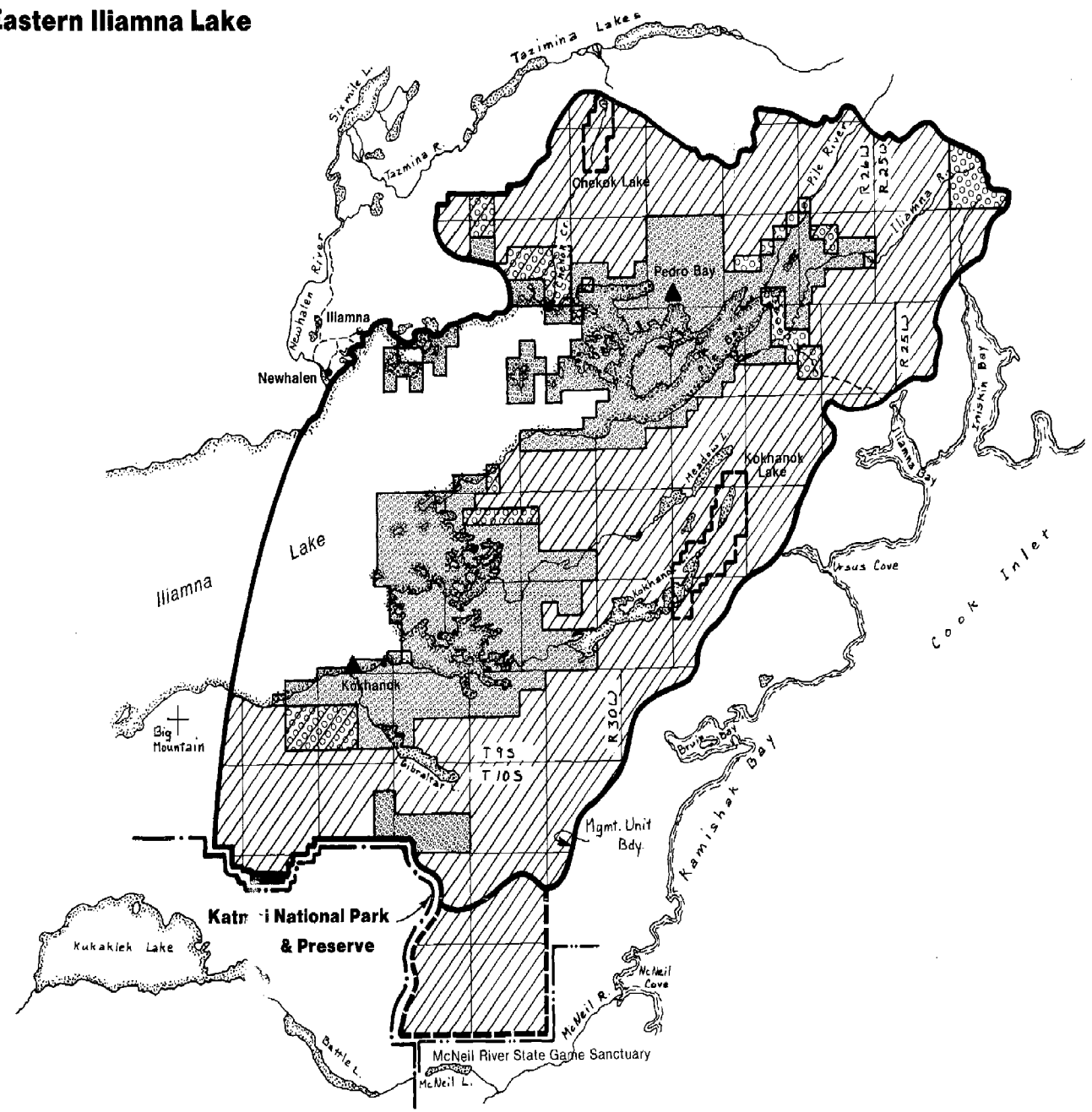
- Iliamna Lake. The DNR should negotiate to acquire public access sites along recreational fishing

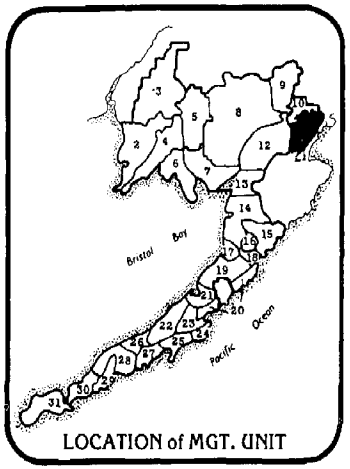
streams and along Iliamna Lake (see land exchanges, Chapter VI).

- The state should select an isolated block of BLM land on the northern border of Katmai NP&P (see state selections, Chapter VI, for further discussion).

- The wildlife and mineral values of state lands located south of the study area boundary and bordering on McNeil River State Game Sanctuary should be assessed by the DNR and the ADF&G. Portions of the area with essential bear habitat should be considered for possible addition to the game sanctuary and lands with high mineral potential should be considered for exchange with Native corporations.

Eastern Iliamna Lake





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Recommended State Selections

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Minerals subject to leasehold location on all state land
- Recreation on public lands

Secondary Uses:
- Forestry for local use
- Community Expansion Settlement ▲
- Remote Settlement ———

Uses Not Recommended:
- Oil & Gas - Surface Entry in the Bristol Bay Fisheries Reserve (Prohibited by Alaska Law)

Unit 12 Western Iliamna Lake, Kvichak River

Resource Summary

- The Kvichak River system, including Iliamna Lake and the Alagnak (Branch) River, is the single most important source of salmon in the region. This resource provides for commercial, subsistence, and sport users. Recreational potential is high, as indicated by the Alagnak River being designated a National Wild and Scenic River. Part of an oil and gas basin is in this management unit; a low to moderate potential is indicated. Other important resources include caribou, beaver, waterfowl, and brown bear.

Management Intent

- This unit should be managed for fish and wildlife with emphasis on fisheries production and public recreation on the Talarik Creeks and the Kvichak and Alagnak rivers.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on Iliamna Lake and on public lands along major rivers and streams.

Secondary Land Uses

- Oil and gas exploration and development.
- Remote settlement. The state may offer land for settlement in the area west of Big Mountain, but it should not be offered before 1989 and should not exceed 750 acres. It is located within T.9S., R.36W., Sections 12-14, 20-36 (excluding private lands). No land should be sold within one half mile on either side of Belinda Creek.
- Mineral exploration and development.

Mineral Entry

- Is allowed on all state uplands but should be subject to leasehold location where indicated on the management unit map consistent with the State's Area Plan, except the following anadromous streams and state and BLM uplands 100 feet from ordinary high water which should be closed to new mineral entry:

  Kvichak River
  Pecks Creek
  324-10-10150-2145 tributary to Iliamna Lake
  324-10-10150-2149 tributary to Iliamna Lake
  324-10-10150-2155 tributary to Iliamna Lake

324-10-10150-2159 tributary to Iliamna Lake
324-10-10150-2163 tributary to Iliamna Lake
Lower Talarik Creek
324-10-10150-2167-3003 tributary to Lower Talarik Creek
324-10-10150-2175 tributary to Iliamna Lake
Upper Talarik Creek
Pete Andrew Creek
324-10-10150-2162 tributary to Iliamna Lake
Belinda Creek
324-10-10150-2156-3005 tributary to Belinda Creek
324-10-10150-2156-3005-4007 tributary to Belinda Creek

Uses Not Recommended

- Surface entry for oil and gas exploration and development in state shore and submerged lands, including Iliamna Lake, pursuant to AS 38.05.148(f), the Bristol Bay Fisheries Reserve legislation.
- Remote settlement outside of the identified areas.
- Remote cabins.
- Large scale grazing on state land (see guidelines for grazing on BLM lands).

Management Guidelines

- The Alaska DNR should develop a more detailed management plan for state land in Management Units 10, 11, and 12 (see Chapter VII for details).
- DNR should close all navigable waterways in Bristol Bay drainages within Katmai National Park and Preserve, including Nonvianuk Lake, Kukaklek Lake, Nonvianuk River (navigability in question), Alagnak or Branch River (part, navigability in question).
- Grazing may be permitted on BLM lands where it will not be in conflict with wildlife or wildlife habitat.

Land Exchanges, Cooperative Agreements, State Selections

- The research and management site, along the Alagnak River, as identified by ADF&G, should be reserved for ADF&G's use through a cooperative management agreement.

- The research and management sites along the Kvichak River (3 sites), as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

- Kvichak BLM lands: The state should not select BLM land as they do not meet state selection guidelines. These lands should remain open for future land selections.

- Kukaklek Lake: The NPS, Igiugig Native Corporation and BBNC should pursue opportunities to exchange land along the upper portion of the Alagnak River as it leaves Kukaklek Lake (see land exchanges in Chapter VI for details).

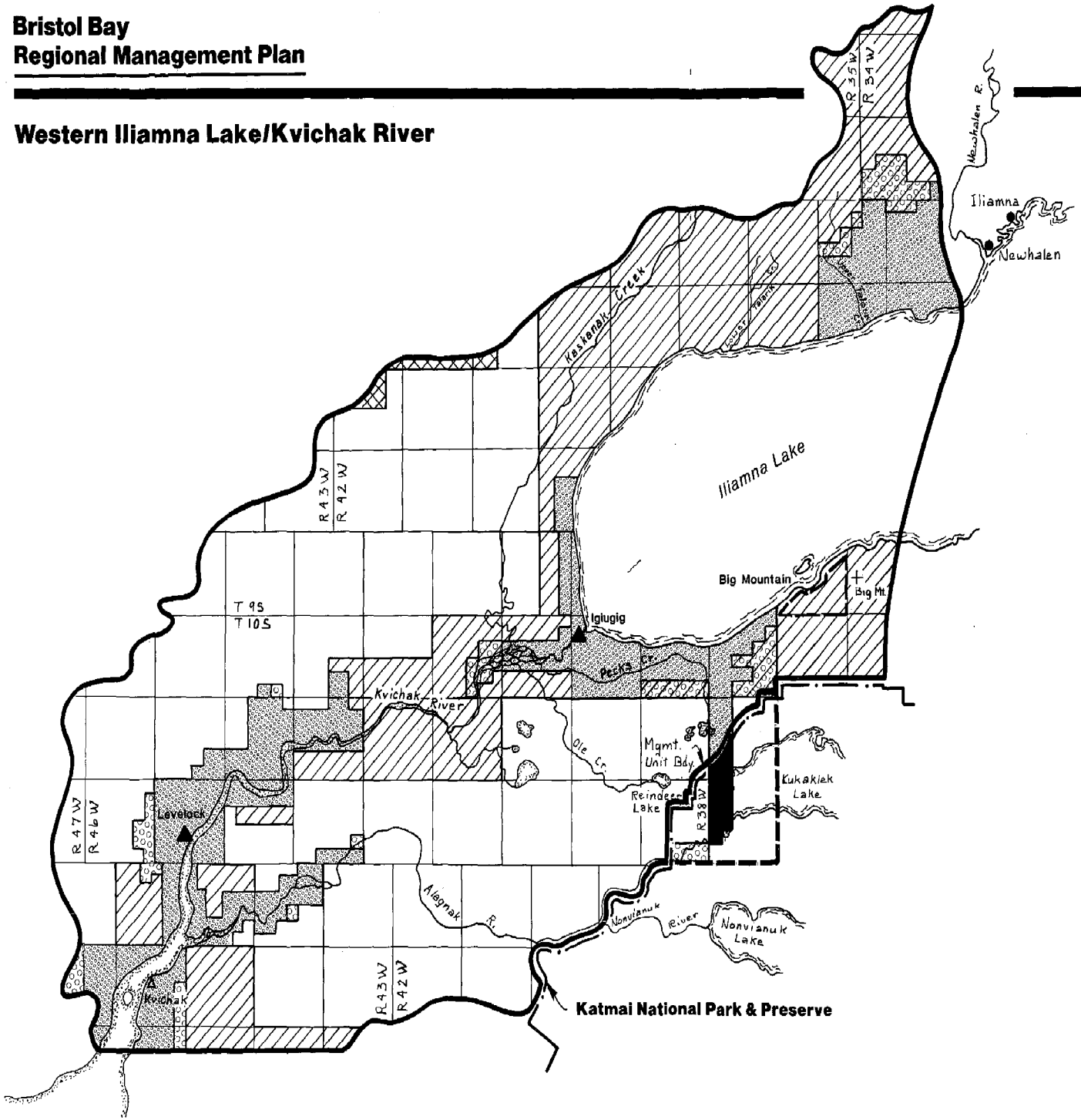
- The DNR should purchase, exchange, or lease land for public access sites along Upper Talarik Creek, Peck's Creek, Ole Creek, and the Kvichak River (see land exchanges in Chapter VI).

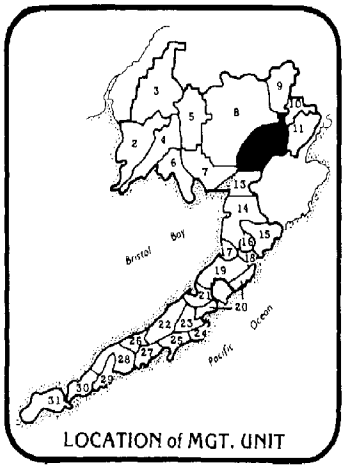
- The state and Native corporations should consider trading state land at Ben Courtney Creek to either the Levelock or the Igiugig Village Corporation for village lands that provide access to the above-mentioned recreation sites or settlement lands for disposals near the communities.

Bristol Bay
Regional Management Plan

Management Unit 12

Western Iliamna Lake/Kvichak River





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LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Possible Land Exchange

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands

Secondary Uses:
- Oil & Gas
- Community Expansion Settlement ▲
- Remote Settlement - - -

Uses Not Recommended:
- Grazing
- Oil & Gas - Surface entry in the Bristol Bay Fisheries Reserve

Unit 13 Bristol Bay Borough Area

Resource Summary

- This management unit includes the entire Bristol Bay Borough and additional lands south of the borough that drain northward. The salmon resource in this unit, particularly in Kvichak Bay and the Naknek River, supports extensive commercial fishing and fish processing. Recreational and subsistence use of this fisheries is intensive. There is also extensive hunting of caribou and waterfowl. A portion of an oil and gas basin is in this management unit, indicating moderate oil and gas potential. Community resources include a major regional airport and some community services provided by the borough government.

Management Intent

- This unit should be managed for fisheries, including harvest and processing, wildlife harvest, recreation, community expansion and transportation, and oil and gas exploration and development in upland areas.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Community expansion settlement (including fish processing and commercial uses) at King Salmon, Naknek, and South Naknek.
- Recreation on public lands, along creeks, lakes, and the Naknek River.

Secondary Land Uses

- Oil and gas exploration and development in the uplands.
- Mineral exploration and development on state and BLM land.

Mineral Entry

- Is allowed on state lands within this unit consistent with the State's Area Plan.
- DNR should close all navigable waterways within Togiak NWR to new mineral entry, including Naknek Lake and Naknek River (part).
- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location,

entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

- Large-scale grazing.
- Remote settlement.
- State tide and submerged lands in this unit will not be placed on the state five-year oil and gas lease schedule consistent with the State's Area Plan.

Management Guidelines

- Reasonable public access should be maintained across and along all public tidelands.
- Big Creek should be managed as a swan staging area.
- Kvichak Bay and the Naknek River should not be used for the loading and transportation of crude oil.
- To maintain the integrity of the caribou herd and opportunities for local use, land disposals by the borough and Native corporations for community expansion and other settlement should be avoided in the caribou-wintering area to the south of the Naknek River.
- Native corporations and the Bristol Bay Borough are encouraged to meet local settlement needs. If the state acquires any lands north of the Naknek River and near the existing road system suitable for community expansion, they should be considered for disposal.
- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.
- The traditional red fish and white fish subsistence fishery in the west end of Naknek Lake within the boundary of Katmai National Park and Preserve should be allowed.

Land Exchanges, Cooperative Agreements, State Selections

- Katmai NP&P: Recommend that the ANILCA boundary be moved back to the old monument boundary at the

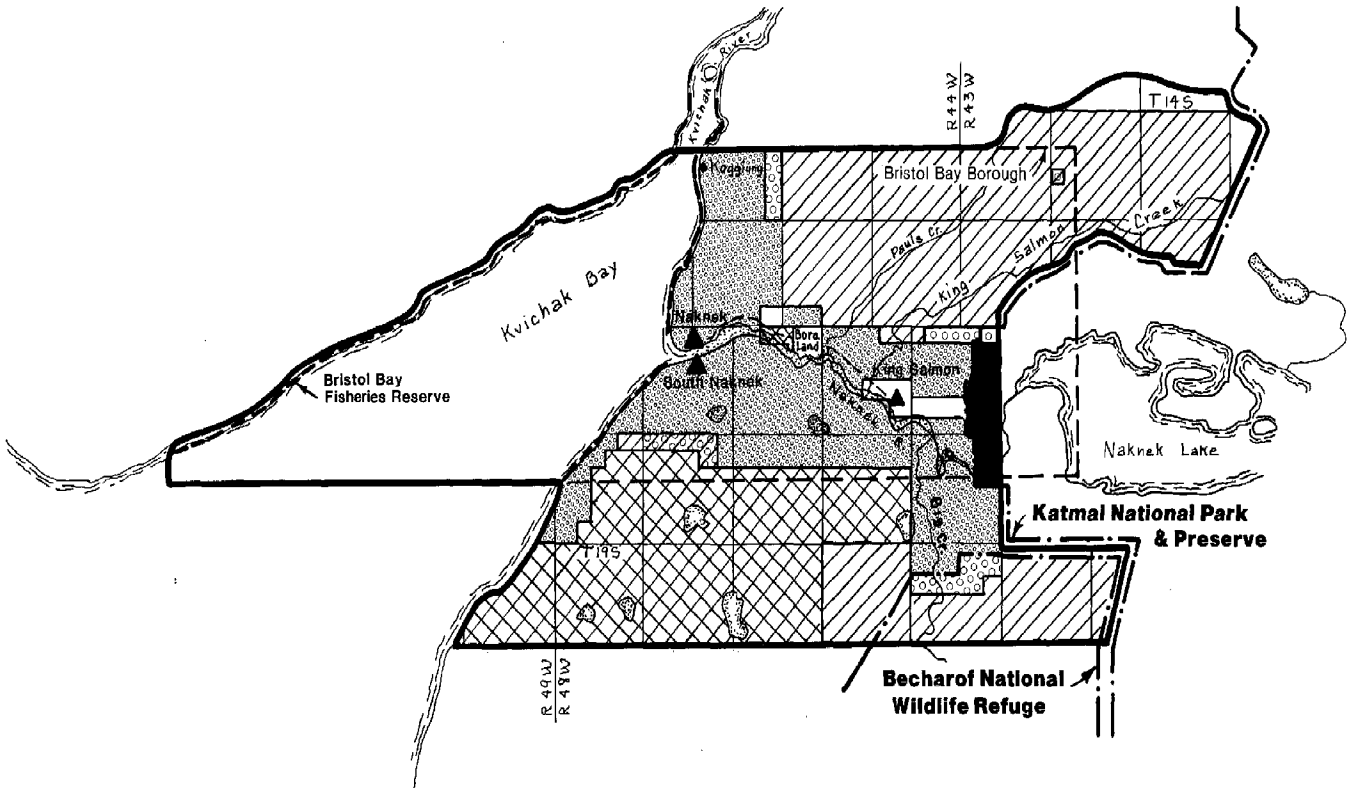
headwaters of the Naknek River, thus removing the Native lands owned by Paug-vik, Alaska Peninsula, and Bristol Bay Native Corporations from the park (see Chapter VI for further discussion).

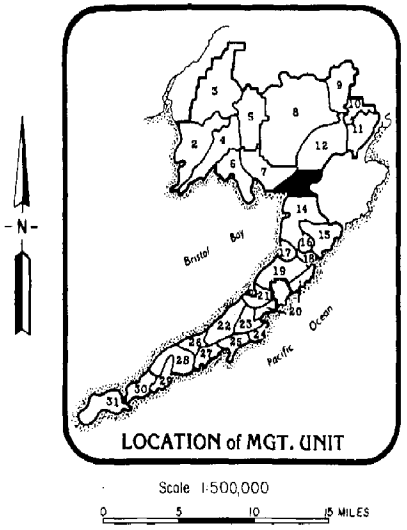
- Naknek River: A cooperative agreement to protect caribou wintering areas should be established between Native landowners and the ADF&G if community development is to occur along the south side of the Naknek River (see cooperative agreements, Chapter VI).

- The research and management sites along Naknek River (3 sites), as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

Management Unit 13

Bristol Bay Borough Area





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Recommended boundary adjustment

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Community Expansion Settlement ▲

Secondary Uses:
- Oil & Gas in upland areas

Uses Not Recommended:
- Grazing
- Oil & Gas - Surface entry in Bristol Bay Fisheries Reserve

Unit 14 Egegik

Resource Summary

- The rivers and lakes in this management unit provide habitat that supports a portion of the salmon resources harvested by the subsistence, recreational, and commercial users in Bristol Bay. Wildlife resources include caribou, brown bear, moose, beaver, and waterfowl, all of which are used extensively by recreational and/or subsistence hunters. Part of an oil and gas basin is within this unit, indicating high oil and gas potential in the western half of the unit.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest. Recreation and oil and gas activities are also important uses in this unit. Development of public roads should be limited to protect caribou migration.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public land.
- Oil and gas exploration and development on state uplands, private, and BLM lands.
- Wilderness, where congressionally designated.

Secondary Land Uses

- Community expansion settlement at Egegik.
- Oil and gas exploration and development on NWR lands where determined to be compatible in the refuge plan.
- Mineral exploration and development on state and BLM land.

Mineral Entry

- Is allowed on state uplands consistent with the State's Area Plan.
- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

- Grazing.

- Remote settlement.

Management Guidelines

- Public roads, elevated pipelines, and new settlements should not be built along the Egegik River because of potential restriction to caribou movement across the Egegik River.

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

- The research and management site on state land along the Egegik River (Egegik River test fish site), as identified by ADF&G, should be reserved for ADF&G use.

Land Exchanges, Cooperative Agreements, State Selections

- Becharof Area: The state should select two isolated blocks of BLM public domain land. One is located along the northern fringe of the Becharof NWR (W½ T20S, R42W), and the other is located west of Becharof Lake (W½ T25S,R47W). Landownership would be consolidated by adding these selections to adjacent state-owned lands (see state selections, Chapter VI).

- Egegik State Critical Habitat Area (SCHA): The DNR and ADF&G, the Becharof Corporation, and the Bristol Bay Native Corporation should begin negotiations to exchange or cooperatively manage land in the SCHA. The ADF&G is interested in the state obtaining ownership to the entire SCHA (see land exchanges, Chapter VI).

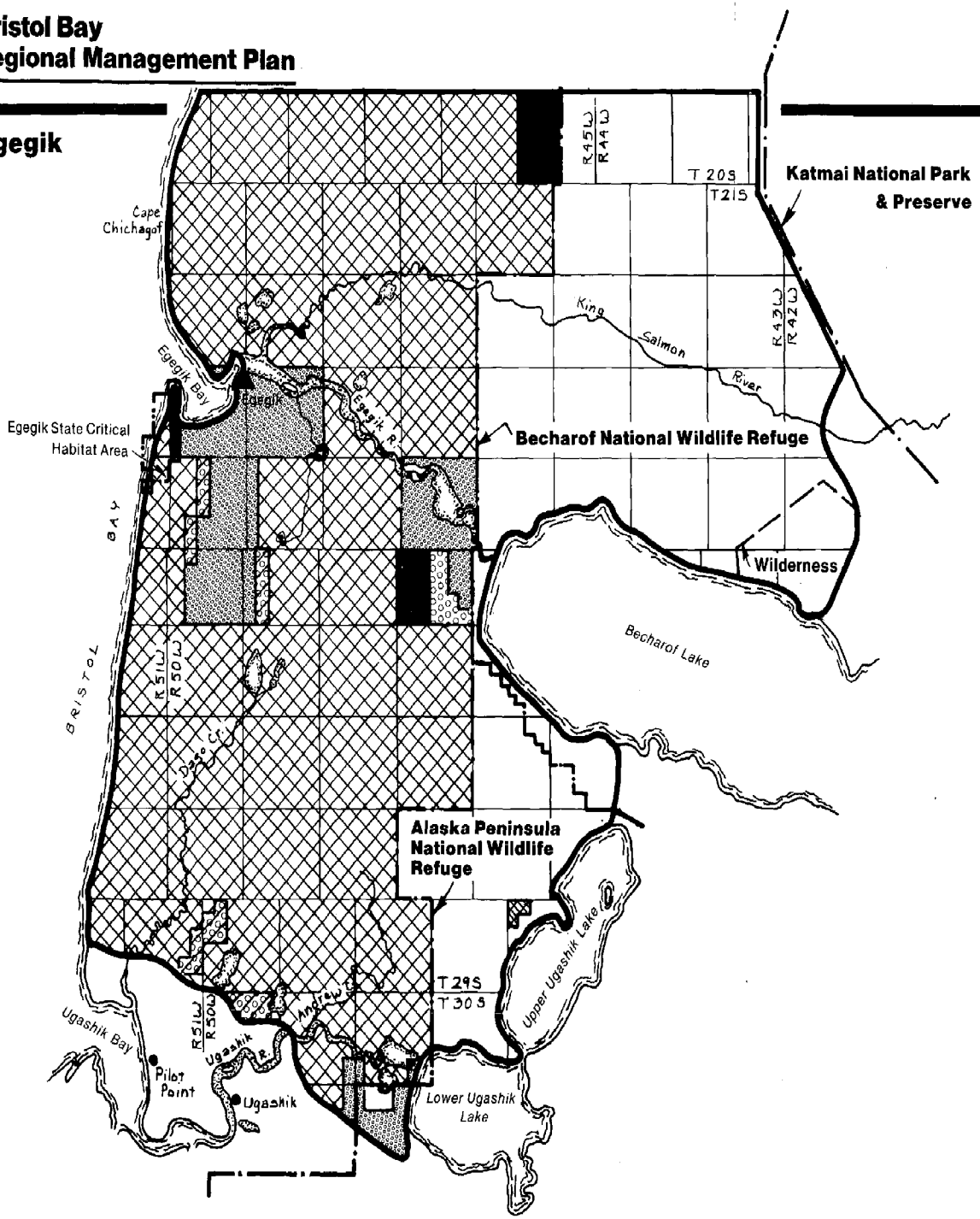
- The USFWS, NPS and ADF&G should develop alternatives to present to Congress that may recommend alterations of the boundary of Katmai NP&P, alter park status, or develop an exchange along the western boundary of the park and preserve to allow sport hunting in this area of the park (see Chapter VI).

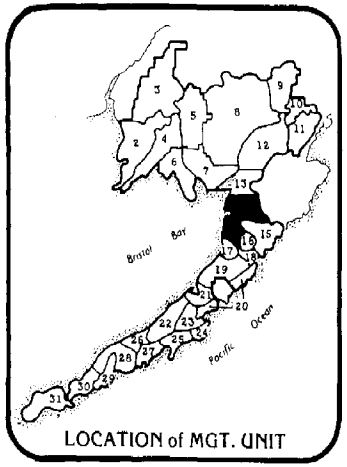
- USFWS lands in this unit are presently in the Becharof NWR but should be transferred to the Alaska Peninsula NWR. This consolidation would reduce the number of refuge headquarters at King Salmon from two to one and substantially reduce administrative costs for the USFWS (see Chapter VI for further discussion).

- The research and management sites along the Egegik River (Egegik River cabin site and sonar site), as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

Management Unit 14

Egegik





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- 11(a)(3) Lands to be owned by U.S. FWS
- Recommended State Selections
- Recommended land exchange - Nat. Corp. to State

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Oil & Gas on State & Native lands

Secondary Uses:
- Oil & Gas on NWR lands
- Community Expansion Settlement ▲

Uses Not Recommended:
- Grazing
- Oil & Gas - Surface entry in the Bristol Bay Fisheries Reserve

Unit 15 Becharof Lake

Resource Summary

- Becharof Lake and its tributaries support a large salmon population, which is harvested locally by subsistence and recreational users. Wildlife resources include caribou, brown bear, wolf, moose, and beaver. These resources support intensive use by subsistence and/or recreational hunters. Recreational resources also include unique geologic features such as the volcanic peak of Mt. Peulik, gas rocks, and marrs. Historic mineral deposit information indicates the possible presence of copper, gold, zinc, lead, and molybdenum.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest and for recreation.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public land.
- Wilderness, where congressionally designated.

Secondary Land Uses

- Oil and gas exploration and development on lands the Koniag Native Corporation has selected for oil and gas rights.

Mineral Entry

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.
- DNR should close all navigable waterways within Becharof NWR to new mineral entry, including Becharof Lake.

Land Uses Not Recommended

- Surface entry for oil and gas exploration or development in Becharof Lake, pursuant to AS 38.05.140(f), the Bristol Bay Fisheries Reserve legislation.
- Grazing.
- Remote settlement.

Management Guidelines

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

- Becharof Wilderness. The USFWS should continue to study the area in the southeast corner of this unit, including Island Arm, for possible addition to the existing wilderness area. This area contains essential brown bear habitat, exceptionally productive salmon spawning areas, and unique areas that provide outstanding scientific and research opportunities. The USFWS will address potential Koniag oil and gas selections in the southeastern part of the proposed wilderness addition.

Land Exchanges, Cooperative Agreements, State Selections

- The research and management sites along Becharof Lake, Featherly Creek, and Alinchak/Kashvik Bays, as identified by ADF&G, should be reserved for ADF&G's use through a cooperative management agreement with USFWS.

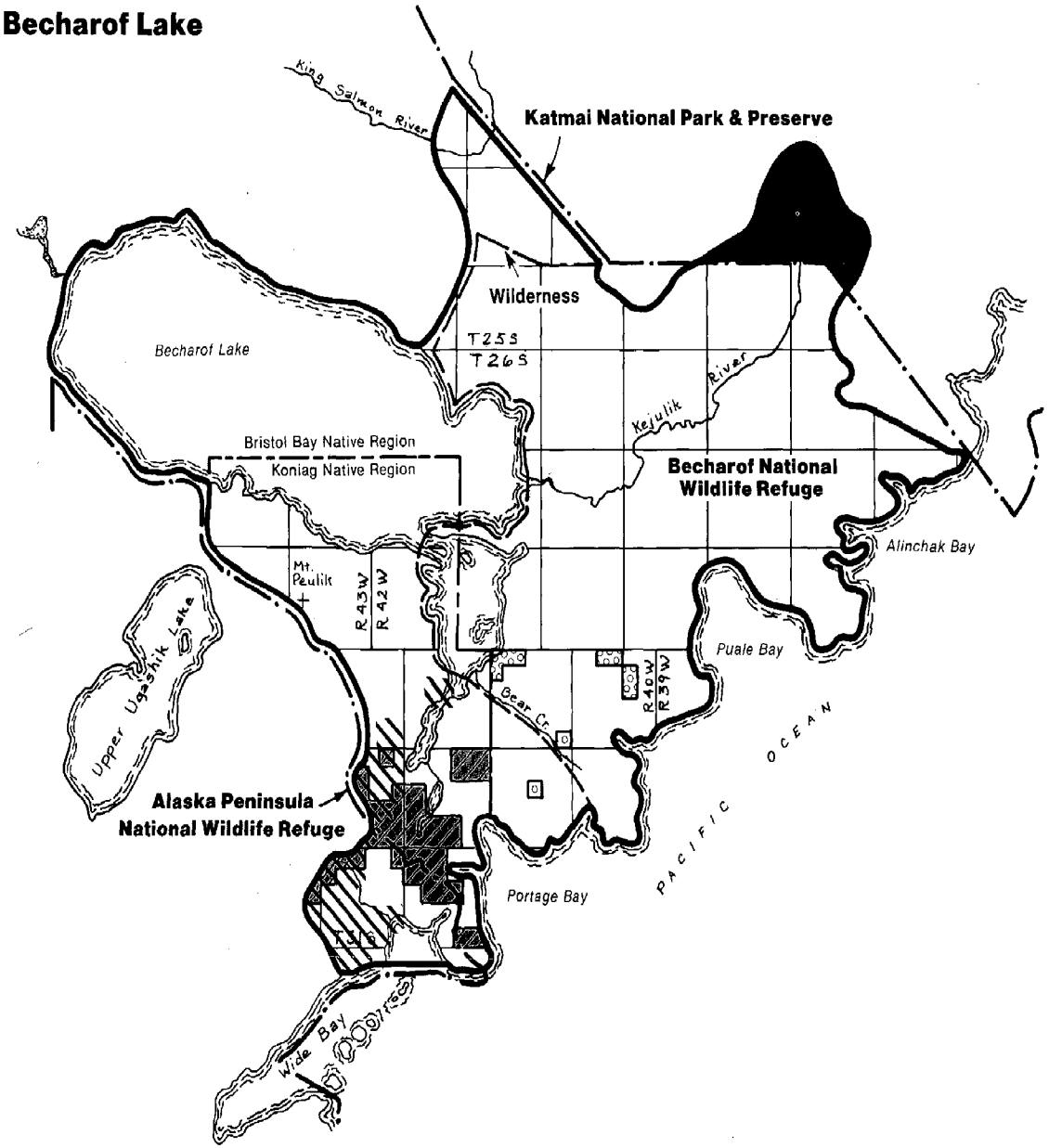
- USFWS lands in this unit are presently in Becharof NWR but should be transferred to the Alaska Peninsula NWR. This consolidation will reduce the number of refuge headquarters at King Salmon from two to one and substantially reduce administrative costs for the USFWS (see Chapter VI for futher discussion).

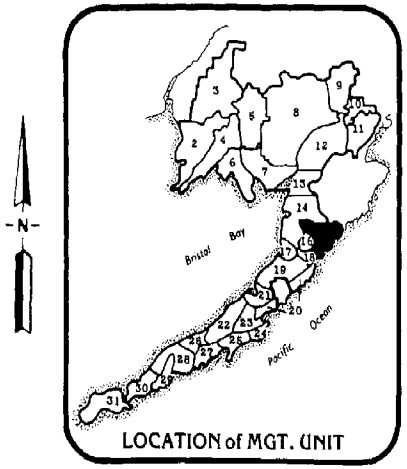
- Kujulik River: The Kujulik River drainage within Katmai NP&P should be transferred (by Congress) to the USFWS (see Chapter VI for further discussion).

- The 11(a)(3) lands in this unit selected by the state should be managed by the USFWS. The state should relinquish these selections (see 11(a)(3) discussion in Chapter VI).

Management Unit 15

Becharof Lake





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- 11 (a) (3) Lands to be owned by U.S. FWS
- Transfer lands from Katmai N.P. to Becharof NWR
- Land available for Koniag Native Corp. Oil & Gas Selections

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Wilderness, where Congressionally designated

Secondary Uses:
- Oil & Gas on Koniag Nat. Corp. lands

Uses Not Recommended:
- Grazing
- Oil & Gas - Surface entry in the Bristol Bay Fisheries Reserve

Unit 16 Ugashik Lakes

Resource Summary

- Fishery resources of salmon and grayling support intensive recreational harvest. Caribou, brown bear, and moose are the major wildlife resources harvested extensively by recreational and/or subsistence users. Part of an oil and gas basin is in the very eastern portion of this management unit, indicating a high potential. The remainder is outside the known oil and gas basin and has an unknown potential.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest and recreation.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public lands.

Mineral Entry

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.
- DNR should close all navigable waterways within Alaska Peninsula NWR to new mineral entry, including Upper Ugashik Lake and Lower Ugashik Lake.

Land Uses Not Recommended

- Surface entry for oil and gas exploration or development in the Upper and Lower Ugashik Lakes pursuant to AS 38.05.140(f), the Bristol Bay Fisheries Reserve legislation.
- Grazing.
- Remote settlement.

Management Guidelines

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

Land Exchanges, Cooperative Agreements, State Selections

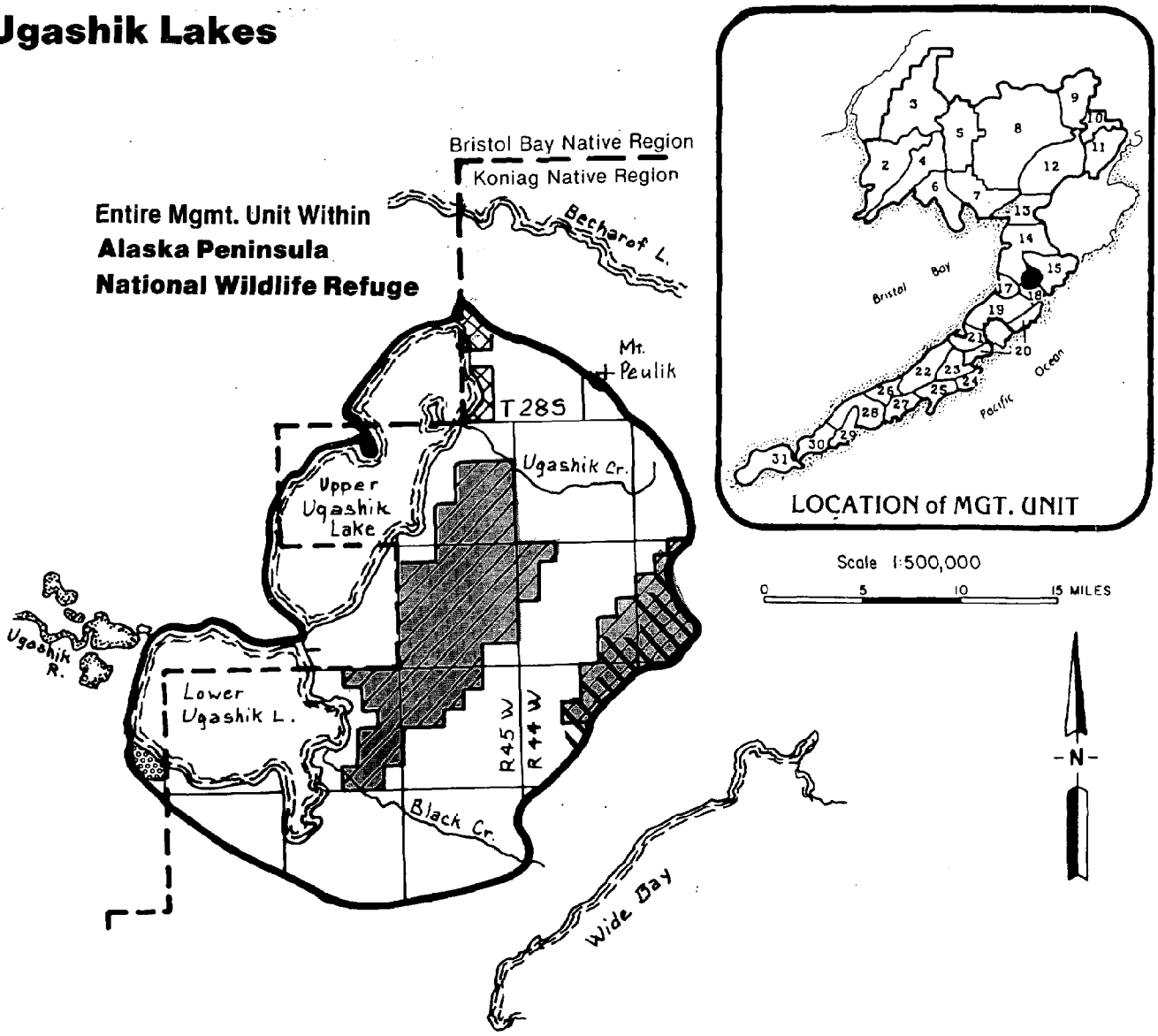
- The research and management sites near the outlet of Lower Ugashik Lake (Ugashik River field camp), as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and appropriate landowner(s).

- Ugashik Lakes: The 11(a)(3) deficiency lands selected by the state should be managed by the USFWS. The state should relinquish these selections (see 11(a)(3) discussion in Chapter VI).

Bristol Bay Regional Management Plan

Management Unit 16

Ugashik Lakes



LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- 11 (a) (3) Lands to be owned by U.S. FWS
- Land available for Koniag Nat. Corp. Oil & Gas Selections.

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands

Uses Not Recommended:
- Grazing
- Oil & Gas - Surface entry in the Bristol Bay Fisheries Reserve

Unit 17 Ugashik Bay Area

Resource Summary

- The rivers and streams provide important spawning habitat for salmon, and Ugashik Bay is an important harvest area for commercial and subsistence users. Waterfowl and caribou are extremely important subsistence resources also harvested by recreational hunters. Brown bear and harbor seals are other important wildlife species. Part of an oil and gas basin is in this management unit, with high potential indicated.

Management Intent

- This unit should be managed for fish and wildlife harvest and habitat, with special emphasis on waterfowl. The area should also be managed for recreation and oil and gas exploration and development.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public lands.
- Oil and gas exploration and development in uplands on state and private uplands.

Secondary Land Uses

- Community expansion settlement at Ugashik and Pilot Point.
- Oil and gas exploration and development, where determined to be compatible by USFWS refuge plans.
- Transpeninsula corridor. Identified a preferred multiple use transpeninsula transportation corridor from Pilot Point to Wide Bay.
- Mineral exploration and development on state land.

Mineral Entry

- Is allowed on state uplands consistent with the State's Area Plan.
- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

- Grazing.

Management Guidelines

- State fish and game boards should use harvest restrictions to maintain traditional caribou use and harvest patterns along any future transportation corridors in this area.

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

- All transportation and utility systems on NWR lands will be subject to Title XI of ANILCA.

- The construction and operation of a boat harbor and associated development at or near Dago Creek north of Pilot Point is excepted from Waterfowl Guideline Number 3, Chapter V.

Land Exchanges, Cooperative Agreements, State Selections:

- Pilot Point SCHA: The ADF&G is interested in obtaining state ownership of the entire SCHA. The Pilot Point Village Corporation is interested in exchange excluding land in the Dago Creek area. The FWS, DNR and ADF&G and the Pilot Point and Bristol Bay Native Corporations should begin negotiations to exchange or cooperatively manage lands in the SCHA (see land exchanges, Chapter VI for further discussion).

Bristol Bay Regional Management Plan

Management Unit 17

Ugashik Bay Area

LAND PATTERNS

Recommended land exchange - Native Corp. to State

LAND USE RECOMMENDATIONS

Primary Uses:

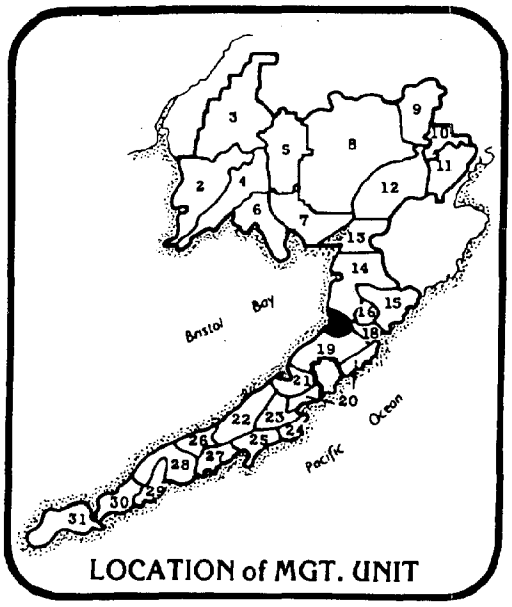
Fish & Wildlife
Recreation on public lands
Oil & Gas on State & Native lands

Secondary Uses:

Oil & Gas on NWR lands
Community Expansion Settlement ▲
Trans-peninsula transportation corridor preferred ——

Use Not Recommended:

Grazing



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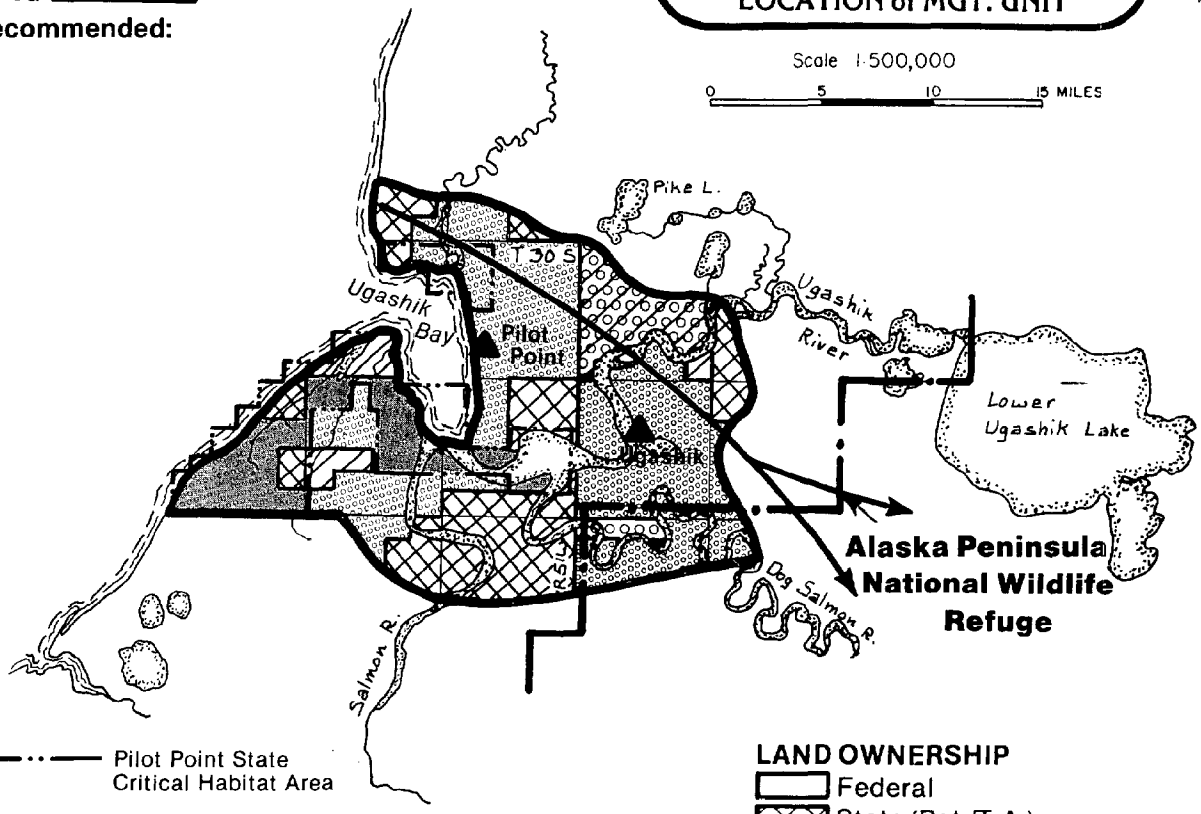


—··— Pilot Point State Critical Habitat Area

LAND OWNERSHIP

Federal
State (Pat./T.A.)
Native Conveyance

SELECTIONS

State
Native

Unit 18 Upper Dog Salmon River, Wide Bay

Resource Summary

- Wildlife resources of caribou, brown bear, and moose provide for subsistence and/or recreational users. Fishery resources, primarily salmon and grayling, are also harvested by subsistence and recreational users. Most of this management unit is outside any known oil and gas basin, indicating an unknown potential; the western portion of this unit lies within part of an oil and gas basin, with high potential indicated. This unit has been identified as being one of the more suitable areas on the peninsula for a transpeninsula transportation facility.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest and recreation. Manage for potential development of a transportation corridor and a port site at Wide Bay.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public lands.

Secondary Land Uses

- Oil and gas exploration and development on NWR lands where determined to be compatible in the refuge plan.
- Potential port site development at Wide Bay associated with oil and gas or transportation development.
- Transpeninsula corridor. Identified a preferred transpeninsula transportation corridor from Pilot Point to Wide Bay.

Mineral Entry

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.
- DNR should close all navigable waterways within Alaska Peninsula NWR to new mineral entry, including the Dog Salmon River.

Land Uses Not Recommended

- Remote settlement. Residential and recreational settlement on state land at Wide Bay not related to resource development.
- Grazing.

Management Guidelines:

- All transportation and utility systems on NWR lands will be subject to Title XI of ANILCA, and the Refuge Administration Act.

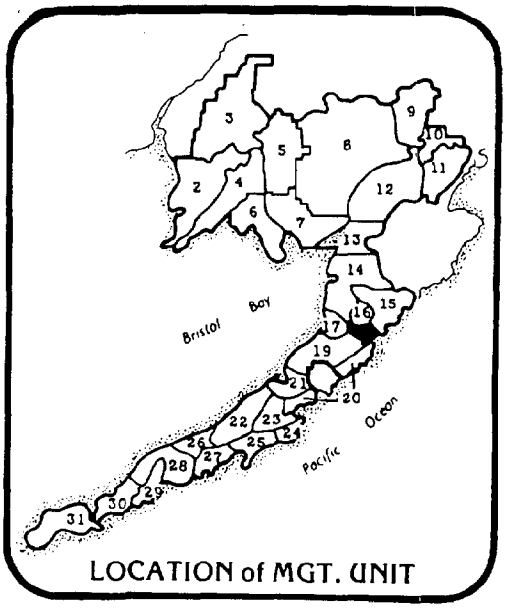
Land Exchanges, Cooperative Agreements, State Selections

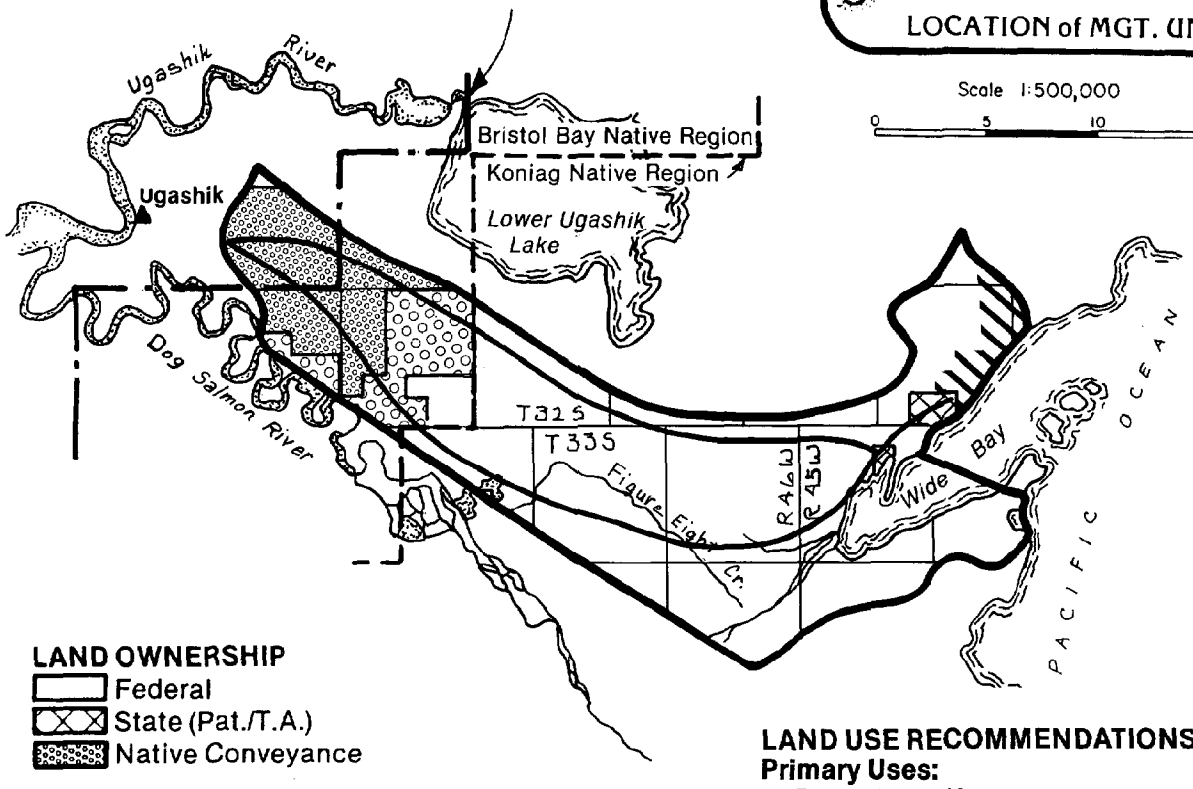
- Wide Bay/Upper Dog Salmon River: If this route is requested (Title XI applicable) as a transportation corridor, a cooperative agreement should be developed between federal, state, and Native landowners to reserve the corridor to serve potential oil and gas and/or road development in the area.

Bristol Bay Regional Management Plan

Management Unit 18

Upper Dog Salmon River / Wide Bay





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Land available for Koniag Native Corp. Oil & Gas selections

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands

Secondary Uses:
- Oil & Gas
- Trans-peninsula transportation corridor preferred

Use Not Recommended:
- Grazing

Unit 19 Cinder River, King Salmon River

Resource Summary

- Caribou, brown bear, waterfowl, and moose are the major wildlife resources in this unit. The Dog Salmon, Cinder, and King Salmon rivers and Mother Goose Lake provide habitat for salmon, which are harvested by commercial, recreational, and subsistence users. Part of an oil and gas basin lies within this management unit, indicating high and moderate potential. Recreation, especially hunting, is most intense in the Mother Goose Lake and Cinder River areas.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest, recreation, and oil and gas exploration and development.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public land.
- Oil and gas exploration and development on state and Native lands.

Secondary Land Uses

- Oil and gas exploration and development on NWR lands, where determined to be compatible by the refuge plan.
- Collector pipelines to transport oil and/or gas to a transpeninsula pipeline.
- Mineral exploration and development on state land.

Mineral Entry

- Is allowed on all state uplands consistent with the State's Area Plan.
- DNR should close all navigable waterways within Alaska Peninsula NWR to new mineral entry, including the Dog Salmon River.
- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

- Grazing.

- Remote settlement.

Management Guidelines:

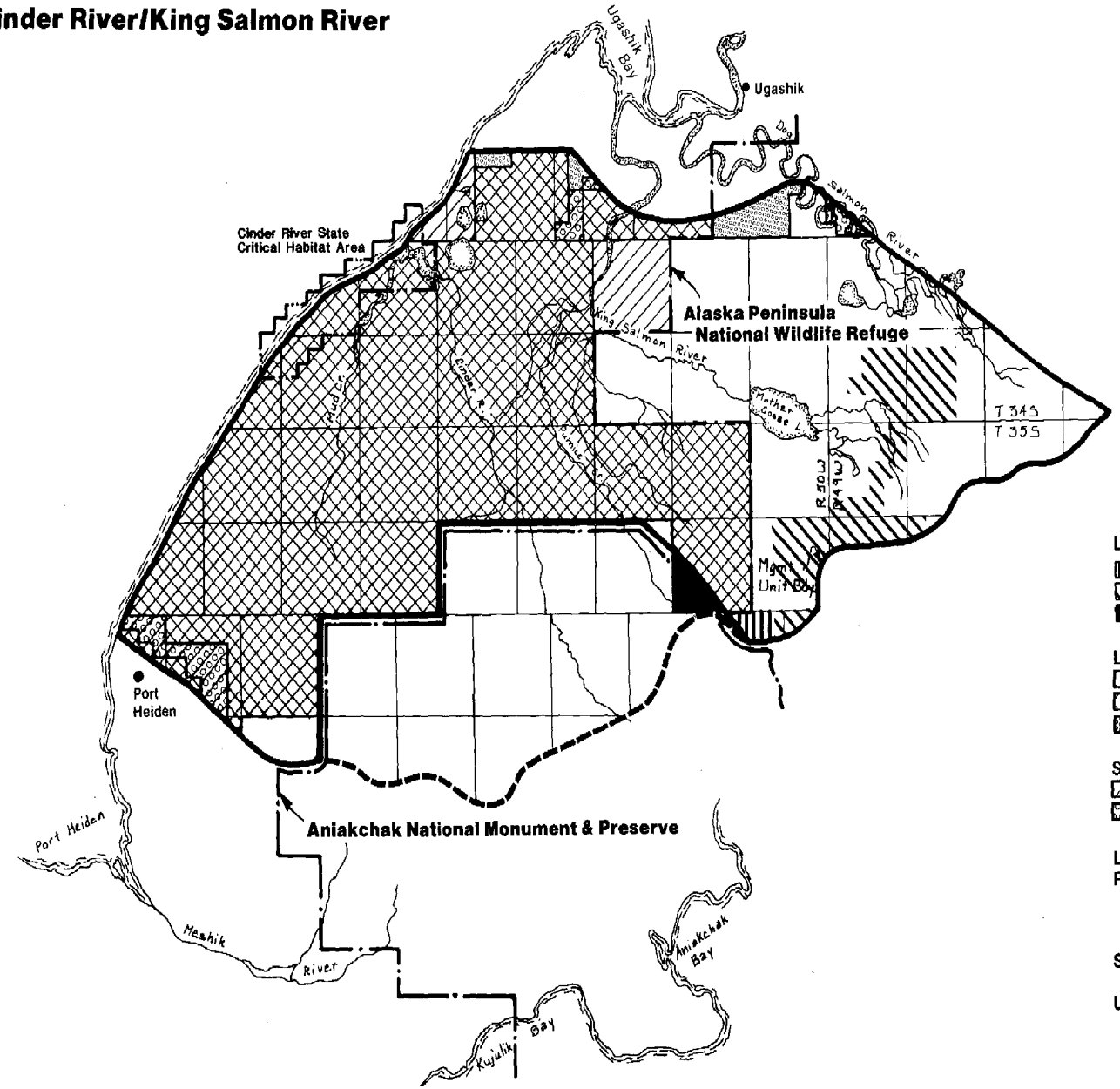
- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

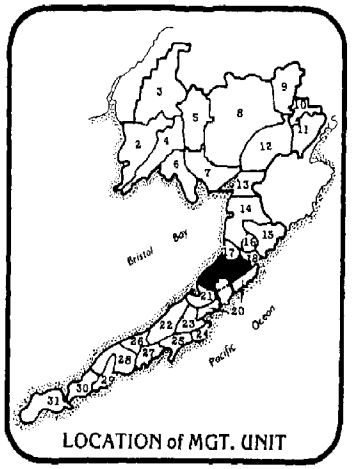
Land Exchanges, Cooperative Agreements, State Selections

- Mother Goose Lake: Consider a land exchange or establish a cooperative agreement between the USFWS and the state to manage the state lands southwest of Mother Goose Lake and USFWS lands in the Mother Goose Lake drainage for the production and harvest of fish and wildlife (see land exchanges, Chapter VI, for further discussion).

- Aniakchak National Monument and Preserve: Consider a land exchange or cooperative agreement between the state and the NPS for state tentatively approved land in the northeast part of the Aniakchak National Monument and Preserve (SW1/3 T36S, R51W) (see land exchanges, Chapter VI for further discussion).

Cinder River/King Salmon River





LAND PATTERNS
- Koniag Native Corp. Oil & Gas Rights
- Land available for Koniag Native Corp. Oil & Gas Selections
- Possible land exchange - State to National Park Service

LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Oil & Gas on State & Native lands

Secondary Uses:
- Oil & Gas on NWR lands

Use Not Recommended:
- Grazing

Unit 20 Aniakchak, Pacific Coast

Resource Summary

- Fish and wildlife resources in this management unit include salmon, brown bear, caribou, moose, shorebirds, waterfowl, and raptors. Recreational resource use is limited because of inaccessibility, although the resources are present. Additional recreational resources include geologic features such as Aniakchak Caldera and floatable rivers such as the Aniakchak River. The Aniakchak River is a National Wild and Scenic River. Lands within the national monument and preserve are outside the plan area; however, resource values on the NPS lands are similiar. Mineral terranes are potentially favorable for deposits of coal and gold, copper, and molybdenum in the southern portion of this management unit.

Subunits

This management unit is divided into the following three subunits:

A. Northern
B. Aniakchak National Monument and Preserve (part)
C. Southern

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest and for recreation. Oil and gas development on Koniag oil and gas lands and other Native lands; access should be ensured to these lands. Manage the southern subunit for mineral exploration and development on Native lands.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public lands in the northern subunit (A).
- Mineral exploration and development on private lands in the southern subunit (C).
- Coal exploration and development for local use on private lands.

Secondary Land Uses

- Oil and gas exploration and development on lands Koniag Native Corporation selects for oil and gas rights in this unit.

- Transportation related to coal and hardrock mineral exploration and development in the southern subunit.

- Transpeninsula corridor. Identified a preferred transpeninsula transportation corridor from Port Heiden to Kujulik Bay.

- Potential port site development at Kujulik Bay.

Mineral Entry

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

- DNR should close all navigable waterways within Aniakchak National Monument and Preserve and Alaska Peninsula NWR to new mineral entry, including the Aniakchak River (navigability in question).

Land Uses Not Recommended

- Grazing.

- Remote settlement.

Management Guidelines

- All transportation and utility systems on NWR lands will be subject to Title XI of ANILCA, and the Refuge Administration Act.

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

Land Exchanges, Cooperative Agreements, State Selections

- The research and management site on USFWS land at Chiginagak Bay, as identified by ADF&G, should be reserved for ADF&G's use through a cooperative management agreement.

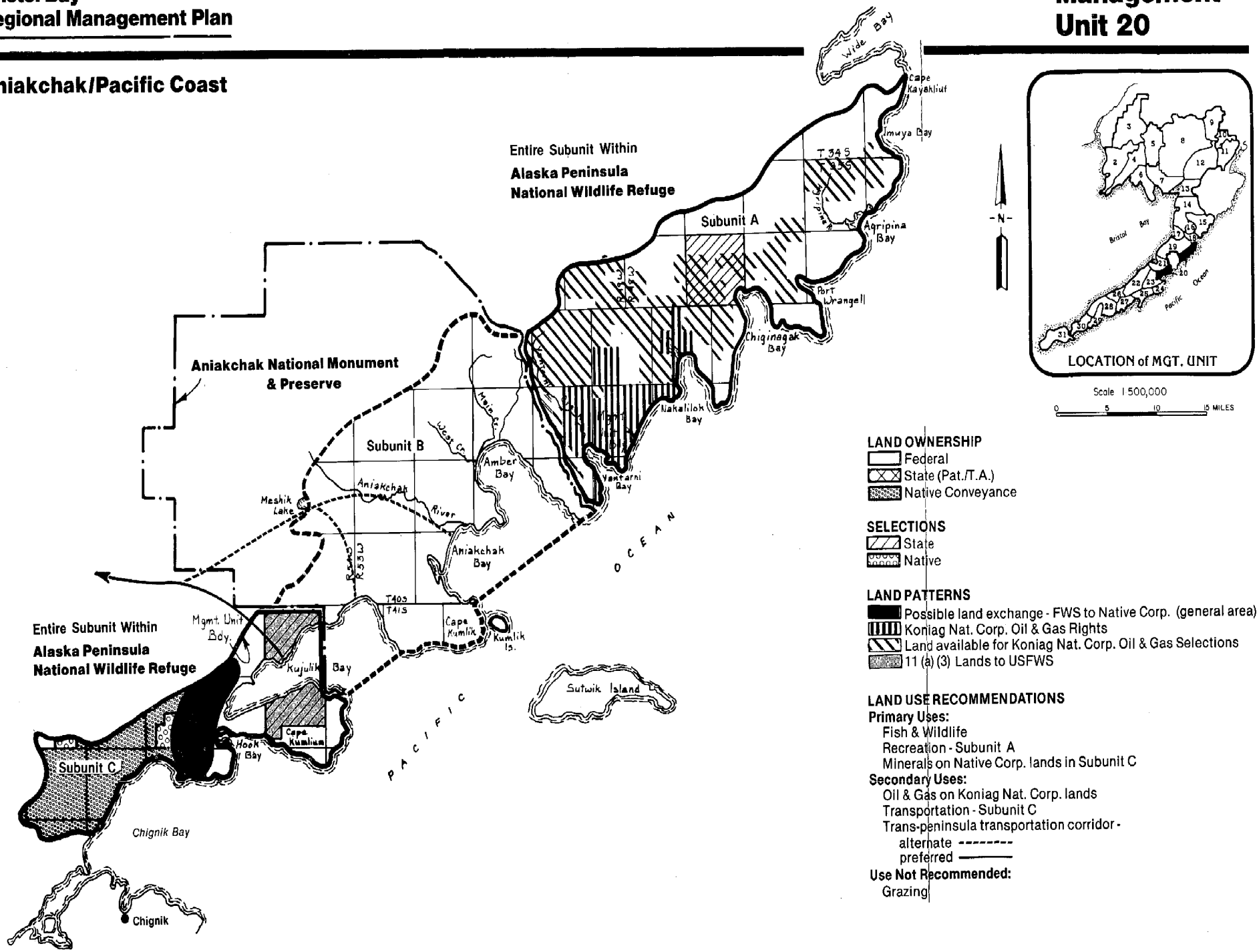
- Hook Bay: The Bristol Bay Native Corporation is interested in obtaining certain NWR lands with favorable mineral potential near Hook Bay from the USFWS. These lands are now closed to mineral entry. The USFWS should consider an exchange for lands with high fish and wildlife resources (see

land exchanges, Chapter VI, for further discussion).

- Kujulik Bay 11(a)(3) lands selected by the state should be managed by the USFWS. The state should relinquish these selections.

Management Unit 20

Aniakchak/Pacific Coast



LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Possible land exchange - FWS to Native Corp. (general area)
- Koniag Nat. Corp. Oil & Gas Rights
- Land available for Koniag Nat. Corp. Oil & Gas Selections
- 11 (a) (3) Lands to USFWS

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation - Subunit A
- Minerals on Native Corp. lands in Subunit C

Secondary Uses:
- Oil & Gas on Koniag Nat. Corp. lands
- Transportation - Subunit C
- Trans-peninsula transportation corridor -
  - alternate --------
  - preferred ———

Use Not Recommended:
- Grazing

Unit 21 Port Heiden

Resource Summary

- The Meshik River and other drainages provide critical salmon habitat, which supports a commercial fishery in Port Heiden. Important wildlife resources include brown bear, caribou, and waterfowl, which are harvested by subsistence and/or recreational users. Recreational resources include hunting as well as river floating on the Meshik River. Part of an oil and gas basin lies within this management unit, with high potential indicated.

Management Intent

- This unit should be managed for fish and wildlife harvest and habitat, recreation, and oil and gas.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public land.
- Oil and gas exploration and development on state and Native lands.

Secondary Land Uses

- Community expansion settlement at Port Heiden.
- Oil and gas exploration and development on NWR lands, where determined to be compatible with the refuge plan.
- Transpeninsula corridor. Identified a preferred transpeninsula transportation corridor from Port Heiden to Kujulik Bay.
- Mineral exploration and development on state land.

Mineral Entry

- Is allowed on all state uplands consistent with the State's Area Plan.
- DNR should close all navigable waterways within Alaska Peninsula NWR and Aniakchak National Monument and Preserve to new mineral entry, including the Meshik River.
- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

- Grazing.
- Remote settlement.

Management Guidelines

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.
- The NPS and USFWS should study the Meshik River for possible designation as a wild and scenic river. The plan takes no position on designation at this time. Designation should not preclude a potential pipeline corridor through the Meshik River Valley.
- All transportation and utility systems or NWR lands will be subject to Title XI of ANILCA, and the Refuge Administration Act.

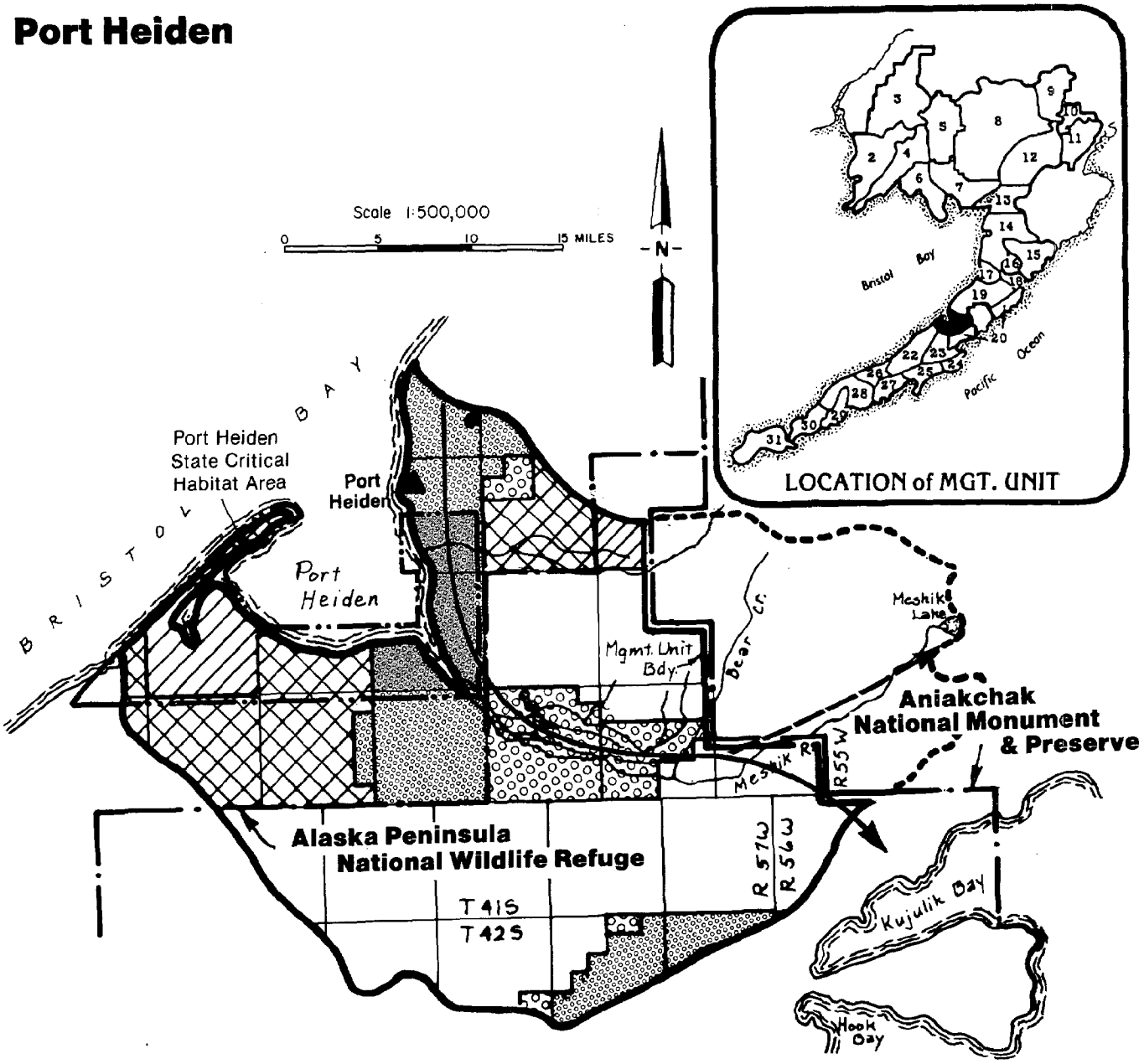
Land Exchanges, Cooperative Agreements, State Selections

- Port Heiden SCHA. The state is interested in obtaining ownership of the entire Port Heiden SCHA. The DNR and ADF&G, Alaska Peninsula, Inc., and the Bristol Bay Native Corporation should begin negotiations to exchange or cooperatively manage land in the SCHA (see land exchanges in Chapter VI for details).

Bristol Bay
Regional Management Plan

Management Unit 21

Port Heiden



LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Oil & Gas on State & Native lands

Secondary Uses:
- Community Expansion Settlement ▲
- Oil & Gas on NWR lands
- Trans-peninsula transportation corridor -
  - alternate
  - preferred

Use Not Recommended:
- Grazing

LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Recommended land Exchange - Nat. Corp. to State

Unit 22 Cape Seniavin, Seal Islands

Resource Summary

- Waterfowl, caribou, brown bear, and walrus are the important known resources in this management unit. Waterfowl, caribou, and brown bear support a considerable recreational harvest and some subsistence harvest. This unit includes the caribou calving grounds for the north peninsula herd and an important walrus haulout area at Cape Seniavin. Scenic recreational resources are present; Mt. Veniaminof, a massive volcano, is considered the focal point. Part of an oil and gas basin lies within this unit, indicating a high and moderate potential.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest, recreation, and oil and gas exploration and development.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Oil and gas exploration and development on state lands.
- Recreation on public lands.

Secondary Land Uses

- Oil and gas exploration and development on NWR lands where determined to be compatible in the refuge plan.
- Collector pipelines to transport oil and/or gas to a transpeninsula pipeline.
- Remote settlement. State land, up to 500 acres in the area north of Port Moller in T.47S., R.72W. and T.48S., R.72W. No more than 1,000 acres total should be sold at this site (these are 11(a)(3) lands) combined with the American Bay and Dorenoi Bay sites in Management Unit 27.
- Mineral exploration and development on state land.

Mineral Entry

- Is allowed on state land consistent with the State's Area Plan.
- The anadromous stream portion and state uplands 100 feet from ordinary high water of Sandy River,

Bear River and 315-11-10200-2009 tributary to Bear River should be closed to new mineral entry.

- ANILCA withdraws refuge lands from all forms of appropriation and disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

- Remote settlement except at Port Moller North.
- Grazing.

Management Guidelines

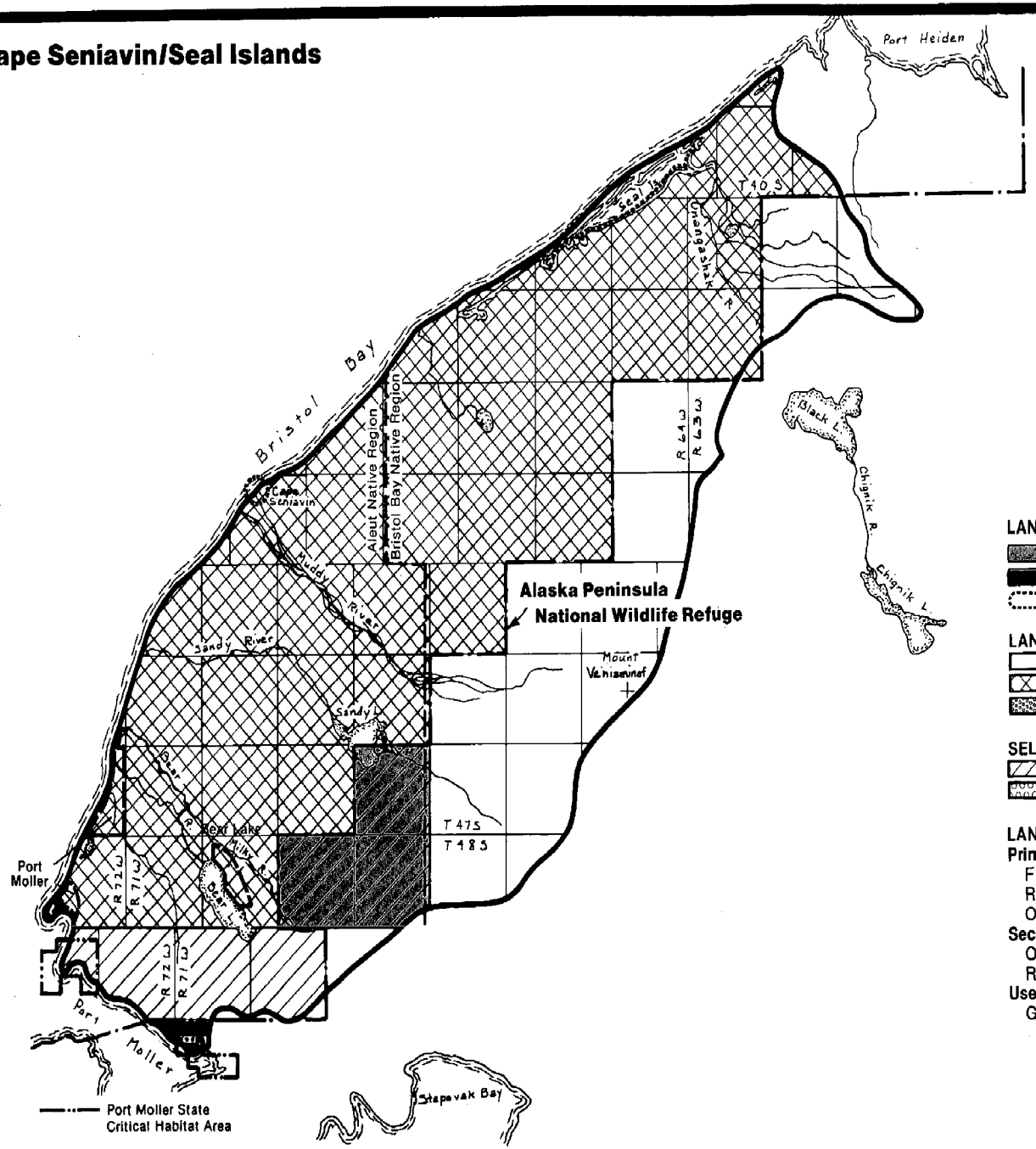
- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet the requirement.
- The research and management sites on state land along Bear Lake, Sandy River, and Ocean River, as identified by ADF&G, should be reserved for ADF&G use.

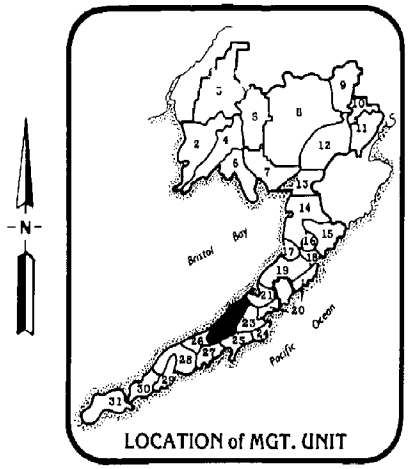
Land Exchanges, Cooperative Agreements, State Selections

- The 11(a)(3) deficiency lands in the Sandy Lake area selected by the state should be managed by the USFWS. The state should relinquish these selections (see 11(a)(3) discussion in Chapter VI).
- The 11(a)(3) lands in the Port Moller area (a portion of which are in this unit) should be owned by the state. BLM should convey these lands to the state (see Chapter VI).

Management Unit 22

Cape Seniavin/Seal Islands





LAND PATTERNS
- 11(a)(3) Lands that should be owned by U.S.FWS
- 11(a)(3) Lands that should be owned by State
- Recommended AMSA

LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Oil & Gas on State land

Secondary Uses:
- Oil & Gas on NWR lands
- Remote Settlement

Use Not Recommended:
- Grazing

Unit 23 Chignik

Resource Summary

- Salmon resources of the Black Lake, Chignik Lake, and Chignik River drainage support a very important commercial and subsistence harvest and commercial fish processing. Wildlife resources include a large brown bear population, caribou, some moose, raptors, abundant marine mammals, and seabirds. Moose and caribou are harvested by subsistence users. Recreational harvest of wildlife, especially brown bear, and non-consumptive recreational uses are becoming increasingly popular. Mineral terranes are favorable for coal and hardrock minerals (copper, lead, and zinc). Part of the Bristol Bay oil and gas basin is near Black Lake, with high potential indicated.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest. Mineral exploration and development and community expansion settlement are also encouraged.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Mineral exploration and development on private lands.
- Coal exploration and development for local use on private lands.

Secondary Land Uses

- Community expansion settlement at Chignik, Chignik Lake, and Chignik Lagoon.
- Hydroelectric development on Mud Bay Creek or Indian Creek.
- Oil and gas exploration and development on private lands and on NWR lands, where determined to be compatible in the refuge plan.

Mineral Entry

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.
- DNR should close all navigable waterways within Alaska Peninsula NWR to new mineral entry,

including Chignik River (part), Black Lake, Alec River and Clark River.

Land Uses Not Recommended

- Grazing.
- Surface entry for oil and gas exploration or development in Black and Chignik lakes and Chignik River.
- Surface coal development within one mile of Black Lake, Chignik Lake and Chignik River between Chignik and Black Lakes.

Management Guidelines

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

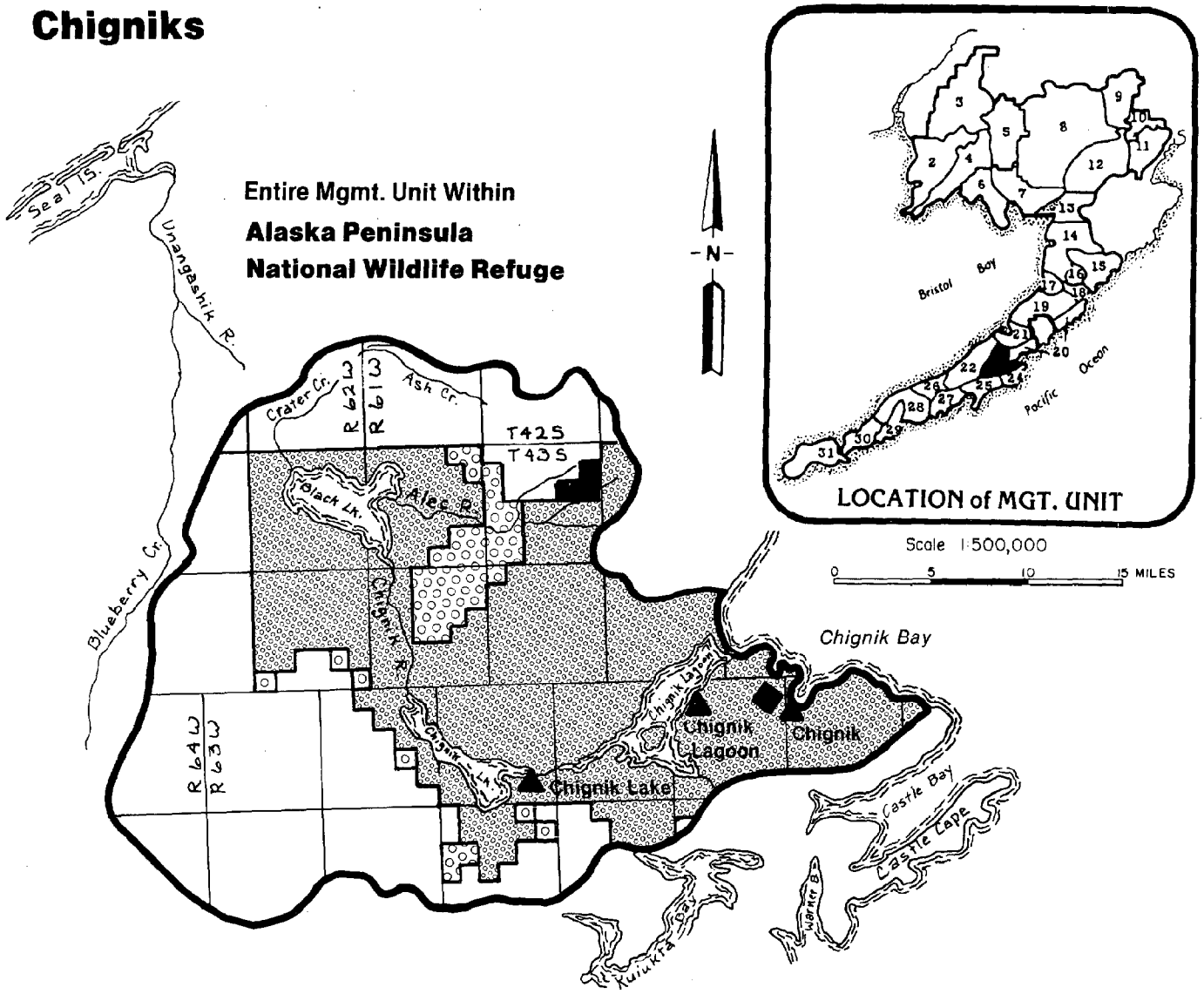
Land Exchanges

- Dinosaur Tracks east of Black Lake. Native corporation lands in T.43S., R.60W., Sections 12, 13 and 14, encompass the only known dinosaur tracks in Alaska. Although the lands are on the northwest flank of the Chignik anticline, it is probably appropriate for the track area and lands suitable for a small airstrip, to be included in a possible exchange for refuge lands elsewhere. This would protect the area's scientific significance and maintain access for viewing and research (see land exchanges in Chapter VI for further discussion).
- The research and management sites along Black Lake, and the Chignik River, as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

Bristol Bay Regional Management Plan

Management Unit 23

Chigniks



LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Recommended land Exchange Nat. Corp. to U.S. FWS

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Minerals on Native Corp. lands

Secondary Uses:
- Oil & Gas
- Community Expansion Settlement ▲
- Potential Hydropower Site ◆

Uses Not Recommended:
- Grazing
- Oil & Gas - Surface entry on Black Lake & Chignik Lake
- Surface Coal development within one mile of Black Lake & active salmon spawning streambeds

Unit 24 Castle Cape

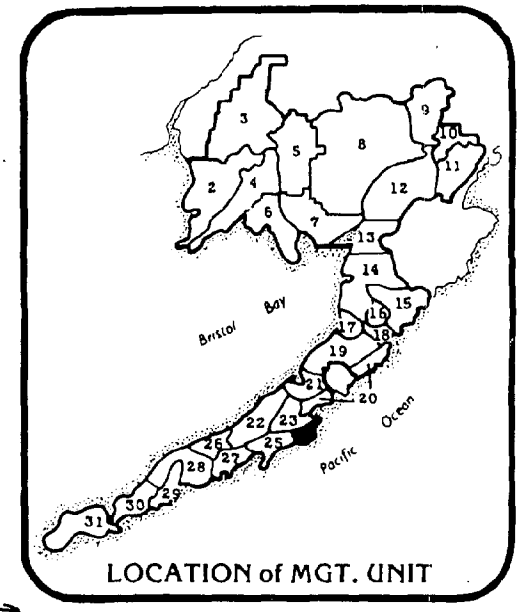
Resource Summary	. Scenic resources in this management unit are very high, although presently the recreational potential is limited because of difficult access. Fish and wildlife resources include herring, some salmon and shrimp, waterfowl, seabirds, raptors, and brown bear. These resources support some commercial fishing and recreational hunting.
Management Intent	. This unit should be managed for recreation and fish and wildlife habitat and harvest. This unit includes many bays and state-owned submerged lands.
Primary Land Uses	. Recreation on public lands.
	. Fish and wildlife habitat and harvest.
Secondary Land Uses	. None.
Mineral Entry	. ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.
Land Uses Not Recommended	. Grazing.
Management Guidelines	. Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.
Land Exchanges, Cooperative Agreements, State Selections	. The research and management site on USFWS land along Castle Bay, as identified by ADF&G, should be reserved for ADF&G's use through a cooperative management agreement.
	. Castle Cape/Mitrofania Bay: State land selections in these areas should be relinquished, as they are

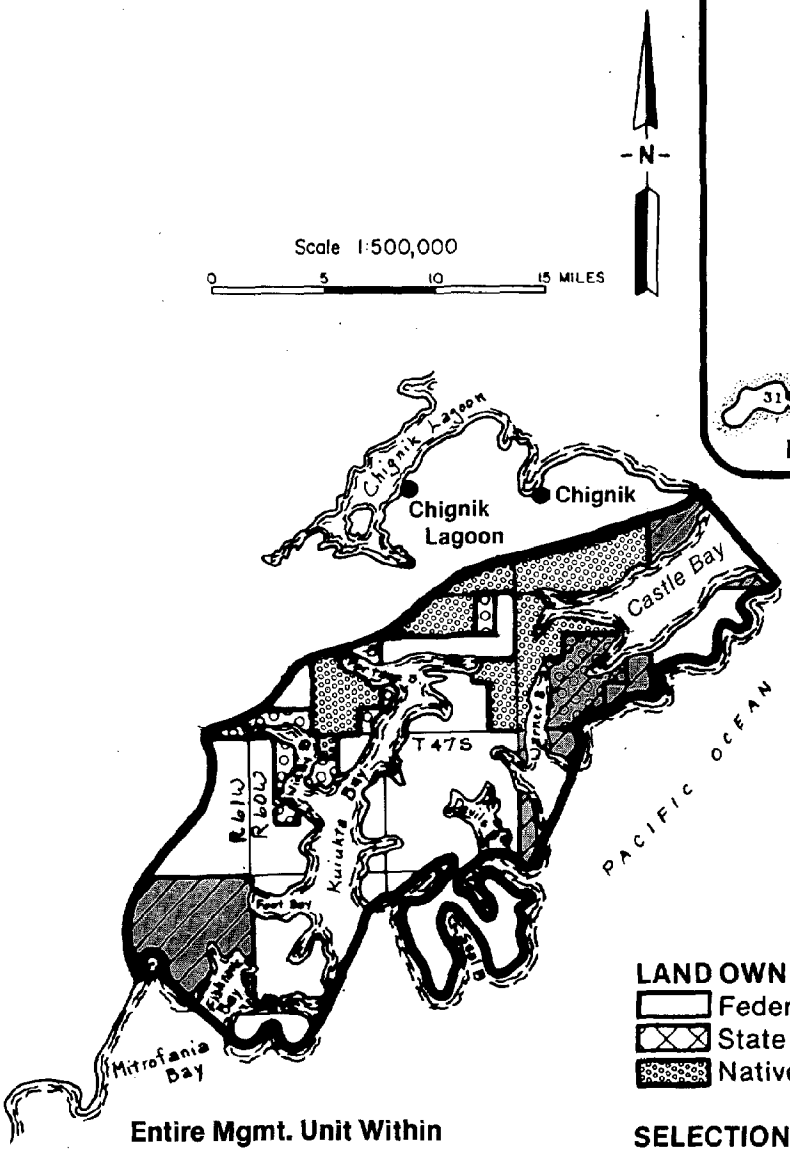
very remote and isolated tracts of land with no substantial resource values and would be difficult for DNR to manage (see state relinquishments in Chapter VI for further discussion).

Bristol Bay Regional Management Plan

Management Unit 24

Castle Cape





Entire Mgmt. Unit Within
Alaska Peninsula
National Wildlife Refuge

LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Recommended State Relinquishment

LAND USE RECOMMENDATIONS
Primary Uses:
Fish & Wildlife
Recreation on public lands
Use Not Recommended:
Grazing

Unit 25 Pacific Coast, Perryville

Resource Summary

- Salmon and herring resources provide for commercial and subsistence harvest. Brown bear, caribou, and a small number of moose in this management unit support subsistence and/or recreational hunting. Recreational use is limited, due to poor access. Mineral terranes are favorable for potential coal deposits in the southwestern part of this management unit, and they are favorable for potential deposits of copper, lead, and zinc in areas scattered throughout the unit. The oil and gas potential through most of this management unit is unknown; part of an oil and gas basin lies in a small portion of the southwestern part of the unit, indicating a high potential in this area.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest and for mineral exploration and development.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Mineral exploration and development on Native lands.

Secondary Land Uses

- Oil and gas exploration and development on Native lands and on NWR lands, where determined to be compatible by the refuge plan.
- Settlement for community expansion at Perryville and Ivanof Bay.

Mineral Entry

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

- Grazing.

Management Guidelines

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness

Preservation System. The USFWS is using the refuge planning process to meet this requirement.

Land Exchanges, Cooperative Agreements, State Selections

- The research and management site on USFWS land at the mouth of "Log Jam" Creek, as identified by ADF&G, should be reserved for ADF&G's use through a cooperative management agreement.

- State land selections, in this unit should be relinquished, as they are very remote and isolated tracts with no substantial resource values and would be difficult for DNR to manage (see state relinquishments in Chapter VI for further discussion).

- The 11(a)(3) deficiency lands in the Sandy Lake area (a small portion of which are in this unit) selected by the state should be managed by the USFWS. The state should relinquish these selections (see 11(a)(3) discussion in Chapter VI).

Bristol Bay Regional Management Plan

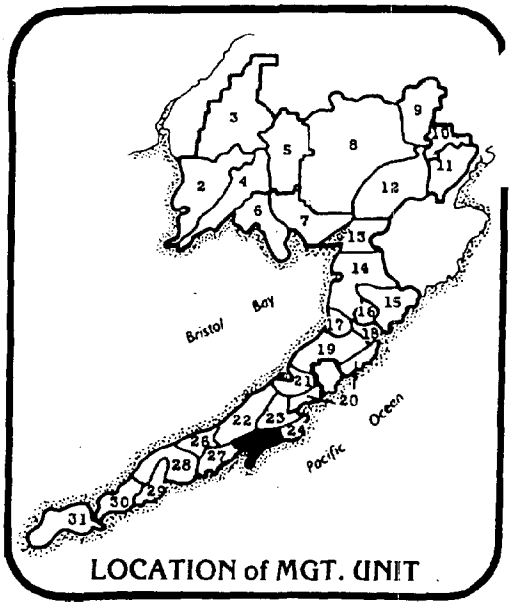
Management Unit 25

Pacific Coast/Perryville

LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND PATTERNS
- Recommended State Relinquishment
- 11 (a) (3) Lands to be owned by the U.S. FWS



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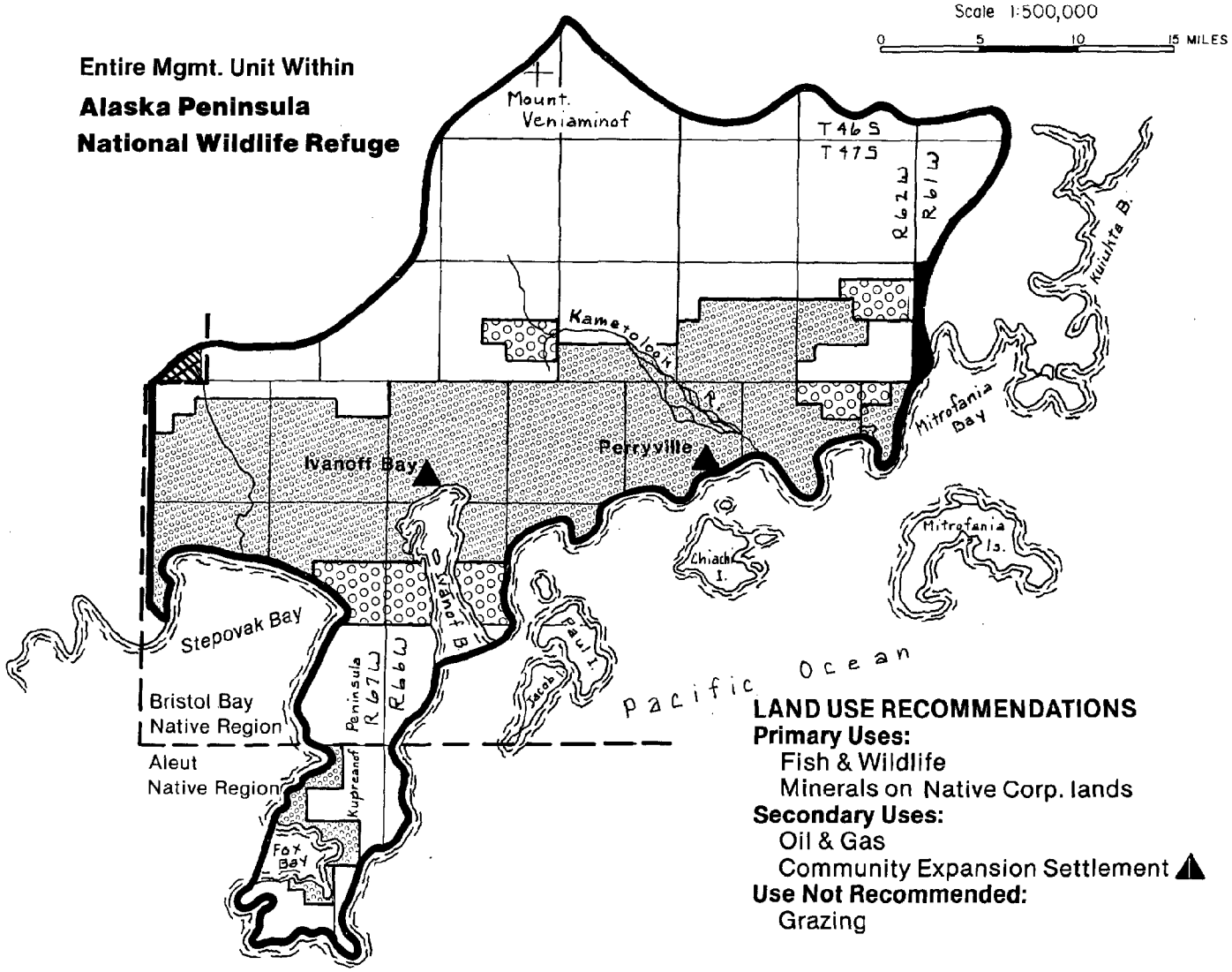
Entire Mgmt. Unit Within
Alaska Peninsula
National Wildlife Refuge



LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Minerals on Native Corp. lands

Secondary Uses:
- Oil & Gas
- Community Expansion Settlement ▲

Use Not Recommended:
- Grazing

Unit 26 Port Moller, Herendeen Bay, Nelson Lagoon

Resource Summary

- Abundant waterfowl and marine mammals are the important wildlife resources in this management unit. Waterfowl support both recreational and subsistence users. Herendeen Bay supports a commercial crab harvest. Part of an oil and gas basin lies in this management unit, indicating a high potential.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Oil and gas exploration and development in upland areas.

Secondary Land Uses

- Community expansion settlement at Nelson Lagoon.
- Recreation on public lands.
- Transpeninsula corridor. Identified a preferred transpeninsula transportation corridor from Herendeen Bay to Balboa Bay (see map for Management Unit 27).

Land Uses Not Recommended

- Oil and gas exploration and development. State-owned tide and submerged lands will not be placed according to the State Area Plan on the state's five-year oil and gas lease schedule.
- Grazing on state and federal lands.

Management Guidelines

- None specific to this unit.

Land Exchanges, Cooperative Agreements, State Selections

- Port Moller SCHA. The state is interested in acquiring ownership of the entire Port Moller SCHA. The DNR and ADF&G and the Nelson Lagoon and Aleut Native Corporations should begin negotiations to exchange or cooperatively manage land in the Port Moller SCHA. The ADF&G should

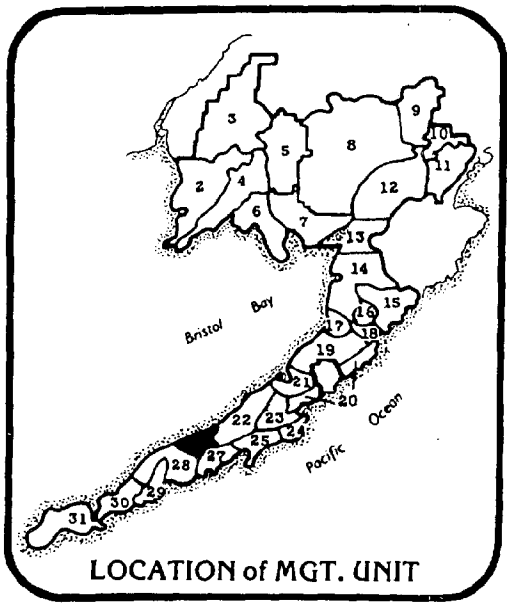
assess the need for boundary adjustments to the SCHA to include all essential habitats and to exclude non-essential uplands areas (see land exchanges in Chapter VI for further discussion).

The research and management site on the west side of Herendeen Bay, as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

Bristol Bay Regional Management Plan

Management Unit 26

Port Moller/Herendeen Bay/ Nelson Lagoon



LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Oil & Gas in upland areas

Secondary Uses:
- Recreation on public lands
- Community Expansion Settlement ▲

Uses Not Recommended:
- Grazing on State & NWR lands

State tide and submerged lands are not placed on the State's 5 year oil and gas lease schedule.

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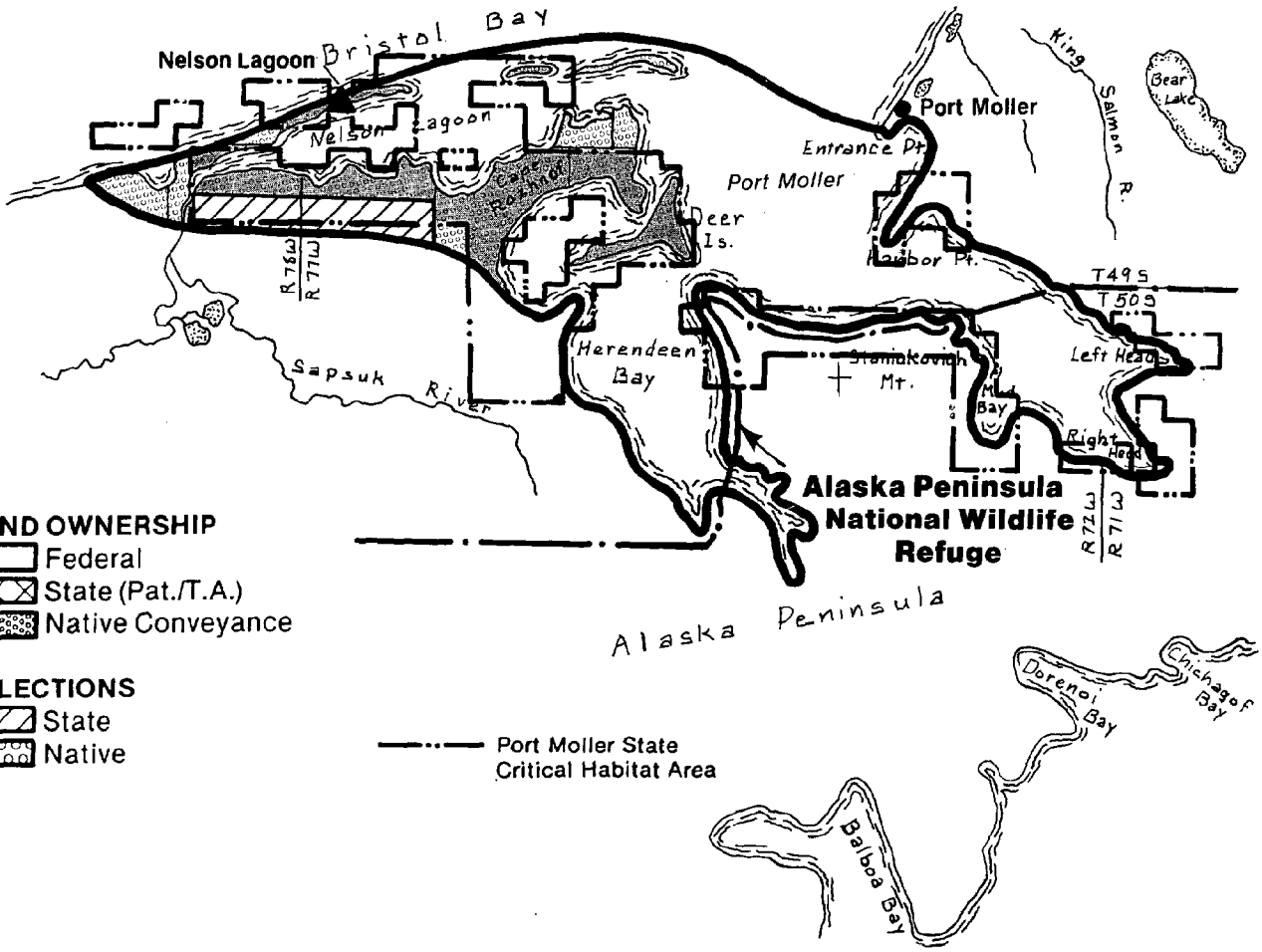
0 5 10 15 MILES

LAND PATTERNS

Land exchange - Nat. Corp. lands to State



LAND OWNERSHIP

- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS

- State
- Native

Port Moller State Critical Habitat Area

Unit 27 Herendeen Bay, Port Moller Uplands

Resource Summary

- Numerous small salmon streams provide habitat for salmon, that are harvested by subsistence and commercial users. Mineral terranes are favorable for deposits of coal and hardrock minerals such as copper, lead, and zinc. Part of this management unit is in an oil and gas basin, with high potential indicated; the remainder of this unit has an unknown oil and gas potential. Wildlife resources include brown bear, raptors, seabirds, and caribou. This area of the peninsula has served as a transpeninsula transportation link in the past and, because of the short overland distances and good deepwater ports on the Pacific Ocean side, has high potential for future transpeninsula transportation development.

Management Intent

- This unit should be managed for mineral development, oil and gas, transportation, and fish and wildlife habitat and harvest.

Primary Land Uses

- Mineral exploration and development on private and state lands.
- Fish and wildlife habitat and harvest.
- Transportation related to oil and gas or mineral activities, including potential port site development at Balboa Bay.
- Transpeninsula corridor. A preferred transpeninsula transportation corridor from Herendeen Bay to Balboa Bay. This corridor is recommended to be developed for industrial or private use, and public access should not be allowed.
- Oil and gas exploration and development on state and private lands.

Secondary Land Uses

- Oil and gas exploration and development on NWR lands, where determined to be compatible with the refuge plan.
- Remote settlement. State land should be sold only in the following areas:

. American Bay: in T.51S., R.70W., Sections 19, 20, 29, 30, 32 and T.52S., R.70W., Sections 5 and 8 (11(a)(3) lands).

. Dorenoi Bay area: in T.52S., R.72W., Sections 16, 17, 20, 21, 28-30, 32, 33 (11(a)(3) lands).

. No more than 1,000 acres total may be sold at these two sites combined with the Port Moller North site in Management Unit 22.

Mineral Entry

. Is allowed on all state lands consistent with the State's Area Plan.

. ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

. Grazing on state and federal lands.

. Remote settlement except at American Bay and Dorenoi Bay.

Management Guidelines

. During development of pipelines, roads, mines, and settlement, caribou movements along the isthmus between Balboa and Herendeen bays and the isthmus between Port Moller and the Pacific Coast should be protected.

. All transportation and utility systems on NWR lands will be subject to Title XI of ANILCA, and the Refuge Administration Act.

. Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

Land Exchanges, Cooperative Agreements, State Selections

. Lands in this unit west of Right Head Bay of Port Moller that are presently part of the Alaska Peninsula NWR should be transferred to Izembek NWR. This transfer will simplify management for the USFWS and reflects wildlife distribution data

and geographic reality better than the present situation (see Chapter VI for further discussion).

- Port Moller/Herendeen Bay: Most land in this unit should be owned by Native corporations, private owners, and the state, in order to aid settlements, mineral exploration, and development and transportation system developments. State and Native corporations should discuss acquisition of this land through exchanges with the USFWS for refuge lands elsewhere (see land exchanges, Chapter VI, for further discussion).

- The 11(a)(3) deficiency lands in the Port Moller area selected by the state should be state-owned. BLM should convey these lands to the state (see 11(a)(3) discussion in Chapter VI).

- The state should relinquish selections in the Balboa Bay/San Diego Bay area as indicated on the management unit map as these are not considered valid selections (see state relinquishments, Chapter VI).

- The research and management site at Port Moller Hot Springs, as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

Bristol Bay Regional Management Plan

Management Unit 27

Herendeen Bay/Port Moller Uplands

LAND USE RECOMMENDATIONS

Primary Uses:

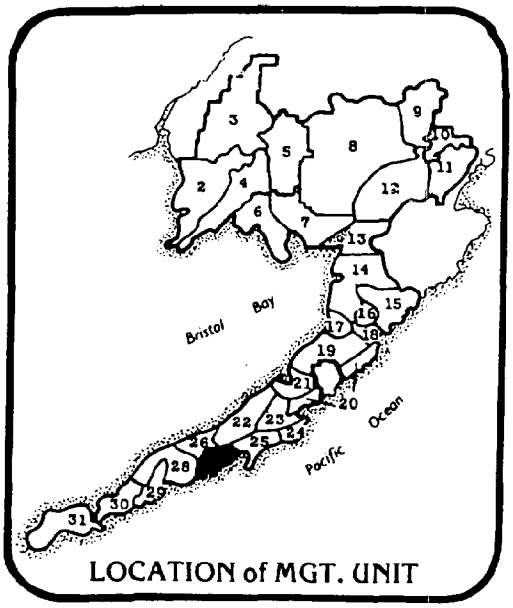
Fish & Wildlife
Oil & Gas on State & Native lands
Minerals on State & Native lands
Trans-peninsula transportation corridor -
alternate
preferred

Secondary Uses:

Oil & Gas on NWR lands
Remote Settlement

Use Not Recommended:

Grazing on State & NWR lands



LAND PATTERNS

11(a)(3) Lands that should be owned by State

State Selections that should be relinquished

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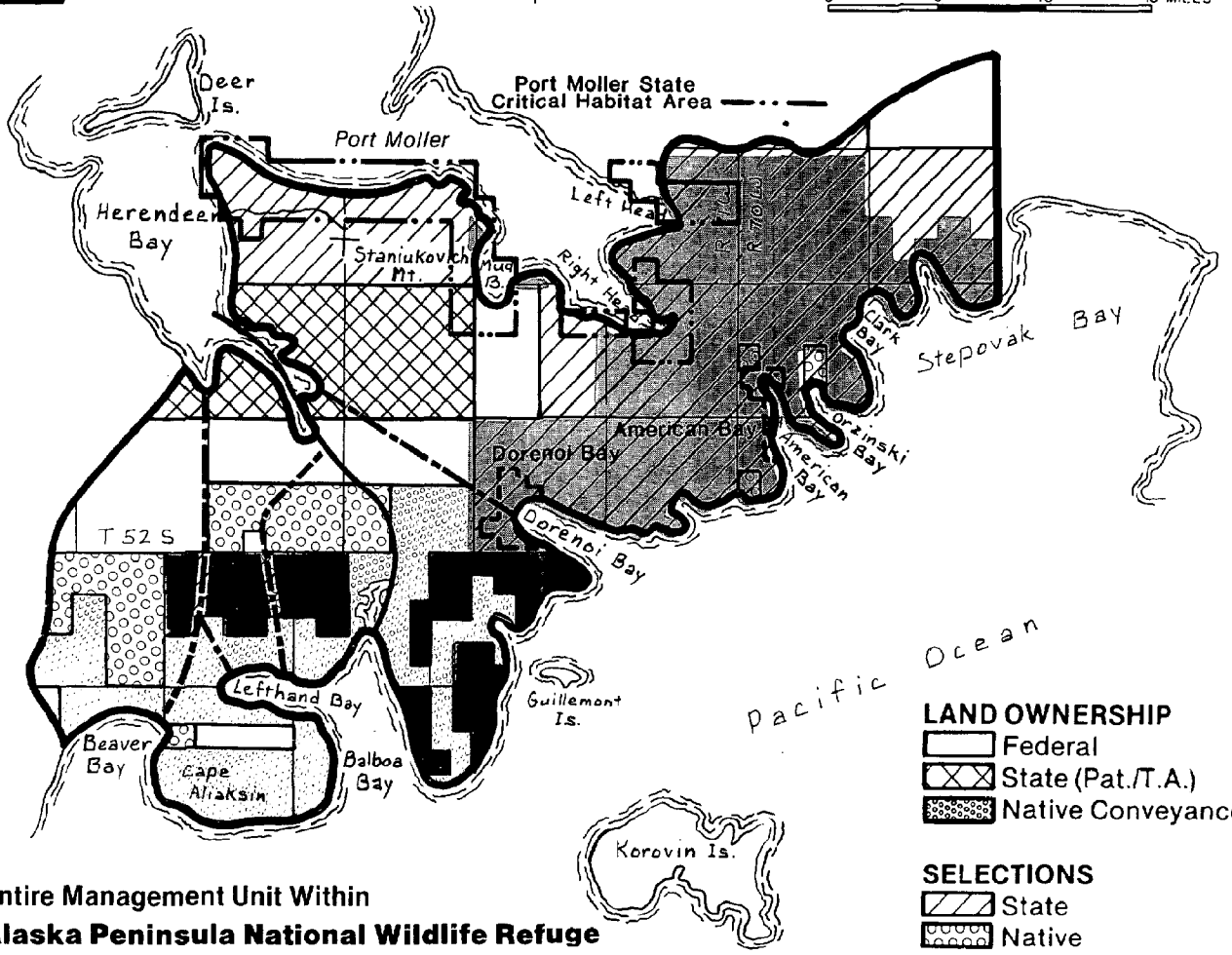


LAND OWNERSHIP

Federal
State (Pat./T.A.)
Native Conveyance

SELECTIONS

State
Native

Entire Management Unit Within
Alaska Peninsula National Wildlife Refuge

Unit 28 Pavlof Bay

Resource Summary

- Salmon and herring resources support an important commercial fishery. Part the Bristol Bay oil and gas basin lies within this management unit, indicating a high potential in this area. Known mineral terranes are in the Canoe Bay area east of Pavlof Bay; they are favorable for deposits of coal. Wildlife resources include caribou, brown bear, waterfowl, seabirds, and marine mammals. Caribou, brown bear, and waterfowl support recreational and/or subsistence users. The Black Hills area in this unit is the calving grounds for the lower peninsula caribou herd.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest and recreation. On state and private lands, also manage for oil and gas and mineral exploration and development.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Wilderness, where congressionally designated.
- Oil and gas exploration and development on private and state lands except the Black Hills caribou calving grounds.
- Minerals exploration and development on Native lands near Canoe Bay and state lands with identified mineral terranes (see map).

Secondary Land Uses

- Recreation on public lands.
- Oil and gas exploration and development on state lands in the Black Hills caribou calving grounds.
- Oil and gas exploration and development on non-wilderness NWR lands, where determined to be compatible in the refuge plan.
- Mineral exploration and development on state lands.

Mineral Entry

- Is allowed on all state lands consistent with the State's Area Plan.

- The anadromous streams portion and state uplands 100 feet from ordinary high water of Caribou River, Sapsuk River, Lefthead River, and Peterson Creek should be closed to new mineral entry.

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

- Remote settlement.

- Grazing on all public lands.

Management Guidelines

- Facilities should be designed, sited, and operated to encourage the continued use of the area by caribou (see guidelines under Fish and Wildlife and Oil and Gas in Chapter V).

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

Land Exchanges, Cooperative Agreements, State Selections

- Lands in this unit that are presently part of Alaska Peninsula NWR should be transferred to Izembek NWR. This transfer will simplify management for the USFWS and reflect wildlife distribution data and geographic reality better than the present situation (see Chapter VI for further discussion).

- Cape Lieskof: The state should select BLM land in the Cape Lieskof area, which is now completely surrounded by state lands (see state selections, Chapter VI).

- Black Hills/Cathedral River: State land in this area may be considered for an exchange or cooperative management agreement with the USFWS. This area is a natural extension of the Alaska Peninsula NWR and includes much of the caribou calving area for the lower peninsula caribou herd and important brown bear and waterfowl habitat. The area also has favorable potential for the discovery of oil and gas (see land exchanges in Chapter VI for further discussion).

- The research and management site on USFWS land along Hoodou Lake (Sapsuk Lake) and Middle Creek, as identified by ADF&G, should be reserved for ADF&G's use through a cooperative management agreement.

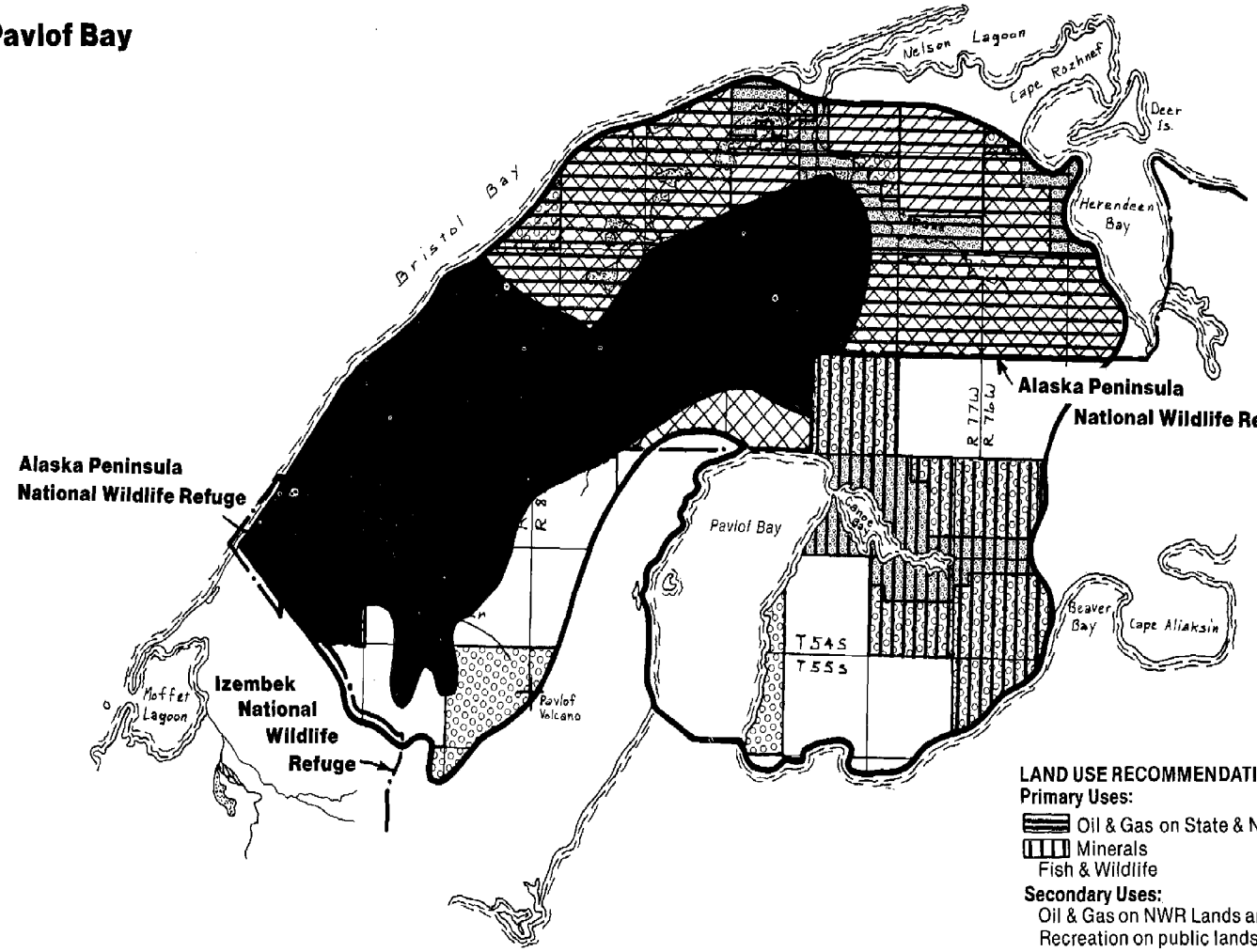
- The research and management sites at Cold Bay Hot Springs and along Canoe Bay and Sapsuk River, as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

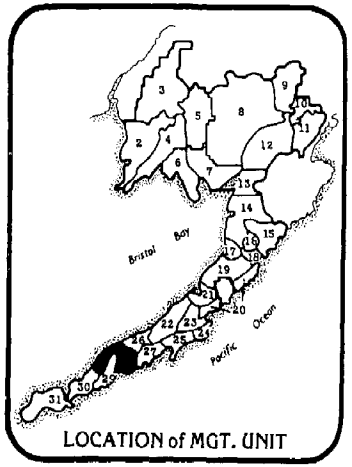
- The state should relinquish selections within the Alaska Peninsula NWR in T.53S., R.86W. and T.54S., R.86W. (see map) (see state relinquishments in Chapter VI for further discussion).

Bristol Bay
Regional Management Plan

Management Unit 28

Pavlof Bay





Scale 1:500,000
0 5 10 15 MILES

LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND USE RECOMMENDATIONS

Primary Uses:
- Oil & Gas on State & Native lands, except in Black Hills caribou calving ground
- Minerals
- Fish & Wildlife

Secondary Uses:
- Oil & Gas on NWR Lands and on State land in Black Hills Caribou Calving Ground.
- Recreation on public lands

Use Not Recommended:
- Grazing

LAND PATTERNS
- Black Hills caribou calving ground

Unit 29 Pavlof, King Cove

Resource Summary

- Numerous streams provide habitat for salmon, which support commercial fishing, fish processing, and subsistence use. Wildlife resources include brown bear, caribou, waterfowl, seabirds, and shorebirds. Brown bear, caribou, and waterfowl provide for some harvest. Recreational potential also includes unique scenic and geologic resources, mainly attributable to the Pavlof Volcanoes. Known mineral terranes exist in the mountainous areas of this management unit; these terranes are favorable for deposits of copper, gold, and molybdenum.

Management Intent

- This unit should be managed for fish and wildlife habitat and harvest. Private lands around King Cove should be used for commercial fish processing and community expansion.

Primary Land Uses

- Fish and wildlife habitat and harvest.

Secondary Land Uses

- Community expansion settlement at King Cove.
- Transportation. Designate a corridor for a potential road from King Cove to Cold Bay. If the road crosses Izembek Refuge Wilderness, it will be subject to Title XI of ANILCA and the National Wilderness Preservation Act would require congressional approval.
- Hydroelectric power on Delta Creek.
- Grazing on private lands.

Mineral Entry

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

Land Uses Not Recommended

- Grazing on all public lands.

Management Guidelines

- All transportation and utility systems on NWR lands will be subject to Title XI of ANILCA.

- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

Land Exchanges, Cooperative Agreements, State Selections

- Native land selections of various Aleut village corporations on Pavlof Bay with high fish and wildlife value should be considered for exchange with the USFWS for other lands in the study area.

- Lands in this unit that are presently part of Alaska Peninsula NWR should be transferred to Izembek NWR. This transfer will simplify management for the USFWS and reflect wildlife distribution data and geographic reality better than the present situation (see land exchanges, Chapter VI).

- The research and management site along Ram Creek, as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

Bristol Bay Regional Management Plan

Management Unit 29

Pavlof/King Cove

Scale 1:500,000

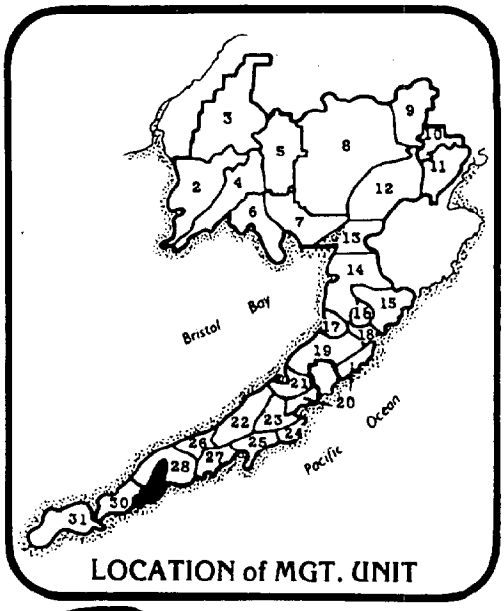
0 5 10 15 MILES

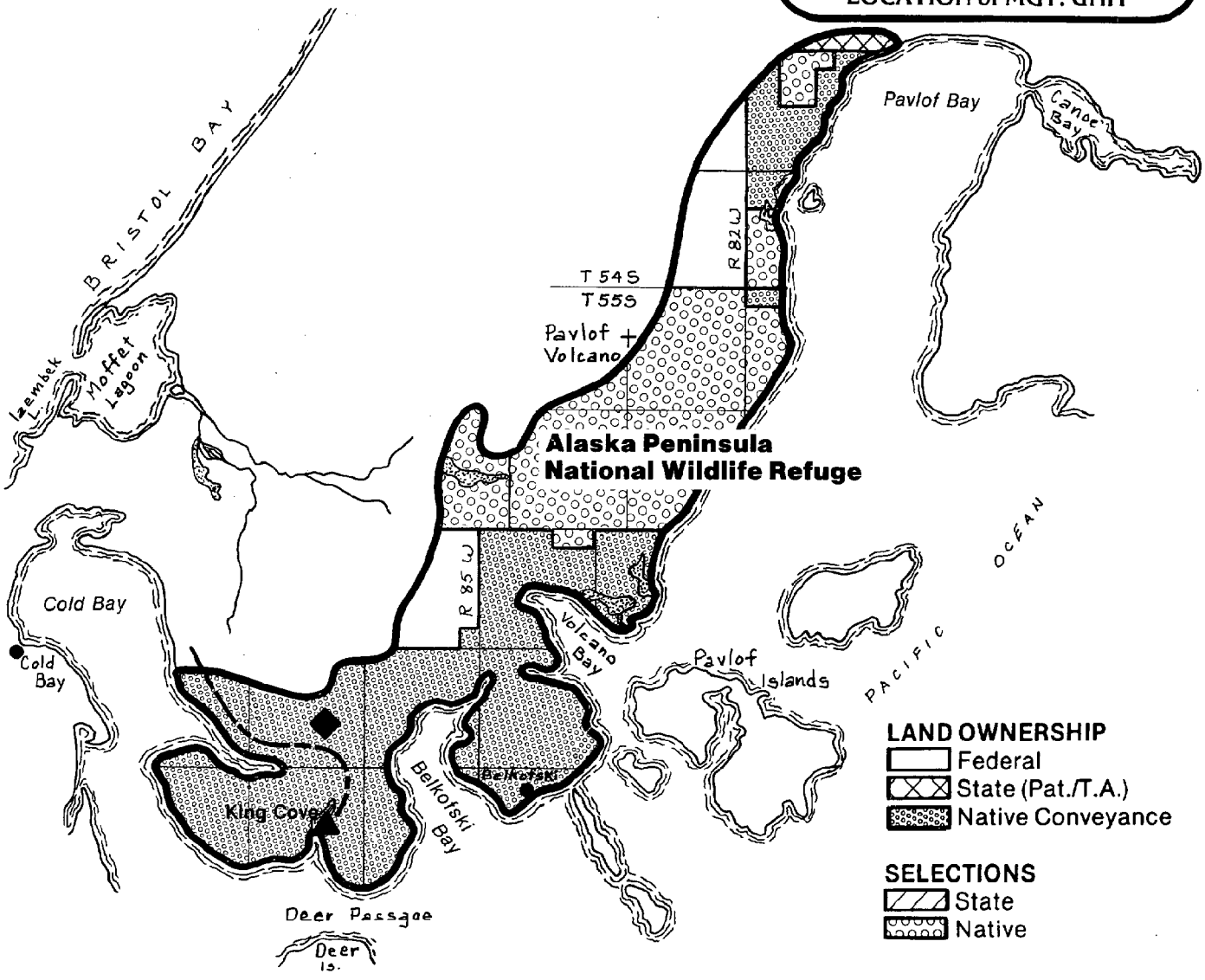
LAND USE RECOMMENDATIONS

Primary Use:
Fish & Wildlife

Secondary Uses:
Potential Hydropower Site ◆
Community Expansion Settlement ▲
Possible road corridor - approx. route ——·——

Use Not Recommended:
Grazing on public lands





LAND OWNERSHIP
Federal
State (Pat./T.A.)
Native Conveyance

SELECTIONS
State
Native

Unit 30 Cold Bay, Izembek

Resource Summary

- False Pass is a major migration corridor for salmon, and numerous small streams support salmon runs. This management unit provides some of the best waterfowl habitat in the world. In addition to abundant waterfowl, wildlife resources include seabirds, shorebirds, brown bear, and caribou resources. This management unit is on the edge of an oil and gas basin; a high potential is indicated in the northwest portion of this unit, a low potential along the Bering Sea coast, and the remainder of the unit outside the basin is of unknown potential. Community resources include a major regional airport at Cold Bay.

Management Intent

- This unit should be managed for fish and wildlife harvest and habitat and recreation. Land around Cold Bay should be managed for transportation, fish processing, and community expansion.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Recreation on public lands.
- Community expansion settlement at Cold Bay on private land and land that may be acquired by the state through a land exchange with the USFWS. If the state acquires land through exchange, up to 1,000 acres of land may be sold.
- Wilderness, where congressionally designated.

Secondary Land Uses

- Transportation. Designate a corridor for a potential road from King Cove to Cold Bay. If this road crosses through Izembek Refuge Wilderness, it will be subject to Title XI of ANILCA and the National Wilderness Preservation Act would require congressional approval.

Mineral Entry

- ANILCA withdraws refuge lands from all forms of appropriation and disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.
- DNR should close all navigable waterways within Izembek and Alaska Peninsula NWR's to new mineral entry.

Land Uses Not Recommended

- Grazing on all public lands.
- Oil and gas exploration and development in Izembek NWR Wilderness. Surface entry for oil and gas and mining on that portion of Izembek State Game Refuge in this unit.
- Transpeninsula oil/gas pipeline through Izembek Lagoon.

Management Guidelines

- Any transportation facility or development at the isthmus at the head of Morzhovoi Bay must not impede caribou movements through this constricted area. Because of the behavioral and physical requirements of caribou, a buried pipeline would be least likely to block caribou movements. See guidelines for caribou and oil and gas in Chapter V.
- Any pipeline constructed through False Pass, which is both tectonically active and a very important migratory corridor for salmon, must be constructed to minimize both the chance of a pipeline failure and the amount of oil spilled in the event of a break (see guidelines for oil and gas in Chapter V).
- The Aleutians East CRSA board should consider designating Morzhovoi and Bechevin bays as Areas Meriting Special Attention (AMSA), as defined by the Alaska Coastal Management Act. These areas contain essential waterfowl habitat.
- All transportation and utility systems on NWR lands will be subject to Title XI of ANILCA.
- Section 1317 of ANILCA requires the review of National Conservation System Unit lands for possible addition to the National Wilderness Preservation System. The USFWS is using the refuge planning process to meet this requirement.

Land Exchanges, Cooperative Agreements, State Selections:

- Lands in this unit that are presently part of the Alaska Peninsula NWR should be transferred to Izembek NWR. This transfer will simplify management for the USFWS and reflect wildlife distribution data and geographic reality better

than the present situation (see Chapter VI for further discussion).

- Cold Bay: The city of Cold Bay presently has limited land available for commercial and residential expansion. The city is surrounded by lands of the Alaska Peninsula NWR, some of which have little value to wildlife, but high suitability for commercial and residential use. The state and Native corporations are interested in acquiring these lands. The USFWS is interested in exchanging these lands for lands having high fish and wildlife value. These parties should enter into negotiations to achieve an appropriate exchange.

  Land should also be made available from excess airport lands. The Alaska DOT/PF should identify airport land suitable for disposal during its airport master planning process (see land exchanges in Chapter VI for further discussion).

- Izembek NWR: The USFWS is interested in acquiring Native corporation 22(g) land near Big Lagoon in the southwestern part of the Izembek refuge and the northeastern shoreline of Cold Bay within the Izembek wilderness area. These areas include essential waterfowl migration and wintering habitat and important brown bear and caribou habitat.

- Mortenson Marsh: This area has been selected by the King Cove Native Corporation. The area is important to nesting whistling swans and other waterfowl and shorebirds. It is an important area for brown bear during spring, summer, and fall. Caribou commonly use the area in fall and winter, and spring, and sockeye salmon spawn in many of the lakes. The USFWS desires to add this land to the Alaska Peninsula NWR in exchange for other lands. The USFWS should pursue negotiations with the King Cove Native Corporation (see land exchanges in Chapter VI for further discussion).

- Izembek Lagoon: This water body is surrounded by the Congressionally designated wilderness of Izembek NWR; the area below mean high tide, however, it is owned by the State of Alaska. USFWS and the State of Alaska should enter into a cooperative management agreement to ensure that these essential migratory bird habitats are protected from incompatible development (see cooperative agreements, Chapter VI, for more details).

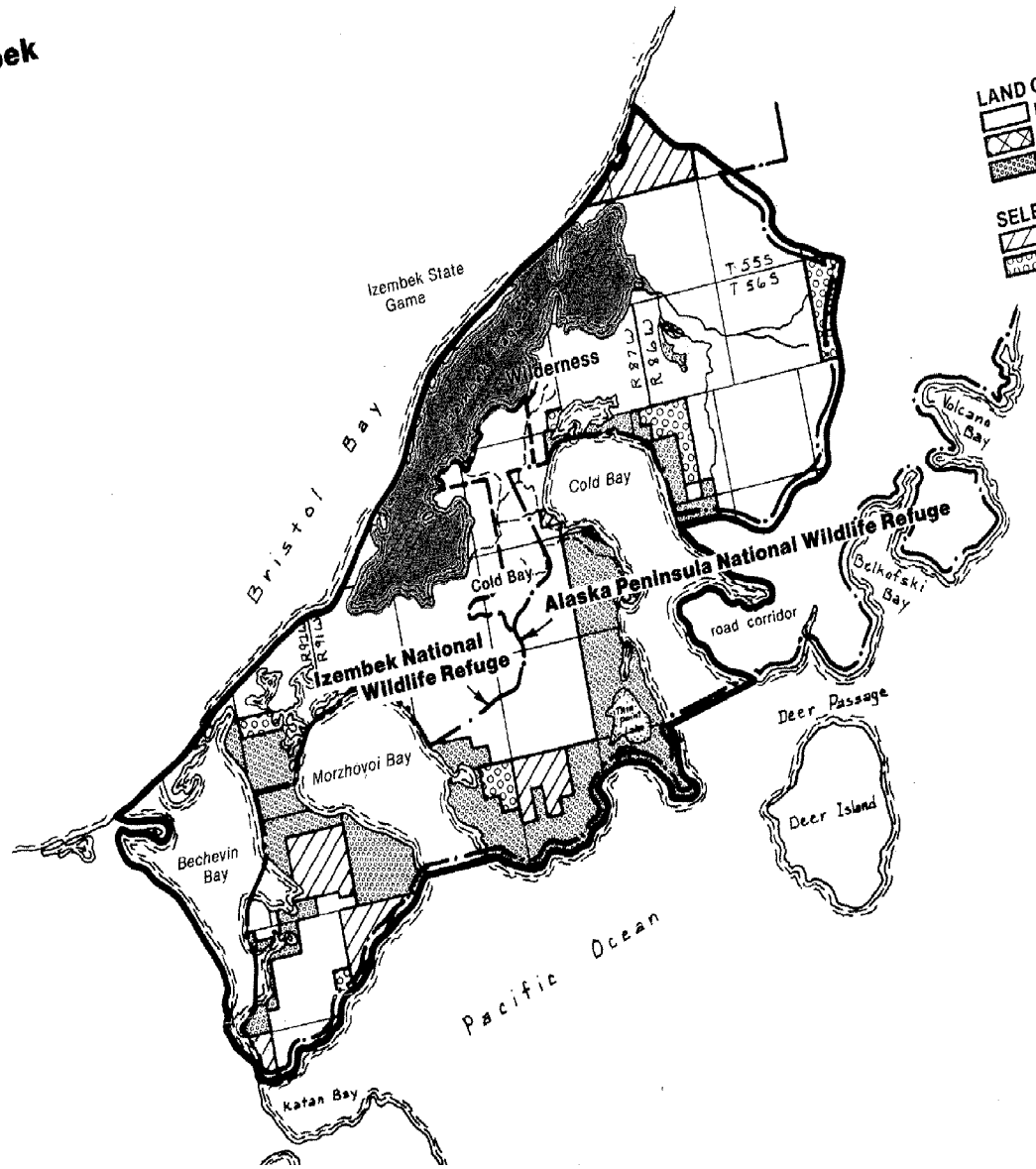
- The state should relinquish selections within Izembek NWR in T.53S., R.86W., and T.54S., R.86W (see state relinguishments Chapter VI).

- Research and management sites along Russell Creek, as identified by ADF&G, should be reserved by purchase, lease or cooperative agreement between ADF&G and the appropriate landowner(s).

- The research and management site on USFWS land along Hotsprings Bay, as identified by ADF&G, should be reserved for ADF&G's use through a cooperative management agreement.

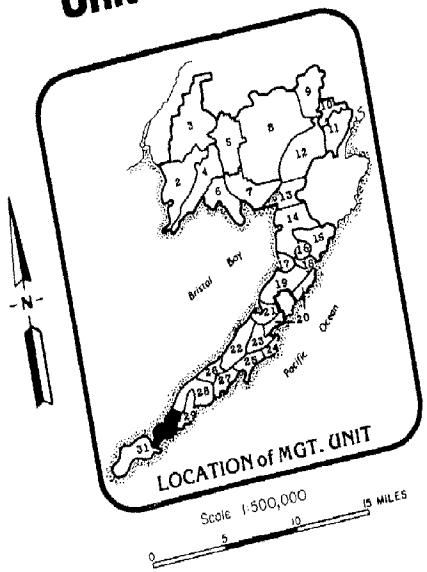
Bristol Bay
Regional Management Plan

Cold Bay/Izembek



LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native



LAND PATTERNS
- Recommended State Relinquishment
- Possible Cooperative Agreement - State / FWS
- Recommended AMSA

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Community Expansion Settlement
- Wilderness, where Congressionally designated

Secondary Uses:
- Possible road corridor - approx. route

Uses Not Recommended:
- Grazing on public lands
- Oil & Gas in Izembek NWR Wilderness
- Trans-peninsula transportation corridor through Izembek Lagoon

State tide and submerged lands in Izembek Lagoon or Bechevin Bay should not be on the State's 5 year oil and gas lease schedule. (See State's Area Plan)

Unit 31 Unimak Island

Resource Summary

- Unimak Pass is the major migration corridor for seabirds, salmon, marine mammals, and various migratory birds. The salmon migrating through this pass support a commercial fishery in the area, and most of Bristol Bay's salmon also migrate through the pass. Brown bear, caribou, seabirds, shorebirds, and marine mammals are the major wildlife resources in the management unit. Limited subsistence and recreational hunting occurs. Most of the island is designated wilderness. Unimak Pass is also a major thoroughfare for commercial shipping between the Pacific Ocean and the Bering Sea.

Management Intent

- This unit should be managed for fish and wildlife harvest and habitat. Federal land should be managed for wilderness.

Primary Land Uses

- Fish and wildlife habitat and harvest.
- Wilderness, where congressionally designated.
- Recreation on public lands.

Secondary Land Uses

- Community expansion settlement at False Pass.

Mineral Entry

- ANILCA withdraws refuge lands from all forms of appropriation or disposal, including location, entry, and patent under the federal mining laws, but not from operation of mineral leasing laws.

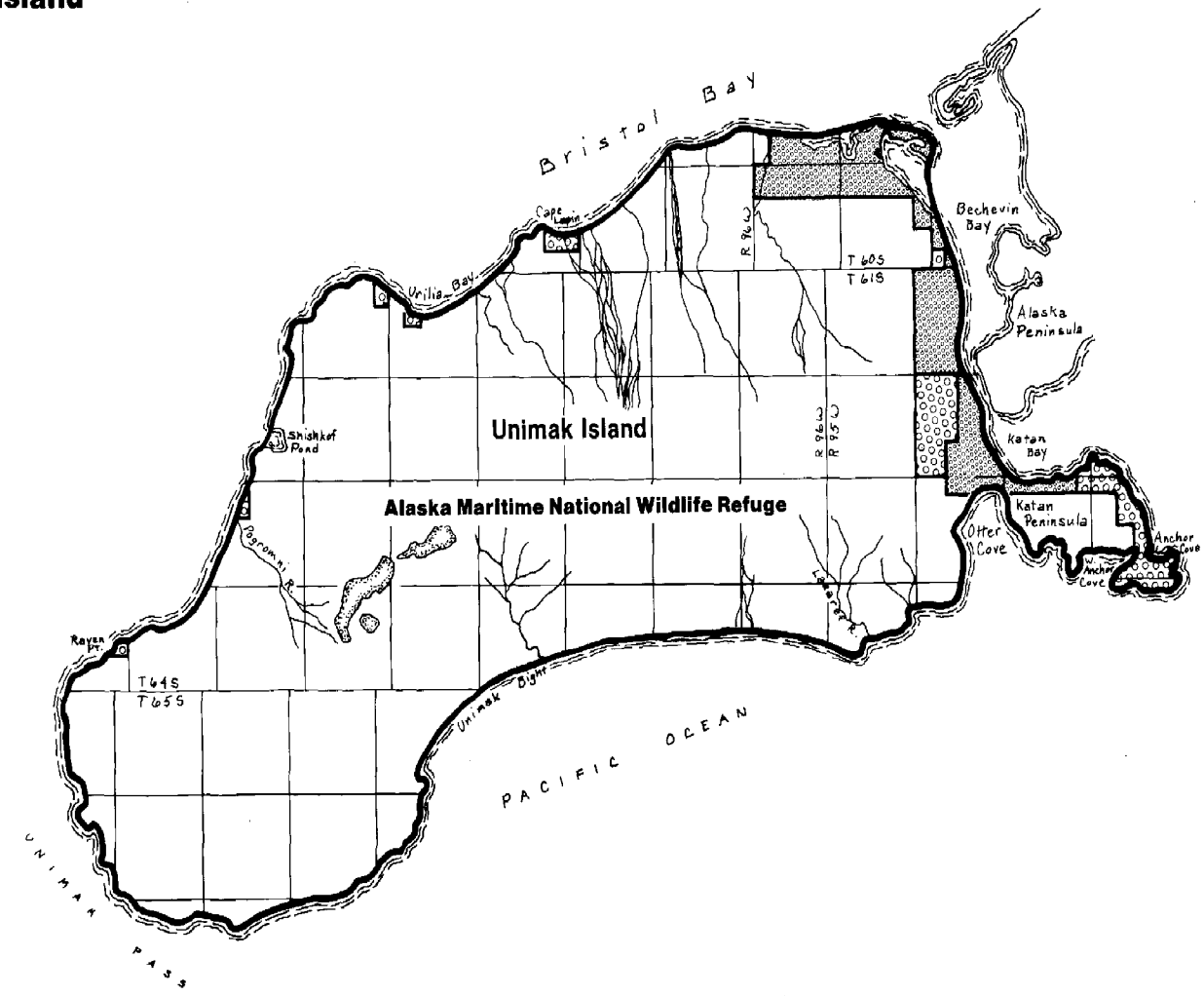
Land Exchanges, Cooperative Agreements, State Selections

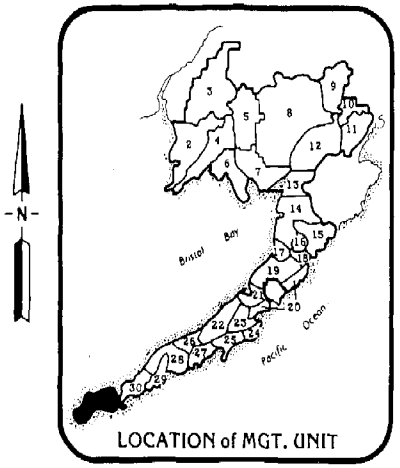
- The research and management site on USFWS land along the east shore of Dora Harbor, as identified by ADF&G, should be reserved for ADF&G's use through a cooperative management agreement.
- Unimak Island: The USFWS should acquire False Pass Native Corporation 22(g) land near Swanson Lagoon and St. Catherine Cove. These areas include waterfowl migration and wintering habitat and important brown bear and caribou habitat.

Bristol Bay
Regional Management Plan

Management Unit 31

Unimak Island





LAND OWNERSHIP
- Federal
- State (Pat./T.A.)
- Native Conveyance

SELECTIONS
- State
- Native

LAND USE RECOMMENDATIONS

Primary Uses:
- Fish & Wildlife
- Recreation on public lands
- Wilderness, where Congressionally designated

Secondary Uses:
- Community Expansion Settlement

Alternatives Considered

Creation of Alternatives

There are many different views as to how to achieve the Congressional objectives defined for the BBRMP in the ANILCA. Responsible land use planning requires that these differing views be considered in the form of plan alternatives that are then assessed for their potential social, economic, and environmental impacts.

The alternatives for the plan were generated through a process involving three steps:

1) The region was divided into 31 management units (see Management Unit Map in this Chapter) in order to evaluate specific resources and their recommended uses. Each management unit is a geographical area with relatively homogeneous topography and resource values or potential. Most units are based on watersheds.

2) After studying current uses, resource potential, and issues identified by the public, the ALUC Study Group described a management intent for each unit and recommended primary land uses, secondary land uses, those land uses not recommended, resource management guidelines, and land exchanges or cooperative agreements. In units where possible resource uses would be in conflict, alternative uses or guidelines were proposed favoring one resource over the other. In some units, for example, alternatives reflect the different viewpoints or concerns of local residents on the one hand and non-local preferences on the other.

3) The decisions made for individual management units were combined, by issue, into alternatives for the entire study area. These alternatives were then aggregated into comprehensive plan alternatives for all resources. An incalculable number of management alternatives could be developed for the Bristol Bay area. To reduce this number and complexity to a manageable analysis, five composite management alternatives were designed, based on general management themes. These five alternatives were described in the Draft BBCMP Plan and EIS. These documents also contained a description of the possible environmental impacts of these alternatives. Public comments on the Draft Plan were solicited between July 20, 1983 and October 20, 1983 (see Chapter 3 and Appendix G for a description of the process).

Based on public comments and the environmental impact analysis, a proposed plan was recommended to the Alaska Land Use Council by its Study Group. The proposal and its environmental consequence were described in the Proposed BBCMP and Revised Draft EIS issued in April 1984. The proposed plan is a modified version of Alternative 1, the preferred alternative in the Draft Plan and

EIS with some modifications coming from Alternatives 2 and 3. The plan presented in the proceding pages is similar to the proposed plan. Unlike the proposed plan, however, all recommendations concerning state land are advisory, although these have been adopted by the State as its Area Plan for state lands. The five alternatives considered in the Draft Plan an Revised Draft EIS are summarized in Table 3 and in the following pages.

Alternatives to the Proposed Plan

Alternative 1 - (Draft Preferred Alternative)

This plan alternative provides for conservation and protection of significant fish, wildlife, and cultural resources while still allowing opportunities for economic growth and development in the region. To ensure that development would occur in an environmentally sound manner, this alternative provides for implementation using the management guidelines as outlined in Chapter V of the draft to guide uses in areas where land use conflicts are possible. In addition, certain areas were identified as environmentally sensitive, essential or other categories not being recommended for certain types of use.

Fish and wildlife habitat and harvest. As in the proposed plan, fish and wildlife habitat and harvest is recommended a primary use in all management units (see maps in Appendix A).

Recreation. This plan alternative recommends recreation a primary use in areas with moderate and high recreational potential (see maps in Appendix A).

Agriculture. As in the proposed plan, small-scale vegetable gardening is encouraged, with crops raised in small acreages or home gardens for personal or local use. Grazing is recommended to be restricted to private lands. Use of federal or most state-owned lands for large-scale grazing is not recommended except for leases for grazing on Hagemeister Island, a portion of the Alaska Maritime Refuge (see Map 18).

Forestry. The timber resources of the region are sparse and can support only limited harvest activity. As in the proposed plan small-scale timbering for house logs and personal use of wood for fuel is encouraged (see Map 18).

Settlement. Community expansion on Native, state, private, and municipal lands around existing communities is recommended under this alternative. If a land exchange is completed between the USFWS and the state involving lands near Cold Bay, up to 1,000 acres could be offered for sale for community expansion. Additionally, it is recommended that the state make available for sale approximately 13,250 acres of state lands in 16 areas. Most of these would be in areas concentrated near Dillingham, the Nushagak River, and Iliamna Lake (Management Units 7, 8, 9, 11, and 12). Smaller sales could be done in Management Units 12, 22,

Summary of Land Use Recommendations

Figure 3

Management Alternative	Fish & Wildlife Habitat & Harvest	Recreation	Forestry
Proposed Plan	Fish and wildlife habitat and harvest is recommended as a primary use in all units.	Recreation is a primary use on public lands in Units 3-7, 9-11, 13-22, 24, 30 and 31 and along river corridors in Units 8 and 12. Secondary Use along rivers in Unit 2 and on public lands in Unit 28.	Small scale timber harvest for local use (house logs and fuel) is a secondary use in Units 2, 5, 7, 8, 10 and 11.
Alternative 1.	Same as Proposed Plan.	Primary use in Units 3, 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 30 and 31. Primary use also around lakes and along river corridors in Units 2, 8 and 12. Secondary use in Unit 28.	Same as Proposed Plan
Alternative 2.	Same as Proposed Plan.	Same as Alternative 1.	Same as Proposed Plan.

Agriculture	Wilderness	Alternate Energy Generation	Oil & Gas Leasing, Exploration, & Development	Minerals	Transportation Corridors	Settlement
Local, small scale vegetable gardening for personal, consumption is a secondary use in Units 7 and 8. Grazing is a secondary use on private lands in Units 4 and 27-30. Grazing is not recommended on state and refuge lands in Units 5, 6, 8, 9, 10, 12-30.	Primary use where Congressionally designated. All remaining NWR lands are presently under study to determine suitability for wilderness designation.	Local, small scale energy generating systems are encouraged. Large scale, regional energy generation systems need further study by the Alaska Power Authority.	Primary use on state, BLM, and Native Lands on the Alaska Peninsula and a secondary use on most other lands within the known oil and gas basin. Surface entry is as a result of the State's Area Plan prohibited in Chignik Lake, Black Land and Chignik River, Izembek Lagoon and designated refuge wilderness areas. The state as a result of the State's Area Plan will not schedule any oil and gas leases in Management Subunits 1A, 1B, 1C, 1D, and Unit 26, and the major bays and estuaries in Units 1E and 1F. As a result of the State's Area Plan there is a ten year moratorium on leasing in Units 1E and 1F, the north shore of the Alaska Peninsula.	Mineral exploration and development is designated a primary use on all state (outside Wood-Tikchik Park) all BLM and most Native lands in the vicinity of known mineral terranes. The recommended portion of 64 anadromous streams and state upland 100 feet on either side are closed to mining (SAP). Leasehold location will be used on state lands in Management Units 9 and 11 (SAP).	Roads into and out of the Bristol Bay region and roads connecting distant communities are discouraged. This alternative identifies transpeninsula transportation corridors from Pilot Point to Wide Bay, from Port Heiden to Kujulik Bay/Aniakchak Bay and from Port Moller to Balboa Bay as preferred routes. A road from King Cove to Cold Bay could be developed by the State if economically and environmentally feasible.	New settlement associated with community expansion is either a primary or a secondary use around all existing communities. Up to 14,000 acres of state land should be made available for state land disposals near Dillingham, Iliamna Lake, Half Cabin Lake and the lower Alaska Peninsula.
Same as Proposed Plan.	Same as Proposed Plan.	Same as Proposed Plan.	Same Primary, secondary and not recommended uses as Plan. The state is not scheduling and oil and gas leases in Management Subunits 1A, 1B, 1C, 1D, and Unit 26, the major bays and estuaries in Units 1E and 1F, and in the Black Hills caribou calving area (SAP).	Mineral exploration and development is recommended a primary use on state, BLM and Native lands in the Goodnews Bay, Nyac, Chignik, Perryville, Herendeen Bay, Port Moller, and Pavlof Bay areas. Active stream channels of all designated anadromous streams and their tributaries under ADNR and U.S.BLM jurisdiction are closed to new mineral entry by the (SAP).	Same as Proposed Plan.	Community expansion is the same as Proposed Plan. Up to 14,250 acres of state land may be made available for state land disposals in Units, 7, 8, 9, 11, 12, 22 and 27 and near Cold Bay once a land exchange is completed.
Same as Proposed Plan.	Same as Proposed Plan.	Only local, small scale energy generating systems are allowed to service villages in close proximity.	Same primary, secondary and prohibited uses as Proposed Plan. The state is not scheduling any oil and gas leases in any tide or submerged lands and in the Black Hills Caribou Calving area of Unit 28 and Mid Peninsula Caribou Calving area of Unit 22 (SAP).	Same as Alternative 1.	Roads into and out of the Bristol Bay region and roads connecting distant communities are discouraged. No preferred transpeninsula transportation corridors are identified.	Community expansion is the the same as Proposed Plan. Up to 2,250 acres of state land may be made available for state land disposals in Unit 7.

Summary of Land Use Recommendations

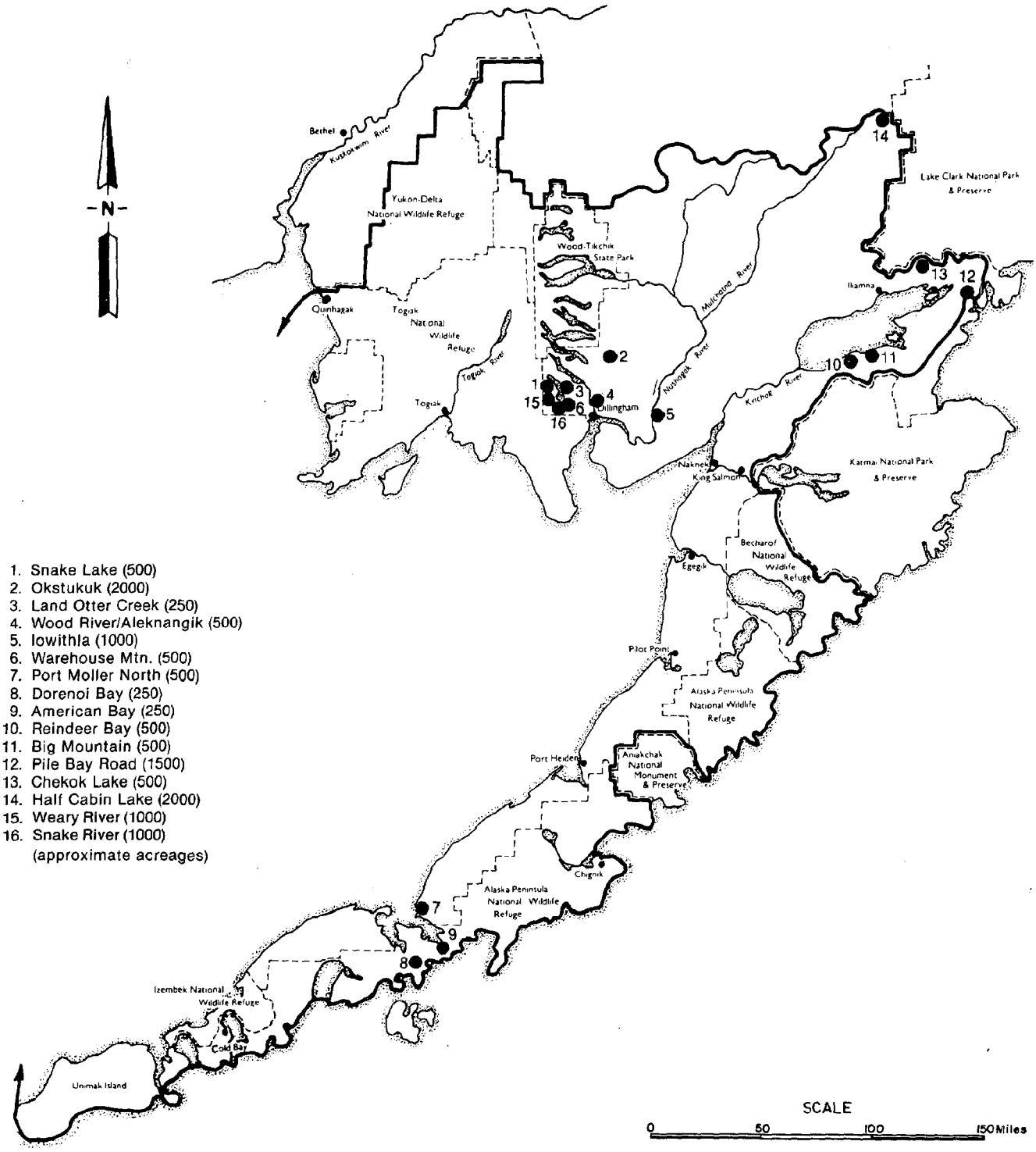
Figure 3

Management Alternative	Fish & Wildlife Habitat & Harvest	Recreation	Forestry	Agriculture	Wilderness	Alternate Energy Generation
Alternative 3.	Same as Proposed Plan.	Same as Alternative 1.	Same as Proposed Plan.	Same as Proposed Plan.	Same as Proposed Plan.	Same as Proposed Plan.
Alternative 4.	Same as Proposed Plan.	Same as Alternative 1.	Same as Proposed Plan.	Same as Proposed Plan.	Same as Proposed Plan.	Small scale energy generating systems would be recommended; large scale regional hydroelectric facility would be allowed provided any substantive environmental conflicts could be resolved.
No Plan Alternative	No land use recommendations for fish and wildlife by the BBRMP. NWR's and State parks, refuges, sanctuaries, and critical habitats have fish and wildlife designated a primary use. Most State lands in the region are designated for fish and wildlife habitat by ADNR's FY 83 Statewide Natural Resources Plan and (SAP).	No land use recommendations for recreation by the BBRMP. Wood-Tikchik State Park and state lands southeast of Lake Iliamna are designated for recreation by ADNR's FY 83 Statewide Natural Resources Plan and (SAP).	No land use recommended for forestry.	No land use recommended for agriculture.	Same as Proposed Plan.	Hydroelectric projects and other energy developments meeting state and federal licensing requirements could be built.

Oil & Gas Leasing, Exploration, & Development	Minerals	Transportation Corridors	Settlement
Same primary, secondary and not recommended uses as Proposed Plan. The state is not scheduling any oil and gas leases in Management Subunits 1B and 1D and Unit 26 (SAP).	Same primary use recommendations as Alternative 1. Leasehold location is required for mineral development in the designated anadromous streams under the state's jurisdiction (SAP).	Same as Proposed Plan.	Community expansion is the same as Alternative 1. Up to 24,300 acres of land made available from state and BLM land disposals in Units 3, 7, 8 9, 11, 12, 14, 19, 22, and 27 and 1,000 acres near Cold Bay once a land exchange is completed.
Same primary, secondary and not recommended uses as Proposed Plan plus a secondary use on all tide and submerged lands except in the Bristol Bay Fisheries Reserve. The state is not scheduling any oil and gas leases in the Bristol Bay Fisheries Reserve in Management Subunit 1D (SAP).	Same primary use recommendations as Alternative 1, no change in mineral entry on all state and BLM lands (all open except Wood-Tikchik State Park).	This alternative identifies transpeninsula transportation corridors from Pilot Point to Wide Bay, Port Heiden to Kujulik/ Aniakchak Bay, Port Moller to Balboa Bay, Bering Sea to Morzhovoi Bay, False Pass to Ikatan Bay, Egegik to Portage or Puale Bay and King Salmon to Portage or Paule Bay as preferred routes. A road from King Cove to Cold Bay is recommended if found economically and environmentally feasible.	Community expansion is the same as Alternative 1. Up to 37,325 acres of land made available for state and BLM land disposa in Units 3, 7, 8, 9, 11, 1 14, 19, 22, and 29 and 1,0 acres near Cold Bay once a land exchange is completed.
Surface entry for oil and gas in Unit 1D is prohibited by State law without approval of the Alaska legislature. State or BLM leasing process and NWR refuge plans would govern oil and gas activity. Oil and gas is prohibited in designated refuge wilderness areas.	Same as Alternative 4 except no primary use recommendations are made.	No preferred transpeninsula transportation corridors identified.	Community expansion could occur around existing communities, remote land disposals could be 70,000 acres or more on state and BLM lands.

Settlement - Alternative 1

Map 21



1. Snake Lake (500)
2. Okstukuk (2000)
3. Land Otter Creek (250)
4. Wood River/Aleknangik (500)
5. Iowithla (1000)
6. Warehouse Mtn. (500)
7. Port Moller North (500)
8. Dorenoi Bay (250)
9. American Bay (250)
10. Reindeer Bay (500)
11. Big Mountain (500)
12. Pile Bay Road (1500)
13. Chekok Lake (500)
14. Half Cabin Lake (2000)
15. Weary River (1000)
16. Snake River (1000)

(approximate acreages)

and 27. Map 21 shows the location and parcel sizes for land disposals under this alternative.

Wilderness. As in the proposed plan, no recommendation is made for additional wilderness at this time. The approximately 3.9 million acres now designated wilderness on Togiak, Becharof, Izembek, and Alaska Maritime refuges would remain in the system. Pursuant to Section 1317(a) of ANILCA, the USFWS will review all remaining refuge lands (approximately eight million acres) in the Bristol Bay study area to determine suitability for wilderness designation. The ALUC Study Group had intended to review the wilderness proposals in the refuge plans and make recommendations on these proposals for inclusion in the final plan. However, refuge plans had not been completed. Existing wilderness areas and wilderness study areas are shown on Map 19.

Transportation corridors. As in the proposed plan, three multiple use transportation corridors are identified as the preferred routes for possible development: Port Moller to Balboa Bay (approx. 43 miles), Port Heiden to Kujulik Bay (with an alternate route to Aniakchak Bay) (approx. 44 miles), and Pilot Point to Wide Bay (approx. 50 miles). These corridors are shown on Map 17. Under the preferred alternative, these corridors could be used for pipelines, roads, transmission lines, and transportation or utility systems. A road corridor is also identified from King Cove to Cold Bay.

Actual design and construction of transportation facilities across national conservation system units would be subject to the provisions of Title XI of ANILCA (see Chapter V for a description of Title XI). This process could be used to establish alternative routes to those preferred by the plan through conservation system units.

The following are the general routes identified for these corridors:

Port Moller to Balboa Bay: This corridor runs from the Bering Sea through Herendeen Bay and Portage Valley to Albatross Anchorage of Balboa Bay. Several other routes were considered as alternatives to this preferred route, including corridors that terminated at Beaver Bay and Dorenoi Bay.

Port Heiden to Kujulik/Aniakchak Bay: The corridor begins near Port Heiden, leads southwest to the base of Aniakchak Crater, and follows the Meshik River valley. The corridor goes either east over a low divide in the Aniakchak River valley to Aniakchak Bay or southwest to Kujulik Bay.

Pilot Point to Wide Bay: The corridor begins near Pilot Point on Ugashik Bay and runs southeast, crossing the Ugashik River near Ugashik village. It continues on the coastal plain north of the Dog Salmon River to south of Ugashik Lake. The corridor continues past Lone Hill to Wide Bay.

King Cove to Cold Bay road: A 32-mile road to connect the communities of King Cove and Cold Bay could be considered for construction if economically and environmentally feasible.

Oil and gas leasing, exploration, and development. Exploration and developmental activities are recommended a primary use and could occur in most areas having high and moderate potential for oil and gas. For purposes of environmental protection, however, the following sensitive areas in the Bristol Bay region are not scheduled by the State for leasing for oil and gas activities (see Map 22): the Black Hills caribou calving grounds; state tide and submerged lands of the Fisheries Reserve and north and west of the reserve (within management sub-units IA, 1B, 1C, and ID); and major bays, estuaries, and lagoons (within Management Units IE and IF) along the north side of the Alaska Peninsula. Oil and gas activity is currently prohibited on designated refuge wilderness areas in Management Units 15, 30, and 31. More specific decisions about where exploration would occur on USFWS lands would be left to the specific refuge comprehensive conservation plans. Activity on state lands where oil and gas leasing can take place would be governed primarily by the State Department of Natural Resources's (DNR) leasing process.

The amount of oil and gas activity that may occur in the Bristol Bay planning area depends on many variables. Chief among them would be the amount of recoverable resources which is presently unknown.

Energy. As in the proposed plan, local, small-scale (about 5 MW) energy systems are encouraged to develop under this alternative to produce hydroelectric or alternative energy for local use. "Local energy systems", is the equivalent of "subregional plans" studied by the Power Authority. A highly ranked subregional plan, the Tazimina run-of-river project, would serve Iliamna, Newhalen and Nondalton with a 1.2 MW project while the other communities in the region would remain dependent upon diesel generation. Waste heat recovery and possibly wind generation could be added to supplement diesel generation in these communities in the future. The Alaska Power Authority (APA) should continue to study regional or inter-regional systems, focusing on economic feasibility and environmental impacts, most notably to salmon. Under this alternative, the plan takes no position on any of these larger projects and notes that the Chikuminuk Lake project is prohibited by existing state statutes.

Minerals. By recommending mineral exploration and development a primary use, mineral exploration would generally be encouraged on state, BLM, or Native lands in the Goodnews Bay, Chignik, Nyac, Herendeen Bay, and Port Moller areas. Public lands outside NWRs and state parks should be open to mineral entry (see Map 23). The development of locatable minerals on valid existing claims should be permitted to continue on NWRs.

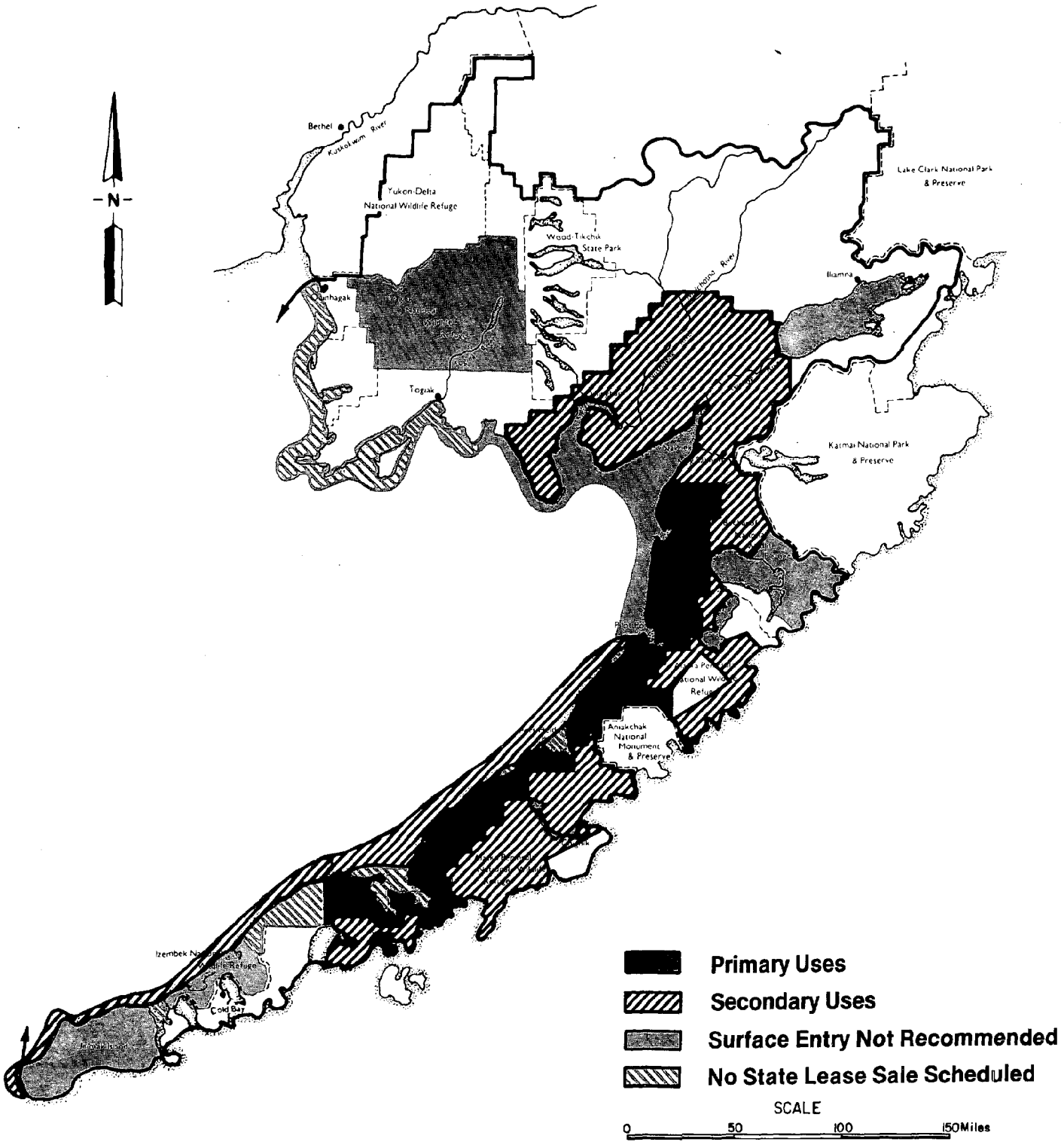
The active stream channels of all identified anadromous streams (see map, Appendix A) and their tributaries under the

Bristol Bay
Regional Management Plan

Land Use
Recommendations

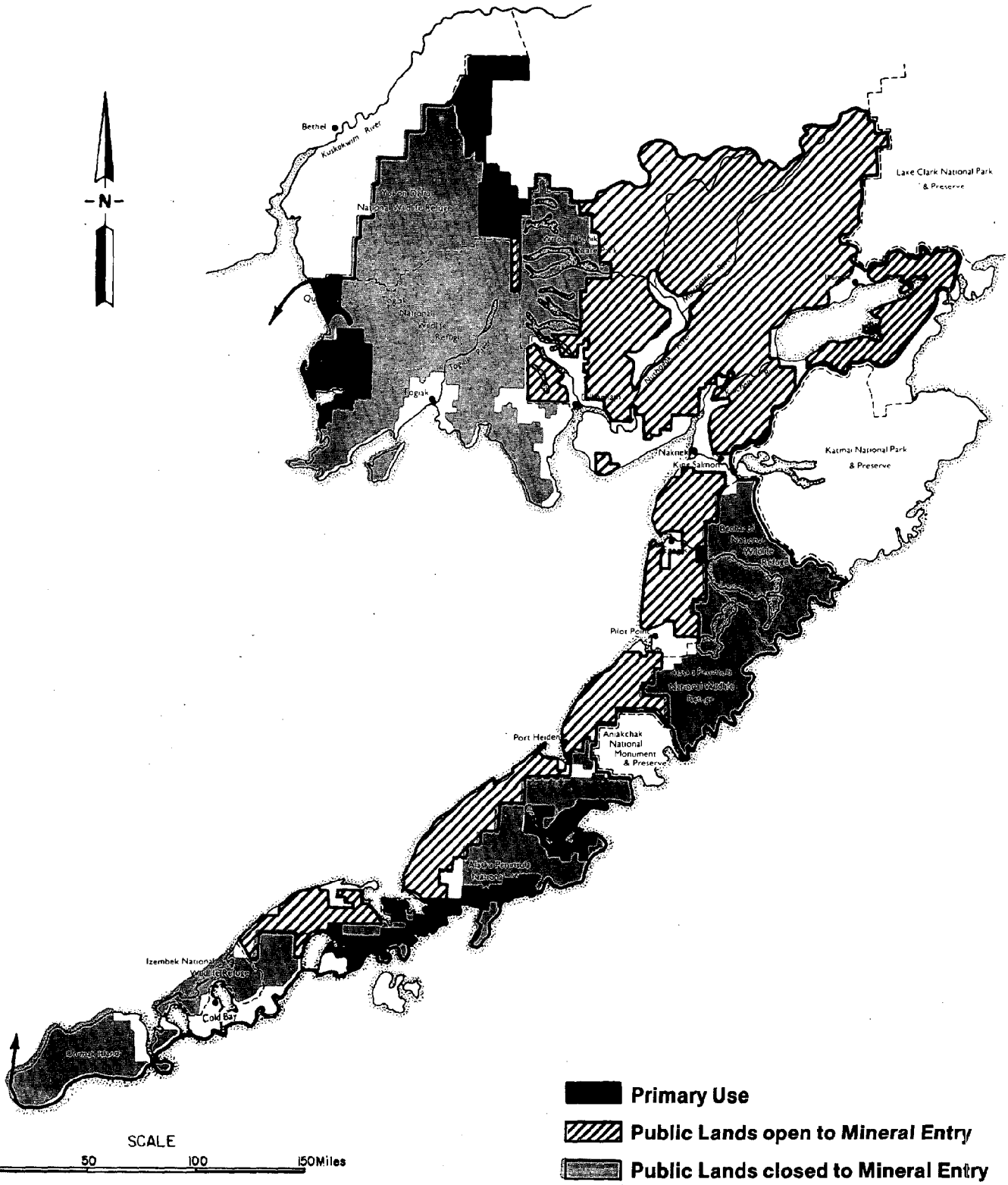
Oil & Gas - Alternative 1

Map 22



Minerals

Map 23



jurisdiction of the DNR or the BLM should be closed to new mineral entry. Stream beds on national wildlife refuges were closed by ANILCA, and all streams in Wood-Tikchik State Park were closed by the state legislature when the park was created. Identified anadromous streams include lakes with anadromous fish populations. Active stream channel is defined as the stream channel occupied by water during the average annual flood measured by the ordinary high water mark. This includes sloughs and backwaters used for salmon rearing that may, during periods of low flow, be cut off from the active stream channel, and gravel bars in braided streams that are covered during the average annual flood. New mineral entry and location adjacent to the active stream channels on state or BLM land and valid existing claims would not be affected by this recommendation.

No Action Alternative

This alternative attempts to predict activities that would occur if the Bristol Bay Regional Management Plan is not adopted. The no action alternative projects past trends of various elements of the Bristol Bay economy and incorporates the land use proposals of individual land managers. This alternative assumes that state land management would encourage oil and gas exploration, mineral exploration, recreation, fish and wildlife harvest, and include a land disposal program that encourages remote settlement. National wildlife refuges would be managed primarily for fish and wildlife habitat protection. A regional hydroelectric project could be developed under this alternative.

Under this alternative, there would be no comprehensive coordinated regional land management effort nor management guidelines and stipulations. Primary and secondary use for tracts of land could vary according to land ownership, development pressures, and individual goals of the various land managing agencies. Expected land use patterns under the alternative are summarized below.

Fish and wildlife habitat and harvest. Without a cooperative plan, fish and wildlife would be a primary use within NWR's, Wood-Tikchik State Park, the state sanctuaries, legislative designated state critical habitat areas, and state game refuges. Most other state lands in the region are designated for fish and wildlife habitat by the DNR's FY 83 Statewide Natural Resources Plan.

Recreation. Recreation would be a primary use in the state park and national parks adjacent to the study area.

Agriculture. Small-scale local agriculture would occur, but large-scale development is unlikely. Grazing may take place in more areas than under the proposed plan, but large-scale grazing is unlikely.

Forestry. Generally consistent with the proposed plan.

Settlement. Community development would likely occur on municipal and Native lands, and more than 70,000 acres of state lands could be made available by disposal during the next 10 years for remote settlement. An additional 4,000 acres or more could be available for settlement through BLM.

Wilderness. Consistent with the proposed plan, except that the ALUC may not have the opportunity to review wilderness proposals.

Transportation corridors. No transpeninsula transportation corridors are presently identified. Should resource development require that a transportation corridor be established, the location would depend on the location of the oil and gas find or other resource development and the economic, political, and environmental values involved. As for all alternatives, any proposed pipeline or road crossing National Conservation System Unit lands could be constructed only after the procedural requirements of Title XI of ANILCA had been met.

Oil and gas leasing, exploration, and development. Exploration activities could occur in most areas having high and moderate potential for oil and gas. Exceptions are refuge wilderness areas (3.8 million acres) and other refuge lands where exploration may not be found to be compatible with refuge purposes. Surface entry for oil and gas development is prohibited by State law in the Bristol Bay Fisheries Reserve (Management Unit 1D). Actual decisions about where exploration could occur on USFWS lands would be left to the specific refuge plans. Activity on state lands would be governed primarily by the DNR's leasing process.

Energy. Small-scale hydropower projects meeting state and federal licensing requirements and other small-scale energy development could be built to serve individual villages or pairs of villages. If the conclusion of the APA's feasibility studies indicates that a regional large-scale (16 MW) hydro development is economically and environmentally possible, such a facility may be built to provide electricity for the upper Bristol Bay planning area. "Large scale regional energy generation systems" would pertain to what the Power Authority has termed "regional" energy projects such as the high ranked 16 MW Newhalen run-of-river project and the 16 MW Tazimina dam project.

Minerals. Most state lands in the region would remain open to new mineral entry, and Native lands would be available for mineral exploration and development. Site-specific mineral activities could be subject to State leasehold location and prohibited from certain anadromous streams if the Commissioner of DNR finds that mining would be incompatible. Lands managed by the BLM are also open to new mineral entry. Refuge and state park lands were legislatively closed to new mineral entry. Valid existing claims in refuges and state parks could be developed.

Alternative 2

The objective of this alternative is to provide maximum fish and wildlife population and habitat protection through a regional plan that restricts opportunities for development. Settlement would allow for localized community expansion, but only very limited remote state land disposals would occur. Preferred routes for multiple use transportation corridors are not identified . Oil and gas exploration and development would be restricted to upland areas only. There would be no regional hydropower development. All identified anadromous streams and their tributaries would be closed to new mineral entry. All national wildlife refuge lands and Wood-Tikchik State Park were legislatively closed to new mineral entry at the time they were created.

Fish and wildlife habitat and harvest. Consistent with the proposed plan.

Recreation. Consistent with Alternative 1.

Agriculture. Consistent with the proposed plan.

Forestry. Consistent with the proposed plan.

Settlement. Community expansion on Native, municipal, private, and state lands near existing communities could occur and would not be affected by this alternative. However, only 2,250 acres of state lands in four areas shown on Map 24 in the vicinity of Dillingham would be made available for remote settlement by land disposal.

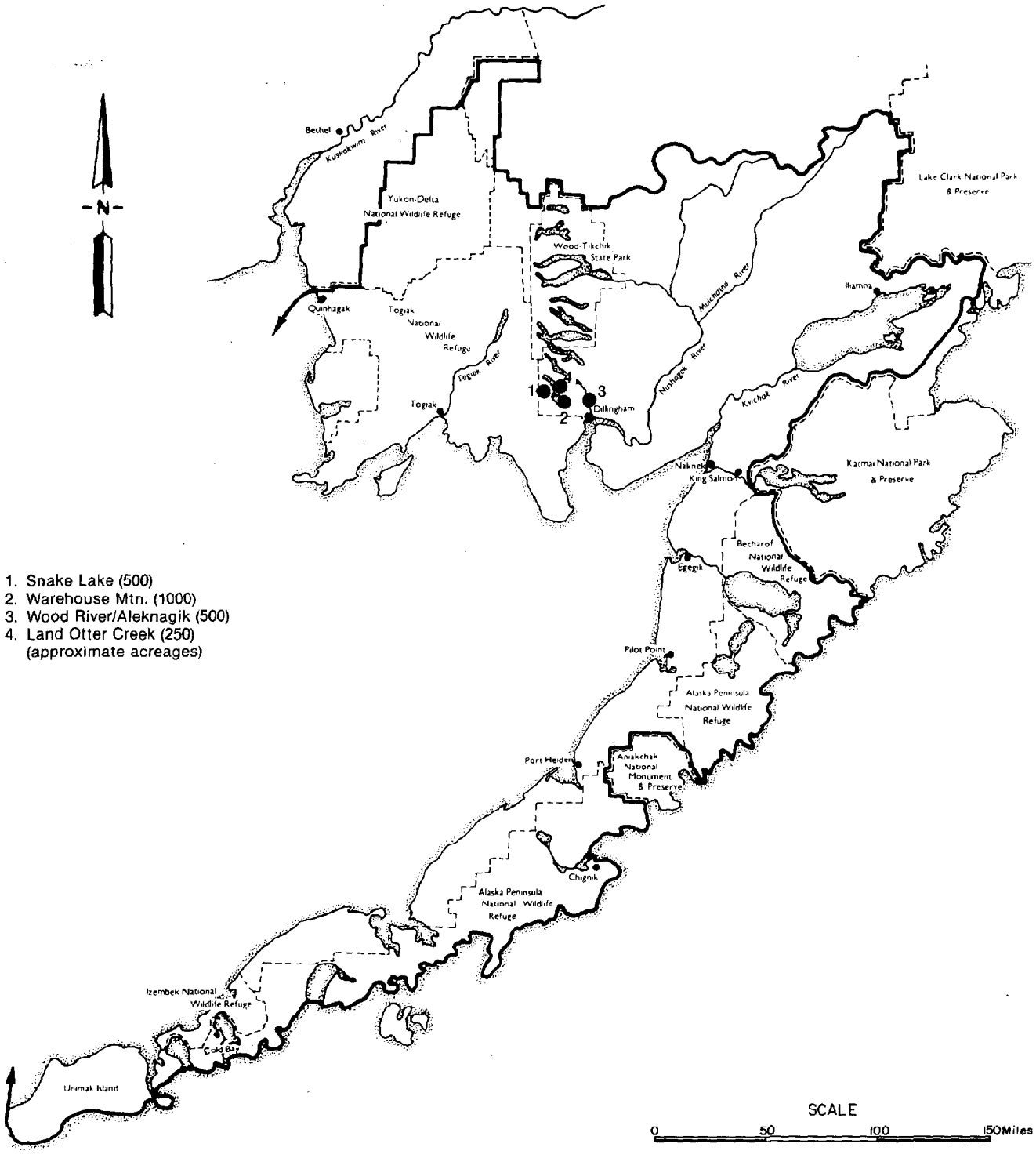
Wilderness. Consistent with Alternative 1.

Transportation corridors. This alternative would not identify preferred multiple use corridors for pipelines, public roads outside of local areas, or other transportation. It can be assumed, however, that in the event of a resource discovery and subsequent development the appropriate transpeninsula transportation system could be constructed in accordance with existing laws and regulations.

Oil and gas leasing, exploration, and development. This alternative recommends upland oil and gas-related activity by designating this a primary use on Native and state lands along the north side of the Alaska Peninsula (see Map 25). This alternative, however, does not recommend the DNR to place the mid-peninsula caribou calving grounds (1,000-1,500 sq. miles) between Port Heiden and Port Moller or the Black Hills caribou calving grounds (300-400 sq. miles) on the state's five-year oil and gas lease schedule. Oil and gas development could occur on refuge land where the refuge management plans determine this to be a use compatible with the purposes for which the specific refuge was established.

Settlement - Alternative 2

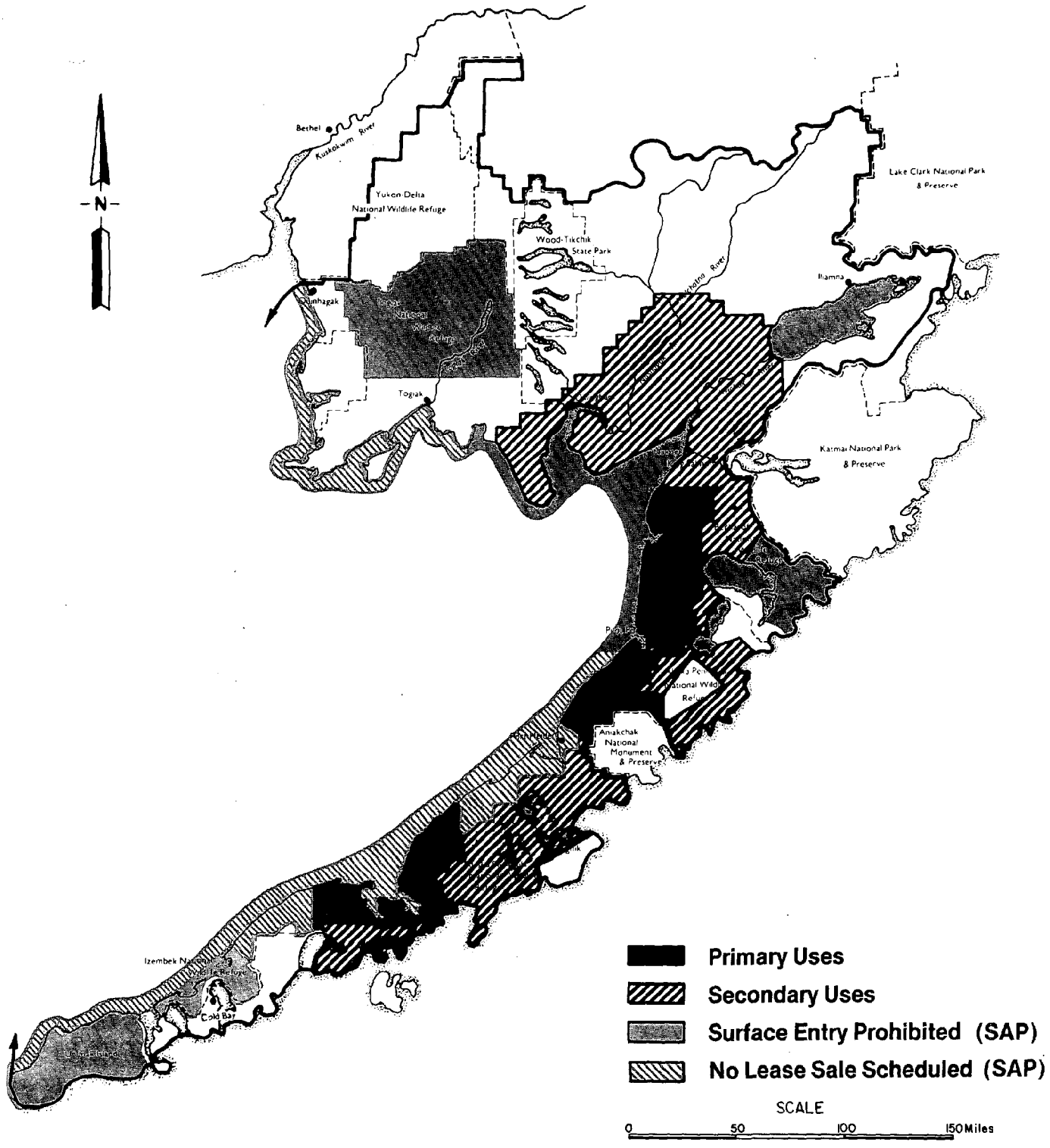
Map 24



1. Snake Lake (500)
2. Warehouse Mtn. (1000)
3. Wood River/Aleknagik (500)
4. Land Otter Creek (250)
   (approximate acreages)

Oil & Gas - Alternative 2

Map 25



State-owned tide and submerged lands are not on the state's five-year oil and gas lease schedule.

Energy. Only local energy systems in the immediate vicinity of villages should be developed under this alternative. This would mean that communities or pairs of communities in close proximity could develop small-scale generating systems (about 5 MW) to produce power for local use, using low-head hydroelectric energy, wind power, geothermal power, waste heat recovery, or other methods of generation.

Minerals. By recommending mineral exploration and development a primary use, this alternative would generally encourage them on state, BLM, and private lands in the Goodnews Bay, Nyac, Chignik, Perryville, Herendeen Bay-Port Moller, and Pavlof Bay areas. Most public lands outside NWRs and state parks would be open to mineral entry (see Map 23).

The active stream channels of all identified anadromous streams (see map in Appendix A), approximately 7,033 miles, and their tributaries, should be closed to new mineral entry. (See Alternative 1 for a definition of active stream channel.)

Alternative 3

As compared with the proposed plan, this alternative represents an increase in development that might be permitted in the planning area. Acreage for remote settlement could be expanded and areas for scheduling oil and gas leasing increased. Mineral entry could be recommended in designated anadromous streams under the BLM's jurisdiction; but leasehold location would be required in designated anadromous streams under the DNR's jurisdiction.

Fish and wildlife habitat and harvest. Consistent with the proposed plan.

Recreation. Consistent with Alternative 1.

Agriculture. Consistent with the proposed plan.

Forestry. Consistent with the proposed plan.

Settlement. This alternative recommends for community expansion on state, Native, municipal, and private lands. Additionally, approximately 24,300 acres of state lands and 2,000 acres of BLM lands could be available for remote land sales through the state's and the BLM's land disposal programs. This remote settlement acreage could be dispersed throughout the region (see Map 26). Much of the acreage to be made available could be around Dillingham, the perimeter of Wood-Tikchik State Park, the upper Mulchatna River, and Iliamna Lake.

Wilderness. Consistent with Alternative 1.

Transportation corridors. Consistent with the proposed plan.

Oil and gas leasing, exploration, and development. Oil and gas activities could be less restricted under this alternative than under Alternatives 1 and 2. Oil and gas exploration and development is recommended a primary or secondary use on all state uplands and on Native and most national wildlife refuge lands with oil and gas potential. The Black Hills and mid Peninsula caribou calving grounds could be placed on the state's five-year leasing schedule (see Map 27).

State-owned tide and submerged lands in Management Subunits 1A, 1C, 1E, and 1F, including bays, estuaries, and lagoons, could be placed on the state's five-year oil and gas leasing schedule. Tide and submerged lands in the area of Tongue Point through Togiak Bay to Rocky Point (Subunit 1B), the Bristol Bay Fisheries Reserve (Subunit 1D), and in the Port Moller and Herendeen Bay (M.U. 26) area are not placed on the state's five-year oil and gas lease schedule.

Energy. Consistent with the proposed plan.

Minerals. Mineral exploration and development is recommended a primary use consistent with Alternative 1. Mining activity on refuges and the state parks would be restricted to valid, existing claims. Mineral entry could be permitted within designated anadromous streams (see map, Appendix A), subject to leasehold location requirements for mineral activity within the active stream channels of streams under the state's jurisdiction (see definition of active stream channels in Alternative 1). The only anadromous streams which would be closed are those legislatively closed in national wildlife refuges and Wood-Tikchik State Park. Mineral entry and location on all other state and BLM lands would not be affected by this alternative (see Map 22).

Alternative 4

This alternative provides the greatest opportunity of the plan alternatives (excluding the no-plan alternative) for development. It assumes that most areas would be open for possible development unless precluded by existing law. Environmental protection would rely on compliance with the management guidelines in Chapter V, case-by-case restrictions, mitigation measures, and existing regulations.

Fish and wildlife habitat and harvest. Consistent with the proposed plan.

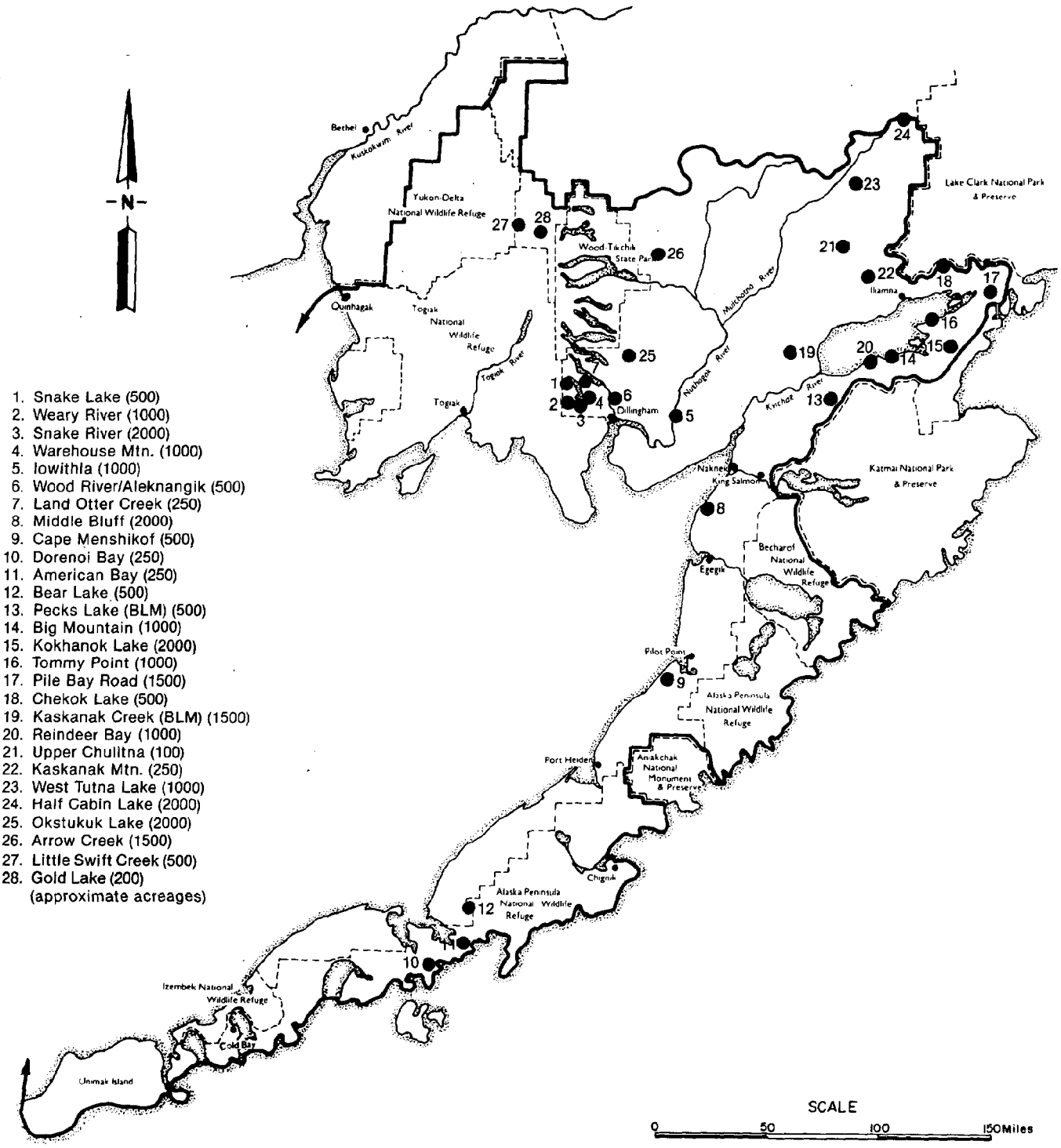
Recreation. Consistent with Alternative 1.

Agriculture. Consistent with the proposed plan.

Forestry. Consistent with the proposed plan.

Settlement - Alternative 3

Map 26



1. Snake Lake (500)
2. Weary River (1000)
3. Snake River (2000)
4. Warehouse Mtn. (1000)
5. Iowithla (1000)
6. Wood River/Aleknangik (500)
7. Land Otter Creek (250)
8. Middle Bluff (2000)
9. Cape Menshikof (500)
10. Dorenoi Bay (250)
11. American Bay (250)
12. Bear Lake (500)
13. Pecks Lake (BLM) (500)
14. Big Mountain (1000)
15. Kokhanok Lake (2000)
16. Tommy Point (1000)
17. Pile Bay Road (1500)
18. Chekok Lake (500)
19. Kaskanak Creek (BLM) (1500)
20. Reindeer Bay (1000)
21. Upper Chulitna (100)
22. Kaskanak Mtn. (250)
23. West Tutna Lake (1000)
24. Half Cabin Lake (2000)
25. Okstukuk Lake (2000)
26. Arrow Creek (1500)
27. Little Swift Creek (500)
28. Gold Lake (200)

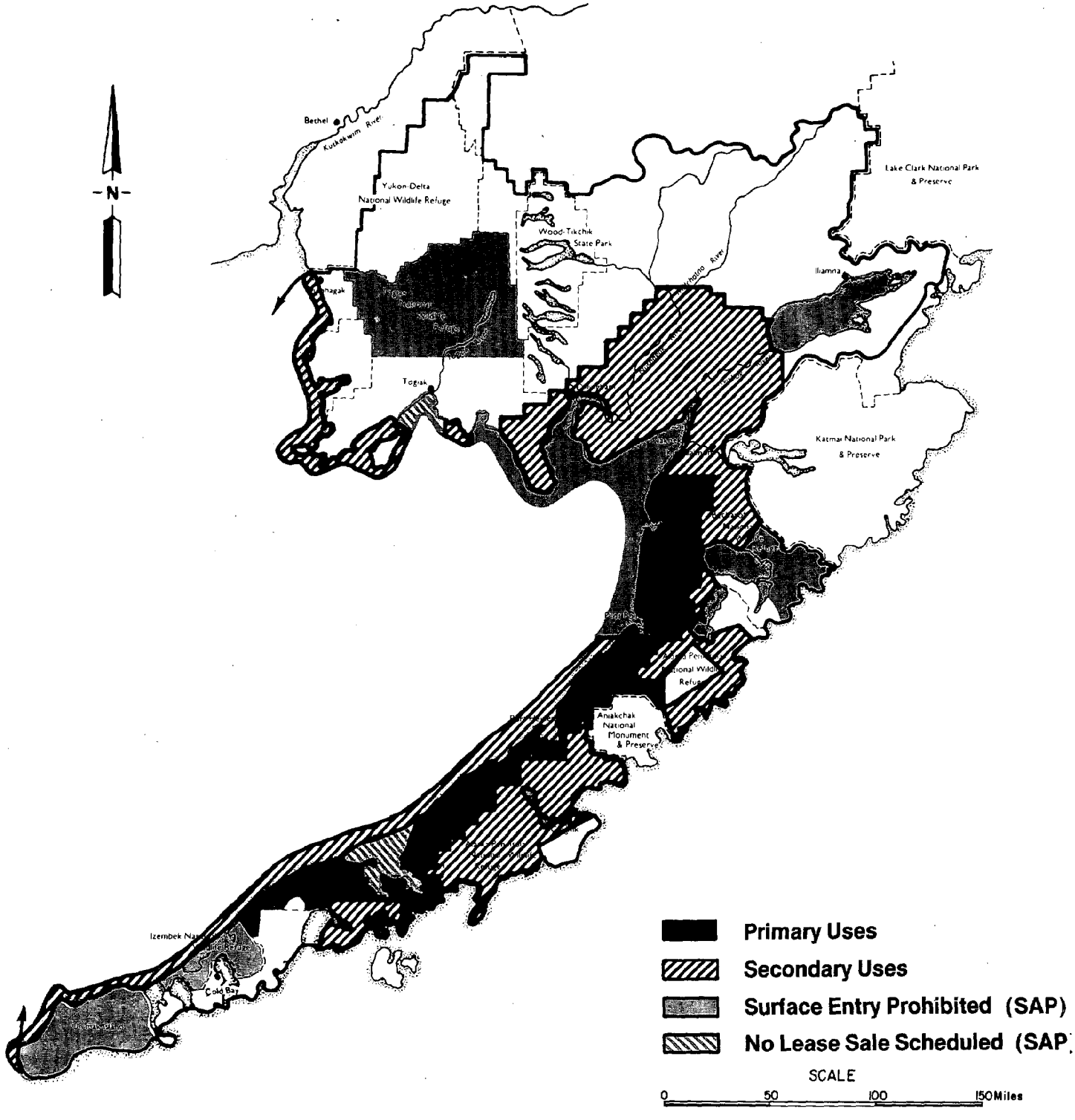
(approximate acreages)

Bristol Bay
Regional Management Plan

Land Use
Recommendations

Oil & Gas - Alternative 3

Map 27



Settlement. Community expansion and remote settlement would be encouraged by this alternative. Community expansion would occur on municipal and private lands and would not be affected by this plan.

Land disposal for remote settlement includes 35,300 of state lands. The disposals would occur throughout the region (see Map 28) in 38 areas ranging in size from 25 to 2,000 acres. The BLM would be encouraged to sell 2,000 acres of federal lands in Management Unit 12 (1,500 acres in the Kaskanak Creek area and 500 acres in the vicinity of Peck's Lake).

Wilderness. Consistent with Alternative 1.

Transportation corridors. In addition to the three preferred multiple use transportation corridors identified in the proposed plan (Port Moller to Balboa Bay, Port Heiden to Kujulik/Aniakchak Bay, and Pilot Point to Wide Bay), Alternative 4 identifies an additional four preferred corridors, for a total of seven. The additional corridors are False Pass to Ikatan Bay (onshore or underwater); Bering Sea to Morzhovoi Bay; Egegik to Portage Bay or Puale Bay; Naknek/King Salmon to Portage Bay or Puale Bay. These corridors are shown on Map 29. The general routes of these four additional corridors are as follows:

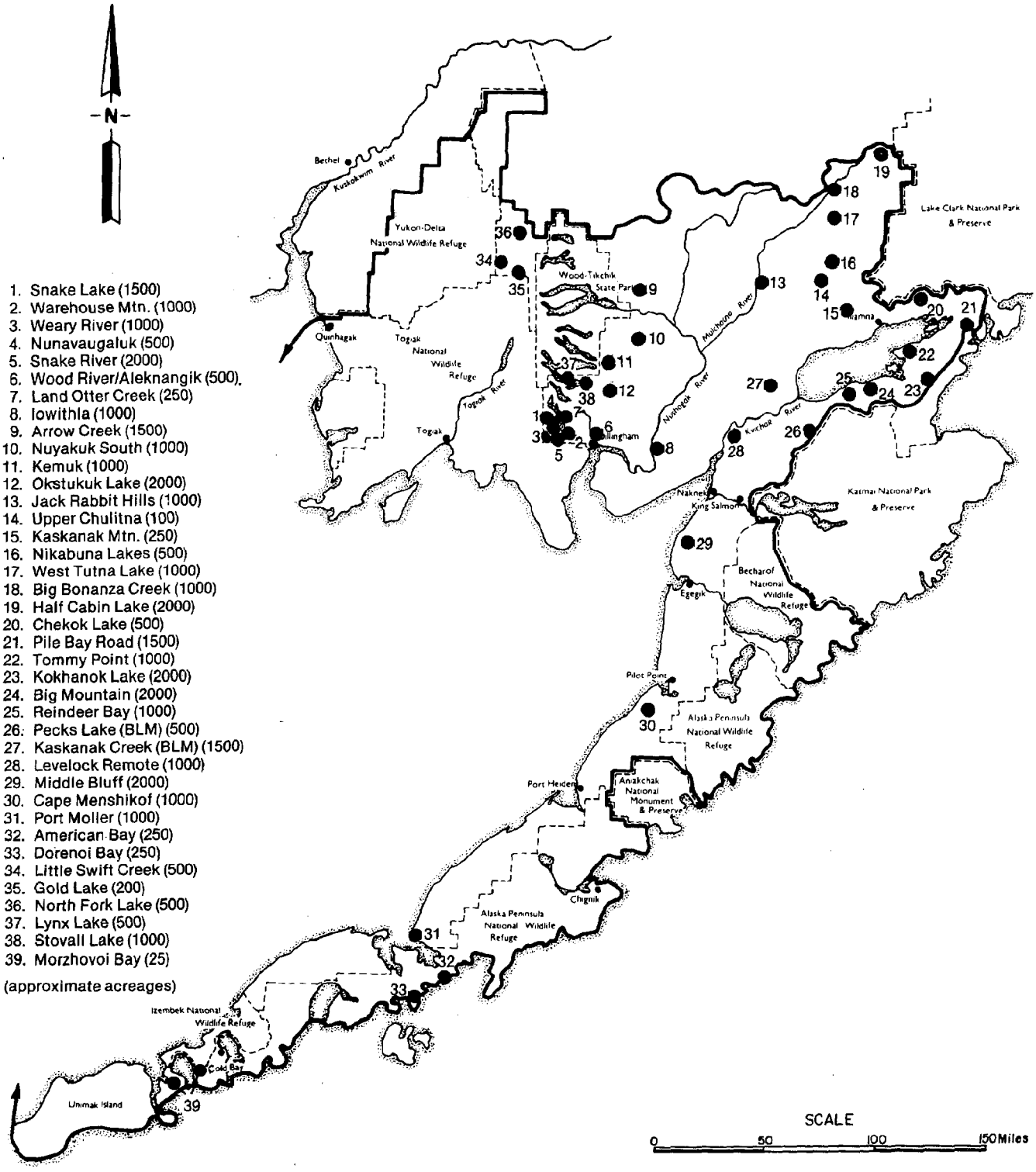
False Pass to Ikatan Bay: There are two possible routes. The first corridor would be approximately 25 miles long, beginning at the mouth of Bechevin Bay, proceeding underwater seven miles before coming ashore south of Rocky Point. It then travels overland near the shore of False Pass until it reaches its southern end at the Ikatan narrows in the vicinity of the abandoned cannery at the base of the Ikatan Peninsula. The port site would probably be located somewhere along the western or southern shores of Ikatan Bay. The second is an underwater route that would be a 23-mile corridor beginning at the same point as the onshore route but continuing underwater through False Pass. The pipeline would surface at the same terminal site located near the head of Ikatan Bay. Both of these corridors would most likely be used for an oil or gas pipeline from the Bering Sea OCS to a deepwater port on Ikatan Bay.

Bering Sea to Morzhovoi Bay: This corridor passes through Morzhovoi Isthmus and under Morzhovoi Bay to either its north or south headlands. The length of the corridor through the Isthmus is about six miles. An additional nine to fourteen miles is required to reach a terminal site.

Egegik to Portage Bay or Puale Bay: This corridor begins north of the mouth of the Egegik River and runs north of Lake Becharof to the end of the lake. At this point the route intersects the Naknek-Puale Bay corridor (see below), and the route to Portage Bay crosses Kejulik River and the Kejulik River Flats and follows the east shore of Becharof Lake. The route then follows Otter Creek to its end in Portage Bay, near the abandoned town of Kanatak.

Settlement - Alternative 4

Map 28

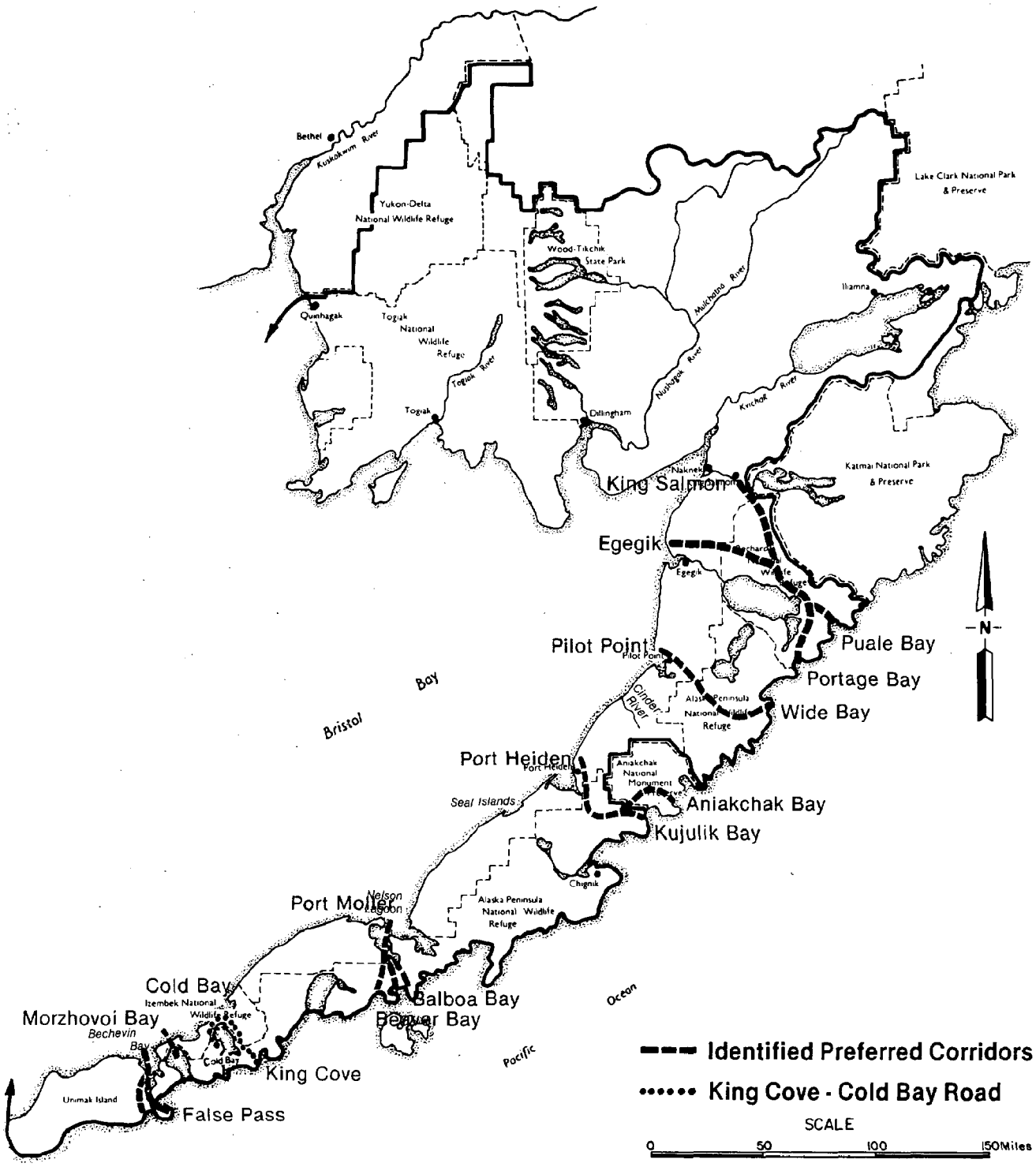


1. Snake Lake (1500)
2. Warehouse Mtn. (1000)
3. Weary River (1000)
4. Nunavaugaluk (500)
5. Snake River (2000)
6. Wood River/Aleknangik (500).
7. Land Otter Creek (250)
8. Iowithla (1000)
9. Arrow Creek (1500)
10. Nuyakuk South (1000)
11. Kemuk (1000)
12. Okstukuk Lake (2000)
13. Jack Rabbit Hills (1000)
14. Upper Chulitna (100)
15. Kaskanak Mtn. (250)
16. Nikabuna Lakes (500)
17. West Tutna Lake (1000)
18. Big Bonanza Creek (1000)
19. Half Cabin Lake (2000)
20. Chekok Lake (500)
21. Pile Bay Road (1500)
22. Tommy Point (1000)
23. Kokhanok Lake (2000)
24. Big Mountain (2000)
25. Reindeer Bay (1000)
26. Pecks Lake (BLM) (500)
27. Kaskanak Creek (BLM) (1500)
28. Levelock Remote (1000)
29. Middle Bluff (2000)
30. Cape Menshikof (1000)
31. Port Moller (1000)
32. American Bay (250)
33. Dorenoi Bay (250)
34. Little Swift Creek (500)
35. Gold Lake (200)
36. North Fork Lake (500)
37. Lynx Lake (500)
38. Stovall Lake (1000)
39. Morzhovoi Bay (25)

(approximate acreages)

Transportation Alternative 4

Map 29



Naknek to Puale Bay or Portage Bay: This corridor begins at the Naknek River near King Salmon, crosses the river, and travels southeast of Blue Mountain past Becharof Lake to Teresa Creek. The alternate route to Portage Bay is described above. It then follows the creek to Puale Bay. Port facilities could be located south of the mouth of Teresa Creek.

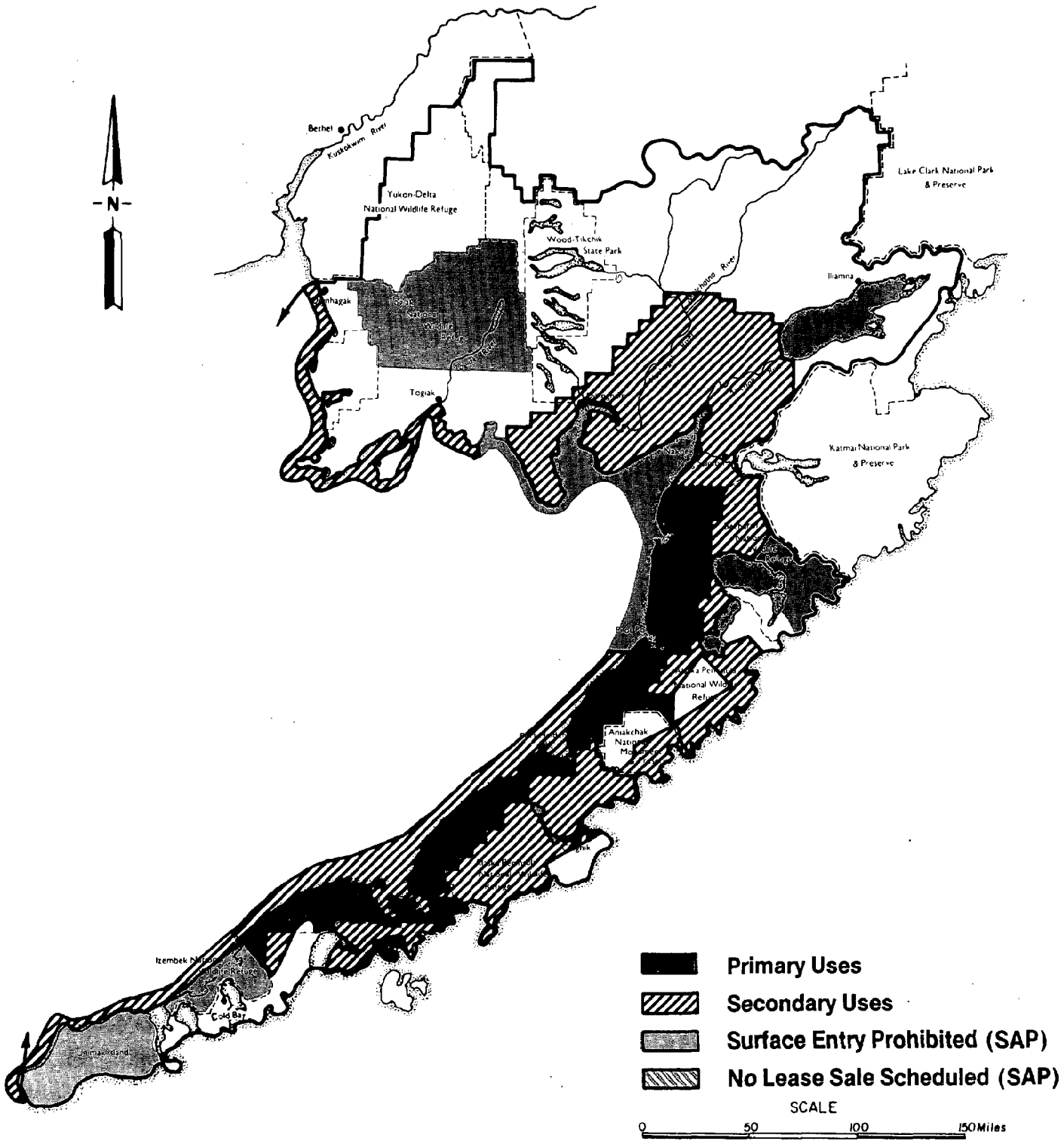
Oil and gas leasing, exploration, and development. Opportunities for oil and gas exploration and development would be expanded on state and Native lands under this alternative, since it recommended oil and gas exploration and development a primary use on most state and Native uplands with favorable potential. It also recommends the DNR place any lands outside the Bristol Bay State Fisheries Reserve (Subunit 1D) on the state's five-year oil and gas lease schedule (see Map 30).

Energy. Small-scale (about 5 MW) hydropower and other alternative energy projects are encouraged. This alternative would allow the development of one large-scale (16 MW) hydroelectric facility to serve part of the region, provided any substantive economic or environmental conflicts could be resolved.

Minerals. Mineral exploration and development would be encouraged. Most all of the state land in the region would remain open to new mineral entry, with no active stream channels of identified anadromous streams closed. BLM lands would also remain open to new mineral entry under existing policies that encourage mineral development. Refuge and state park lands were legislatively closed to new mineral entry. Valid existing claims on refuge and state park lands could be developed. Mineral exploration could occur on Native lands with favorable potential (see Map 23).

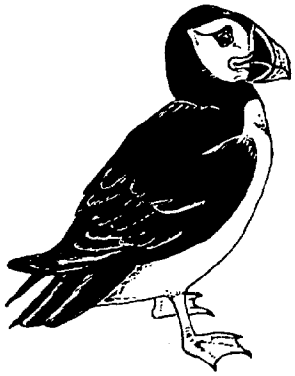
Oil & Gas - Alternative 4

Map 30



CHAPTER V

Goals & Guidelines



CHAPTER V

Goals & Guidelines

Introduction

The management guidelines contained in this Chapter will be used to implement the plan by the U.S. Fish and Wildlife Service and U.S. Bureau of Land Management following approval of this plan by the Secretary of the Interior. These guidelines should be adopted by the State of Alaska in its Area Plan for state land in the region.

Goals

Chapter V contains the goals for the Bristol Bay Regional Management Plan (BBRMP). These goals were developed early in the planning process and state the general intent of the plan or the condition the plan wishes to achieve. The goals are achieved through the many recommendations of the plan. Land use recommendations, guidelines, cooperative agreements land exchanges and other recommendations all contribute to accomplishment of the goals of the plan. After each goal or set of goals there is a brief explanation of how the plan achieves that goal.

The plan incorporates the five goals stated in section 1203(b)(1-5) of ANILCA as General Plan Goals. The other goals in the plan are more resource specific, but reflect and support the intent of the general plan goals.

Guidelines

The guidelines are designed to aid in achieving the plan goals by giving guidance to land managers and regulatory agencies consistent with the intent of the relevant goal. The guidelines assist decision making on important activities, such as settlement, mining and transportation where existing state or federal statutes or regulations leave agencies discretion when making a decision.

A land use plan should clearly state how land managers should exercise the discretionary authorities given to them by law. The land recommendations of the plan tell the public and the land manager <u>what</u> should be done with public resources and the guidelines of the plan explains <u>how</u> it should be done. For State lands, 11 AAC 55.020(c) says that plans "<u>may contain guidelines</u>

to resolve conflicts among competing land uses." Consensus that land should be recommended for two or more potentially competing uses was only possible in the BBRMP because the participants agreed on guidelines for how uses should occur.

Management guidelines assist plan implementation so that intended multiple use of public land and resources occur. The various State and Federal agencies could proceed without the guidelines in the plan and develop guidelines on a case-by-case basis when some use was proposed. However, it is more efficient and area consistent to look for consensus on management decisions before individuals or industry try to develop or use public resources.

ANILCA requires the plan to outline a regional strategy that will balance conservation of natural resources and the development of economic resources in an environmentally sound manner. The guidelines that assist in directing how resources should be developed in Bristol Bay allow the diverse interests represented in the region to achieve this balance.

The guidelines are designated to be consistent with existing State and Federal statutes or regulations. There are cases where the guidelines reference or repeat existing regulations to emphasize the importance of enforcing that particular regulation in Bristol Bay. Generally, the guidelines apply to all state land management and regulatory agencies and the Department of the Interior; however, there are cases where a guideline applies to only one agency because that agency has specific authority for the activity addressed by the guideline. An example is water appropriation, where the Alaska Department of Natural Resources (DNR) has sole authority for granting an appropriation of water.

The guidelines should be implemented through the agency procedures that are in place at the time a permit, lease, sale, or other pertinent decision is made. Specific authorities and procedures are identified in individual guidelines where this clarification is felt to be necessary. Implementation should be consistent with existing federal, state and local laws.

Private landowners were represented on the ALUC Study Group, but private landowners are not bound by Section 1203 of the Alaska National Interest Lands Conservation Act (ANILCA). Although private landowners do not have to follow the plan, including the guidelines, they may be subject to the guidelines as implemented by regulatory agencies such as FWS or ADF&G. Further, it is assumed that because private landowners were represented on the ALUC Study Group and participated in the development of the guidelines, they would, for the most part, follow the guidelines that relate to land management.

A matrix is included at the end of this chapter to show which guidelines are most likely to apply to particular state or federal management activities. This matrix is not intended to be all encompassing but should help the land manager determine those guidelines that should apply in a particular situation.

The following terms are used throughout this chapter and are defined below. Other terms that may occur in this chapter are defined in Chapter IV.

goal: a general statement of intent, usually not quantifiable nor having a specified date of completion. Goals identify desired long-range conditions.

guidelines: guidance for actions to be followed by land managers or regulatory agencies. Guidelines range in their level of specificity and flexibility from simply giving the land manager or regulatory agency general guidance on how a decision should be made or what factors are to be considered, to detailed standards that should be followed when making on-the-ground-decisions. Implementation of all guidelines should be consistent with existing law.

should: this word is used to give strong direction and imply a policy and philosophical commitment to the intent of the statement. It does allow some discretion by the land manager or permitting agency to deal with contingencies that may not have been identified within the plan. The term implies that the land manager or permitting agency will determine the best methods of achieving the same intent consistent with existing law. A written decision is required to explain any action or decision that is in variation with a guideline in this plan that uses the term "should."

feasible and prudent: this phrase is used when the land manager or permitting agency's decision is consistent with applicable laws, sound engineering or management practice and not cause environmental, social, or economic costs that outweigh the public benefit.

A written decision is required to justify a variation from a guideline that uses the standard, "feasible and prudent."

enclave development: refers to the lease of public lands for self-contained work camps that are used for the life of a project.

commercial and industrial: for the purpose of this plan, these are all uses requiring a plan of operation, lease, development plan, miscellaneous land use permit, contract, or Title 11(c) permit.

sensitive period: a period during a species annual life cycle when the population has a significant chance of being harmed by activities that are not part of the natural environment and that cause the animal to detrimentally alter its normal behavior pattern. An example is disturbance that may cause a calving caribou to run during the birthing process or abandon the calf immediately after it is born. These

periods (identified on Fish and Wildlife Maps in Appendix A) generally occur when large numbers of a particular species are concentrated in relatively small geographic areas.

wetlands: the term wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and under normal circumstances do support a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. (33CFR 323.2(c).)

fish and wildlife enhancement: means increasing the quantity of targeted fish or wildlife populations through habitat manipulation. Habitat manipulation includes, but is not limited to, removal of natural fish blocks in streams, controlled burns, and hatchery programs.

General Plan Goals

A. Conserve the fish and wildlife and other significant natural and cultural resources within the region.

B. Provide for the rational and orderly development of economic resources within the region in an environmentally sound manner.

C. Provide for such exchanges of land among the Federal Government, the State, and other public or private owners as will facilitate the carrying out of paragraphs (1) and (2).

D. Identify any further lands within the region that are appropriate for selections by the State under Section 6 of the Alaska Statehood Act and ANILCA.

E. Identify any further lands within the region that may be appropriate for congressional designation as national conservation system units.

These goals are achieved through the land use recommendations of the plan; the recommended land exchanges, state selections and cooperative agreements; and, through the other more resource specific goals and guidelines.

Agriculture/Grazing

Goal

> Reduce food costs and lower the region's dependence on imported foods by maintaining a land base for small-scale, non-commercial agriculture.

Since there is no large scale commercial agriculture potential the plan's goal only endorses local agricultural activities to supplement local food needs primarily in Nushagak River villages where cool weather crops can be grown. This goal can be achieved through use of local village and community lands.

Guideline

1. Grazing

Use of most state and refuge lands for large scale grazing is not recommended as domestic livestock grazing would compete with wildlife populations. Grazing is recommended on BLM lands where it will not be a significant conflict with wildlife or wildlife habitat. Small scale domestic operations, where the land manager, after consultation with ADF&G determines that there is no significant conflict with wildlife populations is also consistent with this guideline.

Alternative Energies

Goal

> Maintain opportunities to develop and use appropriate hydroelectric, wind, geothermal, natural gas, peat, coal, or other energy resources.

The plan achieves this goal by recommending that options for alternative energy development be maintained and by encouraging further study of hydropower options.

Environmental and Cultural Resources

Goals

A. Maintain a level of air and water quality sufficient to protect the human, fish, and wildlife resources of the region.

B. Make the maximum amount of water available for human use and benefit while maintaining a level of water quantity sufficient to protect the fish, wildlife, and other resources of the region.

C. Identify and protect nationally significant cultural resources in the region.

The plan recognizes the importance of protecting air and water quality if the human, fish and wildlife resources of the region are to be maintained. The plan achieves these goals by emphasizing the need to maintain water quality classifications and standards at levels necessary to protect the human, fish, and wildlife resources of the region. The plan also recognizes the need for and emphasizes the importance of enforcing existing water quality regulations in the Bristol Bay region.

Guidelines

1. Historic and Cultural Resources

> The BBRMP consistent with existing laws and regulations provides appropriate protection of historic and cultural resources. Establishing adequate inventory programs and project planning processes that give consideration to these resources early in the development process should be a high priority for both federal and state agencies in the area. Locations of known existing sites are depicted in the plan's Automated Data Base or on maps available from the DNR, Division of Parks, State Historic Preservation Office.

2. Water Quality

It is the intent of the plan that domestic and public water supplies, important for the production and management of waterfowl and fish, and water used for recreation should at a minimum be classified by DEC in consultation with other State and Federal agencies for these uses and that state water quality standards be maintained by DEC at levels necessary to maintain or enhance these uses. All permits, leases or plans of operations for land or water uses that directly affect water quality should require that these activities be sited, designed, constructed and operated to provide a reasonable assurance that discharges will meet state water quality standards for the receiving water use classification. Water quality standards should meet or exceed those criteria set out in 78 AAC 70 (State Water Quality Criteria) and by the U.S. Environmental Protection Agency rules and regulations for these uses. Amendment of state water quality standards or reclassification of waters may be made through ADEC amendment procedures and does not require amendment of the plan.

However, ADEC should provide public notice in a newspaper of general circulation within the region, and provide notice and an opportunity to comment to affected state and federal agencies and local governments before streams in the planning area are reclassified or standards changed.

3. Federal Reserve Water Rights

Federal agencies should quantify their federal reserve water rights for federally withdrawn lands as soon as possible. For BLM lands, BLM should file for water rights only where there is a priority management need.

4. Public Notice

When the land manager determines that an action requiring public notice under Section 810 of ANILCA or, AS 38.05.345 or AS 46.15.133 may have a significant impact on subsistence use, public land managers should give notice of the proposed action to appropriate communities using the area for subsistence, as identified on Maps 6,7 and 8, Appendix A as well as appropriate state and local agencies.

Fish and Wildlife

Goals

A. Maintain the historic levels of productivity of fish and wildlife populations important for commercial, subsistence and recreational use and maintain the carrying capacity of their natural habitats.

B. Provide for optimum commercial harvest, subsistence, and recreational use of fish and wildlife resources through conservation and compatible management of land use consistent with the purposes of the plan.

The plan achieves its fish and wildlife goals by recommending fish and wildlife as a primary use of all lands in the Bristol Bay region. In addition some types of activities have not been recommended in specific areas where they may pose serious conflicts with important fish and wildlife values.

The plan also achieves its goals for fish and wildlife by including guidelines to help managers make decisions so that other resource development actions do not significantly impact fish and wildlife production and by recommending various research and management sites to provide for fishery management.

The plan provides a strategy for protecting subsistence resources by recommending fish and wildlife habitat and harvest a primary use in all of Bristol Bay and through the goals and guidelines.

Guideline for All Species

1. Enhancement

Enhancement on state, BLM and USFWS lands is an acceptable fish and wildlife management practice where it has been determined to be scientifically sound, compatible with land managers objectives, and where public review shows it to be in the public interest. Proposals for fisheries enhancement activities should evaluate and consider the importance, values and advantages of maintaining the genetic integrity of wild and indigenous fish populations. All fisheries enhancement and related activities should only use local, wild, indigenous stocks.

Guidelines for Individual Species

The following guidelines are specific to a particular species or species group and are arranged accordingly, with fish first, followed by caribou, moose, waterfowl, brown bear, marine birds, marine mammals, and, finally, eagles. Where appropriate, guidelines are written for each species to address the following: habitat alteration and destruction; disturbance; and impacts on harvest.

Guidelines Concerning Fish Habitat Alteration and Destruction

1. Instream Flow

Except for public water supply and domestic use, the maintenance of fish stocks is generally the highest priority water use in the study area. Therefore, the DNR should not allow an appropriation of water to cause the instream flow to fall below the amount determined necessary by ADF&G and/or USFWS to protect fish habitat and production and waterfowl habitat, unless, under the procedures outlined in AS 46.15.080, the commissioner of DNR makes a finding based on public review that the competing use of water is in the best public interest and no feasible and prudent alternative exists. Federal water appropriations are guaranteed by federal reserve rights. (This guideline is in accordance with the Cooperative Agreement among the ADF&G, the Alaska Department of Environmental Conservation [ADEC], the DNR.)

2. Buffers Adjacent to Fish Habitat

To minimize negative impacts on water quality and public access, the appropriate public land management agency should retain a publicly-owned vegetated (if naturally occurring) strip of land or an easement as a buffer on lands adjacent to fish habitat for the activities outlined below. This entire guideline does not apply to land exchanges and non-discretionary land conveyances, such as Native selections, Native allotments, etc where the federal government does not have discretionary authority.

The size of river, lake, and stream buffers should be decided by the public land manager on a case-by-case basis and may vary depending on the nature of the activity proposed and the particular values of the stream, lake, or river.

When disposing of land for settlement or commercial recreation facilities land managers should decide on a case-by-case basis whether the buffer should be publicly owned or an easement. Public ownership of the buffer is preferred on streams, rivers and lakes important to the production of anadromous fish or with important public use values. If an easement is used, no development or clearing except for access purposes should be allowed within the easement.

Generally, public land disposals for settlement, commercial recreational facilities, or similar low density, non-water dependent uses should preferably have a buffer of 200 feet landward of the ordinary high water mark(s). Adjacent to designated anadromous fish spawning habitat, the buffer should, to the extent feasible and prudent, never be less than 100 feet landward of the ordinary high water mark(s).

Permits, leases, and plans of operation for non-water dependent commercial and industrial uses, transportation facilities, and pipelines should, where feasible and prudent, require setbacks between these facilities and adjacent water bodies to maintain streambank access and protect adjacent fish habitat, public water supplies, and public recreation. The width of this setback may vary depending upon the type and size of non-water dependent use, but should be adequate to maintain access and protect adjacent waters from degradation below the water quality standard set by DEC. Adjacent to designated anadromous fish spawning habitat this setback should, to the extent feasible and prudent, never be less than 100 feet landward of ordinary high water.

Where it is not feasible and prudent to maintain a setback adjacent to fish habitat, public water supplies and recreational waters, other measures should be implemented to meet the intent of this guideline.

Where buffers are smaller than the minimum, soil erosion should, to the extent feasible and prudent, be minimized by restricting the removal of vegetation adjacent to fish-bearing waterbodies and by stabilizing disturbed soil as soon as possible. Adequate stabilization practices and timing should be determined on a case-by-case basis.

Private landowners are encouraged to maintain development setbacks equivalent to the buffers described here and to follow soil erosion mitigation practices.

This guideline is not intended to preclude or restrict necessary stream, river or lake crossings.

3. Wetlands Identification and Protection

Within an area slated for development, wetlands (33 CFR 323.2(c)) necessary to maintain the productivity of fish should be identified by BLM, ADF&G or USFWS prior to any developmental activities in order to assist in avoiding negative impacts on the fish. Consistent with existing laws and regulations, permits for activities in wetlands will, to the extent feasible and prudent, provide for the maintenance and non-degradation of these areas.

4. Structures in Fish Habitat

To maintain nearshore migration of juvenile fish permitting agencies should, to the extent feasible and prudent, require that structures in fish habitat be built to minimize impacts on fish migration.

5. Heavy Equipment in Fish Habitat

Permits issued for developmental activities that require the use of heavy equipment in fish habitat or wetlands identified by ADF&G, BLM or USFWS should, to the extent feasible and prudent, minimize damage to fish habitat.

6. Water Intake Structures in Fish Habitat

Tideland permits or leases, water appropriations, and/or Title 16 permits for water intake pipes used to remove water from fish bearing waters should to the extent feasible and prudent, require that the intake be surrounded by a screened enclosure to minimize fish entrainment and impingement. Pipes and screening should be designed, constructed, and maintained so that the maximum water velocity at the surface of the screen enclosure is not greater than 0.1 foot per second. Screen mesh size should not exceed 0.04 inch unless another size has been approved by ADF&G. Other technology and techniques that can be demonstrated to further minimize the entrainment and impingement of fish may also be utilized.

7. Stream Alteration

Developmental activities in or adjacent to fish habitat should, to the extent feasible and prudent, not significantly alter a natural stream course or channel.

8. Design and Mitigation of Hydroelectric Projects

Hydroelectric projects should, to the extent feasible and prudent, not dam, divert or draw down rivers, streams, or lakes that support important commercial, subsistence, or recreational fish species unless the project is designed or mitigated so as to cause no net loss to fish production in the area affected by the project.

9. Geophysical Surveys

State Plan will

Permits issued for geophysical surveys in fish habitat should, to the extent feasible and prudent, require the use of energy sources such as airguns, gas exploders, or other sources that have been demonstrated to have no significant effect on fish.

10. Blasting

Permits for blasting may be approved on a case-by-case basis when all steps have been taken to minimize impacts and when no feasible and prudent alternative exists to meet the public need.

Guidelines Concerning Disturbance to Caribou

1. Non-Oil and Gas Development and Caribou Calving Habitat

   Commercial and industrial developments, can be demonstrated to cause significant impact to caribou calving and that can not be restricted seasonally should avoid essential caribou calving habitat, identified on Map 2 in Appendix A. This guideline does not apply to oil and gas activities.

2. Oil and Gas Facilities in Caribou Calving Habitat

   Facilities essential to the production and transportation of oil and gas which cannot be located outside of essential caribou calving habitat should allowed in these habitats. Non-essential facilities and activities that are determined by the land manager, after consultation with ADF&G and other appropriate agencies, likely to displace caribou from essential caribou calving habitat should, to the extent feasible and prudent, be located outside caribou calving habitat. Oil and Gas exploration, development, and construction activities are not subject to this guideline (see caribou guideline 3 and 4, and transportation guideline 14).

3. Seasonal Restrictions of Oil and Gas Development in Caribou Calving Habitat

   Leases and/or permits should require that oil and gas activities that can be restricted seasonally (excluding production and transportation) be restricted seasonally in order to minimize impacts to calving caribou generally during May 1 through June 15 north of the Kvichak River and Iliamna Lake and usually May 7 through June 15 south of the Kvichak River and Iliamna Lake. Caribou calving habitat is depicted on Map 2, Appendix A. Seasonal restrictions should be required by the land manager when 1) significant numbers of calving caribou are present in the area; and 2) available scientific information indicates that the activity will result in detrimental disturbance to calving caribou. This guideline does not apply to seismic activity (see caribou guideline 4 and transportation guideline 14).

4. Blasting in Caribou Wintering and Calving Habitat

   The surface detonation of explosives (not including firearms) should not be allowed in essential caribou wintering habitat and should, to the extent feasible and prudent, not be allowed in essential caribou calving habitat identified on Map 2 Appendix A during the period May 1 through June 15 north of the Kvichak River and Iliamna Lake, and May 7 through June 15 south of the Kvichak River and Iliamna Lake. Subsurface detonations of explosives at depths specifically tested and found acceptable may be permitted at the charge size and at the depths tested, if

tests show that noise, ground shock levels, and associated activities do not displace caribou or detrimentally affect caribou calving behavior. Before issuing permits for the detonation of explosives during sensitive periods, land managers should consult with ADF&G.

Guidelines Concerning the Alteration and Destruction of Moose Habitat

1. Roads, Seismic Lines and Transmission Lines in Moose Habitat

   Road rights-of way, seismic lines, and transmission lines, should, to the extent feasible and prudent, be designed and sited to parallel or skirt and not bisect essential or important moose habitat, identified on Map 3 in Appendix A.

2. Development and Willow Vegetation

   Significant destruction of willow vegetation for the purposes of industrial or commercial development or transportation corridors should be avoided to the extent feasible and prudent. Uses that require a developmental plan or plan of operation should address prompt mitigation of impacts on essential moose winter habitat, identified on Map 3 in Appendix A, including prompt revegetation. Willow vegetation is the primary winter food source in essential moose wintering areas in Bristol Bay.

Guidelines Concerning the Distrubance of Waterfowl

1. Activities in Essential Waterfowl Habitat

   Industrial activities requiring a permit, lease, or development plan with high levels of acoustical and visual disturbance, such as boat traffic, blasting, dredging, and seismic operations, in essential spring and fall waterfowl high use areas should, to the extent feasible and prudent, be avoided during sensitive periods, identified on Map 4 in Appendix A. (This guideline does not apply to traditional hunting and fishing activities allowed by law.)

2. Airports and Other Developments in or Adjacent to Essential Waterfowl Habitat

   New airports, surface transportation corridors, and other developments in or adjacent to essential waterfowl habitat that may result in significant physical, visual, or acoustical disturbance to waterfowl should, to the extent feasible and prudent, be sited and designed to minimize harmful disturbance to waterfowl. Developments should be buffered from essential waterfowl habitats through appropriate measures such as distance (preferably one mile), and/or topography, vegetation, or combinations thereof to reduce disturbance.

Guidelines Concerning the Alteration and Destruction of Waterfowl Habitat

3. Dredge and Fill in Essential Waterfowl Habitat

Permits for dredging and filling in essential waterfowl habitat, identified on Map 4 in Appendix A, including gravel extraction and the construction of roads and pads, should not be granted unless it is determined by Corps of Engineers, after consultation with the ADF&G or USFWS, that the proposed activity will cause no significant adverse impacts to essential waterfowl habitat or the land manager determines that no feasible and prudent alternative exists.

4. Alteration of the Hydrologic System

To the extent feasible and prudent, channelization, diversion, or damming that alters the natural hydrological conditions and has a significant adverse impact on essential waterfowl habitat, identified on Map 4 in Appendix A, should be avoided.

Guidelines Concerning the Impact on Harvest of Waterfowl

5. Public Access

On public lands in essential waterfowl habitat, identified on Map 4 in Appendix A, permits and leases should not restrict access for traditional public uses of these areas during hunting and fishing seasons in accordance with existing regulations. Closures may be considered for public safety.

6. Public Ownership of Essential Waterfowl Habitat

Public lands with essential waterfowl habitat, identified on Map 4 in Appendix A, should be retained in public ownership. Essential waterfowl habitat should be leased only for activities that are determined by the land manager, in consultation with ADF&G and FWS, to be compatible or can be made compatible with the maintenance of waterfowl populations and habitats and do not restrict traditional waterfowl harvest activities except as allowed in number 5 above. Leases issued in essential waterfowl habitat for activities that may be made compatible should incorporate mitigation measures determined by the land manager in consultation with ADF&G, USFWS and other appropriate sources. Mitigation measures should make the activity compatible with the maintenance of waterfowl populations and harvest activities. This guideline does not apply to land exchanges authorized by ANILCA or identified in the plan.

Guidelines Concerning the Alteration and Destruction of Brown Bear Habitat

1. Development in Essential Brown Bear Habitat

Commercial, recreational, or industrial developments that are likely to cause significant permanent alteration to essential brown bear habitat or that can not be restricted seasonally should, to the extent feasible and prudent, avoid essential brown bear habitat, identified on Map 5 in Appendix A. Activities that cause permanent alteration of essential brown bear habitat, that can be restricted seasonally, or that require an exploration plan, development plan, or plan of operation should require mitigation of impacts in essential brown bear habitat. Industrial or commercial development on state and federal land should avoid areas identified as important brown bear habitat, as identified on Map 5 in Appendix A.

Guidelines Concerning the Alteration and Destruction of Marine Mammal and Marine Bird Habitat

1. Development On or Near Haulout Sites and Bird Rookeries

Commercial or industrial developments and transportation infrastructures that may cause significant permanent surface alteration or that can not be restricted seasonally should, to the extent feasible and prudent, not be located on essential walrus or sea lion haulout sites or marine bird colonies, identified on Maps 3 and 4 in Appendix A. A one-half mile buffer should be maintained in order to separate commercial sites, industrial development sites, or transportation infrastructure from these essential walrus and sealion haulouts and marine bird colonies.

2. Activities That Disrupt the Use of Essential Marine Mammal and Marine Bird Habitats

When leases, permits or plans of operation are issued for industrial activities with high levels of acoustical and visual disturbance (such as boat traffic, blasting, dredging, and seismic operations) they should be conditioned to prohibit these activities within one-half mile of sea lion haulouts from May through July, within one-half mile of walrus haulouts from April through November, or within one mile of marine bird colonies from April 15 through August 31, as identified on Map 3 in Appendix A. No seismic work should be conducted within one mile of Amak Island.

Guidelines Concerning the Alteration and Destruction of Eagle Habitat

1. Activities Likely to Disturb Nesting Eagles

Permits and leases for facilities and activities that are likely to disturb nesting eagles, are subject to conditions of the Bald Eagle Act of 1940 as amended.

Forestry

Goal

> Manage public and private forest lands to meet personal use needs of local residents for forest products and maintain or enhance other resource values.

There is not a commercial timber resource in this area. Therefore, the goal, guidelines and land use recommendations of the plan emphasize local use of the forest resources in the Kanektok, Nushagak, Mulchatna, eastern Iliamna Lake and Lake Clark drainages for houselogs, construction, and firewood.

Guidelines

1. Technical Assistance to Private Forest Owners

   The DNR should provide technical assistance to owners of private and public forest land to manage forest resources to help meet local demands for firewood and houselogs.

2. Local Use of Forest Products

   Forest products on state lands within the planning area should be available for local use in accordance with Division of Forestry guidelines and the Wood-Tikchik State Park Master Plan.

Minerals and Materials

Goal

> Maintain opportunities to develop the region's mineral and material resources.

The plan achieves the goal of maintaining opportunities for mineral exploration and development recommending minerals a primary use on all state and BLM lands in the vicinity of known mineral terranes in the Upper Nushagak, Upper Mulchatna, eastern Iliamna Lake, Nyac and Goodnews Bay areas.

A secondary use recommendation has been made on the remainder of the state and BLM lands. Regardless of other primary or secondary use recommendations, all state and BLM lands should remain open to mineral entry except those lands closed by law or within 100 feet of the anadromous streams recommended closed by the plan.

The plan recommends access across public lands for mineral development purposes, and recommends land pattern adjustments on the lower peninsula that would remove mineralized lands from a closed status and make them available for mineral entry and location.

The following guidelines assist in the management of mineral development so that it may be completed in an environmentally sound manner.

Guidelines

1. Access Across Public Lands for Mineral Exploration and Development

   Land managers should ensure reasonable and necessary access to and across public lands for mineral exploration and development.

2. Mineral Inventory on National Wildlife Refuges

   The USFWS should cooperate with the U.S. Geological Survey (USGS) for the purpose of identifying NWR lands with high mineral potential.

3. Mineral Exploration

   Recognized exploration methods for mineral location (i.e. core drilling and geochemical sampling) should be allowed on all BLM and state lands (excluding Wood-Tikchik State Park). Bulk sampling should not be allowed in areas closed to mineral entry. Further, bulk sampling should not be allowed in anadromous streams without a permit from ADF&G.

4. Dredge, Fill and Shoreline Alteration

   To avoid adverse impact on fish or fish habitat, dredging, filling, or shoreline alteration in fish habitat, barrier islands, spits, beaches, or tideflats should be allowed only where it is determined that the proposed activity will not have a significant adverse impact on fish or fish habitat or that no feasible and prudent alternative site exists to meet the public need. Existing community sources of gravel are exempt from this guideline.

5. Extracting Materials or Mining in or Adjacent to Fish Habitat

   Upland sites are the preferred source of sand and gravel. Extraction of sand and gravel from fish habitat should, to the extent feasible and prudent, be avoided.

   When selling sand and gravel on all public lands or issuing a permit for mining adjacent to or within fish habitat, the land manager should require, as a condition of the sale or permit, measures such as levees, berms, and/or settling ponds, and reclamation and rehabilitation measures that, to the extent feasible and prudent, minimize the siltation and sedimentation of fish habitat.

If mining for locatable minerals is proposed on BLM lands adjacent to fish habitat, the land manager should require measures to prevent undue degradation, that may include levees, berms, and/or settling ponds and reclamation and rehabilitation measures that, to the extent feasible and prudent, minimize the siltation and sedimentation of fish habitat.

Recommended guidelines for Leases under DNR's Locatable Mineral Leasing System

The following guidelines should apply only when DNR leases minerals under the state's locatable mineral leasing system. This system should be applied to a small portion of the state lands in the region. These guidelines reflect an agreement between DNR and ADF&G as to the appropriate lease requirements in the specific areas open to leasehold location north and east of Iliamna Lake and in the Upper Mulchatna drainage.

6. Mining Plan of Operation

An approved mining plan of operation should be required prior to the initiation of any operations on a mining lease that would otherwise require a Miscellaneous Land Use Permit (MLUP). It is recommended that the Director of the DNR Division of Minerals may make specific exceptions from this requirement for exploration operations of less than one years duration and minor impact by permitting such activities through an MLUP.

The plan of operations should address, but not be limited to, the following:

a. Location of the area to be mined. A map (1" - 1,000') should be required;
b. Time period of operation;
c. Size and purpose of the operation;
d. Number of pieces of equipment and people working on the project;
e. Methods to be utilized in overburden removal and storage, including blasting;
f. Amount of material to be handled, processed, or removed;
g. How the material will be processed;
h. How the tailings will be disposed of;
i. Waste water treatment and disposal;
j. Reclamation plan that describes activities that will be necessary, including: a time table for each step in the reclamation, a description of the measures to ensure that all debris and toxic materials are disposed of in a sound manner, and a description of the steps to be taken to comply with applicable water quality laws and statues;
k. The actions to be taken to minimize detrimental effects to fish and wildlife;

l. Water requirements (i.e., intended use of appropriated waters, sources and methods of obtaining water, rate of acquisition, design of wastewater treatment systems, and instream requirements);
m. Type and quantity of any elements or chemicals to be used in mining or mineral recovery;
n Plans for fuel transportation and storage;
o. Location and size of camp facilities and overland transportation; and
p. Anticipated restrictions on other surface uses of the lease area, including public access.

7. Coordination of Operating Plans and Water Rights

Approval of operating plans for mineral leases should be coordinated with issuance of a water right permit/ appropriation.

8. Bonding

It is recommended that after consultation with ADF&G and DEC, DNR should determine the level of bonding required (as required by state law) to administer or ensure compliance with the reclamation plan in the approved plan of operations.

9. Approval of Plans of Operation

It is recommended that DNR approve plans of operation required for mineral leases if the plans adequately address the guidelines of the BBRMP and DNR has consulted with and given careful consideration to the recommendations of ADF&G and DEC. Violation of the plan of operations should be cause for enforced cessation of operations, if after a reasonable period of time a negotiated solution cannot be reached with the operator, or in the event of repeated violations.

10. Reclamation

It is recommended that reclamation of mined areas on state and federal land be required. At a minimum, topsoil should be removed separately and stored above the annual floodline; overburden should be disposed of above the limits of the annual floodline and should not be disposed of in fish bearing waters; and tailings should be graded at the close of each season to approximate the surrounding ground contours with the exception of tailings used in the construction of settling ponds and other essential facilities. At the cessation of mining activities, the lessee should regrade all disturbed areas to stable slopes that blend with the natural topography, cover them with topsoil and seed where necessary to facilitate revegetation.

Oil and Gas

Goal

> Maintain opportunities to explore and develop the region's oil and gas resources and opportunities to develop infrastructure needed to support oil and gas exploration and development.

The plan achieves its goal for oil and gas resources by recommending oil and gas as a primary use on most state uplands and native lands considered to have high or moderate potential for oil and gas discoveries. This includes over 3 million acres of state owned uplands on the Alaska Peninsula south of the Bristol Bay Borough.

Oil and gas is recommended a secondary use on all State, Native or BLM uplands having low oil and gas potential. In addition, portions of the Becharof, Togiak and Alaska Peninsula National Wildlife Refuges have lands recommended as secondary use for oil and gas. Final determination of areas in refuges that may be leased must be based on compatibility determinations of the individual refuge plans.

The plan recommends orderly development of potential oil and gas resources by placing the highest priority on upland oil and gas development. The State Area Plan delays oil and gas leasing in the tidelands south of the Fisheries Reserve for 10 years to give time to: 1) determine what oil and gas resources might be discovered on the upland leases; 2) determine whether or not state areas should be leased offshore; and, 3) develop additional technology that may provide better protection of fishery resources during oil and gas exploration, development and production.

The plan also provides guidelines for oil and gas development to assist managers in directing such development in an environmentally sound manner.

Guidelines

1. Oil and Gas Pipelines

   Pipelines and pipeline rights-of-way should, to the extent feasible and prudent, be sited, designed, constructed, and maintained to minimize risk to fish populations from a spill, pipeline break, or construction activities. Pipe-crossing fish-bearing waters should incorporate specific measures to minimize the amount of oil that may enter fish bearing waters as the result of a pipeline break.

2. Submarine Oil and Gas Pipelines

   Permits, lease stipulations, or rights-of-way for submarine pipelines should, to the extent feasible and prudent,

require that pipelines and well heads be buried or provide other protection or use other technology to prevent rupture by ship anchor or fishing trawls.

3. Discharge of Drilling Muds

The discharge of drilling muds and produced water into marine waters should adhere to NPDES permit conditions and those DEC Certificate of Assurance conditions accompanying the NPDES permit. No discharges of drilling muds or produced waters should be permitted to fresh water lakes, streams or wetlands essential to waterfowl and fish habitat.

4. Oil and Gas Facilities in Essential Waterfowl Habitat

All oil and gas production and storage and transportation facilities should, to the extent feasible and prudent, be located outside of essential waterfowl habitat, identified on Map 4 in Appendix A.

Recreation

Goal

Maintain a range of recreational, scenic, educational, wilderness, and unique natural resources in the Bristol Bay region adequate to provide for the needs of local residents, and state and national users.

The plan's goal for this resource is achieved through the recommendation of important recreation areas as a primary use for recreation; guidelines that assist in the maintenance of recreational resources; a recommended recreational development plan for the area; and the identification of numerous access sites that should be acquired by public agencies to provide for public access to important recreational waterways.

Guidelines

1. Future Management Plans Should Address Recreation

State and federal agencies should develop area management plans that maintain public outdoor recreation, scenic areas, wilderness, unique geological features, and fragile or unique ecosystems.

2. Recreation Facility Siting

Recreation facilities should be sited in a manner to minimize the adverse impact on existing wildlife populations and traditional uses while at the same time providing the recreation facilities needed by the public.

Settlement

Goal

> Provide opportunities for the expansion of existing communities and recreational or remote homesite settlement that meets current and projected demand for private land while avoiding significant adverse impacts on other important resources and users.

To achieve the first part of its goal for settlement the plan recommends expansion of existing comnunities through the sale of municipal or private (including Native corporation) lands.

To achieve the second part of its goal for settlement the plan attempts to balance statewide desires for private recreational or homesite land against concerns about the location and impact of such disposals on the local fishing, subsistence and recreation economies.

After weighing all of the considerations the plan recommends up to 14,000 acres of state land sales in 17 different locations over the next 10 years. Their remoteness of the sites and proximity to recreational amenities should, in many cases, lead to conversion of these state land disposals to private recreation use.

The strong local opposition to any state land disposals in the region led to the recommendation in Chapter VII that the governor and the State Legislature initiate a reevaluation of the state land disposal program in order to make the program more responsive to local needs and attitudes.

Guidelines

1. Lands That Should Be Sold

   The plan identifies those public lands in Bristol Bay that should be sold or opened for settlement under the state's land disposal programs (e.g., homesteads, homesites, remote parcels, subdivision) during the ten years following adoption of this plan. For the DNR or the Bureau of Land Management (BLM) to sell or open land for settlement in different areas of Bristol Bay or to increase the amount of land to be opened or sold in allocated disposal areas, except as specifically recommended in the plan, should require an amendment of the plan. Agriculture disposals are not recommended. BLM may use the procedures under FLPMA 203 to resolve land tenure problems resulting in isolated tracts returning to federal ownership through failure of entries. It is recommended that the adjacent major landowner be given priority in obtaining the lands.

Where workforce sites to facilitate commercial or industrial development, such as mining, fish processing, energy development, etc., are needed they should be allowed without amendment of the plan under appropriate federal or state regulations. Where significant conflicts with traditional uses are likely, a lease for enclave type development should be considered as an alternative to fee simple disposal. High density land disposals such as for work force sites in caribou or brown bear habitat, identified on Maps 2 and 5 in Appendix A, are considered a significant conflict. Therefore, work force sites in these habitats should, to the extent feasible and prudent, be leased and enclave development required.

2. Coordination With Municipalities and Native Corporations

The DNR and the BLM should consult with municipalities and Native corporations wishing to coordinate their land disposals in order to make the most suitable land available for community expansion, private recreation, and remote residential uses regardless of present ownership; and also, to coordinate the timing of disposals to best meet the demand of people in and outside the region.

3. Coordination With Coastal Resource Service Area Boards

The DNR and the BLM should coordinate with the appropriate Coastal Resource Service Area board in determining 1) the market for state and federal land, 2) the type of disposal that meets the needs of the people in the area; and, 3) the placement within the designated disposal area, and the timing and design of the disposals recommended by the plan. Also, the DNR should continue, and further emphasize, its present policy of seeking advice on the design, timing, size, and method of disposal from communities and Native corporations owning land nearest the proposed disposal.

As part of the regional planning process, the effect of the disposal of state lands identified in this plan on the density of the population in the vicinity and on traditional uses of the land has been considered as required in AS 38.05.301. State lands selected for disposal are those lands determined to have the least impact on traditional uses and to be where additional population should have the least impact. The plan's guidelines in part fulfill the requirement to develop a plan to resolve or mitigate conflicts. Where necessary, additional provision should be made on a case-by-case basis to resolve or mitigate remaining conflicts such as reservations of corridors for existing trails.

4. Use of Existing Services

Public land disposal projects recommended by the plan should be designed to maximize the use of existing services and

infrastructure, and should provide adequate open space to maintain public access and provide for public use and other important resources.

5. Transportation Related to Land Sales

The local, borough, state, and federal governments should cooperate to provide for reasonable local and regional transportation needs resulting from public land disposals.

6. ADNR Assistance to Local Communities

Local municipalities are encouraged to sell their lands to help satisfy demand for additional private ownership in the Bristol Bay region. As part of this encouragement, DNR should work with the Department of Community and Regional Affairs (DCRA) and municipalities to either amend AS 38.04.021 or get official interpretation that it is possible to: 1) allow grants for survey and other improvements to be applied to community lands that were not previously state-owned lands; 2) allow such grants to be made to the trustee for future municipalities.

It is recommended that municipalities apply to DNR under AS 38.04.021 for assistance in carrying out a land disposal program. At a minimum, it is recommended that DNR provide technical advice to municipalities requesting it. As staff time is available, DNR should provide technical assistance with land sales to municipalities or trustees for future municipalities that request it.

7. Land Sales in Essential Brown Bear Habitat

Public land identified as essential brown bear habitat, on Map 5 in Appendix A, should, to the extent feasible and prudent, be retained in public ownership.

8. Mineral Closures in Subdivisions and Homestead Areas

Land sold as state subdivisions should be closed to new mineral entry and location. The closing order should be signed during the disposal process, and only cover the project area. State lands open for homesteading should be closed to new mineral entry and location during the disposal process. These areas should remain closed to new mineral entry and location until the maximum number of homestead entries allowed has been reached. Only at that time should lands not homesteaded be re-opened for mineral entry and location.

9. Trapping Cabins

It is recommended that trapping cabins be allowed on state land in the Bristol Bay study area subject to the following conditions:

a. A maximum of 50 permits should be issued for new cabins during the ten years following adoption of the plan.

b. No commercial use of the cabins should be allowed except trapping and guiding.

c. No residential use of the cabins should be allowed.

d. Prior to issuing a permit, the application should be circulated for normal interagency review. The local CRSA board (or other regional government in place at the time) should be included in this review.

e. A permit should allow more than one cabin only if a clear need for more than one is demonstrated to the satisfaction of the Director of Land and Water Management, DNR.

Transportation

Goal

> Support resource development and local transportation needs in the region by reserving preferred transportation corridors and port sites.

The proposed plan takes steps to achieve the goal of developing the region's transportation system to support resource development. Specifically, the plan recommends access across the Alaska Peninsula by identifying three preferred trans-peninsula routes that terminate at potential port sites identified in Chapter IV. These could be used to transport oil or gas from the lease sale areas on the north side of the peninsula and OCS sale areas to deepwater ports on the Pacific Ocean and could provide for general transportation and freight transport across the Alaska Peninsula. The plan recommends that to the extent legally allowed, land managers avoid actions that may preclude or impede the designation and use of these corridors and port sites. Other corridors and port sites may also be used if necessary.

In order to aid oil development on the Alaska Peninsula, the plan recommends that pipeline corridors be allowed on the Bering Sea side of the peninsula so that oil and gas can be moved from the point of production to a trans-peninsula corridor.

The plan also achieves its goal by specifically encouraging the development of transportation infrastructure to support resource development while guiding this development in an environmentally sound manner.

The plan discourages intercommunity roads unless local communities want them. It should also be noted that state land

managers have limited authority to control access on RS2477 trails or on section lines if the section line has been surveyed.

Guidelines

1. Roads to Support Resource Development and Intercommunity Roads

   Roads and other transportation may be developed to support resource exploration and development and community expansion. Inter-community roads are discouraged except where: 1) communities are close together, 2) alternate transportation options would be more costly and less dependable, and, 3) there is strong local support.

2. Preferred Trans-peninsula Corridors

   When future trans-peninsula pipeline, road, or other transportation developments are planned, developers should consider using the preferred corridors identified. More detailed route alignment and feasibility analysis is required before any of these routes is chosen for transportation development. Public land managers should, to the extent legally allowed, avoid actions such as land sales or recommending wilderness designations that preclude or impede the construction of pipelines, roads, or other transportation development in these corridors until such time as a final decision is made on the feasibility or appropriateness of the routes or a Title XI application is filed.

   Furthermore, identification of preferred corridors by this plan is not intended to foreclose other options that turn out to be preferable when transportation needs are more clearly defined. These other options may include those corridors that were considered during the planning process.

3. Title XI of ANILCA

   Any transportation or utility system that crosses National Conservation System Units is subject to Title XI of ANILCA. Title XI of ANILCA covers transportation and utility systems in and across, as well as access into, federal conservation system units (including NWRs). Specific regulations can be found in Titles 43 and 50 of the Code of Federal Regulations.

4. North-South Corridors on the Alaska Peninsula

   North-south corridors to support resource development or to connect with the appropriate trans-peninsula corridors are a recommended use on state land on the north side of the Alaska Peninsula.

5. Traditional Public Access

Traditional public access through federal, state, or private land should be maintained or enhanced in the Bristol Bay plan area. If area-specific restrictions are necessary on state or BLM lands, public review of restricted methods and areas should be part of the closure process. Restrictions of access on USFWS refuges are covered by Title 50, part 36, of the Code of Federal Regulations and requires public notice and hearing before a closure or restriction of access can occur.

Elements of public access include site-specific aspects such as roads, waterways, trails, campsites, and aircraft landing areas, as well as methods of transport such as mechanized land, water, and air transportation. Traditional means include, but are not limited to, aircraft, ORV, boat, snowmachine, dogsled, and foot.

6. Transmission Lines

Transmission lines should use existing or preferred transportation corridors where feasible and prudent. The siting and construction of transmission lines should, to the extent feasible and prudent, avoid creating new permanent access corridors and causing significant damage to the land surface.

7. Stream Crossings

To prevent siltation or pollution of fish habitat, roads and pipelines should cross rivers, streams, or lakes only when absolutely necessary, and crossings should be at right angles to the waterbody. Gravel fill ramps and bridges or other appropriate methods should be used to protect the banks.

8. Bridges and Culverts

All bridges and culverts on fish-bearing streams should be large enough and positioned to avoid changing the direction and velocity of stream flow up to and including annual flood conditions or otherwise interfere with the migration or spawning activities of fish unless the ADF&G, where a Title 16 permit is required, determines deviation from this guideline will not have a significant impact on fish resources. In addition, all bridges and culverts should, to the extent feasible and prudent, be large enough to accommodate 25-year peak discharge without significantly interfering with volume, velocity, and sediment transport or substrate characteristics of the stream where these properties are important to the uses of the stream. Bridges and culverts should provide adequate clearance at normal summer flow levels for boat, pedestrian, and large game passage whenever these uses occur or are anticipated.

9. Off Road Access

Permits for temporary off road access should require that surface disturbance and destruction of fragile soils and wetlands vegetation be minimized. Operations should be scheduled when adequate snow and ground frost is available to protect the ground surface, or require the use of low ground pressure vehicles, avoidance of problem areas, or other techniques to protect areas likely to be damaged by off road access.

10. Winter Roads and Winter Access Over Rivers, Lakes and Streams

For winter roads or winter access, snow ramps, snow bridges, cribbing, or other methods should be used to provide access across frozen rivers, lakes, or streams to avoid the cutting, eroding, or degrading of banks. Snow bridges should be removed or breached and cribbing should be removed immediately after final use.

11. New Public Roads or Utilities in Caribou Migration Route

Any new public roads or utility lines connecting communities in the Bristol Bay study area should parallel or skirt and not cross caribou migration routes, identified on Map 2 in Appendix A.

12. Fixed Wing Aircraft and Helicopters

When a land manager issues a lease or permit for a major development requiring repeated fixed-wing aircraft or helicopter support, the developer should be encouraged to maintain above-ground flight altitudes of at least 1,000 feet for fixed-wing aircraft, and 1,500 feet for helicopters, or a horizontal distance of one mile, when flying over the following essential habitats during sensitive periods as identified on the maps.

caribou calving, May 1 - June 15 north of the Kvichak River and Iliamna Lake and May 7 - June 15 south of the Kvichak River and Iliamna Lake (Map 2, Appendix A); waterfowl high spring use, April 7 - May 20 (Map 4, Appendix A);
waterfowl high fall use, August 20 - November 15 (Map 4, Appendix A);
walrus haulout areas, April 1 November 30 (Map 3, Appendix A);
sea lion haulout areas, May 1 July 31 (Map 3, Appendix A)
marine bird colonies, April 15 - August 31 (Map 4, Appendix A);
active eagle nest sites, April 15 - August 31 (Map 4, Appendix A).

Restrictions need only be followed when and where the ADF&G or USFWS determines there are significant wildlife numbers present. The safety of pilot and passengers take precedence over this guideline.

13. Pipelines

Pipelines should, to the extent feasible and prudent, be consolidated, buried, designed, sited and constructed to allow safe passage of caribou and should avoid essential and important moose habitat, identified on Map 3 in Appendix A.

Adequate elevation, burial of pipelines or other appropriate means may be required.

In essential caribou habitat, heavily used service and public roads should be sited as far as is practical from elevated pipelines to avoid additional visual and physical barriers to caribou migration.

14. Repeated Off Road Access in Essential Moose and Caribou Habitat

Repeated Off Road Vehicle (ORV) use regulated by permit should to the extent feasible and prudent not be allowed in caribou calving habitat and during caribou calving (May 1 through June 15 north of the Kvichak River and Iliamna Lake and May 7 though June 15 south of the Kvichak River and Iliamna Lake) and should be restricted in caribou migration and caribou and moose over-wintering areas during sensitive periods, identified on Maps 2 and 3 in Appendix A. (This guideline does not apply to local traffic and traditional hunting activities.) Before issuing permits the land manager should consult with the ADF&G and restrictions need be applied only when and where it is determined that there are significant populations present.

15. Road Construction in Essential Moose or Brown Bear Habitat

Road construction outside existing communities should, to the extent feasible and prudent, avoid essential and important moose and brown bear habitat, identified on Maps 3 and 5 in Appendix A. Where it is not feasible and prudent to avoid essential and important moose or brown bear habitat, roads should be sited, designed, and constructed to minimize conflicts with moose, brown bear, and moose and brown bear habitat.

16. Transmission Lines in Essential Waterfowl Habitat

To the extent feasible and prudent, transmission lines and towers should not be sited in essential waterfowl habitat, identified on Map 4 in Appendix A. Transmission lines should be sited a minimum of one mile inland from the coast, or buried, to avoid coastal waterfowl movements.

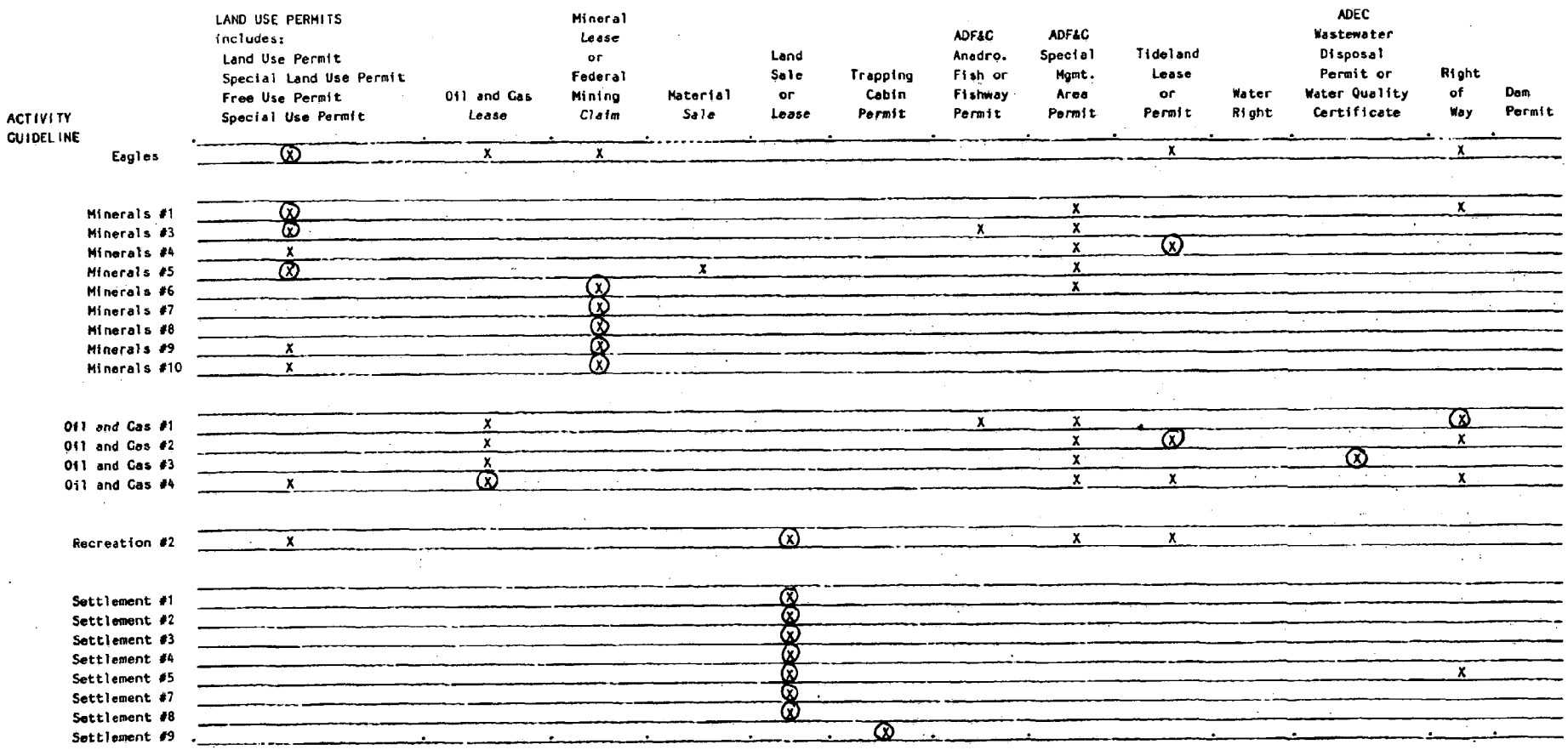
Transmission lines that must cross the Alaska Peninsula at Morzhovoi Bay, Cold Bay, Pavlof Bay, Chignik Bay, and Wide Bay should be sited and designed to minimize the potential for waterfowl collisions during darkness and bad weather.

17. Transmission Lines and Conflicts With Raptors

Transmission lines should be constructed so as to prevent electrocution of eagles and peregrine falcons and should, to the extent feasible and prudent, be sited a minimum of 500 feet away from eagle and other raptor nest sites, identified on Map 4 in Appendix A.

ACTIVITY / GUIDELINE	LAND USE PERMITS includes: Land Use Permit, Special Land Use Permit, Free Use Permit, Special Use Permit	Oil and Gas Lease	Mineral Lease or Federal Mining Claim	Material Sale	Land Sale or Lease	Trapping Cabin Permit	ADF&G Anadro. Fish or Fishway Permit	ADF&G Special Mgmt. Area Permit	Tideland Lease or Permit	Water Right	ADEC Wastewater Disposal Permit or Water Quality Certificate	Right of Way	Dam Permit
Environ./Cult. Res. #1	X	X	X	X	(X)			X	X			X	X
Environ./Cult. Res. #2											(X)		
Environ./Cult. Res. #3										X			
Environ./Cult. Res. #4	X	X	X	X	(X)	X		X	X	X			X
Fish and Wildlife Enhancement	X						(X)	X					
Fish #1										X			
Fish #2	X	(X)	X	X	X	X		X					X
Fish #3	X	X	X	X	(X)		X	X	X			X	X
Fish #4	X	X	X				(X)	X	X	X			X
Fish #5	(X)	X	X	X			X	X		X		X	
Fish #6		X					X	X					X
Fish #7	(X)	X	X	X			X	X					X
Fish #8							X			X			(X)
Fish #9	(X)							X					
Caribou #1	X			(X)	X							X	
Caribou #2	X	(X)		X									
Caribou #3	(X)							X					
Moose #1	(X)							X				X	
Moose #2		X	X	X	X							(X)	
Waterfowl #1	X	(X)	X	X	X			X	X				
Waterfowl #2	X			X	(X)			X	(X)			X	
Waterfowl #3	X			X				X	X				
Waterfowl #4	(X)		X				X	X					X
Waterfowl #5	X	X			X			X	(X)				
Waterfowl #6		X	X	X	(X)			X	X				
Brown Bear	X	X	X	X	(X)							X	
Marine Mammals and Marine Birds #1	X	X	X	X				X	(X)			X	
Marine Mammals and Marine Birds #2	X	X	X					X	(X)			X	

Note: X = Activity the guideline is most likely to effect.
X = Activity the guideline may effect.



Note: X = Activity the guideline is most likely to effect.
X = Activity the guideline may effect.

ACTIVITY / GUIDELINE	LAND USE PERMITS includes: Land Use Permit, Special Land Use Permit, Free Use Permit, Special Use Permit	Oil and Gas Lease	Mineral Lease or Federal Mining Claim	Material Sale	Land Sale or Lease	Trapping Cabin Permit	ADF&G Anadro. Fish or Fishway Permit	ADF&G Special Mgmt. Area Permit	Tideland Lease or Permit	Water Right	ADEC Wastewater Disposal Permit or Water Quality Certificate	Right of Way	Dam Permit
Transportation #1												(X)	
Transportation #2												(X)	
Transportation #3								X				(X)	
Transportation #4								X				(X)	
Transportation #5	X	(X)	X		X			X					
Transportation #6								X				(X)	
Transportation #7	X	X	X				(X)	X				X	
Transportation #8	X	X	X				(X)	X				X	
Transportation #9	(X)	X	X					X					
Transportation #10	(X)	X	X					X				X	
Transportation #11												(X)	
Transportation #12	X	(X)	X					X					
Transportation #13		X						X				(X)	
Transportation #14	(X)	X	X										
Transportation #15								X				(X)	
Transportation #16								X				(X)	
Transportation #17								X				(X)	

Note: X = Activity the guideline is most likely to effect.
X = Activity the guideline may effect.

CHAPTER VI

Landownership Pattern Improvements

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Landownership Pattern Improvements

Introduction

Section 1203 of the Alaska National Interest Lands Conservation Act (ANILCA) directed the Bristol Bay Regional Management Plan (BBRMP) to identify landownership changes that will conserve the fish and wildlife and other significant natural and cultural resources and will provide for the rational and orderly development of economic resources in an environmentally sound manner. ANILCA requires the BBRMP to provide for appropriate land exchanges, identify further lands appropriate for state selections, and to identify lands within the region that may be appropriate for additions to National Conservation System units. The BBRMP fulfills these requirements by recommending areas for land pattern improvements.

The possible areas of land pattern improvement include recommended land exchanges, cooperative agreements, state selections or relinquishments, and additions or alternations to the state park, and to National Conservation System units. The recommendations are based upon the need to consolidate landownership patterns to simplify land management, protect wildlife areas that currently are managed or owned by several different entities, or to aid rational development of the region's resources in areas currently managed by different entities with conflicting legal mandates or land use policies. Additional land pattern changes that were considered but not addressed in the plan are discussed in Chapter 3 under issues not addressed.

This chapter is divided into five sections: 1) Recommended Land Exchanges, 2) Cooperative Management Agreements, 3) State Land Selections or Relinquishments, 4) Additions to and Alterations of Wood-Tikchik State Park and National Conservation System Units, and 5) Fish and Game Research and Management Sites. The order of presentation for the various land exchanges, cooperative agreements, and state selections does not necessarily indicate priority of importance.

A number of the recommendations contained in the draft plan for landownership pattern improvements have been altered or in some instances, deleted altogether, to accommodate public and agency concerns. See Appendix G for a summary of comments and rationale for changes.

Recommended Land Exchanges

In fulfillment of the requirements of ANILCA section 1203(b)(3), the plan recommends several land exchanges that provide for protection of essential fish and wildlife habitat lands and the development of surface and subsurface resource potential areas. The recommended land exchanges generally place developable lands in private or state ownership in exchange for placing sensitive or critical habitat areas in U.S. Fish and Wildlife Service or state ownership.

All exchanges generally involve two parties. One party receives development land and the other receives habitat protection lands. In many cases, the second half of the exchange has not yet been determined. For example, in those exchanges involving private lands within state critical habitat areas, the private land owners may receive lands that are more appropriate for subsurface or surface development than the private lands in the critical habitat areas. The exact identification of lands to be used in these exchanges is not completed.

Land exchanges are also recommended for improving the land pattern of the area and aid resource management. For example, at Etolin Point, where an isolated piece of state land is surrounded by Native corporation lands, the plan recommends an exchange of this land to a Native corporation for more appropriate lands near other state lands. Some exchanges, such as the Herendeen Bay area exchange (long term exchange #6) are intended to make land available for resource development.

The land exchanges discussed in this section are divided into two categories: short-term and long-term land exchange opportunities. These categories do not necessarily indicate the importance of a proposed exchange. Some of the long-term exchanges are listed as long-term, for example, because additional governmental actions are required, such as conveyance of Native selected lands, before a desired exchange can be pursued. For short-term exchanges, agencies should seek funding to begin negotiations. It should also be noted that in some cases a cooperative management agreement rather than a land exchange may fulfill the objectives of the plan.

The recommendations for land exchanges are intended to initiate discussions between the parties identified. Individual exchanges require extensive negotiations between the concerned parties, who in the end may or may not agree to a recommended exchange. It is also recognized that Congressional or legislative approval may be required before some of the recommended exchanges can be implemented.

Land exchange areas are shown on Maps 31 and 32. The exchange areas are identified by the number preceding each description and are keyed to the appropriate map.

Short-Term Land Exchange Possibilities

1. Access sites. Numerous areas requiring additional public access to waterways within the BBRMP region have been identified by Alaska Department of Fish & Game (ADF&G). The existing easements do not provide for adequate public use of many popular recreational waterbodies and streams. In other areas, existing easements do not provide adequate access to public lands. This is particularly true in the Iliamna Lake area. The plan specifically mentions the need for public access sites along Upper Talarik Creek, Peck's Creek, Ole Creek, Gibraltar Lake, Dream Creek, and the Kvichak River. The general location of these sites is identified on the short-term land exchange map as #1.

   This list of specific sites was prepared by ADF&G and has not been thoroughly reviewed. Before further action can be taken on individual sites, land status must be determined. For those sites already in public ownership, land managers should retain the public access sites. For sites in private ownership ADF&G's list should be prioritized to serve as a starting point for negotiations with the individual landowners.

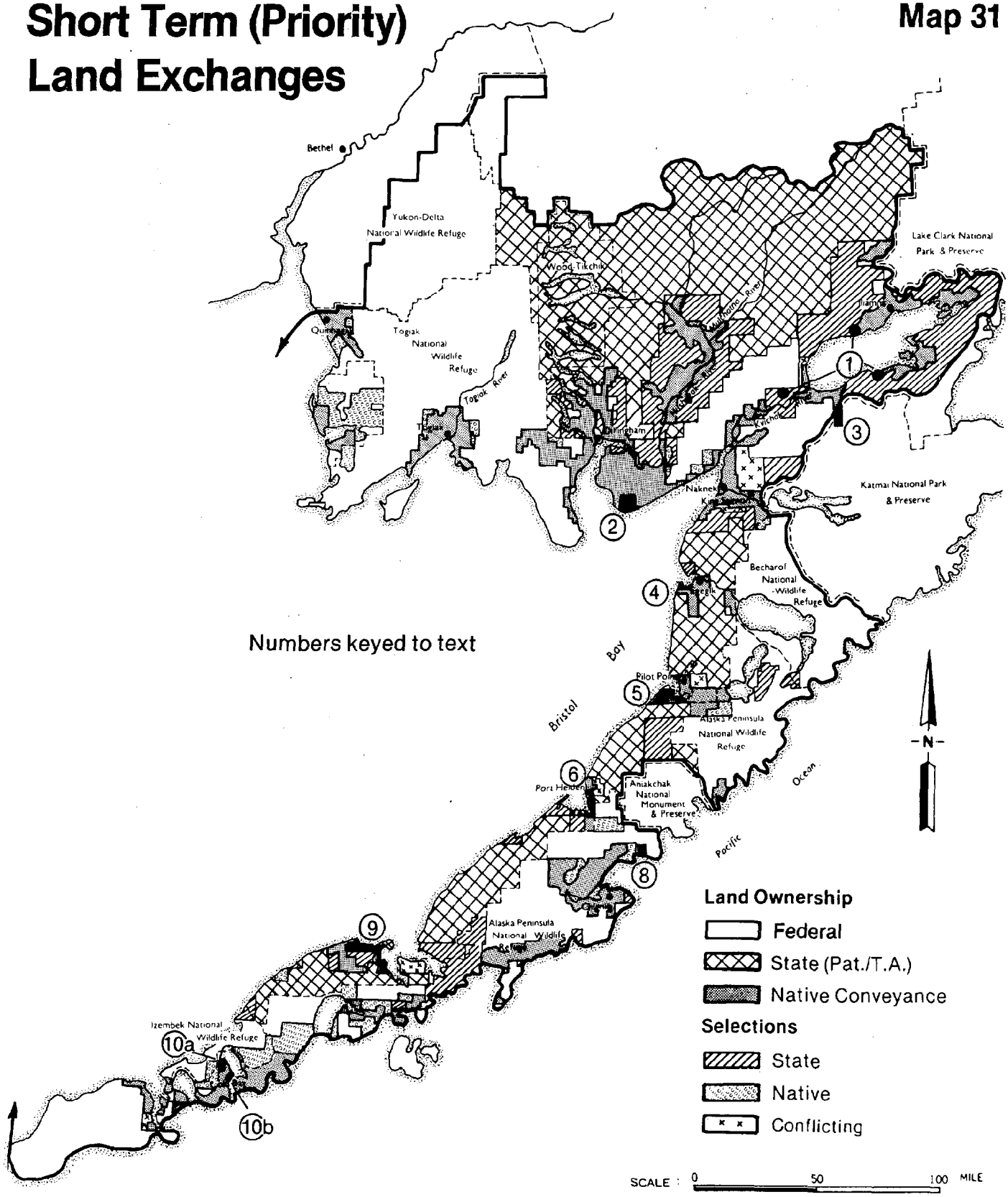
   State or federal agencies should consider acquisition of public access sites in these and other areas by way of exchange, lease, or cash purchases. Such acquisition actions would primarily be between the state and Native village corporations, who own much of the private land in the area. The numerous public access sites identified by ADF&G are in a separate publication available from the ADF&G.

2. Etolin Point. This potential exchange includes one and one-half townships (approximately 34,000 acres) of state land located on Etolin Point in Management Unit 7, surrounded on three sides by Choggiung Village Native Corporation lands. These isolated state lands border on Bristol Bay.

   In order to consolidate the landownership pattern and improve management of this area, the BBRMP recommends that the state consider an exchange of this land to the adjacent Native corporation landowners for land closer to Dillingham that has settlement potential. Both the state and Native corporations have identified this as a priority exchange. Such an exchange would involve transferring the surface rights to these lands to the Choggiung Limited Village Corporation (which includes the former Ekuk, Portage Creek, and Dillingham Native Corporations) and the subsurface rights to the Bristol Bay Native Corporation. A portion of this area could be used by the state for a remote settlement land disposal and thus would not be available for inclusion in the land exchange.

Short Term (Priority) Land Exchanges

Map 31



3. Kukaklek Lake. The Igiugig Natives Limited and the Bristol Bay Native Corporation (BBNC) own approximately 7,680 acres of land around the west end of Kukaklek Lake and the upper portion of the Alagnak (Branch) River which are included within the mapped boundaries of Katmai National Park. The Igiugig Natives Limited own the surface rights to most of the area and BBNC owns the subsurface estate to these village lands. BBNC has also selected surface and subsurface rights to some additional land along the northern portion of the Alagnak River.

   These lands include a prime recreation area encompassing a portion of the Alagnak Wild and Scenic River corridor. The National Park Service (NPS) and the Igiugig Natives Limited have discussed an exchange whereby the NPS would acquire a portion of this acreage. In return, the Igiugig Natives are particularly interested in obtaining the federally owned lands around Big Mountain on the south side of Iliamna Lake.

   The BBRMP recommends that the NPS, the Igiugig Natives Limited and BBNC place a priority on pursuing an exchange in this area. Both the village corporation and the NPS have identified this as a priority exchange area.

4. Egegik State Critical Habitat Area. The Becharof Native Corporation owns approximately 1,600 acres of land within the State Critical Habitat Area (SCHA) located on Egegik Bay in Egegik Management Unit 14. This SCHA is a major staging area for ducks and geese flying south along the Pacific flyway. To ensure continued preservation of this staging area, the state should acquire the Native lands and ensure state ownership of the entire Egegik SCHA. The ADF&G has identified this as a priority exchange area. The plan recommends that the ADF&G, ADNR, the Becharof Corporation, and the Bristol Bay Native Corporation begin negotiations for the purpose of exchanging these Native lands within the SCHA for state lands elsewhere. If such an exchange is not possible, it is recommended that the Native and state landowners formulate a cooperative agreement to ensure preservation of this area for waterfowl staging.

5. Pilot Point State Critical Habitat Area. The Pilot Point Native Corporation owns approximately 20,600 acres of land in the SCHA located around Ugashik Bay near Pilot Point in Management Unit 17. This SCHA is a major staging area for ducks and geese flying south along the Pacific flyway. To ensure continued preservation of the area, the state should acquire these Native lands to ensure state ownership of the entire Pilot Point SCHA. The ADF&G has identified this as its highest priority exchange area.

   The Pilot Point Native Corporation and the Bristol Bay Native Corporation (which owns the subsurface rights) are interested in discussing the possibility of exchanging these

lands for other uplands. The Native corporations, however, do not want to exchange the lands north of Pilot Point, within the SCHA, including the Dago Creek area. The Pilot Point Native Corporation wishes to retain these lands for use as a small boat harbor and other possible developments.

The BBRMP recommends that ADF&G, ADNR, the Pilot Point Native Corporation, and BBNC begin negotiations for an exchange of the Native lands within the SCHA, (excluding Native lands north of the village in the Dago Creek area) for state lands elsewhere. If such an exchange proves impossible, the plan recommends establishment of cooperative management agreements among these landowners to ensure protection of these lands.

6. Port Heiden State Critical Habitat Area. The Alaska Peninsula Native Corporation owns approximately 22,640 acres of the land within the Port Heiden SCHA. This SCHA is a major staging area for ducks and geese flying south along the Pacific flyway. The state should acquire the Native lands to ensure state ownership of the entire Port Heiden SCHA. The ADF&G has identified this as their second most important priority exchange area. The Native corporations have also indicated a willingness to consider exchange possibilities in this area. The plan recommends that ADF&G, ADNR, the Alaska Peninsula Native Corporation, and the Bristol Bay Native Corporation exchange the Native lands in the SCHA for state lands elsewhere. If an exchange is not possible, it is recommended that a cooperative management agreement be established to ensure preservation of these lands.

7. Native interest in proposed exchange of critical habitat lands. The Becharof Corporation, Pilot Point Native Corporation, Alaska Peninsula Corporation, and the Bristol Bay Native Corporation, which own lands discussed in the SCHAs mentioned above, have all indicated an interest in the proposed exchanges. In these early discussions, the corporations were asked to specify the types of state land they might consider for exchange purposes. The village corporations indicated an interest in acquiring lands near their village areas along some of the rivers now owned by the state or possibly other state lands that may be inside or outside the Bristol Bay region. The state is interested in exchanging upland areas adjacent to existing village corporation lands but outside of the SCHA. State lands at Etolin Point have been suggested as trading stock. Certain village corporations and the Bristol Bay Native Corporation indicated an interest in acquiring oil and gas rights from state uplands along the Alaska Peninsula or other lands with mineral potential.

8. Hook Bay. The lands near Hook Bay are located in the southern subunit of Management Unit 20 between Aniakchak

National Monument and Preserve and Chignik Bay. Mineral exploration and development is recommended as a primary use for non-refuge lands in this southern subunit. Far West, Incorporated (Chignik village Native corporation) is interested in acquiring lands adjacent to their village around Hook Bay from the U.S. Fish and Wildlife Service as these lands are part of their traditional hunting area. This area was not available for selection as it was outside the village withdrawal area, however, they do want to control these lands. The BBNC, owning much of the subsurface under the Far West Incorporated's lands, is also interested in acquiring adjacent lands around Hook Bay from the USFWS. The acquisition of these lands would add additional mineral lands to a contiguous block of mineral development lands already owned by BBNC. The USFWS should consider trading these lands for lands with higher wildlife values.

9. Port Moller State Critical Habitat Area. The Aleut Corporation and Nelson Lagoon Native Corporation own a large portion of the land included in the Port Moller SCHA, located around Port Moller and Nelson Lagoon in Management Unit 26. This area is a major staging area for ducks and geese migrating along the Pacific flyway. To ensure continued protection of the staging area, the state should acquire the Native lands to assure state ownership of the entire Port Moller SCHA. The ADF&G has identified this as a priority acquisition and the third most important critical habitat area acquisition possibility. The plan recommends that ADF&G, ADNR, the Nelson Lagoon Native Corporation, and Aleut Corporation landowners transfer to the state the Native lands within the SCHA in exchange for state lands elsewhere.

10. Cold Bay area. A number of land exchange possibilities have been proposed involving state, Native, and National Wildlife Refuge (NWR) lands around Cold Bay. The lands being considered for an exchange include the following:

    a. Cold Bay: The city of Cold Bay presently has limited land available for commercial and residential expansion. The city is surrounded by the Alaska Peninsula NWR. Some lands in the area have little value to wildlife but high suitability for commercial and residential use. State and Native corporations are interested in acquiring these lands. The USFWS is also interested in making these lands available to the state or to King Cove Corporation in exchange for lands with high fish and wildlife value. The plan recommends that the FWS, State and Native groups negotiate an appropriate exchange.

       State land should be made available from excess airport lands. The Alaska Department of Transportation and

Public Facilities should identify airport land suitable for disposal during its airport master planning process.

b. Mortenson Marsh: This area has been selected by the King Cove Native Corporation. The area is important to nesting whistling swans and other waterfowl and shorebirds. It is an important area for brown bear during spring, summer, and fall. Caribou commonly use the area in fall, winter, and spring, and red salmon spawn in many of the lakes. The USFWS desires to add this land to the Alaska Peninsula NWR in exchange for other lands. The plan recommends that the USFWS acquire these lands from the King Cove Native Corporation.

Long-Term Land Exchange Possibilities (Lower Priority)

1. Togiak National Wildlife Refuge. The USFWS, Bureau of Land Management (BLM), the state and appropriate Native corporations should evaluate the following options for the Togiak National Wildlife Refuge. An exchange involving Togiak NWR Wilderness may require Congressional approval.

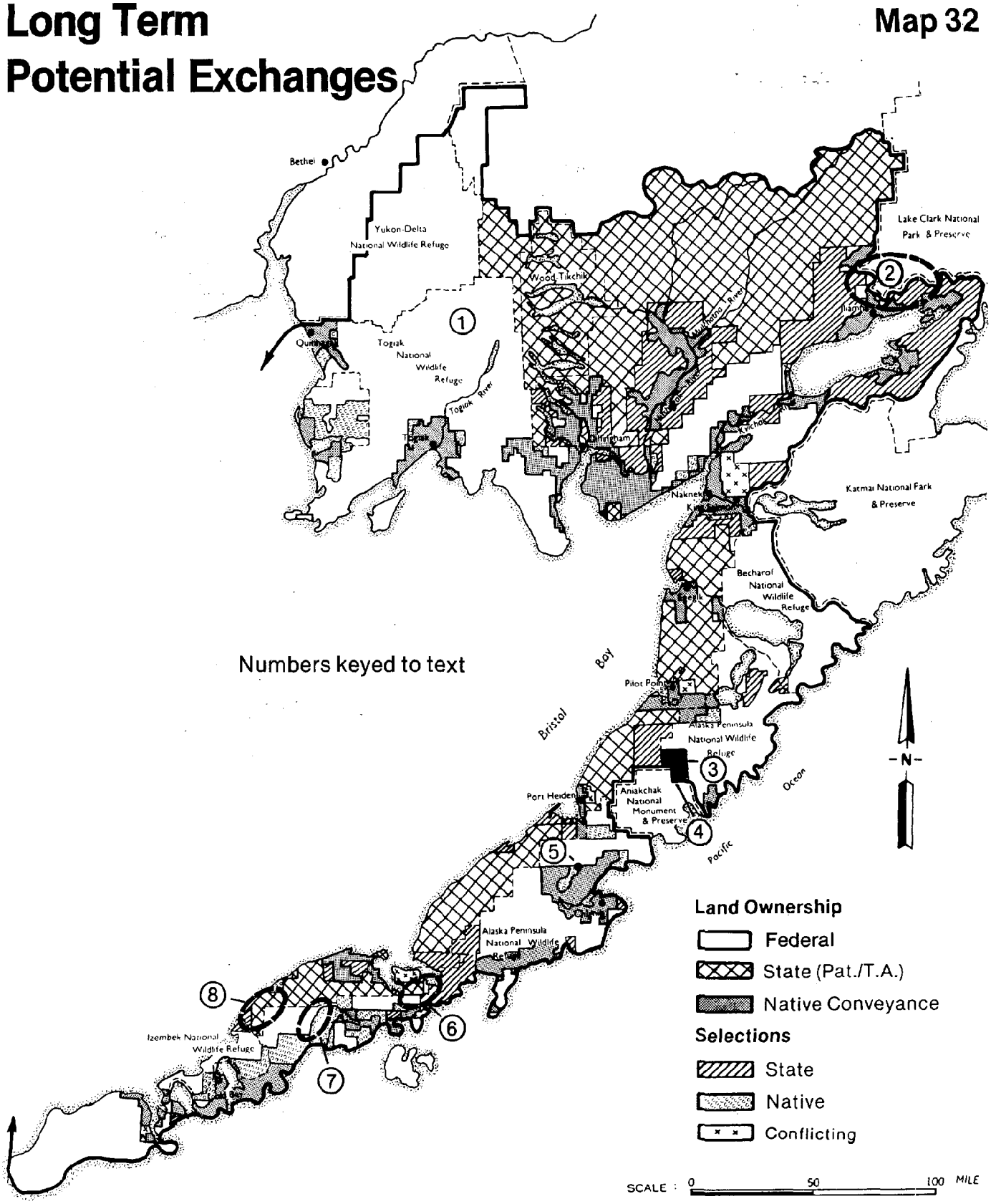
   1. The exchange of USFWS land with mineral potential in Togiak NWR for state or Native land in the Mulchatna and Nushagak drainages with high habitat values is recommended. Such an exchange should result in additional lands being made available for mineral exploration and development.

   2. Transferring a portion of the Togiak NWR including the Kanektok River drainage into the Yukon Delta NWR is recommended. Such a transfer must consider USFWS management, the natural distribution of fish and wildlife resources, and existing subsistence use patterns of local residents. The Refuge CCP should review this recommendation.

2. Southwest portion of Lake Clark National Park. Much of the southwest portion of the Lake Clark National Park and Preserve (NP&P) found in Management Unit 10 is currently selected or owned by the Nondalton Corporation, the Iliamna Natives, Limited, and the Bristol Bay Native Corporation. The state also has selections to the west of this area outside the park, and there are some BLM lands to the west of the park. Depending upon which remaining selections are actually retained by the Native corporations, the land pattern in this area could result in pieces of national park land being totally surrounded by Native lands and separated from the rest of the national park. There will also be some small tracts of BLM land adjacent to the park, surrounded by state, Native, or NPS lands.

Long Term Potential Exchanges

Map 32



This situation could result in difficult resource and visitor management problems. The NPS is interested in working with the Native corporations, through exchange or cooperative management agreements, to ensure that the land ownership and use patterns in this area are reasonable and compatible. Land ownership patterns in this area should be evaluated after the Native corporations have finalized their selections. The state has an interest in acquiring certain additional lands through exchange in the Tazimina Lakes region. The plan recommends that as soon as the Native corporation land selections are finalized, necessary land pattern adjustments be made by the NPS, Native corporations, the BLM, and the state to facilitate reasonable resource and visitor management.

3. Mother Goose Lake. The lands to the southwest of Mother Goose Lake in Management Unit 19 are owned by the State of Alaska. These state lands are included within the Alaska Peninsula NWR. The USFWS should acquire these lands to consolidate ownership of the entire watershed around Mother Goose Lake. This area receives considerable recreational use and has been considered by DNR for land disposals. The plan recommends that state land, which the USFWS considers a priority to acquire through exchange, be added to the refuge.

4. State land in Aniakchak National Monument and Preserve. The state owns lands in the northeast corner of the Aniakchak National Monument and Preserve. These state lands are bordered by park lands on at least two sides and are not noted as having particular value to the state. In order to facilitate compatible management of the lands within the park, it is recommended that state lands located within the monument and preserve boundaries be transferred to the NPS as part of an exchange. If a land exchange is not possible, a cooperative agreement is recommended to ensure compatible management of the state and federal lands.

5. Dinosaur tracks east of Black Lake. Native Corporation lands in Management Unit 23 east of Black Lake (T.43S, R.60W, Sections 12, 13 and 14) encompass the only known dinosaur tracks in Alaska. Although the lands are on the northwest flank of the Chignik anticline, it is probably appropriate for up to three sections of Native land, including the track area and lands suitable for a small airstrip, to be included in an exchange for refuge lands elsewhere. This would protect the areas scientific significance and maintain access for viewing and research.

6. Herendeen Bay lands. Management Unit 27 includes lands between Herendeen Bay and Port Moller on the north and the Pacific Ocean on the south, has a mixed landownership pattern. This unit contains state lands, state selected lands, Native corporation lands, Native corporation selected

lands, USFWS lands, and other private lands. The ownership patterns do not follow any logical order and are still subject to differing ownership claims by various parties.

The plan recommends that this entire management unit be in private and state ownership in order to facilitate resource development. This unit is the site of possible pipeline corridors and transportation system developments, mineral exploration, and settlement. The plan recommends that the state, the USFWS, the Aleut Regional Native Corporation, and the affected village Native corporations pursue land exchanges to ensure that most lands of this unit are owned by Native corporations, the state or by other private landowners. The plan also recommends that the state acquire all private lands in the Port Moller SCHA to ensure that critical waterfowl habitats are protected (see also short-term exchange 9).

7. Pavlof Bay. The Aleut Regional Native Corporation and various village corporations have selected lands along the western shore of Pavlof Bay. The Aleut corporation desires to exchange some of these lands to the USFWS for lands with higher subsurface resource values. Negotiations should await adjudication and conveyance of these lands.

8. Cathedral River/Black Hills caribou calving ground. This area belongs to the state and is adjacent to the Pavlof Unit of the Alaska Peninsula NWR. The caribou calving grounds here are of major importance to the maintenance of the Alaska Peninsula caribou herd. Adding this area to the Alaska Peninsula NWR will ensure their protection. The USFWS is interested in acquiring these lands through an exchange. These lands also have potential for oil and gas resources, a primary reason for the state's selection. Consequently, the state is less interested in an exchange of these lands and would prefer a cooperative agreement approach. The plan recommends the USFWS and the state enter into negotiations to accomplish a cooperative management agreement or land exchange for this area.

9. 12(a)(1) Lands in Alaska Peninsula Refuges (not mapped). Under Section 12(a)(1) of ANCSA, Aleut village corporations selected lands and the Aleut regional corporation selected the subsurface estate within refuge boundaries on the Alaska Peninsula. The FWS should consider entering into exchanges with Aleut village and regional corporations to eliminate 12(a)(1) inholdlings from refuges on the Alaska Peninsula.

10. Wood-Tikchik State Park Native Allotments. This state park, established to protect the area's fish and wildlife resources and habitats and to provide for continued public use of the area, contains numerous Native allotment applications. The allotments are often located on very important habitat and/or outdoor activity areas and

therefore are prone to potential conflicting developments. After patent is issued by BLM, the State would like to acquire through purchase or exchange certain allotments with particularly high public use values.

Recommended Cooperative Management Agreements

This section describes cooperative management agreements for areas in which a land exchange action is not recommended. These cooperative management agreements are intended to ensure compatible land use management among various landowners. The numbers preceding each area are keyed to Map 33.

Procedures for Cooperative Management Agreements

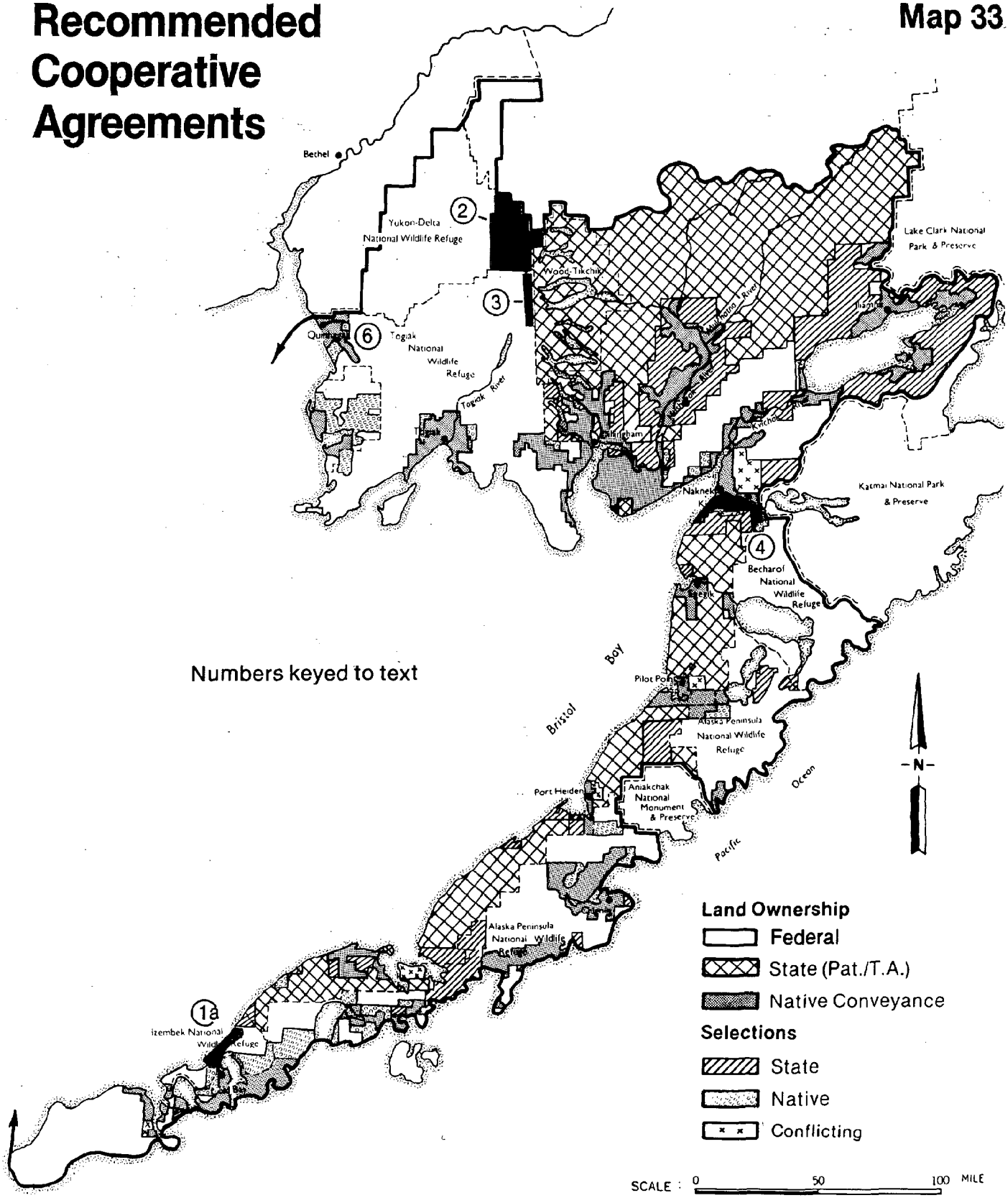
A. USFWS Cooperative Agreements. Cooperative management agreements involving the USFWS must be consistent with the principles set forth in ANILCA. Section 304 (f)(1) authorizes the Secretary of the Interior to enter into cooperative agreements with any Native corporation, the state, municipalities, or other landowners for the management of land within, adjacent to, or near any national wildlife refuge. Each cooperative agreement must be managed by the owner or occupant in a manner compatible with the major purposes of the refuge to which such land pertains, including the opportunity for continuation of subsistence uses by local rural residents. Section 304(f)(2) states that such cooperative agreements define what land uses are compatible, permit reasonable access for state and federal management, identify what services the Department of the Interior agrees to provide the owner or occupant, and identify additional terms and conditions the parties agree are necessary to carry out the intent of Section 304(f)(1). The cooperative agreement must also specify the effective period of the agreement.

B. Public Notice. Public and agency review must be provided for all cooperative agreements recommended in this plan. For cooperative agreements involving state agencies, the public notifications procedures of AS 38.05.345 should be followed. Where public meetings are deemed appropriate, the procedures of AS 38.50.120 (land exchanges) should be followed. For cooperative agreements involving federal agencies, existing regulations for public notification for land exchanges should be used.

C. Plan Amendments. When the BBRMP is amended, affected cooperative agreements should also be reviewed and amended to be consistent with any changes in the plan.

Recommended Cooperative Agreements

Map 33



Recommended Cooperative Agreements

1. Tideland/upland agreements. The tidelands of Bristol Bay are heavily used for commercial and subsistence fisheries and transportation. This use of public tidelands has led to many access and use conflicts with the private and public upland owners. Since such conflicts are widespread, a cooperative agreement should be developed between the state and the upland owners that describes a procedure to prevent tideland/upland disputes, maintain management consistency, and provide access for users of state tide and submerged lands.

1a. Izembek Lagoon: This water body is surrounded by designated Wilderness in Izembek NWR; the area below mean high tide, however, is owned by the state. The Izembek State Game Refuge encompasses all of the tide and submerged lands within the lagoon. The eel grass beds present in the state-owned tide and submerged lands are reportedly the largest in the world and are important to the biological productivity of Bristol Bay. The migratory bird values make the lagoon internationally important.

The BBRMP recommends that the USFWS and the state enter into a cooperative management agreement to ensure that these essential migratory bird habitats are protected from incompatible development. The cooperative agreement should give certain day to day management responsibility to the USFWS refuge management staff at Cold Bay since the ADF&G does not have any land managers in Cold Bay for the state refuge. The USFWS would like to acquire these tide and submerged lands through exchange, however, the State is not interested in an exchange.

2. Upper Kisaralik-state lands. The State of Alaska owns lands in Management Unit 3 that encompass the upper drainages of the Kisaralik and Kwethluk rivers. These lands are bordered by the Wood-Tikchik State Park on the east, state land to the north, the Togiak NWR on the south, and the Yukon Delta NWR on the west. Primarily suited for recreation use and wildlife habitat, these lands should be managed for those uses. Since the area encompasses the upper drainages of two rivers that drain into the Yukon Delta NWR, the activities and land uses on state land should be compatible with the purposes of the Yukon Delta NWR. The Kisaralik River is under study by the NPS for consideration as a National Wild and Scenic River.

The state and the USFWS should enter into a cooperative agreement to ensure consistent management policies throughout this area. In addition, the state should examine the possibility of adding the headwaters of the Wood-Tikchik drainage to the Wood-Tikchik State Park.

3. Togiak/Wood-Tikchik boundary. These lands are located along the western boundary of Wood-Tikchik State Park and the eastern boundary of the Togiak NWR in Management Units 4 and 5. The northern portion is owned by the state and is not included in the state park or the wildlife refuge. A cooperative management agreement in this area should ensure that these state lands, which are totally surrounded by park and refuge lands, are managed in a manner compatible with both. These lands, moreover, include watersheds that drain into both the park and the refuge. The southern portion of this area encompasses lands in the Togiak refuge that straddles the mountain drainage. As a result, certain refuge lands along the boundary drain into the park lands.

   The cooperative agreement between the state and the USFWS is necessary to ensure that these valuable watershed lands, which unavoidably affect the other landowner, are managed in a manner to protect the watershed of the adjacent park or refuge.

4. South side Naknek River. The lands along the south side of the Naknek River are owned by two Native corporations, the Alaska Peninsula Corporation and the Bristol Bay Native Corporation. This area is part of the northern wintering grounds for the north Alaska Peninsula caribou herd, which the residents of the Alaska Peninsula rely upon heavily for subsistence. Certain types of development on the Native corporation lands south of the Naknek River may interfere with caribou wintering and migration activities. Therefore, a cooperative agreement should be developed between the Native landowners and the ADF&G to allow for only those kinds of development along the south side of the Naknek River that would ensure protection of caribou wintering areas.

5. Cooperative management of identified transportation corridors. Several transportation corridors across the Alaska Peninsula are identified and recommended in the plan. These corridors cross federal, state, and private land. The landowners along the plan's identified corridors have agreed to preserve these options for possible future transportation corridors. If actual development of a corridor occurs in the future, the landowners along the corridor should enter into a cooperative management agreement to maintain other resource values of the area.

6. Kanektok River. USFWS and Qanirtuug, Inc. (the Quinhagak village corporation) should establish a cooperative management agreement for land management along the Kanektok River.

State Land Selections and Proposed Relinquishments

State Selections

The State of Alaska is entitled to select lands for state ownership from vacant, unappropriated, and unreserved public lands. In the Bristol Bay region, the state has selected most of the available land with the exception of large parcels located near Nyac, Goodnews Bay, and the Kvichak River and several smaller tracts (less than one township each) scattered throughout the region.

As a result of the planning process for the BBRMP the state intends to make additional selections in the region as explained below and summarized in Table 2. The numbers preceding each area are keyed to the state selections and relinquishments map (Map 34). These selections do not preclude additional future state selections of other vacant, unappropriated and unreserved public lands or preclude additional relinquishments by the state.

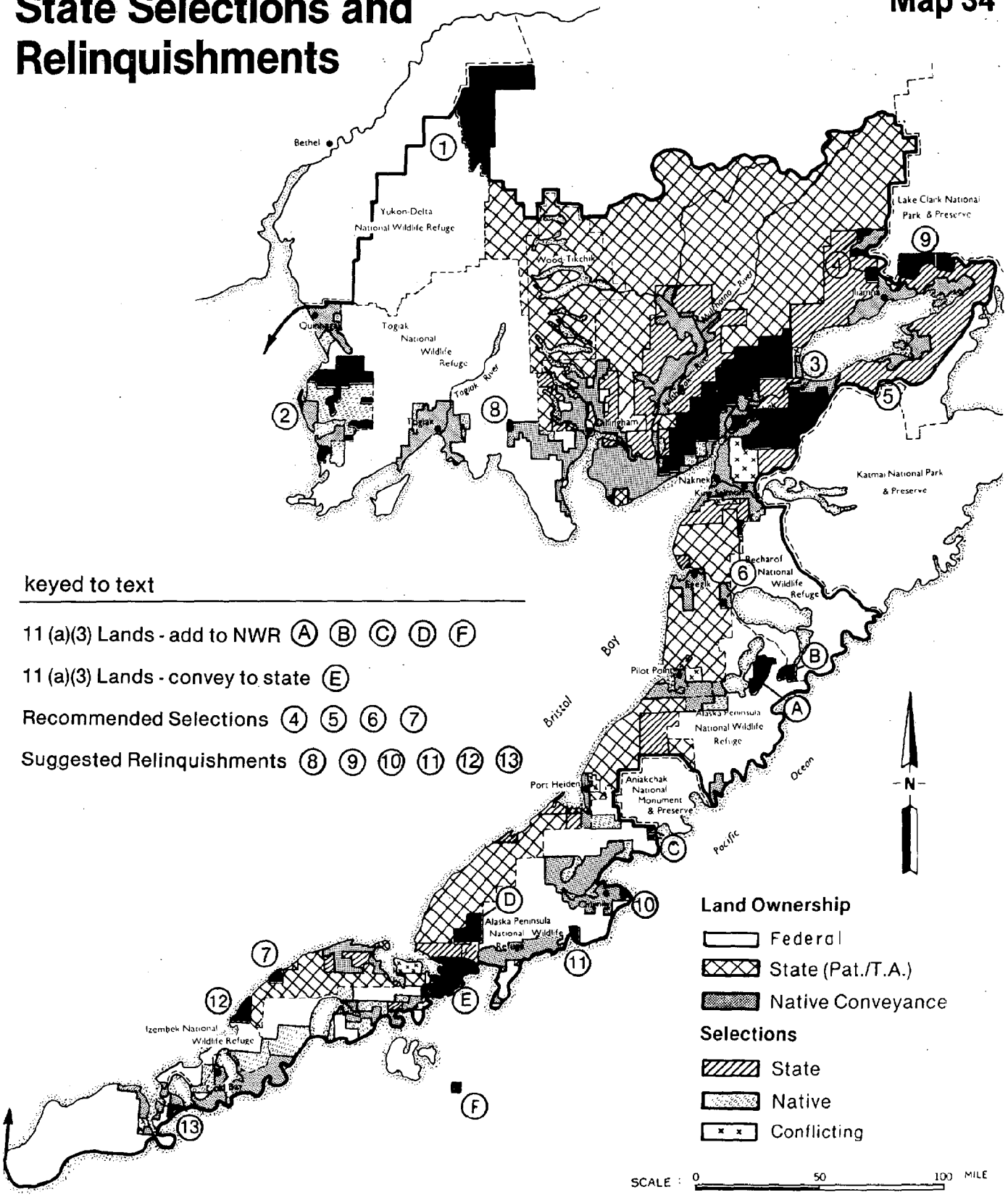
1. Nyac. Approximately 438,000 acres of federal land managed by the BLM in Management Unit 3 do not meet state selection guidelines. This land has moderate fish and wildlife values and known placer deposits. Much of the area with mineral values, however, is already occupied by claims.

2. Goodnews Bay. Approximately 300,000 acres of BLM lands in Management Unit 2 do not meet state selection guidelines. These lands have relatively low habitat, settlement or grazing values and unknown subsurface resource values. Although they contain gold and platinum placer deposits, most areas with known mineral potential have already been staked by mining claims. These lands are over 100 miles from any other state-owned lands and would be difficult to manage. These should remain federal lands.

3. Kvichak. Two large tracts of BLM land in Management Units 7, 8, and 12 are available for state selection. These include approximately 900,000 acres located to the northwest of the Kvichak River and approximately 400,000 acres to the southeast of the Kvichak River adjacent to Katmai National Park. These lands have important fish and wildlife resources and a few small areas marginally suitable for settlement. Most of the land is relatively flat, poorly drained tundra with no known potential for agriculture or forestry. Mineral values are unknown but are presumed to be negligible. Oil and gas potential is low to moderate, as these lands lie on the northern, largely unexplored end of the Bristol Bay oil and gas basin. Local residents use the area for subsistence hunting, particularly for caribou. Recreational use is limited to the Kvichak and Alagnak (Branch) rivers and several small streams with good fishing. The Alagnak River, which flows through the southwest portion of the area is a designated National Wild and Scenic River.

State Selections and Relinquishments

Map 34



These lands should not be selected by the state as they do not meet state selection guidelines.

Table 2

Recommended State Selections and Relinquishments

Area	Acres (approximate)
State Selections	
4) Management Unit 9	
- south of Joe Nort Lake	8,960
- Rock/Groundhog Creek	13,440
Management Unit 10 - west of Newhalen River	18,560
5) North Katmai	2,560
6) Becharof - north	11,520
Becharof - south	11,520
7) Cape Lieskof	11,520
State Relinquishments	
8) Ualik Lake	5,760
9) Lake Clark	90,000*
10) Chignik/Castle Cape	9,000
11) Mitrofania Bay	15,000
12) Izembek	4,000*
13) Morzhovoi Area	
-near Frosty Peak	8,320
-near Morzhovoi Bay	15,000
-False Pass	11,520

* Most are invalid selections

4. Management Units 9 and 10. There are three isolated blocks of BLM land that the state may select to consolidate land management responsibility in this area. These parcels would be costly for the BLM to manage but easy for the state which already has management responsibility for millions of acres of adjoining land.

5. North of Katmai. The state may select this approximately 2,500 acre tract of BLM land that lies on the northern border of Katmai National Park and adjoins state selections to the north. This is a small isolated tract of land that would be difficult for the BLM to manage but could easily be managed by the state along with state land to the north.

6. Becharof area. The state may select these two isolated blocks of BLM land (approximately one-half township each) to provide for more efficient land management. These lands

contain important fish and wildlife habitat and lie within the Bristol Bay oil and gas basin.

7. Cape Lieskof. This one-half township of BLM land has been selected by the Aleut Native Corporation but may not be conveyed to the corporation. It should be top filed by the state in the event it becomes available. It is surrounded by state land and has been rated as being within the high potential portion of the oil and gas basin. Wildlife values are also high.

   Future selections. Isolated tracts of BLM land may, from time to time, become available for state selection as Native landownership patterns become finalized. As a general policy, when these BLM tracts adjoin state lands, the state should select them to increase management efficiency unless resource values or other public considerations indicate otherwise.

State Relinquishments

The ALUC Study Group and the FWS looked at state selections in the region and found that resource potentials on some selected lands are lower than originally thought or that, due to settlement of Native land claims or the establishment of national conservation system units, the state selections have been reduced to very isolated tracts of land that would be difficult to reach or manage. Furthermore, some of these selections may not be valid. The plan recommends that the state relinquish the following state selections:

8. Ualik Lake. The state should relinquish its selections to approximately nine sections (5,760 acres) in Management Unit 6 that should then be added to Togiak NWR. This land is isolated from other state lands and would be difficult for the state to manage. The primary surface resource value is fish and wildlife habitat, which can be managed by the USFWS as part of Togiak NWR.

9. Lake Clark. Most of the state selections within the park and preserve were to have been relinquished pursuant to Section 906 and 1322(b) of ANILCA. Some of these selections were not relinquished as they are along the border of the conservation system unit. The state should relinquish that portion of these selections that fall within Lake Clark National Park and Preserve as soon as the border has been precisely defined (see Management Unit 10 map).

10. Castle Cape. The state should relinquish selections to approximately 9,000 acres of land scattered throughout this area (see Management Unit 24 map). These lands are parts of various capes and cliffs in an area with spectacular

scenery, important shorebird and marine mammal populations, and extremely limited developmental potential, due to their inaccessibility and rugged terrain. These lands are isolated from any other state owned or selected lands.

11. Mitrofania Bay. The state should relinquish approximately 15,000 acres of selections in Management Units 24 and 25, as they are remote lands with little surface resource value and would be difficult for the state to manage. They will become part of Alaska Peninsula NWR.

12. Izembek/Alaska Peninsula NWR Boundary. Parts of these selections have already been ruled as invalid, they should all be relinquished (see Management Unit 28 map).

13. Morzhovoi Bay/False Pass. The state should relinquish these selections in Management Units 30 and 31, as they are essentially remote mountaintops and steep cliffs that are virtually unaccessible. These selections were made because of their possible mineral values and strategic locations. Most of the more strategic lands, however, have already been conveyed to the Native corporations, and the mineral potential does not warrant state ownership. They will become part of the Alaska Peninsula NWR.

14. Balboa Bay/San Diego Bay. The state will relinquish these selections as they are not considered valid selections.

11(a)(3) Lands in National Wildlife Refuges

The Alaska DNR and the U.S. Department of the Interior, USFWS, have agreed to resolve the status of state selection of ANCSA Section 11(a)(3) withdrawal lands on the Alaska Peninsula as part of the BBRMP.

The state-selected lands under consideration include approximately 362,880 acres within the Becharof and Alaska Peninsula NWRs. These selections were filed on lands that had been withdrawn for, but which were not selected by, Native corporations under Section 11(a)(3) of ANCSA. Section 11(a)(3) allowed the Secretary of the Interior to withdraw lands for Native selection purposes in addition to the land immediately surrounding Native villages. The state was allowed to select lands withdrawn under Sections 11(a)(1) and 11(a)(3) that were not under Native selection after these withdrawals were terminated. The validity of these particular state selections are in dispute. The State maintains the selections are valid and it has vested property rights. The federal government argues that they are invalid. The Department of the Interior and the state agreed to review the ownership of selections through the mechanism of the BBRMP and it would provide recommendations for resolution to the Secretary. Resource values and logical land management patterns are the primary criteria by which the state and federal agencies have recommended whether these lands should be included in the NWRs or be owned by the state.

The 11(a)(3) settlement proposed here would add 215,680 acres to NWRs and result in the eventual conveyance of 147,200 acres to the state.

Table 3 shows the recommended settlement. The following is a summary of the resource values and recommendations on ownership for these 11(a)(3) parcels (the letters are keyed to Map 34).

A. Ugashik Lakes. This area (60,160 acres in Alaska Peninsula NWR, selected December 1976 and April 1977) has high to exceptional fish and wildlife values because of concentrations of brown bear feeding areas and denning habitat, spawning areas for salmon, and habitat for freshwater fish species. These lands are within Management Unit 16 and should continue to be managed for fish and wildlife habitat, harvest, and recreation. Remote settlement is a potential use here, but access may be difficult, and potential for serious conflicts with brown bear exists. Because of the high fish and wildlife values, the state should relinquish these selections, and they will then become part of the Alaska Peninsula NWR.

Table 3

11(a)(3) Land Settlement

11(a)(3) Selections		Acreage to State	Acreage to FWS
A	Ugashik Lakes		60,160
B	Becharof/Portage Bay		42,240
C	Kujulik Bay		29,440
D	Sandy River		69,120
E	Port Moller	147,200	
F	Nagai Island		14,720
		147,200	215,680

B. Puale/Portage bays. These lands (42,240 acres in Alaska Peninsula and Becharof NWRs, selected December 1976 and April 1977) are located in Management Unit 15 and have concentrations of bear feeding and denning areas, provide habitat for salmon and freshwater fish, and are important for waterfowl molting. Settlement values are low, and the Bristol Bay tertiary oil and gas basin lies to the west. Known oil seeps exist to the north. There is some access to the Pacific Coast, but none of the selections include good potential port sites or are part of pipeline corridors to Portage or

Puale bays. This area should be managed for fish and wildlife habitat and harvest, and recreation. Because of high fish and wildlife values, the state should relinquish these selections, and they will then become part of the Alaska Peninsula and Becharof NWRs.

C. Kujulik Bay. These lands (29,440 acres in Alaska Peninsula NWR, selected December 1976 and April 1977) have moderately favorable terranes for hard rock minerals. The selections could accommodate a site for a deepwater port to serve mineral or oil/gas development, although they are not adjacent to state land with resource development potential. This area provides important habitat for brown bear, migratory birds, and sea otter. It also abuts Aniakchak National Monument. For these reasons the state should relinquish these selections and these lands will become a part of the Alaska Peninsula NWR. Should a transpeninsula transportation corridor be designated here the USFWS should take no action consistent with law, to stop port site development on these lands.

D. Sandy Lake. These lands (69,120 acres in Alaska Peninsula NWR, selected December 1976 and April 1977), which are in Management Unit 22, lie on the edge of the Bristol Bay tertiary oil and gas basin and abut state-owned lands to the north and west and refuge lands to the east and south. There are very large concentrations of brown bear found along the Sandy River; salmon streams are abundant; and there is some essential and important moose habitat on these lands. Management intent for all of Management Unit 22 emphasizes fish and wildlife habitat and harvest, recreation, and oil and gas exploration and development on non-refuge lands. These lands are some of the most important fish and wildlife habitat lands in the unit and are not in the highest potential oil and gas areas. Therefore, the state should relinquish these selections, and they will become part of the Alaska Peninsula NWR.

E. Port Moller. These lands (147,000 acres in Alaska Peninsula NWR, selected December 1976 and April 1977) have favorable terranes for hard rock minerals, possess known coal deposits, and lie in part within the Bristol Bay oil and gas basin. Portions of potential trans-peninsula transportation corridors cross the area, although the most suitable corridor (Herendeen Bay to Balboa Bay) lies to the west. Certain bays on the Pacific shoreline have remote settlement potential, primarily for recreational homesites for residents of Sand Point. Brown bear populations are fairly high in this area, and Port Moller SCHA contains essential waterfowl habitat. These lands are in Management Unit

27, where the BBRMP intent is to manage lands primarily for mineral exploration and development, oil and gas exploration and development, and fish and wildlife habitat and harvest. Because of the various resource values here, management should be a state responsibility. Therefore, the BLM should convey these lands to the state.

F. Nagai Island. These lands (14,720 acres on Nagai Island within the Alaska Maritime NWR, selected December 1976 and April 1977) are on Nagai Island, 25 miles southeast of Sand Point and outside the planning region. These lands, however, are 11(a)(3) selections and have been assessed as part of this planning effort. They have some potential for minerals and provide habitat for waterfowl and shorebirds. They are very remote and inaccessible, however, and should be managed as part of the Alaska Maritime NWR. The state should relinquish these selections.

Additions and Alterations to Conservation System Units

Section 1203(b)(5) of ANILCA calls for the plan "to identify any further lands within the region which may be appropriate for congressional designation as national conservation system units." Most of the recommendations the plan makes for such additions are contingent upon the land exchanges carried out as recommended by this plan, state land relinquishments within the borders of conservation system units, or the resolution of the 11(a)(3) lands issue within refuges. This section of the plan also proposes some modifications within designated conservation system units and includes recommendations for additions to the Wood-Tikchik State Park. These recommendations are shown on Map 35. These recommendations are both administrative and legislative.

National Wildlife Refuges

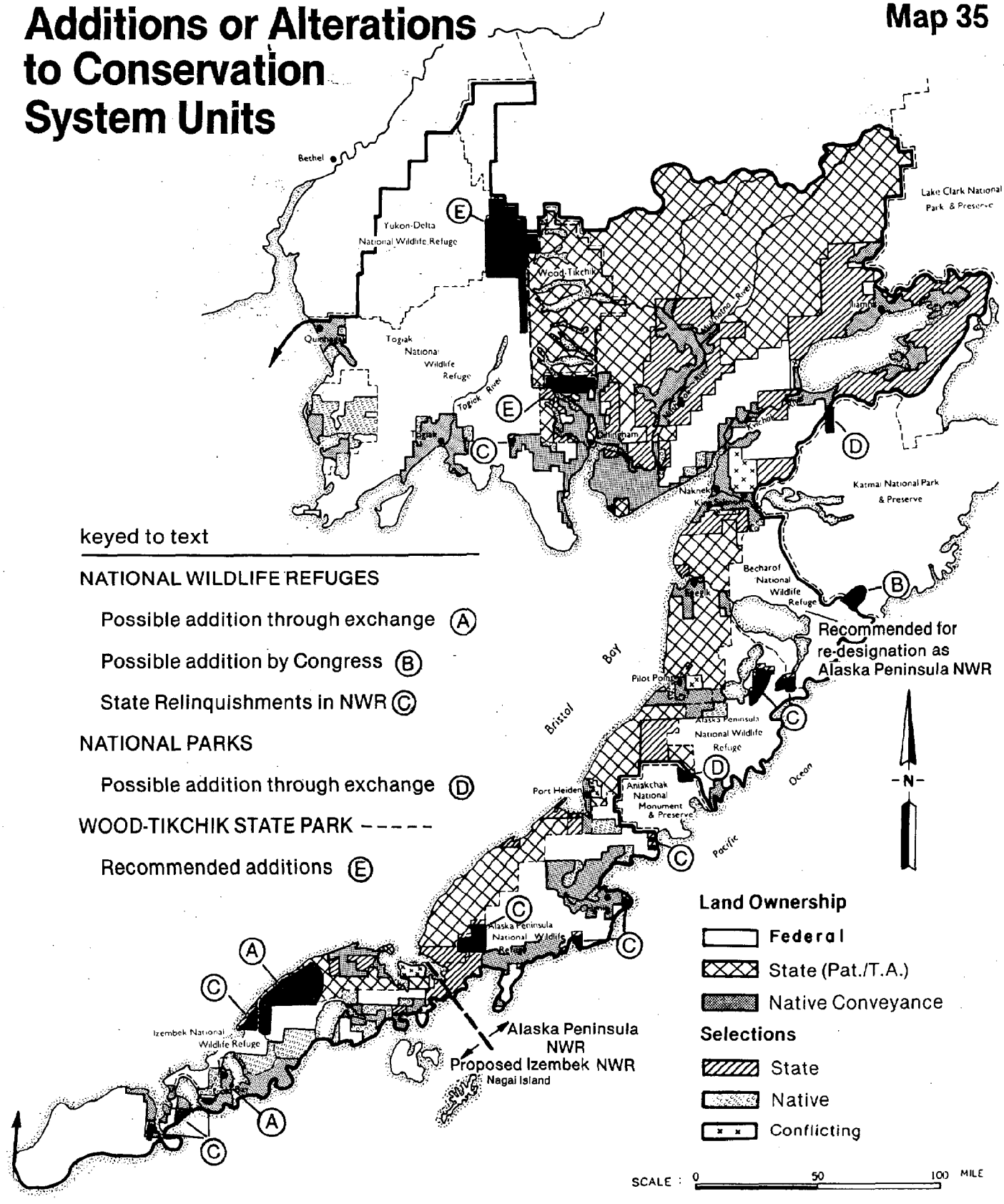
Togiak NWR. The land exchange study recommended for Togiak NWR (see long term exchange #1) could propose significant adjustments to Togiak NWR. Such adjustments may require congressional approval.

The state's relinquishment of 5,760 acres near Ualik Lake would add land to Togiak NWR. This addition requires only administrative action by the state.

Becharof NWR. The state's relinquishment of contested 11(a)(3) lands would assure that these lands become part of this refuge.

Additions or Alterations to Conservation System Units

Map 35



This addition should be implemented administratively after approval of the plan.

Lands in the Upper Kujulik drainage that are currently within Katmai NP&P should be redesignated by Congress as a part of the Becharof NWR because critical fish and wildlife resources for the refuge are found in this valley and should be managed as part of the unit. This action may require congressional action.

Alaska Peninsula NWR. The state's relinquishment of contested 11(a)(3) lands near Ugashik Lakes, Kujulik Bay, and Sandy Lake would assure that these lands become part of this refuge. This addition should be implemented administratively after approval of the plan.

The state's relinquishment of approximately 9,000 acres of selections near Castle Cape, 15,000 acres near Mitrofania Bay, 23,300 acres near Morzhovoi Bay, and 11,520 acres near False Pass would add land to Alaska Peninsula NWR (pending resolution of Native claims to some of these lands). This addition requires administrative action by the state.

If any of the land exchanges suggested for the Mother Goose Lake area or the Black Hills Caribou Calving Ground are carried out, the plan recommends that this area be added to the Alaska Peninsula NWR. Congress would have to take action to add this land to the NWR.

If the land exchange suggested for Mortenson's Lagoon is carried out, any land the USFWS acquires would automatically become a part of the Alaska Peninsula NWR.

Izembek NWR. If any of the possible land exchanges near Cold Bay are carried out, lands acquired by the USFWS would be added to Izembek NWR.

Reorganization of refuges on Alaska Peninsula. Congress should reorganize the NWRs on the Alaska Peninsula to provide more efficient and effective management of fish and wildlife resources. Congress should reallocate the lands that are currently in three refuges (Becharof, Alaska Peninsula, and Izembek) into two refuges, with the new refuge boundary crossing the peninsula at Right Head Bay of Port Moller.

All of Izembek NWR and the Pavlof unit (southern unit) of Alaska Peninsula NWR and Unimak Island should be consolidated into the Izembek NWR. Close proximity, ease of access, and wildlife distributions all suggest that these lands can be best managed by Izembek NWR, which now administers this land for most purposes because of these considerations.

All of Becharof NWR and the northern units of Alaska Peninsula NWR would be consolidated into the Alaska Peninsula NWR. This would allow closing one of the headquarters at King Salmon and

eliminate the need for a refuge manager and at least one additional position. Management of the resulting NWR will not place an undue work load on the Alaska Peninsula NWR staff. The Interior Department proposes to manage the three NWR as two NWR and administratively implement this reorganization.

The changes recommended by this plan will make administration of the affected lands easier for the USFWS. The NWR system will neither gain nor lose acreage, and management intent for affected lands will remain the same no matter what NWR they are in. The refuge plans already underway recommend minor reorganization so that the appropriate sections of each refuge plan can be added or deleted as necessary. This reorganization will allow better management of the resources for which the USFWS is responsible.

National Parks

The BBRMP has identified certain areas along the borders of the national parks, preserves, or monuments where boundary adjustments or land exchanges are appropriate in order to better achieve the objectives of the plan on state, federal or Native corporation land inside the planning area. These are recommendations for consideration by the NPS as it develops its management plans. Lands within the National Park System were specifically excluded from consideration in Section 1203 of ANILCA and therefore, these recommendations do not fall under Section 1203(e). Rationale for land exchanges appears in the previous section of this chapter on land exchanges.

Lake Clark NP&P-Mulchatna/Chilikadrotna area. While the National Park Service has expressed interest in acquiring state-owned lands in the upper Chilikadrotna and Mulchatna drainages this plan recommends they remain in state ownership primarily because of the mineral potential in the region and to maintain existing hunting opportunities. The National Park Service should manage the Twin, Portage and Turquoise lakes area to ensure that historic types of access to state land and the Chilikadrotna River are maintained for all recreational users, including hunters.

Lake Clark/Nondalton area. Land exchange proposals for the Tazimina Lakes and southern portion of Lake Clark described earlier would improve the management, public use, and access to lands around lower Lake Clark, although these proposals may not actually add or remove acreage to the park.

Katmai NP&P/Kukaklek Lake. If the NPS acquires through exchange any lands from the Igiugig Native Corporation along the upper portion of the Alagnak (Branch) River as it leaves Kukaklek Lake, these lands would automatically become part of Katmai NP&P.

Katmai-King Salmon area. Congress should move the ANILCA boundary back to the old park boundary at the headwaters of the Naknek River so that the Native lands owned by Paug-vik Native

Corporation, the Alaska Peninsula Corporation and BBNC are outside the park boundary.

Katmai-border of Management Unit 14. The USFWS, NPS and the state should develop alternatives to present to Congress that alter the boundary between Katmai NP&P and Becharof NWR, or alter park status to preserve status, to allow sport and subsistence hunting in this area of the park.

Katmai-Kujulik River. The Kujulik River drainage within Katmai NP&P should be redesignated by Congress as part of the Becharof NWR. Lands in the Upper Kujulik drainage currently within Katmai NP&P should be a part of the Becharof NWR because critical fish and wildlife resources for the refuge are found in this valley and should be managed as part of the NWR.

Aniakchak National Monument and Preserve. A land exchange between the state and the NPS for state land in the northeast part of the Aniakchak National Monument and Preserve would, if carried out, add approximately 12,000 acres of land to the national monument.

Additions to Wood-Tikchik State Park

Western addition. The strip of land between Togiak NWR and Wood-Tikchik State Park and other state lands in Management Unit 5 should be assessed when developing the State's park management plan for addition to the park. These lands comprise the mountainous headwaters of drainages which flow into the park and Togiak NWR. The land, being very mountainous and similar to lands within the park, would be easy to manage as part of the state park. This addition to the park should be done by the state.

Lake Nerka addition. The land on the north shore of Lake Nerka but south of the existing park border should be added to the park. AS 41.21.161(b) and (c), cited below, gives the governor the authority to add these lands to the state park by proclamation. These lands have been recommended for addition to the park by the Wood-Tikchik State Park Management Council.

> Sections 41.21.161(b) and (c) state:
>
> (b) All or part of the state-owned or acquired land and water within the following adjacent parcel, containing approximately 126,720 acres may be added to the Wood-Tikchik State Park by proclamation of the governor: beginning at the SE corner of T7S, R54W, S.M., which point is the true point of beginning; thence southerly to the SE corner of T8S, R54W, S.M.; thence westerly to the NE corner of T9S, R55W, S.M.; thence southerly to the SE corner of the NE quarter of T9S, R55W, S.M.; thence westerly to the SW corner

of the NW quarter of T9S, R57W, S.M.; thence northerly to the NW corner of T9S, R57W, S.M.; thence westerly to the SE corner of T8S, R58W, S.M.; thence northerly to the NE corner of T8S, R58W, S.M.; thence easterly to the SE corner of T7S, R54W, S.M., which point is the true point of beginning.

(c) Land lying within the parcels described in (a) or (b) of this section, upon which there are valid entries, or which is withdrawn for or selected by Native village or regional corporations under Sections 11, 12, and 14 of the Alaska Native Claims Settlement Act (P.L. 92-203; 85 Stat. 688; 43 U.S.C. 1601 et seq.), is excepted from (a) and (b) of this section; however, if any land excepted under this subsection is subsequently relinquished to the state, it shall be included as part of the Wood-Tikchik State Park. (Section 1 ch 86 SLA 1978)

This addition to the park should occur by the governor signing a proclamation, as prescribed in AS 41.21.161(b).

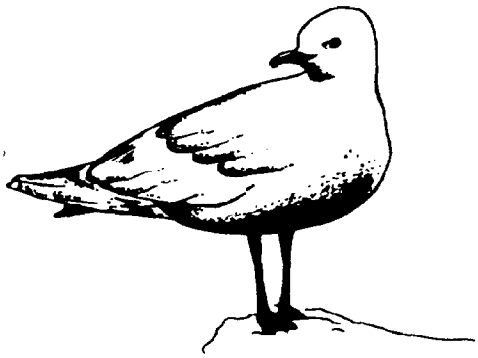
A cooperative management agreement should then be pursued between the Park Management council and the Aleknagik Native Corporation with respect to common land management of areas used by recreationists.

Fish and Game Research and Management Sites

The ADF&G has identified a number of project sites in Bristol Bay. These are to be used for fish-counting operations, hatcheries, fish sampling, and fisheries investigation. Since many of these sites are on land owned by Native corporations, the federal government, or private individuals, the ADF&G feels that it is appropriate to identify them in the plan. The ADF&G should negotiate with individual landowners to discuss cooperative agreements, lease or purchase of these sites. For sites on state land, ADF&G should apply for an Interagency Land Management Agreement (ILMA) from ADNR. The specific sites are described in the individual management units.

CHAPTER VII

Implementation



CHAPTER VII

Implementation

This chapter addresses implementation of the Bristol Bay Regional Management Plan (BBRMP) in terms of administrative actions, legislative actions, future studies, and plan revision.

The BBRMP should guide the Alaska Department of Natural Resources' (DNR) area plan for state lands and function as the Bureau of Land Management's (BLM) resource management plan for BLM lands near the Kvichak River and near Goodnews Bay. The BBRMP will also provide guidance to comprehensive conservation plans for national wildlife refuge (NWR) lands and to the Alaska Department of Fish and Game's (ADF&G) regional plan and plans for legislatively designated state critical habitat areas (SCHA), state game sanctuaries, and state game refuges. This chapter describes the specific activities that must be undertaken to fully implement the BBRMP.

The guidelines in the plan (Chapter V) should be used by the U.S. Fish and Wildlife Service (USFWS), and BLM at the time a permit, lease, sale, or other pertinent decision is made. The guidelines are intended to assist decision making authority granted these agencies by existing statutes and regulations. The State should adopt these same guidelines as part of the area plan for State lands.

The BBRMP is not legally binding on the land management decisions made by state, municipal or private landowners, including Native corporations in the region. Native corporations, however, have generally agreed to follow the land management recommendations proposed in the plan. Effective plan implementation will require continued cooperation between federal, state, local and private interests.

Administrative Actions

Enforcement of Water Quality Standards. During discussions about solutions to potential conflicts between placer mining and anadromous fish it became apparent that the most significant conflicts could be caused by a lack of state enforcement of existing water quality standards. Since commercial fishing is the most valuable developed economic resource in the region it is imperative that there be adequate enforcement of existing water quality standards to protect the productivity of fish resources. Therefore, the Alaska Department of Environmental Conservation should seek funding necessary to adequately perform its water quality enforcement duties in Bristol Bay. Status of funding and enforcement activities in the region should be a part of the

annual review of the BBRMP and reported to the Alaska Land Use Council.

State land classifications. The BBRMP has recommended primary and secondary land uses for the region. For the plan to be implemented on state lands the DNR should classify state lands in categories that reflect the intent of the plan. These categories can be found in 11AAC 55. Land classification is the formal record of the primary uses for which each parcel of state land is managed. Classifications have been recorded on the state land status plats. People proposing various uses for state lands will be able to refer to the plats and to the guidelines found in the Area Plan for State lands to determine whether or not the use they are proposing is compatible with the primary land use recommended in this plan. In addition, state law requires that classification precede the disposal of any lands.

The classification regulations were revised in September of 1983. The revised regulations allow up to three classifications to be made for any parcel "where the dominance of a particular use cannot be determined." The relationship between primary and secondary uses on state land is described in 11AAC 55.040(c) as follows:

> (c) A classification identifies the primary use for which the land will be managed. All other uses are initially presumed as compatible with the primary use. However, if the department determines that a use conflict exists and that activities attendant to a secondary use are incompatible with the primary use, the secondary user shall either cease his activity or modify the use to enable the department to determine that the incompatibility no longer exists. The secondary user may also request that the land be reclassified under 11AAC 55.270 to identify the secondary use as the primary use.

Chapter V contains management guidelines that the State should adopt to ensure that primary and secondary resource uses are compatible to the greatest extent possible.

The land use recommendations for state land under the classification regulations are as follows:

. Agricultural Land
. Coal Land
. Forest Land
. Geothermal Land
. Grazing Land
. Heritage Resources Land
. Material Land
. Mineral Land
. Oil and Gas Land

. Public Recreation Land
. Reserved Use Land
. Resource Management Land
. Settlement Land
. Transportation Corridor Land
. Water Resources Land
. Wildlife Habitat Land

Recommended classifications for state land in Bristol Bay are found in Appendix C.

The state classification process requires public notice and hearings if requested. The extensive hearings already conducted during the BBRMP process may satisfy this requirement. Classification of state land in the Bristol Bay region occurs simultaneously with the adoption of the Area Plan for State lands.

State and federal land disposals. The BBRMP recommends the areas and acres of state land that could be sold through the state's land disposal program. The DNR has developed a Land Availability Determination System (LADS) that they follow to identify general areas available for disposal, assess land capability and suitability, design the project, select a method of disposal, survey the project, advertise the sale, and, finally, sell the land. At various points in the LADS process, people and organizations in the region are asked to comment on the proposed disposal.

The Bristol Bay planning process identified certain areas as appropriate for disposal, and they have been recommended for settlement. However, the BBRMP should not substitute for the entire phase I of the LADS process. Through the LADS process DNR should seek additional public comment on the design of each disposal. For more information on implementation of state land disposals in Bristol Bay, contact the DNR, Division of Land and Water Management, Pouch 7-005, Anchorage, Alaska, 99510.

State five-year oil and gas leasing schedule. Alaska Statute 38.05.180(b) requires the commissioner of the DNR to prepare and submit to the state legislature a five-year program for state oil and gas lease sales. The commissioner should use the BBRMP to guide decisions on what areas in Bristol Bay to place on the state's five-year leasing schedule. The statutes and regulations of the DNR describe the process by which the Commissioner conducts further analysis and decides which, if any, specific areas will be offered for lease. The BBRMP recognizes that the State's Area Plan does not schedule lease sales and recognizes that the tidelands on the north side of the Alaska Peninsula south of the fisheries reserve may not be leased for 10 years (BBAP).

The State of Alaska has scheduled competitive oil and gas lease sales between Port Heiden and the Black Hills for September 1988 (Sale 56, Alaska Peninsula). Before the sale is held, the DNR, Division of Oil and Gas, should work with other state agencies and local representatives to prepare an analysis of the effects of each sale. The BBRMP recommends that oil and gas be a primary or secondary use in this area and should provide guidance to the DNR in making its decisions on the lands to be leased and the stipulations to be applied to those leases.

BLM Oil and Gas Lease Sales. The BLM should use the BBRMP as guidance to implement the ANILCA 1008 process for leasing and management of the subsurface mineral estate for federal lands within the region. All future BLM planning efforts or resource management activities should be consistent with the BBRMP.

DNR mineral closings or leasehold locations. The plan recommends that ADNR close the designated anadromous portion of 64 streams to new mineral entry as mining appears to be incompatible with significant fisheries and recreational values. The plan also recommends ADNR allow mining only under lease on approximately 1.5 million acres of land in the Upper Mulchatna and Eastern Iliamna Lake drainages due to potential conflicts with fisheries, recreation, and wildlife habitat. These actions should be taken by the Commissioner of DNR pursuant to AS 38.05.185(a).

All land and water within Wood-Tikchik State Park is legislatively closed to new mineral entry, and all lands within NWR's are closed to new mineral entry by Congress.

The state has jurisdiction over the stream channels of all streams on state land and all other navigable streams. The BLM has jurisdiction over all non-navigable stream channels on its land. As the question of navigability is in litigation between the state and federal governments, it is not entirely certain what streams are closed by existing refuge legislation (ANILCA) or what streams are under DNR, BLM, or Native ownership. The plan recommends that ADNR close any navigable waterways within national wildlife refuges and Parks in the region to new mineral entry.

Alaska Statute 38.05.185 requires that in order to close state-owned areas to mineral entry the commissioner of DNR must determine that "mining would be incompatible with significant surface uses. This determination should be made in the Area Plan for State lands on 64 streams. The actual closing order would define the grounds for closing the lands to mineral entry. Valid existing rights would not be affected by closings.

Leasehold location on state land should be implemented through "mineral leasehold location orders."

Wood-Tikchik State Park addition. The plan recommends land on the southern boundary of Wood-Tikchik State Park be added to the park. Alaska Statute 41.20.470(b) gives the Governor the authority to add these lands to the state park by proclamation. The specific area included is described in Chapter VI. The Governor should sign a proclamation to add these lands to the park pursuant to AS 41.20.470(b).

DNR: Area Office

The BBRMP has identified the need for a DNR, Division of Land and Water Management/Parks, area office in Dillingham. If funding is available the DNR should establish this office to handle the many issues that require day-to-day decisions important to the people of the region. The most pressing issues that would be best handled by such an office are:

- information and applications for shore fisheries leases;
- land use permits and miscellaneous land use permits;
- information and applications for land disposals;
- liaison for Wood-Tikchik State Park;
- information on state land status around Dillingham;
- trapping cabin permits;
- personal use material sales;
- negotiated material sales from existing gravel pits;
- temporary water use permits;
- water use permits and certificates for 1) placer mining purposes of not more than 20 cfs and 2) single and multi-family domestic use of not more than 1,000 gal/day;
- and field investigations of trespass.

USFWS refuge plans. Four NWRs are located entirely within the Bristol Bay region: Togiak, Becharof, Alaska Peninsula, and Izembek. Portions of the Alaska Maritime and Yukon Delta refuges also fall within the region. The ANILCA requires that the USFWS complete a comprehensive conservation plan for each of these refuges. The USFWS schedule calls for completion of plans for Togiak, Becharof, Alaska Peninsula and Izembek NWR's by September 1985, with completion dates for drafts of the Yukon Delta and Maritime refuge plans later.

According to Section 304(g) of ANILCA these refuge plans are to

- inventory the resources and existing land uses on each refuge;

- designate areas within the refuge according to their respective resources and values;

- specify programs for conserving fish and wildlife and special values;

- specify the uses within each area that may be compatible with the major purposes of the refuge;

- and set forth opportunities that will be available for fish and wildlife oriented recreation, research, education, and interpretation.

In compliance with Section 1317(a) of ANILCA, the USFWS plans will also review non-wilderness refuge lands as to their suitability for possible addition to the National Wilderness Preservation System.

The refuge plans are more specific and affect smaller units of land than does the BBRMP. The refuge plans should implement the BBRMP on USFWS lands by developing land use designations and policies that are consistent with the BBRMP but more specific in their application.

People and organizations interested in pursuing activities on any of these refuges should refer to the BBRMP to determine whether or not the proposed activity is generally consistent with the regional plan. They can then refer to the appropriate refuge plan to determine whether or not their proposed activity may, at a specific location, be compatible with the purposes for which the refuge was established.

ADF&G implementation. The ADF&G is mandated by the Alaska Statutes to conserve and protect fish and game populations and habitats in the State of Alaska.

Department management plans for existing state game refuges, state critical habitat areas, and state game sanctuaries should be consistent with the goals and guidelines adopted in the BBRMP. The ADF&G also should be consistent with the goals and guidelines of the BBRMP when issuing Title 16 permits, which include the following:

AS 16.05.840 fish passage permits
AS 16.05.870 anadromous fish protection permits
AS 16.20.060 state game refuge permits
AS 16.20.120 state game sanctuary authority
AS 16.20.260 state critical habitat area permits

It is important to note that SCHA permits apply only to legislatively established critical habitat areas and would not apply to all areas that are essential habitat for a particular species.

Coastal management. In compliance with the Alaska Coastal Management Act of 1977, four coastal management districts within the region are developing their own plans for inclusion in the Alaska Coastal Management Plan (ACMP).

The four districts are:

. Bristol Bay Coastal Resource Service Area

. Bristol Bay Borough

. Aleutians East Coastal Resource Service Area

. Yukon-Kuskokwim Coastal Resource Service Area (Cenaliulriit)

If these plans are reviewed and approved by the Coastal Policy Council they should contain policies that may be used for consistency review under the Federal Coastal Zone Management Act (CZMA) and Alaska Coastal Management Act.

Activities subject to consistency review may include state, federal, or local permitting or regulating of activities on private lands.

The relationship between the BBRMP and the four local coastal management programs is noteworthy, as three of the local districts were represented on the ALUC Study Group. The BBRMP is designed to implement standards and guidelines similiar in some ways to the ACMP. The locally generated plans and the BBRMP should also be generally compatible.

The Coastal Management Plans, however, are required under the CZMA to provide adequate consideration of the National interest in facilities that are non-local in nature and to balance a broad range of objectives beyond those specified in Section 1203 of ANILCA.

State selections, including 11(a)(3) lands. Recommendations in Chapter VI for state selections outside NWRs and for state relinquishments should be implemented by the State following adoption of the Area Plan for State Lands.

Recommendations in Chapter VI for 11(a)(3) state selections in NWRs should be implemented by the DNR and the BLM. Pursuant to a cooperative agreement by the Governor and Secretary of the Interior, the state should relinquish 11(a)(3) state selections near Ugashik Lake, Portage Bay, Sandy Lake, Nagai Island and Kujulik Bay. The BLM should convey the Port Moller area 11(a)(3) lands to the state.

Land exchanges. Chapter VI contains a number of recommended land exchange possibilities.

The exchanges discussed in Chapter VI are divided into short-term (priority) exchanges and long-term exchanges. The short term exchanges are those where immediate interest in an exchange is evident. These exchanges should be pursued by the identified

parties as soon as possible. Long-term exchanges are those that the plan recommends but where interest is relatively one-sided or landownership patterns are still uncertain.

Execution of any land exchange requires that the parties discuss each proposal and further identify their interests. Land exchange negotiations can be very lengthy, and some of the proposals discussed in Chapter VI may require approval of the state legislature or Congress. Alaska Statutes 38.50 grants ADNR the authority to carry out equal value exchanges involving state land. Exchanges requiring state legislative approval are those where unequal appraised values are involved (see AS 38.50.140). Land in NWR's and national parks created under ANILCA can be exchanged by federal agencies without congressional approval (see section 1302(h) of ANILCA); however, exchange of designated wilderness land may require congressional approval depending on the size and level of controversy of the exchange.

Formalization of cooperative agreements. The BBRMP recommends the use of cooperative agreements for land management on numerous occasions, in recognition of the importance of this tool in managing the lands and resources of the region. The fact that many of these suggested agreements are proposed if land exchanges cannot be completed does not reduce their importance; rather, it recognizes the difficulty of land exchanges.

Presently, there is no single procedure identified for implementing the recommended cooperative agreements. Recommended agreements range in scope from those intended to ensure access by the ADF&G to research sites through those requiring federal, state, and private cooperation.

It is intended that the most significant cooperative agreements necessary to accomplish the intent of this plan be pursued as soon as staff is available. On remaining lands it is intended that agreements be accomplished when necessary in compliance with the intent of the BBRMP.

Reorganization of refuges on the Alaska Peninsula. The BBRMP proposes to reallocate the lands that are currently in three refuges (Becharof, Alaska Peninsula, and Izembek) into two refuges, with the new refuge boundary crossing the peninsula at Right Hand Bay of Port Moller. All of Izembek NWR and the Pavlof unit (southern unit) of Alaska Peninsula NWR would be consolidated into the Izembek NWR. All of Becharof NWR and the northern units of Alaska Peninsula NWR would be consolidated into the Alaska Peninsula NWR. The changes recommended by the BBRMP will make administration of the affected lands easier for the USFWS. The NWR system will neither gain nor lose acreage, and the original intent for placing the affected lands in a refuge will not change. Refuge plans may require minor reorganization so that the appropriate sections of each refuge plan can be added

or deleted as necessary. A more detailed description of the reorganization is found in Chapter VI.

Wilderness management and designation of new Wilderness areas. The Wilderness Act (16 U.S.C. 1131-1136; 78 Stat. 890) as amended provides criteria for determining the suitability of NWR lands for Wilderness status. The act contains provisions related to activities that can be undertaken in a designated area. Specifically, the Wilderness Act provides that designated lands shall be devoted to recreational, historical, scenic, and scientific use. No new structures, roads, or motorized equipment would be permitted in a Wilderness area, except as necessary to administer it. Exceptions are provided in ANILCA for the landing of aircraft and the use of motorized equipment for traditional uses, and the control of fire, insects, and diseases.

ANILCA overlaps the Wilderness Act in several places. In general, ANILCA states that the administration of designated Wilderness in Alaska should be consistent with the Wilderness Act. ANILCA, however, does provide for subsistence use of Wilderness and allows use of motorized vehicles for traditional uses and the construction of temporary structures in certain cases for public recreational uses. ANILCA also established Wilderness in Alaska Maritime, Becharof, Izembek, and Togiak NWRs.

The plan makes no recommendations on additional wilderness proposals. As part of its planning process for the refuges in the Bristol Bay region, the U.S. Fish and Wildlife service will review non-wilderness refuge lands as to their suitability for possible addition to the National Wilderness Preservation System. This complies with Section 1317(a) of ANILCA, which requires the Secretary of the Interior to review in accordance with Section 3(d) of the Wilderness Act, all non-wilderness refuge lands in Alaska as to their suitability for preservation as wilderness and report his recommendations to the President by 1987. The USFWS will submit the draft refuge comprehensive conservation plans, which will include the wilderness suitability reviews, to the Alaska Land Use Council for their review and recommendations as a part of the refuge comprehensive conservation plan process.

Legislative Actions

Review of State Land Disposal Program. One of the most controversial issues addressed in the BBRMP is the settlement issue, specifically, the state land disposal program. The BBRMP recommends a number of state disposals in response to the State's insistence for a disposal program in the study region. Despite strong and near unanimous opposition throughout the region, the State's plan calls for the disposal of up to 14,000 acres over the next 10 years in at least 15 different locations in the

BBRMP. This is primarily done to implement current law which mandates that DNR dispose of land throughout the state. The BBRMP recommends to the governor and the state legislature that they initiate a comprehensive re-evaluation of the state land disposal program as soon as possible in order to make the program more responsive to local needs and attitudes.

Wilderness designations on NWR land. The U.S. Congress is responsible for designation of Wilderness on NWR lands. The congressional designations are based in part on administrative recommendations discussed previously in this chapter.

Land exchanges. Land exchanges involving state lands where unequal appraised values are involved require legislative approval (AS.38.50.140).

Refuge reorganization. Although the Interior Department intends to administratively implement the reorganization of the three peninsula refuges into two, Congressional action is required to implement this reorganization.

National Park Boundary Adjustments. Any boundary adjustments recommended for the exterior boundaries of NPS units may require Congressional action (see Chapter 6).

Future Studies

DNR management plans. The immediate need for more detailed planning on state lands in Bristol Bay is covered by the State's Area Plan, the State's land disposal planning process (LADS), the recreation study described below, the State's five-year oil and gas lease sale planning process, and the Wood-Tikchik State Park management plan.

Increased public use of state land in the region and an increased demand for private ownership of land will result in the need for more detailed management plans for state land. These management plans should be coordinated with the management planning of appropriate Native corporations. DNR has identified the following areas and issues for future management plans.

° Management Unit 7 (Dillingham area). A management plan is needed for state lands in unit 7 because these lands are close to Dillingham and will receive more recreational use development pressure, including pressure for disposals, than other lands in the study area.

° Management Units 10, 11, 12 (Iliamna Lake area). This area has world class recreational values, primarily sport fishing, and competition between private and public recreation and traditional

subsistence uses is likely to increase. Some facility development is needed. Some important access sites are in private ownership and exchanges need to be explored. The management plan should address public access sites along recreational fishing streams and Iliamna Lake; recreational facilities (campgrounds, trails, lodges); possible land exchanges between the state and Native land owners; more detailed planning for the land disposals; and public use areas.

° Tidelands/Adjacent Uplands. A management plan in this area would deal with access, shore fishing sites and future coastal development. The need for more cooperation between upland owners and the tideland owners (largely the state) has been identified in Management Unit 1.

° Tidelands on the south side of the peninsula that are outside the BBRMP from Cape Douglas to Unimak Pass. This management plan should be prepared in cooperation with the USFWS and NPS who manage most of the adjacent uplands.

Recreation Study: ADNR, ADF&G, BLM, and USFWS should develop a recreation management plan for the study area. The study should specifically address the various issues and concerns missed in the public review of the Draft BBCMP as well as the following:

1. recreation management of rivers and lakes with high recreation potential;
2. refinement of the primary recreation use recommendations of the BBRMP;
3. the location of future commercial recreation facilities;
4. the concept of setting aside a strip of State and BLM land on both sides of the Nushagak, Nuyukuk, Mulchatna, Kokwok, Koktuli, Swan, King Salmon (off the Nushagak), Chichitna, and Kvichak Rivers and shoreline of Iliamna Lake as special management corridors that would be managed entirely and exclusively for traditional and public recreational uses;
5. acquisition and marking of public access sites, easements, and campsites;
6. the need for cooperative land management agreements to ensure maintenance of habitats of fish and wildlife resources used for subsistence and recreation.
7. identification and recommended diversification of the entire recreation industry in the study area.

Agencies should develop the study within two years of adoption of the BBRMP.

Togiak Study. The USFWS, BLM, and the state should evaluate the following for the Togiak National Wildlife Refuge:

1. The exchange of USFWS land in Togiak NWR with mineral potential for state or Native lands with high habitat values. Special consideration for a possible exchange should be given to state lands in the Mulchatna and Nushagak drainage with high habitat values.

2. Evaluate transferring a portion of the Togiak NWR including the Kanektok River drainage into the Yukon Delta NWR. Such an evaluation should consider USFWS management, the natural distribution of fish and wildlife resources, and existing subsistence use patterns of the residents in the area.

Instream flow quantification. The BBRMP has identified the need to quantify the instream flow needs for designated wildlife and anadromous fish habitats. The ADF&G, the ADEC, the USFWS and the DNR should develop a coordinated inventory program and seek the necessary funding.

Water resource study. A joint federal-state reconnaissance study of water resources should be done for those areas identified in the BBRMP as potential commercial and industrial sites.

Refuge data collection and research. Detailed information on the Bristol Bay refuges, their resources and uses, is essential for developing a baseline from which to set management objectives; determine trends; evaluate management effectiveness; identify potential problems; and generally meet the needs of refuge users. Although a few biological and socioeconomic studies have been conducted on the refuges, much information needs to be collected to improve the existing data base.

Data collection and research should focus on refuge fish and wildlife populations, particularly those species that can function as ecological monitors. In cooperation with the ADF&G and other researchers, the USFWS should study and monitor brown bear, caribou, waterfowl, marine mammal, salmon, and other important populations. Activities that may adversely impact these species should be closely monitored.

In accordance with Section 812 of ANILCA the USFWS, in cooperation with the ADF&G and other appropriate agencies, should conduct research on subsistence uses of the refuges. Research should focus on issues raised by local advisory committees and regional councils. Results of this research should be provided to all interested parties.

In addition to collecting information about fish and wildlife populations and subsistence use, data about vegetation, cultural resources, water resources, and recreational use should be collected and analyzed as funds permit. There is an on-going

mineral assessment of all federal lands, including NWR's in Alaska being done by the U.S. Geological Survey.

Alaska Minerals Resource Assessment Program (AMRAP). Section 1010 of ANILCA requires that the Secretary of the Interior assess the oil, gas, and mineral potential of all public lands in Alaska. The U.S. Geological Survey (USGS) has the lead responsibility for this program. The USFWS will be working with the USGS, providing access to refuge lands and developing stipulations that ensure all activities are compatible with refuge objectives.

Cultural Resources. The Bristol Bay Region is recognized for its rich cultural, historic, and archeological values. However, documentation of these values is incomplete. State and federal agencies should place a priority on the collection of the region's cultural, archeologic, and historic resource data, agree on a standard for cultural resource preservation in management units with particularly significant cultural values and report the findings. The study should also describe the relative significance of particular sites as well as options and/or contingencies to protect the most important sites.

Plan Modification or Amendment

As a result of the State of Alaska's decision not to be a party to this plan the requirements in Section 1203(c)(2) of ANILCA do not apply.

The BBRMP may be modified by the following procedure:

Any party affected by this plan may formally request an amendment or modification to this plan by filing an administrative petition with the Regional Director of the Fish and Wildlife Service in Alaska. The petition should specifically establish the standing of the petitioner as a party affected by this plan. The petition should also identify, by citation, the specific modification or amendment requested and explain the rational and effects of the change. Federal Administrative Procedures law and appropriate Department of the Interior or FWS regulations will prescribe the processing of amendment or modification requests.

A Significant Modification or Amendment

A significant modification or amendment of the BBRMP is defined as a change that alters the intent of the plan. Any petition that requests a significant modification or amendment of the BBRMP, in addition to meeting the process requirements legally appropriate, must be submitted to the Alaska Land Use Council for review and comment as provided by ANILCA.

A Minor Modification or Amendment

A minor modification or amendment of the BBRMP should be reviewed by the agencies affected by such a change. The Regional Director of the Fish and Wildlife Service in Alaska will insure that each agency impacted by such a minor change will be given a reasonable opportunity to review and comment on the proposed change (no less than 30 days) and will consider those comments prior to approving or rejecting the requested change.

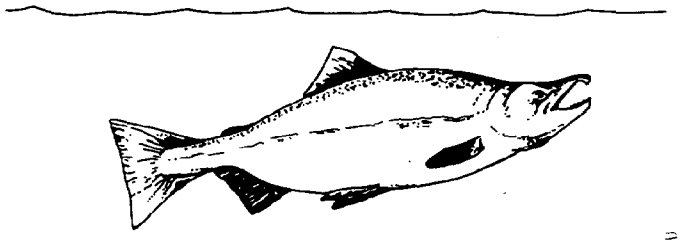
Plan Monitoring. The organizations that prepared the BBRMP should meet annually to review progress or problems in implementing the plan. The USFWS should schedule and chair the annual meeting, and prepare a report on the implementation of the plan. The agency will then forward this status report to the ALUC at their next regular meeting. This report and any comments from the ALUC should be forwarded to the Secretary.

Major Plan Review. The ALUC (or a project group formed by the ALUC) should review the BBRMP and evaluate its effectiveness three years from the date of signature or earlier. The ALUC should hold at least two public meetings, one in Anchorage and one in the region to solicit comments on the effectiveness of the plan. The ALUC should make recommendations to the Secretary of the Interior and others on the need for amendments, following the procedures established in this chapter.

CHAPTER VIII

Environmental Consequences

Prepared by United States Fish and Wildlife Service



United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. TUDOR RD.
ANCHORAGE, ALASKA 99503

IN REPLY REFER TO:
SARD

MAR 19 1985

Dear Reader:

The material found on pages 8-1 through 8-67 of Chapter VIII, Volume I contain errors. The problem occurred when the printer was sent draft rather then the final copy of these pages. Please substitute the attached material for the incorrect pages.

We apologize for this error and any inconvenience it may cause you.

David R. Olson

Acting Regional Director

CHAPTER VIII

ENVIRONMENTAL CONSEQUENCES

The Bristol Bay Regional Management Plan (BBRMP) is a programmatic effort that identifies and recommends compatible land classifications and economic uses in the Bristol Bay region. As such, the Plan proposes a limited committment to a few particular courses of action and is not a proposal for specific developmental activities or projects. Rather the Plan is a pattern of objectives for recommending certain levels of economic development and, for guiding that development, should it occur, in an environmentally acceptable manner.

Five planning alternatives were identified and evaluated in the draft EIS, including a preferred alternative and the consequences of not developing a plan through no action. The five action alternatives outlined various levels of constraints that could be imposed on public land disposal programs and major resource development projects as a means of ensuring orderly development of economic resources within the region.

Some rather significant changes were made to the original proposed action in the revised document as a result of the substantive comment received on the draft. Consequently, the revised document contained a new "Proposed Plan", which reflected those modifications.

After issuance of the Revised Draft Environmental Impact Statement (RDEIS) additional public hearings were held and a review by the Governor of Alaska took place. On August 6, 1984 in a letter to Secretary of the Interior William P. Clark, the Governor announced the withdrawal of the State from the cooperative effort and that the State would adopt the draft plan as an area plan for those state lands involved. However, the federal government continued to be responsible for a plan for the federal lands contained within the Bristol Bay Planning Area. In order to be as congruent as possible with the State's Area Plan, the proposed Federal Plan being submitted to the Secretary for approval is essentially identical to that developed as a joint State/Federal Plan.

This chapter, which analyzes the environmental impact of the Plan and each alternative was the responsibility of the U.S. Fish and Wildlife Service (USFWS). The Alaska Land Use Council Study Group assisted in developing some of the assumptions used for assessment. Some of the assessments were also provided by participating agencies. The conclusive statement of environmental effects is that of the FWS.

To provide a basis for the assessment of potential environmental impacts of the Proposed Plan and alternatives, scenarios had to be developed for each planning alternative discussed in Chapter IV because the Plan left large uncertainties in important areas of the likely action. These scenarios,

representing characteristic activities that could occur in designated planning areas, serve as the basis for identifying and evaluating probable impacts. The scenarios do not represent the Plan's preference or endorsement of developmental schemes nor any decision that the activities outlined in the scenario should occur.

Figures and estimates were developed using available data. In many instances, quantitative information on fish and wildlife and other resources of the region has not yet been developed. In such situations, the best judgment of the EIS team was used.

It should be noted that if a plan is approved by the Secretary of the Interior, whatever specific land use activities that may occur as permitted by the selected plan will be subject to existing state, local, and federal review and site-specific planning processes, including detailed environmental analyses where required.

IMPACT ISSUES

Significant environmental issues raised during the scoping and public involvement process identified key areas of concern in the Bristol Bay planning region. These are discussed in detail in Chapter III. Numerous other issues, not identified here, were also examined during the scoping process, but were omitted from further consideration (see CEQ Regs. Sec. 1501.7) because of their lower significance in a region-wide context. On the basis of this scoping, the following issues were selected for assessment:

- Fish and wildlife resources: salmon, caribou, moose, brown bear, waterfowl, seabirds and marine mammals.
- Socio-economic activities: subsistence, commercial fishing, population, and employment.
- Other issues: water quality, recreation, historical and archeological sites, and wilderness.

Development activities addressed in this plan that would impact these resources include settlement, transportation, oil and gas activity, energy and minerals.

Threatened and Endangered Species

Eight endangered marine mammals (Gray, Bowhead, Humpback, Fin, Right, Blue, Sei, and Sperm whale) and three endangered birds (American peregrine falcon, short-tailed albatross and Aleutian Canada Goose) may occur in, or migrate through, the planning area. In accordance with provisions of the Endangered Species Act of 1973 (P.L. 93-205), consultation with the National Marine Fisheries Service and USFWS has begun (see Appendix H). The USFWS provided the following information:

American peregrine falcon (Falco peregrinus anatum). Surveys are needed on populations of the American peregrine falcon in the Bristol Bay area. Before site-specific activities occur, areas of suitable habitat should be delineated and surveyed. Sensitivity of the American peregrine falcon to human activity near nest sites can result in nest desertion and nestling mortality. If nest sites are found it will be necessary to limit activity. Severity of these restrictions would depend on the type of activity proposed.

Short-tailed albatross (Diomedea albatrus). Since 1975, numerous aerial and shipboard marine bird surveys in Alaskan waters have resulted in only one sighting of a short-tailed albatross--in the central Bering Sea (DeGange, 1981). Additional surveys to document their presence in Bristol Bay are not economically feasible. DeGange (1982) identified two potential human/albatross conflicts: oil spills and commercial fishing. Short-tailed albatrosses could be affected by oil spills through direct contact with oil and by oil degrading their food source. They could also be affected by commercial fisheries through entrapment in nets. Considering both the scarcity of the short-tailed albatross and its free-roaming nature, it is unlikely either source of potential conflict poses a substantial threat to this species in Bristol Bay.

Aleutian Canada Goose (Branta canadensis leucopareia). There are no confirmed sightings of this species for the Bristol Bay region. Although birds breed in the western Aleutians and winter in California, it is believed that they migrate south of the Alaska Peninsula and consequently would not be affected by activities in Bristol Bay.

The National Marine Fisheries Service states that of the eight endangered whales which may occur in marine waters within the Bristol Bay region, only the Gray whale (Eschrichtius robustus) would be likely to occur in waters near shore where it might be affected by development activities. These whales follow the coastline of Bristol Bay from Unimak Pass to Nunivak Island, often within 1 to 3 km of the shore. Activities generating high noise levels or blasting may affect these whales. Any construction or placement of facilities extending into the subtidal zone could also be detected by some individuals of the population. The level of effect would depend on the type and location of the activity. Mitigative actions could include timing of activities to when gray whales were not present, site selection alternatives, or other appropriate measures.

Historical and Archeological Resources

Action implemented under this plan must comply with appropriate state and federal laws and regulations that serve to protect archeological and historical resources. For USFWS lands, a memorandum of agreement between the Advisory Council on Historic Preservation, the State of Alaska and USFWS will be designed to protect or mitigate damages to these resources. This action will insure compliance with Section 106 of the National Historic Preservaton Act of 1966, as amended; its implementing regulations, 36 CFR Part 800; and Section 2(b) of Executive Order 11593 (see Appendix H).

MITIGATION MEASURES CONSIDERED PART OF THE PROPOSED PLAN AND ITS ALTERNATIVES

All pertinent laws of the United States and the State of Alaska are assumed to be in effect for each impact analysis. These laws, regulations and executive orders are assumed to be mitigating measures that are part of the Proposed Plan and alternatives. In addition, Chapter V presents management guidelines that would be applied in the region to give more indication of intent to mitigate adverse effects on fish and wildlife resources if a plan is adopted. These management guidelines are not applicable to the "no action" alternative.

The management guidelines are just that, but they are designed, in general, to supplement existing state and federal regulations to further reduce or eliminate adverse development impacts on fish and wildlife resources. Guidelines range considerably in specificity from general, optional guidance, to some detailed, binding standards.

It is recommended that the guidelines apply to all state land management and regulatory agencies and to the Department of the Interior. Private landowners were represented in the Study Group, but are not bound by Section 1203 of the Alaska National Interest Land Conservation Act (ANILCA). Because they participated in development of the guidelines, however, it is assumed they are willing and able to adhere to those provisions in most cases.

METHODS USED FOR IMPACT ASSESSMENT

The programmatic character of the BBRMP creates some difficulty in analyzing potential environmental impacts. The very nature of the Plan requires a different analytical methodology than might be used to examine effects of an identified construction project or some other well-defined developmental enterprise. Therefore, much of the analysis relative to potential environmental consequences is, of necessity, at a generic level, and in terms of regional, rather than site-specific effects. Likewise, in the absence of more specific planning, scenarios constructed to outline potential levels and types of infrastructures for development which possibly could occur within the Bristol Bay region, are based on experiences in other areas of Alaska and are also of a general nature.

The Plan recommends no specific construction projects. Major development projects, should they occur, will be the result of subsequent decision processes. The Plan and its alternatives describe various levels of constraint on development activities which might be incorporated into those decisions. The degree of possible impact will vary depending upon the level of constraint applied. Assessments developed to analyze potential impacts within the several alternatives have been designed to focus on those variations, in order that decision makers will be better able to distinguish differences in the environmental consequences of each alternative.

DEFINITIONS USED FOR IMPACT ASSESSMENT

Because of the generic nature of many of the assessments, the wide range of variables involved in planning, and in many cases the lack of numerical and statistical information on Bristol Bay's biological, social and other resources, impacts have often been expressed in relative terms. In order to aid the reader, the following definitions are provided.

Fish and Wildlife Resources

- major impact: Affects a regional or as appropriate local population of a species sufficiently to cause a decline in abundance or a change in distribution in such a manner that natural recruitment is not likely to return that population to its former level within several generations.
- moderate impact: Affects a portion of a regional or as appropriate local population sufficiently to cause a change in abundance or distribution over more than one generation, but unlikely to affect the integrity or regenerative capacity of the regional population as a whole.
- minor impact: Affects a specific group of individuals in a local population for a period of time of one generation or less; integrity of the regional population is not likely to be affected.
- short-term impact: Likely to persist less than five years from onset of the disturbance.
- long-term impact: Likely to persist more than five years from onset of the disturbance.

Subsistence

- major impact: May result in so many new restrictions on subsistence harvest that it substantially effects the traditional subsistence lifestyle.
- moderate impact: May result in some new restrictions on subsistence harvest that effect certain aspects of traditonal subsistence lifestyle.
- minor impact: May result in a few new restrictions on subsistence harvest, but has little or no recognizable effect on traditonal subsistence lifestyle.

Commercial Fishing

- major impact: Affects a regional population of salmon sufficiently to cause a decline in commercial catch throughout the region, and in such a manner that natural recruitment is not likely to return the salmon population or commercial harvest to former levels within several generations.

- moderate impact: Affects a portion of a regional salmon population sufficiently to cause a decline in commercial catch in a portion of the region for more than one generation of fish, but unlikely to affect the integrity of regional commercial harvest.

- minor impact: Affects a specific group of salmon and commercial harvest in a localized area for one generation or less, without affecting the integrity of the regional salmon population or commercial harvest.

Population

- major impact: Could result in more than 30% population growth.

- moderate impact: Could result in between 15-30% population growth.

- minor impact: Could result in 0-15% population growth

Employment

- major impact: More than a 30% change in employment.

- moderate impact: Between 15 and 30% change in employment.

- minor impact: Between 5 and 15% change in employment.

- short-term impact: Would result in change that lasts less than 5 years.

Water Quality

- major impact: Effects result in extensive changes in the physical, chemical or biological parameters of a waterbody on the level of several orders of magnitude, to a degree that renders the waterbody unacceptable for use by humans or fish and wildlife species, creates a health hazard, or otherwise impairs the beneficial uses of the waterbody.

- moderate impact: Effects change the physical, chemical or biological parameters of a waterbody to a statistically significant degree, and effects cannot be overcome without man-induced corrective measures.

- minor impact: Effects change some or all of the normal parameters of water quality but exhibit no statistically significant changes from ambient conditions, or deviates significantly but can be readily returned to ambient conditions by the waterbody's natural capacity.

- long-term: More than one year.

- short-term: Less than one year.

- local: Within the immediate project area.

Recreation

- major impact: Recreation uses or scenic and wilderness resources altered in a manner that affects large numbers of recreationists or observers of scenic resources on a regional basis.

- moderate impact: Recreation uses or scenic and wilderness resources altered in manner that affects a significant number of recreationists or observers of scenic resources on a site-specific basis or a limited, group of recreationists on a regional basis.

- minor impact: Recreation uses or scenic and wilderness resources altered in a manner affecting only a small number of recreationists or observers of scenic resources.

Archeological and Historical Sites

- major impact: A large number of archeological and historical sites and a large area of high-site probability affected sufficiently to cause a substantial decline in the quality and quantity of regional archeological and historical resources.

- moderate impact: Some sites or areas of high-site probability affected sufficiently to cause a decline in the quality and quantity of regional archeological and historical resources.

- minor impact: A single site or small group of sites affected or isolated pockets of high-site potential affected.

Wilderness

- major impact: Wilderness attributes altered to an extent that the area no longer possesses those unique qualities that made it eligible for wilderness designation. Natural scene altered to an extent that it affects the aesthetic experience of all people in the area.

- moderate impact: Wilderness attributes altered to an extent that some of the unique qualities of the area are affected. Natural scene altered to an extent that it affects the aesthetic experience of most people in the area.

- minor impact: Wilderness attributes altered temporarily. Natural scene altered slightly but is either accepted or unnoticed by most people.

PROPOSED PLAN

DEVELOPMENTAL ASSUMPTIONS USED FOR IMPACT ASSESSMENT

Settlement. The state would offer for sale up to 14,000 acres of state lands for remote settlement which could result in the addition of approximately 112 new households being established in the region. Most of this land would be near Dillingham, with some in the vicinity of Iliamna Lake and at the southern end of the peninsula around Port Moller and Cold Bay. (See Table 8-1 and Map 16)

The Department of Natural Resources provided the following assumptions based on their past experience with land disposal programs. The average parcel size is assumed to be 15 acres. Some disposals would be 5-acre subdivisions, while others would be 5- to 40-acre homesteads. It is assumed that all parcels offered for sale would be sold within the 20-year assessment period. The first land sale would not occur until state fiscal year 1985 (July 1984-June 1985). Actual settlement and resultant impacts would not occur until 1990, to account for a 5-year period between land sales and land improvements. Disposals at Reindeer Bay and Half Cabin Lakes would not be placed on the state sale schedule for at least 5 years to minimize impacts on local people and the local economy.

Remote land disposals are assumed to result in 190 households being established on the acreage sold by 2002. Of these, 12 would be permanent households and 100 would be seasonal households new to the Bristol Bay region (See table 8-2).

Oil and gas development. Exploration and development activities would be designated a primary use for areas with high and moderate potential for oil and gas. This includes over 2.5 million acres of state owned land on the Alaska Peninsula south of the Bristol Bay borough. Oil and gas is designated as a secondary use on lands having moderate or low oil and gas potential, including the Nushagak Peninsula and the Nushagak and lower Kvichak River basins. In addition, oil and gas development has been designated as a secondary use in portions of the Becharof, Togiak and Alaska Peninsula National Wildlife Refuges. For purposes of environmental protection, however, all state tide and submerged lands in the Bristol Bay Fisheries Reserve, tide and submerged lands north and west of the reserve, and major bays, estuaries and lagoons along the north side of the Alaska Peninsula would be withheld from leasing. There would be at least a 10-year delay in the leasing of other state tide and submerged lands on the north side of the peninsula stretching from Cape Menshikof to Unimak Pass. Oil and gas activities would be prohibited in designated wilderness areas on refuges. Activities are assumed to be restricted or prohibited on an additional 35% of other refuge lands where exploration or development is determined to be incompatible with refuge purposes.

Table 8-1. Comparison of Remote Settlement Alternatives.[a]

Management Unit Number	Name	Proposed Plan	No Plan Alt.	Alt. #1	Alt. #2	Alt. #3	Alt. #4	Subsistence Resource[b]	Villages Using Area[c]
2	Little Swift Creek	0	1000	0	0	500	500	c, m	25, 29
2	Gold Lake	0	400	0	0	200	200	c, m	25, 29
2	North Fork Lake	0	1000	0	0	0	500	c, m	25, 29
4	Lynx Lake	0	1000	0	0	0	500	m	30, 29, 25,18
4	Stovall Lake	0	2000	0	0	0	1000		
5	Snake Lake	↑	3000	500	500	500	1500	m	30, 29, 25, 18,
5	Land Otter Creek	|	500	250	250	250	250	m	18, 30, 29, 25
5	Warehouse Mtn.	|	2000	1000	1000	1000	1000	m	18, 30, 29, 25
5	Hoal River/Aleknagik Rd.	8500	1000	500	500	500	500	m, w	30, 29, 25, 18
5	Weary River	|	2000	1000	0	1000	1000	m	18, 25, 29, 30
5	Snake River	|	4000	1000	0	2000	2000	m	18, 25, 29, 30
5	Nonavnugaluk Lake West	↓	1000	0	0	0	500	m	18, 25, 29, 30
6	Iowithla River	0	2000	1000	0	1000	1000	c, m,	21, 26, 29, 14, 18, 16, 10, 6, 1
6	Okatokuk Lake	0	4000	2000	0	2000	2000	m, w	1, 8, 10, 14, 16, 18, 29, 30
6	Arrow Creek	0	3000	0	0	1500	1500	c, m	1, 8, 10, 16, 18, 21, 25, 26, 29
6	Kaskanak Mtn.	0	500	0	0	250	250	c, m	1, 8, 10, 12, 13, 14, 17, 18, 21, 25, 26
6	Upper Chalitna	0	200	0	0	100	100	c, m	1, 8, 10, 12, 13, 14, 17, 18, 21, 25, 26, 29, 30
6	Nuyakuk South	0	2000	0	0	0	1000	c, m	1, 8, 10, 18, 16, 21, 29, 26
6	Jack Rabbit Hills	0	2000	0	0	0	1000	c, m	1, 6, 8, 10, 21, 25, 26, 29, 30
6	Kemuk Remote	0	2000	0	0	0	1000	m	1, 8, 10, 18, 21, 29
7	Half Cabin Lakes	500	4000	2000	0	2000	2000	None[d]	None
7	West Tutna Lake	0	2000	0	0	1000	1000	c, m	8, 21, 22
7	Nikabuna Lake	0	1000	0	0	0	500	c, m	8, 13, 21, 22, 25
7	Big Bonanza Creek	0	2000	0	0	0	1000	c, m, w	8, 10, 13, 21, 22
8	Newhalen River	1250	0	0	0	0	0	c, m, w	13, 21, 22
9	Chekok Lake	↓	1000	500	0	500	500	None mapped[d]	13, 14
9	Pile Bay Road	0	3000	1500	0	1500	1500	None mapped	13, 14, 23
9	Tommy Point	0	2000	0	0	1000	1000	w	13, 14, 23
9	Kokhanok Lake	1000	4000	0	0	2000	2000	w, m	13, 14
10	Big Mountain	0	4000	500	0	1000	2000	c, m	13, 14
10	Reindeer Bay (Big Mtn.)	750	1000	500	0	1000	1000	c, m	12, 13, 14, 17
10	Levelock	0	1000	0	0	0	1000	c, m, w	1, 6, 14, 17, 19, 21, 26, 28, 29
12	Middle Bluff	0	4000	0	0	2000	2000	c, m, w	1, 6, 8, 15, 18, 19, 25, 28, 29, 30
15	Cape Menshikof	0	2000	0	0	500	1000	c, m, w	6, 8, 18, 19, 15, 25, 24, 27, 28, 30, 31
18	Port Moller North	1000	2000	500	0	0	1000	None mapped	20
18	Bear Lake	|	0	0	0	500	0	None mapped	20
19	American Bay	|	500	250	0	250	250	None mapped	None mapped
19	Dorenoi Bay	↓	500	250	0	250	250	None mapped	None mapped
22	Cold Bay	1000	0	1000	0	0	0		
State Sub-Total		14,000	70,500	14,250	2,250	24,300	35,300		
10	Kaskanak Creek	0	3000	0	0	1500	1500	c, m, w	1, 6, 12, 13, 14, 17
10	Peck's Lake	0	1000	0	0	500	500	c, m	12, 13, 14, 17
BLM Sub-Total		0	4,000	0	0	2,000	2,000		
TOTAL		14,000	74,650	14,250	2,250	26,300	37,300		

a: Source: ADF&G provided data on resources and village use. These data were aggregated by USFWS.
b: c = caribou; m = moose; w = waterfowl;.
c: 1 = Aleknagik; 2 = Belkofski; 3 = Chignik Bay; 4 = Chignik Lagoon; 5 = Chignik Lake; 6 = Clarks Point; 7 = Cold Bay; 8 = Dillingham; 9 = Egegik; 10 = Ekouk; 11 = False Pass; 12 = Igiugig; 13 = Iliamna-Newhalen; 14 = Kokhanok; 15 = King Salmon; 16 = Koliganek; 17 = Levelock; 18 = Manakotak; 19 = Naknek; 20 = Nelson Lagoon; 21 = New Stuyahok; 22 = Nondalton; 23 = Pedro Bay; 24 = Pilot Point; 25 = Platinum; 26 = Portage Creek; 27 = Port Heiden; 28 = South Naknek; 29 = Togiak; 30 = Twin Hills; 31 = Ugashik.
d: "None mapped" and "none" indicate only that ADF&G data did not show an area with subsistence resources present. This does not necessarily mean these resources are not present.

Table S-2 Potential Acres to be sold for remote settlement and estimated results in population to 2002.

ALTERNATIVE	ACRES AVAILABLE	AVERAGE PARCEL SIZE	NUMBER OF HOUSEHOLDS ESTABLISHED[a/]	HOUSEHOLDS NEW TO REGION[b/c/]	POPULATION NEW TO REGION[d/]
PLAN	14,000	15	190	100 Seasonal 12 Permanent	336
NO ACTION	74,600	15	880	465 Seasonal 58 Permanent	1,569
I	14,250	15	164	86 Seasonal 11 Permanent	291
II	2,250	7.0	60	32 Seasonal 4 Permanent	108
III	26,300	15	330	174 Seasonal 22 Permanent	588
IV	37,300	15	450	238 Seasonal 30 Permanent	804

a/ Households established = $\frac{\text{Acres sold in management units}}{(8, 9, 10 \times .3)+(4,5 \times .2)+(\text{ALL OTHERS} \times .1)}$
PARCEL SIZE

b/ Households established x .80 = Seasonal Households
Households established x .20 = Permanent Households

c/ Seasonal Households x .66 = New Seasonal Households
Permanent Households x .33 = New Permanent Households

d/ New Households x 3

Lease sales would likely be scheduled over the next 20 years on any state or federal uplands where oil and gas is a primary use, and/or on federal lands where it is a secondary use. State Lease Sale #41, which took place September 14, 1984, offered 1.44 million acres of uplands between the Kvichak River and Port Heiden. Approximately 280,000 acres were leased. Scheduling and extent of possible exploration activities on this acreage is unknown at present.

State sale #56 which includes approximately 2 million acres of uplands between Port Heiden and Cape Lieskof is assumed to proceed as scheduled in 1988. BLM lease sales of approximately 1.6 million acres of land in the Kvichak and Goodnews Bay areas are assumed to proceed as scheduled.

Because of the 10-year moratorium on leasing state tide and submerged land from Cape Menshikof to Unimak Pass, a sale in these areas could not be considered before 1994.

The estimates for oil and gas resources used in this and all other scenarios are based in part on an unofficial report by DNR's Division of Geologic and Geophysical Surveys (DGGS), "Draft - Undiscovered Oil and Gas Potential in the Bristol Bay Region, Alaska" (1982). Oil and gas developments on the Kenai Peninsula and in Cook Inlet were used as models. Most data on these existing developments were taken from the 1981 Statistical Report of the Alaska Oil and Gas Conservation Commission. Direct employment estimates for each scenario were made using information relating to the Department of the Interior's St. George OCS Sale 70, interpretations of geologic data by DNR-DGGS, and manpower estimates developed as part of an economic and policy analysis of the petroleum resources of the National Petroleum Reserve in Alaska. Employment estimates for tidelands oil and gas activity were derived from Hanley et al. (1980) and the Governor's Agency Advisory Committee (1981).

Exploration. Onshore exploration would probably occur throughout the period from 1985 to 2002. It is assumed that seismic exploration using both helicopters and ATV trains would occur over much of the land leased. Seismic signals would be generated by explosive charges either buried or placed on stakes above ground. Exploratory wells would be drilled in those areas producing favorable seismic returns. It is estimated that as many as 19 exploratory wells could be drilled. Major air support would come from King Salmon or other existing airfields. However, several new bush airstrips would probably be built to service the exploratory wells. Average annual employment would range from 17 to 20 persons depending on the level of activity in any year. At most, 25% of these workers would reside in the region.

Exploration methods in tide and submerged lands that could occur on leases issued after the 10-year moratorium would include seismic operations with vessels using air guns and exploratory drilling. Drilling would be accomplished by directional drilling from uplands, jack-up rigs, semi-submersible rigs, or drill-ships as appropriate.

Development. Preliminary, unofficial estimates from DNR-DGGS in 1982 indicated the probability of commercial quantities of gas within the region is less than 50%. It is assumed however, that 4.0 trillion cubic feet (tcf) of

natural gas could be found and produced on upland portions of the coastal plain about mid-way between Port Heiden and Port Moller. To support this activity, a total of 20 drill pads, a 5,000-foot airstrip and 50 miles of service roads would be built. The total area encompassing development would be 30 square miles (19,200 acres). Land area covered by roads and pads would be approximately 1,920 acres.

Approximately 100 miles of buried 36-inch pipeline would be built from this gas field to a liquid natural gas (LNG) terminal at Balboa Bay. The LNG and tanker loading facilities would be developed on approximately 100 acres of land at Balboa Bay.

The final EIS on the Western LNG project at Nikiski (FERC 1978) provided an example of the type of development and potential impacts of an LNG facility. The LNG terminal would occupy a 60 acre site and would include two gas liquifaction trains, two 550,000-barrel LNG storage tanks, and a marine terminal with two berths and other appurtenant facilities. The plant itself would be built outside the region and transported as modules to be reassembled on site. The liquifaction facility would be based on an air-cooling process and would not require large volumes of water for operation. Discharges from the plant would be waste heat passing through air-cooled heat exchangers and some incinerated natural gas. An electrical generating facility, most likely powered by natural gas, would also be needed. The project would use 6,000 gallons of water per day, and have its own sewage treatment plant. The isolated location of Balboa Bay would necessitate construction of both an airstrip adequate for passenger and cargo aircraft and onsite housing for plant employees.

As a result of the delay in leasing tide and submerged lands in the Unimak Pass to Cape Menshikof area, oil production is not likely to occur during the Plan period. However, the leasing and exploration activities that could occur during the Plan period could lead to a commercially viable discovery and eventual production.

An oil reservoir located in state-owned tide and submerged lands between Port Heiden and Port Moller is assumed based on the DGGS draft report to contain approximately 500 million barrels of recoverable oil. Although some estimates indicate probability of such quantities of oil in the region is less that 50%, this analysis assumes full development of the estimated resources as the worst case condition.

Tidelands oil development would be similar to the McArthur River Field in Cook Inlet (total field size 548 acres). Ninety-eight wells would be drilled from three offshore platforms, within a 30-square mile area. Depending on the location and geology of the field, directional drilling from upland locations may be used in lieu of offshore platforms. Shore-based facilities would include a small marine support base (dock) most likely at or near Port Moller. A 5,000-foot landing strip would be built to serve as an air support base, primarily for transfer of workers and supplies from fixed wing aircraft to helicopters.

Pipelines would run directly onshore from offshore platforms. Oil would be transported via a buried pipeline overland where possible. Short segments would probably be buried underwater in the vicinity of Port Moller and Herendeen Bay. This pipeline system would be routed to intertie with the upland gas development system.

Oil storage and tanker loading facilities would be located at Balboa Bay. The facility would include a marine terminal and storage for 6-7 days production. The combined LNG and oil facility site would occupy approximately 300 acres. Most workers employed in oil and gas production activities in Bristol Bay would reside in industry or contractor-built enclaves. Hanley et al. (1980) and the Advisory Committee (1981) estimate total employment would range from 16 persons, when exploration begins, to 922 during the peak of development. Employment would level off at 283 workers through the remaining life of the field. Fifteen percent of all development and production workers would be permanent local residents; the remaining 85% would reside in the enclaves located near the gas field or at the combined LNG-oil terminal.

Transportation corridors. Three multiple-use transportation corridors are assumed as preferred routes for possible development: Port Moller to Balboa Bay (43 miles), Port Heiden to Kujulik Bay/Aniakchak Bay (44 miles), and Pilot Point to Wide Bay (50 miles). At this time there are no proposals to utilize these routes but because of the substantial uncertainty of future actions, impacts of each are analyzed.

ANILCA requires that transportation and utility systems constructed in conservation system units in Alaska follow procedures described in Title XI of that Act. Approval of transportation facilities on National Wildlife Refuge lands would also be subject to refuge compatibility determination, and would require approval of Congress to cross designated wilderness lands.

A buried 30-inch oil pipeline and a buried 36 inch gas pipeline on each side of a construction access road would require a 100-foot wide right-of-way. Additional sites would be required for barrow pits. The routing near Cathedral Peak, Pyramid Mountain or other high steep terrain could receive substantial snowfall and because of avalanche conditions, structures such as snowsheds may be required.

Logistics for line construction would require air, ground and sea support. This might include various fixed wing and helicopter aircraft, bulldozers, trucks, ATV's, barges, dredges, and ships.

Proximity of the corridors on the lower peninsula to the Shumagin seismic gap, where an event of magnitude 8 or greater is expected in the next few decades, poses a substantial earthquake hazard. Any tsunami generated by such an event may be partly attenuated by the Shumagin Islands but would still produce a large runup in bays on the southeast side of the peninsula. Development of large terminal facilities on the northern coast of the Alaska Peninsula is not anticipated because of the lack of deep water near shore.

Specific routes of transportation corridors identified in this alternative are:

- Port Moller to Balboa Bay: The route would extend from Port Moller through Portage Valley to Balboa Bay. Depending on the port site chosen (Lefthand Bay, Beaver Bay or Dorenoi Bay), this corridor would be 34-43 miles in length. Herendeen Bay and Port Moller are rather shallow embayments with extensive mudflats and average depth of less than 12 feet, although water depths in access channels can exceed 60 feet. At the head of Herendeen Bay, Johnson Channel widens and water depths are greater than 90 feet.

  The corridor follows the right-hand fork of the Portage Valley River crossing a broad, barren pass at 850 feet elevation. It descends into a narrow valley drained by Foster Creek. Upland areas are moderately drained, while valley bottoms are generally swampy.

  Water depth in Lefthand Bay is 80 feet at a distance of one-half mile from shore. The bay, which is 2 1/2 miles wide and 4 miles long, is considered a good anchorage for large vessels and is protected from foul weather coming from any direction.

  The relatively narrow area for a proposed port site on the north of Lefthand Bay at Foster Creek would require that facilities be built back into the valley and some land might have to be used on the steep slopes which surround the valley.

- Port Heiden to Kujulik Bay/Aniakchak Bay: This route, 44 miles in length begins near the village of Meshik (Port Heiden), leads southeast to the base of Aniakchak Crater, and follows the north side of the Meshik River valley around the crater. The Kujulik Bay routing crosses over a low divide and travels southwesterly through Portage Pass or Black Pass to Kujulik Bay. The Aniakchak routing travels easterly over a low divide in the Aniakchak River Valley to Aniakchak Bay.

- Pilot Point to Wide Bay: This route begins near Pilot Point on Ugashik Bay and runs southeast, for a distance of about 50 miles, crossing the Ugashik River near Ugashik village. It continues on the coastal plain north of the Dog Salmon River south of Ugashik Lake where it turns east and follows the Goblet River valley. The route then continues on the north side of Lone Hill up the valley to Wide Bay.

  King Cove to Cold Bay Road - a 32-mile road connecting the communities of King Cove and Cold Bay is assumed to be constructed. The road would be gravel and built to State of Alaska secondary highway standards which require a 200 ft. right-of-way. The project would utilize approximately 775 acres of land for the road bed and right-of-way and an additional 30 acres for barrow pits. Routing would be north from the community of King Cove traversing lowlands near the shore of Cold Bay, circling Kinzarof Lagoon and turning south to the community of Cold Bay. The northernmost

section of this route (around Kinzarof Lagoon) would cross 5 or 6 miles of the Izembek National Wildlife Refuge that is designated wilderness. Title XI of ANILCA requires that Congressional approval must be obtained before construction of roads can occur across designated wilderness areas.

Energy. At least three alternate potential hydroelectric power sites are being examined by the Alaska Power Authority (APA) for a large-scale, regional power project. Present indications are that only one of these is likely to be built. Since APA's evaluations have not been completed, this Plan endorses continued study of hydropower options but does not include any specific proposal for hydropower development. The Plan guidelines require that any hydropower development not cause a net loss of fish production. The Plan also recommends that alternate energy resources, including natural gas, be considered more extensively. Development of small scale (less than 5 MW) energy systems would be encouraged for local use. For purpose of impact assessment, a hydropower project at Newhalen was selected for analysis.

A large scale hydropower plant with a total installed capacity of 16 MW to supply energy needs of 18 communities would be constructed on the Newhalen River. This facility would be a run-of-the-river operation located between river mile 1.0 and 7.0. The power plant and diversion canal would be built on the east bank of the river. Construction would take 3 years, with a peak construction labor force of 300 people, the majority being housed in on-site facilities. The flow diversion canal would be 2.5 miles long and 85 feet wide, located between river mile 2 and 7, and would be designed to bypass average flows of 1033 cfs. and maximum flows as high as 2,100 cubic feet per second (cfs). At this flow, water depth would be about 30 feet. Flow control would be at a concrete spillway near the downstream end of the canal. Located adjacent to the spillway would be the low-level intake for the power plant designed to prevent fish entrainment. Existing roads from the Iliamna airfield to the Newhalen River would be used for access, supplemented with a new road section to the plant.

Approximately 500 miles of transmission lines would be constructed to connect the generating facility and the communities to be served. Transmission corridors for both main and feeder lines would be located on state-owned lands where possible. Lines would be built using helicopters and maintained by all-terrain vehicles or aircraft, eliminating the need for road construction.

Minerals. Mineral exploration would generally be encouraged on state, BLM or Native lands in the Goodnews Bay, Chignik, Nyac, Herendeen Bay and Port Moller areas. Development of valid existing claims for locatable minerals elsewhere would be permitted to continue.

Using available information, the Alaska Land Use Council Mineral Element Work Group identified areas with mineral potential. Mountainous areas around the east half of Iliamna Lake (especially on the south side) and in the upper Mulchatna and Chilikadrotna river drainages have a potential for gold, silver, tin, copper, tungsten, molybdenum, lead and iron. The Goodnews Bay area has also been

identified as having potential for platinum, chromium and gold. The area northwest of the Wood-Tikchik State Park is believed to have deposits of copper, silver, gold, platinum and chromium.

Existing mining activity in the region includes 2 dredges operating at Nyac, employing an estimated 40-50 people. There are also 20-30 people working a placer operation at Platinum. Other small operators (3-4 people) are currently working claims in widely scattered remote areas of the Bristol Bay planning area.

Under this alternative, State lands in the Upper Mulchatna River and East Iliamna Lake area would be made available for new mineral exploration and development, subject to state lease-hold location laws to protect fishery resources. A portion of 64 anadromous fish streams in drainages which produce a majority of the Bristol Bay salmon and all designated navigable streams on refuges would be closed to new mineral entry. This closure amounts to approximately 1400 miles of the more than 4000 miles of mainstem streams in the area. The closure would not affect a majority of the 7000 tributaries (approximately 35,000 stream miles) which flow into the area mainstem rivers. Other stream beds on refuges are closed by ANILCA and all streams in Wood-Tikchik State Park were closed when the park was created.

Placer mining is basically the excavation of existing or relic streambeds for minerals transported by the stream to the site from elswhere. Most operations use bulldozers, draglines, or dredges to remove overburden and collect the ore. Sluice systems are generally used to separate the mineral from the ore and tailings are discarded in piles. Settling ponds are often used to clarify streams muddied by these activities but some operations are conducted without these facilities. Stream courses are often rerouted by the removal of material from both the stream's bed and its banks. Magnitude of placer operations can range from a single individual with a gold pan to massive dredges employing many workers.

Most placer mining operations in Alaska last about four months. Additional time is usually spent at the mining site to clear overburden, maintain and repair equipment, construct buildings, complete exploration drilling programs, or other exploration or development work. Support facilities may include a bunkhouse, cookhouse, workshop and storage area, and an airstrip. Transportation between the camp and mining operations is usually over trails or roads suitable for pickups, four-wheel drive or ATVs. When an area is mined out, restoration consists of leveling tailing piles, breaching settling ponds and recontouring, with the ground left to revegetate naturally.

BLM records indicate there are 339 unpatented Federal lode mining claims and 337 placer mining claims in the Bristol Bay study area, located primarily in the areas of Goodnews Bay, Chignik and the northeastern portion of the Ahklun Mountains. BLM estimates that under the current rate of patenting, three of the 676 claims will go to patent in the next 20 years. Location of these will probably be at Nyac, Platinum and Chignik.

Proposed Plan

Exploration techniques for lode deposits vary considerably with the type of mineral being sought. Principal methods of geophysical exploration include magnetic, electrical, electromagnetic, radioactive, seismic and gravity techniques used to define physical differences in the earth's crust. Geochemical exploration involves collection of samples in the field, with additional testing in the laboratory to discover anomalous occurrences of minerals.

Most chemical and geophysical exploration would involve aircraft-supported field crews, and temporary camps. Both geochemical and geophysical operations may also involve the occasional use of all-terrain vehicles (ATV).

In order to sample deposits, drilling programs would eventually be established. Drills would range from back-packable, to helicopter-portable, to truck-mounted or ATV-mounted types. Road development to support these operations is not expected to be extensive since the most prospective mineral sites anticipated to be developed are all near tidewater.

Lode mining involves tunneling or open pit operations to obtain ore. Facilities and equipment for lode mining are generally much more elaborate than that required for placer operations. Large trucks, massive bulldozers, power shovels, stream drills, powerful explosives and other heavy equipment designed to move great quantities of material are necessary. Many workers and facilities to support them, i.e. mess halls, barracks, sewer systems, large water supplies and well-developed transport systems, are often required. Large lode deposits may be operated for many years often resulting in the development of semi-permanent communities at or near the mining site.

IMPACTS ON FISH AND WILDLIFE RESOURCES

Impacts on Salmon

The Bristol Bay sockeye salmon fishery is the largest salmon fishery in the world. Between 1956 and 1980, Bristol Bay sockeye runs ranged from 3.3 to 62.9 million fish (Middleton, in press). In 1980, the commercial harvest totaled 25.7 million sockeye. Preliminary estimates indicate that approximately 37.3 million fish were harvested in 1983. Salmon fishing season opens May 1 and extends through September depending on the species and fishing regulations. The large sockeye fishery peaks in early July. Chinook, coho, pink and chum salmon are also taken but are less important than sockeye.

Between 1900 and 1940, the annual Bristol Bay commercial harvest of sockeye salmon averaged nearly 15 million fish (McLean, Bucher and Cross, 1977). The average for the Bristol Bay sockeye run for the years 1975 through 1983 was 31.9 million fish.

Sockeye abundance is cyclic with returns fluctuating widely and peaks normally occurring every five years. Between 1956 and 1980, escapement levels ranged

from 1.7 to 38.6 million sockeye salmon (Middleton 1983). Subsistence harvests varied from 88,400 to 207,900 salmon between 1963 and 1980 (ADF&G, 1981c).

Adult salmon return to their natal streams to spawn and die. Sockeye salmon fry live for one to three years in the freshwater system associated with their spawning stream before becoming smolts and migrating to sea (Buck et. al., 1978). The smolt outmigration begins with spring breakup. Smolt outmigration occurs from early May through late September peaking in June when 100 to 650 million juvenile salmon move downstream to Bristol Bay and through the coastal waters north of the Alaska Peninsula (Russel, ADF&G, pers. comm., 1983). The smolt remain within 30 miles of the shore, concentrating at depths not greater than 15 feet as they move through the turbid and relatively unproductive waters of inner Bristol Bay. Outmigration slows as the juveniles approach Port Moller. Once there, they begin feeding in the productive coastal bays, lagoons and estuaries along the lower Alaska Peninsula. Most sockeye smolts move west of Port Heiden by early August. By fall they have passed through False Pass or one of the Aleutian Island passes on their way to the north Pacific Ocean. The immature sockeye range throughout the northern Pacific Ocean and the central and western Bering Sea for one to three years.

The key sockeye salmon habitats and number of fish they contribute to the commercial fishery in order of importance are:

1. Kvichak River system (Iliamna Lake-Lake Clark), 7 million
2. Naknek River system, 3 million
3. Nushagak River system, 2.8 million
4. Egegik River system, 1.2 million
5. Ugashik River system, 0.6 million
6. Togiak River system, 0.2 million.

On the south side of the Alaska Peninsula, the most significant sockeye salmon population is at Chignik. This population has supported annual harvests of between 200,000 and two million fish for the past 20 years. A long-term harvest level of one million sockeye salmon appears sustainable for the Chignik population.

Settlement. Initially the major impact of remote settlement on salmon would be an increase in the harvest of fish. Subsistence allocations are much higher than those for sport fishing, and would account for most of the increased harvest.

This management alternative would offer 14,000 acres of land for remote settlement, resulting in 112 new households by the year 2002. According to ADF&G, the average subsistence household in the region now uses 129 fish a year. This suggests that an additional 14,448 fish (less than .1 percent of the average annual harvest of sockeye salmon) would be caught by subsistence fishermen. In the long term the most significant effect of increased settlement could be cumulative secondary impacts resulting from land use practices, waste water discharges, garbage dumps and other results of human occupancy.

Oil and gas development. State Lease Sale #41 took place September 18, 1984. This offering comprised about 1.44 million acres of uplands between the Kvichak River and Port Heiden. This area contains five relatively major lakes and approximately 14 streams comprising about 700 river miles of salmon habitat. Three major river systems within this area, the Naknek, Egegik and Ugashik, comprise key salmon habitats contributing almost one-third of the commercial sockeye salmon harvest in Bristol Bay. Approximately 280,000 acres were actually leased during the sale. Scheduling and extent of possible exploratory activities on this acreage is currently unknown.

State Lease Sale #56 incorporates approximately 2 million acres of uplands between Port Heiden and Cape Lieskof and is assumed to proceed as scheduled in 1988. This area includes 9 lakes and 112 streams comprising some 88 river miles of salmon habitat.

For purposes of environmental protection, all state tide and submerged lands in the Bristol Bay Fishery Reserve, tide and submerged lands north and west of the reserve, and major bays, estuaries and lagoons along the north side of the peninsula would be withheld from leasing. Other state tide and submerged lands extending along the north side of the peninsula from Port Heider to Unimak Pass - a distance of about 280 miles - would not be considered for lease sale prior to 1994. Development would not likely occur within the 20-year period encompassed by this plan but this analysis assumes eventual development of the resource will occur.

Phases of oil and gas activities with the potential for adverse impacts include geophysical surveying, exploratory drilling, production drilling, platform installation, pipeline and road construction, service base construction, treatment facilities, oil terminals, tankering, and construction of oil refineries and petrochemical plants. Adverse impacts to salmon associated with these activities may be caused by site preparation, disposal of drilling muds, cuttings and formation waters, oil and toxic waste pollution, dredging and filling, gravel mining, shoreline alteration, use of cooling waters, and water withdrawal (ADF&G, 1981).

Activities associated with onshore or tideland oil and gas exploration and development include blasting, clearing, grading, dredging, filling and stream-bed excavation. These activities could result in removal of important streamside vegetative buffer, elevation of water temperatures, elimination of cover and reduction of aquatic food producing areas in the vicinity of facilities. An overall change in water quantity and quality in fish habitat could occur. Petroleum and petroleum products, untreated wastewater, and toxic runoff could have adverse impacts if allowed to enter watersheds.

Adverse impacts likely to affect salmon during exploration stages are minor. Strict adherance to laws and guidelines governing exploration should prevent any appreciable disturbance of fish or habitat. The possibility of damage increases greatly during development and production phases most probably due to the risk of accidents, especially spills.

Because of the potential for oil discovery in some parts of the Bristol Bay study area, as well as the possibility that an OCS pipeline will cross the

BBRMP area, it is recognized in this analysis that oil spills are probable. Spills resulting from accidents caused by human error, equipment failure, severe weather conditions or earthquake activity could have major adverse effects on localized salmon resources and habitats. (USDI, BLM, 1982c)

In order to gain a perspective on the potential for oil spills in the tide and submerged lands of Bristol Bay which might be leased, the following discussion has been taken from the Final Environmental Impact Statement for the March 1984 Outer Continental Shelf Lease Offering for Navarin Basin (MMS, 1983).

"The probability of oilspill occurrences is based on the fundamental assumption that realistic estimates and future spill frequencies can be based on past experience. This analysis assumes that spills occur independently of each other, and that the spill rate is dependent on the volume of oil produced or transported. This last assumption--spill rate is a function of the volume of oil handled--might be modified on the basis of size, extent, frequency, or duration of the handling. In the case of tanker transport, for example, the number of port calls and the number of tanker years have been considered (Stewart, 1976; Stewart and Kennedy, 1978). Our analysis uses volume of oil handled, because other bases for estimates of spill frequency are necessarily derived from this quantity.

This analysis examines spills in two size ranges (where data permit): 10,000 barrels or greater and 1,000 barrels or greater (which also includes 10,000 bbls and greater spills). A 10,000 barrel or greater spill is, in effect, a worst case analysis. To place these sizes in a rough perspective to the type of accident usually involved, spills in the largest category are usually associated with catastrophies, such as large blowouts or shipwrecks. Accidents in the second category typically include these and other serious events, such as structural failures and collisions. The choice of which size to use depends upon the analysis being performed. If, for example, a particular impact could occur only from a massive oil slick, then only large spills should be examined.

Accident rates for platforms on the U.S. OCS were derived from USGS accident files for Gulf fo Mexico (USDOI, 1979) and California (USDOI, 1979) and from USGS production records (USDOI, 1980) (there has been no oil production on the Alaska OCS). For spills of 1,000 barrels or larger, a period from 1964-1980 was used. Between 1964-1980 there were 5 spills 10,000 barrels or larger, and 12 spills (including the 5) over 1,000 barrels. During this period, U.S. OCS oil production was 4,420 million barrels.

USGS accident files are also a major source of data for pipeline accidents. As with platforms, the period from 1964-1980 was used for spills 1,000 barrels or larger. The USGS files include 2 spills over 10,000 barrels and 8 spills (including the 2) over 1,000 barrels. Since nearly all of U.S. OCS production has been transported to shore by pipelines, the same production statistics used for platforms can be applied to the pipeline accident rate. MMS/USGS accident files do not contain tanker accident rates. These had to be derived

from published literature, but, unfortunately, there is no one list detailing tanker spills. Stewart (1976) reported 178 spills of 1,000 barrels or larger in transporting 45,941 million barrels of oil. Devanny and Stewart (1974), examining tanker spills on major trade routes, reported 99 spills greater than 42,000 gallons, 87 spills greater than 100,000 gallons, and 32 spills greater than 1 million gallons. This yields about 53 spills greater than 10,000 barrels, or about 54 percent of the 1,000-barrel spill rate. Listings of spills in Oilspill Intelligence Reports (1979-1980) support this estimate.

Out of 22 spills of crude oil from carriers reported from 1978 and 1979, known or estimated to be larger than 1,000 barrels, 68 percent were larger than 10,000 barrels. Therefore, a ratio of approximately 60 percent of the 1,000 barrel spill rate was reasonable for the 10,000 barrel spill rate. Previous spill statistics were based on the above rates.

To improve spill statistics and update existing data bases, MMS contracted with the Futures Group, Glastonbury, CT, to prepare a data base of historic spills and perform a preliminary analysis of spill rates (The Futures Group and World Information Systems, 1982). The data base contains detailed records of platform, pipeline, and tanker spills. Comparison of the new data base with existing data indicates that a sharp drop of spill occurrence rates for platforms and tankers occurred around 1974. Application of trend-line analysis to the existing spill data has resulted in a significant decrease in the number of predicted spills for a given OCS lease offering. Of the 12 spills greater than 1,000 barrels from OCS platforms, 10 occurred prior to 1974. Trend-line analysis of data through 1980 yields a predicted spill rate for OCS platforms of 1.0 spills/Bbbls (billion barrels) produced. For pipelines, no trend in the spill rate has been found; and the spill rate is computed at 1.6 spills/Bbbls. The new data base has enabled computation of spill rates for tankers in port and at sea. The new spill rates, based on a trend-line analysis of the more detailed and newer data base, are 0.9 spills/Bbbls for spills at sea (in open, restricted, or unknown waters) and 0.4 spills/Bbbls for spills in port (in harbor or at a pier).

The actual reason for the drop in spill rates is likely a combination of increased industry concern; increased public input or pressure; stricter regulations; and better, more advanced technology. Further information on the new spill rates can be found in Lanfear and Amstutz (1983)."

In summary, the spill rates are:

Spills per Billion Barrels

	1,000 BBLS	10,000 BBLS
Platforms:	1.0	0.44
Pipelines:	1.6	0.67
Tankers at Sea:	0.9	0.50
Tankers in Port:	0.4	0.15

If, as assumed in the oil and gas scenario for Bristol Bay, a 500 million bbl resource is discovered and produced, the MMS analysis suggests that two spills greater than 1000 bbls could occur over the life of the field and that one of those spills could be greater than 10,000 bbls.

The impact would vary depending on size and location of the spill, climatic conditions, season, distance between the spill and cleanup equipment, amount of cleanup equipment available, availability of transport equipment, oceanographic conditions and the stages of the life cycle of the affected salmon. Salmon are probably most vulnerable to spills during late spring, summer and early fall when they are either in migration corridors or rearing areas of the marine environment. Impacts to salmon would probably be greatest if a spill were to occur during these periods. Sixty million returning adult salmon, in addition to the 650 million or more outmigrating juvenile salmon, may be present during summer and fall migration.

Oil spills impact salmon by blocking or delaying migrations, contaminating spawning areas, inhibiting growth and depleting food supplies. (USDI. BLM, 1982c). Feeding, reproduction and social behavior in fish have been disrupted by soluble aromatic derivatives as low as 10 to 100 ppb. Also expected is interference with predator detection (USDI, BLM, 1982c).

Storm induced vertical mixing of spilled oil in shallow water, less than 60 meters deep, could deliver oil to the bottom sediments in concentrations on the order of parts per thousand (OCSEAP, 1982). This may effect the food chain. Oil-contaminated bottom sediments may have a long-term impact. Research conducted in Buzzards Bay, Massachusetts, indicated that 8 years after an oil spill sediments contained hydrocarbon levels 12 times higher than normal (Marine Pollution Bulletin, 1981). Cold sub-arctic environments as in the Bristol Bay area could require even more time for degradation of hydrocarbons from oil spills. (ibid.)

If a spill enters a stream, major localized effects could occur downstream in lagoons and estuaries.

If oil spills from onshore drilling or pipeline breaks are carried downstream, oil or gas pollutants could disperse in the small bays, coastal waters and lagoons used as important feeding and migration routes for all of the Bristol Bay sockeye salmon smolts. Deposition of a large amount of pollutants in these inshore waters would affect the plankton fed upon by salmon smolts. As the survival of smolts is directly related to their size, any decrease in food availability that causes a concomitant reduction in salmon smolt growth rates would affect ocean survival. For the most part, however, effects to plankton would be local and short term. Their pelagic nature and quick life cycle provide a natural adaptation which allows them to recolonize areas rapidly.

Damage to salmon from upland oil and gas development could occur on the peninsula within the coastal plain in conjunction with development of the 4.0 trillion cubic foot gas field. Although there would be potential for significant impacts locally, they would probably be minor from a regional perspective.

Transportation corridors. The potential for impacts to salmon from transportation corridors stems primarily from changes in stream water quality due to construction activities (i.e., siltation, turbidity, benthic disturbances); removal of essential spawning gravels from streambeds for construction materials; oil leaks if pipelines are built in the corridor; and tanker or other oil-spill accidents in the ports. Earthquakes or other unpredictable events may cause pipeline leaks along a corridor. The effect of oil spills on salmon are described above in the discussion of impacts associated with oil and gas exploration and development.

Although this discussion focuses on impacts to sockeye salmon, other salmon species can be similarly affected. Generalized impacts to salmon by each corridor are as follows:

- Port Moller to Balboa Bay: The overland route parallels Foster Creek to Lefthand Bay. Foster Creek provides about three miles of pink and chum salmon habitat that could be subject to minor, short-term impacts from construction. Lefthand Bay, a relatively sheltered anchorage, would have a reduced potential for oil spills compared to other bays.

  Salmon have not been reported in Portage Valley on the north shore. However, sockeye salmon smolts feed in Port Moller and Herendeen Bay. Pacific herring use Herendeen Bay for spawning and rearing. Pink and chum salmon use the Johnson River on the Pacific side of the submerged alternate route. Pink salmon are also present in Bishop Creek and in two unnamed streams that would be crossed by a possible pipeline.

  Construction in the watersheds on either route for this corridor could have a short-term impact on the aquatic habitat. Oil spills or pipeline leaks could cause a more serious effect if smolts or returning spawners were in the bays or tributaries at the time.

  Overall, this corridor has less potential adverse effects that any of those identified further north along the peninsula.

- Port Heiden to Kujulik/Aniakchak Bay: This corridor route parallels the Meshik River, and crosses 13 salmon streams on its climb towards Meshik Lake. Depending on the port site chosen, the corridor could parallel 15 miles of the Aniakchak River to Aniakchak Bay. The Aniakchak River is used by sockeye, coho, pink and chum salmon. Both bays provide relatively unprotected anchorages subject to high winds and wave action with some potential for tanker accidents. This corridor's impacts on salmon would probably be minor.

- Pilot Point to Wide Bay: One variation of this pipeline corridor would cross the Ugashik River and then parallel the Dog Salmon River Valley and

the Goblet Creek Valley to Wide Bay. The Ugashik River system, is one of six most important sockeye salmon production areas in the region. It supports a harvest of .5 to 1.0 million salmon annually. The Dog Salmon River and the King Salmon River which flows into Ugashik Bay, each support five species of salmon. (D. Russell, ADF&G, pers. comm., 1983) Fish in this river could be affected by oil spills occurring during the summer migration.

An alternate route would run about three miles south of Lower Ugashik Lake, crossing the Ugashik River, and three sockeye spawning tributaries of Ugashik Lake. The route would parallel Alai Creek on the Pacific side of the peninsula for three miles to Wide Bay. Alai Creek is a spawning stream for pink and chum salmon. Several small streams that also support pink and chum salmon drain into Wide Bay on the south shore. Wide Bay is a sheltered anchorage where the chance of an oil spill would be minimized. However, the Ugashik River, Ugashik Lake and its tributaries are more important salmon producers than the Dog Salmon River and its tributaries. A corridor near or crossing Ugashik tributaries is apt to create a greater threat to spawning salmon than one along the Dog Salmon River.

- King Cove to Cold Bay Road: This alternative allows for the building of a road from King Cove to Cold Bay. The road would be approximately 32 miles long crossing at least 3 salmon spawning streams depending on the exact alignment. Little adverse impact is anticipated, if gravel needed for road beds is obtained from upland sites, and adequate fish passage is ensured at all bridges and culverts.

Energy. The entire salmon population of the Lake Clark region passes through the Newhalen River in both adult and juvenile stages, making the Newhalen River an important link in the Kvichak River salmon fishery. Counts of adult salmon entering the Kvichak River system are made annually by ADF&G. The number of adult sockeye moving up the Newhalen River varies cyclicly from roughly 100,000 to 10 million fish annually (Dick Russell, ADF&G, pers. comm.). Since these return spawners are subject to harvest by the Bristol Bay commercial fishery before reaching the Newhalen River, the total number of salmon attempting to return is somewhat larger. An average Newhalen River run consists of roughly two million fish, assuming that approximately 50% of the run is taken by the commercial fishery. Since 1980, systematic counts of adults have been made annually (Poe and Mathisen 1981 (unpublished), 1982 and Poe et al, 1983). In 1983, studies sponsored by the Alaska Power Authority resulted in accumulation of data that may place the 1983 adult escapement between 800,000 and one million (Stone and Webster/Dames and Moore, 1983, and FRI, unpublished).

Juvenile sockeye salmon migrate down the Newhalen River to Iliamna Lake as fry and smolts. Fry that move downstream to the lake probably rear there for one or two winters before smolting and moving to marine waters.

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Smolts are counted annually as they emigrate from Iliamna Lake but, the contribution of individual watersheds (such as Lake Clark) to the total run is not known. Smolts that have reared for two winters in freshwater lakes normally have an average 10% survival rate to adult size (Chuck Meecham, ADF&G, pers. comm.). If it is assumed all returning adults result from 2-year freshwater smolts, then about 20 million smolts would be required annually to maintain a total run of 2 million adults.

There is some evidence that the average annual Newhalen River run may be less than 2 million fish. The estimated average ten percent survival is for 2+ aged smolt. In Newhalen River studies conducted in 1982, 1+ aged smolt dominated the outmigration while in 1983, 2+ aged smolt dominated. Both smolt outmigrations were from the 1.5 million adult escapement in 1980. Escapement size allowed into the system determine the dominance of 1+ or 2+ aged smolt in a given year. While a large number of fry outmigrated the Newhalen system in 1982 and 1983 to apparently rear for one or two years in Iliamna Lake, far less than 20 million smolt are estimated from the 1980 adult escapement when 1982 (1+) and 1983 (2+) aged smolt are summed. (APA letter of Feb. 27, 1984).

A proposed hydropower facility at Newhalen would be designed to bypass flows not needed for power generation. This means only a portion of the emigrating smolts would be potentially affected. Most sockeye smolts leave freshwater lakes shortly after the outlet rivers become ice free in May or June. In May, the facility would probably require about 20% of the river's flow. As runoff increases in June more water would be bypassed and only about 9% of the flow would be needed to generate electricity. Averaging these two months means that about 15% of the river's flow would be needed for power production during the peak smolt emigration period.

Fish mortality occurs from powerplant turbines in several ways. Fish are hit by turbine blades, damaged by high currents, or injured by abrasion. Fish can also be stunned by pressure changes, making them more susceptible to predation. Experience in Washington and Oregon has indicated a 10% mortality of juvenile salmon can be expected at an unprotected hydropower facility (Bell, 1967 and 1973). With maximum use of mechanical and other mitigation devices, fish loss can be reduced to approximately 5%. If we assume the percentage of smolts drawn into the intake canal and flushed through the turbines is proportional to the amount of water bypassed, then about 15% of the 20 million smolts, or 3 million smolts, could be affected by the project. Therefore, an unprotected facility on the Newhalen River could result in a 10% loss of fish (300,000 smolts) passing through the turbines. Maximum use of devices to reduce fish losses could be expected to reduce this to 150,000 smolts. Because of the average survival rate of 10%, a facility such as the one being studied by Alaska Power Authority for the Newhalen River could be expected to result in an annual loss of about 15,000 adult sockeye salmon if all safeguards are built into the project and it is operated in a manner to prevent smolt losses. Without these safeguards, the loss could double to approximately 30,000 adults. Based on the above analysis, a run-of-the-river

hydropower facility on the Newhalen River would probably result in minor, long-term impacts on the Kvichak salmon run. This impact would increase to moderate if the losses occurred during a low point in the five-year cycle.

The above scenario represents a worst-case analysis. There is some evidence that use of 15 percent of the average river flow for power generation would not directly correlate to the percentage of smolts that would be drawn into the powerhouse. According to studies by the Alaska Power Authority, smolt and fry passing down the Newhalen River at river mile 7 may favor a "fast lane" located near the mid-channel of the river and some distance from the proposed shore intake. Salmon would be further prevented from entering the intake canal by a system of louvers and screens. Those fish which did enter would be subject to one or more other protection devices designed to remove them from the canal. This combined system has been successfully used at the Prairie Island Nuclear Power Plant in Minnesota (APA, letter dated Feb. 27, 1984).

In order to protect the salmon population using the Newhalen River, a hydropower facility would be operated to ensure adequate downstream flows throughout the year to protect spawning areas in the river. In addition, the facility is assumed to be equipped with barriers, deflectors and skimmers to divert fish around the turbine intakes, protecting the millions of salmon fry and smolts migrating downstream from Lake Clark to Iliama Lake.

The Alaska Department of Fish and Game has been working with the APA for setting goals for ensuring no net loss of fish. The Department must be satisfied with fish protection measures before a power plant can be built. Distribution of the energy produced by the Newhalen project would require approximately 500 miles of transmission lines, crossing as many as 19 salmon streams. Some short-term, localized impacts could occur during construction.

Minerals. Mineral development can have adverse impacts on fish and aquatic habitats (La Perriere, 1983; Madison, 1981; Hall and McKay, 1983). Of particular concern to salmon is placer mining in anadromous streams. Placer mining usually involves the addition of sediments to aquatic systems in quantities and sizes sufficient to disrupt normal relationships between stream discharge and sediment size and concentration. Other impacts that may be associated with placer mining include increases in organic loading and minor element content, acid drainage and reduction of aquatic biota (Madison, 1981). Sediment deposited in streambed gravels may be detrimental to the survival of salmon eggs, alevin, and fry. Oxygen depletion which may result from decreased gravel permeabilities, can lead to fungal infections, and delayed and/or impaired fry emergence. A decrease in production of aquatic plants and invertebrates through sedimentation and turbidity will reduce the food available to rearing and resident fish. Streams subject to heavy unnatural silt loads may require 5 to 20 years to recover after the source of the sediment has abated (Hall and McKay, 1983).

Under this alternative , certain segments of 64 streams, sections of which have been designated as anadromous fish habitat for an important portion of the Bristol Bay salmon resource, will be closed by DNR to new mineral entry.

These closures would reduce the possible impact of this activity on salmon. This alternative does not preclude placer mining on existing claims, non-anadromous streams or on Native lands, and it encourages activities that could lead to lode mining in such areas as Chignik, Perryville, Herendeen Bay, Port Moller and Pavlof Bay, that contain important salmon habitat. There could be effects similar to those described previously in those streams where mining occurs. Valid, existing placer mining claims within designated anadromous streams and their tributaries on state and federal lands would continue under present federal and state permit and discharge requirements designed to protect water quality and fishery values.

Aggregate effects. Estimated additional take of salmon by subsistence users as a result of settlement under this alternative would be approximately 14,450. This combined with the current average take for subsistence purposes results in a total of about 163,000 salmon which could be lost annually through subsistence by the year 2002. Impacts of oil and gas development are not quantifiable at this time because of the large uncertainties about where or what development, should it occur, would take place. However, it can be expected, barring a major oil spill, that if any significant impacts are experienced, they will occur primarily during construction activities and will be relatively short term. Even if the calculated number of major oil spills (two greater than 1000 bbls) as determined by the development scenario, should occur during the next 20 years, severe impacts would probably be localized and overall regional impact relatively minor.

Potential loss of fish as a result of a hydroproject on the Newhalen River could, on a worst case basis, result in a maximum annual loss of approximately 30,000 adult salmon.

Mining operations in the area are expected to increase, according to ISFP, by approximately 15% by the year 2002. This would result in one additional small placer operation somewhere in the region, 7 additional people at Nyac and 4 additional workers at Platinum. Current losses of salmon by regional mining activities are unknown.

If it is speculated that 500,000 adult salmon are lost per year through oil production and mining operations (probably a worst case), 30,000 by hydro development and 14,450 by increased subsistence useage, a total of nearly 544,500 fish could be affected by activities allowed under the proposed plan. This represents about 1.7% of the 1975-1983 average annual sockeye salmon run in Bristol Bay.

Conclusion. The cummulative effect of development activities discussed in the Proposed Plan could result in a moderate regional impact on Bristol Bay salmon stocks.

Impacts on Caribou

Settlement. Table 8-2 projects an increase of 112 new households by the year 2002. Table 8-3 indicates the average household harvests 1.3 caribou annually. This suggests that new residents would harvest an additional 146 caribou annually.

Table 8-3. Estimated Resident Household Subsistence by Subregion 1979-1981.[a]

Subregion	Total Households	Salmon/ Household	Total Salmon	Moose/ Household	Total Moose	Caribou/ Household	Total Caribou	Other Species
Togiak/ Kuskokwim	313	80	25,040	0.10	32	0.48	150	Seals, walrus, reindeer
Nushagak Bay and River	650	161	104,800	0.31	200	0.80	520	Beaver, freshwater fish
Iliamna Lake	143	463	66,209	0.40	57	1.70	243	Beaver, freshwater fish
Upper Alaska Peninsula	445	69.5	30,919	0.12	53	2.00	890	Waterfowl
Lower Alaska Peninsula	338	50	19,400	0.02	8	2.00	776	Waterfowl, other saltwater fish
Total	1,939	127	246,368	0.18	350	1.33	2,579	

a: Source: Nebeski et al., 1983.
Estimates are based on data provided by ADF&G Subsistence and Game Divisions for all subregions except the Lower Alaska Peninsula where estimates are based on Langdon and Brelsford (1981), in Nebesky et al. (1983).

Normal growth in subsistence and recreational demand for caribou over the next 20 years as projected by Nebesky et al. (1983), probably will require an increase from the present estimated level of 2,700 animals to nearly 5,000 animals. The relatively small number of additional caribou havested as a result of this plan (3%) would have little impact on caribou populations, but when added to projected normal demand, increases the likelihood that additional hunting restrictions will be necessary.

Oil and gas development. Key habitats occupied by both the northern and southern peninsula caribou subherds will be subjected to oil and gas exploration activities, over the next 20 years and beyond, under the Proposed Plan. Caribou from these two herds seasonally occupy habitat along the entire northern side of the Alaska Peninsula between the Naknek River and Cold Bay.

In the event commercial quantities of hydrocarbons are found, it has been assumed for purposes of analysis that a 4.0 trillion cubic foot (tcf) natural gas discovery will be made on the coastal plain south of Port Heiden within the north peninsula caribou calving grounds. The size of this field would encompass some 30 square miles within the estimated 1,500 square mile calving area.

The total land surface area affected by infrastructure development is estimated at approximately 2,000 acres, or about .2 percent of the north peninsula calving area. Production, which requires year-round operational and maintenance activities would affect caribou behavior and use patterns on at least a portion of the herd's calving grounds throughout the life of the field. Because past oil and gas activities have been so limited, there is little precedent for predicting reactions of caribou to exploration and production operations on the Alaska Peninsula. Predictive responses of caribou to oil and gas activities are therefore based largely on studies and observations made on Alaska's north slope. While some results are conclusive and some conflicting, all underscore the extreme complexity of interacting disturbance factors which affect herd dynamics. The most important factors

affecting reaction of caribou appear to be timing and location of activities in relation to key habitat areas. Studies suggest that caribou within the Central Arctic herd have apparently been displaced from calving areas as a result of industrial development near Prudhoe Bay (Cameron et al., 1979; Cameron and Whitten, 1980; Smith and Cameron, 1983). The same studies also suggest that birthing and immediate post-birthing caribou accompanied by calves are usually intolerant of stress and seek areas of little or no disturbance. Other observations near two wells on the periphery of the Prudhoe oilfield indicated that caribou cows with calves did not avoid the area because of drilling operations (Fancy 1983).

The reaction of caribou to a production facility is expected to vary with location and level of activity. If additional environmental stipulations are developed for site construction, drilling, consolidation of facilities, periods of use, aircraft overflights and other activities, many of the potential impacts would be mitigated. The degree to which animals avoid or shift away from portions of traditional calving grounds will depend on their level of habituation to disturbance and in-place production infrastructure. Studies done on the North Slope demonstrate that caribou tend to habituate to obstructions more readily if they are resident in the area of obstruction (Klein, 1980). Because the north peninsula herd migrates over vast distances, occupying the calving area for only a few months, habituation to disturbance and infrastructure may require a longer period of time than for the southern herd, where at least a portion of the herd remains in the area throughout the year. Some alteration in traditional use patterns is not expected to measurably lower overall herd productivity because of the relatively large geographical size of the calving area.

Effects of oil and gas exploration and development in key habitat areas on the Alaska Peninsula cannot be viewed in isolation. Free and undisturbed access to seasonal habitats must be viewed as an interdependent sequence of events--a perturbation in one phase of the caribou's annual cycle may result in reduced success of another part of the life cycle (Cameron 1983). Indeed, the long-term reproductive success of the northern herd may well be influenced by the type and magnitude of impacts from intensified oil and gas activities or human intrusions in other vital habitats such as winter range, summer range and migratory corridors.

The development scenario assumes a 36-inch buried pipeline will be constructed from the production area down to the vicinity of Port Moller to intertie with the Herendeen Bay - Balboa Bay corridor. Approximately 40-50 miles of the upland portion of this line will traverse traditional calving habitat although exact routing is only speculative at this time. Construction of this line might be constrained seasonally as a means of minimizing potential impacts on caribou behavior patterns.

Transportation corridors.

- Port Moller to Balboa Bay: Caribou are seldom present within the identified corridor route, thus development there would have little effect on the caribou population.

- Port Heiden to Kujulik Bay: The entire north peninsula caribou subherd of 15,000-20,000 animals utilizes a route southeast of Port Heiden during annual spring and fall migrations. The Port Heiden to Kujulik Bay transportation corridor would follow this migration route for approximately 10 miles, from Port Heiden to a point southwest of Aniakchak Crater. This portion of the corridor would traverse a caribou calving area, although the herd's primary calving grounds lie farther to the southwest of Port Heiden. It is not anticipated, given implementation of appropriate mitigatory measures, that the north peninsula herd would be adversely affected by this corridor.

- Pilot Point to Wide Bay: Approximately 20 miles of a proposed 50 mile corridor would cross a traditionally-used migration route. The route is used by animals of the north peninsula herd during spring and fall migration between Naknek and Port Heiden. With construction restricted seasonally and pipelines buried, only negligible impacts are anticipated.

- King Cove to Cold Bay Road: The 6-10 mile segment around the north side of Kinzarof Lagoon would follow the same route used by southern peninsula caribou migrating between their winter range south of the village of Cold Bay and their calving grounds in the Black Hills-Cathedral River area. In most years, nearly 6,000-7,000 animals pass through the narrow (5-6 mile) area between Kinzarof and Izembek lagoons during September and October and again in March and April. The presence of a road, vehicular traffic, and intensified human use could alter migratory patterns in this area. Studies conducted along the Dempster highway in the central Yukon suggest that increasing vehicular traffic and human presence pose a serious barrier to caribou movements (Surrendi and DeBock, 1976). Harvest levels would likely increase as the animals become more vulnerable to hunting due to improved human access into a high concentration area. Additional hunting restrictions might be needed to protect this herd from over-harvest.

Energy. Impacts to caribou from regional hydroelectric power facilities would result primarily from routing power transmission lines from the generating facility to community centers in the upper Bristol Bay region. Other impacts would result from line monitoring by aircraft and opening rights-of-way to the public.

Transmission lines would traverse winter habitat used by the Mulchatna caribou herd. This herd is one of Alaska's 13 major caribou herds and presently numbers 15,000 to 20,000 animals.

Lines and poles would be placed by helicopters and ATV's. Animals would probably avoid areas during construction, as caribou are highly sensitive to low-flying aircraft, particularly helicopters. Reaction of caribou to power lines is unknown. There could be an initial reluctance, especially by cows and calves, to cross a newly-established visual barrier. Animals reluctant to cross the line might avoid traditional wintering habitat south of the Kvichak

River. The extensive area occupied by the herd would probably limit impacts to local population shifts away from activity zones, during construction and shortly thereafter. More studies are necessary to fully assess the effects of transmission lines on caribou movements.

Public use of transmission line rights-of-way could result in increased harvest levels above the current estimated kill of 300-400 animals annually. Magnitude of this increase would depend on local human population growth over the planning period.

Minerals. Parts of the upper Mulchatna River drainage and lands east of Iliamna Lake would remain open to new mineral exploration and development, although portions of 64 anadromous fish streams in the same general area would be closed to new entry. This situation may allow a slight increase in mining activity in the area with a comparable increase in caribou harvest by mining personnel. The effects of this increase would probably be localized and negligible on a regional basis.

Aggregate effects. The three regionwide caribou populations could all be influenced by actions which might occur under this alternative. The small increase in harvest due to settlement projected with this plan (less than 150 animals annually) would have little impact on caribou populations. Continuing increases in demand irrespective of settlement will probably require increased hunting restrictions.

Potential for finding hydrocarbons (primarily gas) is highest in habitats occupied by the north peninsula herd. Consequently, this population would be affected to a greater degree by oil and gas activities than the other caribou herds. This would be particularly true if other than the Port Moller to Balboa Bay corridor is used for a pipeline. Assuming however, that pipelines through essential caribou habitat would be buried and construction regulated seasonally, impacts from corridor development would be minor.

The King Cove to Cold Bay road could have major local impacts on the southern peninsula herd. Strict enforcement of hunting restrictions and wise management could reduce this local impact to moderate.

Development of a major hydropower project at Newhalen and an associated transmission system would probably cause some local populations of the Mulchatna herd to shift away from the activity zone. These impacts would largely cease upon completion of construction. Effect of the in-place transmission system is unknown, but its presence might cause some disruption of normal migrational patterns. Mining activity would produce no measurable increase in the caribou harvest or effect the regional population.

Conclusion. Impact to both the southern and northern peninsula subherds could range up to moderate depending upon the level of oil and gas activity, transportation facilities constructed and degree of constraints applied. Impacts to the Mulchatna herd will be minor. On a regional basis, impacts to the caribou population from activities influenced by the Proposed Plan would be minor.

Impacts on Moose

Moose densities vary considerably throughout the Bristol Bay region. Animals are rarely seen in the area west of Port Moller-Herendeen Bay, while highest concentrations are generally found in the wooded/brushy areas (not necessarily lowlands) from Cinder River to the Ugashik Lakes west of Katmai, Branch River and several areas west of Lake Clark. Moderate concentrations occur in the vicinity of the Chignik drainage. Though the moose population of the total study area is unknown, Game Management Unit 9 alone has an estimated population of 4,000-5,000 moose (D. Sellers, ADF&G, Pers. Comm. 1983). Moose habitat, on a regional scale, would be virtually undisturbed by activities permitted by the Proposed Plan. The animals themselves are very tolerant of human activity. Impacts would be largely limited to temporary displacement and a long-term increase in subsistence and recreation harvest.

Settlement. Table 8-2 projects a total of 112 households resulting from settlement under this alternative. Approximately 37 additional animals would be harvested to meet expected subsistence needs based on a current estimate of 0.33 moose taken per average household in the Nushagak and Iliamna Lake area. Most of this increase is expected to be supplied by moose in the lower Nushagak river drainage and Iliamna Lake area. Present moose populations are not sufficient to meet normal growth in subsistence demand by the year 2002 (Nebesky et al., 1983). Increases in subsistence harvest stimulated by additional remote settlement would exacerbate the supply-demand situation.

Oil and gas development. Moose are found throughout much of the area where exploration and development would occur. Approximately 20%, or 360,000 acres, of the area between Port Heiden and Ugashik Bay has been identified by the ADF&G as essential winter habitat for moose. The most likely activity in this area would be seismic testing.

Moose are relatively difficult to disturb (Denniston, 1956) and readily adapt to the presence of man (Peterson, 1955). Studies conducted on the Kenai National Wildlife Refuge suggest that moose are not particularly sensitive to external stimuli (explosive charges) as a result of seismic research within occupied winter habitat (Bangs and Bailey, 1982). Activities in the 30-square mile gas production field in the uplands south of Port Heiden would result in localized changes in distribution and movement patterns, but would probably not affect overall productivity. Exploration and development of an oil field in the tidelands would not measurably affect moose habitat but could bring some pressure on the population through increased sport harvest by oil field workers.

Transportation corridors. Two of the three proposed corridor routes (Port Heiden to Kujulik Bay and Pilot Point to Wide Bay) traverse essential winter moose habitat.

Moose are found throughout the proposed Port Heiden-Kujulik Bay corridor. They are concentrated in riparian habitat along the Meshik River and tributaries and drainages along the Pacific coast from Cape Kumlik to the

Aniakchak River. Population densities along this route fluctuate on a seasonal basis. The highest densities are found in winter along the 25-mile segment of the upper reaches of the Meshik River and from Meshik Lake to Aniakchak Bay. Because moose occupy this area year-round, construction activities could cause some temporary displacement during peak construction in the corridor. Once construction activity subsided however, moose would reoccupy the habitat, since they exhibit tolerance to human presence, and other disturbance. It does not seem likely that integrity of the local population would be adversely affected by this activity. Development of port facilities in Aniakchak Bay may result in avoidance by moose of at least a portion of their habitat in the Cape Horne-Black Creek area along the upper end of the bay. Localized displacement of a few animals would undoubtedly occur.

The Pilot Point/Wide Bay route north of the Dog Salmon River represents one of the highest winter concentrations for moose on the Alaska Peninsula. Activity within this corridor, e.g. pipeline monitoring, local vehicular traffic, etc., could result in displacement of at least a portion of this herd from traditionally occupied habitats. Some increase in harvest levels would also be expected because of improved access provided by the corridor.

Minerals. A slight increase in mining activity could lead to an additional harvest of moose by mining personnel primarily in the Upper Mulchatna and Iliamna Lake drainages.

Aggregate effects. The effects of gas and oil activities are expected to result in temporary displacement of animals from habitats where seismic and exploratory drilling operations are conducted. Should permanent facilities be installed, some increase in sport harvest by maintenance personnel could be expected. Implementation of the remote settlement program would increase subsistence harvest in the Nushagak and Iliamna Lake area, while transportation corridor development could contribute to a small increase in harvest on the peninsula due to improved access.

Conclusion. Actions which might occur under this proposal would result in minor impacts to the regional moose population.

Impacts on Brown Bear

Brown bear are found throughout the Bristol Bay region, but are concentrated on the coastal lowlands of the Alaska Peninsula. Impacts on brown bear, like caribou, are expected to arise primarily from activities associated with oil and gas exploration, development, and transportation. Impacts from settlement, energy development, and mining could be moderate in local areas, especially near some settlements but would probably be negligible on a region wide basis. Although pipeline construction may cause bears to den elsewhere, much suitable denning habitat exists throughout the peninsula and habitat is not considered a limiting factor affecting the bear population (ADF&G Comments on DEIS, Oct 1983).

Oil and gas development. Although an estimated 75%, or 3.5 million acres of identified important brown bear habitat in the Bristol Bay planning area could be made available for oil and gas resource leasing if this alternative is implemented, the scenario assumes that exploration would occur only on uplands in management unit 14. This area contains several important denning and stream concentration areas south of Naknek Lake, outside the western boundary of Katmai National Park and Preserve. It is also bisected by a heavily used stream concentration area along the King Salmon River and a critical spring use area occurs on the north shore of Becharof Lake in the Whale Mountain area. Brown bear using these areas could potentially be affected by exploratory activity, especially if these activities disrupted their travel patterns to and from the denning areas and spring use areas, or their feeding activity along the King Salmon River.

Exploration activity could also occur throughout the tidelands. It should be noted that nearly the entire coastline and approximately 50% of the uplands from Port Heiden to Port Moller are essential spring use areas, and important summer and fall areas. If oil or gas is discovered and development occurs in the area, increased human presence can be expected to result in increased hunting pressure and harvest, as well as bear/human confrontations resulting in more animals being killed in defense of life or property.

A 10-year delay in tide and submerged land leasing would postpone but not prevent potential impacts on brown bears along the coastline.

Transportation corridors.

- Port Moller to Balboa Bay: Brown bear occupy feeding, denning and spring-use habitats throughout this corridor. Construction of a pipeline in this corridor would probably alter some important habitat, especially where the pipeline comes ashore from the lower reaches of Herendeen Bay near denning areas in nearby Buck and Deer valleys. This area is in near-proximity to an essential spring-use area, and close to known denning areas. Some of the den sites in Deer Valley nearest to the corridor might be abandoned as a result of construction disturbance, pipeline structures and intensified human activity. Denning activity would probably recur, however, once construction was terminated and conditions in the area stabilized. Onshore portions of the corridor from Lower Herendeen Bay to Beaver or Lefthand Bays would bisect bear travel routes between denning and spring use areas. Localized movements between these areas could be disrupted if some construction activities were not seasonally restricted to the November-March period, a time when most bears are denning. Once the pipeline construction ceased, movements between these areas would be altered periodically by vehicle use along the access road.

  Kagayan Flats, on the Pacific coast of the peninsula near the proposed LNG facility, is an essential spring-use area during post-denning periods (May-June) when body condition is poorest and nutritional demands are highest. Bears, especially sows with cubs, displaced from critical food

sources by construction activities, could be subject to increased stress and possibly higher cub mortality rates. Port and LNG facilities developed in either Beaver or Lefthand Bay would result in intensified marine traffic. Bears could react by avoiding essential feeding areas such as salmon streams emptying into these bays, resulting in increased competition in other areas and ultimately lower recruitment. Intensified activity over the long term could eventually cause brown bears to abandon traditional feeding sites altogether, including the Kagayan Flats.

Activity associated with construction, including air and ground logistical support systems, development of camp facilities and increased human presence, as well as operational port tankering facilities could be expected to displace some animals within this local area.

- Port Heiden to Kujulik Bay/Aniakchak Bay: The 44-mile route from Port Heiden to either Kujulik or Aniakchak Bay would cross approximately 10 miles of essential spring use area in the lower portion of Port Heiden. Approximately 150 square miles of coastal lowland habitat borders both sides of the lower Meshik River, and is within 3 miles of known denning sites along the western slopes of the Aniakchak Caldera. This corridor separates an important denning region and an intensive spring-use area, and would cross 13 salmon streams. A port site at the head of Aniakchak Bay would be within the 20-square-mile essential spring-use area. The proposed port site at Kujulik Bay would be located near the mouth of North Fork Creek, an important feeding area.

  Port sites in Kujulik or Aniakchak Bay could increase disturbance-related activity to a point where bear use would be eliminated altogether in the entire Cape Kumlik region. As many as 20 square miles of essential spring-use area, and use of two miles of important feeding streams would be disturbed by port development, nearshore marine and air traffic, and human activity. Changes in the coastal population of bears would be determined largely by the animals' ability to adapt to post-development levels of activity. The most likely result would be short-term avoidance of construction sites as work progresses along the route. Long-term effects could be nearly complete abandonment of the Cape Kumlik region where port facilities are proposed. The loss of some bears could be permanent, assuming bears are now at carrying capacity in the region.

- Pilot Point to Wide Bay: The two alternate routes for this corridor via either Elizabeth Lake (north) or Goblet Creek (south) would traverse stream concentration areas used by brown bear in the Ugashik Lakes region. The northernmost route would cross at least six salmon streams where bears congregate in late summer and fall. The southern route would traverse 3 miles of a suspected denning area in the upper Figure Eight Creek drainage north of Lone Hill and southwest of Mt. Alai. Bears may be at least temporarily displaced from traditional feeding sites, should construction coincide with the salmon spawning season. Disturbance-producing activities within one mile of dens may cause animals to select more distant denning sites if disturbance is intense and

persists through pre-denning periods (October-November). A port facility in the upper region of Wide Bay would increase the level of disturbance in this remote area. Traditional feeding areas at the mouths of Alai and Khalaguik creeks could be abandoned altogether as onshore development increased, resulting in the permanent displacement of some individuals.

- King Cove to Cold Bay Road: The proposed King Cove to Cold Bay road would result in expanded human presence and traffic in the area. It would also provide greater access into a relatively remote, undisturbed region in the Joshua Green River drainage and in key bear use areas in Right and Lefthand valleys. Bears could be expected to change their behavior in response to human presence, and might abandon some traditional use areas, especially during road construction. Sport harvest levels could increase with ease of access and additional hunting restrictions might be required at some point in the planning period to help maintain the biological integrity of the Izembek Refuge population.

Aggregate Effects. Combined oil and gas activities and transportation corridors could result in long term adverse impacts to brown bear, particularly the population between Port Moller and Port Heiden which uses the coastal plain environment. The increased level of activities and human presence within the Bristol Bay uplands resulting from oil and gas activities could displace bears from traditional key habitats. However, denning habitat is abundant on the peninsula and is not considered a limiting factor to bear reproduction. Increased access from corridor and road development would further add to some declines in bear populations as a result of poaching and bears killed in defense of life and property. Energy and mineral development would add to displacement of some animals from traditional habitats but that disturbance would be localized and of short duration.

Conclusion. Region-wide impacts on brown bear would probably be moderate, but impacts to some local subpopulations from transportation development, primarily in the Balboa, Kujulik, and Wide bay areas, could be major.

Impacts on Waterfowl and Marine Birds

The estuaries, lagoons, and bays of Bristol Bay are vital staging grounds during migration for ducks, geese, swans, and shorebirds. Essentially all of the North American population of black brant, emperor geese, cackling Canada geese, and large numbers of white-fronted and snow geese depend upon the area in the spring and fall. Migrating ducks total over a million birds while the number of shorebirds is even greater. The region is less important as breeding habitat for waterfowl, producing a fall flight of about 600,000 ducks, 10,000 tundra swans, and a few geese. However, Bristol Bay provides essential nesting habitat for seabirds, whose numbers total about two million.

The Bristol Bay tidelands are used by staging waterfowl in the spring and fall and approximately 250,000 seabirds nest in 14 colonies along the coast between Pilot Point and False Pass (Sowls et al., 1978). Berries in the uplands provide food for snow geese and Canada geese during the fall migration. The

uplands are not heavily used by nesting waterfowl, although some of the inland lakes and ponds serve as nest sites for tundra swans and dabbling ducks.

Settlement. A total of 14,000 acres of land would be offered for remote settlement. This would be primarily in uplands in the northern portion of the study area (See table 8-1). Marine birds would not be affected and waterfowl would only be affected to a minor extent in local areas as a result of disturbance of some nesting birds and possible destruction of a small amount of habitat.

Oil and gas development. Impacts on waterfowl and marine birds from oil and gas exploration and development would arise from localized disturbance, habitat alteration, and in the event of a spill, oil pollution. With respect to waterfowl in tide and submerged lands, considerable noise would arise from air and boat traffic, use of explosives during seismic surveying, and drilling. Hunting levels and disturbance by humans on foot could also increase in and around construction areas. While on staging grounds in the spring and fall, waterfowl (geese in particular) are very sensitive to noise (Davis and Wiseley, 1974; USDI, BLM, 1976; Simpson et al., 1982). Continued harassment could cause birds to abandon tideland staging areas in favor of less suitable but more isolated sites (Gollop et al., 1972; USDI, BLM, 1976, 1982a; USDI, FWS, 1983a). Disturbance occuring on breeding or staging grounds could lower reproduction and survival rates for the duration of the disturbing activity.

Development of oil or gas could have more effects than exploration. Levels of disturbance would rise as the numbers of people and facilities increase. Habitat alteration would also increase, particularly if a support base and feeder pipelines to Port Moller were built and an LNG processing plant were constructed at Balboa Bay.

Development of oil and gas in the tide and submerged lands could provide an additional source of impact should oil and contaminant pollution from tanker accidents or pipeline or processing plant leaks occur.

Diving ducks and seabirds are among the most sensitive animals to oil pollution (USDI, BLM, 1982). Direct contact with oil may be fatal, through hypothermia, shock, drowning, starvation, or increased vulnerability to predators (Hamilton et al., 1979; Strauch and Hunt, 1982; USDI, BLM, 1982). Ingestion of oil, by eating contaminated food or by preening oiled feathers, causes internal and behavioral disorders and reduces hatchability of eggs (Hamilton et al., 1979; USDI, BLM, 1981; Strauch and Hunt, 1982). Eggs and chicks could be contaminated by oil adhering to parent birds (Hamilton et al., 1979).

Food sources may be contaminated, eliminated, or considerably reduced, which could seriously affect waterfowl during spring and fall migration when energy demands are high and depleted body reserves must be replenished (Strauch and Hunt, 1982; USDI, BLM, 1982). Minor but chronic oil leaks, as well as major spills, are hazardous to waterfowl and seabirds (Bartonek et al., 1971; Strauch and Hunt, 1982).

Proposed Plan

A 10-year moratorium placed on leasing state tide and submerged lands, would delay potential impacts. Impacts might also be reduced as a consequence of continually improving oil and gas industry technology. Oil and gas activities in uplands would have little impact on waterfowl.

Transportation corridors.

- Port Moller to Balboa Bay: The coastal reaches of this proposed corridor pass through or near excellent waterfowl habitat. In the spring and fall, the extensive eelgrass beds in Port Moller and Herendeen Bay are heavily used by geese, ducks, and shorebirds to replenish energy reserves. Port Moller and the adjacent Nelson Lagoon are major spring and fall staging areas for emperor geese (over 100,000 use Nelson Lagoon annually) and may host as many as 500,000 ducks (including 10,000 Steller's eiders) in the fall (USDI, FWS, 1980). The area is also an important wintering area for emperor geese and diving ducks (USDI, FWS, 1980). Balboa Bay, at the terminus of the corridor, is another wintering area for diving ducks. Six seabird colonies in the Port Moller area support nearly 16,000 seabirds, including 1,000 Aleutian tern (Sowls et al., 1978). The Shumagin Islands, offshore of Balboa Bay, support nearly half a million nesting seabirds (Sowls et al., 1978). Parts of the corridor pass through wetlands where swans and ducks nest in low densities.

  This corridor is considered the most likely to be developed of the three considered under this alternative. Threats of earthquakes and landslides are relatively high (Davis and Jacobs, 1980; Davies, 1981), adding to the potential for pipeline ruptures, spills at port facilities and tanker accidents. However, unless spills or leaks occur, in which case there could be major short-term impacts to marine birds and waterfowl in the immediate coastal area, long-term effects of this corridor would be minor.

- Port Heiden to Kujulik/Aniakchak Bay: Port Heiden is an essential staging and molting area in the spring and fall for up to 25,000 emperor geese and also many Canada geese, brant, and eiders (USDI, FWS, 1983b). Aniakchak Bay is heavily used by brant in the spring. Three seabird colonies with a total of 6,000 birds (including over 100 Aleutian terns) are located in Port Heiden; and several small colonies are in Kujulik and Aniakchak bays (Sowls et al., 1978). Overland portions of the corridor would pass through sparse waterfowl nesting habitat.

  Likelihood of earthquakes or landslides is less for this corridor than in the other two corridors proposed by this alternative (Davis and Jacob, 1980; Davies, 1981). Both proposed ports are exposed to violent winds, increasing the possibility of navigational problems and the possibility of

tanker spills. Oil leaks or spills could result in major local impacts to marine birds and waterfowl in the immediate coastal area affected. These impacts would probably be short-term. Unless a spill were to occur, use of this corridor would result in minor impacts to marine birds and waterfowl.

- Pilot Point to Wide Bay: The intertidal flats and the berry-producing uplands of the Ugashik Bay-Pilot Point area are heavily used in the fall by nearly all cackling Canada Geese and many brant, snow, white-fronted, and emperor geese (USDI, FWS, 1980, 1983b). Peak numbers of waterfowl may exceed 100,000 (USDI, FWS, 1980). Wide Bay is a key fall staging area for emperor geese, cackling Canada geese, brant, and dabbling ducks, as well as a molting and wintering area for diving ducks (USDI, FWS, 1983b). At least 2 seabird colonies totalling about 4,000 birds are located in Wide Bay (Sowls et al., 1978). The initial 25 miles of the corridor pass through wetlands where swans and ducks nest in low densities.

  Tanker traffic utilizing a port in Wide Bay could make the bay less desirable to nesting seabirds and staging for wintering waterfowl. The corridor itself would slightly reduce the amount of nesting habitat for waterfowl by passing through small lakes and ponds.

  Because of the stability of the terrain across the peninsula from Pilot Point to Wide Bay, the chances of pipeline ruptures from landslides or earthquakes are lower than in corridors farther down the peninsula (Davis and Jacob, 1980; Davies 1981). This corridor would have a minor impact on waterfowl and seabird habitat.

- King Cove to Cold Bay Road: Loss of some swan and duck nesting habitat would be inevitable. While the actual proposed corridor is not a waterfowl high use area, the road would provide easier access to areas of high use. Unless people were prevented from entering areas of essential habitat, the disturbance resulting from road access could have a major long-term impact on local waterfowl populations.

Energy. The Newhalen project would primarily affect upland areas. Despite its expanse it would, with the exception of extension of a power line to Egegik Bay, be unlikely to affect estuarine or tideland habitat, and would have only minimal effect on waterfowl upland nesting areas. Egegik Bay is an important staging area for snow geese in the fall and white-fronted emperor geese in the spring (USDI, FWS 1983b). The construction of a transmission line could temporarily disturb staging waterfowl, or disrupt the estuarine ecosystem, thus reducing their food source. In either case, some birds might leave the area for less ideal habitat, thus indirectly affecting their welfare or survival. With the substantial migration across the peninsula at Egegik, and local movement to and from ponds and wetlands, some birds are bound to strike a powerline across Egegik Bay. This would have a moderate long-term impact on waterfowl in Egegik Bay. Transmission lines in the interior would not likely be struck by migrating birds as frequently and would produce a lesser impact.

Minerals. Some mining sites would be in the uplands, away from significant waterfowl habitat. However, waterfowl in the lowlands could be indirectly affected by impaired water quality transmitted downstream by mining activity. This alternative precludes new mineral entry in portions of 64 salmon streams in the study area. Existing valid claims on these streams could still be worked, however. Lowlands near the mouths of streams where placer mining occurs could be degraded, thus affecting their value as staging and feeding areas. Region-wide effects from mining would be minor.

Aggregate effects. Of the three corridors identified in this proposal the Port Moller corridor would probably be the most damaging to waterfowl, as its northern end has the potential for affecting the greatest amount of high use waterfowl habitat. Most of the development in Bristol Bay would be localized, small-scale and short-term, resulting in little permanent loss of waterfowl or seabird habitat. Oil or contaminant leaks and major spills, placement of a pipeline, and the operation of terminals and a possible LNG processing plant have the potential for a major aggregate impact on waterfowl and seabirds, in local areas.

Conclusion. The cumulative impact of activities addressed by this proposal on marine birds and waterfowl would be moderate with possible major impacts in localized areas.

Impacts on Marine Mammals

Of the five major development categories evaluated in this EIS, three (settlement, minerals, energy) will have no significant effct on marine mammals, and are thus not discussed in detail. The following analysis concentrates on activities likely to affect marine mammals: oil and gas exploration and development, and transpeninsula transportation corridors.

Oil and gas development. Oil or gas exploration impacts to most marine mammals would not occur for at least ten years under this alternative since no leasing of tidal or submerged state lands could occur before 1994 and possibly later. Impacts generated by upland activity would be negligible. Following the moratorium on leasing, a low potential for some effects on marine mammals from oil and gas operations would develop. Continued closure of the Fisheries Reserve, the Bay's north shore and bays and lagoons along the south shore would substantially reduce the potential for conflict between oil and gas development and marine mammals. This would be particularly important for seals congregating in bays and estuaries, walrus which utilize the Walrus Islands and beluga whales feeding near the head of the Bay.

Some sea otters, which are year round residents, and to a lesser degree a few seasonally migratory whales, specifically the endangered gray, could be at risk. Construction disturbance would displace some sea otters to quieter habitats which may lead to a minor population decline if alternate habitats

are at carrying capacity. Migratory whales would probably move further offshore to elude disturbed areas but should suffer no reduction in population as a result.

Among Alaskan marine mammals, sea otters are probably the most sensitive to oily aquatic pollutants because of their high metabolic rate and dependence on trapped air in the fur for thermoregulation. Accidents which lead to oil pollution could seriously affect otters failing to avoid the spill area. Segments of populations so affected could suffer sharp declines but the effect would be quite localized and impact on the overall otter population would probably be negligible.

Whales, seals, sea lions and walruses which might wander into spill areas could suffer some skin, eye and mucous membrane irritation from the more toxic elements of the pollutant but little mortality would occur and the effect on the overall population would be negligible.

Existing federal and state statutes governing oil and gas activities would reduce the probability and severity of potential impacts to marine mammals.

Transportation corridors.

- Port Moller to Balboa Bay: Harbor seals are abundant in Port Moller and Herendeen Bay on the Bristol Bay side, and in Beaver, Balboa, and Dorenoi Bays on the south side. The area around Cape Rozhnof at the mouth of Port Moller supports high seal densities. Sea otters occur near the bays on the Pacific side of the peninsula. The endangered gray whale migrates along both Pacific and Bristol Bay coasts in the spring and summer, entering bays and lagoons to feed. Two sea lion rookeries that support a total of about 650 animals are located on islands south of Beaver Bay (ADF&G, 1973; Frost et al., 1982).

  The possibility of landslides or volcanic activity, and the resulting possibility of pipeline spills or tanker accidents, is greater for this corridor than for identified corridors located further northeast on the peninsula (Davis and Jacob, 1980; Davis, 1981). The possibility of tanker accidents is greater in Beaver and Dorenoi Bays, which are unsheltered from violent winds. Tanker accidents or spills at the transfer point could impact marine mammals remaining in the area.

- Port Heiden to Kujulik Bay/Aniakchak Bay: Harbor seals occur in Port Heiden (up to 10,000 in summer) and on Cape Kumliun in Kujulik Bay, and can be found throughout Kujulik and Aniakchak Bays. Kujulik and Aniakchak bays support a substantial population of sea otters; otters also occur along the Bristol Bay coast outside Port Heiden. Up to 50 male walruses haul out in Port Heiden in the summer. A small sea lion rookery of approximately 10 animals is located on Cape Kumlik on the western end of Kujulik Bay. Five sea lion rookeries, containing a total of at least 1,500 animals, are located on islands within 20 miles of Kujulik and Aniakchak Bays (ADG&G, 1973; Frost et al., 1982).

Both Kujulik and Aniakchak are deep bays and little habitat alteration from dredging would result if ports were built. The probability of earthquakes or landslides is lower for this corridor than for the Port Moller corridor. However, both bays are exposed to winds, increasing the probability of navigational problems and vessel accidents. A slight population reduction might result from terminal development; short-term losses could be caused by spill accidents.

- Pilot Point to Wide Bay: The coastal reaches of this proposed corridor are situated in important marine mammal habitat. Harbor seals occur along the Bristol Bay coast of the Alaska Peninsula, and are concentrated in Ugashik Bay (up to 450 in summer), the northern end of the proposed corridor. Wide Bay, the terminus, also supports harbor seals, with large concentrations on several islands at the mouth of the bay. Sea otters occur throughout Wide Bay. Endangered gray whales can be found along both coasts and in the bays during their spring and summer migrations (ADF&G, 1973; Frost et al., 1982).

  Little habitat alteration would be necessary to create a deep and sheltered harbor in Wide Bay. However, many of the rocks at the mouth of the bay are navigational hazards that would have to be removed, probably by blasting. Some of these rocks currently support a population of harbor seals.

  Because of the relative geologic stability of the terrain and the suitability of Wide Bay as a port, the probability of oil pollution due to accidents is reduced (Davis and Jacob, 1980; Davis, 1981). In addition, little habitat would need to be altered to create a port and shipping lanes at this site.

Aggregate effects. Marine mammal populations utilizing Bristol Bay would be marginally affected by activities likely to occur with this alternative. Settlement, hydroelectric projects, road construction and mineral activities would not measurably affect marine mammals. Transportation development in the Port Moller/Balboa Bay corridor could effect some local populations of sea otters and seals during construction operations but these effects would be short-term. Spill events at terminal sites could also effect otters and seals but such impacts would be localized and would be attenuated by cleanup mechanisms. Development of this corridor would be the least detrimental to marine mammals of the three identified transportation routes. Oil and gas development following the 10-year moratorium could affect some Bristol Bay marine mammals, principally sea otters, seals, walruses, and migrating whales. Impacts would generally be localized and short-term.

Conclusion. Effects of activities allowed by this proposal would produce negligible to minor impact on marine mammals. In the unlikely event of a major oil spill localized impacts could be major but short term.

IMPACTS ON SOCIOECONOMIC RESOURCES

Impacts on Subsistence

The following analysis relies on information provided by ADF&G, and on a report done for the Alaska Land Use Council Study Group by the Institute of Social and Economic Research (ISER), entitled "Economic, Subsistence and Sociocultural Projections in the Bristol Bay Region" (Nebesky et al., 1983).

Taking of fish and wildlife and other natural resources for subsistence use is based on a history of customary and traditional practices. This harvest and use of a renewable resource fulfills economic, social and cultural needs. The State's subsistence statute and ANILCA have recently defined subsistence uses as "customary and traditional uses" of wild, renewable resources by local residents. These laws provide subsistence uses a priority over other use of fish and wildlife in times of resource shortage. This priority is implemented by the Alaska Boards of Fish and Game under current statutes and regulations.

Salmon and caribou are the two most important subsistence resources taken by residents of nearly every community in the Bristol Bay region. Moose and waterfowl are also important in some areas and marine mammals are important specifically to residents of the Togiak area. Many other species are also harvested for subsistence on at least an occasional basis.

Table 8-3 lists the estimated average subsistence harvest for resident households within the five subregions for 1979-1981. Each of the subregions has significant levels of harvest for the two most important subsistence species. The low harvest levels for moose and caribou in the Togiak/Kuskokwim subregion and for moose on the lower peninsula are indicative of resource supply, not lack of demand.

Settlement. Table 8-1 names the settlement locations for each of the plan alternatives, some of the subsistence resources present in each of these locations and the villages reporting use of the area as mapped by ADF&G's Subsistence Division.

New settlements located in or near areas already used for subsistence will lead to increased competition for local resources, and the possibility that subsistence allocations will be reduced. New settlements in subsistence areas already used by several villages would be more likely to increase competition than those located in areas that receive light use.

The proposed remote settlement parcels northwest of Dillingham would be in areas used for moose by the villages of Manakotak, Platinum, Togiak, and Twin Hills. Moose populations in the general area are now low, probably due to subsistence and sport hunting already occurring in the area and consequently does not constitute a major additional food source. Additional settlement would thus have a small immediate impact. However, an increase in harvest when populations are already low would delay or possibly prevent herd

recovery. Additional legal harvest is not likely to be permitted until moose populations increase. Residents of Dillingham, Clark's Point, and Portage Creek use the Etolin Point area for caribou, moose, beaver, waterfowl, and fishing. Offshore areas to the west are used by a number of villages for marine mammal harvest. The Big Mountain land disposal area on Iliamna Lake is used by residents of Iliamna, Kokhanok, Igiugig, and Levelock for moose hunting with caribou taken incidently. The Kokhanok Lake area is used by residents of Iliamna and Kokhanok for moose and waterfowl, and the Newhalen land disposal area is used by residents of Pedro Bay, Iliamna, Newhalen, Nondalton and New Stuyahok for fish, waterfowl, beaver, moose, and caribou. Residents of Iliamna, Newhalen and Pedro Bay use the Chekok Lake area. Residents indicate that the Chekok Lake land disposal would have the least impact on their subsistence activities of the sites proposed. The Kokhanok Lake and Newhalen River land disposals were also identified by local residents as having less impact on their subsistence activities than other disposals in the Iliamna Lake region.

Subsistence use is not indicated for the American Bay and Dorenoi Bay disposals, however, residents of Sand Point use this area for subsistence. Part of the Port Moller North settlement area is used for subsistence hunting by residents of Nelson Lagoon.

Nebesky et al. (1983) projected demand for caribou to exceed supply throughout the region by 1990, regardless of any actions of the BBRMP. Demand for moose already exceeds supply. Much of the anticipated demand for caribou and present demand for moose is the result of human population increases in both the region and other parts of Alaska. Assuming that state land disposals would lead to an estimated 336 new permanent residents by 2002 (Table 8-?) spread among the disposal areas described above, the problem of demand outstripping supply will be further exacerbated, particularly near Dillingham and in the Iliamna Lake region.

One of the greatest impacts of state land disposals could result from the state game board continuing to use residency as a criteria for defining subsistence use when implementing the subsistence law in times of scarcity. State land disposals would result in an increase in permanent residents in remote parts of the region, increasing the number of subsistence users. The game board could eventually reduce bag limits for subsistence harvest of moose and caribou. Further, if game regulations are not effective in maintaining a sustained yield of wildlife resources, significant long-term population declines could occur. This situation is most likely to affect moose, because of present low numbers. Settlement under this alternative would have no significant impact on subsistence salmon fishing (see Impacts on Salmon).

Oil and gas development. Oil and gas exploration activities would not result in a noticable permanent population increase. With a 10-year moratorium on exploration leasing of tidelands under the Proposed Plan, the earliest that tideland development impacts could occur would be 1994.

Development in the calving grounds and exploration throughout the region, combined with development of transportaion corridors, could have moderate effects on the north peninsula caribou herd. People utilizing this herd could have their subsistence harvest of caribou reduced, which would have a moderate local impact. Villages reported to harvest the north peninsula herd for subsistence are: Aleknagik, Clark's Point, Dillingham,, Egegik, King Salmon, Manakotak, Naknek, Pilot Point, Port Heiden, South Naknek, Ugashik, Twin Hills and Togiak.

There would be little impact on subsistence use of moose from oil and gas exploration and development, because these activities would have little effect on the animals themselves. Neither offshore nor upland oil and gas activities would significantly affect subsistence use of salmon at the regional level. However, an oil spill that affects large populations of fish headed for a particular drainage could have a major, local impact on subsistence fishermen utilizing that drainage.

Transportation corridors. The assessment on caribou concludes that only minor impacts, other than additional hunting from improved access are likely to occur based on transportation corridor development. An above-ground pipeline, however, constructed due to geophysical constraints, could moderately reduce the population of the north peninsula caribou herd in the Port Heiden to Kujulik Bay corridor. The assessment for impacts on caribou from the King Cove to Cold Bay road suggests that increased disturbance and access resulting from this road could have a moderate, long-term impact on caribou. This could be passed on to subsistences users in the form of restrictions in local harvest. Increased access along the King Cove to Cold Bay road, Port Heiden to Kujulik Bay corridor and Pilot Point to Wide Bay corridor could result in increased hunting pressure. Unless additional hunting regulations are imposed and enforced along any public use corridors, moderate local impacts could occur to subsistence users of caribou and moose along these corridors because of increased accessibility.

Transportation corridors would have little direct effect on moose, and overall little effect on subsistence use of moose. It would increase accessibility to local hunters, thereby having some additional impact along the corridor routes.

The possible loss of salmon through oil leaks from pipelines in the transportation corridors would have little effect on salmon from a regional perspective. However, there could be major, short-term losses in stocks of particular drainages from a large oil spill. This could cause subsistence users to go elsewhere for harvests or do without salmon until populations are re-established.

Energy. Construction of a hydroelectric project at Newhalen would add 50 new residents to the population of the Iliamna-Newhalen area during construction. These residents, through hunting activities, would add to the short-term competition for subsistence resources. After construction, many of these new residents would likely leave the area.

Aggregate effects.

Development activities under the Proposed Plan would not result in a major regional impact on any subsistence resource. Oil and gas activities and corridor development could impact peninsula caribou populations, and could therefore impact subsistence use in that area. ADF&G's subsistence maps show that villages on the Peninsula, in the lower Nushagak Bay area and in the Togiak area all harvest caribou for subsistence. Table 8-3 indicates that the per household caribou harvest is highest on the peninsula. Therefore, a reduction in caribou on the peninsula could produce a relatively greater impact on the subsistence harvest of residents of that area. The clumped distribution of subsistence users coupled with local reductions of caribou and/or other subsistence resources could combine to produce a regionally moderate impact on subsistence activities. This could occur even though the effects on caribou or other subsistence resources by development activities allowed under the Proposed Plan, is estimated to produce only a minor regional impact.

A reduction in animal populations, however, would not inevitably result in reduced subsistence harvest since the state fish or game boards are required to give preference to subsistence users where resource shortages arise. Therefore, subsistence uses might be maintained at some expense to sport hunting.

If restrictions on subsistence are required, residents of the region would have to make some adjustments to compensate. These adjustments could take the form of forcing a more rapid assimilation into a cash economy in order to acquire money to buy food. It could also affect the way people, who traditionally rely on the sharing associated with subsistence, cement their social ties to maintain social cohesion. Severe changes in traditional subsistence food sources could affect the traditionally close ties of villages that rely on subsistence. (Nebesky, et al., 1983). Resource development that would be permitted under this alternative would not result in major impacts on subsistence food sources. (See impacts on salmon, caribou, moose, waterfowl and marine mammals).

Conclusion. Resource development projects and remote settlement associated with the Proposed Plan would result in moderate impacts on subsistence activities.

Impacts on the Commercial Fishery

Settlement. If each of 112 new permanent and temporary households qualify for subsistence, less than 15,000 additional fish would be taken annually. This increased harvest would have an insignificant regional impact. Locally, there could be major impacts to commercial fishermen dependent on small stocks. This is particularly true for settlement planned for areas such as Half Cabin Lake, Iowithla, Kaskanak, and others where runs are predominately Chinook and Coho salmon instead of Sockeye. Runs of Chinook and Coho are much more vulnerable to overharvest (ADF&G comments on DEIS, Oct. 1983).

Oil and gas development. Some activities associated with oil and gas exploration and development have a potential for affecting commercial fisheries. Impacts on salmon, the primary commercially fished species in Bristol Bay, were previously discussed and oil and gas activities are expected to have only a minor impact on the fish.

Oil spills which might occur during the summer when adult salmon are returning to spawn would produce the most immediate and visable impact on the Bristol Bay commercial salmon fishery. Spills which occurred at other times of the year would have a less immediate impact but could produce environmental effects which could become apparent in subsequent fishing seasons.

Oil spills could also cause flavor problems which could reduce the market value of the catch. Setnet fishermen could be affected more by oil spills than those using drift nets because of their inability to shift fishing locations. Competition for vessel service facilities used by both the commercial fishing industry and the oil and gas industry could also lead to conflicts.

Oil and gas exploration and commercal fishing activities have the potential for gear conflicts, however, these can generally be mitigated by seasonal restrictions and/or careful planning and monitoring where conflicts are likely.

Transportation corridors. Potential for direct impacts to commercial salmon fishing from a transportation corridor would stem primarily from increased traffic and competition for support services (fuel, dockage, storage, repair, food, and shelter) in ports. There would also be an increased probability of pollution producing accidents at terminals in ports. The commercial fishery would be most affected by activities which occurred during the summer months at the peak of the salmon harvest.

Another impact to commercial fishing from corridor development could result from the effects of construction activities (sedimentation, turbidity, benthic disturbance) which might effect local salmon runs. These impacts would be short-term and minor on a regional scale.

- Port Moller to Balboa Bay: The overland portion of the route would pass through Portage Valley to Lefthand Bay. Lefthand Bay, a relatively sheltered anchorage, would have a lower potential for storm related accidents than terminal sites located in more exposed coastal locations. Oil spills or pipeline breaks would have serious short-term effects if commercial fishing operations were in progress in bays at the time of an accident. These have a relatively low probability of occurrence, however.

- Port Heiden to Kujulik/Aniakchak Bay: This corridor route parallels the Meshik River and, depending on the port site chosen, would terminate in either Kujulik or Aniakchak Bays. Both bays provide relatively unprotected anchorages subject to high winds and wave action with potential for tanker accidents. This corridor's impacts on local

commercial fisheries probably would be minor on the north coast but the exposed bays would increase the probability of moderate impact on the south coast. In the absence of an accident, impacts on commercial fishing would be insignificant.

- Pilot Point to Wide Bay: This pipeline route would cross the Ugashik River on a route to Wide Bay. The Ugashik River system is one of the six most important sockeye salmon production areas in the region. It supports an average harvest of 600 thousand sockeye salmon annually. The King Salmon River, which flows into Ugashik Bay, also produces salmon. Local impacts could be major but relatively short-term if an oil spill were to occur during the summer fishing season. Wide Bay is a sheltered anchorage where the chance of a tanker-related accident would be reduced.

- King Cove to Cold Bay road: Little adverse impact to the local commercial fishery is anticipated from this project. Although three salmon streams would be crossed, construction and maintenance impacts could be effectively mitigated.

Energy. The details of the impacts of the Newhalen hydropower project are discussed under the impact section on salmon. Under a worst case scenario but with a maximum use of mitigation devices, about 95% of the fish entrained by the intake canal of the power plant would survive. This would result in an estimated loss of 0.75% of Newhalen fry and smolt outmigrants and an estimated concomitant loss of 0.75% of the adults, which would be roughly 15,000 mature sockeye salmon. This loss would have a minor regional impact on commercial fishing, although some set-net fishermen dependent on Newhalen River fish could suffer a moderate loss of harvestable salmon. The loss of mature sockeye salmon could be less, dependent upon the actual percentage of fry and smolts drawn through the powerhouse and the effectiveness of features to prevent or minimize entrainment.

Minerals. This alternative closes to new mineral entry portions of 64 anadromous streams which provide spawning habitat and migration corridors for a large segment of Bristol Bay salmon stocks. Most of these streams are located in the Nushagak and Kvichak River drainages. In addition, all navigable streams on National Wildlife Refuges would be closed to new mineral entry. Valid existing mining claims would not be affected by these proposals; thus closure to new entry in selected stream segments does not totally preclude the possibility of placer mining in those segments.

Mining activities could indirectly cause minor regional impacts to the commercial fishery by reducing the productivity of anadromous streams where placer mining would be allowed.

Aggregate effects. Potential impacts to Sockeye salmon under the Proposed Plan could be minor (See Impacts on Salmon). Major local impacts could occur on small streams where commercial fishermen are dependent on small runs of Chinook or Coho salmon. Off-shore or tideland oil spills have the potential to produce major local short-term impacts to commercial fishing. The level of

impact would depend on the amount and type of oil spilled, time of year, location of the spill and the effectiveness of clean-up. In the absence of major spills, the overall effect of oil and gas operations would result in minor long-term impacts.

Any one of the three proposed pipeline routes would have the potential for local temporary impacts. On a regional scale these impacts would be minor.

The development of the Newhalen hydropower facility, placer mining, and remote settlement on public lands could produce minor long-term impacts on the region's salmon resources.

Conclusion. Implementation of activities allowed under this proposal could result in minor long-term impacts to the region's commercial fishing industry.

Impacts on Population

Settlement. The Alaska Department of Natural Resources has estimated that remote settlement under this alternative would result in an increase of 336 new people in the regional population (See table 8-2). Of this number, about 200 people would locate in the Dillingham area, another 100 people would locate in the Iliamna Lake area, six would settle in the remote settlement at Half Cabin Lakes, and the remainder would locate between Port Moller and Cold Bay.

Remote settlements would meet individual housing needs. Settlements near Dillingham would rely on that community for social services and other support services as needed. Because much of the new population (80%) would be seasonal, much of the additional demands on social and support services would also be seasonal.

Many of the people that purchase remote settlement lands would be from outside the region and probably would own or lease airplanes to reach their parcels. It is expected they would rely on Dillingham or even Anchorage for most services. Population impacts on the region from remote settlement are therefore expected to be low, and mostly concentrated in the Dillingham area.

Oil and gas development. Exploration for oil and gas in the upland areas available for leasing could result in an average of 17-20 workers per year.

Eventual development and production of oil and gas would require a workforce of about 925 people during peak development. Approximately 85% of these workers would reside in contractor-provided enclaves. Exploration and development of oil and gas in the tide and submerged lands would result in about 25 new residents in the region.

The new residents would probably reside in the regional centers of Cold Bay or King Salmon with some in the villages of Port Heiden and Nelson Lagoon. Overall impacts would be minor, in the long-term; however, there could be some short-term stress on local medical and housing services.

Transportation corridors. Although three possible corridor routes are identified in this alternative, the construction of more than one is unlikely within the forseeable future. Several hundred people would be employed for about a year on the project. The bulk of these workers would be imported labor residing in contractor-provided enclaves near the construction site. Upon completion of the project virtually all of these workers would leave the region.

- o King Cove to Cold Bay road. Much of the labor force for construction of the road would probably be local residents if construction did not coincide with the fishing season. Some imported workers would be required, however, to handle engineering and other more technical aspects of the project. These employees would probably reside in Cold Bay for the duration of construction and would cause little impact on local services.

Energy. A regional hydropower project would add an estimated 50 workers and dependents to the regional population. Most population growth would probably be in the Iliamna/Newhalen area, the most likely support base for the Newhalen project.

Newhalen is an incorporated second class city with a population of 87 (1980 census). Salmon fishing is the mainstay of Newhalen's economy, with nearly all families holding set net permits. Jobs in the public sector are limited. Subsistence is an important source of food for most villagers in the region. A recent housing shortage has been relieved by house construction sponsored by the Department of Housing and Urban Development (HUD). Health care is provided by the village-owned clinic funded by the Alaska Area Native Health Service.

Iliamna is an unincorporated community with a population of 94. Commercial fishing, sport fishing, and hunting lodges are major sources of income for the community. There are several community service jobs. Although housing is generally of high quality for the region, a shortage of year-round housing exists. A planned HUD housing project is expected to reduce this shortage. Health care is provided by a privately-owned clinic funded by the Alaska Area Native Health Service.

Adding 50 people to the combined population of 181 for the two villages would increase the population by 27%. This increase would probably be temporary; but could produce moderate impacts in the community if additional housing is not provided.

Minerals. Mineral exploration in this alternative would increase the regional population by approximately six persons, probably in Goodnews and Platinum villages. This small increase would cause only a minor impact in demand for social and other services in those communities.

Aggregate effects. Oil and gas activities in the region could result in the addition of an estimated 180 permanent residents by the year 2002. Most temporary workers would be housed in contractor-operated enclaves near construction sites. Moderate, temporary impact would be associated with providing transportation services to the construction force. This impact would probably center in Cold Bay and perhaps Port Moller.

Mineral development would add less than 10 additional residents to the region, probably at Goodnews Bay and Platinum. Energy development could have a moderate temporary housing impact on Newhalen and Iliamna should a project be constructed there, unless most workers were located in enclaves at the development site.

Settlement would add about 336 persons to the region with about 300 of these being seasonal residents.

Conclusion. Increase in the region's permanent population as a result of development activities which might occur under this proposal would be minor; moderate, short-term impacts on local populations in the vicinity of construction activities could occur.

Impacts on Employment

Settlement. Settlement on remote state land disposals proposed by the Plan would result in approximately 36 new permanent residents in the region. This slight increase probably would not result in a substantial effect on employment. Primary source of income for residents of remote land disposals would most likely be generated by other development in the region or employment outside the region. Some secondary employment opportunities would result from purchase of materials for construction of homes, and need for supplies and services, including schools.

If any impacts are realized as a result of the settlement program, they are likely to be concentrated within regional or subregional service centers near land disposals, notably Dillingham, King Salmon and Iliamna/Newhalen.

Oil and gas development. Upland exploration would have a short-term impact, as most workers would be from outside the region and would be accommodated in temporary housing at or near exploration sites.

Development of an uplands gas field would result in peak employment of about 925 during development, which is forecast to occur five years after a lease sale. Of these workers, 17-20 would be residents of the region. An additional, 31 residents jobs would occur in other sectors of the economy. Employment during the production phase would level off at 280 after 10 years. Total new resident employment probably would level off at 42 jobs. All non-resident employees during development and production probably would reside in industry or contractor enclaves located at or near the gas field or LNG facility.

Tide and submerged land exploration would result in shorter-term impacts, with nearly all workers originating from outside the region. A 10-year moratorium on leasing would delay employment impacts generated by this activity but would probably not appreciably change any potential effects.

Total employment, should a commercial discovery be made, would peak at approximately 928 persons in the late 1990s. About one-fifth of these employees would be local residents. The remainder would be imported labor probably residing in company-owned enclaves near the site of the discovery. Employment would decline to about 285 persons by the year 2002, but would retain approximately the same ratio of resident to non-resident employees.

Transportation corridors. Three potential pipeline corridors are identified under this alternative although only one would probably be constructed in the forseeable future. Employment impact would be similar on each corridor, varying only with the length of time for construction depending on the physical length of the corridor. Several hundred workers would be required with the majority being imported labor residing in contractor-provided enclaves near the construction site. All but a few maintenance personnel would depart the region when construction was completed.

The King Cove to Cold Bay road would take one year to complete, employ 25 workers, 5-10 of whom would be from the region (estimate provided by Alaska Department of Transportation and Public Facilities, 1982). The road would be built in the late 1980's.

Energy. A large regional hydroelectric power development would employ substantial numbers of workers during construction and could have long-term impacts on employment in other sectors of the economy.

Using the Newhalen project's development scenario, Nebesky et al. (1983) estimated that:

1) 300 workers would be employed at one time;
2) construction would take 3 1/2 years;
3) 22% of the construction employees would reside year-round in the Iliamna and Newhalen area, one half of these (33 total) would be new residents and the remainder would be existing unemployed or under-employed local workers.

Nebesky further concluded that the greatest impact from such a facility would be the long-term economic implication of cheap power in a region which has traditionally had decentralized and expensive electricity. Energy savings to residents would be $3.3 million, which could increase expenditures in the support and services sector, resulting in 113 new jobs by the year 2002. Two-thirds of these jobs would be filled by existing residents.

Minerals. Existing placer mining operations at Platinum and Nyac employ an estimated 20-30 and 40-50 persons respectively, and operate approximately 4 months per year. Such operations often operate 6 or 7 days a week during these 4 months. Each person employed represents one-half a full-time

employee, therefore full-time-equivalent (FTE) jobs were considered to be 15 at Platinum and 25 at Nyac in 1980. Other small placer operations in the region presently employ 12 persons, or provide 6 FTE jobs.

Closure of portions of 64 anadromous fish streams and requirement for leasehold provisions an approximately 160 others relative to new mineral entry, may cause some attenuation of employment opportunities in the placer mining industry. These actions would not produce a measurable effect on the regional employment outlook.

It is assumed that existing mining exploration provided less that 10 FTE jobs in the region in 1980. Large scale mineral development, although considered unlikely, would substantially increase employment. Such development would occur most likely on Native Corporation lands.

Aggregate effects. Much of the increased employment in the region would occur from activities not influenced by the Plan. The "Economics, Subsistence and Sociocultural Projections in the Bristol Bay Region" (Nebesky et al., 1983) predicts a substantial increase in the region's employment. Basic assumptions used in deriving the figures are:

1. Government employment will rise 2% per year, which is half the recent historic rate, to account for a gradual reduction in the rate due to federal cutbacks and lower state revenues;
2. Support services employment will rise at a rate of 5.7% per year, primarily due to increases in recreation and tourism and trends towards increased employment in the support sector;
3. Basic/proprietor employment will rise 1.9% per year, primarily in commercial fishing and fish processing.

Employment estimates show a disproportionate amount of employment increase in Analysis Subunit II, which includes Dillingham. Increase in the support and services sector in this subunit is particularly noteworthy. Nebesky et al. (1983) showed that Dillingham's economy will continue to grow and will account for a larger percent of employment in the region in 2002 than it does today. The figures also show that increased recreation and tourism, particularly in Subunit II, are becoming an increasingly large portion of the region's economic base.

Development of tidelands oil and gas and a major regional hydroelectric project would result in a significant increase in both resident and non-resident employment in the late 1980's and 1990's. Most of this employment would occur in Analysis Subregions II, III, and IV. Development of a tidelands oil discovery would peak well after the development phases for the uplands gas field and hydroelectric project, and would prolong the increased employment opportunities for residents and non-residents.

New resident employment influenced by the Plan would be approximately 140 persons, while resident employment generated by other activities would be about 1,925 persons.

Proposed Plan

The Proposed Plan is not likely to cause significant impacts on the existing rate of growth of employment in the region. It allows for oil and gas exploration and possible production and regional hydroelectric development activities which provide employment opportunities, especially for people from outside the region.

Conclusion. This proposal would allow developments which could increase employment. The increase in long term, resident employment, should these developments occur, would be minor.

IMPACTS ON OTHER RESOURCES

Impacts on Water Quality

Water quality affects how organisms utilize a particular water system. Deterioration of water quality may result in a significant reduction in biological diversity and alter chemical or physical properties of the water system. Degree of deterioration depends upon the ability of the system to absorb and neutralize pollutants.

Oil and gas development. Impacts associated with the Proposed Plan could occur throughout the exploration, development, and production phases. During the exploration phase, construction and maintenance of a road system may increase sedimentation of waterbodies and disruption of groundwater movement within wetlands. Gravel, mined from streams or pits, for roads and drilling pad material could result in increased sedimentation and turbidity. Placement of discarded drilling muds and cuttings, if not stored in suitable areas, could result in heavy metals and other toxic materials degrading water quality.

These same impacts could also occur during the development phase. Pipelines and access roads pose water quality problems when placed near moving waterbodies or wetlands. Infrastructure necessary to support the development can result in areas being leveled and graded producing localized sedimentation.

Impacts should moderate during the production phase since construction would be complete. Storage and processing facilities could potentially have severe impacts but only if an accident or spill were to occur and toxic materials found their way directly to surface water areas or indirectly through groundwater systems.

The Proposed Plan witholds from leasing all state tide and submerged lands in the Bristol Bay Fisheries Reserve and north and west of the reserve. Also withheld are major bays, estuaries and lagoons along the north side of the Alaska Peninsula. No significant water quality degradation is anticipated in any of these areas unless a major oil spill were to occur. Since this plan proposes a 10-year moratorium on leasing other tidal and submerged lands, impacts in these areas could not occur before 1994. This delay may enhance mitigation of impacts on water quality through improvement in state-of-the-art production and environmental protection techniques which may be developed during the moratorium.

Barring a major oil spill or catastrophic event, however, an active program of oil and gas development in the Bristol Bay area would probably not result in significant region-wide water quality impacts, although localized, short-term degradation may occur during construction phases.

Transportation corridors.

- Port Moller to Balboa Bay: A 30-inch diameter pipeline buried within the 26-mile stretch from the mouth of Port Moller to the head of Portage River Valley would require dredging and displacement of 32,000 cubic yards of material. During the dredging and back-filling stages dispersed sediment would increase turbidity levels in affected waterbodies.

  Degradation of water quality could occur by land clearing, material site (gravel) development, and dredging operations along a 100-foot wide right-of-way through the Portage River Valley and Foster Creek drainage. Sediment transport and turbidity from increased erosion, alteration of surface water and groundwater patterns (creating water ponding or soil saturation) could result. Changes in chemical composition with a decrease in dissolved oxygen and PH may also be observed. Changes in water depth and velocity may occur where construction activity is in close proximity to the river channel. Water degradation resulting from extensive land clearing and grading would be more severe at higher elevations where increased slope causes more rapid erosion from surface runoff. Dredging and filling of wetlands near the mouth of Portage River Valley and in the vicinity of Pyramid Mountain and Cathedral Peak may cause ponding and disruption of natural ground flows.

  Grading and leveling would be required for a terminal site on the northern side of Lefthand Bay. This operation may cause sedimentation within the lower reaches of Foster Creek and require filling of wetlands. Alteration of surface drainage patterns would likely impact both the riverine and estuarine systems. Dredging of a shipping channel at the terminal dock facility would result in an increase in suspended solids, turbidity and reduced light transmissivity.

  Pipeline and access road construction would have a temporary short-term adverse impact on the quality of surface water and groundwater within the proposed corridor route. Localized impacts may be severe but would be temporary. Moderate long-term impacts may occur if continual maintenance dredging of Lefthand Bay is required.

- Port Heiden to Kujulik Bay: Degradation of water quality could occur by land clearing, material site (gravel) development, and dredging operations along a 100-foot wide right-of-way through the entire transportation corridor. Sediment transport and turbidity from increased erosion, alteration of surface water and groundwater patterns (creating water ponding or soil saturation) could result. Changes in chemical composition with a decrease in dissolved oxygen and PH may also be observed. Changes in water depth and velocity may occur where construction activity is in

close proximity to the Meshik River. Water degradation resulting from land clearing and grading could be extensive at higher elevations where increased slope causes more rapid erosion from surface runoff (Black Pass or Portage Pass). Dredging and filling of wetlands from the village of Meshik, along the eastern side of Port Heiden and along the Meshik River may cause ponding and disruption of natural ground flows as well as a considerable loss of wetland habitat.

Grading and leveling would be required for a terminal site on the northern side of Kujulik Bay. This operation may cause sedimentation within the lower reaches of Black Creek or Bear Creek and require filling of wetlands. Alteration of surface drainage patterns would likely impact both the riverine and estuarine systems. Dredging of a shipping channel at the terminal dock facility would result in an increase in suspended solids, turbidity and reduced light transmissivity.

Pipeline and access road construction would have a temporary short-term adverse impact on the quality of surface water and groundwater within the proposed corridor route. Localized impacts may be severe but would be temporary. Moderate long-term impacts may occur if continual maintenance dredging is required. Moderate to major impacts may occur to wetlands along the east side of Port Heiden and along the Meshik River and Blue Creek. Placement of the pipeline and access road should be accomplished during winter months to avoid major impacts to wetland areas.

- Pilot Point to Wide Bay: Degradation of water quality could occur by land clearing, material site (gravel) development, and dredging operations along a 100-foot wide right-of-way through the entire transportation corridor. Sediment transport and turbidity from increased erosion, alteration of surface water and groundwater patterns (creating water ponding or soil saturation) could result. Changes in chemical composition with a decrease in dissolved oxygen and PH may also be observed. Changes in water depth and velocity may occur where construction activity is in close proximity to the Dog Salmon River channel and Goblet Creek. Dredging and filling of wetlands along the corridor and at the port facility at Wide Bay may cause ponding and disruption of natural ground flow as well as a considerable loss of wetlands habitat.

  Grading and leveling would be required for a terminal site on the southwest side of Wide Bay. This operation may cause sedimentation within the lower reaches of Khalagvik Creek and require filling of wetlands. Alteration of surface drainage patterns would likely impact both the riverine and estuarine systems. Dredging of a shipping channel at the terminal dock facility would probably not be required.

  Pipeline and access road construction would have a temporary short-term adverse impact on the quality of surface water and groundwater within the proposed corridor route. Localized impacts may be severe but would be temporary. Moderate to major impacts may occur to wetlands along the east side of Ugashik Bay and along the Dog Salmon River and Goblet Creek.

Placement of the pipeline and access road should be accomplished during winter conditions to avoid major impacts to wetland areas.

- King Cove to Cold Bay road: A 32-mile public road constructed from the village of King Cove to Cold Bay would cross extensive wetland areas and possibly small open water bodies. Impacts to water quality would result from clearing, grading, and leveling. Surface drainage could be altered resulting in increased runoff and compaction of soil which may change water movement below the ground surface. Saturated conditions and pooling along the upstream side of the road bed and localized sedimentation at river crossings may occur. Extensive filling of wetlands may also result in the draining of those areas on the downslope side of the roadbed. Dust control and maintenance operations may introduce toxic substances from the road surface into adjacent waters. Kinzarof Lagoon may experience increased turbidity and sedimentation if road fill is placed along the periphery of the lagoon.

  A majority of the construction related impacts, such as turbidity and sedimentation, will be short-term. Effects of the road alignment, however, such as disruption of flow regime will be long-term. Road maintenance is likely to produce a chronic pollution situation.

Minerals. New mineral exploration and development on state land in the Upper Mulchatna and east of Iliamna Lake would be subject to leasehold location laws. Portions of 64 of the regions salmon streams, and all streams designated as navigable on refuges would be closed to new mineral entry; thus, the potential for water quality degradation from mining activity would be reduced.

Various phases of mineral development have been shown to have adverse impacts on water quality (LaPerriere, 1983; Madison, 1981; Hall and McKay, 1983). Placer mining in anadromous streams is of particular concern. Placer-mined streams are generally short, headwater tributaries. Clearing and mining of gravels create changes in the topography of the mined area while mining in a stream or sluicing and diversion operations can modify stream channel physical characteristics (slope, velocity, discharge, depth, width). These activities can also result in addition of sediments to aquatic systems in quantities and sizes sufficient to degrade water quality. Placer mining can also produce increases in organic and heavy metal loading, acid drainage (Madison, 1981), turbidity, and a lowering of dissolved oxygen levels. These effects can result in a reduction of photo-synthesis and primary production. Toxic heavy metals accumulating in the food chain and high sediment loads covering the stream bed could lower aquatic food production. These impacts would be localized and probably would occur only during ice-free months. Streams subject to abnormally heavy silt loads, however, may require 5 to 20 years to recover after the source of the sediment has abated (Hall and McKay, 1983).

Lode mining could have a long-term impact on water quality if chemically-treated ore tailings are not properly disposed of or if tailings are returned to a waterbody. Heavy metals and chemicals used in the ore milling process exacerbate the problem.

Proposed Plan

While mining development has the potential for creating long-term water quality effects, existing state laws and regulations are sufficient to prevent major adverse impacts. Lack of compliance with existing laws and regulations by the mining industry, however, will increase the potential for impact on water quality. Even with strict compliance and enforcement of water quality regulation, some moderate short-term impacts may occur in localized areas.

Aggregate effects. Impacts to water quality by development operations, primarily oil and gas, transportation, and mineral extraction, include increased sedimentation and turbidity, loss of wetlands, possible localized disruption of surface water and groundwater movements, and an increase in toxicity in river tributaries. Prohibition of new entry mining activity in some of the region's salmon streams, would reduce the probability of degrading water quality beyond levels acceptable to the State of Alaska, provided that existing laws and regulations with respect to other activities are strictly enforced.

Conclusion. Moderate short-term impacts on water quality could be expected within localized areas. Region-wide impact from the combined development actions should be minor.

Impacts on Recreation

Bristol Bay contains some of the world's finest sport fisheries. The recreational resources of the area include salmon, rainbow trout, and other sport fish and large game such as caribou, moose, and bear. Wild lands and waterways and spectacular scenery provide opportunities for camping, hiking, canoeing, floating and photography. The fast growing recreational industry in Bristol Bay is second in economic importance only to the commercial fishery and provides $25 to $40 million a year to the State's economy.

Settlement. Disposal of 14,000 acres of land for remote settlement under this alternative will generate 12 new permanent and 100 new seasonal households. The direct effect of these new residents generally will be minor. There may be a slight increase in competition for recreational opportunities where settlement tracts are located near existing communities, particularly Dillingham. Of far greater consequence may be the opportunities provided by these lands for new owners to establish commercial hunting and fishing enterprises, such as lodges and guide services. This could result in a substantial increase in the contribution of recreation in the Bristol Bay area to the state's economy and also would contribute to greater pressure on existing fish and wildlife resources.

Oil and gas development. The most likely oil and gas activity in the Bristol Bay region is exploration in both the tidelands and uplands. Under this alternative, a 10-year moratorium would be placed on tideland leasing. Exploration on uplands could occur throughout those state lands where oil and gas development is a primary use and on approximately 65% of refuge lands where it is a secondary use. Exploration in these areas could impact recreation in the region in various ways. Airstrips, roads, or other

facilities built to support field work would, once abandoned, improve public access into some areas and recreational use would probably increase.

Development of a 30-square-mile upland gas field between Port Heiden and Port Moller, could result in improved accessibility to that area. If, for safety reasons during development, the gas field were closed to the hunting of caribou, moose, bear, or waterfowl, there could be a negative short-term impact on recreational hunting which presently occurs in that area.

Introduction of a non-local work force as a result of oil and gas development would result in increased recreational demand, particularly for hunting and fishing opportunities.

Transportation corridors. Construction and service roads probably would be developed along any of the three corridors identified by this alternative. Even if these were closed to conventional 4 wheel vehicles it is unlikely that all forms of access could be prevented. As was experienced with the Trans-Alaska Pipeline System (TAPS), local residents could be expected to use service roads as hiking trails, and for driving in all-terrain-vehicles (ATV's), three wheelers and other vehicles. This is particularly likely where corridors originate in or pass by settlements. In more remote areas, the corridors could be used by sport and subsistence hunters as walking or ATV trails. Increased use would place greater pressure on many of the fish and wildlife resources that bring people to the region to recreate.

King Cove to Cold Bay road: The road would improve access to the Izembek Refuge for hunters and bird watchers. It would also provide numerous general recreational opportunities for the residents of Cold Bay and King Cove.

Energy. Development of a major hydropower facility on the Newhalen River would result in some impact on recreation. Most notable would be effects of 500 miles of transmission lines leading to the various communities to be served.

Cross-country power lines would detract from the wild character and related wilderness recreational experiences associated with the region. Any service roads along power transmission corridors would increase access to a number of areas for other recreational activities. This access would increase pressure on fish and wildlife resources.

Minerals. Development of mineral resources under this alternative would have a varying range of impacts on recreational and scenic resources. Mineral development would open up more areas to ground vehicles and thus more people. Remote mineral development could have localized adverse impacts on scenic resources. Water quality degradation from placer mining would have localized adverse impacts on sport fishing and river floating. This alternative would close parts of active stream channels of 64 anadromous and recreational streams and their tributaries to new mineral entry, thus impacts would be reduced on these streams except where valid existing placer claims would be permitted to be developed.

Aggregate effects. Settlement would result in an increase of 112 new households, 12 permanent and 100 seasonal, scattered throughout the region. Recreational opportunity would not be appreciably affected by these additional residents however they could encourage recreational use by outsiders by developing commercial enterprises such as lodges and guide services. This would contribute to a significant increase in regional and state economics but would place increased pressure on fish and wildlife resources. Improved access into remote areas could result from construction of airports and roads relative to oil and gas exploration and development, transpeninsula corridors and electrical energy transmission lines. While increasing recreational opportunity, particularly for residents in close proximity to these areas, it would also place greater stress on fish and wildlife populations. Mining activity could contribute to some minor degree by increasing accessibility into remote areas. It could also impair recreational uses in streams subject to degradation from placer mining activity.

Conclusion. The development allowed by this alternative would have minor impact on asthetic values associated with recreational experience in the region. Regional impacts would be minor relative to improving recreational opportunity. In local situations, potential exists for moderate impacts on fish and wildlife.

Impacts on Historic and Archeological Sites

The lack of precise data on archeological and historical resources in the Bristol Bay region makes evaluation of impacts on these resources highly speculative. In order to reduce speculation, a computer model based on probability of shelters and sites was developed (Table 8-4). A line plot with 620-acre cells was generated showing: 1) cells with known archeological sites; and 2) potential for archeological sites. Developmental scenarios were plotted using an overlay. The six classifications used in the computer model were summarized to: low, moderate, and high site potential. Estimates of acreage directly affected were then calculated. Acreages of indirect impacts were estimated by counting the high-site potential cells in the immediate area of expected development activity.

Each action implemented under this plan must comply with appropriate state and federal laws and regulations that protect archeological and historical resources. For USFWS lands, a memorandum of agreement between the Advisory Council on Historic Preservation, the State of Alaska and the USFWS will be designed to protect or mitigate damages to these resources. This action will insure compliance with Section 106 of the National Historic Preservation Act of 1966, as amended; its implementing regulations, 36CFR part 800; and Section 2(b) of Executive Order 11593.

In addition to the definitions provided in the beginning of Chapter VIII, the following terms apply to the cultural resource assessment.

Table 8-4. Assumptions Used In Developing a Computer Model For Historic and Archeological Sites.

Coastal Shelters/Campsites

1. Very High Probability: Presence of beaches or bluffs within 2 miles of an estuary, river or lagoon.

2. High Probability: Presence of beaches or bluffs within 2-5 miles of an estuary, river or lagoon; or beaches or bluffs not present but dry, stable soils within 2 miles of an estuary, river or lagoon.

3. Moderate Probability: Beaches or bluffs not present but dry, stable soils within 2-5 miles of an estuary, river or lagoon.

4. Low Probability: Presence of beaches or bluffs farther than five miles from an estuary, river or lagoon.

5. Not Probable: All other variable combinations (i.e., any area greater than five miles from an estuary, river or lagoon, that is not beach or bluff).

Inland Shelters/Campsites*

1. Very High Probability: Within 2 miles of a lake greater than 1000 acres or a large river, undulating terrain with few small lakes and ponds; moraine is present.

2. High Probability: Within 2 miles of a lake greater than 1000 acres or a large river; undulating terrain with few small lakes and ponds; moraine absent.

3. Moderate Probability: Simple, flat terrain with few small lakes and ponds; within five miles of a large lake or river; moraine present.

4. Low Probability: Within 5 miles of a large lake or river; simple, flat terrain with few small lakes and ponds; moraine absent.

5. Not Probable: Greater than five miles from large lakes or rivers.

*Slope must be less than 15% average for 1,000 acres, soils must be dry, and landforms must not be mountainous or a large waterbody.

HSPA = High Site Potential Area

MSPA = Moderate Site Potential Area

LSPA = Low Site Potential Area

Very High - Many cultural resources are expected to be present and disturbed.

High - A few cultural resources are expected to be present and disturbed.

Moderate - Significant possibility of presence and disturbance of cultural resources.

Low - Remote possibility of presence and disturbance of cultural resources.

Very Low - No cultural resources likely to be present.

Settlement. Remote settlement increases the likelihood that archeological and historical properties will be damaged or destroyed. Sites affected by construction of roads, homes and utilities may be lost. Increased human populations bring recreational collecting of artifacts. Twelve thousand of the acres of state lands available under this alternative for remote settlement are near Dillingham, Nushagak and Iliamna Lake which are in areas of high site probability.

Indirect threats to archeological resources are created by any development or activity that increases population. A tremendous market exists for archeological artifacts, with prime Alaskan items selling for as much as $50,000. Construction crews and the public can be expected to engage in non-scientific digging for artifacts. The result of this "pot hunting" would be an increase in damaged or destroyed archeological sites, with a consequent loss of valuable information.

Oil and gas development. There could be some loss of archeological sites, especially in locations adjacent to tideland areas. However, most agencies with responsibility and authority for regulating oil exploration and/or development activities, require as a condition of permits that reconnaissance surveys be conducted before operations commence, in order to prevent unintentional destruction of archeological sites.

Transportation corridors.

- Port Moller to Balboa Bay: Probability of impacts by development in this corridor would vary depending on the port site chosen. To Lefthand Bay, the corridor traverses 26 miles of open water and 19 miles of marsh and wetlands, and then a broad, barren pass. Direct effect would be to 692 acres of LSPA. This route would also allow easy access to Portage Valley.

  The Portage Valley to Albatross Anchorage route could affect both directly and indirectly, more archeological resources than other alternate routes for the Port Moller corridor. The route is a historical portage of

considerable importance and is judged to have high potential for cultural resources. Construction activities would directly affect 692 acres of HSPA. Indirect impacts could occur over approximately 68,000 acres along Portage Valley. Terminal construction would affect 500 acres of MSPA. There is one recorded site in the port area.

- Port Heiden to Kujulik Bay/Aniakchak Bay: This route would traverse and end in the Aniakchak National Monument. No model was constructed for this corridor, thus potential impacts cannot be quantified.

- Pilot Point to Wide Bay: This corridor would traverse the Ugashik, Dog Salmon and Goblet river valleys. All have a very high potential for archeological sites. Direct impacts could occur on 1,165 acres of HSPA, 218 acres of MSPA and 437 acres of LSPA. Port construction would take place in a MSPA. The Ugashik River area has 18 recorded archeological and historic sites. These sites are characterized by large nummbers of house pits with materials dating back at least 4,000 years. Evidence from the Ugashik Narrows indicates settlement at least 9,000 years ago. The possibility of additional sites of this age is high. These factors are indicative of the high probability of contact with archeological resources from development in this corridor. In addition, indirect impacts could occur over 95,000 acres of HSPA along the river valleys.

  The alternate to this corridor route has a lower probability of impacting archeological resources. Direct impacts could occur on 437 acres of HSPA, 728 acres of MSPA and 473 acres of LSPA. The 18 recorded sites along the Ugashik River could still be affected. Approximately 56,000 acres of HSPA would be subject to indirect impacts.

- King Cove to Cold Bay road: Although there are no recorded sites along the proposed route of this road, construction could affect the following archeological resource areas: HSPA, 510 acres; MSPA, 109 acres; LSPA, 291 acres; for a total of 910 acres. Indirect impacts from pot hunting and recreational artifact collection could occur over 23,000 acres of HSPA due to improved access.

Energy. The Newhalen hydropower proposal, would affect only about 500 acres during the building of a diversion canal and access roads. Main transmission corridors would be designed to minimize river crossings, thereby reducing risk to these high-potential areas. Nevertheless, over 3,000 acres of HSPA could be at risk. Feeder transmission line corridors would follow high potential routes along coastlines, affecting approximately 6,000 acres of HSPA. The potential for indirect impacts is low because road access would not be provided along these corridors.

Minerals. Mining by its very nature occurs in areas of high potential for archeological sites; destruction of some sites can occur.

Archeological sites encountered during placer mining operations could be destroyed by clearing vegetation and overburden or by actual mining

activities. In cases where mining occurs directly in active stream beds, negligible impacts would be expected; however, support activities on the banks could result in damage.

Lode exploration for mineral deposits would occur in mountainous areas likely to be LSPA and would have a low potential for putting archeological resources at risk.

Aggregate effects. Under the Proposed Plan, the most significant impact could be from the Port Moller corridor that ends at Albatross Anchorage. Sites could probably not be avoided because of the narrow valley, and major impacts would occur on 692 acres of HSPA and 500 acres of MSPA. Additionally, 68,000 acres would be subject to indirect impacts. Settlement, with the transfer of 12,000 acres of HSPA into private ownership could moderately affect historic and archeologic resources. The Pilot Point to Wide Bay corridor with a potential loss of 1,165 HSPA acres , also has a high probability of damaging archeological and historical resources. Other activities discussed by the Proposed Plan would have minor to negligible impacts.

Conclusion. This alternative would allow activities which, if uncontrolled, could have a moderate impact on regional archeological and historical resources.

Impacts on Wilderness

Designated wilderness areas remain unchanged throughout all plan alternatives. Approximately 3.9 million acres of designated wilderness on the Togiak, Becharof, Izembek, and Alaska Maritime NWRs would remain in the system. Pursuant to Section 1317(a) of ANILCA, USFWS will review all remaining refuge lands (approximately 8 million acres) in the Bristol Bay study area to determine suitability for wilderness designation. This being done through the refuge planning process. This assessment deals solely with federally designated wilderness areas or federal areas being studied for wilderness suitability. Table 8-5 shows acreage for both designated wilderness lands and other lands on refuges in the study area.

Impacts on wilderness are basically impacts on the natural quality and solitude of a designated area. Part of the concept of naturalness includes unaltered populations of fish, wildlife and botanical species. Therefore, impacts to these resources ultimately affect wilderness values.
Title XI of ANILCA allows development of transportation and utility systems within the conservation system in Alaska. Such actions are subject to the NEPA process and where designated wilderness lands are to be used, final approval requires congressional action.

Oil and gas development. Oil and gas exploration could occur on approximately 65% (6.4 million acres) of non-wilderness refuge lands. Virtually all of these lands, because of their natural, undisturbed character, could now

qualify for wilderness designation. Oil and gas development, if it were eventually permitted, would occur on a much smaller area than that which had been explored but impacts would be greater and of longer duration.

Table 8-5. Designated Wilderness and Total Refuge Lands in Bristol Bay Study Area.

National Wildlife Refuge	Land In Study Area (acres)	Presently Designated Wilderness (acres)
Yukon Delta*	2,300,000	0
Alaska Maritime*	1,090,323	910,000 (Unimak Island) 3,685 (Amak Island)
Alaska Peninsula	3,500,000	0
Becharof	1,200,000	400,000
Izembek	320,000	300,000
Togiak	4,105,000	2,270,000
Total	12,515,323	3,883,685

* Refers only to lands in the study area.

Exploration activities could be limited to the winter months when the ground is frozen and impacts to wildlife, habitat and natural wilderness would be minimal. Winter seismic exploration would result in short-term, minor impact if carried out in consideration of wilderness values. (USDI, FWS, 1983a). Were some surface disturbance to occur, through the construction of landing strips or drilling of exploratory wells, conditions of the operating permit would require that the area be restored as nearly as possible to its original character.

Development would require construction of permanent facilities that could function about 40 years. Impacts to wilderness values would vary with distance and terrain. In some areas, visual impacts would extend a mile or less beyond the actual activity, while in some mountainous areas they could be seen for 5-10 miles or more.

Transportation corridors.

- Port Moller to Balboa Bay: Approximately 12-15 miles of this corridor would be within the boundary of the Alaska Peninsula Refuge, although part of the land is privately owned or has been selected by Native corporations. Based on a 100-foot right-of-way for the corridor,

approximately 180 acres would be visually impacted. Because of the mountaious terrain, the corridor would be visible for three to five miles from either side. Noise intrusion by aircraft, ATV's, and construction equipment, would disrupt solitude during the construction period. Construction disturbances could harass resident wildlife species, causing them to either abandon the area or demonstrate uncharacteristic behavior.

During the duration of activities in the corridor, noise and visibility of buildings and support facilities along with helicopter and ATV surveillance would impact wilderness values several miles from the disturbance source. Maintenance and emergency activities could further disrupt the wilderness quality of the surrounding natural landscape. This corridor has, however, been previously used for travel across the peninsula and contains remnants of past human development which reduces the land's wilderness character.

- Port Heiden to Kujulik Bay/Aniakchak Bay: This route would extend 15-20 miles through the Alaska Peninsula Refuge and through another 25-30 miles outside the study area in the Aniakchak National Monument and Preserve.

  Land directly affected on the refuge would be less than 100 acres; however naturalness and solitude of a much larger area (45,000 acres or more) would be adversely affected. Like the Port Moller corridor, visual impact and noise could extend three to five miles on either side of the corridor. Other impacts would be similar to those discussed for the Port Moller corridor.

- Pilot Point to Wide Bay: Construction and operation in this corridor could affect some especially unique scenic values. The proposed route is 50 miles long, 35 miles of which would pass through the Alaska Peninsula Refuge. Land directly affected on the refuge would be less than 2,000 acres. However, naturalness and solitude of a much larger viewing area (50,000 acres or more) would be impacted.

  Headwaters of the Dog Salmon River are composed of numerous drainages arising in rugged mountains with peaks 3,000 to 6,000 feet in elevation. This is one of the more scenic settings in the northern portion of the Alaska Peninsula Refuge and is being considered for management and future designation as wilderness in the refuge comprehensive planning process.

- King Cove to Cold Bay road: The road right-of-way and associated material borrow pits would both physically and visually effect approximately 500 acres of presently designated wilderness in the southwestern portion of the Izembek Refuge.

  The southern 5 or 6 miles of the right-of-way would traverse rugged rocks and cliffs along the east side of Cold Bay. The remaining 10 miles would be through rolling tundra with scattered lakes. Although the road would occupy only 500 acres of wilderness land, impacts resulting from dust and noise of passing vehicles would extend through 16 miles of wilderness and

out to a mile or more on each side of the route. Ease of access by the road into Righthand Valley, a pristine area to the east, would encourage increased human use detrimental to the solitude and unconfined recreational experience available now. Wilderness recreationists currently use the area because of its wildlife, scenery and solitude. Access to much of the area is presently limited to travel by foot or by boats in the more sheltered portions of Kinzarof Lagoon.

The road would impact both wilderness values by interrupting naturalness and solitude and habitat values by crossing wetlands, and drainages. This could change natural drainage patterns and ultimately affect natural diversity.

Aggregate effects. Effects to wilderness values from activities associated with implementing the Proposed Plan could occur on the Izembek Wilderness as a result of impacts that would result from construction of a road from King Cove to Cold Bay. The Pilot Point to Wide Bay transportation corridor has a high potential for impact because it would cross 50 miles of potential wilderness. The Port Moller to Balboa Bay corridor would be less damaging because it would disrupt the naturalness and solitude of the least area. Oil and gas exploration could be regulated to have minimal impact on wilderness values.

Conclusion. Impacts on wilderness from activities allowed under this alternative could be moderate at the regional level. The King Cove-Cold Bay road could have major, local impacts.

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The road would impact both wilderness values by interrupting naturalness and solitude and habitat values by crossing wetlands, and drainages. This could change natural drainage patterns and ultimately affect natural diversity.

Aggregate effects. Effects to wilderness values from activities associated with implementing the Proposed Plan could occur on the Izembek Wilderness as a result of impacts that would result from construction of a road from King Cove to Cold Bay. The Pilot Point to Wide Bay transportation corridor has a high potential for impact because it would cross 50 miles of potential wilderness. The Port Moller to Balboa Bay corridor would be less damaging because it would disrupt the naturalness and solitude of the least area. Oil and gas exploration could be regulated to have minimal impact on wilderness values.

Conclusion. Impacts on wilderness from activities allowed under this alternative could be moderate at the regional level. The King Cove-Cold Bay road could have major, local impacts.

NO ACTION ALTERNATIVE

DEVELOPMENTAL ASSUMPTIONS USED FOR IMPACT ASSESSMENT

The basic difference between a No Action Alternative and the Proposed Plan lies mainly in three areas: 1) without a plan, land use managers will not be subject to constraints of the Plan's guidelines, thus, overall impacts of activity common to each plan may be greater. The degree to which impacts of identical activities would be greater if a plan is not adopted will vary between activities and localities, and could range from minor to moderate. It is not anticipated that major adverse impacts would occur without adoption of the guidelines, since existing laws and regulations are designed to prevent such impacts. 2) Whereas the Proposed Plan precludes leasing of all state tide and submerged lands in the Fisheries Reserve, tide and submerged lands north and west of the reserve, and major bays, estuaries and lagoons along the north side of the peninsula, the No Action Alternative would preclude leasing only in the Fisheries Reserve. 3) With no action, leasing could begin on tide lands as early as 1989 whereas the Proposed Plan which imposes a 10-year moratorium on tide and submerged land leasing would not allow leasing those lands until 1994.

Settlement. This scenario assumes that 70,600 acres of state land would be sold for remote settlement through the state land disposal program, and that 4,000 acres of BLM lands would be sold. These disposals would be dispersed throughout the region and could result in 523 new households being established.

The Department of Natural Resources provided the following assumptions based on their past experience with land disposal programs. The average parcel size is assumed to be 15 acres. Some disposals would be 5-acre subdivisions, while others would be 5- to 40-acre homesteads. It is assumed that all parcels offered for sale would be sold within the 20-year assessment period. The first land sale would not occur until state fiscal year 1985 (July 1984-June 1985). Actual settlement and resultant impacts would not occur until 1990, to account for a 5-year period between land sales and settlement.

This alternative would result in 880 households being established on the acreage sold by 2002; of these, 58 would be permanent households and 465 would be seasonal households new to the Bristol Bay region (see table VIII-2).

Oil and gas development. Exploration and development activities would occur on areas with high and moderate potential for oil and gas. Oil and gas activities would be prohibited in designated wilderness areas on refuges and surface entry would be prohibited in the Bristol Bay Fisheries Reserve. Activities are assumed to be restricted or prohibited on an additional 35% of refuge lands where exploration or development would be determined to be incompatible with refuge purposes.

Lease sales would be scheduled over the next 20 years on most state or BLM uplands. State Lease Sale #41, which took place September 14, 1984, included approximately 1.44

million acres of uplands between the Kvichak River and Port Heiden. Approximately 280,000 acres were leased during the sale. Scheduling an extent of possible exploration activities on this acreage is unknown at present. State sale # 56 which includes approximately 2 million acres of uplands between Port Heiden and Cape Lieskof is assumed to proceed as scheduled in 1988, BLM lease sales of approximately 1.6 million acres of land in the Kvichak and Goodnews Bay areas are assumed to proceed as scheduled in 1984. All state-owned tide and submerged land along the Alaska Peninsula, with the exception of the fisheries reserve, are assumed to be leased with most exploration in the area between Pilot Point and Nelson Lagoon. A lease sale is assumed to occur in 1989, which is the earliest a sale would likely be scheduled.

The estimates of oil and gas resources used in this and all other scenarios are based in part on an unofficial report by DNR's Division of Geologic and Geophysical Surveys (DGGS), "Draft - Undiscovered Oil and Gas Potential in the Bristol Bay Region, Alaska" (1982). Oil and gas developments on the Kenai Peninsula and in Cook Inlet were used as models. Most data on these existing developments were taken from the 1981 Statistical Report of the Alaska Oil and Gas Conservation Commission. Direct employment estimates for each scenario were made using information relating to the Department of the Interior's St. George OCS Sale 70, interpretations of geologic data by DNR-DGGS, and manpower estimates developed as part of an economic and policy analysis of the petroleum resources of the National Petroleum Reserve in Alaska. Employment estimates for tidelands oil and gas activity were derived from Hanley et al. (1980) and the Governor's Agency Advisory Committee (1981).

o Exploration: Onshore exploration would probably occur throughout the period of 1984 to 2002. It is assumed that seismic exploration using both helicopters and ATV trains would occur over much of the land leased. Seismic signals would be generated by explosive charges either buried or placed on stakes above ground. Exploratory wells would be drilled in those areas producing favorable seismic returns. It is estimated that as many as 19 exploratory wells could be drilled. Most air support would come from King Salmon or other existing airfields. However, several new bush airstrips would probably be built to service the exploratory wells. Average annual employment would range from 17 to 20 persons depending on the level of activity in any year. At most, 25% of these workers would reside in the region.

Exploration methods in tide and submerged lands would include seismic operations with vessels using air guns and exploratory drilling. Drilling would be accomplished by directional drilling from uplands, jack-up rigs, semi-submersible rigs, or drill ships as appropriate.

o Development: It is estimated that 4.0 trillion cubic feet of natural gas will be found and produced on the coastal plain south of Port Heiden. Preliminary, unofficial estimates from DNR-DGGS in 1982 indicate the probability of such quantities of gas within the region is less than 50%. To support this activity, a total of 20 drill pads, a 5,000-foot gravel airstrip and 50 miles of service roads would be built. The total area encompassing development would be 30 square miles (19,200 acres). Land area covered by roads and pads would be approximately 1,920 acres.

No Action

Approximately 100 miles of buried 36-inch pipeline would be built from this gas field to a liquid natural gas (LNG) terminal at Balboa Bay. The LNG and tanker loading facilities would be developed on approximately 100 acres of land at Balboa Bay.

The final EIS on the Western LNG project at Nikiski (FERC 1978) provided an example of the type of development and potential impacts of an LNG facility. The LNG terminal would occupy a 60-acre site and would include two gas liquifaction trains, two 550,000-barrel LNG storage tanks, and a marine terminal with two berths and other appurtenant facilities. The plant would be built outside the region and transported as modules to be assembled on site. The liquifaction facility would be based on an air-cooling process and would not require large volumes of water for operation. Discharges from the plant would be waste heat passing through air-cooled heat exchangers and some incinerated natural gas. An electrical generating facility, most likely powered by natural gas, would also be needed. The project would use 6,000 gallons of water per day, and have its own sewage treatment plant. The isolated location of Balboa Bay would necessitate construction of both an airstrip adequate for passenger and cargo aircraft and onsite housing for plant employees.

An oil reservoir located in state-owned tide and submerged lands between Port Heiden and Port Moller is assumed based on the DGGS draft report to contain approximately 500 million barrels of recoverable oil. (Probability of such quantities of oil in the region is less than 50%).

Tidelands oil development would be similar to the McArthur River Field in Cook Inlet (total field size 548 acres). Ninty-eight wells would be drilled from three offshore platforms, within a 30-square-mile area. Depending on the location and geology of the field, directional drilling from upland locations may be used in lieu of offshore platforms. Shore-based facilities would include a small marine support base (dock) most likely at or near Port Moller. A 5,000-foot landing strip would be built to serve as an air support base, primarily for transfer of workers and supplies from fixed wing aircraft to helicopters.

Pipelines would run directly onshore from offshore platforms. Oil would be transported via a buried pipeline overland where possible. Short segments would probably be buried underwater in the vicinity of Port Moller and Herendeen Bay. This pipeline system would be routed to intertie with the upland gas development system.

Oil storage and tanker loading facilities would be located at Balboa Bay. The facility would include a marine terminal and storage tanks for 6-7 days production. The combined LNG and oil facility site would occupy about 300 acres.

Most workers employed in oil and gas production activities in Bristol Bay would reside in industry- or contractor-built enclaves. Total employment would range from 16 persons, when exploration begins, to 922 during the peak

of development. Employment would level off at 283 workers through the remaining life of the field. Fifteen percent of all developmental and production workers would be permanent local residents; the remaining 85% would reside in enclaves located near the gas field or at the combined LNG-oil terminal.

Transportation corridor. No transpeninsula corridors are presently identified in the Bristol Bay region, although it can be assumed an upland or offshore oil or gas discovery would result in the need for a pipeline across the peninsula. The location of a transportation corridor would depend on the location of the oil and gas find or the necessity for public roads, and the economic and environmental values involved. As for all alternatives, any pipeline or road crossing federal conservation unit lands could be constructed only after the procedural requirements of Title XI of ANILCA are met.

A tide and submerged lands oil discovery is assumed to result in an oil pipeline built from the development through Port Moller to Balboa Bay. A gas discovery would result in a gas pipeline from the uplands along the same route.

The route would extend from Port Moller through Portage Valley to Balboa Bay. Depending on the port site chosen (Lefthand Bay, Beaver Bay or Dorenoi Bay), this corridor would be 34-43 miles in length. Herendeen Bay and Port Moller are rather shallow embayments with extensive mudflats and average depth of less than 12 feet, although water depths in access channels can exceed 60 feet. At the head of Herendeen Bay, Johnson Channel widens and water depths are greater than 90 feet.

The corridor follows the right hand fork of the Portage Valley River crossing a broad, barren pass at 850 feet elevation. It descends into a narrow valley drained by Foster Creek. Upland areas are moderately drained, while valley bottoms are generally swampy.

A buried 30-inch oil pipeline and a buried 36-inch gas pipeline on each side of a 12-mile constructon access road would require a 100 foot wide right-of-way. Additional sites would be required for barrow pits. The routing near Cathedral Peak and Pyramid Mountain could receive substantial snowfall and because of avalanche conditions, structures such as snowsheds may be required.

Logistics for line construction would require air, ground and sea support. This might include fixed wing and helicopter aircraft, bulldozers, trucks, ATV's, barges, dredges, and ships.

Water depth in Lefthand Bay is 80 feet at a distance of one half mile from shore. The bay, which is 2 1/2 miles wide and 4 miles long, is considered a good anchorage for large vessels and is protected from foul weather coming from any direction.

The relatively narrow area for a proposed port site on the north of Lefthand Bay at Foster Creek would require that facilities be built back into the valley and some land might have to be used on the steep slopes which surround the valley.

Proximity of the Lower Peninsula area to the Shumagin seismic gap, where an event of magnitude 8 or greater is expected in the next few decades, poses a substantial earthquake hazard. Any tsunami generated by such an event may be partly attenuated by the Shumagin Islands but would still produce a large runup in bays on the southeast side of the peninsula. Development of large terminal facilities on the northern coast of the Alaska Peninsula is not anticipated because of the lack of deep water near shore.

Energy. At least three alternate hydroelectric power sites are being examined by the Alaska Power Authority (APA) for a large-scale regional power project. Only one of these is likely to be built. It is assumed for this 'no action' alternative that a large hydropower project will be constructed in the future, with or without approval of a Regional management plan. For purposes of comparative analysis with other planning alternatives, the Newhalen project was chosen for evaluation.

A large-scale hydropower plant with a total installed capacity of 16 MW to supply energy needs of 18 communities would be constructed on the Newhalen River. This facility would be a run-of-the-river operation located between river mile 1.0 and 7.0. The power plant and diversion canal would be built on the east bank of the river. Construction would take 3 years, with a peak construction labor force of 300 people, the majority being housed in on-site facilities. The flow diversion canal would be 2.5 miles long and 85 feet wide, located between river mile 2 and 7, and would be designed to bypass average flows of 1033 cubic feet per second (cfs) and maximum flows as high as 2,100 cfs. At this flow, water detpth would be about 30 feet. Flow control would be at a concrete spillway near the downstream end of the canal. Located adjacent to the spillway would be the low-level intake for the power plant. Existing roads from the Iliamna airfield to the Newhalen River would be used for access, supplemented with a new road section to the plant.

Approximately 500 miles of transmission lines would be constructed to connect the generating facility and the communities to be served. Transmission corridors for both main and feeder lines would be located on state-owned lands where possible. Lines would be built using helicopters and maintained by all-terrain vehicles or aircraft, eliminating a need for road construction.

Minerals. Most of the state and BLM lands in the region would remain open to new mineral entry. Site-specific mineral activities could be subject to leasehold location and may be prohibited from certain anadromous streams. NWR lands are closed to new mineral entry, but valid existing claims on refuges would be allowed to continue.

Using available information, the Alaska Land Use Council Minerals Element Work Group identified areas with mineral potential. Mountainous areas around the east half of Iliamna Lake (especially on the south side) and in the upper Mulchatna and Chilikadrotna River drainages have a potential for gold, silver, tin, copper, tungsten, molybdenum, lead and iron. The Goodnews Bay area has also been identified as having potential for platinum, chromium and gold. The area northwest of the Wood-Tikchik State Park is believed to have deposits of copper, silver, gold, platinum and chromium.

Existing mining activity in the region includes 2 dredges operating at Nyac, employing an estimated 40-50 people. There are also 20-30 people working a placer operation at Platinum. Other small operators (3-4 people) are currently working claims in widely scattered remote areas of the Bristol Bay planning area.

Under the No Action Alternative, new placer mining claims could occur on any streams within the region, except those closed by ANILCA on refuges and those in Wood-Tikchik State Park which were closed when the park was established. It is assumed that an estimated 15% increase in placer activities would occur in the region over the next 20 years. This increase would occur primarily in those areas with existing activity near Goodnews Bay, Nyac, the Upper Mulchatna and Chilikadrotna drainages, and east of Iliamna Lake.

Placer mining is basically the excavation of existing or relic streambeds for minerals transported by the stream to the site from elsewhere. Most operations use bulldozers or draglines to remove overburden and collect the ore. Sluice systems are generally used to separate the mineral from the ore and tailings are discarded in piles. Settling ponds are often used to clarify streams muddied by these activities, but some operations are conducted without these facilities. Stream courses are often rerouted by the removal of material from both the streams' bed and its banks. Magnitude of placer operations can range from a single individual with a gold pan to massive dredges employing many workers.

Most placer mining operations in Alaska last about 4 months. Additional time is usually spent at the mining site to clear overburden, maintain and repair equipment, construct buildings, complete exploration drilling programs, or other exploration or development work. Support facilities may include a bunkhouse, cookhouse, workshop and storage area, and an airstrip. Transportation between the camp and mining operations is usually over trails or roads suitable for pickups, four-wheel drive or ATVs. When areas are mined out, restoration consists of leveling tailing piles, breaching settling ponds and recontouring, with the ground left to revegetate naturally.

BLM records indicate there are 339 unpatented federal lode and 337 placer mining claims in the Bristol Bay study area, located primarily in the areas of Goodnews bay, Chignik and the northeastern portion of the Ahklun Mountains. BLM estimates that under the current rate of patenting, 3 of these 676 claims will go to patent in the next 20 years. Location of these will probably be at Nyac, Platinum and Chignik.

Exploration techniques for lode deposits vary considerably with the type of mineral being sought. Principal methods of geophysical exploration include magnetic, electrical, electromagnetic, radioactive, seismic and gravity techniques used to define physical differences in the earth's crust. Geochemical exploration involves collection of samples in the field, with additional testing in the laboratory to discover anomalous ocurrences of minerals. Most chemical and geophysical exploration would involve

aircraft-supported field crews, and temporary camps. Both geochemical and geophysical operations may also involve the occasional use of all-terrain vehicles (ATV).

In order to sample deposits, drilling programs would eventually be established. Drills would range from back-packable, to helicopter-portable, to truck-mounted or ATV-mounted types. Road development to support these operations is not expected to be extensive, since the most prospective mineral sites anticipated to be developed are all near tidewater.

Lode mining involves tunneling or open pit operations to obtain ore. Facilities and equipment for lode mining are generally much more elaborate that that required for placer operations. Large trucks, massive bulldozers, power shovels, steam drills, powerful explosives and other heavy equipment designed to move great quantities of material are necessary. Many workers and facilites to support them, i.e., mess halls, barracks, sewer systems, large water supplies and well-developed transport systems, are often required. Large lode deposits may be operated for many years often resulting in the development of semi-permanent communities at or near the mining site.

IMPACTS ON FISH AND WILDLIFE RESOURCES

Impacts on Salmon

Settlement. Without a plan, it is assumed that a minimum of 74,600 acres would be offered for sale for remote settlement. This would result in an estimated 58 new permanent and 465 new seasonal households taking an additional 66,400 salmon yearly for subsistence use. This would be in addition to a range of 88,400 to 207,900 salmon taken annually by subsistence fishermen between 1963 and 1980 (ADF&G, 1981c). This increase amounts to less than 0.5 percent of the average annual commercial harvest of sockeye salmon.

Oil and gas development. With the exception of the Fishery Reserve, all state-owned tide and submerged lands including bays, estuaries, and lagoons could be placed on the state's schedule for leasing for oil and gas exploration and development. In addition, Black and Chignik lakes and the Chignik River would be open for possible oil and gas entry. The No Action Alternative expands the area where impacts from oil and gas could occur to include environmentally sensitive areas and would not require that land managers of the area impose the management guidelines developed in this planning process.

Lease sale #56 could proceed as scheduled. All state-owned tide and submerged lands along the Alaska Peninsula, with the exception of the Fisheries Reserve, could be leased over a 20-year period beginning in 1989.

Tide and submerged land area potentially impacted by oil and gas activity is almost twice as great in size with no action as it would be under the Proposed Plan. No action would also allow oil and gas activity in major estuaries, bays and lagoons, thus important feeding areas for salmon smolts would be

more subject to the impacts of oil spills and other pollutants. These water areas include Port Heiden, Port Moller, Izembek Lagoon, and Bechevin Bay. Early leasing of these lands would pose an earlier and probably greater impact on salmon than would similar activities postponed for 10 years. In the latter case, rapidly improving technology assures that the longer oil and gas activities are delayed, the more likely that they can be accomplished with reduced impacts. The types of impacts which may result from oil and gas activities are discussed in the Impacts on Salmon section for the Proposed Plan.

Transportation corridor. The BBRMP identifies no transpeninsula corridors under the No Action Alternative. However, regardless of the plan, discovery and development of oil and gas on either the OCS or lands within the study area could prompt development of a pipeline across the peninsula. The most probable location appears to be Port Moller to Balboa Bay. This corridor has been determined to pose the least adverse impacts of any of the 5 more northerly transpeninsula routes. (A total of 7 routes are identified and evaluated in Alternative 4). Construction and maintenance of this route would have relatively minor impacts on salmon.

Energy. The No Action alternative assumes development of a regional hydropower project on the Newhalen River. The project would be essentially identical to that identified in all of the alternatives, the only significant difference being that there would be no specific management guidelines for environmental protection, thus impacts, overall, would be slightly greater with no action since the project might not be subject to the standard of "no net loss to fish production". Without all safeguards identified in the Proposed Plan, the project could result in double the annual loss to adult sockeye salmon, or 30,000 fish. Under a worst case scenario an unprotected facility could result in a 10% loss of smolts (300,000) passing through the turbines annually. Protective devices being considered by APA should hold losses well below this figure. Overall, long-term impacts on the Kvichak salmon run could be moderate, particularly if losses occurred during a low point in the five-year cycle or during a dry cycle when perhaps a greater number of smolts could be put at risk because of water allocation to the facility.

Minerals. This alternative would allow most anadromous streams and their tributaries controlled by DNR and BLM to remain open to new mineral entry. Decisions about which stipulations protecting salmon would be attached to a permit would be made on a case-by-case basis.

There would be no assurance in the No Action Alternative that even the most productive salmon streams would not be subject to the impacts of placer mining. Major impacts have already occurred in some Alaskan anadromous streams - in some instances many miles downstream from the source of streambed disturbance. Past events indicate that even under existing laws, policies, and regulations there is potential for substantial long-term adverse impacts on individual stream systems from placer mining. Examples of what has already occurred in Alaska include the Eagle Fork of Birch Creek located northeast of Fairbanks, where an entire river system has been made essentially sterile by intensive placer mining (La Perriere, 1983).

No Action

On the basis of known location of mineral deposits within the study area, placer mining will probably not become an intensive, wide-spread activity. Potential areas are located around the east half of Iliamna Lake, in the upper Mulchatna and Chilikadrotna river drainages, in the Goodnews Bay area, and on lands northwest of the Wood-Tikchik State Park.

Regionwide, mineral development would probably have a minor impact, although specific drainages could suffer major damage.

Aggregate effects: Estimated additional take of salmon by subsistence users as a result of settlement under this alternative would be approximately 66,400. This combined with the current average catch for subsistence purposes would produce a total take of about 215,000 salmon for subsistence by the year 2002.

Impacts of oil and gas development are not quantifiable at this time because of the large uncertainties about where or what development, should it occur, would take place. However, it can be expected, barring a major oil spill, that if any significant impacts are experienced, they will occur primarily during construction activities and will be relatively short term. Even if the calculated number of major oil spills (two 1000 bbls) as determined by the development scenario, should occur during the next 20 years, severe impacts would probably be localized and overall regional impact relatively minor.

Potential loss of fish as a result of a hydroproject on the Newhalen River could, on a worst case basis, result in a maximum annual loss of approximately 30,000 adult salmon.

Mining operations in the area are expected to increase by approximately 15% by the year 2002. This would result in one additional small placer operation somewhere in the region, 7 additional people at Nyac and 4 additional workers at Platinum. Current losses of salmon by regional mining activities are unknown.

If it is speculated that 500,000 salmon are lost per year through oil production and mining operations (probably a worst case), 30,000 by hydro development and 66,400 by increased subsistence useage, a total of nearly 600,000 fish will be affected by activities allowed under the No Action Alternative. This represents about 1.9% of the 1975-1983 annual average sockeye salmon run in Bristol Bay.

Conclusion. The cumulative effect of development activities discussed in the No Action Alternative could produce a moderate regional impact on salmon. In local areas impacts to some salmon stocks could be more severe.

Impacts on Caribou

Settlement. This alternative could result in the establishment of 523 new households which could possibly increase the present harvest of caribou by 670 animals. Approximately 590 of these animals would be from the Mulchatna herd,

70 from the North Peninsula herd and 10 from the South Peninsula herd. The 590 additional animals harvested from the Mulchanta area is about 3% of the animals in the existing subherd and approximately 1% of the regional caribou herd. While this number is relatively small, when added to the projected increase in demand as indicated by existing trends, the likelihood that additional hunting restrictions will be needed increases.

Oil and gas development. Key habitats including important calving grounds occupied by both the northern and southern peninsula caribou subherds will be subjected to oil and gas exploration and development activities that could occur in the absence of a plan. Caribou from these two herds seasonally occupy habitat along the entire northern side of the Alaska Peninsula between Naknek and Cold Bay. The scenario developed to assess the potential impacts of No Action does not anticipate oil and gas activity in the range of the Mulchatna herd.

Field seismic operations and exploratory drilling activities will be subject to environmental stipulations and controls imposed by the land manager and/or leasing agency. In addition, the permitting process will probably impose other applicable State and Federal regulations governing such activities.

It is assumed for purposes of analysis that 4.0 trillion cubic feet (tcf) of natural gas will be discovered on the coastal plain south of Port Heiden within the north peninsula caribou calving grounds. The size of this field would encompass some 30 square miles within the estimated 1500 square mile calving area.

The total land surface area affected by infrastructure development is estimated at approximately 2,000 acres, or about .2 percent of the north peninsula calving area.

In the absence of a management plan, oil and gas exploration in tide and submerged land is assumed to occur simultaneously with on-shore development between Port Heiden and Port Moller, intensifying levels of disturbance along coastal habitats occupied by the north peninsula herd.

The scenario assumes a 36-inch buried pipeline will be constructed from the production area down to the vicinity of Port Moller to intertie with a Herendeen Bay - Balboa Bay Corridor. Approximately 40-50 miles of this line will traverse traditional calving ground habitat although exact routing is only speculative at this time. Construction and operation of this line could further add to herd fragmentation/displacement if activities are conducted during calving, and post-calving periods.

Transportation corridor. This alternative does not identify any corridors, but if development activities result in the need for a transportation corridor, the Port Moller to Balboa Bay routing would probably be selected. However, caribou are seldom present within that identified corridor route, thus development there would have little effect on the caribou population.

No Action

Energy. Impacts to caribou from regional hydroelectric power facilities would result primarily from routing power transmission lines from the generating facility to community centers in the upper Bristol Bay region. Other impacts would result from line monitoring by aircraft and opening rights-of-way to the public.

Transmission lines would traverse winter habitat used by the Mulchatna caribou herd. This herd is one of Alaska's 13 major caribou herds and presently numbers 15,000 to 20,000 animals.

Lines and poles would be placed by helicopters and ATV's. Animals probably would avoid areas during construction, as caribou are highly sensitive to low-flying aircraft, particularly helicopters. Reaction of caribou to power lines is unknown. There would probably be an initial reluctance, especially by cows and calves, to cross a newly-established visual barrier. Animals reluctant to cross may parallel the line, avoiding traditional wintering habitat south of the Kvichak River. The extensive area occupied by the herd would probably limit impacts to local population shifts away from activity zones, during construction and shortly thereafter.

Public use of transmission line rights-of-way could result in increased harvest levels above the current estimated kill of 300-400 animals annually. Magnitude of this increase would depend on local human population growth over the planning period, but probably would be minor.

Minerals. It is estimated that placer mining activity will increase about 15% in the region over the next 20 years under the No Action Alternative. A substantial portion of that increase is assumed to occur in the Upper Mulchatna and Chilikadrotna River drainages and east of Iliamna Lake. This activity could result in an increased annual harvest from the Mulchatna herd because of the additional animals taken by mining personnel.

Aggregate effects. The three regionwide caribou populations could all be influenced by actions which might occur under this alternative. The increased harvest due to projected settlement (670 animals) would have little impact on peninsula caribou populations but could measurably affect the Mulchatna herd.

Potential for finding hydrocarbons (primarily gas) is highest in habitats occupied by the north peninsula herd. Consequently, this population would be affected to a greater degree by oil and gas activities than the other caribou herds.

Development of a major hydropower project and transmission lines at Newhalen would probably cause some local populations of the Mulchatna herd to shift away from the activity zone. These impacts would largely cease upon completion of construction. Effect of the in-place transmission system is unknown but its presence might cause some disruption of normal migrational patterns. The herd's range is so large however, that the effect would be inconsequential. A substantial increase in mining, particularly in the upper Mulchatna and Chilikadrotna drainage, could add to harvest levels of the Mulchatna herd.

Conclusion. Impacts on the Mulchatna herd could be moderate to major. Impact on the North Peninsula herd could be moderate while impact on the South Peninsula Herd would be negligible. Overall impact to the Bristol Bay region caribou population could be moderate.

Impacts on Moose

Settlement. Table VIII-2 projects a total of 523 households resulting from settlement under this alternative. Approximately 173 additional animals would be harvested to meet expected subsistence needs based on a current estimate of 0.33 moose taken per average household in the Nushagak and Iliamna Lake area. Most of this increase is expected to be supplied by moose in the lower Nushagak river drainage and Iliamna Lake area. Present moose populations are not sufficient to meet normal growth in subsistence demand by the year 2002 (Nebesky et al., 1983). Increases in subsistence harvest stimulated by additional remote settlement would exacerbate the supply-demand situation.

Oil and gas development. Much of the almost 4 million acres of uplands which may be leased for oil and gas activities along the Alaska Peninsula contain moderate to high concentrations of moose. They are more abundant north of Becharof Lake. Moose are quite tolerant of men and machines and should suffer little or no direct impact from the effects of the relative widely scattered exploration activities, both seismic and exploratory drilling, anticipated to occur on the peninsula. Destruction of moose habitat (primarily willow forage) if not controlled by existing statutes and regulations, would probably not be extensive enough to produce a measurable effect on the moose population. Exploration activities in the highlands would have little or no effect on either the moose or their habitat.

Development of a gas field in a 30-square mile area of the coastal plain south of Port Heiden would require approximately 1,900 acres of ground, some of which the Alaska Department of Fish and Game has identified to be occasionally used by moose.

Petroleum development may increase harvest of moose in the area as a result of sport hunting by oil or gas field workers. The effect of this activity, using experience from Prudhoe Bay and the TransAlaska Pipeline, would probably not affect this population to any measurable degree.

Transportation corridor. Moose do not use the area crossed by the Port Moller to Balboa Bay route which is the only corridor assumed to be developed under this alternative.

Minerals. It is estimated that placer mining activity would increase by 15% in the region over the next 20 years. A substantial portion of that increase is assumed to occur in the upper Mulchatna and Chilikadrotna river drainage and east of Iliamna Lake. This activity could result in an increased harvest of moose (est. 10) by the greater number of miners in those areas.

Aggregate effects. Oil and gas development and construction to service that development may increase harvest of peninsula moose. This increase should not, however, be detrimental to the peninsula moose population. Increased harvest (173 animals) occasioned by potential settlement in the Nushagak River and Iliamna Lake areas and the unknown number of additional moose taken by miners in that area would probably not stress the moose population severely but could cause difficulty in subsistence allocations for local residents.

Conclusion. Impact on moose by activities allowed under this alternative would be negligible on the peninsula, minor in the Nushagak River Valley and Iliamna Lake area and minor for the Bristol Bay region as a whole.

Impacts on Brown Bear

Settlement. Remote settlement on an estimated 74,600 acres of disposed state land would have major local impacts on brown bear due primarily to human disturbance in remote areas and some increased mortality from sport hunting and human/bear conflicts.

Oil and gas development. Brown bear occupy selective habitats on a seasonal basis along the coastal plain. Field seismic activities and exploratory drilling along the coastal uplands between Naknek and Port Moller without stringent environmental controls could displace animals from essential habitats, disturb denning areas and eventually lower productivity within selected subpopulations on the Alaska Peninsula.

Development of permanent gas production facilities within the uplands south of Port Heiden could result in displacement of some animals from essential spring-use areas. Post-denning movements toward the coastal plain generally begin from the mountainous sub-alpine area in April and May, with the peak number of bears reaching the coastal plain by mid-June (Glenn and Miller,, 1977). The coastal plain apparently provides a needed source of protein (dead marine mammals, caribou, and moose) during a critical time in the bears annual cycle. Industrial activities within and near the gas fields, if not seasonally modified or curtailed, could restrict free and undisturbed access to these essential spring-use areas. Offshore exploration and development between Port Heiden and Port Moller could occur along nearly 100 miles of essential coastal habitat. Combined development actions within the tidelands and coastal uplands could result in fewer bears using key habitats over the long term. This movement could result in increased competition for food in other areas, intrapopulation stress, and overall lowering of recruitment within that population using coastal environments between Port Heiden and Port Moller.

Over 70 salmon streams serving as a food source for bears have been identified within the general area where a gas production facility may be developed. Considering the relatively small size of a production field in relation to total number of spawning streams within the coastal plain, it is not likely

that a biologically significant loss in salmon as a food source would occur, but it could force bears to seek salmon in other streams due to the disturbance factor.

Transportation corridor. Brown bear occupy feeding, denning and spring-use habitats throughout the Port Moller-Balboa Bay corridor. Construction of a pipeline in this corridor would probably alter some essential or important habitat, especially where the pipeline comes ashore from the lower reaches of Herendeen Bay near denning areas in nearby Buck and Deer valleys.

The lower reach of Herendeen Bay is in near-proximity to an essential spring-use area, and close to known denning areas. Some of the den sites in Deer Valley nearest to the corridor might be abandoned as a result of construction disturbance, pipeline structures and intensified human activity. Denning activity would probably recur, however, once construction was terminated and conditions in the area stabilized. The onshore portion of the corridor from Lower Herendeen Bay to Beaver or Lefthand bays would bisect bear travel routes between denning and spring use areas. Localized movements between these areas could be disrupted if some construction activities are not seasonally restricted to the November-March period a time when most bears are denning.

Kagayan Flats, on the Pacific coast of the peninsula near the proposed LNG facility, is a essential spring-use area. Spring-use areas provide essential habitat during post-denning periods (May-June) when body condition is poorest and nutritional demands are highest. Bears, especially sows with subadults, displaced from food sources by disturbances from construction activities, could be subject to increased stress and possibly higher mortality rates. Port and LNG facilities developed in either Beaver or Lefthand Bay would result in intensified marine traffic. Bears could react by avoiding essential feeding areas such as salmon streams emptying into these bays. The net result could be increased competition in other areas and ultimately lower recruitment. Intensified activity over prolonged periods of time could eventually cause brown bears to abandon traditional feeding sites altogether, including the essential spring-use area in the Kagayan Flats. Activity associated with construction including air and ground logistical support systems, development of camp facilities and increased human presence, as well as operational port tankering facilities could be expected to displace some animals within this local area, and increase in the number of bears killed in defense of life/property.

Minerals. Leaving all anadromous fish streams outside parks and refuges open to new mineral entry would further add to the harassment and disturbance of local bear populations. The level of impact would depend on time, location and intensity of the mining effort. It is reasonable to assume that more bears would be killed as a result of human/bear encounters, and that bears would be displaced from preferred habitat. A decline in population in some areas would be expected.

Aggregate effects. Under this alternative, land management decisions and development activities would be implemented withoug benefit of a unified and

controlled planning effort and environmental guidelines. An aggregate effect of these decisions would result in a reduction in bear numbers throughout the study area. This alternative would eventually require more restrictive harvest regulations, resulting from human population increases due to settlement and oil and gas development.

The alternative would allow oil and gas leasing over approximately 75% of the regions's important brown bear habitat. One of the most probable corridor routes would be through essential bear habitat. Settlement in remote areas on as much as 74,600 acres would have major adverse effects locally through disturbance, displacement and increased harvest.

Conclusion. This alternative could have major local impacts on brown bears, particulary in the Balboa Bay area. Regionwide, the impacts could range to moderate.

Impacts on Waterfowl and Marine Birds

Settlement. Seventy-four thousand, six hundred acres of lands could be made available for remote settlement under this alternative. Most of these tracts are located in upland areas, thus waterfowl would not be significantly disturbed, although in local areas some nesting habitat could be affected. Disturbance factors could result in alteration of some local distribution and use patterns. Marine birds would not be affected.

Oil and gas development. Oil and gas exploration and development permitted under this alternative could have regionwide impacts on waterfowl and seabird populations in Bristol Bay. Upland exploration and development would slightly reduce the amount of isolated nesting habitat for swans and ducks.

The most significant potential impact with no action is related to activities that would be associated with leasing tide and submerged lands within Bristol Bay although the probability of finding oil and gas in the tidelands along the north shore of the bay appears unlikely. Types of impacts to waterfowl by this activity are discussed under the Proposed Plan.

Transportation corridor. Although no corridors are specifically designated by this alternative, it is assumed that a pipeline would likely be built from Port Moller to Balboa Bay. Impacts resulting from this corridor are identical to those that would result from its development under any of the alternatives.

The greatest threat would come from oil contamination in coastal areas as a result of pipeline spills or leaks or tanker operations (Bartonek et al., 1971). Chronic pollution in areas of oil transport may kill more birds every year than die after a single, large spill (McKnight and Knoder, 1979).

The coastal reaches of this corridor are located in excellent bird habitat and the possibilities of earthquakes and landslides are relatively high (Davis and Jacobs, 1980; Davies, 1981). The danger of pipeline spills or tanker

accidents therefore is significant. The potential impact on waterfowl and seabirds is major but would be of relatively short duration and in localized areas.

Energy. Marine birds would not be affected by development of the Newhalen hydropower project. As described under the Proposed Plan, impacts to waterfowl would be limited to construction and maintenance of transmission lines and corridors. The major disturbance impact would last only during the construction phase - probably 2 or 3 seasons. Since nesting is not extensive throughout the impact area, impacts would likely be limited to power line collisions. This would impose a danger primarily to locally nesting waterfowl since most migrants would probably fly at elevations higher than power lines over interior lands. Mortality from collisions would be identical to those that would occur with development of a regional power transmission network under any of the alternative plans except 2, which precludes such development.

Minerals. Subject only to restrictions already in force, anadromous streams would remain open to mineral exploration and development. Some of the impacts on water quality (toxic compounds, increased turbidity) could be transmitted downstream to wetland and estuarine waterfowl habitat, where the food source for staging or molting waterfowl could be affected. This could influence waterfowl health and mortality throughout most of Bristol Bay and reduce the carrying capacity of impacted areas. Since most potential mining lies in the northern portion of the study area, tidelands along the peninsula would be relatively unaffected. Overall impacts would be minor, with possibility of some major impacts in local areas.

Aggregate effects. There are several factors that would cause no action to result in unavoidable impacts that would be mitigated by the Proposed Plan. With no plan, tide and submerged land leasing could begin as early as 1989, whereas the Proposed Plan places a 10-year moratorium on leasing in those areas. No action would thus result in impacts occurring sooner and possibly to a greater extent, since it is likely that rapidly developing technology will result in fewer or reduced environmental impacts from oil and gas exploration as time goes on. Because of the lack of guidelines to govern location, timing, and intensity of activity associated with oil and gas exploration and development, corridor construction and mining, this alternative could have a moderate regional impact on waterfowl and seabird populations in Bristol Bay, with major impacts occurring in relatively small areas.

Conclusion. This alternative could have a moderate impact on waterfowl and marine birds regionwide.

Impacts on Marine Mammals

Oil and gas development. Impacts on marine mammals from upland oil and gas field exploration and development would be negligible. Activities along the coast on tidal and submerged lands have the greatest potential for producing negative impacts on marine mammals. Development, should it occur, is

anticipated to be centered along the north shore of the Alaska Peninsula between Pilot Point and Port Moller. Therefore, a majority of the walrus which utilize the Walrus Islands, and beluga whales feeding in the larger estuaries at the head of the Bay, should be little affected. However, some marine mammals utilizing Bristol Bay could come in conflict with coastal oil and gas development. Along the north shore of the Alaska Peninsula, sea otters, which are year round residents, seals, sea lions, Amak Island walrus, and to a lesser degree a few seasonally migratory whales, specifically the endangered gray, could be at risk. Construction disturbance would displace some sea otters and seals to quieter habitats which could lead to a local population decline if habitats were at carrying capacity. Migratory whales may move further offshore to elude disturbed areas but probably would suffer no reduction in population as a result of construction disturbance or oil spills.

Sea otters are sensitive to oily aquatic pollutants because of their high metabolic rate and dependence on trapped air in the fur for thermoregulation. Accidents which lead to oil pollution could seriously affect otters that fail to avoid the spill area. Members of populations so affected could suffer injury or death, but the effect would be quite localized and impact on the overall otter population would probably be negligible.

Whales, seals, sea lions and walruses which might wander into spill areas could suffer some skin, eye and mucous membrane irritation from the more toxic elements of the pollutant but little mortality would be likely and effect on overall populations would be negligible.

State-of-the-art spill response technology and existing statutory rules and regulations governing oil and gas developments would reduce the probability of oil related accidents and severity of potential impacts to marine mammals. As compared to the Proposed Plan, however, in which tide and submerged land leasing would be delayed for 10 years, no action could result in impacts occurring earlier, without the benefits of improvement in oil and gas technology.

Transportation corridor. A transportation corridor from Port Moller to Balboa Bay could produce some impact to marine mammals, primarily sea otters and seals. The frequency at which other marine mammals, such as sea lions or whales, enter the bays at each end of this corridor is probably low.

Construction disturbances could displace some resident seals and otters to quieter areas which might lead to a permanent decline in the numbers of animals utilizing the two bays. It is more likely however, that most species would reestablish themselves in the bays once the initial disturbance has subsided, unless high levels of disturbance were to continue indefinitely.

Construction activity should have little or no effect on wider ranging whales, sea lions and walruses. Pollution events associated with the corridors could affect sea otters and seals failing to avoid the spill area. Effects, however, should be localized since spills would most likely occur on at least semi-enclosed waterbodies and pollution abatement and control mechanisms would be in place as required by existing statutes.

Aggregate effects. Marine mammals utilizing Bristol Bay would be marginally affected by activities likely to occur with this alternative. Settlement, hydropower development, and mineral activities would not measurably affect these animals. Transportation development in the Port Moller/Balboa Bay corridor could affect some local populations of sea otters and seals during construction operations, but these effects would be short-term. Spill events at terminal sites could also affect otters and seals but such impacts would be very localized and would be attenuated by control mechanisms. Oil and gas development in tide and submerged lands could affect some Bristol Bay marine mammals, principally sea otters, seals, walruses, and migrating whales. Impacts would generally be localized and short-term. Impacts would occur 10 years earlier in tide and submerged lands than would occur under the Proposed Plan. Impacts could be greater with earlier development since rapidly improving technology would probably result in fewer or less severe impacts with the passage of time.

Laws and regulations governing development activities, which apply in by all of the plan alternatives, would reduce the probability and severity of potential impacts to marine mammals.

Conclusion. Effects of activities occurring under this alternative would produce a minor impact on marine mammals of the Bristol Bay region. In the event of major oil spills, animals and habitat in specific areas could suffer major but relatively short-term impacts.

IMPACTS ON SOCIOECONOMIC RESOURCES

Impacts on Subsistence

Settlement. Seventy-four thousand, six hundred acres of land could be made available for remote settlement (five times as much as would be available under the Proposed Plan). This could result in an increase of 1,500 or more new people over existing populations by 2002 with a concomittant increase in competition for subsistence resources. The greatest increase in competition would occur in areas already used for subsistence. This could eventually lead to a reduction in subsistence allocations in those areas.

Some scattered settlement tracts would occur on the peninsula. Most of the increase would probably occur north of Dillingham and east of Wood-Tikchik State Park, on the Nushagak River and its tributaries, and along the Kvichak River and its tributaries above and below Iliamna Lake.

Table VIII-1 names the settlement locations for each of the plan alternatives, some of the subsistence resources present in each of these locations, and the villages reporting use of the area as mapped by ADF&G's Subsistence Division. Villages located nearest new settlements would be more affected by increased competition than villages further away. Without the BBRMP, it is assumed that remote settlement areas will be dispersed throughout the region, including the most heavily used subsistence areas. New people using these locations would

increase the competition for both caribou and moose throughout the region. The problem of demand outstripping supply will be further exacerbated, particularly near Dillingham, Illiamna Lake, the Nushagak-Mulchatna drainage and the northern Alaska Peninsula. The state game board may have to adjust harvest allocations in order to maintain populations.

Impacts on subsistence fishing would be moderate (see impacts on salmon).

Oil and gas development. Upland exploration would have a short-term impact, as most workers would be temporary and from outside the region, and would be accomodated in temporary housing at or near exploration sites. Development of an upland gas field would employ in excess of 900 people initially, but the bulk of these people would be transient and not eligible for subsistence. New resident employment would level off at about 40 jobs. If these people are concentrated in a fairly restricted area, there could be significant local competition for subsistence species.

Development in the calving grounds and exploration throughout the region could have moderate effects on the North Peninsula caribou herd. People utilizing this herd could have their subsistence harvest of caribou reduced, which would have a moderate local impact.

There would be little impact on subsistence use of moose from oil and gas activities.

Neither uplands or tidelands oil and gas activity would significantly affect subsistence use of salmon at a regional level. However, an oil spill that affects large populations of fish headed for a particular drainage could have a major local impact on subsistence fishermen of certain communities.

Transportation corridor. Though no corridors would be identified without a plan, oil and gas development on outer continental shelf lands or anywhere within the Bristol Bay region would probably result in construction of a transpeninsula corridor. The scenario for this alternative identifies the Port Moller-Balboa Bay corridor as the route for both oil and gas pipelines. Development in this corridor would not impact moose or caribou, and would have a minor impact on salmon. Oil spills could have a major short-term localized impact on salmon and subsistence users primarily from Nelson Lagoon and Sand Point.

Energy. Construction of a hydroelectric project at Newhalen would add 50 new residents to the population of the Iliamna-Newhalen area during construction. These residents, through sport or subsistence hunting, would add to the short-term demand for subsistence resources, especially moose. After construction is completed, many of these new residents would probably leave the area.

Aggregate effects. Impacts of development on salmon, caribou and waterfowl populations could be major locally, and moderate regionally. The impact of this alternative on the Northern Alaska Peninsula and Mulchatna caribou herds could cause the State Board of Game to reduce allowable harvest levels to maintain a sustained yield.

No Action

The number of persons who would qualify as subsistence users would increase substantially in the region regardless of the BBRMP, due to natural population growth and continued growth of the region's economy based on the existing fisheries, recreation, and services industry (Nebesky, et al). The increased demand for subsistence hunting of moose and caribou from these new residents would be concentrated in the Nushagak and Kvichak River drainages and tributaries to Iliamna Lake. Very little of this increased demand would occur in the Togiak-Kuskokwim Area.

Impacts to salmon and waterfowl could be moderate regionwide, with the possibility of local major impacts. Impacts on marine mammals will be negligible.

Conclusion. Major impacts on subsistence in localized areas, particularly with respect to caribou use in the upper peninsula, and moose and caribou in the Iliamna Lake and Mulchatna area, could be expected to occur. This translates into a major impact on subsistence on a regional basis because a majority of the subsistence users will be located in the areas experiencing major localized impacts on subsistence resources.

Impacts on the Commercial Fishery

Settlement. It is anticipated that 74,600 acres of land could be made available for remote settlement in the absence of a plan, resulting in an estimated 58 new permanent and 465 new seasonal households. If each new household qualifies for subsistence use, an estimated 66,000 additional fish would be taken annually by subsistence fishermen. This additional harvest would produce a minor regional impact.

Oil and gas development. Some activities associated with oil and gas exploration and development have a potential for impacting the commercial salmon fishery. Impacts on salmon (the primary commercial fishery) were previously discussed, and oil and gas activity is expected to have a moderate impact on the fish.

Oil spills could cause flavor problems which would reduce market value of the catch. Setnet fishermen could also be affected more by oil spills than those using drift nets because of their inability to shift fishing locations. Competition for vessel service facilities used by both the commercial fishing industry and the oil and gas industry could also cause conflicts.

Transportation corridor. Potential indirect impacts to commercial fishing from corridor development could result from construction and maintenance activities that increase sedimentation, turbidity, and benthic disturbance. Such impacts would be local and of little regional impact.

This alternative would not designate any specific transpeninsula corridor. For purposes of analysis it is assumed that a corridor would eventually be developed from Port Moller to Balboa Bay. Lefthand Bay would provide relatively sheltered anchorage for port facilities and thus have a lower

potential for storm-related accidents than terminal sites located in more exposed coastal locations. Oil spills or pipeline breaks would have local impacts on commercial fishing operations in the immediate vicinity of the corridor or its ports. Major spills have a relatively low probability of occurrence.

Energy. A run-of-the-river hydropower facility on the Newhalen River could result in minor, long-term impacts on the Newhalen salmon run.

Minerals. New mineral entry on State and BLM lands would continue under existing regulations. No specific measures would be taken to prevent new mineral entry in the beds of anadromous fish streams and activity in streams would not be subject to lease hold control. The potential impact of placer mining under these conditions could result in major impacts on some streams.

Aggregate effects. Regionwide impacts on salmon under this alternative could be moderate (see Impacts on Salmon). The Impacts on Subsistence analysis suggests that subsistence harvests may increase at the expense of recreational and perhaps commercial fishing. Offshore and tideland oil spills would be more probable under this alternative and could occur as much as 10 years earlier than with the Proposed Plan. In the absence of major spills, the overall effect of oil and gas operations alone would result in minor to moderate long-term impacts.

Conclusion. This alternative would result in moderate long-term impacts to the region's commercial fishing industry.

Impacts on Population

Settlement. The Alaska Department of Natural Resources has estimated that with approximately 74,600 acres available for remote settlement under this alternative, nearly 1,600 new people would settle in the region. Of these, about 175 would be permanent residents. The majority of the new people would settle in the Dillingham and Iliamna Lake areas, with approximately 25% on parcels around Dillingham and 40% around Iliamna Lake.

Oil and gas development. Exploration for oil and gas in the areas available for leasing could result in an average of 17-20 workers per year with approximately 25% residing in the Bristol Bay Borough, which has significantly more social services than most other communities. Housing, while not abundant, is available. The impact on the Borough's population would be insignificant.

Eventual development and production of oil and gas would require a workforce of about 925 people during peak development. A majority of these workers would reside in enclave developments with a few becoming permanent local residents, most likely in the villages of Port Heiden and King Salmon. Exploration and development of oil and gas in the tide and submerged lands would result in about 42 new residents in the region.

Transportation corridor. No transportation corridors are presently identified in the Bristol Bay region, although it can be assumed an upland or tideland oil or gas discovery would result in the need for a pipeline across the peninsula. Several hundred people would be employed for about a year on this project. The majority of these workers would be imported labor residing in contractor-provided enclaves near the construction site. Upon completion of the project, virtually all construction employees would leave the region.

Energy. A regional hydropower project would add an estimated 50 workers and dependants to the regional population. Most population growth would probably be in the Iliamna/Newhalen area, the most likely support base for the Newhalen project.

Adding 50 people to the combined population of 181 for the two villages would increase the population by 27%. This increase would probably be temporary but could produce moderate stress in the community if additional housing is not provided.

Minerals. Mineral exploration would not be incumbered by closure of streams to placer mining and it is assumed that a 15% increase in this activity could occur over the next 20 years. The increase in population resulting from placer mining would be largely seasonal and widely scattered throughout the region. Impacts to local communities would probably be negligible.

Aggregate effects. Oil and gas activities in the region could result in the addition of an estimated 42 permanent residents by the year 2002. The majority of workers in the industry would be temporary construction employees and would be housed in contractor-operated enclaves near construction sites. Moderate, temporary impact could occur in association with providing transportion services to the construction force. This impact would probably center on the Bristol Bay Borough, Cold Bay or perhaps Port Moller. Mineral development would add a few permanent residents to the region but they would likely be widely dispersed.

Energy development could have a moderate, temporary housing effect on Newhalen and Iliamna should a project be constructed on the Newhalen River, unless most workers were located in enclaves at the development site. Settlement would add about 1,600 new people to the region, but only about 175 of these would be year-round residents.

Conclusion. Increase in the region's permanent population as a result of development activities which might occur under this alternative would be minor. Moderate short-term impacts on local populations in the vicinity of construction activities could occur.

Impacts on Employment

Settlement. Settlement on remote state and federal land disposals in the region, of the magnitude estimated in this alternative, would create additional employment opportunities in the service and construction

industries. New regional residents (175 permanent - 1,395 seasonal) would also increase the demand for government sevices. However, without a regional government with taxation authority, increased employment by the governement to provide such services is unlikely. Land disposals under this alternative could result in a moderate increase in employment with most of these impacts occuring in Dillingham, the Bristol Bay Borough, and the Iliamna-Newhalen areas.

Oil and gas development. Upland exploration would have a short-term impact, as most workers would be from outside the region and would be acommodated in temporary housing at or near exploration sites.

Development of an uplands gas field would result in peak employment of about 925 during development, which is forecast to occur five years after a lease sale. Of these workers, about 140 would be residents of the region. An additional 31 residents jobs would occur in other sectors of the economy. Employment during the production phase would level off at about 280 after 10 years. Total new resident employment probably would level off at 42 jobs. All non-resident employees during development and production probably would reside in industry or contractor enclaves located at or near the gas field or LNG facility.

Tide and submerged land exploration would result in short-term impacts, with nearly all workers originating from outside the region. Total employment, should a commercial discovery be made, would peak at approximately 925 persons in the 1990s. About one-fifth of these employees would be local residents. The reminder would be imported labor probably residing in company owned enclaves near the site of the discovery. Employment would decline to about 285 for the life of the field, but would retain approximately the same ratio of resident to non-resident employees.

Transportation corridor. Although no transportation corridor is identified under this alternative it is assumed that one transportation corridor might be constructed across the Alaska Peninsula. Logic dictates that if a commercial oil or gas discovery was made in the most prospective area on the peninsula, transportation facilities would be required from Port Moller to Balboa Bay. Construction within this corridor would require several hundred workers for about 2 years, most likely in the early 1990's. Most workers would be housed on site and the majority would be from outside the region.

Energy. A large regional hydroelectric power development would employ up to 300 workers during peak construction and could have long-term impacts on employment in other sectors of the economy. Effects of this project on the regional employment picture is discussed in greater detail in the analysis of the Proposed Plan.

Minerals. Existing placer mining operations at Platinum and Nyac employ an estimated 20-30 and 40-50 persons respectively, and operate approximately 4 months per year. Such operations often operate 6 or 7 days a week during these 4 months. Each person employed represents one half of a full-time

employee, therefore full-time-equivalent (FTE) jobs were considered to be 15 at Platinum and 25 at Nyac in 1980. Other small placer operations in the region employ 12 persons, or provide 6 FTE jobs.

It is assumed that existing mineral exploration provided less than 10 FTE jobs in the region in 1980. Under the No Action Alternative, it is assumed that placer mining could increase up to 15% in the next 20 years. Based on estimates of permanent residents currently employed in placer mining, a 15% increase would amount to 7 new resident employees.

Aggregate effects. The "Economics, Subsistence and Sociocultural Projections in the Bristol Bay Region" (Nebesky et al., 1983) predicts a substantial increase in the region's employment.

Development of tidelands oil and gas and a major regional hydroelectric project would result in a significant increase in both resident and non-resident employment in th late 1980's and 1990's. Most of this employment would occur in Analysis Subregions II, III, and IV.

Conclusion. This alternative would not effect the existing rate of growth of employment in the region.

IMPACTS ON OTHER RESOURCES

Impacts on Water Quality

Oil and gas development. Under the No Action Alternative, leasing for oil and gas could occur on any uplands and in any State tide and submerged lands not closed by existing authorities. The range of oil and gas activities which can produce water quality impacts are more fully examined in the discussion under the Proposed Plan.

Barring a catastrophic event however, an active program of oil and gas development in the Bristol Bay area would probably not result in any substantial regionwide water quality impacts although localized, short-term sedimentation may occur during construction phases.

Transportation corridor. Transportation corridors are not identified under the No Action alternative. However, should development activities necessitate the need for a transpeninsula corridor, it is assumed that the Port Moller to Balboa Bay route would be selected. Description of the potential impacts to water quality which might occur as a result of activities along that route, are discussed under the Proposed Plan.

Minerals. This alternative would allow the development of valid existing claims for locatable minerals, new claims or mineral exploration on most State, BLM, and Native-owned lands. Valid existing claims on National Wildlife Refuges would continue to function under existing regulations. Placer claims could be filed for mining within anadromous streams.

No Action

Potential for impact to water quality from mining activities would be greatest in the Upper Mulchatna and Chilikadrotna River drainage and east of Iliamna Lake where placer mining is expected to increase by 15% over the next 20 years.

Mining development has the potential for creating long-term water quality impacts. Currently existing state laws and regulations are sufficient to prevent major adverse impacts. Lack of compliance with existing laws and regulations by the mining industry, however, will increase the potential for impact on water quality. Even with strict compliance and enforcement of water quality regulations some moderate, short-term impacts may occur in localized areas.

Aggregate Effects. Impacts to water quality resulting from development operations, primarily oil and gas, transportation, and mineral extraction, include increased sedimentation and turbidity, loss of wetlands, possible localized disruption of surface water and groundwater movements, and an increase in toxicity in river tributaries. Water quality will not be degraded beyond levels acceptable to the State of Alaska, provided that existing laws and regulations are followed.

Conclusion. Moderate short-term impacts can be expected within localized areas. Regionwide impact from the combined development actions should be minor.

Impacts on Recreation

Settlement. This alternative allows for remote settlement of 74,600 acres and would likely result in an increase of about 1,600 new permanent and seasonal residents (525 households) dispersed throughout the study area, primarily on state lands. The increased human presence and increased competition for resources would lower the quality of the recreational experience of established residents in areas where remote settlements are located near existing communities. While depreciating the value of recreation for resident people, this alternative would increase the development of private recreation sites and commercial ventures. The latter, in turn, would attract a greater number of outside recreationists into the area. While maximizing opportunities for developing commercial recreational enterprises this alternative also imposes the greatest threat to fish and wildlife resources.

Oil and gas development. This alternative would include earlier introduction of a work force relative to tide and submerged land exploration. This could affect hunting for brown bear along the north coast of the peninsula, as well as create additional local competition for other sport species, primarily caribou and salmon as discussed in the Proposed Plan. Upland oil and gas activity would generate very similar impacts under any of the planning alternatives and 'no action.' This similarity exists because most of the constraints imposed by the various alternatives deal only with timing and location of leasing tide and submerged lands.

Transportation corridor. Transpeninsula corridors are not identified under this alternative. If one or more future corridors should be developed in absence of a plan, it (they) would likely occupy routes identified under the alternate plans. Three corridors are assessed under the Proposed Plan. Four additional corridors are assessed under Alternative 4. Effects on recreation under this alternative would be the same as those described under the other planning alternatives.

Energy. Each of the alternate plans, except Alternative 2, assumed that a regional hydropower facility would be developed. With respect to recreation, impacts would be essentially identical in each case, being limited almost entirely to the construction and maintenance of transmission lines and corridors. While detracting from the wild character of remote areas and the recreational wilderness experiences associated with such areas, corridors would provide increased access to surface vehicles. This would expand recreational opportunity to local people while concomitantly increasing stress on recreational species, primarily caribou and moose.

Minerals. Since the beds of anadromous streams would not be closed to new mineral entry and lease hold controls would not be imposed on operators, there would be greater risk of water quality degradation which could result in localized adverse effects on sport fisheries and river floating. By the same token, with few controls imposed on mining activity, more trails, roads, and airstrips would probably be developed in remote areas. This would increase access and related recreational opportunity for local residents, while increasing stress, through sport hunting and fishing or human disturbance activities, on fish and wildlife resources. This additional stress would be a minor impact on a regional scale, but in local areas could result in moderate to major impacts.

Aggregate effects. This alternative would result in cumulative adverse effects with respect to the wild character of some remote areas. Recreational opportunities would increase as a result of lands made available for remote settlement and improved access into remote areas resulting from roads, trails and airstrips constructed in conjunction with electrical transmission lines, oil and gas exploration and development, transpeninsula corridors, and mineral development. Regionally, these activities would combine to produce moderate increases in recreational opportunity. Potentially substantial impacts could occur locally on recreational species, particularly sport fish, brown bear, caribou, and moose.

Conclusion. This alternative could have a moderate impact on esthetic values associated with recreational experience in the region. This alternative could result in moderate increases in recreational opportunity on a regional scale. In local situations, potential exists for major impacts on fish and wildlife, and for increased competition between sport, subsistence and commercial users of these resources.

Impacts on Historic and Archeological Sites

Settlement. Remote settlement increases the likelihood that archeological and historical properties will be damaged or destroyed. Sites affected by

construction of roads, homes and utilities may be lost. Generally, increases in impacts will be proportionate to increases in remote settlement. Since at least 74,600 acres of remote settlement lands are predicted to be sold, impacts can be expected to be approximately five times greater than the Proposed Plan and Alternative 1 where settlement lands would comprise about 14,000 acres.

Oil and gas development. Under this alternative all areas with oil or gas potential could be leased for exploration and development if not prohibited by existing or other statutes and authorities. It is speculative to determine archeological and historical resources at risk from this activity at this time because of the uncertainty of where exploration might occur. There are currently only 38 recorded historical sites occupying a total of approximately 230 acres in the several million acres possibly available for leasing. Indirect affects, primarily "pot hunting", would increase simply because of increased access and human activity should substantial oil and gas development occur. Risk of damage to historic resources is considered low however, since most authorities which regulate the industry require strict compliance with stipulations that mandate locating and protecting archeological sites as a condition when granting operating permits.

Transportation corridor. Transpeninsula corridors are not identified under the No Action Alternative. IF one or more corridors were to be developed in the future without the BBRMP, it is assumed the route would occupy approximately the same locations as those evaluated under either the Proposed Plan, or Alternative 4; and would produce approximately the same impacts.

Energy. Construction of the Newhalen project would put about 500 acres of HSPA at risk at the power production site. Main transmission line rights-of-way would utilize about 3000 acres and feeder line corridors would impact another 6000 acres. Number of archeological sites which might be encountered by these activities is unknown at this time.

Minerals. Mining, by its very nature, occurs in areas of high potential for archeological sites; destruction of some sites can occur.

Archeological sites encountered during placer mining operations could be destroyed by clearing vegetation and overburden or by actual mining activities. In cases where mining occurs directly in active stream beds, negligible impacts would be expected; however, support activities on the banks could result in damage.

Lode exploration for mineral deposits would occur in mountainous areas likely to be LSPA and would have a low potential for placing archeological resources at risk.

Aggregate effects. The No Action alternative places no additional controls on growth and development in the Bristol Bay region. HSPA that could be at risk through direct impact by settlement (74,000+ acres), transportation corridors (1,150+ acres), oil and gas (200+ acres), energy development (9,000+ acres) and other activities combine to make potential risks significant.

Conclusion. Risk probability of this alternative to archeological and historical resources could be locally high in areas directly affected by totally uncontrolled development. Risk to archeological resources of the Bristol Bay region, should these actions occur, would be moderate.

Impacts on Wilderness

Settlement. With 74,600 or more acres expected to be available for remote settlement under this alternative, there could be some indirect effects on wilderness suitability of near-by Federal lands through land clearing and construction of buildings, roads, airstrips and other intrusions on the landscape. This would be mostly likely to occur as a result of increased settlement near the Togiak or Alaska Peninsula Refuges.

Oil and gas development. Tide and submerged lands, with the exception of the Fisheries Reserve, would be available for leasing. Thus, this alternative allows the opportunity for impairment of wilderness value along the coast of the Togiak Wildlife Refuge if any development should occur there. Upland impacts would be the same as with the Proposed Plan.

Transportation Corridor. If a transportation corridor is developed, it is likely to be one of those identified and assessed under the Proposed Plan or Alternative 4.

Aggregate effects. Settlement developments could offset wilderness quality near the Togiak or Alaska Peninsula Refuges. Since all of the Bristol Bay coastline, with the exception of the Fisheries Reserve, would be subject to lease, the coastline of the Togiak Refuge could suffer wilderness impairment. Transportation corridors, electrical power lines, and mining would have essentially the same effects as they would under Alternative 4. Anadromous streams could be degraded by the permission of new mineral entry for placer mining and mining activitiy would not be subject to lease hold restrictions. Perhaps the greatest difference between No Action and the other alternatives, particularly Alternative 4, is that there would be no protective guidelines established to ensure that impacts are prevented, minimized, or mitigated to the fullest extent under provisions of existing Federal and State statutes.

Conclusion. No Action would maximize the potential for adverse impacts likely to occur under the constraints of existing law. Regionwide, development could cause moderate impacts on wilderness suitability of Federal lands.

ALTERNATIVE I

DEVELOPMENTAL ASSUMPTIONS USED FOR IMPACT ASSESSMENT

The original preferred alternative described in the DEIS was modified in response to public comments. These changes, though rather significant, involved only a few resource issues. Most of the assumptions concerning future probable actions and impacts are identical in the Proposed Plan and Alternative 1. The differences are as follows: 1) The Proposed Plan places a 10-year moratorium on leasing tide and submerged lands along the peninsula for oil and gas exploration, whereas Alternative 1 would permit immediate placement of the lands on the state's five-year lease schedule, with 1989 being the earliest that a sale would likely be scheduled. 2) The Proposed Plan permits lease sales on State or Federal lands where oil and gas is a primary use, and on federal lands where it is a secondary use. Alternative 1 is identical, with the exception that it would close the Black Hills caribou calving grounds to leasing. 3) Whereas Alternative 1 would close to new mineral entry the active stream channels of all designated anadromous streams (approximately 7,000 linear miles), and their tributaries, the Proposed Plan would close parts of 64 selected anadromous streams which produce Bristol Bay salmon. The differences in impacts which would result with adoption of Alternative 1 instead of the Proposed Plan are highlighted in the following discussions.

Settlement. The State would offer for sale up to 14,250 acres of State lands for remote settlement. About a third of this land would be near Dillingham. Another third would be located in the Mulchatna and Nushagak river rainages. The remaining third is divided between sites in the vicinity of Iliamna Lake and various areas near Port Moller and Cold Bay.

The Department of Natural Resources provided the following assumptions based on their past experience with land disposal programs. The average parcel size is assumed to be 15 acres. Some disposals would be 5-acre subdivisions, while others would be 5- to 40-acre homesteads. It is assumed that all parcels offered for sale would be sold within the 20-year assessment period. The first land sale would not occur until state fiscal year 1985 (July 1984-June 1985). Actual settlement and resultant impacts would not occur until 1990, to account for a 5-year period between land sales and land improvements.

Remote land disposals are assumed to result in 164 households being established on the acreage sold by 2002. Of these, 11 would be permanent households and 86 would be seasonal households new to the Bristol Bay Region.(See Table VIII-2)

Oil and gas development. Exploration and development activities would be designated a primary use for areas with high and moderate potential for oil and gas. This includes over 2.5 million acres of state owned land on the Alaska Peninsula south of the Bristol Bay Borough. Oil and gas is designated as a secondary use on lands having moderate or low oil and gas potential,

including the Nushagak Peninsula and the Nushagak and lower Kvichak River basins. In addition, oil and gas development has been designated as a secondary use in portions of the Becharof, Togiak and Alaska Peninsula National Wildlife Refuges. For purposes of environmental protection, however, all state tide and submerged lands in the Bristol Bay Fisheries Reserve, tide and submerged lands north and west of the reserve, major bays, estuaries and lagoons along the north side of the Alaska Peninsula and the Black Hills caribou calving grounds would be withheld from leasing. Oil and gas activities would be prohibited in designated wilderness areas on refuges. Activities are assumed to be restricted or prohibited on an additional 35% of other refuge lands where exploration or development is determined to be incompatible with refuge purposes.

Lease sales would likely be scheduled over the next 20 years on any state or federal uplands where oil and gas is a primary use, and/or on federal lands where it is a secondary use. State Lease Sale #41, which took place September 18, 1984, included approximately 1.44 million acres of uplands between the Kvichak River and Port Heiden. Approximately 280,000 acres were leased during the sale. Scheduling and extent of exploratory activities which may occur on this acreage is unknown at this time.

State sale #56 which includes approximately 2 million acres of uplands between Port Heiden and Cape Lieskof is assumed to proceed as scheduled in 1988. BLM lease sales of approximately 1.6 million acres of land in the Kvichak and Goodnews Bay areas are assumed to proceed as scheduled in 1984.

The estimates for oil and gas resources used in this and all other scenarios are based in part on an unofficial report by DNR's Division of Geologic and Geophysical Surveys (DGGS), "Draft - Undiscovered Oil and Gas Potential in the Bristol Bay Region, Alaska" (1982). Oil and gas developments on the Kenai Peninsula and in Cook Inlet were used as models. Most data on these existing developments were taken from the 1981 Statistical Report of the Alaska Oil and Gas Conservation Commission. Direct employment estimates for each scenario were made using information relating to the Department of the Interior's St. George OCS Sale 70, interpretations of geologic data by DNR-DGGS, and manpower estimates developed as part of an economic and policy analysis of the petroleum resources of the National Petroleum Reserve in Alaska. Employment estimates for tidelands oil and gas activity were derived from Hanley et al. (1980) and the Governor's Agency Advisory Committee (1981).

Exploration: Onshore exploration would probably occur throughout the period from 1984 to 2002. It is assumed that seismic exploration using both helicopters and ATV trains would occur over much of the land leased. Seismic signals would be generated by explosive charges either buried or placed on stakes above ground. Exploratory wells would be drilled in those areas producing favorable seismic returns. It is estimated that as many as 19 exploratory wells could be drilled. Major air support would come from King Salmon or other existing airfields. However, several new bush airstrips would probably be built to service the exploratory wells. Average annual employment would range from 17 to 20 persons depending on the level of activity in any year. At most, 25% of these workers would reside in the region.

Exploration methods in tide and submerged lands would include seismic operations with vessels using air guns and exploratory drilling. Drilling would be accomplished by directional drilling from uplands, jack-up rigs, semi-submersible rigs, or drill ships as appropriate.

Development: Preliminary, unofficial estimates from DNR-DGGS in 1982 indicated the probability of commercial quantities of gas within the region is less than 50%. It is assumed however, that 4.0 trillion cubic feet (tcf) of natural gas could be found and produced on upland portions of the coastal plain about mid-way between Port Heiden and Port Moller. To support this activity, a total of 20 drill pads, a 5,000-foot airstrip and 50 miles of service roads would be built. The total area encompassing development would be 30 square miles (19,200 acres). Land area covered by roads and pads would be approximately 1,920 acres.

Approximately 100 miles of buried 36-inch pipeline would be built from this gas field to a liquid natural gas (LNG) terminal at Balboa Bay. The LNG and tanker loading facilities would be developed on approximately 100 acres of land at Balboa Bay.

The final EIS on the Western LNG project at Nikiski (FERC 1978) provided an example of the type of development and potential impacts of an LNG facility. The LNG terminal would occupy a 60 acre site and would include two gas liquifaction trains, two 550,000-barrel LNG storage tanks, and a marine terminal with two berths and other appurtenant facilities. The plant itself would be built outside the region and transported as modules to be reassembled on site. The liquifaction facility would be based on an air-cooling process and would not require large volumes of water for operation. Discharges from the plant would be waste heat passing through air-cooled heat exchangers and some incinerated natural gas. An electrical generating facility, most likely powered by natural gas, would also be needed. The project would use 6,000 gallons of water per day, and have its own sewage treatment plant. The isolated location of Balboa Bay would necessitate construction of both an airstrip adequate for passenger and cargo aircraft and onsite housing for plant employees.

An oil reservoir located in state-owned tide and submerged lands between Port Heiden and Port Moller is assumed based on the DGGS draft report to contain approximetly 500 million barrels of recoverable oil. Probability of such quantities of oil in the region is less that 50%.

Tidelands oil development would be similar to the McArthur River Field in Cook Inlet (total field size 548 acres). Ninety-eight wells would be drilled from three offshore platforms, within a 30-square mile area. Depending on the location and geology of the field, directional drilling from upland locations may be used in lieu of offshore platforms. Shore-based facilities would include a small marine support base (dock) most likely at or near Port Moller. A 5,000-foot landing strip would be built to serve as an air support base, primarily for transfer of workers and supplies from fixed wing aircraft to helicopters.

Pipelines would run directly onshore from offshore platforms. Oil would be transported via a buried pipeline overland where possible. Short segments would probably be buried underwater in the vicinity of Port Moller and Herendeen Bay. This pipeline system would be routed to intertie with the upland gas development system.

Oil storage and tanker loading facilities would be located at Balboa Bay. The facility would include a marine terminal and storage for 6-7 days production. The combined LNG and oil facility site would occupy approximately 300 acres. Most workers employed in oil and gas production activities in Bristol Bay would reside in industry or contractor-built enclaves. Hanley et al. (1980) and the Advisory Committee (1981) estimate total employment would range from 16 persons, when exploration begins, to 922 during the peak of development. Employment would level off at 283 workers through the remaining life of the field. Fifteen percent of all development and production workers would be permanent local residents; the remaining 85% would reside in the enclaves located near the gas field or at the combined LNG-oil terminal.

Transportation corridors. Three multiple-use transportation corridors are assumed as preferred routes for possible development: Port Moller to Balboa Bay (43 miles), Port Heiden to Kujulik Bay/Aniakchak Bay (44 miles), and Pilot Point to Wide Bay (50 miles). At this time there are no proposals to utilize these routes but because of the substantial uncertainty of future actions, impacts of each are analyzed.

ANILCA requires that transportation and utility systems constructed in conservation system units in Alaska follow procedures described in Title XI of that Act. Approval of transportation facilities on National Wildlife Refuge lands would also be subject to refuge compatibility determination, and would require approval of Congress to cross designated wilderness lands.

A buried 30 inch oil pipeline and a buried 36 inch gas pipeline on each side of a construction access road would require a 100-foot wide right-of-way. Additional sites would be required for barrow pits. The routing near Cathedral Peak, Pyramid Mountain or other high steep terrain could receive substantial snowfall and because of avalanche conditions, structures such as snowsheds may be required.

Logistics for line construction would require air, ground and sea support. This might include various fixed wing and helicopter aircraft, bulldozers, trucks, ATV's, barges, dredges and ships.

Proximity of the lower peninsula area to the Shumagin seismic gap, where an event of magnitude 8 or greater is expected in the next few decades, poses a substantial earthquake hazard. Any tsunami generated by such an event may be partly attenuated by the Shumagin Islands but would still produce a large runup in bays on the southeast side of the peninsula. Development of large terminal facilities on the northern coast of the Alaska Peninsula is not anticipated because of the lack of deep water near shore.

Specific routes of transportation corridors identified in this alternative are:

- Port Moller to Balboa Bay: The route would extend from Port Moller through Portage Valley to Balboa Bay. Depending on the port site chosen.(Lefthand Bay, Beaver Bay or Dorenoi Bay) This corridor would be 34-43 miles in length. Herendeen Bay and Port Moller are rather shallow embayments with extensive mudflats and average depth of less than 12 feet, although water depths in access channels can exceed 60 feet. At the head of Herendeen Bay, Johnson Channel widens and water depths are greater than 90 feet.

  The corridor follows the right-hand fork of the Portage Valley River crossing a broad, barren pass at 850 feet elevation. It descends into a narrow valley drained by Foster Creek. Upland areas are moderately drained, while valley bottoms are generally swampy.

  Water depth in Lefthand Bay is 80 feet at a distance of one-half mile from shore. The bay, which is 2 1/2 miles wide and 4 miles long, is considered a good anchorage for large vessels and is protected from foul weather coming from any direction.

  The relatively narrow area for a proposed port site on the north of Lefthand Bay at Foster Creek would require that facilities be built back into the valley and some land might have to be used on the steep slopes which surround the valley.

- Port Heiden to Kujulik Bay/Aniakchak Bay: This route, 44 miles in length, begins near the village of Meshik (Port Heiden), leads southeast to the base of Aniakchak Crater, and follows the north side of the Meshik River valley around the crater. The Kujulik Bay routing crosses over a low divide and travels through Portage Pass or Black Pass to Kujulik Bay. The Aniakchak routing travels easterly over a low divide in the Aniakchak River Valley to Aniakchak Bay.

- Pilot Point to Wide Bay: This route begins near Pilot Point on Ugashik Bay and runs southeast, for a distance of 50 miles, crossing the Ugashik River near Ugashik village. It continues on the coastal plain north of the Dog Salmon River south of Ugashik Lake where it turns east and follows the Goblet River valley. The route then continues on the north side of Lone Hill up the valley to Wide Bay.

- King Cove to Cold Bay Road: a 32-mile road connecting the communities of King Cove and Cold Bay is assumed to be constructed. The road would be gravel and built to State of Alaska secondary highway standards which require a 200 ft. right-of-way. The project would utilize approximately 775 acres of land for the road bed and right-of-way and an additional 30 acres for barrow pits. Routing would be north from the community of King Cove traversing lowlands near the shore of Cold Bay, circling Kinzarof Lagoon and turning south to the community of Cold Bay. The northernmost

section of this route (around Kinzarof Lagoon) would cross 5 or 6 miles of the Izembek National Wildlife Refuge that is designated wilderness. Title XI of ANILCA requires that Congressional approval must be obtained before construction of roads can occur across designated wilderness areas.

Energy. At least three alternate potential hydroelectric power sites are being examined by the Alaska Power Authority (APA) for a large-scale, regional power project. Present indications are that only one of these is likely to be built. Since APA's evaluations have not been completed, this Alternative endorses continued study of hydropower options but does not include any specific proposal for hydropower development. The Alternative guidelines require that any hydropower development not cause a net loss of fish production. The Alternative also recommends that alternate energy resources, including natural gas, be considered more extensively. Development of small scale (less than 5 MW) energy systems would be encouraged for local use. For purposes of impact assessment, a hydropower project at Newhalen was selected for analysis.

A large-scale hydropower plant with a total installed capacity of 16 MW to supply energy needs of 18 communities would be constructed on the Newhalen River. This facility would be a run-of-the-river operation located between river mile 1.0 and 7.0. The power plant and diversion canal would be built on the east bank of the river. Construction would take 3 years, with a peak construction labor force of 300 people, the majority being housed in on-site facilities. The flow diversion canal would be 2.5 miles long and 85 feet wide, located between river mile 2 and 7, and would be designed to bypass average flows of 1033 that cubic feet per second (cfs) and maximum flows as high as 2,100 cfs . At this flow, water depth would be about 30 feet. Flow control would be at a concrete spillway near the downstream end of the canal. Located adjacent to the spillway would be the low-level intake for the power plant. Existing roads from the Iliamna airfield to the Newhalen River would be used for access, supplemented with a new road section to the plant.

Approximately 500 miles of transmission lines would be constructed to connect the generating facility and the communities to be served. Transmission corridors for both main and feeder lines would be located on state-owned lands where possible. Lines would be built using helicopters and maintained by all-terrain vehicles or aircraft, eliminating the need for road construction.

Minerals. Mineral exploration would generally be encouraged on State, BLM or Native lands in the Goodnews Bay, Chignik, Nyac, Herendeen Bay and Port Moller areas.

Using available information, the Alaska Land Use Council Mineral Element Work Group identified areas with mineral potential. Mountainous areas around the east half of Iliamna Lake (especially on the south side) and in the upper Mulchatna and Chilikadrotna river drainages have a potential for gold, silver, tin, copper, tungsten, molybdenum, lead and iron. The Goodnews Bay area has also been identified as having potential for platinum, chromium and gold. The area northwest of the Wood-Tikchik State Park is believed to have deposits of copper, silver, gold, platinum and chromium.

Existing mining activity in the region includes 2 dredges operating at Nyac, employing an estimated 40-50 people. There are also 20-30 people working a placer operation at Platinum. Other small operators (3-4 people) are currently working claims in widely scattered remote areas of the Bristol Bay planning area.

Under this alternative, active stream channels of all designated anadromous streams and their tributaries under DNR or BLM jurisdiction would be closed to new mineral entry. Stream beds on National Wildlife Refuges were closed by ANILCA and all streams in the Wood-Tikchik State Park were closed by the state when the park was created. Designated anadromous streams include lakes with anadromous fish populations. Development of valid existing claims for locatable minerals would be permitted to continue. New exploration or prospecting for placer deposits is assumed not to occur under this alternative.

Placer mining is basically the excavation of existing or relic streambeds for minerals transported by the stream to the site from elswhere. Most operations use bulldozers, draglines, or dredges to remove overburden and collect the ore. Sluice systems are generally used to separate the mineral from the ore and tailings are discarded in piles. Settling ponds are often used to clarify streams muddied by these activities but some operations are conducted without these facilities. Stream courses are often rerouted by the removal of material from both the stream's bed and its banks. Magnitude of placer operations can range from a single individual with a gold pan to massive dredges employing many workers.

Most placer mining operations in Alaska last about four months. Additional time is usually spent at the mining site to clear overburden, maintain and repair equipment, construct buildings, complete exploration drilling programs, or other exploration or development work. Support facilities may include a bunkhouse, cookhouse, workshop and storage area, and an airstrip. Transportation between the camp and mining operations is usually over trails or roads suitable for pickups, four-wheel drive or ATVs. When an area is mined out, restoration consists of leveling tailing piles, breaching settling ponds and recontouring, with the ground left to revegetate naturally.

BLM records indicate there are 339 unpatented federal lode mining claims and 337 placer mining claims in the Bristol Bay study area, located primarily in the areas of Goodnews Bay, Chignik and the northeastern portion of the Ahklun Mountains. BLM estimates that under the current rate of patenting, 3 of these 676 claims will go to patent in the next 20 years. Location of these will probably be at Nyac, Platinum, and Chignik.

Exploration techniques for lode deposits vary considerably with the type of mineral being sought. Principal methods of geophysical exploration include magnetic, electrical, electromagnetic, radioactive, seismic and gravity techniques used to define physical differences in the earth's crust. Geochemical exploration involves collection of samples in the field, with additional testing in the laboratory to discover anomalous occurrences of minerals.

Most chemical and geophysical exploration would involve aircraft-supported field crews, and temporary camps. Both geochemical and geophysical operations may also involve the occasional use of all-terrain vehicles (ATV). Road construction to support these operations is not expected to be extensive since the most prospective mineral sites anticipated to be developed are near tidewater.

In order to sample deposits, drilling programs would eventually be established. Drills would range from back-packable, to helicopter-portable, to truck-mounted or ATV-mounted types.

Lode mining involves tunneling or open pit operations to obtain ore. Facilities and equipment for lode mining are generally much more elaborate than that required for placer operations. Large trucks, massive bulldozers, power shovels, stream drills, powerful explosives and other heavy equipment designed to move great quantities of material are necessary. Many workers and facilities to support them, i.e. mess halls, barracks, sewer systems, large water supplies and well-developed transport systems, are often required. Large lode deposits may be operated for many years, often resulting in the development of semi-permanent communities at or near the mining site.

IMPACTS ON FISH AND WILDLIFE RESOURCES

Impacts on Salmon

Settlement. This alternative would offer 14,250 acres of land for remote settlement - only slightly more than the Proposed Plan. However, due to the difference in locations of the tracts offered, fewer people would be attracted to these lands. Thus, a total of 86 new seasonal and 11 permanent households would be established as compared to 100 and 12 respectively with the Proposed Plan. Only half as many acres (4,250) would be offered in Management Units 5 and 7 as would be offered under the Proposed Plan. Units 5 and 7 include the Dillingham area and lands adjacent to Wood-Tikchik State Park. Alternative 1 offers 7,000 acres in "other areas" as compared to 2500 acres under the Proposed Plan. Most of these other areas are located in the Nushagak/Mulchatna drainage or on the lower peninsula. Thus, the Proposed Plan focuses more subsistence uses in the Dillingham area than does Alternative 1. With respect to salmon, the total increased subsistence use amounts to 12,319 salmon per year - too few to have more than a minor impact in local areas.

Oil and gas development. Alternative 1 would permit immediate placement of tide and submerged lands south of Cape Menshikof on the state's 5-year lease schedule. Thus, exploration and development could proceed five to ten years earlier under Alternative 1 than under the Proposed Plan.

On the other hand, Alternative 1 would preclude oil and gas development on 1500 square miles encompassing the Black Hills caribou calving grounds. Thus, salmon streams within this area would not be subject to impacts from oil and gas activities.

Impacts associated with oil and gas are discussed under the Proposed Plan.

Transportation corridors. Impacts associated with transportation would be similar to those discussed under the Proposed Plan. Overall impacts of any of the three trans-peninsula corridors or the King Cove to Cold Bay road on salmon would be minor, although localized short-term major impacts could occur in the event of an oil spill.

Energy. The Proposed Plan and plan alternatives with the exception of Alternative 2 assumes development of a regional hydropower development on the Newhalen river. Impacts associated with the development of this project would be identical with those described in the Proposed Plan.

Maximum use of devices to reduce the losses associated with this project would be made under this alternative. Net losses, even with these devices in place, are estimated to be 15,000 adult sockeye salmon annually as a result of loss of smolts through the turbines. These net losses can be largely mitigated through the use of such compensating features as spawning channels, fish ladders and, if necessary, fish hatcheries. Long-term regional impacts would be minor, although moderate levels of impact might be felt on the Newhalen river.

Minerals. This alternative would close the active stream channels of all designated anadromous streams and their tributaries on lands under DNR or BLM jurisdiction to new mineral entry. Thus, the only impacts to salmon from placer mining would occur from active working of existing claims, the number of which is presently unknown. The impacts of existing claims would be the same with any of the alternative plans, since existing valid claims are permitted under provisions of existing law. Indirect impacts could result from lode mining claims outside active stream channels. This would result from contaminants introduced through erosion or discharge of tailings and impacts would also be the same with any of the planning alternatives. There are currently 339 unpatented federal lode mining claims in the study area. The number of lode mining claims on state lands is unknown.

Aggregate effects. The numerous site-specific impacts from minerals, oil and gas exploration and development, transportation, energy and settlement are individually expected to be minor. However, if all the activities described in the scenario were to occur, which is unlikely, they could have a moderate aggregate impact on salmon in portions of the region. Transportation, oil and gas, and local hydropower could impact the peninsula, while settlement and a large-scale hydropower project could affect the northern part of the region. A major oil spill could cause a moderate to major short-term impact if it occurred during migration. The severity of long-term impacts would depend on factors discussed earlier.

Conclusion. This alternative would have a moderate regional impact on salmon. Oil spills, if they occurred, could have major local impacts.

Impacts on Caribou

Settlement. Table VIII-2 projects an increase of 97 new households by the year 2002. Table VIII-3 indicates the average household harvests 1.3 caribou annually. This suggests that new residents would harvest an additional 126 caribou annually.

Normal growth in subsistence and recreational demand for caribou over the next 20 years as projected by Nebesky et al. (1983), probably will require an increase from the present estimated level of 2,700 animals to nearly 5,000 animals. The relatively small number of additional caribou havested as a result of this plan (2.5%) would have little impact on caribou populations, but when added to projected normal demand increases the likelihood that additional hunting restrictions will be necessary.

Oil and gas development. Key habitats occupied by the northern peninsula caribou subherd will be subjected to oil and gas exploration and development activities over the course of the planning period and beyond. Caribou from this herd seasonally occupy habitat along the northern side of the Alaska Peninsula between the Naknek and Port Moller.

In the event commercial quantities of hydrocarbons are found, it has been assumed for purposes of analysis that a 4.0 trillion cubic foot (tcf) natural gas discovery will be made on the coastal plain south of Port Heiden within the north peninsula caribou calving grounds. The size of this field would encompass some 30 square miles within the estimated 1500 square mile calving area.

The total land surface area affected by infrastructure development is estimated at approximately 2,000 acres, or about 0.2 percent of the north peninsula calving area.

The scenario assumes a 36-inch buried pipeline will be constructed from the production facility down to the vicintiy of Port Moller to intertie with the Herendeen Bay - Balboa Bay Corridor. Approximately 40-50 miles of this line will traverse traditional calving ground habitat although exact routing is only speculative at this time.

Transportation corridors.

- Port Moller to Balboa Bay: Caribou are seldom present within the identified corridor route, thus development there would have little effect on the caribou population.

- Port Heiden to Kujulik Bay: The entire north peninsula caribou subherd of 15,000-20,000 animals utilizes a route southeast of Port Heiden during annual spring and fall migrations. The Port Heiden to Kujulik Bay transportation corridor would follow this migration route for approximately 10 miles, from Port Heiden to a point southwest of Aniakchak Crater. This location is also within a caribou calving area although the herd's primary calving grounds are farther southwest of Port Heiden.

- Pilot Point to Wide Bay: Approximately 20 miles of a proposed 50 mile corridor would cross a traditionally used migration route. The route is used by animals of the north peninsula herd during spring and fall migration between Naknek and Port Heiden. If construction is restricted seasonally and pipelines buried, only negligible impacts are anticipated.

- King Cove to Cold Bay Road: The 6-10 mile segment around the north side of Kinzarof Lagoon would follow the same route used by southern peninsula caribou migrating between their winter range south of the village of Cold Bay and their calving grounds in the Black Hills-Cathedral River area. In most years, nearly 6,000-7,000 animals pass through the narrow (5-6 mile) area between Kinzarof and Izembek lagoons during September and October and again in March and April.

The presence of a road, vehicular traffic, and intensified human use could alter migratory patterns in this area. Harvest levels would likely increase as the animals become more vulnerable to hunting due to improved human access into a high concentration area. Additional hunting restrictions might be needed to protect this herd from over-harvest.

Energy. Impacts to caribou from regional hydroelectric power facilities would result primarily from routing power transmission lines from the generating facility to community centers in the upper Bristol Bay region. Other impacts would result from line monitoring by aircraft and opening rights-of-way to the public.

Transmission lines would traverse winter habitat used by the Mulchatna caribou herd. This herd is one of Alaska's 13 major caribou herds and presently numbers 15,000 to 20,000 animals.

Lines and poles would be placed by helicopters and ATV's. Animals probably would avoid areas during construction, as caribou are highly sensitive to low-flying aircraft, particularly helicopters. Reaction of caribou to power lines is unknown. There would probably be an initial reluctance, especially by cows and calves, to cross a newly-established visual barrier. Animals reluctant to cross may parallel the line, avoiding traditional wintering habitat south of the Kvichak River. The extensive area occupied by the herd would probably reduce impacts to local population shifts away from activity zones, during construction and shortly thereafter.

Public use of transmission line rights-of-way could result in increased harvest levels above the current estimated kill of 300-400 animals annually. Magnitude of this increase would depend on local human population growth over the planning period.

Minerals. Most upland areas would remain open to mining but all anadromous streams would be closed to new mineral entry. Any increase in mining activity under this alternative would probably result in a comparable increase in caribou harvest by mining personnel.

Aggregate effects. The three regionwide caribou populations could all be influenced by actions which might occur under this alternative. The small increase in harvest due to increased settlement projected with this plan (less than 130 annually) would have little impact on caribou populations. Continuing increases in demand irrespective of settlement will probably require increased hunting restrictions.

Potential for finding hydrocarbons (primarily gas) is highest in habitats occupied by the north peninsula herd. Consequently, this population would be affected to a greater degree by oil and gas activities than the remainder of the herd. This would be particularly true if other than the Port Moller/Balboa Bay corridor is used for a pipeline. Assuming however, that pipelines through essential caribou habitat would be buried and construction regulated seasonally, impacts from corridor development would be minor.

The King Cove to Cold Bay road could have major local impacts on the southern peninsula herd.

Devlopment of a major hydropower project including transmisssion lines at Newhalen would probably cause some local populations of the Mulchatna herd to shift away from the activity zone. These impacts would largely cease upon completion of construction. Effect of the in-place transmission system is unknown, but its presence might cause some disruption of normal migrational patterns.

Conclusion. Impact to both the southern and northern peninsula subherds could range up to moderate depending upon the level of oil and gas activity, transportation facilities constructed and degree of constraints applied. Impacts to the Mulchatna herd will be minor. On a regional basis, impacts to the caribou population by activities which might occur under this alternative, would be minor.

Impacts on Moose

Settlement. Table VIII-2 projects a total of 97 new homesites resulting from settlement under this alternative. Approximately 32 additional animals would be harvested to meet expected subsistence needs based on a current estimate of 0.33 moose taken per average household in the Nushagak and Iliamna Lake area. Most of this increase is expected to be supplied by moose in the lower Nushagak river drainage and Iliamna Lake area. Present moose populations are not sufficient to meet normal growth in subsistence demand by the year 2002 (Nebesky et al., 1983). Increases in subsistence harvest stimulated by additional remote settlement would exacerbate the supply-demand situation.

Oil and gas development. Leasing for oil and gas exploration could include parts of the 360,000 acres of uplands between Port Heiden and Ugashik Bay identified by ADF&G as essential winter habitat for moose.

Moose are relatively difficult to disturb (Denniston, 1956) and readily adapt to the presence of man (Peterson, 1955). Studies conducted on the Kenai National Wildlife Refuge suggest that moose are not particularly sensitive to external stimuli (explosive charges) as a result of seismic research within occupied winter habitat (Bangs and Bailey, 1982). Most impacts would be limited to temporary displacement of animals from habitats along or in the vicinity of active shot lines. Development of a gas production facility south of Port Heiden would cause temporary displacement of some animals, but would be localized and of little consequence since population densities are low in the area. A similar facility developed south of Port Moller would have virtually no affect since moose rarely occur in that area.

Oil development in tidelands would cause little or no impact to peninsula moose populations. Construction of permanent facilities, should commercial quantities of hydrocarbons be discovered and produced, could cause some displacement of moose during peak construction disturbance. Animals would probably return to the area however, when construction was completed. A slight increase in sport hunting harvest by oil or gas industry personnel could be expected but impact to the overall moose population from this activity would be negligible.

Transportation corridors. Potential effects on the peninsula moose population resulting from development of any one of the three identified corridor routes under this alternative are more fully described in the Proposed Plan. The Port Moller to Balboa corridor would have no effect on moose. The Port Heiden to Kujulik Bay or Pilot Point to Wide Bay routes, which cross moose winter habitat, might cause some displacement during construction. Better access provided by the corridors to previously remote areas could result in an increase in harvest levels.

Minerals. A slight increase in mining activity could lead to an additional harvest of a few animals by mining personnel primarily in the Upper Mulchatna and Illiamna Lake area.

Aggregate effects. Settlement in the Nushagak River valley and around Iliamna Lake could increase harvest levels, exacerbating the subsistence shortfall in moose supply predicted by the year 2002. Settlement would probably not effect the viability of the moose population.

Oil and gas exploration and development could produce some temporary displacement of moose in localized areas during construction. Animals would be likely to reestablish in the disturbed areas once construction is completed. Similar effects are anticipated relative to development of a transportation corridor across the upper peninsula.

Conclusion. Actions which might occur under this alternative would result in a minor impact on regional moose populations.

Impacts on Brown Bear

Oil and gas development. Brown bear occupy selective habitats on a seasonal basis throughout the entire coastal plain. Seismic activities and exploratory drilling would probably occur in coastal uplands between Naknek and Port Moller. These activities could displace animals from essential habitats, disturb denning areas and eventually lower productivity within selective subpopulations on the Alaska Peninsula.

Development of permanent gas production facilities within the uplands south of Port Heiden could futher result in displacement of some animals from essential spring-use areas. Offshore exploration and development between Port Heiden and Port Moller could occur along nearly 100 miles of essential coastal habitat. That combined with development actions in the uplands could result in fewer bears using key habitats over the long term. This disturbance could result in increased competition for food in other areas, intrapopulation stress, and overall lowering of recruitment within that population using coastal environments between Port Heiden and Port Moller.

Over 70 salmon spawning streams have been identified within the general area where a gas production facility may be developed. Considering the relatively small size of a production field in relation to total number of spawning streams within the coastal plain, it is not likely that a significant loss of salmon as a food source for bears would occur.

The only significant difference between this alternative and the Proposed Plan is that there would not be a 10-year moratorium on tide and submerged land leasing, thus, bears associated with adjacent lands would be impacted sooner, and possibly to a greater degree, than they would under the Proposed Plan.

Transportation corridors.

- Port Moller to Balboa Bay: Brown bear occupy feeding, denning and spring-use habitats throughout this corridor. Construction of a pipeline in this corridor would probably alter some essential or important habitat, especially where the pipeline comes ashore from the lower reaches of Herendeen Bay near denning areas in nearby Buck and Deer valleys. This area is in near-proximity to an essential spring-use area, and close to known denning areas. Some of the den sites in Deer Valley nearest to the corridor might be abandoned as a result of construction disturbance, pipeline structures and intensified human activity. Denning activity would probably recur, however, once construction was terminated and conditions in the area stabilized. The onshore portion of the corridor from Lower Herendeen Bay to Beaver or Lefthand bays would bisect bear travel routes between denning and spring use areas. Localized movements between these areas could be disrupted if some construction activities were not seasonally restricted to the November-March period, a time when most bears are denning.

Kagayan Flats, on the Pacific coast of the peninsula near the proposed LNG facility, is an essential spring-use area during post-denning periods (May-June). Bears, especially sows with subadults displaced from essential food sources by disturbance from construction activities, could be subject to increased stress and possibly higher mortality rates. Port and LNG facilities developed in either Beaver or Lefthand Bay would result in intensified marine traffic. Bears could react by avoiding essential feeding areas such as salmon streams emptying into these bays, resulting in increased competition in other areas and ultimately lower recruitment. Intensified activity over the long term could eventually cause brown bears to abandon traditional feeding sites in the Kagayan Flats.

Activity associated with construction could displace some animals within this local area, and increase the number of bears killed in defense of life/property.

- Port Heiden to Kujulik Bay/Aniakchak Bay: The route would cross approximately 10 miles of intensively used essential spring use area in the lower portion of Port Heiden. Approximately 150 square miles of coastal lowland habitat borders both sides of the lower Meshik River, and is within 3 miles of known denning sites along the western slopes of the Aniakchak Caldera. This corridor separates an important denning region and an intensive spring-use area, and would cross 13 salmon streams. A port-site at the head of Aniakchak Bay would be within the 20-square-mile essential spring-use area. The proposed port site at Kujulik Bay would be located at the mouth of North Fork Creek, an important feeding area.

  Port sites in Kujulik or Aniakchak Bay could increase disturbance-related activity to a point where bears might abandon the entire Cape Kumlik region. As many as 20 square miles of essential spring-use area, and use of two miles of important feeding streams would be disturbed by port development, nearshore marine and air traffic, and human activity. Changes in the coastal population of bears would be determined largely by the animals' adaptation to post-development levels of activity, and most likely result in short-term avoidance of construction sites as work progresses along the route. Long-term effects could be nearly complete abandonment of the Cape Kumlik region where port facilities are proposed. The loss of some bears would be permanent, assuming bears are now at carrying capacity in the region.

- Pilot Point to Wide Bay: The two alternate routes for this corridor would traverse stream concentration areas used by brown bear in the Ugashik Lakes region. The northernmost route would cross at least six salmon streams where bears congregate in late summer and fall. The southern route would traverse 3 miles of a suspected denning area in the upper Figure Eight Creek drainage north of Lone Hill and southwest of Mt. Alai. Bears may be at least temporarily displaced from traditional feeding sites, should construction coincide with the salmon spawning season. Disturbance-producing activities within one mile of dens may cause animals

to select more distant denning sites if disturbance is intense and persists through pre-denning periods (October-November). A port facility in the upper region of Wide Bay would increase the level of disturbance in this remote area. Traditional feeding areas at the mouths of Alai and Khalaguik creeks could be abandoned altogether as onshore development increased, resulting in the permanent displacement of some individuals.

- o King Cove to Cold Bay Road: The proposed King Cove to Cold Bay road would result in expanded human presence and traffic in the area. It would also provide greater access into a relatively remote, undisturbed region in the Joshua Green River drainage and in key bear use areas in Right and Lefthand valleys. Bears could be expected to change their behavior in response to human presence, and might abandon some traditional use areas, especially during road construction. Sport harvest levels could increase with ease of access and additional hunting restrictions might be required at some point in the planning period to help maintain the biological integrity of the Izembek Refuge population.

Aggregate effects. Combined oil and gas activities and transportation corridors could result in local, long-term adverse impacts to brown bear, particularly that population between Port Moller and Port Heiden which uses the coastal plain environment. The increased level of activities and human presence within the Bristol Bay uplands resulting from oil and gas activities could displace bears from some traditional key habitats. With oil and gas development, over 900 additional workers would be employed in oil and gas activities, resulting in greater hunting pressure, and an increase in bears taken in defense of life and property. Corridor and road development would further add to increased harvest levels. Energy and mineral development would add to displacement of some animals from traditional habitats but that disturbance would be localized and of short duration.

Conclusion. Region wide impacts on brown bear are expected to be moderate, but impacts to some local subpopulations, primarily in the Balboa, Kujulik, and Wide Bay areas could be major.

Impacts on Waterfowl and Marine Birds

Settlement. A total of 14,250 acres of land would be offered for remote settlement. This would be widely scattered, primarily in uplands in the northern portion of the study area. Marine birds would not be affected. Waterfowl would be affected to a minor extent in local areas as a result of disturbance to some nesting birds and possible destruction of a small amount of habitat.

Oil and gas development. With respect to potential oil and gas activities, this alternative differs from the Proposed Plan in that it permits immediate placement of tide and submerged lands on the state's 5 year lease schedule. Earlier leasing could result in some adverse affects to waterfowl habitat that might be made less harmful through the continual improvement of oil and gas

technology. Thus, delayed action would probably lower the potential for oil spills and would probably result in fewer surface impacts relative to exploration and production activities. On a regional basis upland oil and gas development under Alternative 1 would result in insignificant impacts to waterfowl but tideland development could cause minor to moderate effects. Major impacts would be local and of short duration.

Transportation corridors. The three corridors considered in Alternative 1, and the King Cove to Cold Bay road, are identical to those in the Proposed Plan. The two alternatives would differ only in that with Alternative 1, tideland leasing would be permitted to occur 10 years earlier than with the Proposed Plan. Since oil and gas production is most likely to be the driving force behind corridor development, the associated impacts would be 10 years earlier with Alternative 1. Foregone would be whatever impacts might be reduced through advancing technology. Impacts from transportation corridor development would be minor, although major-short-term effects from oil spills are possible.

Energy. This alternative proposes development of the Newhalen hydropower project identical to the Proposed Plan. In upland areas, the project would have minor impact on waterfowl; none on marine birds. A powerline to Egegik Bay could interfere with snow geese and white-fronted emperor geese and could result in mortality of birds through collision. Regionally impacts would be minor.

Minerals. With respect to mining activity, particularly placer mining in the active channels of anadromous streams, Alternative 1 would result in somewhat lesser impact to waterfowl and marine birds than would the Proposed Plan, since it would close the beds of all designated anadromous streams to new mineral entry. The possibility of downstream contamination of resting and feeding areas associated with tidelands would be reduced. Although there could be some moderate to major impacts on a localized basis, particularly on streams where valid existing mining claims could still be developed, the regional effect would be minor.

Aggregate effects. Settlement would have no measurable impact on regional waterfowl populations. Oil and gas leases as early as 1989 in tide and submerged lands would result in earlier and potentially greater threats from disturbance activities and oil spills than would occur 10 years later with the Proposed Plan. This same probability is applicable to development of any one of the three identified pipeline corridors. Development of the Newhalen project would have negligible effects other than impacts that could occur as a result of collisions with a transmission line at Egegik Bay. Threats from placer mining would be less than with the Proposed Plan, since all anadromous streams would be closed to new mineral entry.

Conclusion. Regional impacts from this alternative would be moderate, with major short-term impacts possible in some local areas.

Impacts to Marine Mammals

Oil and gas development. Impacts to marine mammals generated by upland activity would be negligible. A potential for some effects on marine mammals from oil and gas operations in tide and submerged lands exists. Not leasing the Fisheries Reserve, the Bay's north shore, and bays and lagoons along the south shore would substantially reduce the potential for conflict between oil and gas exploration and development and marine mammals. This would be particularly important for seals congregating in bays and estuaries, walrus which utilize the Walrus islands and beluga whales feeding near the head of the Bay.

Some sea otters, which are year round residents, and to a lesser degree a few seasonally migratory whales, specifically the endangered gray, could be at risk. Construction disturbance would displace some sea otters to quieter habitats which may lead to a minor population decline if habitats are at carrying capacity. Migratory whales may move further offshore to elude disturbed areas or oil spills but should suffer no reduction in population as a result of such events.

Sea otters are sensitive to oily aquatic pollutants because of their high metabolic rate and dependence on trapped air in the fur for thermoregulation. Accidents which lead to oil pollution could seriously affect some otters should they fail to avoid the spill area. Populations so affected could suffer sharp declines but the effect would be quite localized and impact on the overall otter population would probably be negligible. Whales, seals, sea lions and walruses which might wander into spill areas could suffer some skin, eye and mucous membrane irritation from the more toxic elements of the pollutant but little mortality is expected and effect on overall population size would be negligible.

Transportation corridors. The types of impacts to marine mammals affected by each of the three corridors identified in this alternative would be similar to those described in the Proposed Plan.

Aggregate effects. Marine mammal populations utilizing Bristol Bay could be marginally affected by actions allowed in this alternative. Transportation development in the Port Moller/Balboa Bay corridor could effect some local populations of sea otters and seals during construction operations but these effects would be short-term. Spill events at terminal sites could also effect otters and seals but such impacts would be localized and would be attenuated by control mechanisms. Oil and gas development could affect some Bristol Bay marine mammals, principally sea otters, seals, walruses, and migrating whales. Impacts would generally be localized and short-term.

Conclusion. Effects of activities allowed by this alternative would produce minor to negligible impact on marine mammals of the Bristol Bay region. In the unlikely event of a major oil spill, localized, short term impacts could be major.

IMPACTS ON SOCIOECONOMIC RESOURCES

Impacts on Subsistence

Settlement. Lands allowed for settlement in the Dillingham and lower peninsula areas under this alternative are essentially the same locations as those in the Proposed Plan. Impacts, therefore, are virtually identical. This alternative would, however, result in less acreage being sold near Dillingham and more acreage being offered in the Nushagak drainage at the Iowithla River, Okstukuk Lake and Half Cabin Lake.

Table VIII-1 names the settlement locations for each of the plan alternatives, some of the subsistence resources present in each of these locations and the villages reporting use of the area as mapped by ADF&G's Subsistence Division.

As shown in the table, the Iowithla River and Okstukuk Lake disposal areas are both used by residents of Aleknagik, Ekwok, Koliganek, Kokhanok, Manakotak and Togiak. Residents of Clarks Point, New Stuyahok and Portage Creek also use the Iowithla area, and residents of Dillingham and Twin Hills use the Okstukuk Lake area.

Land disposals in the Iliamna Lake region would occur in subsistence use areas of all lake area villages.

Settlements located in or near areas already used for subsistence will lead to increased competition for resources and increase the possibility that subsistence allocations will be reduced. Only 250 more acres are proposed to be made available for settlement under this alternative than under the Proposed Plan. However, overall this alternative would have a more significant impact than the Proposed Plan on subsistence since it would offer tracts in remote areas where people are more dependent on subsistence resources.

Oil and gas development. Oil and gas exploration activities would not result in a noticeable population increase. Oil and gas activities could have moderate impacts on the north peninsula caribou herd and the subsistence use of these animals. There would be little impact on moose and the subsistence use therof. Overall regional impacts on salmon populations are anticipated to be minor, although oil spills could have a major short term impact on local populations and the subsistence uses of these populations (See Impacts on Salmon, Caribou, Moose and Waterfowl). Overall impacts on subsistence would be minor.

Transportation corridors. Impacts associated with transportation corridors would be the same as described under the Proposed Plan. Impact on moose would be insignificant, impacts on caribou and salmon minor. Impacts on subsistence use would generally be the same. Increased access along certain corridors (Port Heiden to Kujulik Bay, Pilot Point to Wide Bay and the King Cove to Cold Bay road) could result in increased hunting pressure. Unless additional hunting regulations are imposed and enforced along any public use corridors, moderate local impacts could occur to subsistence uses of caribou and moose along these corridors.

Energy. Construction of a hydroelectric project at Newhalen would add 50 new residents to the population of the Iliamna-Newhalen area during construction. These residents through hunting activities, would add to the short-term competition for subsistence resources. After construction is completed, many of these new residents would likely leave the area.

Aggregate effects. Impact of the proposal on caribou populations of the Alaska Peninsula could be great enough to cause a lowering of allowable harvest levels required to maintain a sustained yield.

The increased demand for subsistence by new residents of remote settlement areas would be concentrated in the Lower Nushagak and Upper Peninsula areas and would be somewhat less in the Iliamna Lake, Upper Nushagak, and Lower Peninsula. Very little of this increased demand would occur in the Togiak-Kuskokwim Area.

Conclusion. Resource development activities and remote settlement would result in moderate impacts on subsistence use of caribou and moose, and insignificant effects on uses of marine mammals, waterfowl and salmon. Regional impact on subsistence would be moderate because of the clumped distribution of subsistence resource users.

Impacts on the Commercial Fishery

Settlement. If each new permanent and temporary household qualifies for subsistence, approximately 12,000 additional salmon would be taken annually by subsistence fishermen. This harvest is too small to have a significant regional impact.

Oil and gas development. Some activities associated with oil and gas exploration and development have a potential for affecting the commercial salmon fishery. Impacts on salmon (the primary commercial fish species) were previously discussed and oil and gas is expected to have a moderate impact on the fish. Oil spills could also create flavor problems which would reduce market value of the catch. Setnet fishermen could be affected more by oil spills than those using drift nets because of their inability to shift fishing locations. Competition for vessel service facilities used by both the commercial fishing industry and the oil and gas industry could also lead to conflicts.

Transportation corridors. Potential indirect impacts to commercial fishing from corridor development could occur from changes in water quality due to construction activities (sedimentation, turbidity, loss of spawning gravel, benthic disturbance) which might effect local salmon runs. Impacts would be essentially identical to those described in more detail under the Proposed Plan.

Energy. Impacts from the Newhalen project would be identical to those described in detail in the Proposed Plan. An estimated loss of 15,000 salmon annually through entrainment and other physical effects of moving through the low head diversion structure would result in a minor regional effect.

Minerals. This alternative allows for new mineral development on State an BLM lands. In order to protect existing salmon fishery resources, this alternative proposes closure to new mineral entry of all designated anadromous streams, lakes and tributaries which provide spawning habitat and migration corridors for a majority of Bristol Bay's salmon. Valid existing claims would not be subject to restrictions imposed on new entry. Consequently, mining activities could still indirectly impact the commercial fishery by reducing the productivity of anadromous streams. Overall, however, potential impacts would be less than with the Proposed Plan, since more streams would be excluded from new mineral entry.

Aggregate effects. The assessment of impact on salmon indicates that this alternative could have a minor to moderate effect on the resource. Offshore or tideland oil spills have the potential of producing locally severe short-term impacts on commercial fishing activities. Level of impact would depend on the amount and type of oil spilled, time of year, location of spill and the effectiveness of clean-up. In the absence of major spills, the overall effect of oil and gas operations are expected to result in minor long-term impacts.

Each of the three proposed transpeninsula corridor routes have a potential for minor impacts to local commercial fisheries during construction, with a potential for greater impacts should a severe spill accident occur.

Development of a regional hydropower facility, placer mining, removal of gravel for construction of oil and gas facilities and remote settlement on public lands under this alternative could produce minor long-term impacts on the region's salmon resources and as a result effect the commercial salmon fishing industry.

Conclusion. Development activities allowed under this alternative could result in minor long-term impacts to the region's commercial fishing industry.

Impacts on Population

Settlement. The Alaska Department of Natural Resources has estimated that remote settlement under this alternative would result in an increase of 290 new people in the regional population. Of this number, about 100 people would locate in the Dillingham area. Another 100 people would locate in the Iliamna Lake area. Twenty-four people would settle in the remote settlement area at Half Cabin Lakes. The remainder would locate in the vicinity of Iowithla (11), Okstukuk Lake (22), and along the lower Alaska Peninsula.

Settlements near Dillingham would rely on that community for social services and other support services as needed. Because much of the new population (80%) would be seasonal, the additional demands on social and support services would also be seasonal.

Oil and gas development. Exploration for oil and gas in the upland areas available for leasing could result in an average of 17-20 workers per year.

Eventual development and production of oil and gas would require a workforce of about 925 people during peak development. Exploration and development of oil and gas in the tide and submerged lands would result in about 25 new residents in the region.

The new residents would probably reside in the regional centers of Cold Bay or King Salmon, with some in the villages of Port Heiden and Nelson Lagoon. Overall impacts would be minor in the long-term but some temporary stress on medical services and housing could occur during initial construction phases.

Transportation corridors. Although three possible corridor routes are identified in this alternative, the construction of more than one is unlikely within the forseeable future. Several hundred people would be employed for about a year on the project. The bulk of these workers would be imported labor residing in contractor-provided enclaves near the construction site. Upon completion of the project virtually all construction employees would leave the region.

- King Cove to Cold Bay Road: A portion of the labor force for construction of the road would probably be local residents if construction did not coincide with the fishing season. Some imported workers would be required, however, to handle engineering and other more technical aspects of the project. These employees would probably reside in Cold Bay for the duration of construction and would cause little impact on local services.

Energy. A regional hydropower project would add an estimated 50 workers and dependants to the regional population. Most population growth would probably be in the Iliamna/Newhalen area, the most likely support base for the Newhalen project.

Adding 50 people to the combined population of 181 for the two villages would increase the population by 27%. This increase would probably be temporary but could produce moderate stress in the community if additional housing is not provided.

Minerals. Mineral exploration assumed in this alternative would increase the regional population by approximately six persons, probably in Goodnews Bay, and Platinum. This small increase would cause only a minor impact in demand for social services in those communities.

Aggregate effects. Oil and gas activities in the region could result in the addition of an estimated 42 permanent residents by the year 2002. Most temporary workers would be housed in contractor-operated enclaves near construction sites. Moderate, temporary impact could occur in association with providing transportation services to the construction force. This impact would probably center on Cold Bay and perhaps Port Moller.

Mineral development would increase population by less than 10 new residents to the region, probably at Goodnews Bay and Platinum. Energy development could have a moderate temporary housing effect on Newhalen and Iliamna should a project be constructed there, unless most workers were located in enclaves at the development site.

Settlement would add about 290 persons to the population of the region with about 260 of these being seasonal residents.

Conclusion. Increase in the region's permanent population as a result of development activities which might occur under this alternative would be minor. Moderate short-term impacts on local populations in the vicinity of construction activities could occur.

Impacts on Employment

Settlement. Settlement on remote state land disposals proposed by this alternative would result in an estimated 33 new permanent residents in the region. This slight increase would not result in a substantial effect on employment. Primary source of income for residents of remote land disposals would most likely be generated by other development in the region or employment outside the region. Some secondary employment opportunities would result from purchase of materials for construction of homes, and need for supplies and services, including schools.

If any impacts occurred as a result of the settlelment program they would likely be concentrated within regional or subregional service centers near disposal tracts, notably Dillingham, King Salmon and Iliamna/Newhalen.

Oil and gas development. Upland exploration would have a short-term impact, as most workers would be from outside the region and would be accommodated in temporary housing at or near exploration sites.

Development of an uplands gas field would result in peak employment of about 925 during development, which is forecast to occur five years after a lease sale. Of these workers, 17-20 would be residents of the region. An additional 31 resident jobs would occur in other sectors of the economy. Employment during the production phase would level off at about 280 after 10 years. Total new resident employment probably would level off at 42 jobs. All non-resident employees during development and production probably would reside in industry or contractor enclaves located at or near the gas field or LNG facility.

Tide and submerged land exploration would result in short-term impacts, with nearly all workers originating from outside the region.

Total employment should a commercial oil discovery be made would peak at approximately 925 persons in the late 1990's. About one-fifth of the employees would be local residents. The remainder would be imported labor, probably residing in company owned enclaves near the site of the discovery. Employment would decline to 285 persons during production from the field.

Transportation corridors. Three potential corridors are identified under this alternative although only one is expected to be constructed in the forseeable future. Additional discussion is provided on the employment impact of the corridor under the Proposed Plan. The King Cove to Cold Bay road would employ about 25 workers, 5-10 of whom would be from the region (estimate provided by Alaska Department of Transportation and Public Facilities, 1982). The road would be built in the late 1980's. No other major road developments are assumed.

Energy. A regional hydroelectric power development would employ substantial numbers of workers during construction and could have long-term impacts on employment in other sectors of the economy. Effects of this project on the regional employment outlook is discussed in greater detail in the analysis of the Proposed Plan.

Minerals. Existing placer mining operations at Platinum and Nyac employ an estimated 20-30 and 40-50 persons respectively.

Closure of all anadromous fish streams and and their tributaries to new mineral entry could cause some attenuation of employment growth in the placer mining industry. This action would not have a measurable effect on the regional employment outlook, however.

A large scale mineral development, although considered unlikely in the near future, would substantially increase employment. Such development would most likely occur on Native Corporation lands.

Aggregate effects. Much of the increased employment in the region would occur from activities not influenced by the plan alternative. However, development of tidelands oil and gas and a major regional hydroelectric project would result in a significant increase in both resident and non-resident employment in the late 1980's and 1990's. Development of a tidelands oil discovery would peak well after the development phases for the uplands gas field and hydroelectric project, and would prolong the increased employment opportunities for residents and non-residents.

New resident employment influenced by the plan alternative would be approximately 140 persons, while resident employment generated by other activities would be about 1,925. Increases in non-resident employment influenced by the plan alternative, however, are much more significant, peaking at 1,015 in 1988.

This alternative is not likely to cause measurable impacts on the existing rate of growth of employment in the region. The alternative allows for oil and gas exploration and possible production and regional hydroelectric development, activities which provide employment opportunities, especially for people from outside the region. Closure of all anadromous streams to new mineral entry could prevent some employment opportunities but the regional effect would be negligible.

Conclusion. This alternative would allow most developments which could increase employment. The increase in long-term, resident employment, should these developments occur, would be minor.

IMPACTS ON OTHER RESOURCES

Impacts on Water Quality

Oil and gas development. No leasing would be permitted on State tide and submerged lands within the Bristol Bay fisheries Reserve or similar lands lying north and west of the reserve. Major bays, estuaries and lagoons along the north side of the peninsula would also be withheld from leasing as would the Black Hills caribou calving grounds, thus associated tidal areas and streams would not be subject to degradation.

Barring a catastrophic event, an active program of oil and gas development in the Bristol Bay area would probably not result in significant region-wide water quality impacts, although localized, short-term sedimentation may occur during construction phases.

Transportation corridors. Corridors identified and water quality impacts associated with transportation development are the same as under the Proposed Plan.

Minerals. Development of valid existing claims for locatable minerals would be allowed to continue. New mineral entry would be permitted on most State, BLM, and Native-owned lands in the Goodnews Bay, Chignik, Nyac, Herendeen Bay and Port Moller areas subject to leasehold location. Valid existing claims on National Wildlife Refuges would continue to function under existing regulations. The beds of all designated anadromous fish streams, lakes and tributaries under state or BLM control would be closed to new mineral entry, thus potential water quality degradation by placer mining activity would be substantially reduced, except where valid existing claims may be worked.

Aggregate effects. Water quality impacts resulting from activities of development operations, primarily oil and gas, transportation, and mineral extraction include increased sedimentation and turbidity, loss of wetlands, possible localized disruption of surface water and groundwater movements, and an increase in toxicity in rivers and tributaries. Potential for impact from placer mining is reduced in this alternative because of closure of all anadromous waterways to new mineral entry.

Conclusion. Potential for water quality degradation in the Bristol Bay region from combined activities allowed under this alternative will be minor.

Impacts on Recreation

Settlement. Although this alternative offers slightly more land (250 acres) for settlement than the Proposed Plan, fewer new households are anticipated (97 as opposed to 112) because of differences in the location of settlement tracts. This alternative offers less land near already settled areas, particularly Dillingham, and concommitantly more acres in isolated remote areas. Increased recreational competition resulting from new residents near existing communities would be slightly less with this alternative.

Oil and gas development. The only difference between the Proposed Plan and Alternative 1 with respect to oil and gas is that leasing of State tide and submerged lands would be delayed for 10 years under the Proposed Plan and the Black Hills caribou calving ground would be unavailable for leasing under Alternative 1. Potential impacts on hunting of brown bear associated with leasing near-shore areas along the north side of the peninsula would occur as much as 10 years earlier under this alternative. By the same token, sport hunting of the northern peninsula caribou herd could be impaired as a result of exploration activity that would be permitted under the Proposed Plan.

Transportation corridors. Difference in the impact of a transpeninsula corridor between this alternative and the Proposed Plan is related to the 10 year leasing moratorium in the Proposed Plan. In the event that a driving force behind building a corridor would be development of an oil or gas field associated with state tide or submerged lands, the corridor and thus its impacts-could occur as much as 10 years earlier under this alternative.

Energy. Development of a regional hydropower facility on the Newhalen River under this alternative would be identical with the Proposed Plan. Impacts would be primarily associated with the transmission system which would detract from the wilderness experience enjoyed by recreationists in remote, wild areas and at the same time provide greater access to those areas.

Minerals. With Alternative 1, all designated anadromous streams under State and BLM jurisdiction would be closed to new mineral entry. This obviously decreases the potential for adverse impacts on recreation associated with river floating and reduces water quality degradation in fishing streams. By the same token, it would reduce the number of trails, roads, and airstrips generated by mineral activity which could serve as access routes for motorized vehicles into formerly inaccessible areas.

Aggregate effects. Settlement impacts of Alternative 1 would differ from the Proposed Plan primarily because of tract location. Alternative 1 would provide slightly more land in remote areas and less land near existing

settlements, thus overall effects of recreation competition with local residents would be lower with this alternative. Oil and gas impacts would differ on the peninsula from the Proposed Plan only to the extent that recreational activity would be affected by earlier tide and submerged land leasing and closure of the Black Hills caribou calving grounds to leasing. Corridor development would be the same under either alternative although it could occur earlier with Alternative 1. Development of a regional hydropower system would have identical effects with either alternative. Mineral development under the Proposed Plan could result in a greater increase in improved access and also would possibly degrade more fishing streams than would activities allowed under this alternative.

Conclusion. Regional impacts on recreation would be relatively minor. There could be some moderate to major impacts in local areas immediately affected by settlement or development activity.

Impacts on Historic and Archeological Sites

Settlement. Remote settlement increases the likelihood that archeological and historical properties will be damaged or destroyed. Sites affected by construction of roads, homes and utilities may be lost. Generally, increases in impact will be proportionate to increases in remote settlement with much of the impact resulting form recreational "pot hunting". Acreage at risk under this alternative is virtually the same as that described in the Proposed Plan.

Oil and gas development. There could be some loss of archeological sites, especially in locations adjacent to tideland areas. Requirements by permitting agencies which regulate oil and gas activities would substantially reduce the probability of any archeological or historical sites being violated by operations or workers.

Transportation corridors. Potential risks to archeological or historical resources which might be associated with the corridors proposed under this alternative (Port Moller to Balboa Bay, Port Heiden to Kujulik Bay, Pilot Point to Wide Bay and the King Cove to Cold Bay road) are more fully described in the discussion for the Proposed Plan.

Energy. See discussion under the Proposed Plan.

Minerals. See discussion under the Proposed Plan.

Aggregate effects. Potential aggregate effects on archeological and historical resources which could be put at risk by actions permitted under this alternative are equivalent to those discussed under the Proposed Plan.

Conclusion. This alternative would allow activities which, if uncontrolled, could have a moderate impact on regional archeological and historical resources.

Impacts on Wilderness

Oil and gas development. There are several aspects of Alternative 1 that could result in minor differences from the Proposed Plan in potential impacts from oil and gas activities on wilderness suitability. The main difference is that the Black Hills carribou calving ground would be closed to leasing under Alternative 1, whereas the area would be subject to lease under the Proposed Plan. This closure would prevent potential oil and gas development which, by its close proximity to the Alaska Peninsula Wildlife Refuge, could impair wilderness quality on the refuge. Tide and submerged land leasing would be delayed under the Proposed Plan whereas it could occur 10 years sooner under this alternative. Any potential for wilderness designation in these coastal areas would thus be subject to degradation from exploration and development activities at an earlier date.

Transportation corridors. Transpeninsula pipeline routes under this alternative are identical to those in the Proposed Plan, thus potential impacts on wilderness suitability would be the same.

Energy. See discussion under the Proposed Plan.

Minerals. All anadromous streams would be closed to new mineral entry under Alternative 1, whereas only portions of 64 of the regions more productive salmon streams would be closed under the Proposed Plan. Thus, there would be reduced potential for impacts on wilderness qualities attributable to placer mining under this alternative.

Aggregate effects. Locations for remote settlement would not significantly impinge on the wilderness character of established conservation system land. Oil and gas activities could have some locally adverse effects in tide or submerged land areas subject to leasing. Transportation corridors could have adverse visual effects within viewing distance of construction features. The Togiak Refuge could be affected by transmission lines from a regional hydropower project. Effects of mining would be reduced by closure of all designated anadromous streams to new mineral entry.

Conclusion. On a regional basis, impacts of this alternative on wilderness suitability would be moderate.

ALTERNATIVE 2

DEVELOPMENTAL ASSUMPTIONS USED FOR IMPACT ASSESSMENT

Settlement. Up to 2,250 acres of state lands, in the vicinity of Dillingham, would be made available for remote land disposal within this alternative. These would include 500 acres at Snake Lake, 250 acres near Land Otter Creek, 1,000 acres at Warehouse Mountain and 500 acres at various locations along the Wood River and Aleknagik Road. There would be no other remote state or federal land sales in the region.

Under this alternative, it is assumed that the few land disposals offered would average about 7.5 acres which is smaller (half the size) than the average under other plan alternatives.

This alternative would result in 60 households being established on the acreage sold. Of these, 4 would be permanent households and 32 would be seasonal households new to the Bristol Bay region (see table VIII-2).

Oil and gas development. This alternative allows upland oil and gas activity to occur where it is designated a primary use on Native and state lands along the north side of the Alaska Peninsula. It would prevent exploration and development in all tide and submerged lands in the region. In addition, the North Peninsula caribou calving grounds (1,000-1,500 square miles between Port Heiden and Port Moller), and the Black Hills caribou calving grounds (300-400 square miles) would not be included in the state's five-year oil and gas lease schedule. It is currently estimated that approximately 35% of non-wilderness refuge lands would also be closed to oil and gas exploration. Oil and gas development could occur only on refuge land where it is determined to be compatible with the purposes for which the specific refuge was established.

If not prohibited by other authorities, lease sales would be scheduled over the next 20 years on any state or federal uplands where oil and gas is a primary use, and/or on federal lands where it is a secondary use. State Lease Sale #41, which took place September 18, 1984, included approximately 1.44 million acres of uplands between the Kvichak River and Port Heiden. Approximately 280,000 acres were actually leased during this sale. Scheduling and extent of exploratory activities which may occur on this acreage is unknown at this time. State sale #56 presumed to proceed in 1988, would be substantially reduced in area, since the proposed sale area includes the two calving grounds that would be precluded from leasing under this alternative.

Exploration activity would occur in areas where oil and gas is designated a primary use, on adjacent refuge lands where it is a secondary use, and on Native corporation lands.

Since many of the more favorable areas could not be leased and explored under this alternative, seismic work and the drilling of exploratory wells would be limited, probably with less than 12 wells drilled, between 1984 and 2002. Most work would be supported by air, primarily from King Salmon or other existing airfields. Because of the limits on exploration, potential for

discovery of commercial quantities of hydrocarbons under this development scenario is considered very low and production is not anticipated.

Transportation. This alternative assumes that no public road would be built from King Cove to Cold Bay. No transportation corridor routings are identified and none are expected to be developed because of the low potential for discovery of commercial quantities of hydrocarbons.

Energy. Local energy systems in the immediate vicinity of villages could be developed under this alternative. This would mean that communities could develop small-scale generating systems (not to exceed 5 MW) to produce power for local use, using low-head hydroelectric, wind power, geothermal power or waste heat recovery provided that no net loss to fish and wildlife would result. This alternative would not support the study of potential large scale hydropower developments for the region.

Minerals. Mineral exploration would generally be limited to state, or BLM lands in the Goodnews Bay, Chignik, Nyac, Herendeen Bay and Port Moller areas, and on Native lands throughout the region.

National Wildlife Refuges are closed to new mineral entry by ANILCA and Wood-Tikchik State Park is closed to that activity by state statute. All designated anadromous streams, their tributaries and associated lakes currently managed by DNR or BLM would be closed to new mineral entry. Only the development of valid existing claims for locatable minerals would be permitted to continue in any streams. New exploration or prospecting for placer deposits is assumed not to occur.

BLM records indicate there are 339 existing unpatented federal lode mining claims in the Bristol Bay study area. They are located primarily in the areas of Goodnews Bay, Chignik and the northeastern portion of the Ahklun Mountains. These claims could be developed under this alternative.

Existing mining activity in the region includes 2 dredges operating at Nyac, employing an estimated 40-50 people. There are also 20-30 people working a placer operation at Platinum. Other small operators (3-4 people) are currently working claims in widely scattered remote areas of the Bristol Bay planning area.

IMPACTS ON FISH AND WILDLIFE RESOURCES

Impacts on salmon

Settlement. This alternative would allow 2,250 acres of land for remote settlement, resulting in an increase of 32 seasonal and 4 permanent households and an increased harvest of 4500 salmon for subsistence purposes.

Oil and gas development. With respect to oil and gas activities, this alternative varies from the No Action in that (1) no leasing would be permitted in any of the state's tide and submerged lands, and (2) the North Peninsula caribou calving grounds and the Black Hills calving grounds would be excluded from the state's 5-year lease schedule.

Because of these limitations on exploration, potential discovery of commercial quantities of hydrocarbons is low and production is not anticipated. This would reduce the potential for adverse impacts on returning and out-migrating salmon from surface disturbances or gas and oil-related contaminants, including the possibility of oil spills.

Energy. This alternative precludes development of a regional energy system; thus, there would be no impacts from the Newhalen or similar hydroelectric projects. Communities could develop small-scale generating systems, with low-head hydroelectric being one of the more likely methods. Such projects, to meet the standard of "no net loss to fish production", would incorporate diversion dams, desilting basins, ladders, or other mitigative features. Unavoidable impacts would be minor and restricted to relatively small streams.

Minerals. New mineral entry would be prohibited in stream beds of all designated anadromous streams, their tributaries, and associated lakes currently managed by DNR or BLM. This would protect these streams from placer mining except where valid existing claims already exist. Mineral development could occur on uplands that have not been previously closed by state or federal legislation. Mineral development carried out in conformance with existing laws and regulations under Alternative 2, should have minor regional impacts.

Aggregate effects. This alternative allows a limited number of remote settlement homesites, resulting in a negligible impact on salmon. It also reduces the probability of an oil spill by closing all state-owned tide and submerged lands and caribou calving grounds to leasing. Closure of anadromous streams to new mineral entry could substantially reduce potential degradation of spawning streams and subsequent impact on salmon stocks.

Conclusion. Impacts to salmon from activities permitted by this alternative would be minor.

Impacts on caribou

Settlement. Table VIII-2 projects an increase of 36 new households by the year 2002. Table VIII-3 indicates the average household harvests 1.3 caribou annually. This suggests that new residents would harvest an additional 47 caribou annually.

Oil and gas development. Under this alternative oil and gas leasing is restricted to those Alaska Peninsula uplands outside the approximately 1,600 square miles of caribou calving grounds. Because of this limited leasing

area, the scenario for this alternative assumes reduced exploration activities and no commercial discoveries. Impacts to caribou will be minimal, consisting largly of disturbance factors associated with the few exploratory wells which may be drilled. No permanent or long-term facility construction is anticipated.

Transportation. The scenario for this alternative assumes no oil and gas development will occur within the region and no pipelines will be built. No other major roads or transportation developments are likely which would impact caribou.

Minerals. The slight increase in mining activity (almost entirely lode exploration) could lead to a slight increase in caribou harvest by mining personnel in the Upper Mulchatna and Alaska Peninsula areas.

Aggregate effects. The slight increase in the Mulchatna herd harvest as a result of settlement and the temporary disturbance of the north and south peninsula herds by oil and gas exploration will produce little or no effect on those individual caribou herds.

Conclusion. Effect of development activities, addressed by the Plan, on the regional caribou population under this alternative will be negligible.

Impacts on moose

Settlement. Table VIII-2 projects a total of 36 new households resulting from settlement under this alternative. Approximately 12 additional animals would be harvested to meet expected subsistence needs based on a current estimate of 0.33 moose taken per average household in the Nushagak and Iliamna Lake area. Most of this increase is expected to be supplied by moose in the vicinity of Dillingham. Present moose populations are not sufficient to meet normal growth in subsistence demand by the year 2002 (Nebesky et al., 1983). Increases in subsistence harvest stimulated by additional remote settlement would exacerbate the supply-demand situation.

Oil and gas development. Under this alternative, oil and gas activity would be limited to uplands. The development scenario assumes that no discoveries would be made. Moose would be affected only by seismic operations and the drilling of less than 12 exploratory wells. Well sites, which would likely be widely separated in space and time, would probably be occupied for less than six months. The affect of these activities on moose would be minor.

Minerals. A slight increase in mining activity could lead to an additional harvest of moose by mining personnel principally in the Upper Mulchatna and Iliamna Lake drainages.

Aggregate effects. Actions which might occur under this alternative could result in a slight increase in subsistence and sport harvest.

Conclusion. This alternative will result in no measurable impact on Bristol Bay moose populations.

Impacts on Brown Bear

Oil and and development. An estimated 15% (450,000 acres) of the area where oil and gas exploration could occur is considered excellent bear habitat--primarily spring use areas and summer-fall feeding areas.

Essential and important bear use areas would be subject to minor impact under this alternative. Not leasing caribou calving grounds eliminates the potential impacts on 15 of the 17 anadromous fish streams between Port Heiden and the Cathedral River and approximately 500 square miles of essential spring-use habitat.

In certain site-specific instances, gas and oil exploration could be permitted in the western Iliamna, Lower Mulchatna and Kvichak river drainages and in the Ugashik area, including lands surrounding the Aniakchak Caldera, Chignik and Perryville Bay. Some denning areas could be affected depending on the level and intensity of development in these areas,.

Transportation. This alternative does not identify pipeline corridors. It is assumed that no corridor would be developed since no oil or gas discoveries are anticipated.

Aggregate effects. An estimated 85% (2.5 million acres) of the key brown bear habitat in the study area would be protected from development activities under this alternative. The remaining 15% of the key habitat could be subject to some level of oil and gas leasing and mining. Long-term impacts on the regional bear populations are not anticipated.

Conclusion. Minor regionwide impacts to brown bears may occur under this alternative.

Impacts on waterfowl and marine birds

Settlement. Only 2,250 acres of lands would be offered for settlement. There would be no adverse effects on waterfowl or marine birds.

Oil and gas development. All of the coastal waterfowl and seabird habitat would be closed to oil and gas leasing. Minor impacts to birds are anticipated in upland areas.

Transportation. The plan does not identify any specific corridor for this alternative and it is assumed that no corridor would be developed.

Energy. Local, small-scale energy systems near population centers would have a negligible impact on waterfowl and seabird habitat. A regional energy project would be precluded by this alternative.

Minerals. With closure of all designated anadromous streams to new mineral entry, potential impacts to waterfowl feeding areas as a result of contamination from upstream sources is reduced. On a local basis there could be some moderate impacts; regionally impacts would be negligible.

Aggregate effects. The effect of remote settlement is negligible due to the small acreage offered. Since all tide and submerged lands would remain closed, impacts would be limited to uplands and would be minor. No analysis is made of a transportation corridor since none is identified. Energy development limited to small-scale systems would have no effect. Mining would have insignificant impacts regionally.

Conclusion. This alternative would have a minor or negligible impact on waterfowl and marine birds in Bristol Bay.

Impacts on marine mammals

Oil and gas development. Impacts generated by upland oil and gas activities would be negligible. Under this alternative, there would be no oil and gas leasing in marine mammal habitats.

Transportation. The scenario for this assessment assumes that no oil and gas will be discovered, therefore, no oil or gas pipeline would be constructed. No other major transportation facility is assumed to be developed under this alternative.

Minerals. Mining operations near Goodnews Bay, Chignik and Port Moller may cause some local disturbance, water turbidity and perhaps a slight increase in local hunting pressure on walrus and seals by Natives employed at the mining operations.

Aggregate effects. Upland lease offerings for oil and gas activities and only 2250 acres of land offered for remote settlement should not affect marine mammals. Effects of mining will be negligible.

Conclusion. No measurable impacts to marine mammals would occur as a result of activities allowed under this alternative.

IMPACTS ON SOCIO-ECONOMIC RESOURCES

Impacts on Subsistence

Settlement. As indicated on Table VIII-2, remote settlement would be restricted to 2,250 acres, primarily in the vicinity of Aleknagik and Dillingham. This would increase the region's population by about 100, of which less than 10% would be permanent residents. Since moose are scarce and

not a significant source of subsistence food in this area, and caribou are not present, this alternative would have negligible impacts on subsistence harvest of these species as a result of settlement.

Oil and gas development. Exploration would be permitted only in uplands and oil and gas development would not be allowed to occur on the calving grounds of either of the two peninsula caribou subherds. There would be essentially no threat to subsistence species from oil and gas activities under this alternative. There would also be no significant population increase and therefore no increased demand for subsistence resources.

Transportation. This alternative does not identify any preferred corridor.

Energy. Under this alternative, development of a major electrical power project would not be permitted. Energy would likely be devloped primarily as small hydropower projects. Effects would be localized and would have little impact on subsistence species.

Aggregate Effect. The number of persons who would qualify as subsistence users will increase in the region regardless of the BBRMP, due to natural population growth and continued growth of the regions economy based on the existing fisheries, recreation, and services industry (Nebesky, et al). Under this alternative, BBRMP would measurably restrict the numbers of new residents associated with settlement, oil and gas, energy and mineral development. The increased demand for subsistence by these new residents would be concentrated in the vicinity of Dillingham and Aleknagik, where moose and caribou make no important contribution under current conditions; thus, impacts on subsistence would be negligible.

Conclusion. The effects of activities allowed in this alternative on subsistence use would be minor.

Impacts on the Commercial Fishery

Settlement. This management alternative allows 2,250 acres of remote settlement, resulting in an estimted 4 new permanent and 32 new seasonal households. According to Alaska Department of Fish and Game (ADF&G), the average subsistence household in the region now uses 129 salmon a year. If 36 new permanent and temporary households qualify for subsistence, approximately 4500 additional fish would be taken annually. This additional harvest would not produce a significant local or regional impact on the commercial fishery.

Oil and Gas Development. Leasing for oil and gas exploration would be limited to uplands not encompassing traditional caribou calving grounds or closed by statute. Some activities associated with oil and gas exploration and development have a potential for affecting the commercial salmon fishery. Impacts on salmon, the primary commercially-fished species, are not expected to be measurably affected by oil and gas activities under this alternative.

Minerals. Under this alternative new mineral entry would be prohibited in all anadromous fish streams and their tributaries. Valid existing mining claims would not be affected by this restriction, and could operate under existing regulations.

Mining activities, should they occur in important anadromous fish streams, could affect the commercial fishery indirectly by causing siltation and excessive sedimentation which could reduce the streams' fish productivity. However, overall impacts to salmon production would be lowered as a consequence of closure of all designated salmon streams to new mineral entry.

Aggregate Effects. Disturbance of salmon spawning beds as a source of gravel for roads, along with placer mining operations, could produce some local impacts on salmon resources. Effects of these local perturbations would probably not be apparent in the commercial salmon fishery.

Conclusion. Implementation of this alternative would not produce a measurable negative impact on the Bristol Bay commercial salmon fishery.

Impacts on Population

Settlement. Lands available for settlement would be limited to 2,250 acres. This would add approximately 36 new households to the region, with most of the settlelement occurring near Dillingham, the largest community in the region. This would result in approximately 100 new people; 10 permanent and 90 seasonal. Additional demand for social services would be minor.

Oil and gas development. Exploration in the upland areas available for leasing could result in an average 17-20 workers per year. Most of these people would be seasonal residents located at Cold Bay or King Salmon. Additional permanent residents in the region as a result of oil and gas activities is not expected, since no commercial discovery is assumed under this alternative.

Minerals. Exploration activities would probably be centered in the vicinity of Goodnews Bay and Platinum but new placer development activities in the rest of the region are assumed not to occur. Population increases from mining activity would be negligible.

Aggregate Effects. Impacts on population from settlement, oil and gas and mining would be negligible.

Conclusion. Impacts on regional population under this alternative would be negligible.

Impacts on Employment

Settlement. Settlement on 2,250 acres of state land disposals in the region is not expected to cause any substantial increase in employment. A few jobs in services or construction could be created in the Dillingham area.

Oil and gas development. Only certain upland areas with a potential for oil and gas deposits could be scheduled for leasing under this alternative. The development scenario for this action does not anticipate an uplands discovery nor would any tidelands exploration occur. Few jobs would be available.

Exploration could result in an average of 17-20 jobs per year for perhaps 5 years. Most of the workers would reside in King Salmon or Cold Bay.

Transportation. No corridors were considered for this alternative. Should a corridor be needed, employment impacts would be temporary and confined to the construction period. A majority of the employees would be from outside the region.

Minerals. Existing placer mining operations at Platinum and Nyac employ an estimated 20-30 and 40-50 persons respectively, and operate approximately 4 months per year. Other small placer operations in the region employ 12 persons, on a seasonal basis.

Closure of all anadromous streams and their tributaries to new mineral entry may cause some attenuation of employment growth in the placer mining industry. This action would not have a measurable effect on the regional employment outlook, however.

Aggregate effects. The existing economy and its forecast growth are dependent primarily on increases in recreation, commercial fishing, government employment and related services. Activites examined in this alternative will have little effect on existing employment trends in the Bristol Bay region.

Conclusion. This alternative will not measurably effect existing employment conditions in the Bristol Bay region but could constrain, to a moderate degree, construction and resource development projects and the temporary increases in employment which they might generate.

IMPACTS ON OTHER RESOURCES

Impacts on Water Quality

Oil and gas development Water quality effects under this alternative would be limited to impacts associated with the exploration for oil or gas in the uplands since tide and submerged lands could not be leased. Impacts could occur during exploration, although they probably would be localized, temporary and minor. Possible impacts include increased suspended sediments, decreased dissolved oxygen levels, and increased turbidity. The probability of a discovery of commercial quantities of oil and gas is considered unlikely under the scenario for this alternative.

Minerals. The beds of all designated anadromous fish streams, lakes and tributaries under state or BLM control would be closed to new mineral entry, thus placer mining, except where valid existing claims exist, would not contribute to water quality degradation.

Aggregate effects. Oil and gas exploration is the major source of probable impacts associated with this alternative. Development is considered unlikely in view of the low probability of a discovery of commercial quantities of hydrocarbons in the uplands. Other activities would likely result in only minor impacts.

Conclusion. Adverse water quality impacts would be local, minor, and short-term in duration.

Impacts on Recreation

Settlement. Growth in the number of new households resulting from settlement in this alternative is estimated to be 4 permanent and 32 seasonal. These additional residents may compete directly for recreation activities such as sport fishing and hunting. Such impacts would be negligible. Of greater potential impact would be additional commercial development on these lands such as lodges and outfitting services. This could contribute to the state's economy and cause some moderate local impact on recreation, but with the small amount of settlement anticipated, these impacts would be minor on a regional scale.

Oil and gas development. Upland oil and gas exploration would be limited because of closure of the calving grounds of the two peninsula caribou herds and tide and submerged land leasing would not be permitted. Impacts on recreation would be transitory and limited to areas encompassed by lease sales #41 and #56 outside the caribou calving grounds in the mid-and southern peninsula area. On a regional basis, impact would be minor and short-term.

Transportation. No corridors are identified under this alternative.

Minerals. All anadromous streams would be closed to mineral entry, thus impacts on recreation fishing would be reduced. Conflicts between miners and recreationists on streams qualifying for entry or where valid historic claims already exist, could occur where both groups want to use the same areas. This would be a minor regional impact when compared to any of the other alternatives.

Aggregate effects. Impact could result from increased recreational use by both local residents and people from outside the region. This could take the form of some increased competition for caribou, moose, and brown bears and slightly more crowded conditions on popular rivers, lakes, and hunting areas. This would be more the result of new commercial enterprises which draw vacationists into the area, than it would be from the small increase in new households. Oil and gas activity would be limited to exploration in lease areas #41 and #56 not including the peninsula's caribou calving grounds.

Mineral development would be very limited and would cause no significant impact. Small energy development projects allowed under this alternative would have no appreciable impact.

Conclusion. Actions addressed under this alternative would have a negligible impact on regional recreation.

Impacts on Historic and Archeological Sites

Settlement. The 2250 acres of settlement land proposed under this alternative would put four small HSPA sites at risk near Dillingham.

Oil and gas development. The development scenario for this alternative assumes that oil and gas exploration will be limited to less than 12 wells and that no development will occur. Probability of this limited action affecting a significant number of archeological or historic sites is remote.

Aggregate effects. This alternative assumes that no major energy projects or transportation corridors will be constructed. Settlement acreage and land affected by oil or gas exploration is minimal and commercial discoveries are not anticipated. Aggregate risk to historic resources is low.

Conclusion. Activities examined under this alternative would have a negligible effect on archeological or historic resources.

Impacts on wilderness

Settlement, oil and gas, small-scale hydropower and mining developments under this alternative are sufficiently restricted to prevent any significant impacts on the suitability of areas for wilderness designation.

Conclusion. This alternative would result in negligible impacts on areas suitable for wilderness designation.

ALTERNATIVE 3

DEVELOPMENTAL ASSUMPTIONS USED FOR IMPACT ASSESSMENT

Settlement. Approximately 26,300 acres of state and BLM lands would be available for sale through DNR and BLM land disposal programs. This remote settlement acreage would be dispersed throughout the region, as far south on the Alaska Peninsula as Dorenoi Bay. Much of the available acreage would be around Dillingham, the perimeter of the Wood-Tikchik State Park, and Iliamna Lake. The Department of Natural Resources provided the following assumptions based on their past experience with land disposal programs. The average parcel size is assumed to be 15 acres. Some disposals would be 5-acre subdivisions, while others would be 5- to 40-acre homesteads. It is assumed that all parcels offered for sale would be sold within the 20-year assessment period. The first land sale would not occur until state fiscal year 1985 (July 1984-June 1985). Actual settlement and resultant impacts would not occur until 1990, to account for a 5-year period between land sales and land improvements. This alternative would result in 330 households being established on the acreage sold by the year 2002. Of these, 22 would be permanent households and 174 would be seasonal households, new to the Bristol Bay region. (See Table VIII-2).

Oil and gas development. Exploration and development activities would be designated a primary use for areas with high and moderate potential for oil and gas. This includes over 2.5 million acres of state owned land on the Alaska Peninsula south of the Bristol Bay Borough. Oil and gas is designated as a secondary use on lands having moderate or low oil and gas potential, including the Nushagak Peninsula and the Nushagak and lower Kvichak River basins. In addition, oil and gas development has been designated as a secondary use in portions of the Becharof, Togiak and Alaska Peninsula National Wildlife Refuges. For purposes of environmental protection, however, approximately 83,500 acreas in the area of Tongue Point through Togiak Bay to Rocky Point, 1,140,000 acres comprising the Bristol Bay Fisheries Reserve and 229,000 acres in the Port Moller and Herendeen Bay area could not be placed on the state's lease schedule under this alternative. Oil and gas activities would be prohibited in designated wilderness areas on refuges. Activities are assumed to be restricted or prohibited on an additional 35% of other refuge lands where exploration or development is determined to be incompatible with refuge purposes.

Lease sales would likely be scheduled over the next 20 years on any state or federal uplands where oil and gas is a primary use, and/or on federal lands where it is a secondary use. State Lease Sale #41, which took place September 18, 1984, included approximately 1.44 million acres of uplands between the Kvichak River and Port Heiden. Approximately 280,000 acres were actually leased during this sale. Scheduling and extent of possible exploratory activities which may occur on this acreage is unknown at this time.

State sale #56 which includes approximately 2 million acres of uplands between Port Heiden and Cape Lieskof is assumed to proceed as scheduled in 1988. BLM lease sales of approximately 1.6 million acres of land in the Kvichak and Goodnews Bay areas are assumed to proceed as scheduled in 1984.

The estimates for oil and gas resources used in this and all other scenarios are based in part on an unofficial report by DNR's Division of Geologic and Geophysical Suveys (DGGS), "Draft - Undiscovered Oil and Gas Potential in the Bristol Bay Region, Alaska" (1982). Oil and gas developments on the Kenai Peninsula and in Cook Inlet were used as models. Most data on these existing developments were taken from the 1981 Statistical Report of the Alaska Oil and Gas Conservation Commission. Direct employment estimates for each scenario were made using information relating to the Department of the Interior's St. George OCS Sale 70, interpretations of geologic data by DNR-DGGS, and manpower estimates developed as part of an economic and policy analysis of the petroleum resources of the National Petroleum Reserve in Alaska. Employment estimates for tidelands oil and gas activity were derived from Hanley et al. (1980) and the Governor's Agency Advisory Committee (1981).

Exploration. Onshore exploration would probably occur throughout the period from 1984 to 2002. It is assumed that seismic exploration using both helicopters and ATV trains would occur over much of the land leased. Seismic signals would be generated by explosive charges either buried or placed on stakes above ground. Exploratory wells would be drilled in those areas producing favorable seismic returns. It is estimated that as many as 19 exploratory wells could be drilled. Major air support would come from King Salmon or other existing airfields. However, several new bush airstrips would probably be built to service the exploratory wells. Average annual employment would range from 17 to 20 persons depending on the level of activity in any year. At most, 25% of these workers would reside in the region.

Exploration methods in tide and submerged lands would include seismic operations with vessels using air guns and exploratory drilling. Drilling would be accomplished by directional drilling from uplands, jack-up rigs, semi-submersible rigs, or drill ships as appropriate.

Development. Preliminary, unofficial estimates from DNR-DGGS in 1982 indicated the probability of commercial quantities of gas within the region is less than 50%. It is assumed however, that 4.0 trillion cubic feet (tcf) of natural gas could be found and produced on upland portions of the coastal plain somewhere about mid-way between Port Heiden and Port Moller. To support this activity, a total of 20 drill pads, a 5,000-foot airstrip and 50 miles of service roads would be built. The total area encompassing development would be 30 square miles (19,200 acres). Land area covered by roads and pads would be approximately 1,920 acres.

Approximately 100 miles of buried 36-inch pipeline would be built from this gas field to a liquid natural gas (LNG) terminal at Balboa Bay. The LNG and tanker loading facilities would be developed on approximately 100 acres of land at Balboa Bay.

The final EIS on the Western LNG project at Nikiski (FERC, 1978) provided an example of the type of development and potential impacts of an LNG facility. The LNG terminal would occupy a 60 acre site and would include two gas liquifaction trains, two 550,000-barrel LNG storage tanks, and a marine

terminal with two berths and other appurtenant facilities. The plant itself would be built outside the region and transported as modules to be reassembled on site. The liquifaction facility would be based on an air-cooling process and would not require large volumes of water for operation. Discharges from the plant would be waste heat passing through air-cooled heat exchangers and some incinerated natural gas. An electrical generating facility, most likely powered by natural gas, would also be needed. The project would use 6,000 gallons of water per day, and have its own sewage treatment plant. The isolated location of Balboa Bay would necessitate construction of both an airstrip adequate for passenger and cargo aircraft and onsite housing for plant employees.

An oil reservoir located in state-owned tide and submerged lands between Port Heiden and Port Moller is assumed based on the DGGS draft report to contain approximetly 500 million barrels of recoverable oil. Probability of such quantities of oil in the region is less that 50%.

Tidelands oil development would be similar to the McArthur River Field in Cook Inlet (total field size 548 acres). Ninety-eight wells would be drilled from three offshore platforms, within a 30-square mile area. Depending on the location and geology of the field, directional drilling from upland locations may be used in lieu of offshore platforms. Shore-based facilities would include a small marine support base (dock) most likely at or near Port Moller. A 5,000-foot landing strip would be built to serve as an air support base, primarily for transfer of workers and supplies from fixed wing aircraft to helicopters.

Pipelines would run directly onshore from offshore platforms. Oil would be transported via a buried pipeline overland where possible. Short segments would probably be buried underwater in the vicinity of Port Moller and Herendeen Bay. This pipeline system would be routed to intertie with the upland gas development system.

Oil storage and tanker loading facilities would be located at Balboa Bay. The facility would include a marine terminal and storage for 6-7 days production. The combined LNG and oil facility site would occupy approximately 300 acres. Most workers employed in oil and gas production activities in Bristol Bay would reside in industry or contractor-built enclaves. Hanley et al. (1980) and the Advisory Committee (1981) estimate total employment would range from 16 persons, when exploration begins, to 922 during the peak of development. Employment would level off at 283 workers through the remaining life of the field. Fifteen percent of all development and production workers would be permanent local residents; the remaining 85% would reside in the enclaves located near the gas field or at the combined LNG-oil terminal.

Transportation corridors. Three multiple-use transportation corridors are assumed as preferred routes for possible development: Port Moller to Balboa Bay (43 miles), Port Heiden to Kujulik Bay/Aniakchak Bay (44 miles), and Pilot Point to Wide Bay (50 miles). At this time there are no proposals to utilize these routes but because of the substantial uncertainty of future actions, impacts of each are analyzed.

ANILCA requires that transportation and utility systems constructed in conservation system units in Alaska follow procedures described in Title XI of that Act. Approval of transportation facilities on National Wildlife Refuge lands would also be subject to refuge compatibility determination, and would require approval of Congress to cross designated wilderness lands.

A buried 30-inch oil pipeline and a buried 36 inch gas pipeline on each side of a construction access road would require a 100-foot wide right-of-way. Additional sites would be required for barrow pits. The routing near Cathedral Peak, Pyramid Mountain or other high steep terrain could receive substantial snowfall and because of avalanche conditions, structures such as snowsheds may be required.

Logistics for line construction would require air, ground and sea support. This might include various fixed wing and helicopter aircraft, bulldozers, trucks, ATV's, barges, dredges and ships.

Proximity of the lower Alaska peninsula area to the Shumagin seismic gap, where an event of magnitude 8 or greater is expected in the next few decades, poses a substantial earthquake hazard. Any tsunami generated by such an event may be partly attenuated by the Shumagin Islands but would still produce a large runup in bays on the southeast side of the peninsula. Development of large terminal facilities on the northern coast of the Alaska Peninsula is not anticipated because of the lack of deep water near shore.

Specific routes of transportation corridors identified in this alternative are the same as those fully described in the Proposed Plan.

Energy.

At least three alternate potential hydroelectric power sites are being examined by the Alaska Power Authority (APA) for a large-scale, regional power project. Only one of these is likely to be built. Since APA's evaluations have not been completed, this Alternative endorses continued study of hydropower options but does not include any specific proposal for hydropower development. The Plan guidelines require that any hydropower development not cause a net loss of fish production. The Plan also recommends that alternate energy resources, including natural gas, be considered more extensively. Development of small scale (less than 5 MW) energy systems would be encouraged for local use. For purposes of impact assessment, a hydropower project at Newhalen was selected for analysis. A full description of this project is given under the Proposed Plan.

Minerals. Mineral exploration would generally be encouraged on state, BLM or Native lands in the Goodnews Bay, Chignik, Nyac, Herendeen Bay and Port Moller areas.

Using available information, the Alaska Land Use Council Mineral Element Work Group identified areas with mineral potential. Mountainous areas around the east half of Iliamna Lake (especially on the south side) and in the upper Mulchatna and

Chilikadrotna river drainages have a potential for gold, silver, tin, copper, tungsten, molybdenum, lead and iron. The Goodnews Bay area has also been identified as having potential for platinum, chromium and gold. The area northwest of the Wood-Tikchik State Park is believed to have deposits of copper, silver, gold, platinum and chromium.

Existing mining activity in the region includes 2 dredges operating at Nyac, employing an estimated 40-50 people. There are also 20-30 people working a placer operation at Platinum. Other small operators (3-4 people) are currently working claims in widely scattered remote areas of the Bristol Bay planning area.

Under this alternative, State lands would be made available for new mineral exploration and development, and entry within active stream channels of designated anadromous streams would be subject to state leasehold location laws to protect fishery resources. Stream beds on National Wildlife Refuges were closed by ANILCA and all streams in the Wood-Tikchik State Park were closed by the State when the park was created. A more complete description of potential mining activities which might occur in Bristol Bay is presented under the Proposed Plan.

IMPACTS ON FISH AND WILDLIFE RESOURCES

Impacts on Salmon

Settlement. This alternative provides 26,300 acres of land for remote settlement which would attract 174 seasonal and 22 permanent new households to the region. Subsistence uses of salmon would be increased by approximately 25,000 fish per year. Although a few local areas could experience a moderate impact on the resource, from a regional perspective the impact would be minor.

Oil and gas development. With respect to oil and gas activities, this alternative differs from the No Action alternative in that tide and submerged land from Tongue Point through Togiak Bay to Rocky Point (all of management subunit 1-B comprising 83,482 acres) and in the Port Moller-Herendeen Bay area (all of management unit 26 - 229,264 acres) would be excluded from the state's lease schedule. These are estuarine areas having particularly high value to out migrating salmon smolt. This alternative would protect these lands from potential hydrocarbon production and thus lessen the possibility of adverse impacts from oil spills and other contaminants. This alternative would allow exploration of the Black Hills caribou calving ground and other portions of the state's tide and submerged lands - with exception of the Fishery Reserve, which would remain closed under any planning alternative. Regional impacts could range from minor to moderate, and locally they could be major on a short-term basis in the event of oil spills. Types of impacts on salmon resulting from oil and gas activities are described under the Proposed Plan.

Energy. This alternative envisions development of a regional hydropower project on the Newhalen River identical to the project evaluated in all of the alternatives except Alternative 2. Maximum use of devices to reduce loss of

an estimated 150,000 smolts drawn through the turbines annually could reduce losses of adult sockeye salmon to 15,000. Net losses could be mitigated in several ways, including construction of compensatory spawning channels, fish ladders and - if necessary - fish hatcheries. Transmission lines would result in minor short-term impacts on intersected streams during the construction period. Overall, long-term impacts to salmon would likely be minor on a regional basis.

Transportation corridors. Corridors and the King Cove to Cold Bay road are more fully discussed under the Proposed Plan.

Minerals. Mineral entry on anadromous streams and their tributaries under the state DNR jurisdiction would be subject to leasehold location restrictions. This means that leases would be required before a mining claim could be worked, and stipulations to protect fisheries would be attached to the lease. Although anadromous streams would be subject to the effects of placer mining, the leasehold location requirement would increase the state's control over these activities and augment existing authority to enforce permit stipulations when violations occur. The overall effect would be to lessen the potential degradation of salmon spawning habitat. Mineral development under this alternative would have a generally minor effect regionally, with moderate impacts possible on a local basis. Major impacts would not be likely.

Aggregate effects. This alternative is intermediate relative to other planning alternatives. The number of salmon that may be taken by residents of remote settlements and the acreage open to oil and gas exploration and possible development, is greater than that of the Proposed Plan but less than No Action. Leaving streams open to new mining, even under leasehold location, could have a moderate to major impact on salmon habitat in those streams affected. Oil spills could have major local impacts. In general, major impacts to salmon would remain localized, and the integrity of the regional salmon population probably would not be seriously threatened.

Conclusion. This alternative would have a moderate impact on salmon at the regional level, but mining or an oil spill could have major impacts locally.

Impacts on Caribou

Settlement. Table VIII-2 projects an increase of 196 new households by the year 2002. Table VIII-3 indicates the average household harvests 1.3 caribou annually. This suggests that new residents would harvest an additional 255 caribou annually.

Normal growth in demand for caribou over the next 20 years as projected by Nebesky et al. (1983), probably will require an increase from the present estimated level of 2,700 animals to nearly 5,000 animals. The number of additional caribou havested as a result of this plan could have an impact on the Mulchatna caribou population, and when added to projected normal demand, increases the likelihood that additional hunting restrictions will be necessary.

Oil and gas development.

Key habitats occupied by both the northern and southern peninsula caribou subherds will be subjected to oil and gas exploration activities over the course of the planning period and beyond. Caribou from these two herds seasonally occupy habitat along the entire northern side of the Alaska Peninsula between the Naknek and Cold Bay.

In the event commercial quantities of hydrocarbons are found, it has been assumed for purposes of analysis that a 4.0 trillion cubic foot (tcf) natural gas discovery will be made on the coastal plain south of Port Heiden within the north peninsula caribou calving grounds. The size of this field would encompass some 30 square miles within the estimated 1500 square mile calving area. Total land surface area affected by infrastructure development is estimated at approximately 2,000 acres, or less than .2 percent of the north peninsula calving area. The scenario assumes a 36-inch buried pipeline will be constructed from the production facility down to the vicinity of Port Moller to intertie with the Herendeen Bay - Balboa Bay Corridor. Approximately 40-50 miles of this line will traverse traditional calving ground habitat although exact routing is only speculative at this time. Construction of this line is expected to be controlled seasonally as a means of minimizing potential impacts on normal behavior patterns.

Transportation corridors. Corridors and the King Cove to Cold Bay road are more fully discussed under the Proposed Plan.

Energy. Impacts to caribou from regional hydroelectric power facilities would result primarily from routing power transmission lines from the generating facility to community centers in the upper Bristol Bay region. Other impacts would result from line monitoring by aircraft and opening rights-of-way to the public.

Public use of transmission line rights-of-way could result in increased harvest levels above the current estimated kill of 300-400 animals annually. Magnitude of this increase would depend on local human population growth over the planning period.

Minerals. This alternative may result in a slight increase in mining activity in the area with a comparable increase in caribou harvest by mining personnel. The effects of this increase will probably be localized and directed toward the Mulchatna herd.

Aggregate effects. The three caribou populations in the region could each be influenced by actions which might occur under this alternative. The increase in harvest (about 225 annually) due to settlement projected with this alternative would have some impact on the Mulchatna caribou population. Potential for finding hydrocarbons is highest in habitats occupied by the north peninsula herd. Consequently, that population would be affected to a greater degree by oil and gas activities than the other herds. This would be particularly true if other than the Port Moller/Balboa Bay

corridor is used for a pipeline. If pipelines through essential caribou habitat are buried and construction regulated seasonally, impacts from corridor development would be reduced.

The King Cove to Cold Bay road could have major local impacts on the southern peninsula herd. Easy access to the herds' migration corridor near Kinzarof Lagoon could substantially increase harvest take from the population.

Development of a major hydropower project and associated transmission lines at Newhalen would probably cause some local populations of the Mulchatna herd to shift away from the activity zone. These impacts would largely cease upon completion of construction. Effect of the in-place transmission system is unknown, but its presence might cause some disruption of normal migrational patterns. The slight increase in harvest of caribou by miners when added to the increase by settlers, could cause a measureable impact on the Mulchatna herd.

Conclusion. Impact to both the southern and northern peninsula subherds could range up to moderate depending upon the level of oil and gas activity, transportation facilities constructed and degree of constraints applied. Impacts to the Mulchatna herd would be minor. Overall effect of development activities which might occur under this alternative would be minor.

Impacts on Moose

Settlement. Table VIII-2 projects a total of 196 households resulting from settlement under this alternative. Approximately 65 additional animals would be harvested to meet expected subsistence needs based on a current estimate of 0.33 moose taken per average household in the Nushagak and Iliamna Lake area. Most of this increase is expected to be supplied by moose in the lower Nushagak river drainage and Iliamna Lake area. Present moose populations are not sufficient to meet normal growth in subsistence demand by the year 2002 (Nebesky et al., 1983). Increases in subsistence harvest stimulated by additional remote settlement would exacerbate the supply-demand situation.

Oil and gas development. Oil and gas activities permitted under this alternative would have the same impact on moose as might occur under the Proposed Plan.

Transportation corridors. Corridors recommended under this alternative are the same routes identified under the Proposed Plan. Potential impacts to moose from development of those corridors are more fully described in discussion of the Proposed Plan.

Minerals. An increase in placer mining activity over the next 20 years could result in an increased harvest of moose by the greater number of miners in the area. While this additional harvest would

not constitute a large number of animals (perhaps 10) it would cause difficulty in subsistence allocations for local residents already facing a supply shortage.

Aggregate effects. Increased harvest by settlers and miners could affect subsistence allocations in the Nushagak-Mulchatna river areas and around Iliamna Lake. This harvest could have a moderate effect on some local populations. Oil and gas and transportation corridor development could temporarily displace some animals at the peak of construction but the population should return to a nearly normal distribution when construction is completed.

Conclusion. Effect of activities which might occur under this alternative would have a minor impact on moose.

Impacts on Brown Bear

Settlement. This alternative would dispose of 26,300 acres mostly in the northern portion of the region around the Lake Clark - Iliamna Lake and Dillingham areas. Remote settlement would have a negligible effect in producing loss or alteration to bear habitat.

Brown bears are of secondary importance for subsistence use but are an important big game sport species, and some increase in bear harvest would result from land disposals if remote homesites are developed. With increased population in remote areas, the number of human-bear encounters would increase, and more bears may be killed in defense of life and property. The result could be a moderate impact on existing population levels in the area.

Oil and gas development.

Brown bear occupy selective habitats on a seasonal basis throughout the entire coastal plain. Seismic activities and exploratory drilling would probably occur in coastal uplands between Naknek and Port Moller. These activities could displace animals from essential habitats, disturb denning areas and eventually lower productivity within selective subpopulations on the Alaska Peninsula.

Development of permanent gas production facilities within the uplands south of Port Heiden would result in displacement of some animals from critical spring-use areas. Offshore exploration and development between Port Heiden and Port Moller would occur along nearly 100 miles of essential coastal habitat. Combined development actions within the tidelands and coastal uplands could result in fewer bears using key habitats over the long term. This disturbance could result in increased competition for food in other areas, intrapopulation stress, and overall lowering of recruitment within that population using coastal environments between Port Heiden and Port Moller.

Transportation corridors. Potential impacts to bears from the three corridors and the King Cove to Cold Bay road identified in this alternative are identical with those described in the Proposed Plan.

Aggregate effects. Combined oil and gas activities and transportation corridors could result in long term adverse impacts to brown bears, particularly that population between Port Moller and Port Heiden which uses the coastal plain environment. Increased level of activities and human presence within the Bristol Bay uplands resulting from oil and gas activities could displace bears from traditional key habitats. Energy and mineral development would add to displacement of some animals from traditional habitats but that disturbance would be localized and of short duration.

Conclusion. Region wide impacts on brown bears are expected to be moderate, but impacts to some local subpopulations, primarily in the Balboa, Kujulik, and Wide Bay areas, could be major.

Impacts on Waterfowl and Marine Birds

Settlement. This alternative would offer 26,300 acres of widely scattered upland parcels for remote settlement. Marine birds would not be affected and waterfowl would suffer only minimal adverse effects through local disturbance or habitat destruction related primarily to home site construction.

Oil and gas development. Bays, lagoons, and estuaries on the Bristol Bay coastline (except for Togiak Bay, the Bristol Bay Fisheries Reserve, Port Moller, and Herendeen Bay) could be open to leasing for oil and gas exploration. These acres are major staging and molting grounds for a large portion of the Pacific flyway's ducks, geese, swans, and they provide habitat for some two million seabirds. Widespread oil and gas exploration and development in tide and submerged lands could have a major impact on waterfowl and seabird populations in Bristol Bay. However, the probability of finding oil and gas on the north shore of the bay in commercial quantities appears unlikely. Development on the south shore is assumed to be limited to an area between Port Moller and Port Heiden. Upland exploration and development could produce minor reductions in the amount of nesting habitat for swans and ducks. Under this alternative, some habitat destruction or disturbance could occur and the impacts on waterfowl and marine birds would be moderate on a regional scale. Impacts, though relatively short term, could be moderate to major in local areas in the event of oil spills.

Transportation corridors. The three transportation corridors and the King Cove to Cold Bay road considered under this alterntave, are identical to those discussed in the Proposed Plan. Since leasing for oil and gas exploration could begin as early as 1989, the impacts of this alternative are identical to those of alternative 1. Lesser impacts attributable to a 10-year delay, as with the Proposed Plan, would not be realized. Even without a delay, however, impacts attributable to corridor development should have only minor impact on regional waterfowl populations.

Energy. This alternative proposes development of the Newhalen hydropower project as in the Proposed Plan. In upland areas, the project would have minor impact on waterfowl, none on marine birds. A powerline across Egegik Bay could interfere with white-fronted emperor geese and snow geese, and could cause mortality to a relatively large number of birds as a result of collision accidents.

Minerals. Anadromous streams would remain open to new entry for mineral exploration and development but would be subject to leasehold location requirements. Some of the impacts on water quality (toxic compounds, increased turbidity) could be transmitted downstream to wetland and estuarine waterfowl habitat, where the food source for staging or molting waterfowl could be affected. This could influence waterfowl health and survival and reduce the carrying capacity of impacted areas. However, the imposition of leasehold location stipulations on new mineral entry would tend to mitigate potential impacts by enabling the state to move more rapidly and effectively in enforcing lease conditions than could be done without such control. Also, since most potential mining lies in the northern portion of the study area, birds using tide and submerged lands along the peninsula would be relatively unaffected.

Aggregate effects. Settlement will not measurably affect waterfowl and marine birds. The closure of estuarine areas associated with Togiak Bay, Port Moller, and Herendeen Bay, in addition to the Fisheries Reserve, would exclude oil and gas exploration and development from those important waterfowl areas, thus reducing the potential for oil spill and other contaminant effects. Development of any one of the three identified transportation corridors could result in major local impacts on waterfowl and marine bird populations. These would likely be short-term. Regional impacts would be minor. Development of a regional energy project on the Newhalen River would result in minor regional impacts. A transmission line to Egegik Bay could result in local mortality through collision with powerlines. Leasehold requirements would improve enforceability of placer mining restrictions, thus reducing potential impacts to tideland feeding areas along the north side of Bristol Bay.

Conclusion. This alternative could have minor to moderate impacts on marine birds and waterfowl on a regional scale. Some major, short-term impacts could occur locally, particularly in conjunction with development of a pipeline corridor.

Impacts on Marine Mammals

Oil and gas development. Impacts to marine mammals generated by upland oil and gas activities would be negligible. Activities along the coast on tidal and submerged lands have the greatest potential for producing negative impacts on marine mammals. Oil and gas development would be centered along the north shore of the Alaska Peninsula between Pilot Point and Port Moller. Continued closure of the Fisheries Reserve, Togiak Bay, and Port Moller would reduce the potential for conflict between oil and gas development and marine mammals. This would be particularly important for seals congregating in those bays and estuaries, walrus which utilize the Walrus Islands and beluga whales feeding near the head of the bay.

Sea otters, which are year round residents, and to a lesser degree a few seasonally migrating whales, specifically the endangered gray, could be at risk. Construction disturbance would displace some sea otters to quieter habitats which would lead to a minor population decline if habitats were at carrying capacity. Migratory whales may move further offshore to elude disturbed areas or oil spills but should suffer no reduction in population as a result of such events.

Sea otters are sensitive to oily aquatic pollutants because of their high metabolic rate and dependence on trapped air in the fur for thermoregulation. Accidents which lead to oil pollution could seriously affect otters failing to avoid the spill area. Segments of populations so affected could suffer sharp declines but the effect would be quite localized and impact on the overall otter population would probably be negligible.

Whales, seals, sea lions and walruses which might wander into spill areas could suffer some skin, eye and mucous membrane irritation from the more toxic elements of the pollutant but little mortality is expected and effect on overall populations would be negligible.

Transportation corridors. Impacts to marine mammals from each of the three corridors identified in this alternative are more fully described under the Proposed Plan.

Aggregate effects. Marine mammal populations utilizing Bristol Bay would be marginally affected by activities likely to occur with this alternative. Development in the transportation corridors could effect some local populations of sea otters and seals during construction operations but these effects would be short-term. Spill events at terminal sites could also effect otters and seals but such impacts would be localized and would be attenuated by control mechanisms. Oil and gas development could affect some Bristol Bay marine mammals, principally sea otters, seals, walruses, and migrating whales. Impacts would generally be localized and short-term.

Conclusion. Effects of activities allowed by this alternative would produce minor to negligible impact on marine mammals in the Bristol Bay region. In the unlikely event of a major oil spill, major short-term local impacts are possible.

IMPACTS ON SOCIO-ECONOMIC RESOURCES

Impacts on Subsistence

Settlement. This alternative is less restrictive than either the Proposed Plan or alternative 1 with respect to remote settlement tracts, and would make available 26,300 acres. Although a few isolated tracts would be located on the peninsula, most would be located in the vicinity of Dillingham and Aleknagik, with some tracts widely dispersed along the Nushagak and Kvichak Rivers and their tributaries.

Little Swift Creek and Gold Lake are located in areas used for subsistence by people from Platinum and Togiak. Although not shown on the maps in Appendix A, residents of Kuskokwim River villages are also known to use this area for subsistence. Arrow Creek and Kaskanak Mountain and Upper Chulitna are all located more or less in the center of the Mulchatna drainage. They are the most heavily-used locations for subsistence of any of the remote settlement locations in any of the alternatives. Arrow Creek is used by people from 10 villages; Kaskanak is used by people from 11 villages; and Upper Chulitna by people from 13 villages. The main subsistence species at or near all three villages are caribou and moose. People from Dillingham, New Stuyahok and Nondalton hunt caribou and moose at West Tutna Lake.

Tommy Point and Kokhanok Lake are near Iliamna Lake , and used by people from Iliamna and Kokhanok. Tommy Point is used for waterfowl and moose while Kokhanok Lake provides caribou and moose. Middle

Bluff provides caribou, moose and waterfowl and is used by people from 11 villages. It is located in the wintering grounds for the northern Alaska Peninsula caribou herd. There are no resources mapped for Cape Menshikof, but the village of Nelson Lagoon is reported to use the area for subsistence.

Kaskanak Creek and Peck's Lake are southwest of Iliamna Lake. Kaskanak Creek is a place where caribou, moose and waterfowl are hunted by people from Aleknagik, Clarks Point, Iliamna, Igiugig, Kokhanok and Levelock. Peck's Lake is used by people from Igiugig, Iliamna, Kokhanok and Levelock for caribou and moose.

Settlement of these tracts would result in an estimated increase of about 600 people. Villages located nearest new settlements would be more affected by increased competition than villages further away. Alternative 3 would locate settlements in the most heavily used subsistence areas in the region. It also would add several large settlement locations in the Iliamna Lake area and would scatter other settlements throughout the region. New people using these locations would increase the hunting pressure on both caribou and moose. If not in fact, there would be a perceived increase in competition for scarce resources, and those relying on subsistence as a lifestyle would feel pressure from outside. There would be only a slight chance of harvest allocation restrictions, so the impact would be minor. Impact of settlement on salmon would be minor (See Impacts on Salmon).

Oil and gas development. Exploration and development would not be prohibited in the Black Hills caribou calving grounds; thus people in Belkofski, False Pass, Cold Bay and Nelson Lagoon who report using this area could be affected in their take of caribou for subsistence. Impacts to subsistence caribou hunting would be limited to the peninsula.

Transportation corridors. This alternative identifies the same transportation corridors as are identified in the Proposed Plan. Impacts would be similar to those previously described in Impacts on Subsistence under the Proposed Plan.

Energy. Construction of a hydroelectric project at Newhalen would add 50 new residents to the populations of the Iliamna-Newhalen area during construction. These residents through hunting activities would add to the short-term demand for subsistence resources. After construction is completed, many of the workers would leave the area.

Aggregate effects. The remote settlements added by this alternative are scattered throughout the region, but several are in areas of high subsistence use. Several are located on or near Iliamna Lake. The presence of an estimated additional 600 people in these areas would cause pressure on all subsistence resources, but particularly caribou from the Mulchatna and Alaska Peninsula herds.

The three transportation corridors may make both the mid-peninsula and southern peninsula herds much more accessible to hunters. Allowing oil and gas leasing in the Black Hills calving grounds could also affect the southern subherd.

The impact of these activities could result in additional restrictions on the use of the herd, some of which could adversely affect subsistence hunters.

Conclusion. The impacts of this alternative on subsistence use of caribou and moose would be moderate on a regional scale and could be major locally, particularly with respect to caribou on the peninsula. Impact on subsistence use of marine mammals, waterfowl and salmon would be minor region-wide. Regional impact on subsistence would be moderate because of the clumped distribution of subsistence resource users.

Impacts on the Commercial Fishery

Settlement. If each new temporary and permanent household qualifies for subsistence, approximately 25,000 additional fish would be taken annually. This harvest is too small to have a significant regional impact. There could be a moderate local impact in some places if harvest were concentrated in small streams that were the primary producers for a few commercial fishermen. This is unlikely since remote settlement lands would be widely distributed throughout the region and concentrated subsistence use should not occur.

Oil and gas development. Some activities associated with oil and gas exploration and development have a potential for affecting the commercial salmon fishery. Impacts on salmon, the primary commercially fished species, were previously discussed in the Proposed Plan and oil and gas activities are expected to have a minor to moderate impact on the fish.

Transportation corridors. Potential indirect impacts to commercial fishing from corridor and road development could occur from changes in water quality due to construction activities which cause sedimentation, turbidity, and benthic disturbance. Impacts would be essentially identical to those that discussed under the Proposed Plan.

Energy. See discussion on commercial fisheries under the Proposed Plan.

Minerals. This alternative would subject all new mineral entry on State lands to leasehold stipulations but would not prohibit new entry on stream beds of anadromous streams. State Parks and

National Wildlife Refuges would remain closed to new mineral entry. Valid existing mining claims could still be exercised under present laws and regulations.

Both lode and placer mining could impact the commercial fishery indirectly by affecting the productivity of anadromous streams.

The effective enforcement of existing mining laws, would aid in reducing the occurrence of significant impacts to the commercial fishery.

Aggregate effects. The development of a regional hydropower facility, placer mining, removal of gravel for construction of oil and gas facilities and remote settlement on public lands under this alternative could produce minor to moderate long-term impacts on the region's salmon resources and as a result affect the commercial salmon fishing industry.

Each of the three proposed corridor routes would have the potential for moderate to minor long-term impacts to local commercial fisheries.

Conclusion. Implementation of this alternative could result in moderate long-term impacts to the region's commercial fishing industry.

Impacts on Population

Settlement. The Alaska Department of Natural Resources has estimated that remote settlement under this alternative would result in a population increase of about 590 people. Of this number, about 120 people would locate in the Dillingham area and 320 around Iliamna Lake. Approximately 90 people would settle in the upper Mulchatna area and about 60 along the lower Alaska Peninsula.

Oil and gas development. Exploration for oil and gas in the upland areas available for leasing could result in an average of 17-20 workers per year. Eventual development and production would require a workforce of about 925 people during peak development. Similar development in the tide and submerged lands would result in about 25 new residents in the region.

The new residents would probably reside in the regional centers of Cold Bay or King Salmon with some in the villages of Port Heiden and Nelson Lagoon. Overall impacts would be minor, but there could be some stress on local medical and housing services.

Transportation corridors. See discussion on population in the Proposed Plan.

Energy. See discussion on population in the Proposed Plan.

Minerals. Mineral exploration would increase the regional population by approximately six persons, probably in Goodnews Bay and Platinum. This small increase would cause only a minor increase in demand for social services in these communities.

Aggregate effects. Oil and gas activities in the region could result in the addition of an estimated 80 permanent residents by the year 2002. The majority of workers in the industry would be temporary construction employees and would be housed in contractor operated enclaves near construction sites. Moderate, temporary impact could occur in association with providing transportation services to the construction force. This impact would probably center on Cold Bay or perhaps Port Moller. Mineral development would add a few permanent residents to the region but they would likely be widely dispersed.

Energy development could have a moderate, temporary housing effect on Newhalen and Iliamna should a project be constructed on the Newhalen River, unless most workers were located in enclaves at the development site.

Settlement would add about 590 new people to the region but only about 66 of them would be year round residents.

Conclusion. Increase in the region's permanent population as a result of development activities which might occur under this alternative would be minor. Moderate short-term impacts on local populations in the vicinity of construction activities could occur.

Impacts on Employment

Settlement. Settlement on remote state and federal land disposals proposed by this alternative would result in approximately 66 new permanent residents in the region. New local residents would increase the demand for government services. However, without a regional government with taxation authority, increased employment by the governement to provide such services is unlikely. Land disposals under this alternative could result in a moderate increase in employment. Most of these impacts would occur in Dillingham, the Bristol Bay Borough, and the Iliamna-Newhalen areas.

Oil and gas development. Upland exploration and development of a gas field coupled with tidelands exploration could create many jobs in the 1990s. The majority of these jobs would be held by imported labor, however. A more thorough analysis of the employment picture for oil and gas development is contained in the discussion under the No Action Alternative.

Transportation corridors. Under this alternative, it is assumed that one of three identified transportation corridors might be used to cross the Alaska Peninsula. Logic dictates that if a commercial oil or gas discovery was made in the most prospective area on the peninsula, transportation facilities would be required from the discovery to the south side of the peninsula. Construction within this corridor would require several hundred workers for about 2 years, most likely in the early 1990's. Most workers would be housed on site and the majority would be from outside the region.

The King Cove to Cold Bay road would take one year to complete, employ 25 workers, 5-10 of whom would be from the region (estimate provided by Alaska Department of Transportation and Public Facilities, 1982). The road would be built in the late 1980's. No other major road developments are assumed.

Energy. See discussion in the Proposed Plan.

Minerals. This alternative should cause little or no effect on the employment outlook as described under the No Action Alternative.

Aggregate effects. Much of the employment in the region would occur from activities not influenced by the Plan.

Development of tidelands oil and gas and a major regional hydroelectric project would result in a significant increase in both resident and non-resident employment in the late 1980's and 1990's. Development of a tidelands oil discovery would probably peak after the development phases for the uplands gas field and hydroelectric project, and would prolong increased employment opportunities for residents and non-residents.

This alternative may cause negative impacts on the existing rate of growth of employment in the region over that of the No Action Alternative. This alternative allows for oil and gas exploration and possible production and regional hydroelectric development. These activities could increase employment opportunity, especially for people from outside the region. However, reduced settlement may decrease employment opportunities.

Conclusion. This alternative allows for increased employment opportunities over that of the proposed plan but to a lesser extent than under the No Action Alternative. This difference is minor.

IMPACTS TO OTHER RESOURCES

Impacts On Water Quality

Oil and gas development. Under this alternative all uplands and all tide and submerged lands, except the Fisheries Reserve, Togiak Bay and Port Moller would be open for oil and gas leasing. Potential

impact to water quality could occur on any lands leased. The range of oil and gas activities which can produce water quality impacts are more fully examined in the discussion under the Proposed Plan.

Barring a catastrophic event, an active program of oil and gas development in the Bristol Bay area would probably not result in significant region-wide water quality impacts, although localized, short-term sedimentation may occur during the construction phases.

Transportation corridors The three transportion corridors and the road from King Cove to Cold Bay identified in this alternative are the same as those discussed in the Proposed Plan. Effects of these developments on water quality are more fully examined in the discussion under the Proposed Plan.

Minerals. The potential for water quality degradation through placer mining activity is wide-spread throughout the region under this alternative. Mining development has the potential for creating long-term water quality effects, but currently existing state laws and regulations are sufficient to prevent major adverse impacts. Lack of compliance with existing laws and regulations by the mining industry, however, will increase the potential for impact on water quality. Even with strict compliance and enforcement of water quality regulation, some moderate short-term impacts may occur in localized areas.

Aggregate effects. Impacts resulting from development operations, primarily oil and gas, transportation, and mineral extraction include increased sedimentation and turbidity, loss of wetlands, possible localized disruption of surface water and groundwater movements, and an increase in toxicity in rivers and tributaries. A major potential for water quality degradation from placer mining activities exists for some localized areas primarily in the Upper Mulchatna, Chilakadrotna River drainages and east of Iliamna Lake. Water quality would not be degraded beyond levels acceptable to the State of Alaska, provided that existing laws and regulations are followed.

Conclusion. Moderate to major adverse impacts could be expected within localized areas, however region-wide impact from the combined development actions should be minor.

Impacts On Recreation

Settlement. A total of 26,300 acres would be allowed for remote settlement, almost double that of the Proposed Plan. This would introduce 330 new households into the region, or approximately 600 seasonal and permanent residents. Some adverse affect would accrue to the existing wild character of some areas, particularly around Kokhanok Lake, Little Swift Creek and near Gold Lake in the

headwaters of the Kisarilik River. There would be some locally significant increases in recreational demand by these new residents. Of greater importance would be potential increases in demand generated by recreation-oriented commercial enterprises on these settlement tracts. With the continually increasing use of the Bristol Bay area by hunters, fishermen and non-consumptive recreationists, new settlement lands will inevitably be used to exploit this demand. This could result in a significant competition between consumptive and non-consumptive users.

Oil and gas development. Impacts from oil and gas would be almost identical to the No Action Alternative except that Togiak Bay and Port Moller would be closed to leasing. These differences would have no appreciable effect on recreation beyond that discussed under this topic in the No Action Alternative.

Transportation corridors. Transpeninsula pipeline routes envisioned with this alternative would be identical to those considered under the Proposed Plan. Local residents would use these corridors for vehicular access into some areas currently available only by hiking or aircraft. Animals, particularly caribou and brown bear could suffer some reduction in habitat, impairment of movement, or changes in local distribution. These effects would be limited to the general vicinity of the corridors.

Energy. Development of the Newhalen hydropower project would be identical to that under the Proposed Plan . Similarly, recreational impacts would be associated with powerline corridors, which would both impair scenic quality locally and open up access to motor vehicle use by local people.

Minerals. Although there would be no restrictions on new mineral entry in the beds of anadromous streams, all such entry and associated activity would be subject to leasehold location requirements. This would enable the State to more effectively prevent water and land degradation by providing more effective control mechanisms and more stringent protective requirements.

Aggregate effects. Settlement would result in introducing 600 new people to the area. In addition to their impact on recreational opportunities, many of these people could be expected to engage in commercial recreational enterprises. These activities would foster increased outside visitation and the attendant impacts including economic benefits as well as greater pressure on recreational resources, particularly fish and wildlife. Transportation corridors and electrical transmission lines would increase vehicular access by local residents into affected areas and contribute to impairment of wild qualities of some areas. Mineral development in streams would be subject to leasehold restrictions. Thus impacts would be less than No Action, which would not require leasehold stipulations.

Conclusion. Impacts on recreational pursuits would be minor on a regional basis. There could be some moderate to major impacts in local areas.

Impacts on Historic and Archeological Sites

Settlement. Approximately 7000 acres of the 26,300 acres offered for settlement under this alternative would be in the Dillingham area. Another 11,000 acres would be in the vicinity of Iliamna Lake. Both of these areas contain HSPA which could be affected by the increase in people land disposals would bring to the area. Remainder of the acreage is of lesser importance but could still result in some risk to archeological and cultural resources.

Oil and gas development. Potential effects of this activity on archeological resources will be similar to that described under the No Action Alternative. Potential risks may be slightly attenuated in this alternative by prohibiting leasing in Togiak Bay and Port Moller.

Transportation corridors. Corridors identified under this alternative are the same locations identified and discussed in the Proposed Plan.

Energy. See discussion under the Proposed Plan.

Mineral. See discussion under the Proposed Plan.

Aggregate effects. Amount of archeological and historic resource at risk under this alternative is greater than that under the Proposed Plan primarily because of the larger amount of acreage available for settlelment and oil and gas development. Transportation corridors and energy development are similar to the Proposed Plan.

Conclusion. This alternative would allow activities which could, if uncontrolled, create a moderate impact on regional archeological and historic resources.

Impacts on Wilderness

Oil and gas development. In addition to the Fisheries Reserve, the only other tide and submerged lands closed to leasing would be Togiak Bay and Port Moller, thus, there would be more potential impact on wilderness suitability in these areas than would result from the Proposed Plan or Alternatives 1 and 2. This is particularly true of tide and submerged lands lying north and west of the Fisheries Reserve where oil and gas exploration could impair coastal wilderness suitability on the Togiak National Wildlife Refuge. Potential for upland disturbance would be identical to the

Proposed Plan, where caribou calving grounds on the peninsula would be open for leasing, thus increasing potential impact of wilderness suitability on portions of the Alaska Peninsula Wildife Refuge.

Transportation corridors. The three corridors and road identified under this alternative are identical to those under the Proposed Plan, and impacts would be essentially the same.

Minerals. The potential for water quality degradation through siltation from placer mining is considerably greater with this alternative than with the Proposed Plan.

Aggregate effects. Settlement would pose little threat to wilderness suitabilty on conservation system units. Tide and submerged land leasing along the coastline of Togiak Wildlife Refuge could impair the wilderness character of that area. Upland impacts on the peninsula could potentially affect some portions of the Alaska Peninsula Wildlife Refuge. Transportation corridors associated with this alternative are identical to the Proposed Plan and Alternative 1. Any one of these corridors would impair wilderness quality within sight of construction features. Regionally, impacts would be minor. Since anadromous streams would be open to new mineral entry, increased sedimentation in some streams from placer mining could lower wilderness character.

Conclusion. Potential impact by activities allowed under this alternative on suitability of federal wild land areas being designated for wilderness classification, in the Bristol Bay region is moderate.

ALTERNATIVE 4

DEVELOPMENTAL ASSUMPTIONS USED FOR IMPACT ASSESSMENT

Settlement. Community expansion and remote settlement could be more extensive than that of the proposed plan under this alternative. This alternative increases opportunities for economic development, and increased expansion could be expected near the major regional centers of Dillingham, Naknek/King Salmon, Newhalen, Iliamna and Cold Bay.

Land disposal for remote settlement of up to 35,300 acres of state lands would be dispersed throughout the region in 26 areas, ranging in size from 250 to 2,000 acres. BLM would initiate a settlement program to allow development of 2,000 acres of federal lands in Management Unit 12 (1,500 acres in the Kaskanak Creek area and 500 acres in the vicinity of Peck's Lake).

The Department of Natural Resources provided the following assumptions based on their past experience with land disposal programs. The average parcel size is assumed to be 15 acres. Some disposals would be 5-acre subdivisions, while others would be 5- to 40-acre homesteads. It is assumed that all parcels offered for sale would be sold within the 20-year assessment period. The first land sale would not occur until state fiscal year 1985 (July 1984-June 1985). Actual settlement and resultant impacts would not occur until 1990, to account for a 5-year period between land sales and land improvements.

Remote land disposals are assumed to result in 450 households being established on the acreage sold by 2002. Of these, 30 would be permanent and 238 would be seasonal households new to the Bristol Bay Region (See table VIII-2).

Oil and gas development. Exploration and development activities would be designated a primary use for areas with high and moderate potential for oil and gas. This includes over 2.5 million acres of state owned land on the Alaska Peninsula south of the Bristol Bay Borough. Oil and gas is designated as a secondary use on lands having moderate or low oil and gas potential, including the Nushagak Peninsula and the Nushagak and lower Kvichak River basins. In addition, oil and gas development has been designated as a secondary use in portions of the Becharof, Togiak and Alaska Peninsula National Wildlife Refuges. For purposes of environmental protection, however, all state tide and submerged lands in the Bristol Bay Fisheries Reserve, would be withheld from leasing. Oil and gas activities would be prohibited in designated wilderness areas on refuges. Activities are assumed to be restricted or prohibited on an additional 35% of other refuge lands where exploration or development is determined to be incompatible with refuge purposes.

Lease sales would likely be scheduled over the next 20 years on any state or federal uplands where oil and gas is a primary use, and/or on federal lands where it is a secondary use. State Lease Sale #41, which took place September 18, 1984, included approximately 1.44 million acres of uplands between the Kvichak River and Port Heiden. Approximately 280,000 acres were actually leased during the sale. Scheduling and extent of possible exploratory activities which might occur on this acreage is unknown at this time.

State sale #56 which includes approximately 2 million acres of uplands between Port Heiden and Cape Lieskof is assumed to proceed as scheduled in 1988. BLM lease sales of approximately 1.6 million acres of land in the Kvichak and Goodnews Bay areas are assumed to proceed as scheduled in 1984.

The estimates for oil and gas resources used in this and all other scenarios are based in part on an unofficial report by DNR's Division of Geologic and Geophysical Suveys (DGGS), "Draft - Undiscovered Oil and Gas Potential in the Bristol Bay Region, Alaska" (1982). Oil and gas developments on the Kenai Peninsula and in Cook Inlet were used as models. Most data on these existing developments were taken from the 1981 Statistical Report of the Alaska Oil and Gas Conservation Commission. Direct employment estimates for each scenario were made using information relating to the Department of the Interior's St. George OCS Sale 70, interpretations of geologic data by DNR-DGGS, and manpower estimates developed as part of an economic and policy analysis of the petroleum resources of the National Petroleum Reserve in Alaska. Employment estimates for tidelands oil and gas activity were derived from Hanley et al. (1980) and the Governor's Agency Advisory Committee (1981).

o Exploration. Onshore exploration would probably occur throughout the period from 1984 to 2002. It is assumed that seismic exploration using both helicopters and ATV trains would occur over much of the land leased. Seismic signals would be generated by explosive charges either buried or placed on stakes above ground. Exploratory wells would be drilled in those areas producing favorable seismic returns. It is estimated that as many as 19 exploratory wells could be drilled. Major air support would come from King Salmon or other existing airfields. However, several new bush airstrips would probably be built to service the exploratory wells. Average annual employment would range from 17 to 20 persons depending on the level of activity in any year. At most, 25% of these workers would reside in the region.

Exploration methods in tide and submerged lands would include seismic operations with vessels using air guns and exploratory drilling. Drilling would be accomplished by directional drilling from uplands, jack-up rigs, semi-submersible rigs, or drill ships as appropriate.

o Development. Preliminary, unofficial estimates from DNR-DGGS in 1982 indicated the probability of commercial quantities of gas within the region is less than 50%. It is assumed however, that 4.0 trillion cubic feet (tcf) of natural gas could be found and produced on upland portions of the coastal plain about mid-way between Port Heiden and Port Moller. To support this activity, a total of 20 drill pads, a 5,000-foot airstrip and 50 miles of service roads would be built. The total area encompassing development would be 30 square miles (19,200 acres). Land area covered by roads and pads would be approximately 1,920 acres.

Approximately 100 miles of buried 36-inch pipeline would be built from this gas field to a liquid natural gas (LNG) terminal at Balboa Bay. The LNG and tanker loading facilities would be developed on approximately 100 acres of land at Balboa Bay.

The final EIS on the Western LNG project at Nikiski (FERC 1978) provided an example of the type of development and potential impacts of an LNG facility. The LNG terminal would occupy a 60 acre site and would include two gas liquifaction trains, two 550,000-barrel LNG storage tanks, and a marine terminal with two berths and other appurtenant facilities. The plant itself would be built outside the region and transported as modules to be reassembled on site. The liquifaction facility would be based on an air-cooling process and would not require large volumes of water for operation. Discharges from the plant would be waste heat passing through air-cooled heat exchangers and some incinerated natural gas. An electrical generating facility, most likely powered by natural gas, would also be needed. The project would use 6,000 gallons of water per day, and have its own sewage treatment plant. The isolated location of Balboa Bay would necessitate construction of both an airstrip adequate for passenger and cargo aircraft and on-site housing for plant employees.

An oil reservoir located in state-owned tide and submerged lands between Port Heiden and Port Moller is assumed based on the DGGS draft report to contain approximetly 500 million barrels of recoverable oil. Probability of such quantities of oil in the region is less that 50%.

Tidelands oil development would be similar to the McArthur River Field in Cook Inlet (total field size 548 acres). Ninety-eight wells would be drilled from three offshore platforms, within a 30-square mile area. Depending on the location and geology of the field, directional drilling from upland locations may be used in lieu of offshore platforms. Shore-based facilities would include a small marine support base (dock) most likely at or near Port Moller. A 5,000-foot landing strip would be built to serve as an air support base, primarily for transfer of workers and supplies from fixed wing aircraft to helicopters.

Pipelines would run directly onshore from offshore platforms. Oil would be transported via a buried pipeline overland where possible. Short segments would probably be buried underwater in the vicinity of Port Moller and Herendeen Bay. This pipeline system would be routed to intertie with the upland gas development system.

Oil storage and tanker loading facilities would be located at Balboa Bay. The facility would include a marine terminal and storage for 6-7 days production. The combined LNG and oil facility site would occupy approximately 300 acres. Most workers employed in oil and gas production activities in Bristol Bay would reside in industry or contractor-built enclaves. Hanley et al. (1980) and the Advisory Committee (1981) estimate total employment would range from 16 persons, when exploration begins, to 922 during the peak of development. Employment would level off at 283 workers through the remaining life of the field. Fifteen percent of all development and production workers would be permanent local residents; the remaining 85% would reside in the enclaves located near the gas field or at the combined LNG-oil terminal.

Transportation corridors. Seven multiple-use transportation corridors are assumed as preferred routes for possible development: Port Moller to Balboa

Bay (43 miles), Port Heiden to Kujulik Bay/Aniakchak Bay (44 miles), Pilot Point to Wide Bay (50 miles), False Pass to Ikatan Bay (23-25 miles), Bering Sea to Morzhovoi Bay (15-20 miles), Egegik to Portage Bay or Puale Bay (80 miles) and Naknek to Paule Bay or Portage Bay (72 miles). At this time there are no proposals to utilize these routes but because of the substantial uncertainty of future actions, impacts of each are analyzed.

ANILCA requires that transportation and utility systems constructed in conservation system units in Alaska follow procedures described in Title XI of that Act. Approval of transportation facilities on National Wildlife Refuge lands would also be subject to refuge compatibility determination, and would require approval of Congress to cross designated wilderness lands.

Should a corridor be used for a pipeline, facilities necessary would probably include a construction access road and a 100-foot wide right-of-way. Additional sites would be required for barrow pits. Routing near high, steep terrain could receive substantial snowfall and because of avalanche conditions, structures such as snowsheds may be required to protect unburied facilities.

Logistics for line construction would require air, ground and sea support. This might include various fixed wing and helicopter aircraft, bulldozers, trucks, ATV's, barges, dredges and ships.

Proximity of corridors on the lower peninsula to the Shumagin seismic gap, where an event of magnitude 8 or greater is expected in the next few decades, poses a substantial earthquake hazard. Any tsunami generated by such an event may be partly attenuated by the Shumagin Islands and other islands but would still produce a large runup in bays on the southeast side of the peninsula. Development of large terminal facilities on the northern coast of the Alaska Peninsula is not anticipated because of the lack of deep water near shore. Details for the Port Moller to Balboa Bay, Port Heiden to Kujulik Bay and Pilot Point to Wide Bay routes and the King Cove to Cold Bay road are given in the Proposed Plan. Specific routes of the four additional transportation corridors identified in this alternative are:

- False Pass to Ikatan Bay: There are two possible routes. The first corridor would be approximately 25 miles long, beginning at the mouth of Bechevin Bay, proceeding underwater seven miles before coming ashore one or two miles south of Rocky Point. It would then travel overland near the shore of False Pass until it reaches its southern end at the Ikatan Narrows, in the vicinity of an abandoned cannery, at the base of the Ikatan Peninsula. The port site would probably be located on the western or southern shore of Ikatan Bay. The second corridor has an underwater route. It would be a 23-mile corridor beginning at the same point as the onshore corridor, but continuing underwater through False Pass. A pipeline would surface at the same terminal site near the head of Ikatan Bay. These corridors would most likely be used for an oil or gas pipeline from the Bering Sea OCS to a deepwater port.

- Bering Sea to Morzhovoi Bay: This corridor would pass through the Morzhovoi Bay isthmus and under Morzhovoi Bay to either its north or south

headland. The length of the corridor through the isthmus would be about six miles. An additional 9-14 miles would be required to reach a terminal site. A pipeline built through this area would be entrenched where necessary or allowed to lie on the bottom of shallow lakes and lagoons.

- o Egegik to Portage Bay or Puale Bay: This 80-mile corridor would begin north of the mouth of the Egegik River, and run eastward along the north side of Becharof Lake to the end of the lake. At this point, the route would intersect the Naknek-Puale Bay corridor and extend southwest along the north side of Whale Mountain, across the Kejulik River flats to intersect with Otter Creek and continue to its end in Portage Bay near the abandoned town of Kanatak on Portage Creek. Because the bay is too shallow and narrow to permit large oil tankers, tank farms would probably have to be built at the bay's mouth near deeper water .

- o Naknek to Puale Bay or Portage Bay: This 72-mile corridor would begin at the Naknek River near King Salmon, cross the river and travel southeast of Blue Mountain, past Becharof Lake to Teresa Creek. The Puale Bay route would then follow the creek to Puale Bay. Port facilities could be located south of the mouth of Teresa Creek.

Energy. At least three potential hydroelectric power sites are being examined by the Alaska Power Authority (APA) for a large-scale, regional power project. Only one of these is likely to be built. Since APA's evaluations have not been completed, this plan endorses continued study of hydropower options but does not include any specific proposal for hydropower development. The plan also recommends that alternate energy resources, including natural gas, be considered more extensively. Development of small scale (less than 5 MW) energy systems would be encouraged for local use. For purposes of impact assessment, a hydropower project at Newhalen was selected for analysis.

A large-scale hydropower plant with a total installed capacity of 16 MW to supply energy needs of 18 communities would be constructed on the Newhalen River. This facility would be a run-of-the-river operation located between river mile 1.0 and 7.0. The power plant and diversion canal would be built on the east bank of the river. Construction would take 3 years, with a peak construction labor force of 300 people, the majority being housed in on-site facilities. The flow diversion canal would be 2.5 miles long and 85 feet wide, located between river mile 2 and 7, and would be designed to bypass average flows of 1033 cubic feet per second (cfs) and maximum flows as high as 2,100 cfs. At this flow, water depth would be about 30 feet. Flow control would be at a concrete spillway near the downstream end of the canal. Located adjacent to the spillway would be the low-level intake for the power plant. Existing roads from the Iliamna airfield to the Newhalen River would be used for access, supplemented with a new road section to the plant.

Approximately 500 miles of transmission lines would be constructed to connect the generating facility and the communities to be served. Transmission corridors for both main and feeder lines would be located on state-owned lands where possible. Lines would be built using helicopters and maintained by all-terrain vehicles or aircraft, eliminating the need for road construction.

Minerals. Using available information, the Alaska Land Use Council Mineral Element Work Group identified areas with mineral potential. Mountainous areas around the east half of Iliamna Lake (especially on the south side) and in the upper Mulchatna and Chilikadrotna river drainages have a potential for gold, silver, tin, copper, tungsten, molybdenum, lead and iron. The Goodnews Bay area has also been identified as having potential for platinum, chromium and gold. The area northwest of the Wood River-Tikchik State Park is believed to have deposits of copper, silver, gold, platinum and chromium.

Existing mining activity in the region includes 2 dredges operating at Nyac, employing an estimated 40-50 people. There are also 20-30 people working a placer operation at Platinum. Other small operators (3-4 people) are currently working claims in widely scattered remote areas of the Bristol Bay planning area.

Under this alternative, most of the state lands in the region would remain open to new mineral entry. Mineral activities could be subject to leasehold location and may be prohibited from certain anadromous streams. Lands managed by BLM would also remain open to new mineral entry under existing policies which encourage mineral development activities. NWR lands are closed to new mineral entry, but valid existing claims on refuges would be allowed to continue. New placer mining claims could occur on any streams within the region, except those closed by ANILCA on refuges and those in Wood-Tikchik State Park which were closed when the park was established. It is assumed that an estimated 15% increase in placer activities would occur in the region over the next 20 years. This increase would occur primarily in those areas with existing activity near Goodnews Bay, Nyac, the Upper Mulchatna and Chilikadrotna drainages, and east of Iliamna Lake.

Placer mining is basically the excavation of existing or relic streambeds for minerals transported by the stream to the site from elsewhere. Most operations use bulldozers, draglines, or dredges to remove overburden and collect the ore. Sluice systems are generally used to separate the mineral from the ore and tailings are discarded in piles. Settling ponds are often used to clarify streams muddied by these activities but some operations are conducted without these facilities. Stream courses are often rerouted by the removal of material from both the stream's bed and its banks. Magnitude of placer operations can range from a single individual with a gold pan to massive dredges employing many workers.

Most placer mining operations in Alaska last about four months. Additional time is usually spent at the mining site to clear overburden, maintain and repair equipment, construct buildings, complete exploration drilling programs, or other exploration or development work. Support facilities may include a bunkhouse, cookhouse, workshop and storage area, and an airstrip. Transportation between the camp and mining operations is usually over trails or roads suitable for pickups, four-wheel drive or ATVs. When an area is mined out, restoration consists of leveling tailing piles, breaching settling ponds and recontouring, with the ground left to revegetate naturally.

BLM records indicate there are 339 unpatented federal lode mining claims and 337 placer mining claims in the Bristol Bay study area, located primarily in the areas of Goodnews Bay, Chignik and the northeastern portion of the Ahklun Mountains.

Exploration techniques for lode deposits vary considerably with the type of mineral being sought. Principal methods of geophysical exploration include magnetic, electrical, electromagnetic, radioactive, seismic and gravity techniques used to define physical differences in the earth's crust. Geochemical exploration involves collection of samples in the field, with additional testing in the laboratory to discover anomalous occurrences of minerals.

Most chemical and geophysical exploration would involve aircraft-supported field crews, and temporary camps. Both geochemical and geophysical operations may also involve the occasional use of all-terrain vehicles (ATV).

In order to sample deposits, drilling programs would eventually be established. Drills would range from back-packable, to helicopter-portable, to truck-mounted or ATV-mounted types. Road development to support these operations is not expected to be extensive since the most prospective mineral sites anticipated to be developed are all near tidewater.

Lode mining involves tunneling or open pit operations to obtain ore. Facilities and equipment for lode mining are generally much more elaborate than that required for placer operations. Large trucks, massive bulldozers, power shovels, stream drills, powerful explosives and other heavy equipment designed to move great quantities of material are necessary. Many workers and facilities to support them, i.e. mess halls, barracks, sewer systems, large water supplies and well-developed transport systems, are often required. Large lode deposits may be operated for many years often resulting in the development of semi-permanent communities at or near the mining site.

IMPACTS ON FISH AND WILDLIFE RESOURCES

Impacts on Salmon

Alternative 4 provides the maximum opportunity of the five proposed plan alternatives for development in the Bristol Bay region. It differs from the No Action Alternative in the following ways which result in a differing impact on salmon: 1) The Alternative guidelines are assumed to apply to all resource development activities. 2) Only half as much acreage would be made available for remote settlement (37,325 acres). 3) A total of seven potential transpeninsula transportation corridors are identified.

Settlement. Based on an assumed increase of 238 seasonal and 30 permanent new households as a result of 37,325 acres of lands made available for remote settlement, the increased take of salmon for subsistence uses would be roughly 34,000 per year. Distribution of this take would be wide-spread and result in only minor regional impacts.

Oil and gas development. This alternative, like that of No Action, would permit lease sales to be scheduled on most State and Native uplands. It would encompass all State lands on the Alaska Peninsula, including caribou calving grounds. It would also include all State tide and submerged lands, with the exception of the Fisheries Reserve. Lease areas are identical to those that would be available without a plan. If the alternative guidelines were in effect, control of all resource development activities would be tightened up with respect to restrictions and enforcement over that imposed by existing state and federal statutes. There is no way the effects of these additional constraints can be measured however, in terms of reduced impacts on salmon resources. It is assumed that they would result in some overall reduction of potential impacts and would provide more positive assurance that adverse impacts are appropriately mitigated.

Transportation corridors. Three of the seven corridors and the King Cove to Cold Bay road recommended in this alternative are identical to those identified and evaluated under the Proposed Plan; the remaining four corridors are unique to this alternative:

- False Pass to Ikatan Bay: False Pass is a summer migration route for millions of young and mature salmon moving to feeding and spawning grounds. Impacts due to construction of either a submerged or above-ground pipeline would be short-term and localized. The impact would result from water quality deterioration (increased sedimentation and turbidity) and would, therefore, be expected to have only minor impacts on salmon passing through the area. A greater impact would result from a pipeline rupture and oil spill. The area is subject to earthquakes, volcanic activity, land and snowslides, high winds, vigorous wave action and swift currents (up to 7 knots). An oil spill in the summer could have a major affect on out-migrating smolts, young adults, and returning spawners. The impacts would be similar to those described in the Proposed Plan assessment of oil and gas impacts on salmon.

- Bering Sea to Morzhovoi Bay: Morzhovoi Bay is used by out-migrating and returning salmon as a feeding ground. Sockeye salmon spawn and rear in the lake west of Big Lagoon and pink and chum slamon spawn in five streams near Little John Bay. The pipeline would be submerged in the unnamed lake used by sockeye salmon with a temporary, minor impact from sedimentation and turbidity created by construction activities. The corridor would be subject to earthquakes. The port site is also subject to high winds and tsunamis that further increase the chance of an oil spill from tanker accidents.

- Egegik to Portage Bay/Puale Bay: This corridor crosses an area containing some of the most valuable salmon habitat on the Alaska Peninsula, and could affect salmon dependent on the Egegik, King Salmon and Kejulik rivers and Becharof Lake. Becharof Lake has an annual production of sockeye salmon which varies between 5-40 million smolts. The Egegik River system is one of the major salmon-producing systems feeding Bristol Bay, providing a harvest of 1-2 million sockeye salmon yearly. In addition,

coho, pink and chum salmon are also found in the Egegik River system and five species of Pacific Salmon spawn in the King Salmon River. The Kejulik River, the largest tributary to Becharof Lake, is a major sockeye salmon spawning stream.

- Naknek to Puale Bay/Portage Bay: This corridor would cross or be adjacent to the Naknek and Kejulik rivers and Big Creek, passing through two important salmon producing systems--the Naknek and Egegik rivers. Oil spills from a ruptured pipeline could adversely affect these two major salmon- producing systems, with major, long-term impacts. The sockeye salmon population of these two systems now supports a commercial and recreational harvest of nearly 4 million salmon. The Naknek River is used as spawning habitat by both chinook and pink salmon. The river serves as a migration corridor for sockeye, coho and chum salmon. Big Creek is a spawning ground for chinook and chum salmon.

Energy. Similar to the Proposed Plan

Minerals. This alternative would not impose any prohibitions (mineral closings) or leasehold location requirements on mining which could impact salmon. Impacts would be similar to those described under the No Action alternative.

Aggregate effects. Estimated additional take of salmon by subsistence users as a result of settlement under this alternative would be approximately 34,000 by the year 2002.

Impacts of oil and gas development are not quantifiable at this time because of the large uncertainties about where or what development, should it occur, would take place. However, it can be expected, barring a major oil spill, that if any significant impacts are experienced, they will occur primarily during construction activities and will be relatively short term. Even if the calculated number of major oil spills (two 1000 bbls) as determined by the development scenario, should occur during the next 20 years, severe impacts would probably be localized and overall regional impact relatively minor.

Potential loss of fish as a result of a hydroproject on the Newhalen River could, on a worst case basis, result in a maximum annual loss of approximately 30,000 adult salmon.

Mining operations in the area are expected to increase by approximately 15% by the year 2002. This would result in one additional small placer operation somewhere in the region, 7 additional people at Nyac and 4 additional workers at Platinum. Current losses of salmon by regional mining activities are unknown.

If it is speculated that 500,000 salmon are lost per year through oil production, transportation, and mining operations (probably a worst case), 30,000 by hydrodevelopment and 34,000 by increased subsistence useage, a total of 564,000 additional fish will be affected by activities allowed under this

alternative. This represents about 1.8% of the 1975-1983 annual average sockeye salmon run in Bristol Bay.

Conclusion. On a regional basis these impacts would be moderate. In local areas, cumulative impacts could be major.

Impacts on Caribou

Settlement. Table VIII-2 projects an increase of 268 new households by the year 2002. Table VIII-3 indicates the average household harvests 1.3 caribou annually. This suggests that new residents would harvest an additional 356 caribou annually.

Normal growth in subsistence demand for caribou over the next 20 years as projected by Nebesky et al. (1983), probably will require an increase from the present estimated level of 2,700 animals to nearly 5,000 animals. The number of additional caribou harvested as a result of this plan could have an impact on the Mulchatna caribou population, and when added to projected normal demand increases the likelihood that additional hunting restrictions will be necessary.

Oil and gas development. Key habitats occupied by both the northern and southern peninsula caribou subherds will be subjected to oil and gas exploration activities over the course of the planning period and beyond. Caribou from these two herds seasonally occupy habitat along the entire northern side of the Alaska Peninsula between Naknek and Cold Bay.

In the event commercial quantities of hydrocarbons are found, it has been assumed for purposes of analysis that 4.0 trillion cubic feet (tcf) of natural gas discovery will be made on the coastal plain south of Port Heiden within the north peninsula caribou calving grounds. The size of this field would encompass some 30 square miles within the estimated 1500 square mile calving area.

The total land surface area affected by infrastructure development is estimated at approximately 2,000 acres, or less than 2 percent of the north peninsula calving area.

The scenario assumes a 36-inch, buried pipeline will be constructed from the production area down to the vicinity of Port Moller to intertie with the Herendeen Bay - Balboa Bay Corridor. Approximately 40-50 miles of this line will traverse traditional calving ground habitat although exact routing is only speculative at this time. Construction of this line is expected to be controlled seasonally as a means of minimizing potential impacts on normal behavior patterns.

Transportation corridors. Three of the following seven corridors and the King Cove to Cold Bay road recommended in this alternative are identical to those identified and evaluated under the Proposed Plan; the remaining four corridors are unique to this alternative.

- False Pass to Ikatan Bay: The onshore corridor route would traverse caribou habitat along the eastern shore of Unimak Island. A herd of approximately 1,000 caribou inhabit the island. Although seasonal distribution patterns for caribou on Unimak Island are not well known, animals have been observed along the coast within the area of the proposed corridor.

  Construction of a pipeline in this corridor would require intensive air and ship support in addition to increased human presence in a region where encounters with humans have been rare. Animals would be displaced to other parts of the island during construction, and might avoid the coastal area permanently if an above-ground pipeline is built. Given the topographical characteristics of the onshore portion of the route, it is likely that up to eight miles of the line would have to be constructed above ground. While certain environmental guidelines would be imposed on the design, visual or physical barriers would increase the extent of avoidance of the area, particularly by cows with calves. The corridor would be along the extreme eastern edge of Unimak Island however, and would probably not have a long-term impact on population levels.

  Construction of an underwater pipeline in this corridor would require some onshore support, resulting in minor levels of disturbance to caribou using coastal habitat. Displacement probably would be short-term, with animals reoccupying former habitat once construction is completed.

- Bering Sea to Morzhovoi Bay: Wintering caribou could be displaced from the narrow Morzhovoi Isthmus, should construction of a pipeline take place during late fall and winter. A majority of the estimated 6,000-7,000 caribou wintering on the Izembek Refuge concentrate 12-15 miles east of the site proposed for this corridor. Animals also occupy habitat within the affected area between Bechevin and Morzhovoi bays. Construction, ATV's, boats, and human presence could cause animals to avoid traditional habitat within the lagoon system as long as the disturbances continue. Migratory patterns could change temporarily, and habitats south of the proposed corridor could be avoided altogether. The corridor, however, is not expected to have a long-term impact on caribou wintering in the area.

- Egegik to Portage Bay/Puale Bay: This corridor traverses winter habitat used by the north peninsula caribou herd. The herd of 15,000-20,000 animals, winters from August to February in the general area between Ugashik Lake and the Naknek River. The segment of corridor from Egegik Bay to a point north of Becharof Lake between the King Salmon River and Shosky Creek crosses a heavily-used migration route between winter ranges. Nearly half of the northern subherd passes through this region each year on its way to and from calving grounds near Port Heiden.

  An above-ground pipeline could result in the abandonment of winter habitat between the pipeline and the Naknek River, an area representing nearly half of the winter range of the north peninsula herd.

It is unlikely the remainder of the proposed corridor that turns south to Portage Bay would significantly alter caribou patterns over this portion of the winter range. Population densities decrease considerably around the eastern end of Becharof Lake, with few animals in the general area south of the Kejulik River.

- Naknek to Paule Bay/Portage Bay: The segment from King Salmon to Blue Mountain crosses heavily-used winter range occupied by the northern peninsula subherd. As many as 8,000-10,000 animals traditionally use this area between Becharof Lake and the Naknek River from mid-August to February. Impacts would generally parallel those discussed for the Egegik corridor, except that they would occur over a larger area and would affect more animals.

Energy. Impacts to caribou from regional hydroelectric power facilities would result primarily from routing power transmission lines from the generating facility to community centers in the upper Bristol Bay region. Other impacts would result from line monitoring by aircraft and opening rights-of-way to the public.

Transmission lines would traverse winter habitat used by the Mulchatna caribou herd. This herd is one of Alaska's 13 major caribou herds and presently numbers 15,000 to 20,000 animals.

Public use of transmission line rights-of-way could result in increased harvest levels above the current estimated kill of 300-400 animals annually. Magnitude of this increase would depend on local human population growth over the planning period.

Minerals. This alternative would propose no restrictions on mining activity beyond those currently in place. The estimated 15% increase in placer mining over the next 20 years could produce on increase in caribou harvest by mining personnel. The majority of this increased harvest would be borne by the Mulchatna population.

Aggregate effects. The three region-wide caribou populations could all be influenced by actions which might occur under this alternative. The increase in harvest due to increased settlement projected with this plan, about 355 animals annually, would have some impact on the Mulchatna caribou population. Potential for finding hydrocarbons (primarily gas) is highest in habitats occupied by the north peninsula herd. Consequently, this population would be affected to a greater degree by oil and gas activities than the other herds. This would be particularly true if other than the Port Moller/Balboa Bay corridor is used for a pipeline. Impacts from corridor development would be reduced however, assuming that pipelines through essential caribou habitat would be buried and construction regulated seasonally.

The King Cove to Cold Bay road could have major local impacts on the southern peninsula herd. Easy access to the herd's migration corridor near Kinzarof Lagoon could substantially increase harvest take from the population.

Development of a major hydropower project at Newhalen would probably cause some local populations of the Mulchatna herd to shift away from the activity zone. These impacts would largely cease upon completion of construction. Effect of the in-place transmission system is unknown but its presence might cause some disruption of normal migrational patterns. The increase in harvest of caribou by miners when added to the increase by settlers, could cause a measurable impact on the Mulchatna herd.

Conclusion. Impact to both the southern and northern peninsula subherds could range up to moderate depending upon the level of oil and gas activity, transportation facilities constructed and degree of constraints applied. Impacts to the Mulchatna herd could be moderate. Overall effect of development activities in Bristol Bay which might occur under this alternative could be moderate.

Impacts on Moose

Settlement. Table VIII-2 projects a total of 268 new households resulting from settlement under this alternative. Approximately 88 additional animals would be harvested to meet expected subsistence needs based on a current estimate of 0.33 moose taken per average household in the Nushagak and Iliamna Lake area. Most of this increase is expected to be supplied by moose in the lower Nushagak River drainage and Iliamna Lake area. Present moose populations are not sufficient to meet normal growth in subsistence demand by the year 2002 (Nebesky et al., 1983). Increases in subsistence harvest stimulated by additional remote settlement would exacerbate the supply-demand situation.

Oil and gas development. Oil and gas activities permitted under this alternative would have the same impacts to regional moose populations as discussed in the Proposed Plan.

Transportation corridors. Three of the corridors identified under this alternative (Port Moller to Balboa Bay, Port Heiden to Kujulik Bay, Pilot Point to Wide Pay) are discussed under the Proposed Plan. Two of the additional routings identified in this alternative (False Pass to Ikatan Bay, and Bering Sea to Morzhovoi Bay) are located in areas where moose are absent.

The two remaining corridors, Egegik to Portage or Puale Bay and Naknek to Portage or Puale Bay, cross areas identified by ADF&G as essential wintering areas for moose. Because moose occupy these areas year round, construction activities would occur when substantial numbers of moose are present. Moose, however, are quite tolerant to disturbances and would probably only be locally displaced during the peak of construction. Once construction activities cease and the corridor is put in an operation mode most of the displaced animals would probably return to their former range. Under some circumstances, areas disturbed during the construction phase could be altered to the extent that

carrying capacity for moose would be enhanced. Access provided by the corridor to previously inaccessible areas could result in increased sport and subsistence harvests.

Mining. A substantial portion of the increase in placer mining is assumed to occur in the Upper Mulchatna and Chilikadrotna River drainages. This activity could result in a larger harvest of moose (est. 10) by the additional miners in the area.

Aggregate effects. Oil and gas development and construction of a cross peninsula transportation corridor through moose habitat could result in temporary displacement of some localized populations and a slight increase in harvest.

Settlement coupled with mining activities in the Nushagak, Mulchatna and Chilikadrotna River drainages and around Iliamna Lake could cause an decrease in moose habitat and impact on subsistence allocations. Viability of the herd would probably not be damaged, however.

Conclusion. Impacts to moose by activities which might occur under this alternative would be minor on a regional basis.

Impacts on Brown Bear

Settlement. Brown bears have extensive spatial needs and tend to range almost continuously. As has been well demonstrated in the lower 48 states, increased human intrusion into remote brown bear habitat has resulted in human/bear conflicts, and eventually, has led to the removal of bears from their historic range. Remote settlement to the level permitted by this alternative (37,300 acres) could ultimately displace some brown bears from their traditional habitat in the Bristol Bay region. This would have a moderate regionwide impact, except in some areas along the peninsula where more essential use areas are prevalent and human intrusion has been minor. These areas could experience major local population declines.

Oil and gas development. Brown bears occupy selective habitats on a seasonal basis throughout the entire coastal plain. Seismic activities and exploratory drilling would probably occur in coastal uplands between Naknek and Port Moller. These activities could displace animals from essential habitats, disturb denning areas and eventually lower productivity within selective subpopulations on the Alaska Peninsula.

Development of permanent gas production facilities within the uplands south of Port Heiden could further result in displacement of some animals from essential spring-use areas. Offshore exploration and development between Port Heiden and Port Moller could occur along nearly 100 miles of essential coastal habitat. Combined development actions within the tidelands and coastal uplands could result in fewer bears using key habitats over the long term. This disturbance could result in increased competition for food in other areas, intrapopulation stress, and overall lowering of recruitment within that population using coastal environments between Port Heiden and Port Moller.

Transportation corridors. Three of the seven corridors and the King Cove to Cold Bay road which might affect bear populations have been discussed in the Proposed Plan alternative. Possible effects of the remaining corridors is as follows:

- False Pass to Ikatan Bay: Recent population estimates indicate 70-80 brown bears inhabit Unimak Island (USDI, FWS, 1982). An estimated 10-15 animals consistently use the proposed corridor region throughout the summer, while a similar number can be found in the lower part of the Ikatan Peninsula. Bears would be temporarily displaced from traditional habitat if pipeline construction overlaps with seasonal use of the area by bears. The overland option for this corridor would have to pass through approximately 5 miles of essential spring habitat and important summer and fall habitat.

  Development and operation of a port facility along the southern shore of Ikatan Bay would increase levels of disturbance to local bear populations. With increased human presence, and boat and air traffic along the narrow stretch between Ikatan Bay and Otter Cove, bear use of the area would be substantially reduced if not eliminated altogether. Overall bear productivity on Unimak Island could experience a minor decline.

- Bearing Sea to Morzhovoi Bay: This corridor would cross essential spring and important summer and fall use areas. As brown bears occupy this corridor route most of the year, there would be at least a temporary displacement of animals as a result of noise from construction and boat and aircraft traffic. While individual numbers and distribution patterns vary considerabley throughout the season, it is likely that some animals would be displaced from the immediate area. This displacement could be permanent if boat traffic intensifies throughout the upper reaches of Morzhovoi Bay and its lagoons. While some individual animals would habituate to human presence and disturbance-related activities, most would seek more remote habitats to avoid conflicts.

- Egegik to Portage Bay/Puale Bay: Bears occupy habitat along the entire 80-mile route; the most intensively used areas are located along the approximate 30-mile segment from the northeast corner of Becharof Lake to Portage Bay. The corridor would pass directly through a 10-mile portion of denning habitat. This segment would cross the Kejulik River and at least eight other salmon streams where bears are known to concentrate in the summer and fall. The proposed route would also traverse 15-20 square miles of essential spring feeding habitat in the Kejulik River Flats. While bear numbers vary seasonally in this region of Becharof Refuge, an estimated 80-100 animals could be present in summer and fall. A count in the late summer and early fall of 1981 found 26 bears along Becharof and Cleo creeks, which would be crossed by the proposed route. An additional 40 animals were observed along Otter and Salmon creeks north of Portage Bay.

If pipeline construction were to occur when bears are in the area, most would be displaced at least temporarily from the immediate vicinity. Human/bear encounters in this area traditionally have been low, confined primarily to hunters, fishermen and other recreationists. Increased disturbance would probably result in abandonment of some traditional use areas until construction was completed.

- Naknek to Puale Bay/Portage Bay: The initial segment of this corridor, from King Salmon to the northeast corner of Becharof Lake via Blue Mountain, could have impacts similar to those discussed for the Egegik route. The approximate 12-mile segment from the northeast corner of Becharof Lake would cross an intensive spring use area in the Kejulik Flats and at least 5 salmon streams where bear concentrate in late summer and early fall. As many as 100 bears can be found along the proposed corridor during the non-denning period (April to November). The development of port facilities at the upper end of Puale Bay would eliminate bear use in the upper reaches of the bay. Some animals could be permanently displaced.

The net effect on brown bears in these corridors could be at least the temporary displacement of local populations if construction were not limited to the November-March denning season.

Minerals. Allowing all anadromous fish streams outside parks and refuges to be open to new mineral entry would contribute to the harassment and disturbance of local bear populations, increasing intraspecific competition for food and suitable habitat. The level of impact would depend on time, location and intensity of the mining effort. Long-term cumulative effects on brown bears would depend greatly on the level of placer mining on streams where traditional use is intense. It is reasonable to assume that more bears would be killed as a result of human/bear encounters, and that bears would be displaced from preferred habitat. A decline in population in some areas would be expected.

Aggregate effects. This alternative over the planning period would: 1) increase the proportion of the total bear population vulnerable to sport harvest by increasing human access; 2) cause more human/bear confrontations, resulting in more animals killed in defense of life-property; 3) cause bear abandonment of some traditionally used areas, thus increasing competition for space, food, denning sites; and 4) alter behavior by expanding remote settlement and industrial infrastructure development, resulting in "nuisance" bears that would be killed.

While the above factors would operate regionwide, certain areas would be subject to more intense levels of activity. These are: 1) Becharof Lake-Kejulik River; 2) Port Heiden-Meshik River spring use area; 3) Aniakchak-Mt. Veniaminof concentration and denning areas; and 4) Cold Bay-Joshua Green River drainages. Populations within these areas have historically been the least disturbed on the Alaska Peninsula, and would be the most vulnerable to actions which could occur under this alternative.

Conclusion. This alternative could have major local impacts on brown bear populations. Regional impacts would be moderate.

Impacts on Waterfowl and Marine Birds.

Settlement. This alternative would offer a total of 37,300 acres of upland tracts for remote settlement. Some minor loss to upland waterfowl habitat, and disturbance resulting from increased human activity would occur but regional impacts would be insignificant. Marine birds would be unaffected because of distance from settlement sites.

Oil and gas development. This alternative would leave all estuaries, bays and lagoons along the Bristol Bay coast (except those within the Bristol Bay Fisheries Reserve) open to possible exploration and development. It differs from Alternatives 3 and No Action in that Port Moller and Herendeen Bay, areas of essential waterfowl habitat, would be open to leasing. However, development would probably be limited to an area between Port Moller and Port Heiden along the north side of the peninsula.

Transportation corridors. Seven corridors, including the three corridors and the King Cove to Cold Bay road discussed in the Proposed Plan are identified in this alternative. The four additional corridors are:

- False Pass to Ikatan Bay: This corridor passes through important but not essential waterfowl habitat, used principally by migratory emperor geese in the spring, brant in the fall, and Steller's eiders year round (USDI, FWS, 1983b). At least four seabird colonies, with a total of about 12,000 nesting birds, can be found along the corridor. Amak Island and the Sea Lion Rocks, north of Morzhovoi Bay, support some 14,000 nesting marine birds (Sowls et al., 1978).

  Corridors on the western end of the Alaska Peninsula are more susceptible to volcanic activity, earthquakes and high winds than those farther north and east, making them more vulnerable to damage. Tanker navigation out of Ikatan Bay, because of high winds and strong currents, could be hazardous; accidents resulting in oil spills could be relatively more frequent.

- Bering Sea to Morzhovoi Bay: The coastal reaches of this corridor are in important waterfowl and marine bird habitat. Morzhovoi Bay is a key staging area for lesser Canada Geese, brant, emperor geese, and eiders (USDI, FWS, 1983b). Three marine bird colonies, with a total of about 460,000 nesting birds, occur in Morzhovoi Bay. The islands south of Morzhovoi Bay support up to a million nesting marine birds. An additional 14,000 marine birds nest on Amak Island and the Sea Lion Rocks, north of the bay (Sowls et al., 1978).

  Morzhovoi Bay is less susceptible than Ikatan Bay to volcanic activity and navigational problems, and has fewer engineering constraints. As a result, the chances of pipeline breakage, tanker accidents, and oil spills are considerably reduced. This corridor probably would have a negligible

impact on waterfowl but could reduce the amount of habitat in the area. Because of the corridor's proximity to essential marine bird habitat on the south side of the peninsula, oil pollution might produce a greater effect on marine birds.

- Egegik to Portage Bay/Puale Bay: The coastal reaches of this corridor provide important waterfowl habitat. The Egegik River delta is an important staging area for snow geese in the fall and for white-fronted geese in the spring. Egegik Bay is also heavily used by emperor geese and diving ducks for staging and molting (USDI, FWS, 1983b). Few marine birds nest in Egegik Bay, but nearly 100,000 nest in 10 colonies on the south side of the peninsula in or near Portage and Puale bays (Sowls et al., 1978).

  Minor but permanent reductions in populations would result from a loss in habitat that would be caused by this corridor. Because of the relative stability of the terrain at the northeast end of the peninsula, the possibility of pipeline accidents is slim relative to corridors farther southwest. However, high winds in both Portage and Puale bays increase the chance of tanker accidents. If pipeline leaks or a major harbor spill occurred, the impact on waterfowl and seabirds would be moderate but temporary.

- Naknek to Portage Bay/Puale Bay: The coastal reaches of this corridor constitute important waterfowl habitat. Each spring, the Naknek River hosts up to 1,000 tundra swans and an unknown number of white-fronted geese, emperor geese, and diving and dabbling ducks (USDI, FWS, 1983b). Few marine birds nest near Naknek, but nearly 100,000 birds nest in 10 colonies on the south side of the peninsula in or near Puale and Portage bays (Sowls et al., 1978).

  A small reduction in populations would result from the slight loss in habitat caused by the presence of this corridor. Because of the relative stability of the terrain at the northeast end of the peninsula, the possibility of pipeline accidents is slim relative to corridors farther southwest. However, high winds in both Portage and Puale bays increase the chance of tanker accidents.

Energy. This alternative proposes development of the Newhalen hydropower project identical to the Proposed Plan. Similarly in upland areas the project would have minor impact on waterfowl; none on marine birds. A powerline to Egegik Bay could interfere with snow geese and white-fronted emperor geese and could result in mortality of birds through collision accidents.

Minerals. This alterntive places no constraints on mining activities other than existing laws and statutes. Subject only to restrictions already in force, anadromous streams would remain open to mineral exploration and development. Some of the impacts on water quality (toxic compounds, increased turbidity) could be transmitted downstream to wetland and estuarine waterfowl habitat, where the food source for staging or molting waterfowl could be

affected. This could influence waterfowl health and mortality throughout most of Bristol Bay and reduce the carrying capacity of impacted areas.

Aggregate effects. Of all the corridors proposed by this alternative, those that occur farthest northeast on the peninsula are the most stable and pass through the poorest waterfowl and seabird habitat. They would be the least detrimental, therefore, to Bristol Bay waterfowl and seabird populations. The occurrence of oil and gas development between Port Moller and Port Heiden, construction of an LNG processing plant in Balboa Bay, construction and public use of transportation corridors, development of a large-scale hydroelectric plant, and activation of settlement and mining projects could cumulatively result in a minor to moderate impact on waterfowl and marine birds in Bristol Bay.

Conclusion. This alternative could have a moderate regional impact on waterfowl and marine birds. Local impacts, while short-term, could be major.

Impacts on Marine Mammals

Oil and gas development: Impacts generated by upland activities would be negligible. Exploration and development on State tide and submerged lands, has a potential for some effects on marine mammals utilizing near-shore habitats.

Some sea otters, which are year round residents, and to a lesser degree a few seasonally migratory whales, specifically the endangered gray, could be at risk. Construction disturbance would displace some sea otters to quieter habitats which may lead to a minor population decline if habitats are at carrying capacity. Migratory whales may move further offshore to elude disturbed or spill areas but should suffer no reduction in population as a result of such events.

Sea otters are sensitive to oily aquatic pollutants because of their high metabolic rate and dependence on trapped air in the fur for thermoregulation. Accidents which lead to oil pollution could seriously affect some otters should they fail to avoid the spill area. Populations so affected could suffer sharp declines but the effect would be quite localized and overall impact on the otter population would probably be negligible.

Whales, seals, sea lions and walruses which might wander into spill areas could suffer some skin, eye and mucous membrane irritation from the more toxic elements of the pollutant but little mortality would be likely and effect on overall population would be negligible.

Existing state and federal statutes governing oil and gas developments would reduce the probability and severity of potential impacts to marine mammals.

Transportation corridors. Impacts to marine mammals from each of the seven corridors identified in this alternative would be similar, differing only in degree of effect. All would be localized and none would affect regional populations.

Impacts would be generated by construction of port facilities, general human disturbance, and a small amount of habitat disruption affecting local populations of seals and sea otters. Some beluga whales may be displaced from the mouth of the Naknek River or Egegik Bay by construction activities but such displacement would be temporary. Construction activity should have little or no effect on wider ranging whales, sea lions and walruses. Pollution events associated with the corridors could affect sea otters and seals which fail to avoid the spill area. Effects however, would be localized since spills would most likely occur on at least semi-enclosed water bodies and pollution abatement and control mechanisms would be in place as required by statutory rules and regulations.

Aggregate effects.

Marine mammal populations utilizing Bristol Bay would be marginally affected by activities likely to occur with this alternative. Development in transportation corridors could effect some local populations of sea otters, seals and perhaps beluga whales during construction operations but these effects would be short-term. Spill events at terminal sites could also affect otters and seals but such impacts would be localized and would be attenuated by control mechanisms. Oil and gas development could affect some Bristol Bay marine mammals, principally sea otters, seals, walruses, and migrating whales. Impacts would generally be localized and short-term.

Existing state and federal statutes governing development activities would reduce the probability and severity of potential impacts to marine mammals.

Conclusion. Effects of activities addressed by this alternative would produce minor to negligible impact on marine mammals of the Bristol Bay region. In the unlikely event of a large oil spill, major short term local impacts are possible.

IMPACTS ON SOCIOECONOMIC RESOURCES

Impacts on Subsistence

Settlement. Under this alternative, up to 37,300 acres would be made available for remote settlement. These lands would attract an estimated 800 additional people to the region of which 700 would be seasonal and 100 would be permanent residents. Although some of the locations added by this alternative are remote (e.g., North Fork Lake), most are near Dillingham, in the Mulchatna River drainage or near Iliamna Lake. The remote North Fork Lake is near an area used for subsistence hunting of moose and caribou by residents of Platinum and Togiak.

Nunavaugaluk Lake West, west of Dillingham, is associated with moose hunting, and used by people from Manakotak, Platinum, Togiak and Twin Hills for subsistence. There are few moose in this general area, however.

Nuyakuk South and Jack Rabbit Hills are on the Mulchatna River in the heart of the drainage. Both locations are used for moose and caribou by people from Aleknagik, Dillingham, Ekwok, New Stuyahok, Portage Creek and Togiak. People from Koliganek and Manakotak also use the Nuyakuk location, while Jack Rabbit Hills is also used by people from Clarks Point and Platinum.

Residents of Clarks Point, Dillingham, King Salmon, Manakotak, Naknek, Platinum, South Naknek, Togiak and Twin Hills are reported to use the Levelock area for subsistence. Caribou, moose, and waterfowl are the species most taken.

Kemuk Remote provides moose to subsistence hunters from Aleknagik, Dillingham, Ekwok, Manakotak, New Stuyahok and Togiak. Nikabuna Lake provides moose, caribou and waterfowl and is used by people from five villages, while Big Bonanza Creek is used by people from Iliamna and Kokhanok.

Villages located nearest new settlements would be more affected by increased competition than villages further away. Alternative 4 would locate settlements in the most heavily used subsistence areas in the region. New people using these locations could increase the competition for both caribou and moose throughout the region. The problem of demand outstripping supply will be further exacerbated, particularly near Dillingham, Iliamna Lake, the Nushagak-Mulchatna drainage and the northern Alaska Peninsula. The State Game board may have to adjust harvest allocations in order to maintain populations.

Impacts on subsistence fishing would be minor (See Impacts on Salmon)

Oil and gas development. Upland exploration would have a minor, short-term impact, as most workers would be non-resident and ineligible to participate in subsistence harvest. Development of an upland gas field would employ in excess of 900 people initially. The bulk of these people would be transient and ineligible for subsistence hunting and fishing although they could increase pressure on subsistence species through sport hunting. New resident employment would level off at about 50 jobs, or about 150 new people. Depending on where these people settle, there could be fairly significant increases in local subsistence competition. Oil and gas activities under this alternative could have moderate impacts on the north peninsula caribou herd and the subsistence use of these animals. There would be little impact on moose and subsistence moose harvest. Overall regional impacts on salmon would be minor, although oil spills could have a major short term impact on local populations and the subsistence use of these populations. Impacts on waterfowl and the subsistence use of them would be minor to moderate. (See Impacts on Salmon, Caribou, Moose and Waterfowl).

Transportation corridors. Of the 7 corridors evaluated under this alternative, the Port Moller-Balboa Bay corridor would have relatively little impact on most subsistence resources, with the exception of waterfowl, whereas either the Egegik or Naknek routes would disrupt caribou movement. People

from Aleknagik, Clarks Point, Dillingham, Egegik, King Salmon, Manakotak, Naknek, Platinum, South Naknek and Twin Hills use this herd for subsistence.

Energy. Construction of a hydroelectric project at Newhalen would add 50 new residents to the populations of the Iliamna-Newhalen area during construction. These residents, through hunting activities, would add to the short-term demand for subsistence resources. After construction is completed, many of these new residents would leave the area.

Aggregate effects. An increase of 800 seasonal and year-round residents would increase the demand for moose, caribou and fish. This increase, on top of a shortage predicted regardless of the plan adopted (Nebesky et al., 1983), suggests that additional restrictions on harvest would eventually be necessary. The long-term effects of oil and gas development would impose moderate impacts on subsistence resouces as a result of an estimated increase of 150 full-time residents. Most of these people would concentrate in one or two communities, thus, impacts could be significant in local areas. A major hydropower development could result in moderate increases in subsistence demand in the Iliamna-Newhalen area. This demand would decrease following the construction phase of development.

Conclusion. This alternative would result in moderate impacts on subsistence use on a regional scale. Locally, these impacts could be major, although many would be relatively short-term.

Impacts on the Commercial Fishery

Settlement. If each new temporary and permanent household qualifies for subsistence, approximately 34,000 additional fish would be taken annually. This harvest would produce a minor to moderate regional impact. Major local impacts could conceivably occur to commercial fishermen dependent on small stocks if the subsistence harvest was concentrated in a few small areas. This is unlikely since remote settlement lands would be widely distributed throughout the region.

Oil and gas development. Leasing for oil and gas exploration could occur on uplands and tidelands with moderate to high potential for hydrocarbons. The Bristol Bay Fisheries Reserve would remain closed to oil and gas leasing.

Some activities associated with oil and gas exploration and development have a potential for affecting the commercial salmon fishery. Impacts on salmon, the primary commercially fished species, were previously discussed and oil and gas activities are expected to have a minor to moderate impact on the fish.

Spills which might occur during the summer when adult salmon are returning to spawn and are harvested in near-shore waters would produce the most immediate and visable impact on the Bristol Bay commercial salmon fishery. Spills which occurred at other times of the year would have a less immediate impact but might produce environmental effects which become apparent in subsequent fishing seasons.

Oil spills could also cause flavor problems which could reduce the market value of the catch. Setnet fishermen could be affected more by oil spills than those using drift nets because of their inability to shift fishing locations. Competition for vessel service facilities used by both the commercial fishing industry and the oil and gas industry could also lead to conflicts.

Oil and gas exploration and commercial fishing activities have the potential for gear conflicts, however, these can generally be mitigated by seasonal restrictions and/or careful planning and monitoring where conflicts are likely.

Transportation corridors. Potential indirect impacts to commercial fishing from corridor development in the Pilot Point to Wide Bay, Port Heiden to Kujulik or Aniakchak Bays and Port Moller to Balboa Bay are described under 'Impacts on Commercial Fishing' in the Proposed Plan. Impacts would be moderate locally and minor regionally.

In addition to the three corridors and road evaluated under the Proposed Plan, this alternative identifies four additional potential transpeninsula transportation routes:

- False Pass to Ikatan Bay: False Pass is a summer migration route for millions of young and mature salmon moving to feeding and spawning grounds. Impacts could occur from construction of either a submerged or above-ground pipeline. The impact would result from water quality deterioration (increased sedimentation and turbidity) and would, therefore, be expected to have only a minor impact on salmon passing through the area. A greater impact would result from a pipeline rupture and oil spill. The area is subject to earthquakes, volcanic activity, land and snowslides, high winds, vigorous wave action and swift currents (up to 7 knots). An oil spill in the summer could have a direct impact on returning spawners and therefore an impact on the Bristol Bay commercial salmon fishery.

- Bering Sea to Morzhovoi Bay: Morzhovoi Bay is used by out-migrating and returning salmon as a feeding ground. Sockeye salmon spawn and rear in the lake west of Big Lagoon and pink and chum salmon spawn in five streams near Little John Bay. The port sites on both sides of this route are subject to high winds which increase the chance of a tanker accident. An oil spill on the north shore could impact False Pass or Izembek Lagoon which is an important salmon nursery area. An accident in Morzhovoi Bay would have little direct impact on the commercial fishery because the bay is not a significant fishing area but could impact feeding and rearing salmon that could ultimately be harvested in other fishing areas. This route would have little impact on local commercial fishing.

- Egegik to Portage Bay/Puale Bay: This proposed corridor route crosses an area containing some of the most valuable salmon habitat on the Alaska Peninsula, and could affect commercial fishermen dependent on salmon originating from the Egegik and King Salmon Rivers and Becharof Lake. The Egegik River system is one of the major salmon-producing systems feeding Bristol Bay, providing an average annual harvest of 1.2 million sockeye salmon. In addition, coho, pink and chum salmon are also found in the Egegik River system and all five species of Pacific salmon spawn in the King Salmon River.

  This corridor route would have the potential for major short-term impacts to both the Bristol Bay fishing industry and local fishermen dependent on the Egegik salmon run.

- Naknek to Puale Bay/Portage Bay: This 72-mile corridor would cross through the Naknek and Egegik River systems, two major salmon producing drainages. These two watersheds produce an average commercial harvest of over 4 million salmon.

  Both Portage and Puale Bays are exposed locations where there would be an increased probability of tanker accidents which could affect local commercial fishing on the south shore.

  This corridor route would have the potential for major short-term impacts to both the Bristol Bay fishing industry and local fishermen dependent on the Egegik and Naknek salmon runs. A major pipeline break along the Naknek River could also affect Kvichak Bay where over half of Bristol Bays' salmon are harvested.

Energy. Impacts at the Newhalen hydropower facility would be identical to those described under the Proposed Plan. Subsistence fishermen dependent to a significant extent on the Newhalen River salmon run could experience a minor to moderate impact. On a regional scale, impacts would be negligible.

Minerals. Mining activities could indirectly impact the commercial fishery by affecting the productivity of anadromous streams, primarily through introduction of sediments.

Salmon streams would be subject to new mineral entry, thus the potential for degradation of salmon spawning habitats would be increased.

Aggregate effects.

The development of a regional hydropower facility, placer mining, oil and gas exploration and production, transportation corridors and remote settlement on

public lands could produce moderate long-term impacts on the region's salmon resources and as a result affect the commercial salmon fishing industry.

Of the seven proposed pipeline corridors, the Port Heiden to Kujulik/Aniakchak Bay, the Port Moller and the Morzhovoi Bay routes would probably have only minor impacts on salmon. The Pilot Point to Wide Bay and False Pass corridors would have the potential for moderate long-term impacts while the Egegik and Naknek corridors would have the potential for major impacts to commercial fishing operations.

Conclusion. Activities which might occur under this alternative could result in moderate long-term impacts to the commercial fishery on a regional scale.

Impacts on Population

Settlement. This alternative would add an estmated 800 people to the regional population. This figure includes 700 seasonal and 100 permanent residents located in 38 places spread throughout the region. Concentration would occur near Dillingham, in the Mulchatna drainage, and around Iliamna Lake. The Dillingham area could be expected to absorb 180 people. The Iliamna Lake area population could increase by 320 new people. The Nushagak/Mulchatna River drainages could accrue 270 new people. About 30 new residents would locate in the lower Alaska Peninsula.

Oil and gas development. Exploration for oil and gas in the upland areas available for leasing could result in an average of 17-20 workers per year. Eventual development and production would require a workforce of about 925 people during peak development. Similar development in the tide and submerged lands would result in about 42 new residents in the region.

The new residents would probably reside in the regional centers of Cold Bay or King Salmon with some in the villages of Port Heiden and Nelson Lagoon. Overall impacts would be minor, but there would be some stress on medical and housing services.

Transportation corridors. This alternative identifies seven possible corridor routes but the construction of more than one of the identified corridors is unlikely within the forseeable future. Several hundred people would be employed for about a year on such a project. The bulk of these workers would be imported labor residing in contractor provided enclaves near the construction site. Upon completion of the project, virtually all the construction workers would leave the region. The King Cove to Cold Bay road is discussed under the Proposed Plan.

Energy. See Discussion under the Proposed Plan.

Minerals. Mineral exploration for placer deposits is assumed to increase 15% in the next 20 years. The increase in population as a result of this activity would be largely seasonal and widely dispersed throughout the region. Local communities would probably not be measurably affected.

Aggregate effects. Oil and gas activities in the region could result in the addition of an estimated 80 permanent residents by the year 2002. The majority of workers in the industry would be temporary construction employees and would be housed in contractor-operated enclaves near construction sites. Moderate, temporary impact could occur in association with providing transportation services to the construction force. This impact would probably center on Cold Bay or perhaps Port Moller. Mineral development would add a few permanent residents to the region but they would likely be widely dispersed.

Energy development could have a moderate, temporary housing effect on Newhalen and Iliamna should a project be constructed on the Newhalen River, unless most workers were located in enclaves at the development site.

Conclusion. Increase in the region's permanent population as a result of development activities which might occur under this alternative would be minor. Moderate short-term impacts on local populations in the vicinity of construction activities could occur.

Impacts on Employment

Settlement. Settlement on remote state and federal land disposals proposed by this alternative would result in approximately 100 new permanent residents in the region. Land disposals under this alternative could result in a moderate increase in employment. Most of these impacts would occur in Dillingham, the Bristol Bay Borough, and the Iliamna-Newhalen areas.

Oil and gas development. Employment effects under this alternative are similar to those more fully described under the No Action Alternative.

Transportation corridors. Seven potential transportation corridors are identified under this alternative although only one is expected to be constructed in the forseeable future. A fuller discussion of the potential impacts of corridor construction on employment is presented in the Proposed Plan.

Energy. A discussion of project impacts on employment is presented under the Proposed Plan.

Minerals. This alternative would place no restrictions on mineral activities beyond those currently in place by law and regulation. Placer mining is expected to encrease by 15% over the next 20 years which could add approximatley 11 new residents to the area although they would probably be employed only part time in mining.

Aggregate effects. This alternative is likely to cause some negative impact on the existing rate of growth of employment in the region. Potential settlement land is reduced by 50% over the No Action Alternative. This represents a reduction of 88 people who would be new permanent residents and approximately 700 new seasonal residents.

Conclusion. This alternative as opposed to the No Action alternative would restrict settlement which could decrease employment. The decrease in long-term resident employment, would be minor.

IMPACTS ON OTHER RESOURCES

Impacts on Water Quality

Oil and gas development. Under this alternative all uplands and all tide and submerged lands except the Fisheries Reserve are availalbe for oil and gas leasing. Potential impact to water quality could occur on any land leased. The range of oil and gas activities which can produce water quality impacts are more fully examined in the discussion under the Proposed Plan.

Barring a catastrophic event, an active program of oil and gas development in the Bristol Bay area would probably not result in significant region-wide water quality impacts, although localized, short-term sedimentation may occur during construction phases.

Transportation corridors. The Port Moller to Balboa Bay, Port Heiden to Kujulik Bay and Pilot Point to Wide Bay corridors and the King Cove to Cold Bay road identified in this alternative are the same as those discussed in the Proposed Plan. Effects of these developments on water quality are more fully examined in the discussion under the Proposed Plan. Four additional corridors identified in this alternative are discussed below.

- False Pass to Ikatan Bay: Dredging within Bechevin Bay to Rocky Point would result in increased sedimentation. Approximately 8,600 cubic yards of material would be removed to accommodate the submerged portion of the pipeline. Dredging within Bechevin Bay, False Pass, and Ikatan Bay would require the removal of approximately 24,000 cubic yards of material. During the dredging and backfilling stages, dispersed sediment would increase turbidity levels.

  It is doubtful that a measurable degree of water quality degradation would occur on the overland route from Rocky Point to the terminal site.

  Grading and leveling would be required for a terminal site at Ikatan Bay. This operation may cause sedimentation within the western portion of Ikatan Bay and may require filling of wetlands. Alteration of surface drainage patterns may temporarily impact the estuarine system. If a pier is constructed at the terminal site, minor sedimentation would occur from shoreline to approximately 2,000 feet into the bay. In the event that a pier could not be constructed, a boat basin would require up to 6 million cubic yards of material being removed initially followed by periodic maintenance dredging.

  Pipeline construction would have a temporary short-term adverse impact on the quality of marine and estuarine waters within the proposed corridor

route. Localized impacts may be major but would be temporary. Moderate long-term impacts may occur if continual maintenance dredging of Ikatan Bay is required.

- Bering Sea to Morzhovoi Bay: Dredging and filling for a pipeline and access road across the Morzhovoi Isthmus would result in a considerable disruption of surface and ground water movement, loss of productive wetland areas, and sedimentation in the numerous lakes and lagoons. Approximately 72 acres of wetland and deep water habitat could be lost and the drainage pattern affecting thousands of acres could be altered through ground compaction. A pipeline from the isthmus to the southern headlands would cause increased sedimentation from the displacement of 6,000 cubic yards of bottom material. A pipeline to the northern headlands would displace the same quantity of material. If a terminal facility were constructed on the east side of the bay, significant water quality deterioration could occur from blasting, rock crushing, land grading, and filling. Less water quality degradation would occur if terminal facilities were located in the more level uplands on the western side of the bay. Minor sedimentation would occur at both sites if a pier were constructed to 60 feet (mllw). If a channel were dredged in lieu of a pier, approximately 7.7 million cubic yards of material would need to be removed, resulting in considerable sedimentation.

  Pipeline and access road construction would have a moderate adverse impact on the quality of surface water and groundwater within the Morzhovoi Isthmus. Localized impacts may be major. Moderate long-term impacts may occur if continual maintenance dredging of Morzhovoi Bay is required.

- Egegik to Portage Bay/Paule Bay: This corridor bisects some of the most productive salmon streams in Alaska, therefore, any degradation of water quality as a consequence of constructing and maintaining transportation facilities would have a direct impact on spawning and rearing functions. Increased soil erosion during and immediately following road and pipeline constructon could result in severe, though relatively short-term, impacts to physical properties of water. With respect to impacts to salmon, this would be translated in terms of reduced light and oxygen, and smothering of spawning beds. These effects would diminish and eventually largely disappear as revegetation and other restoration measures become effective. Of longer duration would be impacts to wetlands along the route which would require filling or draining to accomodate construction and maintenance; thus, some relatively localized impacts would result from the impairment of wetland functions. Perhaps the most significant impact on water quality would result from extensive dredging (in excess of 16 million cubic yards) which would be required for port facilities and shipping channels. This activity would cause significant sedimentation to the associated estuarine habitats and would be long-term because of the need for periodic maintenance dredging.

- Naknek to Puale Bay/Portage Bay: Since this route approximates the alignment of the Egegik to Portage Bay/Puale Bay corridor, many of the

same salmon streams would be bisected, particularly in the highland areas where the corridors lie in close physical proximity to each other. The major difference in the effects of these two routes lies in the vicinity of required port facilities. With the Naknek route, water quality regimes associated with the Kejulik Flats would be degraded. This would be a long-term effect, as would the dredging required for construction and continued maintenance of a shipping channel. However, this would initially amount to 8 million cubic yards of dredge material as compared to 16 million cubic yards required for construction of harbor facilities associated with the Egegik route.

Minerals. This alternative would not limit the development of valid existing claims for locatable minerals, new claims or mineral exploration on most State, BLM, and Native-owned lands. Valid existing claims on National Wildlife Refuges would continue to function under existing regulations. Placer claims could be filed for mining within all anadromous streams. Potential impacts to water quality by mining activities is more fully examined in the discussion under the Proposed Plan.

Aggregate effects. Water quality impacts resulting from activities of development operations, primarily oil and gas, transportation, and mineral extraction, include increased sedimentation and turbidity, loss of wetlands, possible localized disruption of surface water and groundwater movements, and an increase in toxicity in rivers and tributaries. A major potential for water quality degradation from placer activities may exist for some localized areas, primarily in the Upper Mulchatna and Chilikadrotna river drainages and east of Iliamna Lake. Water quality will not be degraded beyond levels acceptable to the State of Alaska, provided that existing laws and regulations are followed.

Conclusion. Moderate short-term impacts can be expected within localized areas. Region-wide impact from the combined development actions should be minor.

Impacts on Recreation

Settlement. This alternative allows 37,300 acres for remote settlement. This would induce an increase of 450 new households or about 800 new permanent and seasonal residents. The wide dispersement of these lands would tend to detract from the wild character of many of the settlement areas. This would be most noticeable in the Dillingham, Upper Mulchatna and Iliamna Lake areas where most settlement would occur. Sport fishing and hunting would increase somewhat, but much of the increase from new residents would be considered subsistence harvest. The greatest impact on fish and wildlife resources and other forms of recreational activity would result from expansion of commercial sport hunting and fishing enterprises associated with new settlement. These operations would further increase outside visitation to the area.

Oil and gas development. Effects of oil and gas activity would be essentially identical to that which could occur with No Action, since both alternatives could lease identical areas for exploration under the same time frame. These impacts would be only slightly greater than under the Proposed Plan. Alternative 4 would not impose a 10-year moratorium on leasing of tide and submerged lands for exploration.

Transportation corridors. In addition to the three corridors and road identified and assessed under the Proposed Plan, this alternative identifies four additional transpeninsula routes. It is assumed that one or two corridors may eventually be developed to serve future transportation needs. All of these corridors would improve recreational access via ground vehicles into areas presently available only to hiking or aircraft. Improved access would accrue almost exclusively to local residents.

Energy. Development of a regional hydropower system under this alternative would be identical to that discussed in the Proposed Plan and under the other alternatives. Impacts would be associated primarily with transmission lines. The wild character of some remote areas would be locally degraded while overland access could be improved to the benefit of residential recreationists.

Minerals. With regard to mining exploration and development, Alternative 4 would be essentially identical to No Action, since no additional restrictions would be placed on activities. The fact that guidelines would be assumed under this alternative does not infer that the effect of some activities, particularly placer mining, would be less severe, nor impose less threat to the viability of sport fishing streams.

Aggregate effects. The effects of new residents attributable to remote land settlement would fall about midway between Alternative 2 and No Action. Effects on the wild character of settlement tracts would be most evident in the Upper Mulchatna and Iliamna Lake area. Settlement would attract about 800 new permanent and seasonal residents who would contribute directly to recreational competition with established residents. Considerable economic benefit would probably accrue due to expanded commercial recreation services on these tracts. Oil and gas development would result in impacts mainly in two areas, relative to two sport hunting species. Brown bear hunting could be affected by tide and submerged land leasing. Both bear and caribou hunting would be affected on upland areas on the peninsula. Hydropower development on the Newhalen River would result in impacts from powerline development-most notably degradation of the wild quality of remote areas and improved ground access for local residents along maintenance corridors.

Conclusion. Cumulative impacts on recreation would be minor on a regional basis. Local and subregional effects could vary from moderate to major.

Impacts on Historic and Archeological Sites

Settlement. This alternative proposes land disposals for settlement of about 7000 acres in the Dillingham area, 11,000 acres around Iliamna Lake and 12,000 in the Nushagak and Mulchatna river drainage. The remainder is primarily

located along the Alaska Peninsula shoreline. All of these areas contain HSPA which could be affected indirectly by additional "pot hunters" which settlement would bring to the area.

Oil and gas development. Land available for leasing and potential risks to archeological and historic resources within this alternative are the same as those more fully described under the No Action alternative.

Transportation corridors. Potential impacts of three of the seven corridors identified under this alternative are described in the Proposed Plan. Potential risks to archeologial resources of the other four corridors are as follows:

- Bering Sea to Morzhovoi Bay: This corridor would begin on the Bering Sea side of the Morzhovoi Isthmus, crossing 109 acres of MSPA and 255 acres of LSPA. The port terminal could affect 500 acres of MSPA. Indirect impacts could occur on approximately 12,000 of HSPA. An archeological site at the point of origin on the Morzhovoi Isthmus would be affected. Another site is located along the corridor route.

- False Pass to Ikatan Bay: The first seven miles of the corridor would go through open water. Deep water depths coupled with swift currents create a very low possibility of underwater sites. The overland route could affect 655 acres of MSPA and would cross an area that has received a reconnaissance-level archeological study, which resulted in nine sites being discovered. Two of those sites are in the vicinity of a possible port. All could be affected by pipeline and port construction. Construction of a port terminal would affect about 500 acres of MSPA.

- Egegik to Portage Bay: This corridor would present a serious threat to archeological resources of the region, by opening thousands of acres of HSPA to "pot hunting." Direct loss could occur on 946 acres of HSPA, 1,674 acres of MSPA and 800 acres of LSPA. Approximately 95,000 acres of HSPA along the Egegik River, 72,000 acres along the north side of Becharof Lake, and another 42,000 acres on the east side Becharof Lake would be exposed to pot hunters.

- Naknek to Puale Bay: Construction in this corridor could threaten archeological resources of the region. Direct effects could occur on 1,092 acres of HSPA, 1,674 acres of MSPA and 619 acres of LSPA. The potential for indirect impacts is severe. Approximately 61,000 acres of HSPA in the Naknek/King Salmon area; 59,000 acres in the Kejulik River area; 72,000 acres along the north side of Becharof Lake; and 61,000 acres on the east side of the lake would be accessible to pot hunters. There are two recorded sites in the King Salmon/Naknek portion of the corridor. The historic village of Kanatok is in the area of a proposed port.

Energy. See discussion under the Proposed Plan.

Mining. See discussion under the Proposed Plan.

Aggregate effects. This alternative allows development which could increase risk to archeological and historical sites, as a result of expanding areas for pipelines, mining, and oil and gas exploration and development. A transportation corridor on the northern Alaska Peninsula has a high probability of affecting archeological and historic resources of the region. Corridors on the southern Alaska Peninsula, have a lesser potential for impacts.

Conclusion. Risk probability of this alternative to archeological and historic resources could be locally high in areas directly affected by totally uncontrolled development. Risk to those resources on a regional basis would be moderate.

Impacts on Wilderness

Oil and gas development. See discussion under No Action Alternative.

Minerals. See discussion under No Action Alternative.

Transportation corridors. In addition to the three corridors discussed under the Proposed Plan this alternative would include designation of the following four transpeninsula transportation routes:

- False Pass to Ikatan Bay: This route does not affect any designated wilderness areas.

- Bering Sea to Morzhovoi Bay: This corridor would cross 6 miles of designated wilderness on the Izembek NWR. Approximately 2.5 miles would be on land and the remainder would pass through lakes and lagoons. This area is near the western boundary of the 300,000-acre Izembek Wilderness designated by Congress. The Izembek Wilderness was designated because it is an outstanding scenic natural landscape with a diverse community of life in a remote setting.

  Space needs for construction of a pipeline in a trench and an adjacent road could be as much as 300 feet wide and would leave a long-lasting scar on the upland landscape which would have a moderate to high visual impact. Due to a terrain of rolling tundra, the line could be visible for a distance of a mile. Impacts on scenic qualities in the area of lakes and lagoons would be moderate to low if proper care is taken during construction. Roads and borrow sites necessary for construction, especially around lakes and lagoons, probably would have a longer-lasting visual effect than the pipeline itself.

During construction, noise, equipment, and human intrusions would impact wilderness values for a distance of three to six miles depending upon wind and weather. The proposed corridor would be only six miles from Izembek Lagoon itself. Impacts in winter would be less than in other seasons due to decreased wildlife and human presence in the area.

During the life of the pipeline, the noise and visibility of pump stations, loading and unloading activities at support facilities, and helicopters used in maintenance would impact wilderness values for a circumference of several miles around the source. Impacts to refuge wilderness values would be substantial but confined to a relatively small geographic area.

- Egegik to Portage Bay/Puale Bay: The route from Egegik to Whale Mountain extends 30 miles through the Becharof Refuge. The area is important wintering range for caribou. The drainages are important to salmon, bears and moose. The route continues through low, rolling tundra with numerous potholes and lakes. A pipeline could be visible several miles away. The corridor would have a major long-term impact on about 1,500 acres of wilderness in this area.

  The route from Whale Mountain to Portage Bay is 35 miles long, passing through the center of the 400,000-acre Becharof Wilderness. This area was designated wilderness by Congress in ANILCA because it encompasses some of the most dense and unique populations of brown bear in Alaska. Salmon-spawning streams and concentrations of dens in mountainous areas and on islands in Becharof Lake are key features. Prey populations of moose and caribou support this dense bear population. Waterfowl, raptors, marine birds and mammals are other key wildlife in the area.

  The area is remote, wild and scenic. Access is difficult and visitors enjoy solitude. Wildlife and fish habitats support a diverse community of life.

  About 1,500 acres of wilderness would be affected directly, but the impact to the wilderness values of the area would extend several miles on each side of the route. The view from mountains on the eastern portion looking northwest over the corridor extend 20-30 miles. During the life of a pipeline, noise and visibility of pump stations, and other support facilities or helicopters and vehicles used in surveillance would impact wilderness values for a distance of several miles from the disturbance source.

- Naknek to Puale Bay/Portage Bay: The route would extend 35 miles through the Becharof Refuge. It would cross the King Salmon River drainage, an important wintering range for caribou and important for salmon and bears during the summer. The King Salmon River is also used intensively by fly-in sport fishermen.

Impact on wilderness values from this route could be greater than those from the Egegik route because of impacts on the King Salmon River drainage that would ultimately affect water quality, salmon, and bears. This route, like the Egegik route, passes through low, rolling tundra with numerous potholes and lakes. The corridor would be visible from several miles away. Like the Egegik corridor, this corridor would cross through the center of the Becharof Wilderness.

Puale Bay is surrounded by designated wilderness. Port and dock facilities, pump stations, and shipping would have a high visual and noise impact on this natural setting. Sea birds and marine mammals would be harassed and displaced. Establishing a new access point to the designated wilderness would increase entry to this remote area.

Aggregate effects. Development within any of these four transportation corridors would jeopardize wilderness values of designated wilderness areas in Izembek and Becharof refuges. Direct, major impacts would occur along a stretch of 36-41 miles through wilderness, but noise and visibility would extend well beyond the actual corridor routes. This disturbance would also affect the suitability of remaining refuge lands for wilderness designation. The King Cove-Cold Bay road would have major, local effects. The combined impact of these developments on wilderness would be major.

Conclusion. Any corridor developed under this alternative would have a major local impact on wilderness. Other development activities can be accomplished so as to not permanently impair the attributes required for designation of lands on the peninsula as wilderness. Potential impact on suitability of federal wild land areas in the Bristol Bay region being designated for wilderness classification by activities allowed under this alternative is moderate.

OTHER EFFECTS

Discussion of activities and trends that will occur in the Bristol Bay region over the next 20 years whether a plan exists or not, will make it easier to understand some of the possible effects of this Proposal. An assessment of the impacts of outside activities and trends is beyond the scope of this document, but those outside activities could add to the level of impact on those particular resources affected by this Plan.

Other effects are discussed when necessary in the Aggregate Effects section of each assessment within a particular alternative, but the conclusion for that assessment represents only impacts related to that alternative. A broader perspective will be gained by using projections of historic patterns within the region, assumptions about resource development on private lands, and scenarios for the St. George OCS developed by the U.S. Department of the Interior, Alaska OCS office. Some of the assumptions and figures are based on a report "Economic, subsistence and sociocultural projections in the Bristol Bay region" by Nebesky et al. (1983) from the Institute of Social and Economic Research (ISER).

Fisheries. The commercial salmon harvest will continue at current fluctuating levels, but an increase in offshore processing facilities (as opposed to onshore canneries) is expected. Assumptions for other commercial fisheries are that the herring fishery will continue to grow; the crab harvest will continue to fluctuate at current levels; and interest in bottomfish will continue but will not substantially increase. However, the current trend with respect to bottomfish is that both domestic and joint venture catches are rapidly increasing. In addition, a fishery for capelin is anticipated to develope in the near future (ADF&G Comments on DEIS, Oct. 1983).

Recreation. It is assumed existing growth trends in all aspects of recreation will continue. Commercial lodges and camps on private lands will attract more recreationists. Certain actions allowed in this plan may have an impact on recreational activity on National Park Service and private lands. With or without this impact, it is assumed overall recreational use of private and National Park Service lands will continue to increase, enlarging the demand for services and creating additional employment opportunities.

Population. Estimates by ISER show that without new resource development, population in the region would increase from 7,263 people in 1980 to 8,265 in 1987, 9,080 in 1992, 9,984 in 1997 and 10,984 in 2002 (Nebesky et al., 1983).

Settlement. Expansion of existing communities will occur in response to the need for more residential land to accomodate increased population and decreasing household size. Increased demand for land for services and government facilities will occur in the major regional centers (Dillingham, Bristol Bay Borough and Cold Bay). It is estimated that 10,000 acres of land are likely to be sold by Native corporations or municipalities to accommodate this demand for settlement land around existing communities. Based on ISER's projections of where population increases are most likely, it is assumed much

of this new settlement land will be in Dillingham, Naknek, Iliamna, Togiak and King Cove. Land sales will in part respond to the projected growth forcast to expand from 7,263 in 1980 to 10,984 by 2002, regardless of the BBRMP (Nebesky et al., 1983).

Substantial disposals of Native corporation lands for remote residences are not planned nor considered in this EIS.

Subsistence. Subsistence hunting and fishing patterns will not change dramatically from those observed in the recent past unless, because of increased population, demand for a given resource surpasses supply. In this event the State Fish or Game Boards may restrict harvest.

Oil and Gas - Outer Continental Shelf. The St. George Basin OCS sales in 1983, 1984 and 1986 could open the entire 46-million acre basin to leasing. The North Aleutian Basin OCS sale could make any of the 32.4-million acre OCS planning area in Bristol Bay available for leasing in 1985. These OCS basins however, are outside the jurisdiction of the Plan, and this assessment focuses only upon potential onshore impacts from exploration and possible development and production.

It is assumed exploration for the 1983 St. George Basin sale will occur as described in the MMS-OCS mean base-case scenario for that area (USDI, BLM, 1982). It is further assumed the mean resource estimate of 1.12 billion barrels of oil will be discovered and produced.

Offshore exploration would probably be conducted from semi-submersible rigs in the St. George Basin and from jack-up rigs or drill ships in the North Aleutian Basin. A pipeline is assumed to be built from the St. George Basin to oil terminals on the Alaska Peninsula through one of the preferred corridors identified in the BBRMP. These pipeline routes are described in the transportation scenario. A tanker-loading facility and oil terminal would be built at the sourthern end of a pipeline in Balboa Bay or Morzhovoi Bay. Personnel for operation and maintenance of the pipeline and terminal are assumed to reside in self-contained enclaves.

Air support for OCS activity is assumed to come from Cold Bay, while marine support would come from Dutch Harbor on Unalaska Island (outside the BBRMP area). The St. George Basin Final EIS (USDI, BLM, 1982) assumed most offshore workers would commute through Cold Bay enroute to work stations in the Bering Sea. The EIS also assumed Cold Bay would serve as a base for overseeing of construction of the terminal and pipeline facilities and would absorb some of the families of personnel during operation of this facility. The EIS projected this scenario would contribute 39% (112 persons) to the total Cold Bay population of 543 by 1985, and 56% (538 persons) to the population of 960 in 1990. Cold Bay is the only community within the region assumed to receive developmental and population impacts in the St. George OCS scenario.

Oil and gas - Native corporation and private lands. Oil and gas exploration and devleopment on Native corporation and other private lands is addressed in the scenarios for oil and gas development on state or federal lands.

Minerals - Native corporation and private lands. Mineral exploration is likely to occur on Native corporation lands and other private lands in areas with favorable mineral terranes. The type of exploration activity likely to occur on Native lands would be similar to that discussed under the minerals scenario in the Proposed Plan. Data synthesized by the Alaska Land Use Council Minerals Element Working Group indicated that the Pyramid Mountain copper prospect on Native land north of Balboa Bay shows potential for future development. Development and production from that property, however, is not anticipated during the next 20 years. Major coal development on Native corporation lands near Chignik is also unlikely in the next 20 years.

SHORT-TERM USE VS. LONG-TERM PRODUCTIVITY

Designation of primary and secondary use areas for oil and gas and other mineral exploration and development activity recognizes that these important resources are potentially available throughout much of the region, and that the BBRMP is planning for their eventual development. It has been amply demonstrated that exploration and development of these resources could result in a long-term trade-off of other environmental values such as fish and wildlife productivity and pristine wilderness. Increased community development will occur in support of these activities.

The Plan recommends several levels of possible remote lands disposal that could result in further settlement throughout the region. Impacts of remote settlement analysed in the EIS are expected to occur within the next 20 years. During this time it is expected that 10% to 30% of the sold parcels will be used. In the long term, private ownership of the remaining parcels could lead to more development. If this is the case, impacts would be greater than have been identified in this analysis. To serve this expanding region, small-scale hydropower or other energy generating systems will be developed, and a regional hydropower system seems probable. In the event a commercial quantity of oil or gas is discovered and production takes place, a transportation system, including a pipeline system and port, would seem a certainty. All of these factors would benefit from a cooperative planning effort that would result in coordinated development activity.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Biological Resources: Salmon could be lost due to the destruction of habitat caused by mining in some streams. Whether these losses are irretrievable would depend on the success of mitigating measures. Losses could also occur if oil spills interfered with salmon migrations or came in contact with larval fishes or their planktonic food supplies. These losses would be passed on to the commercial fishery as irreversible to the extent that they were uncompensated. Losses from hydropower could be irretrievable if efforts at developing hatcheries or building bypasses to replace lost fish were unsuccessful.

Caribou herds could be reduced by loss of essential habitat, construction of physical and visual barriers in migration routes and increased hunting pressure. If these losses are not sufficiently mitigated they could cause an irreversible downward trend in population numbers.

Large mammals and birds could be displaced into less favorable environments by disturbance as well as by habitat degradation and reduction in food. These impacts would result from settlement, oil and gas operations, activities in transportation corridors, and hydropower development. Ultimately, displacement could reduce population levels. Reductions could become irretrievable if the impacts are not mitigated.

Endangered Species: It is possible that endangered whales could be subject to adverse affects caused by loss or deterioration of habitat due to facility development and other human activities. Whether such impacts would lead to permanent losses of whales is unknown.

Social Systems: Reductions in numbers or displacement of subsistence resources could cause changes in subsistence practices. Whether or not this would cause irreversible changes in cultural values and orientations is impossible to predict.

Economic Systems: Permanent losses to the commercial fishery or subsistence could result from some developmental activities. Whether impacts are irreversible would depend primarily on the location, intensity and length of activities and mitigating measures applied to those activities.

Cultural Resources: Historic and archaeological sites affected by developmental activities could result in an irretrievable loss of scientific data, if appropriate protective measures are not applied.

Comparison of Alternatives

Comparison of the difference in impacts to each of the 14 identified resource issues within each alternative is shown in Figure 8-1. The figure was developed by aggregating all potential development activities which might afffect an individual resource issue under a particular alternative. In some instances the size of the symbol is largely influenced by impact of a single activity while in others, impact is more evenly distributed across a number of developmental entities. The reader is cautioned however, that all issues are not directly comparable since several are resources (salmon, caribou, bears, etc.), some are activities (commercial fishing, recreation, subsistence), others are demographic measurements (employment, population), while still others are legal definitions (water quality, wilderness).

Fig. VIII-1 Aggregated Impact on Identified Resource Issues by Development Activities which may occur under each Alternative.

Resource Issue	Alternative					
	Proposal	No Action	1	2	3	4
° Salmon	M	M	M	m	M	M
° Caribou	m	M	m	N	m	M
° Moose	m	m	m	N	m	m
Brown Bear	M	M	M	m	M	M
° Waterfowl and Marine Birds	M	M	M	m	M	M
° Marine Mammals	m	m	m	N	m	m
° Subsistence	M	M	M	m	M	M
° Commercial Fisheries	m	M	m	N	M	M
° Population	m	m	m	N	m	m
° Employment 1/	m	N	m	M	m	m
° Water Quality	m	m	m	N	m	m
° Recreation 2/	m	M	m	N	m	m
° Historical & Archeological Resources	M	M	M	N	M	M
° Wilderness	M	M	M	N	M	M

Key: Major - M
Moderate - M
Minor - m
Negligible - N

1/ Impact is reduction in employment opportunity
2/ Impact is increase in recreational activity

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. TUDOR RD.
ANCHORAGE, ALASKA 99503

IN REPLY REFER TO:

SARD

MAR 19 1985

Dear Reader:

The Bristol Bay Regional Management Plan and Final Environmental Impact Statement has been prepared in accordance with Section 1203 of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980, the National Environmental Policy Act of 1969, and the regulations of the Council of Environmental Quality.

This document contains the plan and five land-use alternatives for the Bristol Bay region. It has been prepared by an interdisciplinary team under the direction of the U.S. Fish and Wildlife Service and the Alaska Land Use Council.

The U.S. Fish and Wildlife Service is responsible for Chapter VIII, which assesses the environmental consequences of the alternatives. The U.S. Fish and Wildlife Service and Bureau of Land Management are also responsible for Chapter IX, the ANILCA Section 810(a) subsistence evaluation.

For further information, please contact:

Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Sincerely,

Acting

Regional Director
U.S. Fish and Wildlife Service
Region 7 - Alaska

ERRATA

Table of Contents - Pagination for Chapter VII should read:

- Pagination for Chapter VIII should read:

Chapter V - Page 5-31 - Add Table title - "Guidelines Which may Apply to Activities Under the Plan." First x in footnote should be circled.

Minerals - Native corporation and private lands. Mineral exploration is likely to occur on Native corporation lands and other private lands in areas with favorable mineral terranes. The type of exploration activity likely to occur on Native lands would be similar to that discussed under the minerals scenario in the Proposed Plan. Data synthesized by the Alaska Land Use Council Minerals Element Working Group indicated that the Pyramid Mountain copper prospect on Native land north of Balboa Bay shows potential for future development. Development and production from that property, however, is not anticipated during the next 20 years. Major coal development on Native corporation lands near Chignik is also unlikely in the next 20 years.

Worst Case Analysis - Mining

Although the Alaska Land Use Council Minerals Element Working Group did indicate some potential for future mineral development, the Bristol Bay Regional Management Plan (pages 2-3 and 2-4), indicates that the extent of this potential for mineral development in Bristol Bay is largely unknown. More exploration and data collection are necessary before reliable mineral development potentials can be determined. However, to allow for a prediction of the worst possible case for the development of mining operations in the Bristol Bay Region, the following scenarios and analyses of impacts are provided for a world class coal mine in the Chignik area, and an open pit copper mine in the vicinity of Pyramid Mountain, both located on the Alaska peninsula. Both activities could only occur on Native corporation and private lands, and are therefore beyond the scope and influence of this federal plan. Estimated environmental impacts described for these projects in the analyses are highly speculative and would be expected to be substantially modified should such developments actually occur.

Chignik Coal Mine

The Alaska Land Use Council Mineral Element Working Group indicated the possibility of a coal mine at Chignik; however, the probability of such a development in the near future is extremely unlikely in light of current world markets for the mineral. Nevertheless, a worst case analysis for impacts to salmon resulting from a world class open pit coal mine at Chignik is discussed below. This analysis concentrates on impacts to salmon stocks since salmon are the primary resource of the area and any discussion of impacts to salmon also serves as a prime indicator of adverse water quality impacts as well.

Because the major variable factors in cause and effect involve different degrees of uncertain and unknown conditions, it is necessary to assume some specific level or condition to perform realistic analyses. The following is a speculative assessment of a possible large coal mine which could interact with salmon on the lower portion of the Alaska Peninsula at Chignik.

Scenario:

The mine would be located on the privately-owned uplands immediately north of Chignik Lagoon in Management Unit 23 on the Alaska Peninsula, approximately 450 miles west of Anchorage.

The project is composed of several separate components which, when integrated, would form a complete working project. A brief description follows for each major project component as speculated for full production capacity in 1992 and continuing until 2012.

Mine. The coal is contained in five major seams, each varying in thickness between six and 20 feet. It would be mined using the open pit concept. Ultimately, approximately 5,000 acres (the "mine limit") would be disturbed and reclaimed, but a maximum of about 450 acres of pit would be open at any one time. An additional maximum of 150 acres around the pit would be disturbed at any one time in clearing vegetation in preparation for stripping overburden, or recontouring in preparation for revegetation.

At the start of operations, 22 million cubic yards of overburden would be stripped and trucked to a point outside the boundary of the mining limit where it would be permanently placed in an overburden stockpile covering about 200 acres. As new overburden is stripped from the pit's advancing face to expose the coal, it would be put onto the trailing edge of the pit from which coal would have already been removed. Maximum depth of the pit would range from 20 feet during the first year of production to approximately 400 feet in the final years of the project. Average pit depth would be about 200 feet.

Three water-control processes would be necessary at the mine. First, runoff from undisturbed areas adjacent to the mine pit would be diverted into existing drainages. Runoff from disturbed areas would be diverted for collection before release to existing streams. Second, to minimize water flowing into the mine pit, ground water would be lifted from wells by pumps, and discharged by an underground collecting pipe network or ditch system into existing streams. Third, runoff into the mine pit would be removed by portable pumps and released into existing streams.

Mining methods would employ cable shovels and electric-wheel trucks, as well as draglines, to strip and move overburden. Coal would be scooped directly from the seams by hydraulic backhoes and put into trucks which would haul the coal to a primary crusher in front of the advancing mine face. The coal would then be moved by a two-sectioned mine conveyor to a secondary crusher located in the mine service area. Following crushing, the coal would be weighed.

Mine Service Area. The permanent mine service area would cover approximately 60 acres and be located outside the mining limit. This area would include the main administration building, the principal maintenance and warehouse facilities, service shops, equipment ready lines, fuel storage, and emergency and safety facilities. Coal from the primary crusher would enter this area by conveyor and pass through a secondary crusher and weighing facility. It would then either be stockpiled or put onto the overland conveyor to the port.

Worker Housing. Approximately 440 workers would be provided single status housing on a 20-acre site outside the lease area. Personnel would be transported to work areas by bus in two, 11-hour shifts.

Airport. An airport with two, 5,000-foot gravel runways would be constructed to handle workforce changes and large pieces of equipment that must be flown in on a timely basis.

Water Supply. Water for both industrial and domestic uses would be provided by wells.

Power Generation. Peak power requirements would be approximately 60 megawatts. The power source would be a diesel generation facility located at the port site.

Overland Transportation. The coal would be transported from the mine service area on an above-ground 42" conveyor to the port site. A 100-foot wide haul road would be parallel to the conveyor.

Port Facilities. The onshore port area would cover approximately 300 acres on the shore of Chignik Bay. Facilities would include coal storage piles, service buildings, a coal sampling building, fuel storage, and emergency and safety equipment. Coal would be taken from the conveyor and stockpiled for shipment.

The offshore port facility would consist of an approach trestle and ship mooring dolphins. The trestle would be supported by single piles approximately 400 feet apart and would be a minimum of 20 feet above the water at mean high tide. Coal would be loaded by means of a conveyor and shiploader supported by the trestle. The facility would be designed to service vessels from 20,000 to 120,000 tons.

Impact Analysis:

Substantial runs of all five species of Pacific Salmon utilize Chignik Bay, Lagoon, and associated tributaries. Current estimates of the size of average runs into the system are: Sockeye, 2.5 to 3.0 million; Coho, 100 to 400 thousand; Pink, even year, 500 thousand; Chum, 50 thousand; and Chinook, two to six thousand (ADF&G pers. comm.).

Much of this population would be at risk from toxic effluents (acid mine runoff, surface runoff, sanitary wastes, lubricants and fuel, fugitive coal dust) should the coal mine operate and discharge during the season of peak salmon activity (April to December). Location of the mine, near the mouth of Chignik Lagoon, would be particularly critical since the bulk of the salmon are associated with the Black Lake-Chignik Lake stream system which empties into Chignik Lagoon. Some portions of the adult population could be at greater risk than others. For instance, sockeye salmon which migrate rather rapidly and utilize tributaries to the lakes

far upstream would be exposed to toxic effluents for a much shorter time than pink salmon, many of which spawn intertidally. Similarly, chum and coho salmon which spawn in the fall would perhaps be less susceptible to difficulties generated by the excess oxygen demand of effluents and sediments than chinook salmon which pass through the area when water temperatures are higher and oxygen demand greater.

All outmigrants could be affected, however. Chignik Lagoon serves as an important acclimitization zone for each species utilizing the system. All spend some time in the lagoon on their seaward migration to feed and equilibriate for ocean existence. Should the lagoon or its approaches be seriously polluted with highly toxic mine effluents, the duration of exposure experienced by the outmigrating fry and and smolts would perhaps be sufficient to directly eliminate a majority of the migration. Secondarily, even if the toxin levels were not sufficient to mortally affect the young fish, it most likely would still reduce the lagoonal plankton biota, thus resulting in a depauperate planktonic environment at the critical freshwater-saltwater interface. Such a lack of prey species at that location during the period of heightened metabolic stress experienced by the young salmon as they transit this halocline could well lead to the demise of the entire population of outmigrants. Should the mine continue to operate in this manner for the duration of its maximum production life (20 years), the entire original stock of all five species of salmon could be eradicated from the Chignik Lagoon system. Following closure of the mine, some recolonization of the system might occur, especially by pink and coho salmon, but re-establishment of sockeye and chinook runs is highly problematical. In addition, lingering toxic sediments and continued acid waste runoff could extend the barren period far beyond the time of mine closure.

Should toxicity levels in effluents from the mining operation be reduced through the use of sediment ponds or other primary treatment schemes, potentially severe impacts could still occur. Although adult spawners might pass through the polluted zone relatively unscathed, providing the pollutants did not affect their homing capability, and successfully reproduce, their offspring would still be required to spend time and feed in the sour waters. Some planktonic prey species living out their lives in such polluted situations are quite efficient at assimilating certain heavy metals which can readily be transferred to their predators, in this case the young outmigrants of the Chignik Lagoon and Lake system. The fact that those heavy-metal ladened fish might enter the commercial fishery or be used for subsistence has obviously serious ramifications.

Conclusion:

If all negative effects of a world class coal mine at the mouth of Chignik Lagoon occurred, it is likely that the effect on the local salmon stocks could be MAJOR. Effect on regional salmon stocks would probably be MINOR but effect on commercial fisheries and subsistence usage could be MODERATE.

Pyramid Mountain Copper Mine

Because of the speculative nature of the potential for copper mining in the Pyramid Mountain area based on ISER predictions, and the unanswered question as to whether the amount of copper available would allow for an economic operation, this analysis must rely on other available information. Therefore the scenario is developed from a predicted copper-molybdenum mine and processing facilities that were described in the draft and final environmental impact statements (EIS) for the Mount Tolman Project in Ferry County, Washington. These EISs, incorporated by reference, were prepared by the Bureau of Indian Affairs (BIA) and the U.S. Geological Survey (USGS), with the final issued January 30, 1981. The EIS states that the copper market is generally considered unpredictable and making long-range forecasts is difficult. However, the projected domestic supply is not expected to meet U.S. demands for copper beginning in 1985.

In developing alternative for the Mount Tolman project, technical, economic and environmental constraints influenced project capacity. Because there has been no attempt to open-pit copper mine on the Alaska Peninsula, it is unknown how additional problems relative to severe climatic conditions, difficult terrain, lack of modern electric power facilities and limited freshwater availability would further constrain such a mining operation. Therefore, for purposes of this analysis, it will be assumed that these factors can be overcome and that economic copper mining can take place.

Scenario:

The mine would be located on the Native-owned uplands north of Balboa Bay on the Alaska peninsula, within Management Unit 27. Depending upon the extent of the mining operation, it could extend onto state-owned lands as well. Portions of the Alaska Peninsula National Wildlife Refuge are in the vicinity. Refuge lands under ANILCA are withdrawn from location, entry and patent under the federal mining laws, but not from operation of mineral leasing law.

Mine. It is assumed for purposes of evaluation that mine production would be 60,000 short tons of ore per day (tpd) resulting in 192 tpd of copper concentrate. Mining at 60,000 tpd would result in a potential project life in excess of 40 years.

Open-pit mining would require overburden removal and ore excavation to the final limits of the open pit. Overburden removed would become waste rock. Approximately 17,000,000 tons of waste rock and ore would be removed during construction to develop work areas and initiate work on tailings embankments. At its greatest extent, the mine would cover approximately 850 acres. Excavation and overburden removal would be done by blasting using ammonium nitrate fuel oil.

A reclamation program would be initiated at the beginning of the project. Reclamation activities would be carried out throughout the life of the operation as contemporaneously as possible. However, much of the final reclamation cannot be completed until the mining activity stops, approximately 40 years after startup.

Approximately 34,000 gal per day of effluent from the mill site, mine support facilities and administration building wastewater would be discharged to infiltration disposal fields near the administration site. Solid wastes would be placed in landfills. Wastes classified as hazardous would be disposed of in approved off-site facilities. Currently, no such waste facilities have been approved in Alaska.

Less than 0.5 percent of the ore milled would be shipped as concentrate, therefore, approximately 900,000,000 tons of tailings would be produced and require disposal over the life of the project. As discharged from the mill, the tailings would contain about 40 percent solids and 60 percent liquids. These tailings would have to be stored until the lowest levels of the pit were mined before they could be returned to the pit. Methods for impounding tailings would be use of embankments constructed of waste rock and cycloned tailings. Because of tundra soil conditions, complete control of tailings would be difficult, and leaching of toxic water may be expected.

Mill. It is assumed that on-site primary processing would be required since shipping such huge quantities of raw material to mills at off-site locations, presumed to be located in the continental United States, would be cost prohibitive. The mill would use semi-autogenous wet grinding technology to produce copper concentrate at the mine. That material would then be shipped to smelters elsewhere.

The mill facilities would be located south of the mine pit, toward Balboa Bay. The mill would be designed to process 60,000 tons of ore per average day on a long term basis. Operations would continue 24 hours a day approximately 350 days per year. Ore from the mine will be discharged into one of two 54"x80" gyratory crushers. Crushed material will feed by conveyor belt to a coarse ore stockpile designed to contain approximately 400,000 tons of material. A system of feeders and conveyors underneath the stockpile would transport the ore to the ginding section. Size reduction of the ore for froth flotation concentration will be accomplished in a two-stage, wet process grinding mill. The total average mill power load, of which most will be used in grinding, is approximately 60 MW.

Once the separation and cleaning process is completed, the filtrated copper concentrate will be shipped in bulk by truck to the port for shipment to a smelter. All reagents to be used within the mill will be received, mixed and stored according to the standard procedures prescribed by the manufacturer.

Mine and Mill Service Areas. The permanent mill and mine service areas would cover approximately 100 acres and would be located outside the pit limit. The area would include the mill itself, main administration buildings, principal maintenance and warehouse facilities, service shops, equipment ready lines, fuel storage, reagent storage facilities, and emergency and safety facilities.

Worker Housing. Approximately 600 workers would be required to oversee a 60,000 tpd operation. Enclave housing would be provided as necessary and some single family/duplex housing would be anticipated. The housing area would be located outside the mining area and would require at least 20 acres.

Airport. An airport with two, 5,000-foot gravel runways would be constructed to handle workforce changes and equipment and supply needs that cannot be met by shipping. Appertanent facilities would include a fuel storage area and small maintenance/hanger facility.

Water Supply. The project will require a continuous supply of freshwater for the milling process, fire control and drinking water. The average project fresh water requirement would be approximately 8,000 gallons per minute (gpm). Water would be obtained by pumping from various streams or from wells in the area, but sufficient water may not be available and streams may experience complete drawdowns. After the initial 1-year start-up, about 70-80% of the mill water requirements could be met by reclaiming water from tailing impoundments.

Power Generation. The project would require an estimated average electric load of 70 MW. Because of the lack of locally available power, it is assumed that on-site power generation would occur in some form, either small scale hydropower, wind generation, diesel generators, or combinations of different technologies.

Port Facilities. Port facilities would be similar to those described for the Chignik coal mine, and would be located in Balboa Bay/Lefthand Bay.

Impacts:

If an open-pit copper mining operation were to occur in the Pyramid Mountain region of the Bristol Bay, it could be assumed in the worst case to have substantial adverse effects on the fish, wildlife, habitat and socioeconomic resources of the area.

Disposal of almost a billion tons of tailings would result in filling most available low areas, including valuable wetlands which would consequently be lost forever. Leaching from the embankments in this high rainfall area would be almost certain, and water pollution effects could be major, far reaching, and of a duration substantially exceeding the life of the mine. Portage Creek feeding into the head of Herendeen Bay

would carry sediment and toxic substances into nursery and feeding areas for herring, feeding and possibly migration routes of salmon, and would in addition adversely effect both marine bird and mammal habitats. It is possible that sediment could completely fill Herendeen Bay and that pollution levels in the remainder of Port Moller could be raised to the point that the entire embayment becomes biologically sterile.

The extensive freshwater demands for processing at the mine site would severely reduce adjacent clear and productive streams, used by pink and chum salmon for spawning and rearing, and replace them with sour, toxic, and turbid flows. Brown bear that frequent the area for feeding, denning and spring-use would be displaced for 40 or more years and could be considered lost to the population. Virtually pristine coastal habitat would be degraded by sediment transport, toxic runoff and construction of port terminals. Shipping activities would be a continual disturbance factor affecting marine mammals and waterfowl.

The influx of population required to support the construction, development and operation of the mine would have an overwhelming negative effect on the socio-economic resources of the area. Competition for subsistence resources would exceed resource availability several times over. While enclave development is anticipated to be the method of servicing a majority of the mine workforce, peripheral development will exceed the capabilities of villages such as Port Moller and Nelson Lagoon to provide other goods, services and housing.

Conclusion:

If all negative effects of a copper mine of this magnitude were to occur at the Pyramid Mountain location, impacts to the local environment would be MAJOR. Impacts to the overall environment of Bristol Bay would be MINOR, but could be MODERATE for commercial fishing and subsistence.

SHORT-TERM USE VS. LONG-TERM PRODUCTIVITY

Designation of primary and secondary use areas for oil and gas and other mineral exploration and development activity recognizes that these important resources are potentially available throughout much of the region, and that the BBRMP is planning for their eventual development. It has been amply demonstrated that exploration and development of these resources could result in a long-term trade-off of other environmental values such as fish and wildlife productivity and pristine wilderness. Increased community development will occur in support of these activities.

The Plan recommends several levels of possible remote lands disposal that could result in further settlement throughout the region. Impacts of remote settlement analysed in the EIS are expected to occur within the next 20 years. During this time it is expected that 10% to 30% of the sold parcels will be used. In the long term, private ownership of the remaining parcels could lead to more development. If this is the case,

impacts would be greater than have been identified in this analysis. To serve this expanding region, small-scale hydropower or other energy generating systems will be developed, and a regional hydropower system seems probable. In the event a commercial quantity of oil or gas is discovered and production takes place, a transportation system, including a pipeline system and port, would seem a certainty. All of these factors would benefit from a cooperative planning effort that would result in coordinated development activity.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Biological Resources: Salmon could be lost due to the destruction of habitat caused by mining in some streams. Whether these losses are irretrievable would depend on the success of mitigating measures. Losses could also occur if oil spills interfered with salmon migrations or came in contact with larval fishes or their planktonic food supplies. These losses would be passed on to the commercial fishery as irreversible to the extent that they were uncompensated. Losses from hydropower could be irretrievable if efforts at developing hatcheries or building bypasses to replace lost fish were unsuccessful.

Caribou herds could be reduced by loss of essential habitat, construction of physical and visual barriers in migration routes and increased hunting pressure. If these losses are not sufficiently mitigated they could cause an irreversible downward trend in population numbers.

Large mammals and birds could be displaced into less favorable environments by disturbance as well as by habitat degradation and reduction in food. These impacts would result from settlement, oil and gas operations, activities in transportation corridors, and hydropower development. Ultimately, displacement could reduce population levels. Reductions could become irretrievable if the impacts are not mitigated.

Endangered Species: It is possible that endangered whales could be subject to adverse affects caused by loss or deterioration of habitat due to facility development and other human activities. Whether such impacts would lead to permanent losses of whales is unknown.

Social Systems: Reductions in numbers or displacement of subsistence resources could cause changes in subsistence practices. Whether or not this would cause irreversible changes in cultural values and orientations is impossible to predict.

Economic Systems: Permanent losses to the commercial fishery or subsistence could result from some developmental activities. Whether impacts are irreversible would depend primarily on the location, intensity and length of activities and mitigating measures applied to those activities.

Cultural Resources: Historic and archaeological sites affected by developmental activities could result in an irretrievable loss of scientific data, if appropriate protective measures are not applied.

CUMULATIVE IMPACT ASSESSMENT

There are two fundamental issues in cumulative impact assessment: identifying other actions which may contribute to significant cumulative impacts and identifying methods for measuring and evaluating cumulative impacts in this EIS. These two basic issues are interrelated, in that a meaningful cumulative effects assessment cannot be completed until it is determined whether another action or project is sufficiently defined and whether the impacts of the action or project are understood.

There are several specific factors to consider when determing if future actions should be the subject of cumulative impact assessments. These factors are derived from the Council on Environmental Quality (CEQ) guidelines and should be present before a future action is included in the list of projects considered for cumulative effects: (1) the proposal includes a submittal and completed application for a license, permit, or other regulatory approval; (2) the proposal has been determined to be a "project which may significantly affect the environment" under NEPA; (3) the proposal is sufficiently defined in terms of construction and operations characteristics to derive potential effects in the absence of any formal NEPA review; (4) the proposal's geographic area of influence is contiguous to or overlapping with the region that is the subject of environmental assessment in this proposal; (5) there is a substantial commitment to execute the proposal; and (6) the timing of the proposal's authorization and implementation allows for cumulative effects assessment to be performed within a subsequent EIS required with or expected to accompany the proposal.

The Council on Envirnomental Quality's (CEQ) definition of cumulative impact recognizes past, present, and reasonably foreseeable future actions. Past and ongoing actions are identified and evaluated in Chapter II of this EIS (Affected Environment of the Bristol Bay area), and future impacts that can be attributed to these past and present actions are considered as part of the aggregate impact sections within the assessment of each topic. It is often difficult in cumulative effects assessment to differentiate the incremental (past, present, and future) effect of each action because of uncertain conditions and methodological difficulties. In these circumstances, the EIS assumes that the aggregate impact across all types of actions constitutes the cumulative impact.

For cumulative effects, future actions are assumed to be reasonably foreseeable where there is a substantial commitment to complete the project, even though impacts can only be generically identified and project characteristics can only be presumed. However, there are three circumstances when such projects affect assessment need not be considered: (1) the commitment to carry out the project or action is not assured; (2) the project is sufficiently removed in time, e.g., 5 to 10 years; and (3) the project definition and impact specification are conjectural.

The phased or sequential consideration of environmental impacts on future actions is permitted under the CEQ regulations that implement NEPA (40 CFR 1508.28). CEQ recognizes the "tiering" of environmental impacts assessment when project development involves more than one stage over the life of the project and where individual projects constitute implementation of a broader proposal, either in terms of program organization or region of consideration. The CEQ tiering procedure is applied to yield phased documentation of cumulative effects assessment where either of the above applies.

Major Actions Affecting the Bristol Bay Planning Area

This section contains a brief description of the major actions which may occur in the near future within or close to the proposed planning area.

(1) Federal and State Oil and Gas Lease Sales:

Federal Sales: Federal oil and gas lease sales in the Bering Sea region which could contribute to cumulative effects in the Bristol Bay area are the St. George Basin (Sales 70, 89, and 101), and North Aleutian Basin (Sale 92).

- St. George Basin (Sales 70 and 89): The St. George Basin Sale 70 was held April 12, 1983, with 96 blocks leased. Potential cumulative effects could result from tankering, oil spills, and the use of Cold Bay as a support-base site. The effects of the development scenario are analyzed in the St. George Basin (Sale 70) FEIS. The St. George Basin Sale 89 is scheduled to be held in September 1985 with the final EIS scheduled for release in April 1985 and Sale 101 is scheduled for April 1987. The types of activities which could create cumulative effects would be similar to those identified for Sale 70.

- North Aleutian Basin (Sale 92): The North Aleutian Basin Sale 92 is scheduled for December 1985. A draft EIS for this sale was issued in January 1985 and the FEIS is scheduled for July 1985. Assumed impacts of the development scenario for this project are assessed in the sale 92 DEIS including potential cumulative effects.

State Sale Areas:

- Bristol Bay Uplands (Sale 41): The state of Alaska held an oil and gas lease sale for the Bristol Bay uplands in September 1984. The sale area, containing about 4 million acres, is located south of the Kvichak River and north of Port Heiden on the Alaska Peninsula. Of the 1.4 million acres offered, 278,938 acres received bids.

- Alaska Peninsula (Sale 56): The proposed sale area contains about 2 million acres on the northern side of the Alaska Peninsula between Cape Lieskof and Port Heiden. No decision has been made on whether to hold the lease sale; however, the call for comments will be distributed in July 1986. If it is determined that the sale is in the best interests of the state, a written decision and notice of sale would be issued in July 1988 (State of Alaska, 1984).

Development scenarios and assumed potential effects of these State lease sales are discussed in appropriate sections of this EIS and are included in the aggregate effects section of each resource issue analyzed.

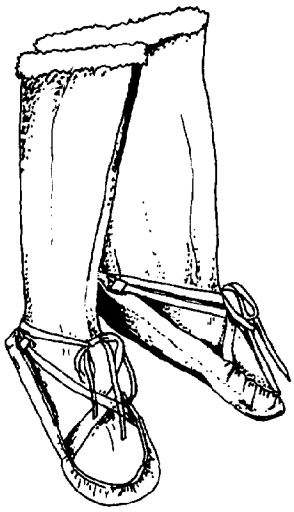
Comparison of Alternatives

Comparison of the difference in impacts to each of the 14 identified resource issues within each alternative is shown in Figure 8-1. The figure was developed by aggregating all potential development activities which might affect an individual resource issue under a particular alternative. In some instances the size of the symbol is largely influenced by impact of a single activity while in others, impact is more evenly distributed across a number of developmental entities. The reader is cautioned, however, that all issues are not directly comparable since several are resources (salmon, caribou, bears, etc.), some are activities (commercial fishing, recreation, subsistence), others are demographic measurements (employment, population), while still others are legal definitions (water quality, wilderness).

CHAPTER IX

ANILCA Section 810(a) Evaluation

Prepared by United States Fish and Wildlife Service and Bureau of Land Management



CHAPTER IX

ANILCA Section 810(a) Evaluation

INTRODUCTION

This evaluation of restrictions to subsistence uses resulting from the Plan is limited to public lands only, as defined below. This limitation is based on Section 810(a) of the Alaska National Interest Lands Conservation Act (ANILCA) which states:

> In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes.

The primary purposes of the Bristol Bay Regional Management Plan, hereinafter referred to as the Plan, were established by section 1203(b) of ANILCA:

> To conserve the fish and wildlife and other significant natural and cultural resources within the region.
>
> To provide for the recreational and orderly development of economic resources within the region in an environmentally sound manner.
>
> To provide for such exchanges of land among the federal government, the state and other public or private owners as will facilitate the carrying out of the above purposes.
>
> To identify additional lands within the region that are appropriate for selection by the State under section 6 of the Alaska Statehood Act and ANILCA.
>
> To identify any additional lands within the region that may be appropriate for congressional designation as national conservation system units.

The Plan is a programmatic Federal planning document that, in and of itself, does not withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands within the Bristol Bay region, as defined by section 102(3) of ANILCA. (ANILCA defines "public lands" as lands situated in Alaska that, after the date of enactment of this Act, are Federal lands, except: (A) land selections of the State of Alaska which have been tentatively approved or validly selected...(B) land selections of a Native Corporation made under the Alaska Native Claims Settlement Act...(C) lands referred to in section 19(b) of ANCSA). The Plan does, however, recommend that certain types of actions be allowed in the Bristol Bay region on public lands administered by the U.S. Fish and Wildlife Service (FWS) and Bureau of Land Management (BLM). Because these recommendations eventually could result in certain site-specific actions on FWS and BLM lands that may have effects on

subsistence uses and needs, this general discussion of the requirements of section 810 in relation to the Plan is included as a part of the Plan and environmental impact statement.

The 31,000,000 acre planning area prescribed by ANILCA is described in Chapter IV. Of this total acreage, approximately 12,720,000 acres are Federal public lands. The FWS manages 10,780,000 acres, comprising Togiak, Becharof, Izembek and Alaska Peninsula National Wildlife Refuges (NWR's) and parts of Alaska Maritime and Yukon Delta NWR's. Most of the 1,940,000 acres of BLM lands are located near Goodnews Bay west of Togiak NWR, near Nyac, and southwest of Iliamna Lake. Other Federal lands in the region are National Park Service lands at Lake Clark, Katmai and Aniakchak Crater. These lands are not addressed in the Plan because they were specifically excluded from the Bristol Bay planning process by Congress. The remaining acreage is either State or private land not subject of section 810 evaluation. A complete description of the land ownership patterns in the Bristol Bay region is given in Chapter II.

In addition to the Plan, Comprehensive Conservation Plans (CCP's), as required by section 304 of ANILCA, are being prepared for the four NWR's in the Bristol Bay region. Each of these CCP's will be accompanied by an environmental impact statement that will further evaluate the impact of FWS management of public lands. The Plan will be adopted by BLM as an "other Agency Plan" which fulfills the requirements of section 202 of the Federal Land Policy and Management Act of 1976 (FLPMA) and will guide management of BLM lands in the region. The Plan will also guide BLM in application of the ANILCA section 1008 process within the region for leasing and managing the subsurface estate, for mining, and for exchange, sale or lease of public lands under FLPMA and the Alaskan Settlement Laws. Both FWS and BLM will make additional evaluations as required by section 810 for all future land use and site specific plans where applicable.

SUMMARY OF PROPOSED ACTIONS ON FEDERAL PUBLIC LANDS

A complete description of the actions recommended in the Plan is found in Chapter IV. A primary purpose of the Plan is the protection of natural habitat and the continued harvest of fish and wildlife on a sustained yield basis.

Actions recommended specifically by the Plan for Federal public lands include an exchange of 1,000 acres of FWS refuge lands in the vicinity of the village of Cold bay, identification of a road corridor crossing refuge lands between King Cove and Cold Bay, and the identification of potential transportation corridors located on the peninsula across NWR lands. An additional planning assumption is that oil and gas activities might be determined by CCP's to be incompatible with refuge purposes on up to 35% of NWR lands, thereby excluding these lands from leasing. Each of these proposed actions would require further study, and could require environmental assessments or environmental impact statements and refuge compatibility determinations. Site-specific, section 810 evaluations would also be made for each proposed action at that time.

In addition to the recommended Cold Bay land exchange, Chapter VI of the Plan also suggests other short-term and long-term land exchanges, some of which involve Federal public lands. In general, these suggested exchanges are

intended only to initiate discussions between the parties identified and are not intended as mandates that specific exchanges occur. Extensive negotiations among the exchange parties will be required, and recommended exchanges may or may not be agreed upon. Possible exchanges involving FWS or BLM lands are discussed in detail in Chapter VI and include: Hook Bay (from FWS to Natives), Togiak NWR (from FWS to State or Natives), Mother Goose Lake (from State to FWS), Herendeen Bay (from FWS to State or Natives), Pavlof Bay (from Natives to FWS), and the Cathedral River/Black Hills caribou calving grounds (from State to FWS). If any of these suggested exchanges receive further consideration, they will be subject to the evaluations required by the National Environmental Policy Act (NEPA) process and by section 810.

The Plan designates minerals as a primary use on all State and BLM lands in the vicinity of known mineral terranes, and places a secondary use designation on the remainder of available State and BLM lands in the region. These designations mean that some BLM lands could be subject to placer mining activities which could result in localized impacts to subsistence uses. Mining activities proposed on BLM lands would require section 810 evaluations prior to being permitted.

Other land uses discussed in the Plan include: Fish and Wildlife Habitat and Harvest, Recreation, Agriculture, Forestry, Settlement, and Wilderness designation. A comparison of land uses for each of six alternatives is found in Chapter VI. In making the section 810 determination for the Plan, all comparisons were to the No Action Alternative which assumes economic development in the region in the absence of a cooperative management plan.

Some recommendations made by the Plan for activities on State lands, although not subject to section 810 evaluations, have been determined to have potential for moderate impacts on subsistence. Guidelines have been developed for these activities to aid in protecting subsistence resources. Chapter VIII presents an analysis of impacts to subsistence resources on all lands in the Bristol Bay area.

SUBSISTENCE USES AND RESOURCES

Subsistence uses and resources harvested for subsistence in the Bristol Bay region are discussed throughout the Plan. Chapter II discusses the biological resources in the region upon which subsistence activities depend, and the tradition of subsistence itself. Chapter VIII evaluates possible impacts of the Plan and five alternatives on the principal species of concern for subsistence uses (salmon, caribou, moose and waterfowl), and on the subsistence lifestyle, including impacts of increased human population and recreational activities.

PUBLIC INVOLVEMENT

The Bristol Bay Study Group consisted of two state agencies, two federal agencies, two regional representatives and two local representatives. These were the Alaska Department of Natural Resources, Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, Bureau of Land Management, Bristol Bay Coastal Resource Service Area Board, Aleutians East Coastal Resource Service Area Board, Bristol Bay Borough, and Native interests.

Teams of representatives conducting early public involvement and NEPA scoping sessions on the Plan visited 29 communities and held 50 meetings and workshops. Appendix G of the Plan contains the results of the public involvement effort. Subsistence was always a major topic at the sessions, although section 810 was not discussed specifically. Concern was expressed at all rural meetings that the Plan not recommend activities detrimental to subsistence resources. The study group issued a contract to the Institute of Social and Economic Research for a detailed socio/economic report addressing these concerns. Data from this report were then used throughout the planning effort and in the preparation of the draft EIS.

On July 28, 1983, the Plan and EIS was made available for public review and comment. During the comment period, 33 public meetings were held throughout the region, and public hearings were held in Dillingham and Anchorage. Public comments received contained only one reference (by BLM) to section 810.

POTENTIAL IMPACTS OF THE PROPOSED PLAN TO SUBSISTENCE USES ON FEDERAL PUBLIC LANDS

Activities that would affect both public and private lands in the region are described for the Plan and five alternatives in Chapter IV. Scenarios of possible development and assessment of impacts caused by that development for the Proposed Plan and its alternatives are discussed in Chapter VIII. A brief summary of impacts related to potential Federal actions is presented below.

Exchange of 1,000 acres of Alaska Peninsula or Izembek NWR lands proposed for the Cold Bay area is intended for community expansion. The land is not high quality wildlife habitat because it is subject to frequent human disturbance through existing road access to old military sites. Development of this area would not significantly reduce local subsistence opportunity, inasmuch as increases in settlement would be minimal and NWR lands would surround the tract and be available for continuing subsistence uses. In addition, exchange of this land for habitat of higher wildlife value, which is currently owned by the State or Native corporations, would probably assure greater overall protection of fish and wildlife resources in the future.

The Plan states that a 32-mile road to connect the communities of King Cove and Cold Bay could be considered for construction if economically and environmentally feasible. Six miles of this road would traverse Izembek NWR. Preliminary analysis presented in Chapter VIII indicates that this road could have major local adverse impact on the southern Peninsula caribou herd. Prudent management and strict enforcement of additional restrictions on hunting could reduce this impact to moderate. Such restrictions could include implementation by the State of subsistence priority if necessary to meet requirements of state and federal laws.

Allowing portions of the NWR lands in the region to be available for oil and gas leasing is not anticipated to have significant impact on subsistence. This conclusion is based on the fact that any activity permitted on NWR lands must be determined to be compatible with the purposes for which the refuge was established. Opportunity for continued subsistence use by local residents is

one of the purposes for which all refuges in the Bristol Bay region were established. Other purposes for which the refuges were established are conservation of fish and wildlife populations and habitats and maintenance of water quantity and quality, purposes assuring continued availability of resources vital for subsistence activities. Additionally, special use permits are required even for activities that have been determined to be compatible. Such permits generally contain stipulations to further insure that compatibility is maintained.

Transportation corridors identified and discussed in Chapter IV and evaluated in Chapter VIII would be subject to existing statutes and regulations as well as to the environmental guidelines discussed in Chapter V. These controls would work in combination to reduce adverse effects to fish and wildlife to the maximum extent practicable. Additionally, before rights-of-way can be granted across conservation system units in Alaska, provisions of Title XI of ANILCA must be met. These provisions include an environmental impact statement, a compatibility determination, and a section 810 evaluation, any one of which could result in further modification of proposed activities in order to mitigate potential adverse effects.

Impacts to Habitat

The Plan designates maintenance of fish and wildlife habitat and harvest as primary uses in all management units in the Bristol Bay region. Proposed recommendations in the Plan are designed to attenuate degradation of the environment by: reducing acreage available for oil and gas leasing, restricting available lease areas to less sensitive habitats, reducing acreage available for remote settlement, and concentrating acreages available for settlement to parcels near the most populous parts of the region.

To protect fishery resources, designated portions of 64 anadromous fish streams and any State or BLM owned uplands within 100 feet of ordinary high water on both sides of the streams will be closed to new mineral entry. Other streams in the region, except those on NWR lands, will remain open to new mineral entry.

Some residents of the region use trees for fuel and shelter and berries and other plants for food. The Plan and all alternatives insure continued subsistence use of these resources.

Impacts to Fish and Wildlife

The Plan has been designed to recommend levels of economic development in the region that are compatible with conservation and protection of fish and wildlife resources and with the purposes for which federal conservation units were established. The Plan will also aid in the future development of additional protective measures for fish and wildlife in the Bristol Bay region.

IMPACTS TO SUBSISTENCE USES AND NEEDS

Recommendations in the Plan for Federal public lands will neither reduce nor displace wildlife in a manner that would significantly restrict subsistence uses on a regional basis. None of the recommendations provide for increased access to the region by non-local residents which could increase competition for harvest of resources used for subsistence. Identified transportation

corridors could, however, facilitate travel by local residents, making access for subsistence purposes easier and perhaps increasing competition among local users.

Economic development allowed by the Plan could eventually result in more jobs and income for some local residents. This potentially could decrease dependence of some individuals on locally harvested resources.

AVAILABILITY OF OTHER LANDS

Boundaries of the study area were mandated by Congress in ANILCA, so there are no alternative study sites, although specific land uses could have been located elsewhere within the study region. However, it is a purpose of the Plan to identify the best possible locations for carrying out economic development in an environmentally sound manner as mandated by ANILCA section 1203(b)(2). The opinion of the study group, on the basis of environmental and socio-economic analysis and public comments, is that the Plan accomplishes that requirement.

OTHER ALTERNATIVES

Six alternative management regimes were considered for the study area. These ranged from regional development without a plan (No Action Alternative) to a preservationist approach (Alternative 2). Extensive public participation was vital to the selection of a preferred alternative. After careful consideration of the alternatives and public response, the study group was confident that the proposed Plan is the best alternative for the region. Other alternatives were rejected primarily because the study group did not believe that those alternatives responded adequately to the concerns of the public for economic development in an environmentally sound manner.

FINDINGS

The Plan considers availability of all lands within the Bristol Bay region for a variety of uses in accordance with the provisions of ANILCA. Alternative uses on these lands were considered carefully throughout the planning process and are discussed in the alternatives section of this document. Analysis of these lands and alternative uses was the basis for selection of the final Plan.

Use of resources and lands for subsistence purposes was a primary consideration during development of the Plan, as discussed above. In making the section 810(a) analysis, FWS and BLM find that: 1) the Plan does not create significant adverse impact on Federal public lands important to continuation of viable subsistence resources including plant species; 2) the Plan does not cause significant adverse impact on fish and wildlife populations using Federal public lands in the Bristol Bay region; 3) the Plan does not adversely affect access of rural subsistence users to subsistence resources on Federal public lands of the region; and 4) the Plan proposes no improved access that would significantly increase non-rural, non-subsistence use of subsistence resources. Based upon these findings, FWS and BLM conclude that reasonably foreseeable events which might occur as a result of the Plan will not entail significant restriction to subsistence uses in the Bristol Bay planning area.