

Bristol Bay Borough

Alaska Coastal Management Program

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Acknowledgements

This report consolidates findings originally submitted to the Bristol Bay Borough in two separate publications. The Resource Inventory, which was issued in May 1981, was prepared by Kramer, Chin & Mayo, Inc. (KCM) in association with Science Applications, Inc. and Frank Orth and Associates. It is reprinted in this volume as Part I.

Part II of this report contains the Coastal Management Plan which was submitted to the borough as a draft for public discussion in October 1982. The current version of the proposed Management Plan incorporates a number of versions suggested during the original review process and September 2005 revisions.

Cover Photo: Bristol Bay gill netters in the 1930's were towed from port to their fishing grounds. Sailboats could catch as much fish as powerboats today. One sail fisherman brought in about 300,000 pounds of red salmon in a single season. By 1951, however, power fishing had completely replaced sail fishing, because the sailboats were more vulnerable to storms. Cover photo from the J. Johannesen Collection, San Francisco Maritime Museum.

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Summary

THE LAW

With coastal lands faced by mounting pressure for development and use, congress in 1972 passed the Coastal Zone Management Act providing incentives for coastal states to protect, manage, and, where possible, rehabilitate the coastal resources. In 1977 the Alaska Legislature passed the Alaska Coastal Management Act making local governments responsible for managing the coast within their jurisdiction and requiring each to prepare a district coastal management plan.

THIS REPORT

This report is divided into two segments. Part I contains information first printed in May 1981 as a Resource Inventory for the Bristol Bay Borough. This Section describes the regions physical characteristics as well as the animals, fish, birds, and plants which are native to the region. Detailed maps define topography, habitats, migratory paths and other patterns of use, which characterize the Bristol Bay Borough. Man's use and the current status of land ownership are also described in Part I.

Part II contains the proposed coastal management program. It includes the community's goals and objectives, a resource analysis, management recommendations, a definition of areas which merit special attention, coastal policies, and an implementation process. These recommendations originally were submitted as a draft for public discussion in October 1982. Most recently, revisions have been made to this plan in September, 2005.

GOALS AND OBJECTIVES

The Bristol Bay Borough, working with community representatives and the coastal management steering committee, developed goals and objectives detailing needs and future plans for the borough. A series of five community meetings was held in the Borough during development of the program. The goals and objectives of the management plan are the result of that community involvement.

RESOURCE INVENTORY (September, 2005 revision)

The Physical Setting

The majority of the land has poor surface drainage resulting in standing water and wet or moist tundra. Most of the Borough is moraine and glacial drift and, in the low-lying areas, alluvial floodplain and glacial outwash deposits.

The Borough's communities, although protected from tsunami hazards, are threatened by high-energy coastal erosion. The earthquake potential is low but the coastal and river bluffs present significant landslide and erosional hazards due to unstable geologic formation and soils. Volcanic activity in the area is high, and ash deposition is the primary hazard.

The Natural Setting

Marine mammals, moose, caribou, birds and a variety of fish are migratory and spend a portion of the year in the Borough. Kvichak Bay and the Naknek River serve as primary migration corridors for most of Bristol Bay's salmon. Paul's Creek, King Salmon Creek, Big Creek, Naknek Lake, and the Naknek River are primary salmon spawning and rearing areas.

Because only a small portion of Bristol Bay's 500 square miles is accessible by road, mapping of habitats by onsite analysis was impossible. A variety of means was used to establish habitats, but the main source was a land cover map developed from digital land-sat and digital topographic data and coded for a range of vegetation cover types. This process allows, for the first time, reliable determination of habitat in the Borough's inaccessible areas.

Human Use

Fish processing represents the majority of industrial land use in the Borough. There are 16 registered operators that buy, sell, and/or process fish with the largest facilities occupying 40 plus acres each. Adequate land for future housing and commercial development is available for growth over the next 20 years, based on demand forecasts. Most land in the Borough is in its natural state and is used for recreational purposes and subsistence hunting, trapping, and gathering. Water bodies in the Borough are more intensively used than the land, mainly for fishing and transportation.

Population growth has been slow to moderate in the past 10 years and is expected to remain so in the future; however, the population increases from just over 1,000 to about 8,000 during the salmon season. Commercial fishing is the mainstay of the Borough economy. Government employees, seasonal construction, tourism and subsistence activities also contribute significantly. Seasonal unemployment is a chronic problem.

RESOURCE ANALYSIS

Because of the area's relatively isolated location and cultural heritage, commercial fishing, subsistence hunting and fishing, and, to a lesser extent, recreational hunting and fishing play an important part in the lives of many residents. It is difficult to evaluate the sensitivity of habitats and the effects of development on habitat quality since impacts are so-site and project-specific; however, as Bristol Bay Borough continues to grow, losses in types and quality of habitat are unavoidable.

To effectively evaluate land and water uses and develop management recommendations, lands in the Borough were divided into the following categories:

- Offshore areas
- Estuary
- Tide flats
- Exposed high-energy coasts
- Rivers, streams, and lakes
- Wetlands

The Naknek River, major creeks, fresh and saltwater marshes, and associated riparian areas receive the most intense wildlife use.

DISTRICT ENFORCEABLE POLICIES

Policies developed as part of the management plan will be used by the Borough Planning Commission and Assembly to determine proper and improper uses of resources and the acceptability of proposed plans and projects. The state uses policies during consistency reviews.

IMPLEMENTATION PROCESS

Bristol Bay Borough Planning Commission

The Borough Assembly has delegated local implementation of the Borough CMP to the Planning Commission and the Planning Director. The Planning Commission implements the Borough CMP when issuing consistency comments. The Planning Commission normally delegates authority to make consistency comments to the Borough CMP Coordinator, who is the Planning Director. There are several specific responsibilities of the Planning Commission and the CMP Coordinator which are listed in detail in Part II, Chapter 5.

In addition, the Planning Commission has the following responsibilities:

- Monitor and assess consistency comments issued on its behalf by the CMP Coordinator.
- Review every five years and amend, if required, the Bristol Bay Borough CMP.
- Submit every ten years the Bristol Bay Borough CMP to OPMP for reapproval. The submittal shall include an evaluation of the plan effectiveness and implementation, a presentation of any new issues, and a recommendation for resolving any problems that have arisen.

Bristol Bay Borough CMP Coordinator

The Bountiful Borough CMP Coordinator is a member of the Borough Planning Department staff. The CMP Coordinator may receive oversight and direction from the Planning Commission.

The CMP Coordinator has day to day responsibilities within the Borough Planning Department for the administration of the Borough CMP. He or she must:

- Help applicants fill out the coastal project questionnaire (CPQ) including an evaluation of the district's enforceable policies along with the boundary determination and educate them about the ACMP and the Bristol Bay Borough CMP throughout the process.
- Ensure that information has been received in a timely manner by the parties involved in the consistency review process
- Determine if information received is complete and sufficient for a consistency review
- Decide which projects are routine and which projects have great significance to the coastal zone and should be reviewed and discussed with the Planning Commission (routine approvals will be processed by the CMP Coordinator)
- Evaluate uses and activities that require local, state, or federal permits or authorizations for consistency
- Evaluate proposed projects against the enforceable policies of the Coastal Program
- Accurately assess the effect of applicable policies of the Bristol Bay Borough CMP on the application
- Manage project information to ensure that it reaches all affected persons and organizations
- Draft effective, concise and comprehensive consistency determinations and recommendations and produce evidence in support of the conclusions reached
- Develop draft consistency comments and alternative measures for consideration by the Planning Commission, when necessary
- Integrate feedback from the local contacts and other interested parties into the Bountiful Borough's consistency recommendation
- Coordinate consistency review activities with adjoining coastal districts where issues or activities of mutual concern are under consideration
- Prepare and submit the consistency recommendation in a timely manner
- Prepare quarterly and annual reports to the state, as required by the Bountiful Borough's ACMP grant agreement
- Facilitates and receives public input, and acts as an information resource concerning the Bountiful Borough CMP

The CMP Coordinator represents the Bristol Bay Borough at meetings, conferences, and in ongoing interactions with applicants, the general public and state and federal agency staff regarding the Bristol Bay Borough CMP.

Part I Resource Inventory and Analysis

Chapter 1 Introduction

INVENTORY BACKGROUND

The Bristol Bay Borough, as an organized local government, is a Coastal Resource District. As a Borough, it has authority for planning and zoning within its boundaries, and as a Coastal Resource District it has responsibility for developing and implementing a Coastal Management Program that meets the requirements of the Alaska Coastal Management Act and also meets the standards of the Alaska Coastal Management Program.

The Bristol Bay Coastal Management Program contains the following:

1. Goals and Objectives: The identification of the concerns and desires for the future by the people living within the Bristol Bay Borough.
See chapter 3, Part II.
2. Coastal Boundaries: The designation of the boundaries that allow the district to manage activities that could have a significant impact on coastal areas.
See Chapter 2, Part II.
3. Resource Inventory: An identification and description of the natural, physical, and cultural resources within the district. The resource inventory emphasizes those resources that are basic to man's wellbeing, and it forms the basis for both a Coastal Management Plan and a Comprehensive Plan.
See Part I.
4. Resource Analysis: A synthesis of the resource inventory that determines generalized findings about land sensitivity, that is, the sensitivity of land and water to the future activities of human occupants. Land sensitivity is determined by giving equal consideration to the sensitivity of both the natural and the physical systems within the district and by considering human historic and future use of the land and water within the district.
See Chapter 4, Part I.
5. Coastal Management Policies: Policies that apply to uses within the management classification that is used to determine whether specific uses and activities will be allowed.
See Chapter 4, Part II.

6. Implementation: A description of the method and activity used to implement the district program.
See Chapter 5 and 6, Part II.

Each district program is required to include an inventory of the resources within and adjacent to its boundaries. The purpose of the inventory is to identify and to locate important resources and to determine size and importance of each within the district.

The Bristol Bay Borough Resource Inventory is organized into four main sections. They are as follows:

THE PHYSICAL SETTING

This section is an inventory of the topography, surficial geology, soils, permafrost, and surficial hydrology. It identifies and describes the Borough's physical features, surface conditions, and soil composition.

See Chapter 2, Part I

THE NATURAL SETTING

This section is an inventory of fish, mammals, birds, and vegetation within the Borough. The inventory describes seasonal habitats, migration routes, and calving, spawning, and nesting areas.

See Chapter 3, Part I.

RESOURCE ANALYSIS

This section addresses the requirement calling for an assignment of the sensitivity of the natural environment to change.

See Chapter 4, Part I.

HUMAN USE

This section inventories industrial, commercial, and residential use of the land, recreational and subsistence use of both land and water, commercial fishing, prehistoric and archaeological sites as well as transportation throughout the Borough. It identifies and describes major land and water use within the Borough as it occurred historically and as it exists today. The section also inventories the communities within the Borough as well as the Borough's economy.

See Chapter 5, Part I.

LAND STATUS

This section inventories land ownership and federal, state, borough, and private land and water management responsibilities.

See Chapter 6, Part I.

The information contained within this report was developed from current literature and maps, and from individuals, who have lived, worked, hunted, and fished in the area. This information has been field checked and carefully reviewed by the Bristol Bay Borough Planning and Zoning Commission, Citizen's Advisory Committee, state and federal agencies, and a number of helpful individuals.

THE REGION

The land area within the Bristol Bay Borough is only part of the physical, natural, and cultural system of the region. The entire system extends well beyond the Borough boundaries. For example, the Bristol Bay salmon fishery, the world's largest, is dependent upon fish traveling through the Borough to the primary spawning areas in the Kvichak and Naknek River systems outside Borough boundaries. This is also the case for caribou, moose, and bear. A regional map is used to introduce each major section of this resource inventory and is intended to illustrate how the physical, natural, and cultural settings within the Borough are part of a regional system. The regional map extends from Unimak Island in the south to Lake Iliamna in the north, and Kodiak Island in the east to the Kuskokwim Delta in the west.

THE BOROUGH

The Bristol Bay Borough is approximately 500 square miles in area and extends from the foothills of the Aleutian Range in Katmai National Park to the western shore of Kvichak Bay.

The east side of Bristol Bay Borough encompasses the majority of the usable land and the communities of Naknek, South Naknek, and King Salmon. The west side primarily contains Kvichak Bay and land extending to the western boundary of the coastal watershed. The western Borough boundary runs along the western mean high tide line of Kvichak Bay. The base map extends west of the mean high tide line to include the coastal watershed that drains into Kvichak Bay and consequently into the Borough.

In 1983, the Bristol Bay Borough chose to extend the coastal zone boundaries beyond the established biophysical boundaries to include important areas of direct influence and to conform to the Borough's political jurisdiction. Establishing the Borough boundaries as the coastal zone boundary incorporates the following areas above 200 feet elevation limit established in the biophysical boundaries within the Borough:

- The foothills of the Aleutian Range found in the northeast corner of the Borough. These hills provide important uplands habitat and form the upper drainage of King Salmon and Paul's Creek.
- The ridge separating the Naknek Lake and Naknek river systems, which drain into primary salmon spawning areas.
- The hills in the southwest corner of the Borough, which drain into the Naknek River and Kvichak Bay, both important anadromous fish migration routes.

The Bristol Bay Borough coastal management district is surrounded by the Bristol Bay Coastal Resource Service Area. The Borough's coastal zone boundaries were designated to be compatible with the contiguous service area, and now include the entire jurisdiction of the Borough.

The legal description from the Alaska Local Boundary Commission, Juneau:

“Beginning at a point which is located at 58 degrees, 53 minutes, 9 seconds North Latitude and 157 degrees, 02 minutes and 45 seconds West Longitude (Coast and Geodetic Survey Marker, Russ.); thence East to a point 156 degrees, 37 minutes, 50 seconds West Longitude; thence South approximately 61 miles to a point at 158 degrees West Longitude; thence North approximately 3 miles to the point of intersection with the North shore of Kvichak Bay; thence meandering approximately 38 miles in a Northeasterly direction along the North shore of Kvichak Bay to the point of beginning”.

Part I Resource Inventory and Analysis

Chapter 2 The Physical Setting

THE REGION

CLIMATE AND WEATHER

The Bristol Bay region has a maritime climate with cloudy skies, relatively mild temperatures, and moderate precipitation. The area has cool summers with average summer maximum temperatures of 50 degrees F to 60 degrees F. Winters are warm with average minimum temperatures of 6 degrees F to 20 degrees F. Extreme temperatures are 42 degrees F. and 88 degrees F. Annual rain averages about 20 inches, while snow averages about 45 inches. Fog is often present in the summer and may be an impediment to surface and airborne activities. Sea and river ice usually is present in the area from mid-November to early April. In winter, winds blow from the north to northeast and change to prevailing southwesterly winds in the summer months. Wind speeds throughout the year average about 9 knots. Easterly winds are the strongest, usually averaging 13.1 knots. Extreme winds, in the range of 40 to 70 knots, occur periodically during the year, usually blowing from the east.

OCEANOGRAPHY

Bristol Bay is approximately 58,000 square miles in area, with an average depth of 192 feet. The Inner Bay, extending northward from Port Heiden to Cape Newenham, covers 9, 700 square miles and splits at its head forming Kvichak Bay and Nushagak Bay.

Tidal fluctuations in the bay are extreme, with higher ranges toward the head. The mean tidal range at Port Heiden is 7.5 feet and at Naknek, 18.5 feet. The large tidal range prevents shore-fast ice from forming.

Bristol Bay is estuarine and is fed fresh water from several major river systems. Both the salinity and temperature of the bay characterize estuarine conditions. Mean salinity is 28.9 parts per thousand, and the mean water temperature is 11.4 degrees C. This is less saline and considerably warmer than the outer bay waters where mean salinity is 32.0 parts per thousand and mean temperature is 8.6 degrees C.

Wind speeds and direction in the bay are extremely variable, creating locally derived wave patterns and heights. During severe storms from the southwest; the shallowness of the bay causes steep, irregular waves rather than long swells.

The Nushagak, Kvichak, and Naknek Rivers carry high volumes of fresh water during the summer months when ice and snow melt from the Kuskokwim Mountains and the Alaska Range. Although the runoff carries large amounts of nutrients, it also carries finely ground sediments which limit light penetration and photosynthesis.

The sediments of Bristol Bay are classified as sands with coarse-grained materials (fine sands and coarse silts) at the edge of the continental shelf. Quartz and feldspar sands are dominant; they tend to be poorly sorted and have low concentrations of organic carbons.

Kvichak Bay forms a northeastern arm and the headwaters of Bristol Bay. It is fed by the Kvichak River (the drainage for Lake Iliamna), and the Naknek River (the drainage for Naknek Lake). The depth of the bay ranges from 11 to 66 feet and has an extreme tidal range of 18.5 feet. At low tide numerous shoals and banks are uncovered. At 2.5 knots, the current in Kvichak Bay is considered strong.

HYDROLOGY

The Naknek River drainage area is approximately 3,700 square miles. The Naknek River watershed includes seven interconnecting lakes: Murray, Hammersly, Coville, Grosvenor, Brooks, Idavain, and Naknek, and the Naknek River itself, as well as the streams connecting the lakes. In addition, 16 streams with midsummer flows in excess of 3 cubic meter/second flow into the Naknek River. The watershed extends well beyond the limits of the Bristol Bay Borough. Through little hydrologic information exists for the Borough, it has been recorded that the water quality is good with relatively low (114 mg/l) dissolved solids and less than 500 mg/l suspended sediments. Concentrations of minerals are within U.S. Public Health Service standards for potable water.

SEISMICITY

The Bristol Bay area is north of the major area of seismic activity in the state, and those earthquakes, which do occur, are at great depths and of low strength. Along the north foothills of the Alaska Range, the Bruin Bay Fault extends southward from Kamishak Bay to Becharof Lake. The fault crosses the Naknek system in Katmai National Park.

VOLCANISM

The Alaska Peninsula forms part of the “ring of fire,” caused by the movement of crustal plates along the Aleutian Trench. Volcanoes on the peninsula are extremely active; more than 40 of the 60 volcanic centers have been active in the last 300 years. Eruptions have spread ash and lava over large areas, creating some of the soil stratas found in the Bristol Bay Borough. Table 2.1 presents a summary of past local volcanic activity.

TABLE 2.1
LOCAL VOLCANIC ACTIVITY

Name	Approximate Summit Height	Number of Eruptions Since 1700	Date of Last Eruption	Remarks on Activity
Martin	6,050 ft.	0	--	Intermittent steaming Since 1912.
Mageik	7,295 ft.	4	1946	Ash eruptions—1912, 1927, 1926, 1953, active—1929, 1946
Novarupta	2,760 ft.	1	1912	Vent breached during 1912 Katmai eruption. Vent believed to be one of main sources for ash and pumice flow deposits in Valley of 10,000 smokes.
Trident	6,830 ft.	3	1968	Steaming 1912; lava eruption—1953; explosive, ash-charged vapor columns—April 1963 and May 1964; vent clearing explosions plus ash eruptions—Dec. 1967 to Feb. 1968, Nov. 1968.
Katmai	7,540 ft.	7	1931	Explosive eruption with vast pumice and ash deposits accompanied by caldera collapse caused extensive damage to buildings and crops on Kodiak Island and corrosive rains at Seward and Cordova—1912, steam—1931.

THE BOROUGH

TOPOGRAPHY

The Bristol Bay Borough slopes from the foothills of the Aleutian Range in the east of the Naknek River and Kvichak Bay in the west. Maximum elevation is 1,061 feet at the northeastern corner of the Borough and the lowest elevation is Kvichak Bay at sea level. Typically, the land in the Borough is flat with over 75 percent below 200-foot elevation. Naknek and King Salmon are located at elevation 50 feet and South Naknek at elevation 100 feet. The elevation on the northwest side of Kvichak Bay ranges from 383 feet to sea level. The land slopes from the rolling hills of the Kvichak drainage to the bay.

SURFICIAL GEOLOGY

The surficial geology of that portion of the Alaska Peninsula containing the Bristol Bay Borough consists of moraine and glacial drift features as well as some alluvial floodplain and glacial outwash deposits in low-lying areas. The region is characterized by low moraine hills and many shallow lakes. The coastline includes sandy beach areas and bluff escarpments along the Naknek River, as well as several areas of low-lying brackish tidal marsh. The coastal and river bluffs are composed of glacial drift and fluvial deposits which are unconsolidated and unstable. Erosion due to wind, wave, and tidal action can be severe in these areas.

Table 2.2 illustrates the types of deposits, their origin, and general engineering applications.

SOILS

A detailed soil survey was conducted in 1968 by the Soil Conservation Services (SCS) (Furbush and Wiedenfeld, 1969). The SCS survey covered a 40-square-mile area along the Naknek River near Naknek, South Naknek, and King Salmon. The SCS conducted a field investigation and air photo analysis to identify soil series. Air photos were interpreted at a large scale and are relatively accurate. Four soils comprise 98 percent of the area, with several other minor features present.

Information for the rest of the Borough was drawn from the Arctic Environmental Information and Data Center (AEIDC). The AEIDC survey includes generalized soil types in its Alaska Regional Profile for the Southwest Region. The map scale, however, is small and too generalized for engineering application.

TABLE 2.2
SURFICIAL GEOLOGY

Type	Origin	Engineering Application
Moraine and Drift Drift	Extensive moraines and associated glacial drift	Poor foundation materials Poorly drained High ice content Frost susceptible
Glaciolacustrine	Produced by glacially-dammed lakes, high silt content	Poor foundation material Poorly drained High ice content Not frost susceptible
Alluvial	Outwash deposits slightly-to-moderately sorted	Well-drained Not frost susceptible
Coastal	Interlayered alluvial and marine sediments Beaches, spits, bars and deltas	Fair-to-good foundation material Well-drained Not frost susceptible
Tertiary	Basalt and volcanic rock with layer of ash	Good foundation material Steep slopes

The Soil Conservation Service identified the following soil series (see Table 2.3):

1. Kvichak Series: This series is a well-drained soil consisting of a layer of volcanic ash over strata of loam, sandy loam, and sand. It is a very acid soil, and is found on terraces bordering the Naknek River and adjacent tributaries, and on some low hills. Slopes are generally less than 7 percent. These soils were found on approximately 32 percent of the area mapped in the survey.
2. Naknek Series: This is a poorly - drained, perennially frozen soil consisting of a peaty surface mat, sphagnum moss and sedge, over mineral layers often consisting of volcanic ash. This soil is found in most low - lying areas, with slopes less than 7 percent, and constitutes about 50 percent of the soils found in the area.
3. Pustoi series: This series is a well – drained soil consisting of volcanic materials overlain by silt – loam or loamy sand. It is found on the stream terraces and sides of valleys where slopes range from 0 to 12 percent, and constitutes about 9 percent of the area mapped.
4. Tolsona Series: Tolsona soils are sand, generally poorly drained, with a shallow permafrost table. They are covered with a thick organic mat of moss and sedge and are most often found in flood plains draining into Naknek River. Tolsona sands cover about 8 percent of the area surveyed.
5. Nk Series The Nk series is poorly drained loam, sandy loam, and silt loam with, at most, a very thin organic mat at the surface. These soils are strongly acid and are found on slopes of less than 0.5 percent. They are perennially frozen at depths greater than about 42 inches. The soils are not extensive and are generally closely associated with the Naknek soils.
6. Other features: Cliffs and escarpments of exposed glacial drift are found along the Naknek River; these are exposed to moderate – to – severe erosion from tidal action and storm surges in the river. Tidal marshes are found along the Naknek River and its major tributaries.

The AEIDC identified the following soil types:

- | | |
|------------------------------------|---|
| 1. IAHP
---- E - 2
IM | This series is a poorly drained, loamy soil with a peaty surface layer and a shallow permafrost table. Slopes are generally less than 12 percent and erosion potential is a medium. |
| 2. INT - IAHP
----- E - 2
IC | This series is the same as the preceding one but it is mixed with well – drained soil and formed in mostly coarse volcanic ash or in shallow ash over other material. |

Table 2.3

Suitability of Major Soil Series
Found in SCS Survey

<u>Soil Series</u>	<u>Texture</u>	<u>Potential Frost Action</u>	<u>Buildings And Highways</u>	<u>Suitability For:</u>		
				<u>Topsoil</u>	<u>Sand</u>	<u>Gravel</u>
Kvichak	0 – 21", Loam 21" – 39", Sandy Loam	High in upper horizons; low in substratum	Good to fair	Good	Poor above 40"; good below	Poor
Naknek	0 – 3", Loam + 3", permafrost	High	Poor (permafrost)	Poor	Poor (permafrost)	Poor
Pustoi	0 – 4", loam 4" – 24", sandy	Low	Good	Good	Poor (shallow material)	Good
Nk	0 – 5", loamy 5" – 42", sandy	High	Poor (high water table)	Poor	Poor	Poor
Tolsona	0 – 6", sand + 6", permafrost	High	Poor (permafrost)	Poor	Poor	Poor

SURFICIAL HYROLOGY

The Bristol Bay Borough lies within two major watersheds. They are the Naknek lake and river system and the Kvichak Bay or coastal watershed. The Naknek lake and river system is the most significant hydrologic feature within the Borough. Feeding the Naknek River are four major tributaries with drainages that form a major portion of the Borough. The major tributaries are King Salmon Creek, Paul's Creek, Smelt Creek, and Big Creek. In addition, there are numerous surface-fed streams that run into Naknek Lake and Naknek River.

The Kvichak Bay or coastal watershed is comprised primarily of tidal marshes and surface-fed streams that are often tidally influenced. On the northwest side of the borough there are two major creeks feeding Kvichak bay. They are Copenhagen Creek and King Salmon Creek.

Chapter 3 The Natural Setting

THE REGION

The Bristol Bay Region is one of the most productive areas for fish and wildlife in Alaska. It is the heartland of the world salmon fishery and abounds with caribou, moose, bear, waterfowl, and many fur beavers. In addition to commercial salmon fishing, fish and wildlife are taken for subsistence and recreation purposes by both local and non-local hunters and fishermen.

A number of fish, mammal, and bird species are migratory and spend only a portion of the year in the Bristol Bay Borough. The remainder of the year is spent traveling in or out of the borough to seasonal habitats. Salmon, caribou, bear, and a variety of birds are migratory and travel through the borough at various times of the year.

The appendices to this report contain a description and map reference for habitats as defined by 11 AAC 112.300. A complete list of important plants and animals by community is also included in this section.

FISH

All five species of Pacific Salmon migrate into Bristol Bay from the Gulf of Alaska. The majority of these salmon spawn in the river drainages feeding Kvichak Bay. The Kvichak river system, including Lake Iliamna, and the Naknek river system, including Naknek Lake, are the largest salmon spawning area in Alaska.

CARIBOU

There are, essentially, two major herds of caribou present in the Bristol Bay region. The Mulchatna herd ranges centrally in the region, extending as far south as the southwestern shore of Lake Iliamna. The Alaska Peninsula herd ranges between its wintering grounds along the southern banks of the Naknek River to its calving grounds south of Port Heiden.

MARINE MAMMELS

Walrus, seals, and whales migrate into Bristol Bay and can be found periodically in Kvichak Bay. The migration of each species is seasonal and dependant upon weather, ice conditions, and food sources.

BIRDS

The Bristol Bay Region is located along the major flyway for waterfowl, swans, shore birds, and cranes. The coastal and river waters of Bristol Bay support a large number of migratory birds that cross the Alaska Peninsula from the Gulf of Alaska. The Naknek River system and Kvichak Bay serve as a major staging area for those birds migrating north to nest in the Yukon Delta.

THE BOROUGH

FISH

The salmon fishery in Bristol Bay provides a major segment of the economy in the Bristol Bay Borough, and, as such, is probably the most important resource for both commercial and subsistence use. Five major species of salmon comprise the stocks in the area, including: Chinook salmon, pink salmon, coho salmon, chum salmon, and the most abundant, the sockeye salmon. Historically, the total run of salmon in the Naknek-Kvichak estuary has been the largest in the world.

Chinook salmon is a prime sport fish species and is taken in the Naknek River in June and July. Chinook spawn in King Salmon Creek, Big Creek, Paul's Creek, and the Upper Naknek River, with a peak in early July. The fish is taken for both sport and subsistence purposes. Coho salmon, also an important sport and subsistence fish, spawns somewhat later in the year, moving into the Naknek River in late August. Spawning has been observed in King Salmon Creek, Paul's Creek and Big Creek. Chum salmon are not common in the Naknek River drainage, although they are utilized as part of the subsistence fishery. These fish spawn in Big Creek, King Salmon Creek, Smelt Creek, and Paul's Creek during July and August. Pink salmon are utilized by both sport and subsistence fishermen.

Sockeye salmon are by far the most abundant commercial fish species in the Bristol Bay Borough. Extensive work has been done to depict their life history, distribution, movements, and catchment in the Kvichak drainages. Escapement of adult sockeye within the Naknek River drainage ranges from approximately 330,000 to 3.3 million; approximately 50 to 70 percent of the total number of returning adults are taken by commercial fishermen in the Naknek-Kvichak estuary. Most of these fish have returned after two to three years at sea to spawn throughout the Naknek River drainage basin. The fish migrate primarily along the south bank of the Naknek River and spawn mainly in the Brooks River drainage during late July and early August. Eggs over-winter and hatch in January. Fry remain within the gravel until spring breakup, when they move into the various nursery lakes of the Naknek River drainage. Here they feed and grow, moving gradually downstream, and migrate to the ocean early the following summer. Females tend to spend three years at sea before returning to spawn, while males may spend two or three years.

Diving birds, larger fish, seals, and beluga whales are the main predators of salmon smolt. Whales, seals, sea lions, bears, and bald eagles are the main predators of the adult fish returning to spawn.

Other fish present and utilized in the Naknek-Kvichak estuary and the Naknek River include whitefish, grayling, rainbow and lake trout, northern pike, arctic char, dolly varden, herring, and smelt.

Rainbow trout is abundant throughout the area. The Naknek River is one of the primary spawning areas for trout in Alaska.

MAMMELS

Caribou

Caribou is an especially important species in the Bristol Bay Borough because of its subsistence value. Persons in Naknek and South Naknek indicate the possibility of two distinct herds being present on either side of the Naknek River. Historically, caribou distribution in the area of the Borough has been erratic, with animals probably responding to population pressures, forage availability, snow conditions, and weather. The Alaska Department of Fish and Game considers the area to contain two herds. Skoog (1968) considers the area to contain a single herd, with varying boundaries depending on the year. Residents of the Borough indicate that there is a local herd of caribou on the north side of the river that migrates northward in the winter and spends the summer west of King Salmon Creek. The Alaska Peninsula herd utilizes the area north of Becharof Lake and south of the Naknek River as wintering grounds, with calving grounds between the Bear and Meshik rivers to the south.

Biologists as well as residents note that the migration patterns of the Alaska Peninsula herd have been erratic over the last four or five years. Alaska Fish and Game speculates that this may be a response to increasing herd density, and may precede an emigration of the herd and subsequent decline in numbers throughout the range. Emigration appears likely to occur northward across the Naknek and Kvichak Rivers.

Caribou are opportunistic feeders, utilizing lichens, sedges, grasses, mushrooms, and green tips and leaves of willow and dwarf birch. The Alaska Peninsula herd winters north of Becharof Lake where it can forage only lichens and sedges. Forage during the other three seasons of the year is not difficult to obtain.

Moose

Moose are found throughout the Bristol Bay Borough during the year, with winter concentrations along King Salmon Creek, Smelt Creek, Big Creek, and Paul's Creek. Calving occurs in the higher elevations between King Salmon and Paul's Creek and along the lower reaches of King Salmon and Big Creek. Trends in calving, natural mortality, and hunter harvest indicate a steady decline in productivity of the herd. This decline can be related to

deficient habitat and hunger in adult animals. (Faro and Franzmann, 1978). Moose winter habitat in the Borough is limited and that which is present has been over-browsed. Moose browse is limited in this area to willow and dwarf birch found along stream bottoms. Winter browse of high quality is thus very difficult to maintain. It is speculated that hunger has caused lower birth rates and poor calf survival. Predation from bears is also an important factor in calf mortality (Moose Inventory, 1979). Moose productivity is not expected to increase within the next few years, because of the age structure and bull:cow ratios.

Brown Bears

Brown bears are abundant on the lower drainages of the Naknek River. These bears come mainly from the high-density bear areas of the Katmai National Park. Bears concentrate on the major salmon spawning drainages off the Naknek River during the summer months; during winter, they move to higher elevations for denning.

BIRDS

Waterfowl, seabirds, and raptors are present on land and water within and adjacent to the Bristol Bay Borough. The entire Bristol Bay region forms a major staging area for migratory waterfowl. Pacific black brant, Canada geese, pintails, mallards, teal, oldsquaw, eider, scoter, goldeneye, and scaup use this area heavily in both spring and fall as a major stopover. In addition, the Kvichak River is a major migration corridor for both whistling swans and sandhill cranes. Data (King and Lensink, 1971) indicates that autumn migration of 572,000 dabbling ducks and 10,600 whistling swans can be expected in Bristol Bay and the adjacent lake/stream systems. Geese (snow, Canada, American emperor, and black brant) may number as high as one million. Diving duck numbers may be even higher. Eel grass, freshwater rooted aquatic vegetation, and marine and freshwater invertebrates form a major food source for these species.

In addition to waterfowl, raptors such as bald eagles, gyrfalcons, rough-legged hawks, and snowy owls are present in the area. Other birds include shorebirds and passerine birds of various kinds. Willow ptarmigan and spruce grouse also are present.

VEGETATION

The vegetation of the Bristol Bay region is transitional between sub-arctic forest and arctic tundra. Trees in the area are few and distributed sporadically. Distributions seem to be closely associated with soil conditions.

The following are plant communities found most often in the Bristol Bay Borough (Alaska State Housing Authority, 1966):

Alpine Tundra

This low-lying growth of mosses and shrubs appears on the un-forested sand dunes and at the higher local elevations. It thrives in the driest local areas and those with the best drainage. Among this group are various mosses and the local variety of cranberry.

Wet Tundra

On much of the outwash plain, soil conditions favor the growth of sphagnum or bog moss. Where permafrost prevents drainage, overlying soils are water saturated, though there may not be open water. The dampness of the air also favors the growth of sphagnum.

The growth characteristics of sphagnum are such that, once firmly established, it may expand into adjacent areas. If this is the case, it is likely that in time, areas of spruce lichen growth will be converted into areas of moss.

Moist Tundra

Near the shore in almost all the small lakes and ponds, more or less submerged plants live and die to form a mass of humus which builds up the lake bottoms. This condition is a forerunner of cotton grass-sedge marsh. With the continual building up of the bottom of the lake, more and more marsh is created, and the pond shrinks in size.

The dominant shrub of the plant community is a small species of willow, while the most common herb is cotton grass, which is often found in pure stands. This "cotton" tuft was once twisted by natives for oil lamp wicks.

Lowland Forest

White spruce grows on sand dunes, on damp rocky areas where the subsoil is porous and on well-drained parts of the outwash plain. The densest stand of spruce is at King Salmon on the eastern part of a sand dune by the air base. Here soil conditions are most favorable because the soils are well-drained, relatively warm, and the least acidic. The largest and perhaps the oldest tree in the region is located here. Its height is estimated to be 36 feet, its diameter 22 inches, and its age at least 160 years. Most spruces in the Naknek are less long-lived because they are shallow-rooted and are easily overturned by strong winds.

Mixed Thicket

Along the banks of the Naknek River and its tributaries, and on ice-pressure ridges around the numerous lakes and ponds where there are sandy, well drained soils, shrubs of various kinds flourish. Kenai birch is one of the two commonest shrubs and grows individually and in clumps rising generally about 2 to 5 feet high. Its squat form and strong root system enables it to withstand the frequent strong winds, and it attains great age. Alder, the other dominant shrub, rarely grows singly but usually in dense and almost impenetrable clumps, 8 to 12 feet high.

Estuarine Plants

Because of the tidal nature of the Naknek River, salt-loving plants that normally grow only along the seashore are found along the edge of the river and its tributaries, nearly as far inland as the Naknek moraine.

Riparian Plants

A small but separate community of “watergrowers,” dominated by reeds and five-finger, is recognized along the edges of the Naknek River and its tributaries beyond the upper tidal limit.

Lacustrine Plants

Bordering the shores of the lakes and generally growing in the water, there is a distinctive community of plants. This includes water lilies rooted in the soft, unconsolidated muck that forms the bottom of most of the ponds.

Chapter 4 Resource Findings

RESOURCE INVENTORY FINDINGS

This section summarizes the results of the resource inventory found in Part I of the Borough's coastal management program, and forms the basis for designated appropriate land and water uses, management policies and the identification of areas which merit special attention. The findings report the essential elements of the resource inventory, and the conclusions suggest areas which need thorough consideration by the Borough as part of its coastal management program.

THE PHYSICAL SETTING

TOPOGRAPHY

Finding

The land area within the Borough is relatively flat with over 75 percent below 200-foot elevation. The topography slopes gently from the high elevation of 1,061 feet in the northeast to the coastal bluff along the Naknek River and Kvichak Bay.

Conclusion

The majority of the Borough land has poor surface drainage, which is characterized by standing water and wet or moist tundra. Poor drainage is typical in large areas of relatively flat terrain.

Finding

King Salmon, Naknek and South Naknek are situated at elevations 50, 100, and 75 feet, respectively. Naknek and South Naknek are located on the bluffs above the Naknek River.

Conclusion

The Borough's communities, though protected from tsunami hazards due to shallow marine waters, are threatened by high-energy coastal erosion.

SURFACE GEOLOGY

Finding

The primary surface geological features of the Borough are moraine and glacial drifts. Alluvial floodplain and glacial outwash deposits, to a lesser extent, from the low-lying areas.

Conclusion

Moraine and drift deposits are characterized by poor drainage, high ice content and frost-susceptible material. Alluvial and glacial outwash deposits are suitable foundation material, well drained and non-frost susceptible.

Finding

The coastal bluffs supporting the communities of Naknek and South Naknek are composed of unconsolidated glacial and fluvial deposits. This material tends to be unstable during seismic activity.

Conclusion

The landslide hazard in the developed areas of the Borough is significant and could cause property damage or loss of life. A public awareness program should be established by the Borough to assure public knowledge of this hazard and to help design means to assure safe development.

Finding

Gravel is a key material for most of development in the Borough, yet it is a relatively scarce commodity.

Conclusion

A gravel resource needs and availability evaluation should be undertaken jointly by all three levels of government in association with the private sector.

SEISMICITY

Finding

The Bristol Bay Borough is north of the major areas of seismic activity. Typically, earthquakes that affect the Borough are at great depths and of low strength.

Conclusion

The earthquake potential within the Borough is low, though the coastal and river bluffs present increased hazards due to their geologic formation and soils.

VOLCANISM

Finding

Volcanic activity within the Bristol Bay is extreme. Forty of the sixty volcanic centers have been active over the last three decades.

Conclusion

Ash deposits present the primary hazard related to volcanic activity in the region.

SOILS

Finding

The Kvichak and Pustoi soils, identified by the Soil Conservation Service, comprise approximately 41 percent of the Borough's developed land area. Kvichak and Pustoi soils are suitable for highway and building foundation material and are a good source of topsoil and sand.

Conclusion

There is adequate land within the developed area of the Borough to support highway and building construction, and to provide the necessary construction materials. However, gravel resources are limited, as noted earlier.

Finding

The Naknek and Tolsona soils comprise approximately 58 percent of the land within the Borough's development area. These soils are generally poorly drained with high water content. They are poor construction materials due to high frost susceptibility.

Conclusion

Naknek and Tolsona soils should be avoided when possible for construction sites and materials due to potential structural damage and high development costs.

HYDROLOGY

Finding

The Bristol Bay Borough lies within two major watersheds which include the major inland creeks, the Naknek River and Kvichak Bay. These watersheds extend beyond the limits of the coastal management district.

Conclusion

Land and water use within the Borough could impact both local and regional water bodies. Development activity outside the coastal management district could impact resources within the Borough. Cooperative management is necessary to assure adequate protection of Borough resources.

THE NATURAL SETTING

MIGRATORY FISH & WILDLIFE

Finding

Marine mammals, caribou, birds and a variety of fish and migratory and spend a portion of the year is spent out of the Borough in other seasonal habitats.

Conclusion

When considering the fish and wildlife resources of the Borough, it is important to understand their migratory nature and the need for a cooperative approach to resource management.

MIGRATION CORRIDORS

Finding

The Kvichak Bay and Naknek River serve as primary migration corridors for a majority of Bristol Bay salmon.

Conclusion

Salmon migration corridors are essential to the maintenance and enhancement of salmon stocks, and should be protected.

SPAWNING AREAS

Finding

Paul's Creek, King Salmon Creek, and Big Creek are primary spawning and rearing areas for red, king, chum, coho, and pink salmon. The Naknek River, between the communities of King Salmon and the mouth of Naknek Lake, is a primary spawning and rearing area for pink and king salmon and rainbow trout. Naknek Lake and its tributaries are primary spawning and rearing areas for coho salmon.

Conclusion

There are a number of significant salmon and trout rearing areas within the Bristol Bay Borough. These areas should be protected against land and water uses that would adversely impact the species.

CARIBOU

Finding

The Bristol Bay Borough provides wintering habitat for both the Alaska Peninsula herd and for a small local herd. The Alaska Peninsula herd winters south of Naknek River and the local herd winters north of the river.

Conclusion

The number of caribou wintering within the Borough varies annually, depending upon migration patterns and weather. Caribou is an important subsistence food source for many of the Borough's residents. Wintering habitat should be protected from detrimental land and water uses to maintain and enhance the subsistence resources.

MOOSE

Finding

Moose range in the riparian habitat associated with Paul's Creek, Smelt Creek, Big Creek, and King Salmon Creek during the fall and winter. They calve along the lower Big Creek, King Salmon Creek, and in the higher elevations in the northeast portion of the Borough during the spring.

Moose are hunted as a subsistence food source by many of the Borough's residents.

Conclusion

Though the moose population in the Borough is presently stable, disturbance to calving areas or reduced food sources could negatively affect to stock. Moose habitat should be protected from disruptive uses.

BIRDS

Finding

The Naknek River and the coastal areas along Kvichak Bay serve as primary staging areas for both the fall and spring migration of shorebirds, ducks, geese and swans. In addition, the uplands of the Borough provide nesting grounds for a number of migratory birds.

Conclusion

Staging and nesting areas are essential for maintaining migratory bird populations. Many species of migratory birds are managed under international treaties and provide a subsistence food source for rural Alaskans. Staging and nesting areas should be preserved to maintain present bird populations.

MAN'S LAND USE

SETTLEMENT

Finding

Settlement in the Bristol Bay region occurred over 6,000 years ago. One hunting camp discovered on the Naknek River dates back to 3000 to 4000 B.C.

Conclusion

The Bristol Bay Borough holds a wealth of historic and prehistoric resources. The existing and future sites should be protected as a valuable resource illustrating the community's heritage.

INDUSTRIAL LAND USE

Finding

Fish processing represents the majority of industrial land use within the Borough. There are approximately 16 operators or salmon processing sites that occupy up to 40 acres each.

Conclusion

Fish processing is a priority land use within the Borough due to its importance to the regional economy. Industrial land should be maintained and future sites reserved to protect and promote economic development.

COMMERCIAL AND RESIDENTIAL LAND USE

Finding

Mixed commercial and residential land use is concentrated within the communities of King Salmon, Naknek and South Naknek. Lower density use is developing along the Naknek-King Salmon Road, with increasing concentration in the vicinity of King Salmon and Paul's Creek.

Conclusion

While there are presently 10,000 acres of private land in and around the communities of King Salmon, Naknek, South Naknek, and along the Naknek-King Salmon Road, much of this land is unavailable due to limited roads or large block ownerships. The majority of the private land is owned by the Borough's village corporations. Based on demand forecasts for future housing and commercial development, adequate land is available for development over the next 20 years, assuming access and disposition are overcome.

RECREATIONAL AND SUBSISTENCE LAND USE

Finding

The largest amount of land in the Borough remains in its natural state and is used for recreational purposes and subsistence hunting, trapping, and gathering.

Conclusion

The value of subsistence food sources and recreational pursuits is well documented and contributes to the Borough resident's lifestyles. Adequate land for subsistence and recreational use should be reserved and protected.

WATER USE

Finding

The water bodies within the Bristol Bay Borough tend to be more intensively used than the land. Kvichak Bay is used for marine transportation and is a primary commercial fishing area. The Naknek River is used as a marine transportation corridor to service the Borough communities by bringing in supplies and groceries, and to supply fish to the canneries and fish processing sites. The river shores are intensively used for subsistence set-netting, sport fishing, and float plane operations.

Conclusion

Commercial, subsistence and sport fishing, and transportation access are primary water uses for Kvichak Bay and the Naknek River. These uses should be protected and maintained, and public access to these waterways should be guaranteed.

POPULATION

Finding

The population of the Borough has remained consistent over the past 10 years. Seasonal influx of transient labor increases populations to approximately 8,000 people during the salmon season.

Conclusion

The Borough population will increase slightly over the next 10 years based on a low, but constant, growth in the resident fishing industry. Seasonal population expansion will continue to place pressure on the Borough housing market and infrastructure.

EMPLOYMENT

Finding

Commercial fishing and fish processing employ the majority of Borough residents on a seasonal basis. During the 2004 salmon season, Borough fishermen received a gross income of 60.5 million from drift netting, and 15.1 million from set nets.

Conclusion

Commercial fishing is the mainstay in the Borough economy. Priority should be given to those land and water uses necessary to maintain and enhance the fishing industry.

Finding

Government employment, seasonal construction, tourism, and sport fishing activities contribute significantly to the Borough economy.

Conclusion

The Borough should look to growth within these areas.

LAND OWNERSHIP

Finding

The federal government is the largest landowner in the Bristol Bay Borough, occupying approximately 189,000 acres, or 59 percent of the land area. Paug Vik and the Alaska Peninsula village corporations own a majority of the private land. Individual landowners make up a lesser portion of the 129,000 acres, or 40%, in private ownership. The Borough and state governments each own less than one percent, or about 3,000 acres of land.

Conclusion

Land ownership in the Borough is varied with large holdings in both private and federal ownership. Village corporations own the surface rights and the Bristol Bay Native Corporation owns the subsurface rights to most of the privately owned land. Future major development activities will depend upon market forces and land and resource availability. The coastal management program should serve as a guide to government and private landowners, by determining appropriate land and water uses and setting policy guidelines. As land moves from federal ownership to state or other ownership, such land will automatically fall under state and local management jurisdiction.

LAND MANAGEMENT

Finding

Land management within the Borough is the responsibility of a variety of federal and state agencies, as well as the Borough government.

Conclusion

It is in the best interest of the Borough to complete its coastal management program and work in cooperation with the various levels of government involved in the Bristol Bay region.

HABITAT EVALUATION

Maintaining rich wildlife habitat is very much in the interest of Bristol Bay Borough. Because of its relatively isolated location and cultural heritage, commercial fishing, subsistence hunting and fishing, and, to a lesser extent, recreational hunting and fishing, play an important part in the lives of many residents. In addition to socioeconomic values, recreational and less tangible aesthetic benefits accrue from managing wildlife habitat in a sensitive and ecologically consistent manner.

Evaluation of development impacts on habitat quality is difficult at a general level. The impacts vary from one type of development to another, and from one site to another. The impacts can occur at the immediate site, by displacement of the habitat or offsite such as by siltation of streams. As the Bristol Bay Borough continues to grow, some losses in habitat quality and type are unavoidable.

Generally, tundra upland receives the least amount of wildlife use. The Naknek River, major creeks, fresh and saltwater marshes, and associated riparian areas receive the most intense wildlife use. Borough management and residents must assume responsibility for determining the type and degree of habitat disruption from future development permitted by the Borough. Cooperative effort and communication between residents, Borough management, resource managers, government regulators and developers are necessary for a coastal management program to be effective.

In order to effectively evaluate land and water uses and develop management recommendations commensurate with the Alaska Coastal Management Act of 1977, we used the following definitions of types of habitat.

1. Offshore areas - submerged lands and waters seaward of the coastline. 11ACC112.990(17)
2. Estuary – a semi-closed coastal body of water, which has a free connection with the sea and within which seawater is measurably diluted with fresh water derived from land drainage. 11AAC112.990(11)
3. Tide-flats - mostly unvegetated areas that are alternately exposed and inundated by the falling and rising of the tide. 11AAC112.990(27)
4. Exposed high-energy coasts – open and unprotected sections of coastline with exposure to ocean-generated wave impacts and usually characterized by coarse sand, gravel, boulder beaches, and well-mixed coastal water. 11AAC112.990(12)
5. Rivers, streams, and lakes – undefined. 11AAC112.990 923
6. Wetlands – includes both freshwater and saltwater wetlands; freshwater wetlands are those environments characterized by rooted vegetation which is partially submerged either continuously or periodically by surface fresh water with less than 0.5 part per

thousand salt content and not exceeding three meters in depth; saltwater wetlands are those coastal areas along sheltered shorelines characterized by halophytic hydrophytes and macro-algae extended from extreme low tide to an area above extreme high tide which is influenced by sea spray or tidally induced water table changes.11AAC112.990(33)

7. Rocky islands and sea-cliffs – islands of volcanic or tectonic origin with rocky shores and steep faces, offshore or coastal remnants which form a barrier of low-lying islands and bars protecting a saltwater lagoon with free exchange of water to the sea. 11AAC112.990(24)
8. Barrier islands and lagoons – depositional coastal environments formed by deposits of sediment offshore or coastal remnants which form a barrier of low-lying islands and bars protecting a saltwater lagoon with free exchange of water to the sea.11AAC112.990(93)

Bristol Bay Borough has approximately 500 square miles of land area (and another 400 square miles of water area). Only a small portion of this region is accessible by road. Consequently, onsite analysis of most of the area was infeasible. Although a variety of means was employed in delineating habitat, a land cover map developed from digital Landsat and digital topographic data for the Bristol Bay Cooperative Study Region and coded for a range of cover types was the primary source.

Vegetated land cover consists of plant communities. A plant community is an association of plants of different species, which are responding to similar environmental conditions such as soil type, moisture, slope, temperature, and aspect. Vegetation communities indicate particular habitat types. Based on a number of variables, but primarily reflectance, plant communities will code as different colors based on digital computerized data.

Habitat types as defined by ACMP are broad, and some of them contain a variety of more specific habitats. For example, uplands include lichen-covered rocky alpine slopes; coniferous, deciduous, and mixed forest; lichen shrub tundra; and drier types of ericaceous and graminoid shrub tundra. Wetlands cover saline tidal marsh, freshwater marsh and wet bogs and meadows.

Three ranges of cover types characterized the largest portion of terrestrial/wetland portions of Bristol Bay Borough.

- Open low shrub ericaceous/conifer woodland/mesic bog/ericaceous shrub tundra
- Open low shrub graminoid/mesic bog/graminoid shrub tundra
- Lichen shrub tundra

Detailed descriptions of different plant associations which actually form specific subhabitats under each broad habitat category are discussed in Viereck, et al. (1982). These references should be investigated for a more detailed enumeration of plants and ecological characteristics.

OFFSHORE AREAS

Approximately 40 percent of Bristol Bay Borough consists of Kvichak Bay, the northernmost portion of Bristol Bay. The eastern boundary of the Borough follows the western shoreline of Kvichak Bay.

Large tidal ranges prevent the formation of shore-fast ice during winter months. Tidal ranges increase toward the head of the bay; in Naknek, the mean tidal range is 18.5 feet.

Much of Kvichak Bay is relatively shallow with large tide flats, exposed at low tides. The long fetch of the southwest and the relative shallowness of the water cause steep, irregular waves, rather than long swells.

Water quality in Kvichak Bay is good with excellent flushing because of the large tidal ranges and large flows from the rivers. Turbidity varies but can be high because of the shallow bay, large waves, and spring melt waters.

Kvichak Bay abounds in wildlife on a seasonal basis. All five species of Pacific salmon migrate through the coastal waters to the Kvichak and Naknek Rivers for spawning. Walrus, seal, and whale migrate through Bristol Bay proper and can be found in Kvichak Bay and the Naknek River. Whistling swans, sand-hill cranes, numerous species of ducks and shorebirds, and several species of geese all rest and feed at times in the shallow water of the bay.

ESTUARY

Because of the freshwater influence of the Kvichak and Naknek Rivers, and general coastal drainage, the waters of Kvichak Bay are considered estuarine with salinity ranging from 12.4 to 31.2 parts per thousand. Because of the higher water flows from the drainages during spring and early summer, salinity tends to be less at those times. In addition, a saline wedge of water protrudes up both the Kvichak and Naknek Rivers creating estuarine conditions in their lower sections. In the Naknek River, salinities of up to 10 parts per thousand have regularly been detected eight miles up from the mouth and may extend several miles past this point during a combination of high tide and low river flow (Buck, et al., 1978)

TIDE-FLATS

Tide-flats occur throughout Kvichak Bay and approximately four miles up the Naknek River. Tide-flats occurring in Kvichak Bay and the estuarine portion of the Naknek River are strongly influenced by the saline character of the water and are mainly un-vegetated.

Tides also cause fresh water upriver of the estuarine areas of the Naknek River to rise and fall uncovering sand, mud, or silt substrate. These periodically wetted lands are also mainly un-vegetated.

Both the Fish Wildlife Service (FWS) and Corps of Engineers (COE) consider tide-flats as wetlands and the COE maintains permit authority over alteration to these habitats. On State-owned tidelands, a lease or permit from the State must be obtained.

EXPOSED HIGH-ENERGY COASTS

North of the Naknek River, coastal bluffs consisting of glacial drift and fluvial deposits occur upriver of the town of Naknek, around Cape Suworof, and up the coast approximately three miles. South of the Naknek River, coastal bluffs occur from upriver of South Naknek, west toward the mouth of the river, and south down the coast past the southern Borough boundary line. Riverine bluffs also occur up the Naknek River on the north and south side of the river. Generally, these bluffs are highest at Naknek and South Naknek where they reach 75 to 100 feet in height. Upriver and around the mouth of the river to the north and south, bluffs vary between 25 and 75 feet high.

The steep sides of the bluffs are generally un-vegetated consisting of unconsolidated materials. Deciduous thickets of Kenai birch, Sitka alder, and willow occur along the top of the bluffs.

RIVERS, STREAMS, AND LAKES

The Bristol Bay Borough lies within two major watersheds. They are the Naknek Lake and river system and the Kvichak Bay or coastal watershed. The Naknek lake and river system is the most significant hydrologic feature within the Borough. Feeding the Naknek River are four major tributaries with drainages that form a major portion of the Borough. The major tributaries are King Salmon Creek, Paul's Creek, Smelt Creek, and Big Creek. In addition, there are numerous surface-fed streams that run into Naknek Lake and Naknek River.

Land adjacent to rivers and creeks consisting of relatively flat floodplains and steeper terrain leading up to relatively level tundra or deciduous forests is termed "riparian." Grasses primarily blue-joint and sedges, are common along with herbaceous plants such as bunchberry, fireweed, yarrow, northern water carpet, northern rockcress, cloudberry, nagoon-berry, and violets. Kenai birch, willow, and alder comprise a tall shrub or tree layer depending on where they grow. Frequently on the low, active floodplain areas, dense thickets of these trees occur.

On the edge of the streams and rooted in the water, marsh five-finger and sedges predominate. Water buttercup and mare's tail occur as submerged aquatics.

Lakes and ponds of varying sizes and depths occur throughout the Borough. Many of the shallower ponds are constantly filling with decayed plant materials and sediment as they change to marshes and wet meadows. A number of ponds on the 1951 U.S.G.S. topographic maps appeared as marshy areas on the 1981 Landsat photographs.

Emergent aquatic plants such as sedges, marsh five-finger, swamp horsetail, and buckbean grow in the shallow margins of the lakes. Occasionally, yellow pond lily, a floating aquatic plant, will cover a portion of a pond.

Although described under “rivers, streams, and lakes” in this analysis, the COE considers active floodplains along riparian areas and lakes and ponds with depths less than 6.6 feet as wetlands for permitting purposes.

The Naknek River and Paul’s and King Salmon Creeks are excellent fish habitat. Salmon hatch, rear, migrate, and spawn in these waters. In addition, rainbow trout, grayling, Dolly Varden, and whitefish and several non-game species of fish, including sculpin and stickleback, reside year-round in these waters. The stretch of river above Rapids Camp is especially noted for rainbow trout fishing.

Naknek Lake and a number of other smaller lakes are also noted for fishing. Northern pike, rainbow trout, lake trout, and Arctic char are the main species in these lakes.

Riparian areas up and down the major creeks and along the Naknek River provide excellent habitat for a number of larger mammals including brown bears, moose, beaver, mink, wolverine, otter, muskrat, lynx, caribou, red fox, and wolf. These animals venture out on the flat tundra vegetation, mainly to feed.

Whistling swans and numerous species of waterfowl nest and stage along the Naknek River. The area along the section of the river between Naknek Lake and Smelt Creek is a noted whistling swan and pintail staging area.

WETLANDS

The importance of wetlands to the ecology of a region is well documented. Wetlands provide buffers from storms and flooding by absorbing excess water into the organic matrix, which serves as substrate. Wetlands serve as hydrological reserves where they slowly release stored water to ground and surface water reservoirs, which is especially needed during times of drought.

Wetlands can also filter out pollutants, such as suspended solid material, as water flows through the vegetation and organic matrix. Wetlands supply nutrients to marine and aquatic habitats thereby enhancing productivity and serving as habitat, nursery grounds, and food sources for a large variety of plants and animals.

For the purpose of developing and implementing a coastal management program, however, there are two particular definitions that must be considered. The Alaska Coastal Management Program (ACMP) provides a definition in its regulations, which was used in the resource inventory and analysis. The U.S. Army Corps of Engineers (COE) also has a definition.

Freshwater Marsh

Fresh standing water, occasionally obscured by vegetation, supports plants which generally only occur in this type of mostly aquatic habitat. Buckbean, marsh fivefinger, and swamp horsetail are dominant forbs; sedges also occur in thick stands.

Wetbog - Meadow

These very wet habitats support a moderate diversity of plants with mosses and sedges predominating. Shallow standing water occurs in pools and wet barren soil is scattered throughout the habitat, but very little vegetation grows in these areas. Mounds characterize the micro-relief vegetated with bog rosemary, dwarf birch, and blueberry.

Tidal Marsh

Tidal marshes occur throughout most of the low areas along Kvichak Bay, and they extend inland along some of the creeks, which drain the lowlands. Much of the ground is barren and covered with water at higher tides. Vegetation consists of plants which can tolerate tidal fluctuations and saline water. Sedges, mainly Carex Lyngbye and cottongrass, comprise of the vegetation.

CONDITIONAL UPLAND/WETLAND

These habitats include tundra vegetation and probably correspond to areas Viereck and Little (1972) mapped as wet tundra. Along with the definite marsh and wet bog and meadow areas, Landsat revealed two main habitat types: ericaceous shrub tundra and graminoid shrub tundra. These occur on both poorly drained and moderately well drained soils.

Visits to a number of these sites during mid-June 1982 showed relatively dry areas with a minimum of standing water and cotton-grass tussocks as the dominant vegetation. Below the surface layers of vegetation, soil was damp. None of the vegetation was actually submerged. Small pothole like depressions were present and contained wet soil or shallow water with no vegetation. Conceivably during spring thaw, some of the lower areas and portions of the plants are under standing water for periods of time.

Ericaceous Shrub Tundra

This plant community has little structural diversity. Ericaceous shrubs such as Labrador tea, bog rosemary, alpine azalea, dwarf birch, and low willow comprise the very low shrub layer. The ground layer consists of mat willows, cloudberry, grasses, and sedges, primarily cotton-grass.

Graminoid Shrub Tundra

This species composition resembles ericaceous shrub tundra, but with grasses and sedges, mainly cotton-grass, occurring more abundantly.

Chapter 5 Human Use

THE REGION

SETTLEMENT

Settlement in the Bristol Bay region first occurred over 6,000 years ago. A hunting camp has been identified on the Naknek River (Dumond, 1973) that dated 3,000 to 4,000 B.C. Yupik Eskimo and Athapascan Indians jointly occupied the region for an extended period of time. The Eskimo residents of the region inhabited the coastal areas while the Indians inhabited the uplands around Lake Iliamna.

Recorded history began in Bristol Bay in 1818, with the arrival of Russian traders. The first Russian settlement was established in 1820. In 1841, the first Russian Orthodox mission was built at Nushagak and from there the Russians explored and settled the region until 1967. In 1884, the first salmon cannery was built at Nushagak and, in 1890, Cress P. Hale built the first cannery on Kvichak Bay at Pederson Point. By 1900, there were a dozen canneries on the shores of Bristol Bay.

The community of Naknek formed around the Russian Orthodox Church, the first recorded land owner of the north side of the Naknek River. South Naknek was settled after the turn of the century as a result of the cannery development on the south shore of the Naknek River. In the 1930s, an air navigation site was built connecting King Salmon and Naknek, and the settlement of King Salmon began

Table 5.1 shows archaeological and historical sites in the area.

TABLE 5.1
ARCHAEOLOGICAL AND HISTORICAL VILLAGE SITES

Name	Date	Ownership	Condition	Environment
Smelt Creek	200 BC	Private	Partially excavated	Riverine, moist tundra
Pakik	1000 AD	Private	Partially excavated Undisturbed	Riverine, moist tundra
Naknek No. 4	c. 1900 AD	Private	Undisturbed	Riverine, moist tundra
Naknek No. 5	c. 1900 AD	Private	Site tested only	Riverine, moist tundra
Naknek No. 6	500 AD	Private	Partially excavated	Riverine, moist tundra
Naknek No. 7	c. 1900 AD	Private	Partially excavated	Riverine, moist tundra
Naknek No. 8	1400 AD	Private	Partially excavated	Riverine, moist tundra
Naknek No. 9	c. 1900 AD	Private	Undisturbed	Riverine, moist tundra
Naknek No 11	1400 AD	Private	Partially destroyed	Riverine, moist tundra
Naknek No.12	1820 AD	Private	Site tested only	Riverine, moist tundra
Naknek No. 13	c. 1900 AD	Private	Undisturbed	Riverine, moist tundra
Naknek No 14	c. 1900 AD	Private	Site tested only	Riverine, moist tundra
Naknek No. 16		Private	Site tested only	Riverine, moist tundra
Naknek No. 17		Private	Undisturbed	Riverine, moist tundra
Naknek No. 18	5920 BC	Private	Disturbed, partially excavated	Wave beaten coast, wet tundra
Naknek	c. 1900 AD	Local Government	Undisturbed	Riverine, moist and wet tundra

Source: Alaska Heritage Resource Survey, 1976, State of Alaska

THE BOROUGH

LAND AND WATER USE

The Bristol Bay Borough is approximately 900 square miles in total area. There are about 500 square miles of land area and an additional 400 square miles of water area. Type and intensity of land use within any area is dependent upon economic activity and population. Industrial activity in the Borough is seasonal and centralized around salmon processing. Commercial activity supports the fishing industry on a seasonal basis and a resident population year round. Considering the seasonal nature of the economic activity in the Borough and the small resident population, both the intensity and the densities associated with land use are minimal.

Canneries

There are presently 16 operators or salmon processing sites in the Borough. Canneries have developed on the shores of Kvichak Bay or on the banks of the Naknek River on fairly compact sites of up to 40 acres.

Residential/Commercial, Moderate Density

In the communities of Naknek, South Naknek, and King Salmon, residential and commercial development has occurred to support the Borough's residential population. The approximate total area for commercial and residential use in the three communities is 3,000 acres. The figure is a gross estimate including community facilities, governmental offices, and roads.

Residential/Commercial, Low Density

A portion of the resident population of the Bristol Bay Borough lives outside the limits of the three communities. The majority of these people live along the Naknek-King Salmon Road corridor. The vicinity where the road meets King Salmon Creek and Paul's Creek is developing as a residential/commercial area. There are approximately 7,700 acres of easily accessible land along the road corridor between Naknek and King Salmon. The amount of residential and commercial use of this land is minimal and both the density and intensity of use is low. In addition to the road corridor, there are some scattered cabins and fish camps along the Naknek River and along Kvichak Bay at Pederson Point.

Recreation, Subsistence, Wilderness

Most of the land in the Borough remains in its natural state and is used solely for recreational or subsistence hunting. Recreational or sport hunting within the Borough occurs to a much lesser extent, by comparison, than in other parts of the region or the Alaska Peninsula.

There is a substantial amount of subsistence hunting and trapping as well as subsistence gathering throughout the Borough. Caribou is hunted primarily on the south side of the Naknek River. Smelt Creek and Big Creek are used to travel farther into the herds' wintering grounds.

Moose is hunted in the foothills of the Alaska Range in the northeast corner of the Borough and also at the headwaters of King Salmon and Paul's Creek. Trapping for mink, martin, and beaver takes place throughout the Borough and berry picking occurs in the areas south of South Naknek and north of Naknek around Pederson Point.

Water Use

Kvichak Bay and the Naknek River and lake system are used both for fishing and for transportation. Intense gill-netting for salmon migrating into the Nushagak and Kvichak Rivers occurs in Kvichak Bay. In addition, commercial set-nets line the shores of the bay and subsistence nets line the banks of the Naknek River. There is also sport fishing along the Naknek River and its major tributaries.

TRANSPORTATION

Historically transportation, both within the region and to other parts of Alaska has been limited to dog team during the winter, and boat after breakup. The airplane opened up Alaska and, today, air transportation is the most efficient and available means of travel in and out of the region. There are commercial airlines and air charters servicing Bristol Bay airports and air strips throughout the region.

Captain Cook, sailing one of the first ships into Bristol Bay in 1778, was impressed by the multitude of salmon. Marine transportation remains a mainstay for moving bulk goods in and out of the bay. Goods from Anchorage and Seattle are shipped into the region to supply residents of the region as well as fishermen working in Bristol Bay. During the fishing season, canned and frozen fish are shipped to Japan and the West Coast ports.

The Bristol Bay Borough has the region's only paved road, the regional airport, numerous landing strips, and dock facilities for marine transportation. There is an established road network in each of the three communities and a paved road connecting Naknek and King Salmon. At present there is a bridge planned to connect Naknek and South Naknek.

King Salmon Airport shares a modern, paved runway with the King Salmon Air Force Base. The runway is capable of landing a jet aircraft and has an apron for airplane storage. Table 5.2 lists the airport and landing strips within the Borough.

The Bristol Bay Borough is serviced by barge and ship. Freight is moved in and out of the Borough by sea during the ice-free months of the year. In 1983, the Borough developed a shipping dock/port that in 2004 handled over 150 million pounds of freight and fish. At high tide, power scows with drafts of 12 feet or less can navigate 12 miles up river, and those crafts with 3-foot drafts or less can proceed to the rapids.

TABLE 5.2
AIRPORT AND LANDING STRIPS

	Location	Type	Length	Surface	Owner	Comments
1.	King Salmon	Airport	8,500 ft. x 150 ft 4000 ft. x 100 ft	Asphalt	Public	Major regional airport, lighted
2.	King Salmon	Seaplane	3,000 feet	Naknek River	Public	Runways, apron, terminal
3.	Naknek	Landing Strip	1,700 feet	Gravel	Private	Private service
4.	Naknek	Landing Strip	1,950 x 50 feet 1,850 x 45 ft	Dirt	Public	Lighted
5.	Naknek	Landing Strip	2000 x 300 feet	Nornek Lake	Public	
6.	South Naknek	Landing Strip	3,310 x 60 feet 2,260 x 60	Gravel	Public	Lighted
7.	Pederson Pt.	Landing Strip	1,200 feet	Dirt	Private	Primary access to beach/closed

THE COMMUNITIES

Naknek

The earliest evidence of man's presence in the Bristol Bay Borough places him in Naknek approximately 5,000 to 6,000 years ago (Dumond, 1973). In recent history, Naknek developed around a Russian Orthodox church, built on the banks of the Naknek River in the 1800s. The community grew out of the salmon fishery and, today, is the heart of the sockeye salmon fishing and processing industry and the seat of Borough government. Naknek, with its four canneries, offers the largest variety of goods and services in the Borough, and, over the past few years, has experienced continued moderate growth. There is a borough high school that serves Naknek, King Salmon, and South Naknek, and a pre-school and elementary school that serves Naknek and King Salmon. There is a hotel, two restaurants, a health clinic, civic center, fire station, and a variety of offices including Paug-Vik, the village corporation for Naknek and major landowner in the Borough.

South Naknek

South Naknek, an early Native village, developed around the canneries built at the mouth of the Naknek River. The community is the smallest in the Borough. There is an elementary school in South Naknek, but students are flown to Naknek daily to attend high school. The community has a recreation hall that houses an office of the Alaska Peninsula Corporation and the village council. The community has a store and an airstrip. The Borough recently built a firehouse for South Naknek.

King Salmon

The community of King Salmon originated as an air navigation site built in the 1930s. In 1943, the site was converted to the Naknek Air Force Base and subsequently became the King Salmon Air Force Base. King Salmon grew as a result of World War II and was connected to Naknek by road in 1949. A long, paved runway and modern facilities make King Salmon the major airport in the region. State and federal government agencies located in King Salmon because of the accessibility, land availability, and the convenience of the services supporting the Air Force base.

King Salmon has a store, a hotel, and three restaurants. A dock facility and boat launch is provided on the Naknek River for recreational users. The community has modern housing and a planned residential area along King Salmon Creek. King Salmon is a departure point for sportsman and recreational users traveling to other parts of the region and to Katmai National Park. Pre-school through 12th grade students are transported by buses to Naknek.

See tables 5.3 and 5.4 for a listing of the communities' facilities, services and utilities.

TABLE 5.3
COMMUNITY FACILITIES AND SERVICES

	SCHOOLS	HEALTH FACILITIES	TRANSPORTATION	CHURCHES	HALLS	COMMERCIAL	GOVERNMENT
NAKNEK	HIGH SCHOOL FOR NAKNEK, KING SALMON, SOUTH NAKNEK, ELEMENTARY SCHOOL FOR NAKNEK AND KING SALMON	HEALTH CLINIC DOCTOR 3 BEDS DENTIST	ROADS AIRPORT DOCK FACILITY MARINE INDUSTRIAL PARK	LUTHERAN CATHOLIC RUSSIAN ORTHODOX COMMUNITY CHAPEL	CIVIC CENTER	GIFT SHOP NAKNEK TRADING BEAUTY SALON AUTO PARTS STORE	BRISTOL BAY BOROUGH LIBRARY POST OFFICE FIRE STATION MAGISTRATE
SOUTH NAKNEK	ALL STUDENTS GRADES 1-12 FLOWN TO NAKNEK	HEALTH CLINIC HEALTH AIDE HALF TIME	ROADS AIRPORT DOCK FACILITY	LUTHERAN RUSSIAN ORTHODOX	RECREATION HALL	JOHNSON'S STORE	LIBRARY POST OFFICE VILLAGE COUNCIL
KING SALMON	PRESCHOOL THROUGH GRADE 12 BUSED TO NAKNEK	HEALTH CLINIC HEALTH AIDE	ROADS AIRPORT DOCK FACILITY PARK	COMMUNITY CHAPEL	VILLAGE COUNCIL	KING SALMON COMMERCIAL FLORIST BEAUTY SALON HEALTH CLUB GIFT SHOP	LIBRARY POST OFFICE NATIONAL PARK SERVICE FEDERAL AVIATION ADMINISTRATION ALASKA DEPT OF FISH AND GAME POLICE STATION/ JAIL US FISH & WILDLIFE OFFICE

TABLE 5.4
COMMUNITY UTILITIES

	WATER SUPPLY	SANITARY SYSTEM	SOLID WASTE	ELECTRIC	COMMUNICATION
Naknek	Ground and surface Water well	Sewer System	Landfill shared with King Salmon	Naknek Electric Assoc.	Radio reception Television (Alaska Satellite Sys.) Telephone
South Naknek	Groundwater Well	Septic Tanks	Open Dump	Naknek Electric Assoc.	Radio reception Television (Alaska Satellite sys.) Telephone
King Salmon	Groundwater Well	Sewer System	Landfill shared with Naknek	Naknek Electric Assoc.	Radio Reception Television (Alaska Satellite Sys.) Telephone

THE ECONOMY

Population

According to 2000 U.S. Census data, the Bristol Bay Borough has a population of 1,258. The population breaks down to 54% male, with a median age of 36. The ethnicity of Bristol Bay Borough is 43% Alaska Native. The population of each village breaks down as follows: King Salmon, 442; Naknek, 678; South Naknek, 137.

Employment

The unemployment figures for the Borough per the 2000 Census shows a 7.5 rate. It is estimated that there is full employment among year-round residents during the fishing season. During the rest of the year there are few jobs available, the major employer being local, state, and federal government. Transportation and education, health and human services are also large employers representing over 40% of the workforce. Construction also provides a few jobs to residents during the winter months. Some jobs that require specialized skills, such as plumbing and electrical work, call for labor from outside the Borough. Other non-government winter sources of employment include the air services, guiding, trapping, and restaurant and hotel services.

In the Bristol Bay Borough, as in the region, commercial fishing is the industry most important to the economy. Fishing and fish processing provide ample summer employment for both the permanent and seasonal residents of the Borough and contribute the highest proportion of total annual employment. Unemployment in the Borough remains a chronic problem which permanent residents face during the remainder of the year. Government, traditionally one of the most important employers in Alaska, provides the largest amount of year-round jobs in the Borough. There are 222 businesses licenses held in the Borough that supply goods and services to both the permanent and seasonal residents.

Major economic activity

The Borough's economy is very basic. Fishing, the Borough's primary industry provides seasonal employment for permanent residents. Local, state and federal governments provide the largest amounts of year-round employment. Subsistence hunting and fishing continues to play a significant role in the local economy. Tourism and the construction industry are primarily limited to the summer months.

There are basically two types of impacts that could have a major effect on the local economy. The first is any occurrence that could affect the fishing industry itself, i.e., changes in technology, availability of fish, etc. The second is any occurrence that could generally affect the seasonal nature of present Borough's employment base, i.e., year-round employment opportunities, longer fishing season, etc.

The fishing industry, despite the drastic fluctuation in numbers of fish, appears to be a fairly stable element in the local economy. Technology is changing, but the changes are occurring slowly. Generally, there is a reduction in the number of shore-based canneries and an increase in the number of fast-freeze processing sites to support air freighting salmon to market. There is a slow to moderate growth in the

demand for shore-based facilities. The length of the fishing season is changing with the addition of a herring fishery and the potential for bottom-fishing in the Bering Sea.

Two major oil and gas lease sales close to Bristol Bay are presently scheduled. With proper environmental attention to the salmon grounds, neither sale should have a significant impact on the Bristol Bay Borough. Communities located further south on the Alaska Peninsula have been identified as better able to provide support services to leasable lands. However, the Borough airport is one of the most fully developed in southwest Alaska.

Tourism, outdoor recreation and sport hunting and fishing are activities that could expand due to the passage of the Alaska National Land Conservation Act. In addition to enlarging Katmai National Park, the Act established the following parks and wildlife refuges in November of 1980:

- Lake Clark National Park and Preserve
- Alaska Peninsula National Wildlife Refuge
- Becharof National Wildlife Refuge
- Alaska Maritime National Wildlife Refuge
- Togiak National Wildlife Refuge
- Aniakchak National Monument and Preserve

The Bristol Bay Borough is the logical staging area for serving park and refuge users and presently services many of the 70,000 annual visitors to Katmai. These activities attract visitors six months of the year and could expand seasonal employment opportunities.

Commercial fisheries

Commercial fishing is the most important industry in the Borough and regional economy. The 20-year average catch is 76,000 with an average value of \$121 million. Salmon, particularly sockeye salmon, is the primary fishery for the area and constitutes the main source of income for area residents. The other species of king, chum, pinks, and coho also produce income, but do not return to the Bristol Bay region in the same quantities as the sockeye salmon. Herring has also become a minor fishery in the area and provides some supplemental income to the local residents before the sockeye season begins. In addition, in May there is a very small cottage industry of commercial halibut harvest for local sales to residents and restaurants.

Thus, Bristol Bay salmon values reflect not only the current availability of raw product in Bristol Bay, but the current inventory of processed product on the world market and the current costs of processing and obtaining the fish.

16 canneries and land-based processors, with or without fish camps operate in the area. The canneries and processing plants are mostly owned by non-residents of the Borough and, as most residents are fishing during the salmon season, employ very few local people. For this reason, labor for the processing of the fish is generally imported from areas outside the Borough.

Processors have utilized these large runs by increasing production in several ways:

- Floating processors have entered the fishery in increasing numbers, freezing the catch that is received from fishermen.
- Tenders have transported a portion of the catch to other areas in Alaska and Canada.
- Fish have been flown from King Salmon to other processing plants in Alaska for canning and freezing.

The Borough provides a market to fishermen and the fishermen utilize many of the support services provided by Borough residents, principally equipment rental and flying services. The Borough also collects a 3 percent raw fish tax that averages \$300,000-\$1 million paid directly to the Borough.

GOVERNMENT

Government services are the primary source of year-round employment in the Borough and as of the 2000 Census there were 215 employees. Jobs exist at the federal, state, and local levels, in addition to those listed, temporary and seasonal positions have been made available on a regular basis.

U.S. Air Force

The U.S. Air Force base has closed down but remains in a “ready” status. There is a civilian workforce that lives there and maintains the base.

Federal Aviation Administration

The Federal Aviation Administration (FAA) presently employ’s 12 personnel. This number is expected to remain stable in the near future.

Other Federal Agencies

Other federal agencies are located principally in King Salmon and, with few exceptions, maintain steady year-round employment. Three of the agencies do increase employment during the summer months. These include the Fish and Wildlife Service, the National Park Service, and the U.S. Post Office.

State Government

The state employs a total of 18 year-round personnel in the Borough. This number grows to approximately 38 during the summer months.

Local Government

The Borough government employs a total of 38 people on a year-round basis, and grows to 50 during the summer. In past years many of these employees have supplemented their incomes by fishing during the summer season.

SUBSISTENCE AND SPORT FISHING

In addition to commercial uses of the wildlife resources in the area, both subsistence and sport fishing and hunting take place in the Borough. There have been ambiguities between the definition and distinction of subsistence versus sport fishing and hunting. For the purpose of this report, subsistence will be defined as animals or fish taken in order to be used as a major component of the user's diet.

Subsistence fishing is distinguished from sport fishing by the Alaska Department of Fish and Game primarily by gear type. Subsistence fishing is defined as "the taking, fishing, or possession of fish, shellfish or other fisheries resources for subsistence use with gill-net, seine, fish wheel, longline or other means defined by the Board of Fisheries" whereas sport fishing applies to non-commercial fish taken by a hook and line.

It is estimated that all civilian residents of the Borough are dependent, to some extent, on salmon for food during the winter months. This salmon can be either a portion of a fishermen's commercial catch, fish caught for sport, or fish caught in subsistence fishery.

Aside from being used for food by local residents, sport fish also plays an important role in attracting tourists to the area. Sport fishermen are from inside and outside the Borough. When sport fishermen come from outside the Borough, they may use local guides and the hotels, restaurants, and air charter facilities within the Borough. Two main types of fish, rainbow trout and salmon, are the principal target species of the sport fishermen. In addition, Dolly Varden, grayling and smelt are caught in significant numbers.

Wild game also is used for subsistence purposes by the Borough residents, although ADF&G does not make any distinction between subsistence game hunting and sport hunting. The three principal types of large game in the area are caribou, moose, and bear. Infrequently, wolf, wolverine, and lynx also are taken. Both caribou and moose are used by local residents as a part of their winter food supply. In addition, duck, goose, ptarmigan, and other small game are hunted both by residents and non-residents of the Borough.

Non-residents are required to use guides for hunting brown bear and dall sheep. Guides also are used by some non-residents for hunting caribou and moose. Approximately five regular guides live within the Borough. It is estimated that these guides may take three to four hunters out per year at a price of approximately \$8,000 per hunter. In addition, guides from other parts of the state may use King Salmon as a base of operations for some of their trips. Support services used by the hunters include air charter services, hotels, and restaurants.

TRAPPING

Commercial trapping takes place in the Borough during the winter months. The major species that are taken include fox, beaver, otter, wolverine, and lynx.

NATIONAL PARKS AND REFUGES

Closely related to the popularity of sport fishing and hunting in the area is the close proximity of the Borough to federal parks and refuges. Bristol Bay Borough is located adjacent to Katmai National Park and Becharof National Wildlife Refuge. Many individuals are drawn to the area to use these federal lands for camping and sport fishing during the summer months. Katmai National Park had over 70,000 visits in 2004.

SUPPORT SERVICES

The primary support services used for both commercial fishing and tourism in the area are air services, hotels and restaurants, and commercial and recreational rental equipment. In addition, boat storages, hardware and dry goods stores, and gas stations receive increased business from the influx of the summer population. A small influx of support services does take place in the summer for the fishing industry. These are primarily small flying services, helicopters, and repair services.

COST OF LIVING

The cost of living in the Borough is high when compared to many other locations in Alaska and the United States. The Alaska Bureau of Commerce and Economic Development estimates that in 1978 it cost 2.2 times as much to live in Bristol Bay Borough as it did to live in the lower United States, and to live in the Borough cost 1.5 times as much as to live in Anchorage.

HOUSING

Housing in the Borough is considered to be expensive and in short supply. One reason for the shortage is the high cost of building a house and the high price of land in the area. Currently, one acre of residential property sells for approximately \$40,000.

The shortage of housing is particularly evident in the summer months with the large influx of seasonal workers. For this reason the canneries offer housing to imported workers and some operate “fish camps.” Fish camps are operated by companies that process products in the Borough and companies that only buy products to be processed elsewhere.

ENERGY

The Bristol Bay Borough uses diesel-generated electricity supplied by the Naknek Electric Association. This energy is extremely expensive, averaging \$0.15/kwh plus a fuel surcharge.

LOCAL DEVELOPMENT ACTIVITY

The following projects are typical of development activity within the Bristol Bay Borough. These projects will provide direct economic benefits to the Borough, particularly during the construction phase. However, many of the projects will be built during the summer months which will coincide with the salmon season, the period of highest employment. Also, the construction may require specialized labor which would be imported from outside the Borough. Construction that begins in the spring and extends into the fall periods on either side of the salmon season could offer additional employment opportunities to the local work force.

Public Dock

A pile-supported, concrete dock was constructed in 1982, The facility is the only public dock in the Borough. Prior to its completion, small barges either unloaded at the cannery docks or where beached for unloading.

The dock facility can accommodate 200-foot vessels. The channel adjacent to the dock is dredged to 16 feet below mean low tide, allowing deeper draft vessels to remain afloat at low tide. Currently there is a plan to repair and enlarge the dock to satisfy the increasing cargo demands.

Sewage disposal systems are operating in all 3 villages. A system was built for Naknek that includes primary and secondary treatment using a sewage lagoon.

Solid waste disposal sites are built in both Naknek/King Salmon and South Naknek. The Naknek/King Salmon site includes a trash compactor. South Naknek will use an earthfill disposal site with a bear proof fence.

Airport

King Salmon, a major regional airport serving the fishing industry, the Air Force and the general public, experiences crowded conditions during the peak of the sockeye salmon run. There have been several expansions but more are still needed. Naknek air strip has been improved but continued maintenance is necessary.

Public Facilities

- The school serves K-12 with 287 students per the 2000 census. A fire station was completed in South Naknek to support fire protection on both sides of the river.
- A 2500 square foot health clinic was built in Naknek, The clinic, includes an emergency room, offices, examination rooms, X-ray equipment, and provisions for eye, dental, and medical care.

Industrial and Commercial Development

There is a moderate amount of new industrial and commercial development recently constructed or planned for the Borough fish processing facilities, boat storage, transportation facilities, maintenance yards; lodges and cabins are representative of the type of construction occurring presently. The location

of these facilities are logically related to the Naknek River or its tributaries because they service fishing or fish processing.

Residential Development

The Bristol Bay Borough has developed a subdivision located on 800 acres of land overlooking the Naknek River. A community cemetery and residential lots are developed and ready for disposition to individual owners. In addition, the Alaska Peninsula Corporation is discussing the possibility of a subdivision in the South Naknek area and Paug-Vik, the village corporation of Naknek, is planning a 5-acre, 99-year lease program along rapids section of the Naknek River. Paug-Vik has also subdivided land at Pikes Lake and Pikes Ridge.

Part I Resource Inventory and Analysis

Chapter 6 Land Status

THE REGION

Land ownership and land management jurisdiction are two of the most complicated and important issues in Alaska today. With the passage of the Alaska National Interest Land Conservation Act, long-standing questions about land ownership, management, and jurisdiction may be answered.

There are essentially four major landowners in the Bristol Bay region. They are the state, federal, and Borough governments as public owners and the local village corporations as private owners. The federal government, on behalf of the general public, is by far the largest landowner in the region. The following is a list of the national parks and the wildlife refuges that were established by congress in November 1980.

- Aniakchak National Park
- Katmai National Park (extension)
- Lake Clark National Park
- Alaska Peninsula National Wildlife Refuge
- Becharof National Wildlife Refuge
- Alaska Maritime National Wildlife Refuge
- Togiak National Wildlife Refuge

The State of Alaska has jurisdiction from the mean low tide line to three geographical miles offshore and over the tidelands between mean high tide and mean low tide. The state has jurisdiction from tidelands to three miles offshore, which includes all of Kvichak Bay. The Alaska State Legislature, in 1972, created a Bristol Bay Fisheries Reserve within its jurisdiction, for the purpose of limiting oil and gas development that would prove dangerous to the salmon fishery.

The Bristol Bay Borough, as an organized regional government, is a Coastal Resource district. This is not the case for the Bristol Bay region. Regions that are not organized governments must organize into Coastal Resource Service Areas for the purpose of developing a district plan. The Bristol Bay region was formed by joining two Rural Educational Attendance Areas. The Bristol Bay Coastal Resource Service Area was organized in 1981 and a board was elected in 1982.

THE BOROUGH

LAND OWNERSHIP

Land ownership in Bristol Bay Borough is as complex as it is throughout the state. There are four basic categories of landowners in the Borough. They are federal, state, borough governments, and private landowners

Federal Ownership

There are about 292 square miles of federal land in the Borough, 71 square miles of which are Katmai National Park and Katmai Wilderness. The remaining 221 square miles are in a block, primarily in the northeast corner of the Borough. This land includes the drainage of both Paul's Creek and King Salmon Creek and abuts the National Park. This federal land has been withdrawn for village corporation selections within the Borough, for the most part, have been made, adjudicated, and patented. Any further selections and has also been selected by the State of Alaska. The village corporation selections will most likely be outside of the Borough. It appears that both the federal and state governments are interested in the northeast corner of the Borough for control and management of the salmon spawning areas. It is likely that this area will be included in the Bristol Bay Borough Cooperative Region and will be jointly managed.

State Ownership

There is a minimal amount of state land in the Borough. The state land consists of small sites to house state agencies, land leased for the King Salmon Airport, material sites for common use, or land being selected by the Borough. Most of the Federally – owned land in the Borough outside of Katmai National Park is state – owned. The tidelands and submerged lands in Kvichak Bay and the beds navigable rivers are also owned by the state. The state is likely to become a major landowner in the Borough.

Borough Ownership

The Bristol Bay Borough has an entitlement of 2,898 acres from the state, according to legislation passed in 1978.

Private Ownership

The amount of private ownership in the Borough is significant, when considering the population. There are about 129,000 acres of privately owned land. The surface rights to over 90 percent of this land are owned by either Paug – Vik, the Naknek Village Corporation, or Alaska Peninsula Corporation, representing the village of South Naknek. The subsurface rights below village corporation lands are owned by the Bristol Bay Regional Corporation. During the Native land selected process, the village corporations of Naknek and South Naknek worked out an agreement restricting land selections by both communities to their side of the river. Today, the majority of private land on each side of the river is

owned by the representative corporation. Private land that is not held by either corporation is owned in the form of lots, homesteads, or native allotments.

LAND MANAGEMENT

The management of land within the Bristol Bay Borough is the responsibility of the federal, state, and the borough government. Each level of government has jurisdiction over some portion of the Borough's land area, with jurisdiction often overlapping.

Federal Jurisdiction

The federal government has jurisdiction over the following areas within the Borough:

	Land Category	Agency
1.	Federally owned land	Bureau of Land Management
2.	Katmai National Park	National Park Service
3.	King Salmon Air Force Base	Department of Defense
4.	South Naknek townsite	Bureau of Land Management
5.	Public easements (Native Land Claims Settlement Act)	Bureau of Land Management
6.	Navigable waters	U.S. Corps of Engineers
7.	Migratory birds, polar bears, sea otter, walrus, endangered species	U.S. Fish & Wildlife Service
8.	All other marine mammals	National Marine Fisheries Service

State Jurisdiction

The State of Alaska has jurisdiction over state land within the Borough. In addition, the state manages the waters of Kvichak Bay and inland navigable waters. The Alaska Department of Fish and Game manages the fishery within the bay and the wildlife in upland areas.

Borough Jurisdiction

The Bristol Bay Borough, with second class status, has three basic powers. They are taxation, education, and planning and zoning. The Borough has adopted a zoning ordinance and has a comprehensive plan. In addition to the basic powers, voters have given the Borough the responsibility for police, libraries, fire protection, telecommunication, roads, sewer, water, and health.

Chapter 7 Designated Use Areas

A. Commercial Fishing & Seafood Processing Facilities Use

Located in and on the banks of the Naknek River at ordinary high water plus 100' downstream from the point where the electrical lines cross the river near Telephone Point, to the mouth on both the north and south banks, then continues into Kvichak Bay and follows the southern, western, and northern borders of Bristol Bay. * see map

The commercial fishing industry is the largest contributor to the economy of the Borough. As stated by ADF&G it's 20 year average annual value of \$12 million. It is imperative that the industry be supported and be given priority consideration for development. The Bristol Bay Borough Port and Dock Facility is located in this area allowing for easy and fast access to shipping of the fish.

B. Recreation Use

Located between the ordinary high water marks in the Naknek River up stream from the point where the electrical lines cross the river near Telephone Point to the head waters at Naknek Lake. * see map

11 AAC 114.250(c) allows a coastal district to designate areas from recreational use based on the criteria that the area receives significant use by persons engaging in recreational pursuits or that the area has the potential for recreational use because of physical, biological, or cultural features.

In 1988 a study done by David Ackley M.A., estimated the total trip expenditures of sport fishing anglers in Bristol Bay to exceed \$6 million. It is clear why these uses be given priority consideration for development within the area. Sport fishing is one of the largest segments of the tourism trade in the Borough. The industry is promoted and maintained through the 10 fishing lodges located within the Borough. These lodges paid the Borough over \$50,000 in bed tax for 2004 with a season that is 4 months long. In addition, as shown in the Alaska Department of Commerce records, over 50% of the 222 current business licenses in the Borough are held for businesses that have goods or services related to tourism or sport fishing. Supporting recreational use of this portion of the Naknek River is supportive of an existing economy.

C. Tourism Use

Located between the ordinary high water marks in the Naknek River where the King Salmon Creek enters following 2000' feet up stream. * see map

11 AAC 114.250(c) allows a coastal district to designate areas from recreational use based on the criteria that the area receives significant use by persons engaging in recreational pursuits or that the area has the potential for recreational use because of physical, biological, or cultural features.

The Bristol Bay Borough is the gateway to Katmai National Park, which states in 2004 they had over 70,000 visitors. In addition, the Borough is adjacent to 4 other National Parks and National Refuges. The importance of it supporting tourism use of the Naknek River is reflected by offering the most used access point to Katmai Park via the float plane runway on the Naknek River. There are 7 commercial taxi float plane docks located in this section of the river which are used for transport to off river fishing holes, lodges, and the National Parks and Refuges that surround Bristol Bay Borough. Without this access to these fly out locations, tourism would not be a viable industry for this Borough. As stated by the King Salmon Visitor's Center, 18,000 people travel to this Borough to use the Naknek River for sport fishing, kayaking, or hiking and camping to Katmai National Park.

Part II Management Plan

Chapter 1 The Program

BACKGROUND

The coast of the United States has long been one of our country's greatest assets. Coastal habitats contain a wealth of resources that have both natural and economic value. America's coast is unique, productive, and diverse. Though the coast seems endless and the coastal areas vast, both have limits, which must be acknowledged and respected. With much of our coastal areas settled and pressure for development and use increasing, Congress in 1972 passed the Coastal Zone Management Act. The act provides incentives for coastal states to protect, manage, and, where possible, rehabilitate the coastal resources. In 1977, the Alaska Legislature passed the Alaska Coastal Management Act, which established a process for protecting and managing the coastal resources of the state. The legislature made most local governments and special planning boards in the unorganized Borough responsible for managing the coast within their jurisdictions and required each to prepare a district coastal management plan.

The Bristol Bay Borough, as an organized local government, is a coastal resource district. As a borough, it has authority for planning and zoning within its boundaries, and as a coastal resource district, it has responsibility for developing and implementing a coastal management program that meets the standards and guidelines of the Alaska Coastal Management Program.

PURPOSE

While writing the Alaska Coastal Management Act in 1977, the legislature outlined its purpose in developing such a law in Alaska. The following list summarizes the purpose of the Alaska Coastal Management Act of 1977:

- Preserve, protect, develop, use, and, where necessary, restore or enhance the coastal resources of the state for this and succeeding generations.
- Encourage coordinated planning and decision making in the coastal area among levels of government and citizens using the coastal resources of the state.
- Develop a management program with policies, objectives, and procedures to guide and resolve conflicts among public and private use of resources impacting the coastal land and water of the state.

- Assure the participation of the public, local governments, and agencies of the state and federal governments in the development and implementation of a coastal management program.
- Utilize existing governmental structures and authorities, to the maximum extent feasible, to achieve the policies set out in this section.
- Authorize and require state agencies to carry out their planning responsibilities and to take actions affecting the use of the resources of the coastal area in accordance with the policies set out in this section.

REQUIREMENTS

The Bristol Bay Coastal Management Program contains the following:

- Issues, Goals and Objectives: The identification of the present concerns and desires for the future by the people living within the Bristol Bay Borough. 11 AAC 114.200
- Organization 11 AAC 114.210
- Coastal Boundaries: The determination of the land and water area included within the district coastal management program. 11 AAC 114.220
- Resource Inventory: An identification and description of the natural, physical, and cultural resources within the district. The resource inventory emphasizes those resources that are basic to man's well being, and it forms the basis for the management plan. 11 AAC 114.230
- Resource Analysis: A summary of the demand for the Borough's resources and the type and scale of development expected in the future. An identification and description of the important habitats within the Borough as well as recommendations for their management. 11 AAC 114.240
- Subject Uses, Activities, and Designations 11 AAC 114.250
- Proper and Improper uses 11 AAC 114.260
- District Enforceable Policies: statements that direct coastal land and water uses. 11 AAC 114.270
- Implementation: A description of the method and process used to implement the district program. 11 AAC 114.280
- Public Participation 11 AAC 114.290

It is important to keep in mind, while considering any aspect of the Bristol Bay District Program, that the program was designed and developed not just to satisfy the requirements of the act or the standards and guidelines, but to establish a foundation on which a comprehensive planning program could be built.

The program is a comprehensive planning tool that provides the Borough with the information necessary to make reasonable planning and zoning decisions that could impact the communities and their resources long into the future.

MANAGEMENT PROGRAM, PART I AND PART II

The Bristol Bay Borough Coastal Management Program is divided into two halves. Part I is the resource inventory and analysis and Part II is the management plan, which includes goals, a management framework, coastal policies and an implementation approach.

PART I, RESOURCE INVENTORY AND ANALYSIS

The resource inventory contains a review of the physical, natural, and man-made resources within the Bristol Bay Borough. It consists of a narrative, which describe the nature and distribution of the resources found throughout the coastal district.

PART II, MANAGEMENT PLAN

The management plan includes the remainder of the program requirements. It includes a narrative which present:

- Description of community goals and objectives
- Boundary identification
- Recommended areas which merit special attention (AMSA)
- Uses within the management area
- District Enforceable Policies
- Implementation process

Part II Management Plan

Chapter 2 The Boundary

THE BOROUGH

The Bristol Bay Borough is approximately 500 square miles in area and extends from the foothills of the Aleutian Range in Katmai National Park to the western shore of Kvichak Bay.

The east side of Bristol Bay Borough encompasses the majority of the usable land and the communities of Naknek, South Naknek, and King Salmon. The west side primarily contains Kvichak Bay and land extending to the western boundary of the coastal watershed. The western Borough boundary runs along the western mean high tide line of Kvichak Bay. The base map extends west of the mean high tide line to include the coastal watershed that drains into Kvichak Bay and consequently into the Borough.

In 1983, the Bristol Bay Borough chose to extend the coastal zone boundaries beyond the established biophysical boundaries to include important areas of direct influence and to conform to the Borough's political jurisdiction. Establishing the Borough boundaries as the coastal zone boundary incorporates the following areas above 200 feet elevation limit established in the biophysical boundaries within the Borough:

- The foothills of the Aleutian Range found in the northeast corner of the Borough. These hills provide important uplands habitat and form the upper drainage of King Salmon and Paul's Creek.
- The ridge separating the Naknek Lake and Naknek river systems, which drain into primary salmon spawning areas.
- The hills in the southwest corner of the Borough, which drain into the Naknek River and Kvichak Bay, both important anadromous fish migration routes.

The Bristol Bay Borough coastal management district is surrounded by the Bristol Bay Coastal Resource Service Area. The Borough's coastal zone boundaries were designated to be compatible with the contiguous service area, and now include the entire jurisdiction of the Borough.

The legal description from the Alaska Local Boundary Commission, Juneau:

“Beginning at a point which is located at 58 degrees, 53 minutes, 9 seconds North Latitude and 157 degrees, 02 minutes and 45 seconds West Longitude (Coast and Geodetic Survey Marker, Russ.); thence East to a point 156 degrees, 37 minutes, 50 seconds West Longitude; thence South approximately 61 miles to a point at 158 degrees West Longitude; thence North approximately 3 miles to the point of intersection with the North shore of Kvichak Bay; thence meandering approximately 38 miles in a Northeasterly direction along the North shore of Kvichak Bay to the point of beginning”.

Part II Management Plan

Chapter 3 Issues, Goals and Objectives

SETTING

The Bristol Bay Borough, working with community representatives and the coastal management citizen advisory committee, developed goals and objectives detailing needs and future plans for the Borough. Five community meetings were held in Naknek, South Naknek, and King Salmon during development of the program. The following goal statements are a result of the community involvement.

With a revision in September, 2005 the Planning Commission and the Coastal Management Coordinator offered public comment on the revised goals and objectives.

LAND USE PLANNING

Goal: Actively pursue sound land use planning which helps guide the future growth and development of the Borough and its communities.

The Bristol Bay Borough has responsibility for planning and zoning within its boundaries. There is a need for sound land use planning within the Borough to guide the development of the area according to the desires of its residents.

Long-Range Development Plan

Objective: Prepare and periodically update a comprehensive development plan.

The Bristol Bay Borough has hired a full time Planning Specialist to serve as the coastal management coordinator, as well. The job description is for this person to oversee and plan all development by following the Bristol Bay Borough Strategic Comprehensive Plan which is currently being rewritten and updated with reference to the ACMP.

Data Update

Objective: Develop a current data base including base maps, resource inventory, etc., to support wise planning and land use decisions.

The Borough has recently begun a borough wide community profile mapping project with the Alaska Department of Community, Commerce, & Economic Development. This project is being organized and managed by the Planning Specialist and is expected to be complete in 2007.

COMMUNITY DEVELOPMENT

Goal: Plan for and guide the present and future development of the Borough and its communities.

Areas of the Bristol Bay Borough have been settled and used for centuries. Since 1900 the villages of Naknek, King Salmon, and South Naknek have grown and developed into permanent communities that support a resident population. It is important to maintain the health of these communities and guide their future development.

Commercial Development

Objective: Identify and set aside prime commercial land within the Borough for future commercial development.

The Bristol Bay Borough will set aside prime real estate for future growth through borough wide zoning. Currently, the Planning & Zoning Commission is ready to embark on a re-examination of our zoning districts and definitions once the community mapping project is complete.

Objective: Encourage and give priority consideration to water-dependent commercial development for future waterfront use.

Waterfront development will be controlled and monitored by the ACMP Enforceable Policy CD-1.

Parks and Recreation

Objective: Maintain and increase recreational opportunities within the Borough by developing a park and recreation master plan which identifies the demand for recreation within the Borough, identifies and recommends conservation of primary recreation and scenic areas, increases and maintains controlled public access to the waterfront, and recommends recreational programs for Borough residents.

Recreational use of our waterways will be controlled and monitored by the ACMP Enforceable Policy CA-1, CD-2, and the Recreational Use Enforceable Policy. The Planning & Zoning Commission will work towards developing a master plan for recreation through zoning.

Economic Development

Goal: Strengthen the economy of the Bristol Bay Borough by encouraging economic development that provides employment opportunities on a year-round basis and maintains and expands the existing employment base.

The economy in the Bristol Bay Borough is primarily dependent upon commercial fishing, an industry characterized by its short, intensive seasons. A majority of the Borough residents are employed in the fishing industry between May and August. The construction industry, to a lesser extent, also provides

employment opportunities, but it is also seasonal and coincides with commercial salmon fishing. State, federal, and local government is the major year-round employer.

Commercial Fishing

Objective: Set aside primary coastal areas and uplands for priority use by the commercial fishing industry and develop the necessary infrastructure (i.e., waste disposal, transient housing water sources, etc.) necessary to accommodate industrial development.

The commercial fishing industry will be protected and monitored by the ACMP Enforceable Policy for Commercial Fishing and Seafood Processing.

Tourism

Objective: Increase the opportunities for tourism and recreational use in the Borough that stimulates economic development and minimizes negative environmental and social impacts.

Tourism will be encouraged and monitored through the ACMP Tourism Area Enforceable Policy.

Industrial Development

Objective: Encourage industrial development that is compatible with community values and the natural resources within the region.

Industrial development will be monitored and controlled through the Planning & Zoning Commission and their regulations.

LAND AND WATER MANAGEMENT

Goal: Protect important cultural and historical areas as well as critical natural habitat in the Bristol Bay Borough.

Objective: Prepare and implement an integrated land and water management program, including intergovernmental coordination, comprehensive planning, Borough-wide zoning, and subdivision regulations.

Integrated land & water management is managed through the Planning & Zoning Commission.

Fish and Wildlife

Objective: Minimize impacts of increased pressure and maintain populations by protecting important spawning and migration areas of salmon and resident sport fish species.

The sport fishing industry will be encouraged and monitored through the ACMP Enforceable Policy for the identified Recreational Area.

Chapter 4 The Management Framework

FRAMEWORK

The management framework chapter of this report focuses on the following topics required by the standards and guidelines:

- Subject Uses: Those land and water activities considered in the Boroughs program.
- District Enforceable Policies: Statements that direct development and land and water uses within the borough.
- Areas which merit special attention (AMSA). Those areas with unique and valuable resources needing special management attention.

SUBJECT LAND AND WATER USES

The following land and water activities and uses are subject to the Bristol Bay Borough Coastal Management Program.

- Coastal development: Residential, commercial, and industrial
- Recreation: Land and water areas
- Energy facilities: Oil and gas exploration, processing, and transport; electric and hydroelectric facilities; and transmission lines
- Transportation: Highway, air, and marine facilities
- Utilities: Water and sewer lines and facilities, wells and treatment sites, solid waste disposal
- Mining and mineral processing: Hard rock mining; gravel, sand, and related extraction
- Subsistence: Areas used for subsistence activities

USES OF STATE CONCERN

The Bristol Bay Coastal Management Program addresses uses of state concern through its policies and implementation strategy. Uses of state concern, meaning those lands and water uses which significantly affect the long-term public interest, are outlined and defined according to the following five categories:

1. Uses of national interest, such as the use of resources for the siting of ports and major facilities which contribute to meeting national energy needs, construction and maintenance of navigational facilities and systems, resource development of federal land, and national defense and related security facilities that are dependent upon coastal locations.
2. Uses of more than local concern, such as land and water uses, which confer significant environmental, social, cultural, or economic benefits or burdens beyond a single coastal resource district.
3. Siting of major energy facilities, activities pursuant to a state oil and gas lease, or large-scale industrial or commercial development activities which are dependent on a coastal location and which, because of their magnitude or the magnitude of their effect on the economy of the state or the surrounding area, are reasonably likely to present issues of more than local significance.
4. Facilities serving statewide or interregional transportation and communication needs.
5. Uses in areas established as state parks or recreational areas under AS 41.20 or as state game refuges, game sanctuaries, or critical habitat areas under AS 16.20.

PROPER AND IMPROPER USES

It is the Bristol Bay Borough's intent to evaluate and to make decisions upon the appropriateness of land and water uses and activities on a case-by-case basis. Proposed uses will be measured according to the performance standards stated in the enforceable policy section of this report. The standards will be applied with due consideration to the resource inventory and analysis. A discussion of the review process is included in the implementation chapter of this plan (Chapter 5).

DISTRICT ENFORCEABLE POLICIES

The following policies are to be used to direct the Bristol Bay Borough Planning Commission and Assembly in determining proper and improper use and the acceptability of proposed plans and projects within the coastal district.

COASTAL DEVELOPMENT

CD-1. Prioritization of Waterfront Land Use

In accordance with the prioritization requirement set forth in 11 AAC112.200(b)

- A. The following non-exhaustive list of land uses and activities are considered “water dependent”. Such uses are economically or physically dependent upon a coastal location, and as such are given a higher priority than those land and water uses and activities that are not water-dependent: fish processing, float plane bases, boat harbors, freight, fuel, or other docks, marine based tourism facilities, boat repair, haul outs, remote recreational/sport fishing cabins dependent on water access, and facilities that serve as inter-modal transportation links for the transfer of goods and service between the marine transportation links for the transfer of goods and services between the marine transportation system and the road system.
- B. The following non-exhaustive list of uses or activities are considered “water related” and thus given a lower priority of use than those previously listed as “water dependent”: marine retail stores and commercial activities such as hotels, restaurants, and other similar uses that provide views and access to the waterfront.
- C. Uses and activities which are neither water dependent or water related, but for there is no practicable alternative to meet the public need for the use or the activity, receive the lowest priority.

Justification:

- A. Within a defined portion of the district’s coastal zone [11 AAC 114.270(h)(1)(A)]. The prioritization enforceable policy applies to waterfront areas within the Bristol Bay Borough’s coastal zone boundary.
- B. Demonstrated as sensitive to development in the resource analysis [11 AAC 114.270(h)(1)(B)]. The waterfront area is sensitive to development because of competition for waterfront area within the coastal district. Due to the economic importance of water-dependent industries in Bristol Bay Borough, it is important to establish a priority of water-dependent and water-related uses and activities, as these uses and activities can be adversely impacted by other development that may interfere with or preclude them. See Part 1, Chapters 2-6 in the Resource Inventory and Resource Analysis chapter for more information.
- C. Not adequately addressed by state or federal law [11 AAC 114.270(h)(1)(C)]. The coastal development state standard at 11 AAC 112.200 directs coastal districts to list uses that are water-dependent and water-related. We reviewed Alaska Statutes Titles 38 and 46, USCG regulations, and USACOE regulations and found no statutes or regulations that prioritized waterfront uses for Bristol Bay Borough. Since the coastal development state standard does not specifically list priority uses or activities, this district enforceable policy adds specificity to the existing state standard at 11 AAC 112.200.

- D. Of unique concern to the district as demonstrated by local usage or scientific evidence [11 AAC 114.270(h)(1)(D)]. The limited waterfront area of the coastal district is a unique concern to the coastal district. The economic well-being of Bristol Bay Borough depends on this area. Commercial fishing and fish processing are the mainstays of the economy of the Borough. Borough fisherman received a gross income of 75.6 million in 2004. There are approximately 16 fish processing operators that occupy 40 acres each. It is important to reserve waterfront property for fish processing and closely related activities.

CD-2 **Tidelands Viewsheds**

Placement of structures or dredged or fill material in tidelands below the mean high water, shall minimize to the maximum extent practicable obstruction of the water views as currently enjoyed.

Justification:

- A. Within a defined portion of the district's coastal zone [11 AAC 114.270(h)(1)(A)]. The enforceable policy applies to waterfront areas within the Bristol Bay Borough's coastal zone boundary.
- B. Demonstrated as sensitive to development in the Resource Analysis [11 AAC 114.270(h)(1)(B)]. Tidelands viewsheds are an important contribution to the regional identity of the Bristol Bay Borough. The scenic quality of these viewsheds is achieved by natural, unobstructed views. Improper placement of structures can reduce the scenic quality of the area and significantly detract from the character of the Borough.
- C. Not adequately addressed by state or federal law [11 AAC 114.270(h)(1)(C)]. The coastal development standard requires that the discharge of dredged or fill material must at a minimum comply with 33 CFR 320-323. 33 CFR 320-323 requires permits for the placement of structures or dredged or fill material in navigable waters and the project is subject to the requirements of the permit. Permits under 33 CFR 320-323 do not specify that scenic views shall be maintained. Several state statutes were reviewed: Title 44 and 46 Alaska Coastal Management Program, Title 29 Municipal Government, Title 38 Public Land, and Title 41 Public Resources. None of these statutes addressed minimizing obstructions to water views. The US Forest Service was contacted and there are no current USFS lands in Bristol Bay Borough. There were no comments received about tidelands viewsheds.
- D. Of unique concern to the district as demonstrated by local usage or scientific evidence [11 AAC 114.270(h)(1)(D)]. With the continued growth in the lodging industry in Bristol Bay Borough there is a perceived need to out do your competitors. More site development applications are being submitted for larger lodges and docks. The newest facility built a 200' dock and there are concerns that, without restriction, the future could involve structures on these large docks.

CD-3 Floating Facilities

Floating facilities in coastal waters shall be sited and operated to utilize anchoring methods that securely anchor the facility during high winds and extreme tides prevalent in the area.

Justification:

- A. Within a defined portion of the district's coastal zone [11 AAC 114.270(h)(1)(A)]. The enforceable policy applies to waterfront areas within the Bristol Bay Borough's coastal zone boundary.
- B. Demonstrated as sensitive to development in the Resource Analysis [11 AAC 114.270(h)(1)(B)]. The waterfront area where floating facilities will be located is sensitive to development because the high winds and extreme tides increase the possibility of floating facilities breaking loose and causing hazards. Unless properly anchored, floating facilities can ground during low tide causing damage to the shore, break loose and block navigation or cause a navigational hazard. Improperly anchored floating facilities can also impede access to the shore. See Part 1, Chapter 2 in the Resource Inventory and Analysis for more information.
- C. Not adequately addressed by state or federal law [11 AAC 114.270(h)(1)(C)]. Several state statutes were reviewed: Title 44 and 46 Alaska Coastal Management Program, Title 29 Municipal Government, Title 38 Public Land, and Title 41 Public Resources. None of these statutes addressed the anchoring of floating facilities. General permit 89-4 of the Corps of Engineers specifies that A "floating house shall be adequately secured by anchors and shore ties." Policy CD-4 addresses specific anchoring methods for floating facilities for anchoring floating facilities with respect to the extreme weather conditions of the Bristol Bay Borough outside of the scope of general permit 89-4. There were no comments received about floating facilities.
- D. Of unique concern to the district as demonstrated by local usage or scientific evidence [11 AAC 114.270(h)(1)(D)]. Our local tides can get to be 25' high tide with an average high of 18'. It is imperative that all floating structures be securely anchored to avoid be cast about to the sea. In Bristol Bay, the winds blow across the Bay and we can have winds up to 50mph. Because the Bay is shallow, it causes very rough seas from minimal wind and causes impact to the strength of the incoming tide. Each year, one of the lodges with a large 100' dock spends time chasing after pieces of it when we have a "summer blow".

COASTAL ACCESS

CA-1 Maintenance of Public Access to Public Waters

In accordance with the prioritization requirement set forth in 11 AAC112.220

Proposed use or activities shall not impede or degrade access to and within designated recreational area along coastal waters

Justification:

- A. Within a defined portion of the district's coastal zone [11 AAC114.270(h)(1)(A)]. The enforceable policy applies to waterfront areas within the Bristol Bay Borough's coastal zone boundary. See the Coastal Boundary section and the Resource Inventory for more information delineating the location of the waterfront zones within the coastal zone boundary.
- B. Demonstrated as sensitive to development in the Resource Analysis [11 AAC 114.270(h)(1)(B)]. The demand for outdoor recreation is increasing and is expected to continue to increase. The residents of Bristol Borough frequently use these areas for outdoor recreational pursuits including sport hunting and fishing. It is important to the outdoor recreationists of Bristol Bay Borough to protect access to and within designated recreation areas. Access to recreation areas would be sensitive to any development that could result in the degradation or impediment of current access to those areas. See Part 1 Chapter 4 in the Resource Inventory and Analysis for more information..
- C. Not adequately addressed by state or federal law [11 AAC114.270(h)(1)(C)]. Several state statutes were reviewed: Title 44 and 46 Alaska Coastal Management Program, Title 29 Municipal Government, Title 38 Public Land, and Title 41 Public Resources none of these statutes addressed the maintenance of public access to and within designated recreation areas in the Bristol Bay Borough. 11AAC112.220 directs districts to ensure that coastal access to, and from and along coastal waters is maintained, policy CA-1 specifies how access to designated recreation areas along coastal waters in the Bristol Bay Borough is to be maintained.
- D. Of unique concern to the district as demonstrated by local usage or scientific evidence [11 ACC 114.270(h)(1)(D)].

DEVELOPMENT IN DESIGNATED AREAS

DA-1 Commercial Fishing and Seafood Processing

Maintenance and enhancement of facilities to avoid or minimize impacts to facilities related to commercial fishing and seafood processing shall be given priority consideration in reviewing proposals, which might adversely impact fisheries habitat,

migratory routes, and harvest of fish. Uses and activities within this area shall be sited to avoid or minimize impacts to the physical and biological features of this area.

Justification:

- A. Within a defined portion of the district's coastal zone [11 AAC 114.270(h)(1)(A)]. The enforceable policy applies to waterfront areas within the Bristol Bay Borough's coastal zone boundary.
- B. Demonstrated as sensitive to development in the Resource Analysis [11 AAC 114.270(h)(1)(B)]. The commercial fishing industry is sensitive to development because it is the largest contributor to the economy of the Borough. As stated by ADF&G it's 20 year average annual value of \$12 million. Any development that would adversely affect the commercial fishing industry would negatively affect the economy of the Bristol Bay Borough.
- C. Not adequately addressed by state or federal law [11 AAC 114.270(h)(1)(C)]. There are no state standards for the Development of Facilities for Commercial Fishing and Seafood Processing established in 11 AAC 112. Alaska Department of Fish and Game Title 5 regulate uses and activities of commercial fisheries but not specifically the location of development of commercial fisheries and seafood processing facilities. Title 44 and 46 Alaska Coastal Management Program, Title 29 Municipal Government, Title 38 Public Land, and Title 41 Public Resources. None of these statutes addressed maintenance and enhancement of commercial fisheries and seafood processing facilities or established commercial fisheries and seafood processing as a priority.
- D. Of unique concern to the district as demonstrated by local usage or scientific evidence [11 AAC 114.270(h)(1)(D)]. The Bristol Bay Borough is home to the largest sockeye fishery in the Alaska. Our dock handles over 93,000,000 pounds of processed fish for shipping to many Asia locations which proves the economic importance of the commercial fishing industry. All of that fish is processed locally through the 16 processors and several small fishing vessel processors. Over 300 fishing vessels call Bristol Bay Borough home.

DA-2 Recreational Designated Area

Maintenance and enhancement of recreational use, to include sport fishing, shall be given priority consideration in reviewing proposals, which might adversely impact these activities. Projects located in this area shall be designated, located, constructed, and

operated to minimize adverse impacts to the physical features of the competing recreational users of the area.

Justification:

- A. Within a defined portion of the district's coastal zone [11 AAC 114.270(h)(1)(A)]. The enforceable policy applies to the Naknek River and Lake areas within the Bristol Bay Borough's coastal zone boundary.
- B. Demonstrated as sensitive to development in the Resource Analysis [11 AAC 114.270(h)(1)(B)]. The maintenance and enhancement of recreational resources is sensitive to development because any development that would adversely affect recreational fishing would negatively affect the economy of the Bristol Bay Borough. In 1988 a study done by David Ackley M.A., estimated the total trip expenditures of sport fishing anglers in Bristol Bay to exceed \$6 million. It is clear why these uses be given priority consideration for development within the area. Sport fishing is one of the largest segments of the tourism trade in the Borough. The industry is promoted and maintained through the 10 fishing lodges located within the Borough.
- C. Not adequately addressed by state or federal law [11 AAC 114.270(h)(1)(C)]. There are no state standards for recreation established in 11 AAC 112. Several state laws address recreation, particularly in Title 38 and Title 41 of the Alaska Statutes, but these only apply to state lands, not private or municipal lands, and thus, do not address the management of recreational resources in the Bristol Bay Borough. Likewise, federal laws, such as the Fish and Wildlife Act of 1956 and ANILCA apply only to federal lands, and thus do not adequately address the need to manage recreation use in the Bristol Bay Borough. There was no comment against this policy.
- D. Of unique concern to the district as demonstrated by local usage or scientific evidence [11 AAC 114.270(h)(1)(D)]. Currently there are 19 licensed sport fishing guides in the Bristol Bay Borough and 10 seasonal fishing lodges. The lodges operate for a 4-5 month season with up to a total of 120 possible visitors per week.

DA-3 Tourism Designated Area

Maintenance and enhancement of tourism use shall be given priority consideration in reviewing proposals, which might adversely impact these activities. Projects located in this area shall be designated, located, constructed, and operated to minimize adverse impacts to the physical features of the competing tourism users of the area.

Justification:

- A. Within a defined portion of the district's coastal zone [11 AAC 114.270(h)(1)(A)]. The enforceable policy applies to tourism designated areas (specify map or description page) within the Bristol Bay Borough's coastal zone boundary.

- B. Demonstrated as sensitive to development in the Resource Analysis [11 AAC 114.270(h)(1)(B)]. Bristol Bay Borough is a gateway community to Katmai National Park. Visitors to Katmai National Park spend time in Bristol Bay Borough sleeping, eating, shopping and sightseeing. Bristol Bay Borough has an important role in providing food lodging and transportation for these visitors. Tourism is sensitive to development because maintenance and enhancement of tourism use prevent Bristol Bay Borough from becoming a congested tourist-trap, provide long lasting economic benefits and help retain community character.
- C. Not adequately addressed by state or federal law [11 AAC 114.270(h)(1)(C)]. There are no state standards for tourism established in 11 AAC 112. Title 44 and 46 Alaska Coastal Management Program, Title 29 Municipal Government, Title 38 Public Land, and Title 41 Public Resources. None of these statutes addressed maintenance and enhancement of tourism or a tourism development priority.
- D. Of unique concern to the district as demonstrated by local usage or scientific evidence [11 AAC 114.270(h)(1)(D)]. The Bristol Bay Borough is the gateway to Katmai National Park, which states in 2004 they had over 70,000 visitors. In addition, the Borough is adjacent to 4 other National Parks and National Refuges. The importance of it supporting tourism use of the Naknek River is reflected by offering the most used access point to Katmai Park via the float plane runway on the Naknek River. There are 7 commercial taxi float plane docks located in this section of the river which are used for transport to off river fishing holes, lodges, and the National Parks and Refuges that surround Bristol Bay Borough. Without this access to these fly out locations, tourism would not be a viable industry for this Borough.

Part II Management Plan

Chapter 5 Implementation Process

The Planning Commission is responsible to:

- Monitor and assess consistency comments issued on its behalf by the CMP Coordinator.
- Review every five years and amend, if required, the Bristol Bay Borough CMP.
- Submit every ten years the Bristol Bay Borough CMP to OPMP for reapproval. The submittal shall include an evaluation of the plan effectiveness and implementation, a presentation of any new issues, and a recommendation for resolving any problems that have arisen.

CMP Coordinator

The Bristol Bay Borough CMP Coordinator is a member of the Borough Planning Department staff. The CMP Coordinator may receive oversight and direction from the Planning Commission.

The CMP Coordinator has day to day responsibilities within the Borough Planning Department for the administration of the Borough CMP. He or she must:

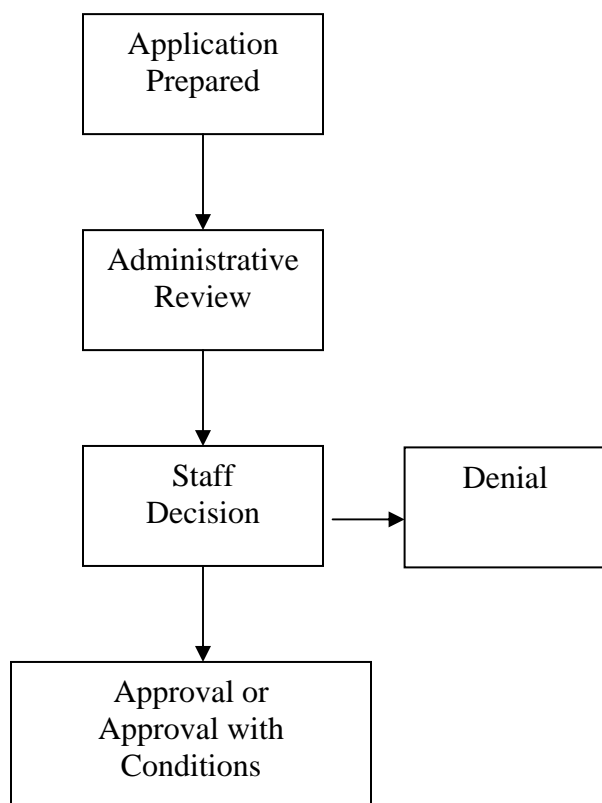
- Help applicants fill out the coastal project questionnaire (CPQ) including an evaluation of the district's enforceable policies along with the boundary determination and educate them about the ACMP and the Bristol Bay Borough CMP throughout the process.
- Ensure that information has been received in a timely manner by the parties involved in the consistency review process
- Determine if information received is complete and sufficient for a consistency review
- Decide which projects are routine and which projects have great significance to the coastal zone and should be reviewed and discussed with the Planning Commission (routine approvals will be processed by the CMP Coordinator)
- Evaluate uses and activities that require local, state, or federal permits or authorizations for consistency
- Evaluate proposed projects against the enforceable policies of the Coastal Program
- Accurately assess the effect of applicable policies of the Bristol Bay Borough CMP on the application
- Manage project information to ensure that it reaches all affected persons and organizations
- Draft effective, concise and comprehensive consistency determinations and recommendations and produce evidence in support of the conclusions reached
- Develop draft consistency comments and alternative measures for consideration by the Planning Commission, when necessary
- Integrate feedback from the local contacts and other interested parties into the Bountiful Borough's consistency recommendation
- Coordinate consistency review activities with adjoining coastal districts where issues or activities of mutual concern are under consideration

- Prepare and submit the consistency recommendation in a timely manner
- Prepare quarterly and annual reports to the state, as required by the Bountiful Borough's ACMP grant agreement
- Facilitates and receives public input, and acts as an information resource concerning the Bountiful Borough CMP

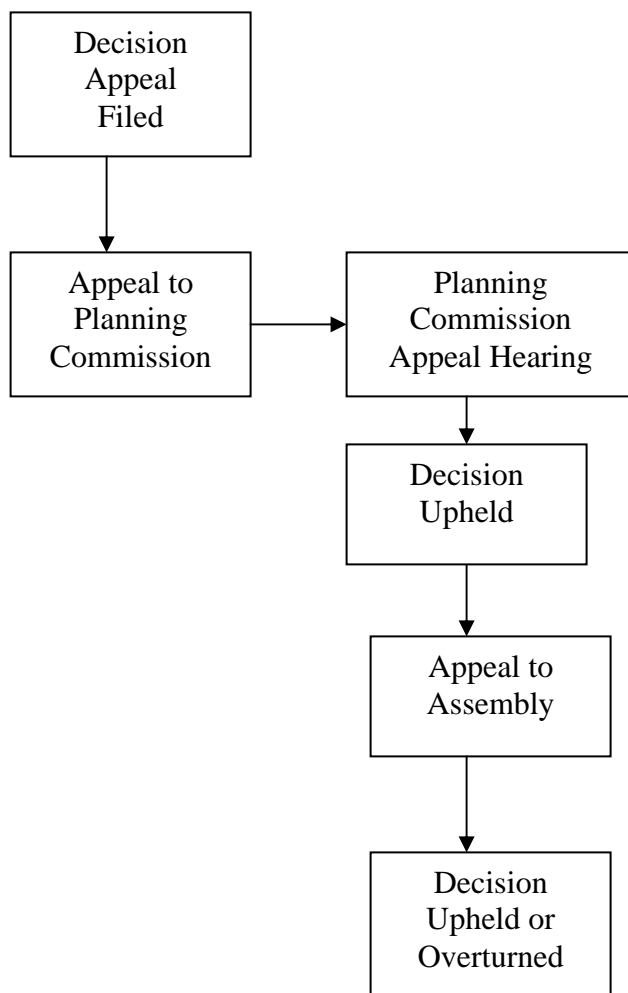
The CMP Coordinator represents the Bristol Bay Borough at meetings, conferences, and in ongoing interactions with applicants, the general public and state and federal agency staff regarding the Bristol Bay Borough CMP.

Bristol Bay Borough is capable of controlling all growth and development through the Borough Assembly and zoning regulations set forth in their ordinances. The Assembly, advised by the Planning & Zoning Commission, has control over all issues related to community and economic development. This is a system that was put in place to protect the coastal zone, as well as the economic forces that maintain the financial stability of the Borough.

CONSISTENCY REVIEW
PROCESSING



APPEAL OF
COSISTENCY REVIEW



The Borough Assembly, on appeal from an action of the Borough Planning Commission, can affirm or overturn recommendations and decisions made by the Planning Commission. This includes:

1. The Borough's own consistency determines on borough-controlled activities;
2. The Borough's comments and recommendations on state and federally controlled or initiated activities; and
3. All forms of enforcement actions including appeals.

The chart on page 85 illustrates the process of permit reviews, actions, and appeals.

The CMP Coordinator and Bristol Bay Borough Planning Specialist is Yvonne Kopy, Bristol Bay Borough, P.O. Box 189, Naknek , AK 99633.

REGULATORY AUTHORITY

The coastal management policies described in 11 AAC 114 and detailed in Chapter Four are the foundation of the Borough's program. They are the enforceable rules used to determine proper and improper land and water uses and used to guide coastal development within the districts. In addition to the management policies, the following Borough ordinances are also used to implement the Coastal management program.

- Title 20, Bristol Bay Borough Zoning Code
- Title 18, Bristol Bay Borough Subdivision Regulations
- Title 20, Site Development process

The Bristol Bay Borough Coastal Management Program will be adopted by ordinance as part of the Borough's land use regulations, prior to review, and will be enacted by ordinance following approval.

FEDERALLY REGULATED OR INITIATED ACTIVITIES

The State of Alaska is responsible for deciding, on behalf of the Alaska Coastal Management Program, whether or not particular federal actions are consistent with the state coastal management program. Presently, this function is carried out by the Alaska Department of Natural Resources. Whether the current system remains, or changes, the Bristol Bay Borough will be given an opportunity to review all federal actions of subsistence that occur in or could affect the Borough's coastal resources. The Borough will assist the state in making these decisions and has the option of seeking review and relief if it is felt that the state has not appropriately complied with the enforceable provisions of this program.

STATE REGULATED OR INITIATED ACTIVITIES

The Bristol Bay Borough has selected as a minimum the following state and federal activities and permits for receiving notification prior to an agency decision.

- Anadromous fish protection, Office of Habitat Management & Permitting Title 41
- Land selection, leases (including minerals), classification or land disposals issued by the State Department of Natural Resources AS 38.05.045-.110, AS 38.05.181, AS 38.05.150, AS 38.05.185-.280, AS 38.05.180, AS 38.05.035, AS 38.05.345.
- Designation of any “critical habitat” under 11AAC112300 DNR OPMP
- Designation, expansion, or deletion of any state land holdings within or adjacent to Borough receiving special management attention (e.g., refuges, parks, sanctuaries, national monuments, and scenic rivers).
- State Department of Environmental Conservation water quality standards-certificate of reasonable assurance (AS 46.03.010-.750, 18AAC70).
- Solid waste disposal.
- Section 404 of the federal Clean Water Act and federal Section 10 of Rivers and Harbors Act permits issued by Corps of Engineers.
- Construction of public facilities and projects.

Written recommendations on the project’s consistency will be forwarded to the agency in a timely manner (maximum 30 days) and due deference as defined in regulations 11 AAC 110

As with state consistency decisions or federally regulated or initiated activities, the Borough may obtain review by, and seek relief from, the Coastal Policy Council if it believes that a state agency has not complied with the enforceable provisions of this program.

CHECKLIST AND PROCESS

The process below will be used in completing the checklist. Each consistency decision or recommendation to be made by the Borough will have a checklist completed for it.

1. Using the included checklist, review the project for consistency with the local program.
2. If the project or activity is consistent, write consistent or approved online 8. The Borough may want to encourage the state and federal government in their determination. This can be

- accomplished by outlining the positive aspects of the project along with the consistency determination.
3. If the project or activity is not consistent, state the portions of the program affected and recommended remedial action. The comments should include, at a minimum.
 - Specific remedial action
 - Rationale for requesting action
 - Binding provisions of the district program, cited by policy.
 4. The review should be complete within 30 days, or within the timeframe of the agency involved.

FIELD CHECKING AND ENFORCEMENT

Periodic checking of major projects and routine field inspections will be conducted concurrently with the administration of zoning, regulating subdivisions and issuing building permits. If projects or activities are found in violation of the program, the Borough will use local, state and federal enforcement to correct the situation. Enforcement will depend upon the nature and jurisdiction of the violation.

QUARTERLY REPORT

On the first meeting following the last day of March, June, September and December, the Borough Manager or designee will send a quarterly report to the Borough Planning Commission and Assembly. The report will summarize all reviews and actions taken during the reporting period.

ANNUAL REPORT

On December 31st of each year, the borough manager or designee will send an annual report to the DCCED. The report will summarize all changes and improvements to the Borough's coastal program and will include copies of all the checklists completed for activities and copies of all enforcement actions taken.

**Bristol Bay Borough
Coastal Management Program**

CONSISTANCY CHECKLIST

1. Project description _____

2. Level of government _____

3. General effects upon coastal area and resources _____

4. Uses, activities, resources and habitats that will be significantly affected:

____ A. Offshore and estuaries

____ C. Wetlands and tideflats

____ B. Exposed high – energy coasts

____ D. Rivers, streams and lakes

5. Area which merits special attention affected _____

6. Does project or activity require written response _____

7. Is the action consistent with:

a. Local land and water use controls _____

b. Goals and objectives (if not, indicated which) _____

c. Management policies _____

d. Areas which merit special attention _____

8. What action is necessary to make project or activity consistent?

Date _____

Signed _____

Use other side for comments as necessary

Chapter 6 AMSA Recommendation

Areas Which Merit Special Attention

“Areas which merit special attention” (AMSA) is a designation created by the Alaska Coastal Management Act for geographic areas requiring special management. To receive this special consideration, an area must be one of the following:

- Unique, fragile natural habitat, of cultural value, of historical significance or scenic importance
- Of substantial recreational value
- Where development of facilities is dependent upon the utilization of, or access to, coastal waters
- Susceptible to industrial or commercial development
- A significant hazard
- Needed to protect, maintain, or replenish coastal land or resources, including coastal floodplains, aquifer recharge areas, beaches, and offshore sand deposits

In the Bristol Bay Borough, there are three such geographic areas requiring special consideration (see Areas Which Merit Special Attention map). It is recommended that these areas be considered for designation as areas which merit special attention. A management plan should be developed for each area that allows both planned development occur, while protecting the natural, physical, and man – made resources.

AMSA A: MARINE INDUSTRIAL PARK

This area surrounds the newly constructed public dock facility located between the Naknek – King Salmon Road and the Naknek River. It is recommended as an AMSA because of the proposed port facilities and industrial park developing adjacent to the Naknek River, a critical salmon migration corridor. The area includes the Naknek River bluffs, which are both hazardous and have high erosion potential.

Selected Criteria

AMSA A is an industrial area adjacent to an important salmon migration and rearing area. Potential hazards include land-slides, storm surges, erosion, and accidental petroleum spills.

Area Description

The area in and around the public dock is included along with the Naknek River coastline and uplands.

Status of Adjacent Area

The ownership management jurisdiction and use are similar to that within the AMSA.

Management Objectives

The management objectives for this AMSA is to protect the salmon migration and rearing areas in the Naknek River and to allow the marine industrial park to develop while minimizing resource conflicts and natural hazards.

AMSA B: PAUL'S CREEK/KING SALMON CREEK AREA

This area includes both Paul's Creek and King Salmon Creek. The reason for the designation is the potential conflict between developing along the Naknek-King Salmon Road and adjoining areas and two highly productive salmon spawning creeks.

Selection Criteria

AMSA B is an area of high natural productivity and of essential habitat for wildlife, especially salmon, trout, bear, and moose.

Area Description

The area includes the upland and floodplain around Paul's Creek and King Salmon Creek. It extends from approximately ½ mile west of Paul's Creek to ½ mile east of King Salmon Creek, and from the Naknek River, 4 miles north to the rolling uplands. The area includes the intersection of the Naknek-King Salmon Highway and two of the Borough's most important salmon spawning creeks.

Status of Area

The area is primarily privately owned by individuals and is under the planning and zoning jurisdiction of the Bristol Bay Borough. Low density residential and commercial use presently exists within the area. Paul's Creek and King Salmon Creek serve as marine access routes and moorages to a limited degree.

Status of Adjacent Area

The ownership, management, jurisdiction, and use are similar to that within the AMSA.

Potential Conflicts

The uplands along Paul's Creek and King Salmon Creek are developable areas. They are privately owned with easy access and are surrounded by a pleasant natural setting. Presently, a number of residences and businesses are located in the area and indications are that this trend will continue. As development occurs, the potential for disturbance and destruction to water-sheds will increase. Poor construction practices causing erosion, dredging and filling, and toxic waste spillage are examples of the potential hazards. A management plan developed to accommodate special considerations in this area could promote appropriate development and still protect the Borough's valuable resources.

Management Objective

The management objective for this area is to promote planned development of a type and scale that protects that protects the salmon migration corridor and spawning beds. Proper and improper uses would be determined, design guidelines established, and a regulatory process recommended as part of the management scheme.

ASMA C: BIG CREEK AND RAPIDS SECTION OF THE NAKNEK RIVER

This area includes the Big Creek and rapids section of the Naknek River. The reason for the designation is the high spawning concentration of king, coho, pink, and chum salmon and rainbow trout in an area that is privately owned and being leased for residential development.

Selection Criteria

The area is an area of high natural productivity and of essential habitat for wildlife. In addition to containing prime salmon spawning reaches, the lower reaches of Big Creek serve as a staging area for a large population of swans.

Area Description

This AMSA extends from King Salmon along the Naknek River to the federally owned land of Katmai National Park. It includes the upland on both sides of the river as well as the first three miles of Big Creek.

Status of Area

The area north of the Naknek River is owned by Paug-Vik Corporation and the area south of the river is owned by the Alaska Peninsula Corporation. The Bristol Bay Borough has planning and zoning jurisdiction over the area; the state and federal government have specific jurisdiction over the river. This area is presently used for recreation, fisheries research and management, and subsistence and sport hunting and fishing.

Status of Adjacent Area

Katmai National Park is east of the recommended AMSA. The community of King Salmon is directly to the west. All of the remaining contiguous land has similar ownership, management jurisdiction and use.

Potential Conflict

The uplands area north of the Naknek River that border the rapids area and Katmai National Park is some of the most attractive and developable land in private ownership within the Borough. There has already been some discussion of a 5-acre, 99-year lease program for residential development by Paug-Vik Village Corporation. Along with being attractive and developable, this area also contains the largest concentration of king and pink salmon spawning beds in the Borough and is reputed to hold one of the most significant rainbow trout spawning areas in North America. Lower Big Creek also serves as a staging area for a large population of swans. Uncontrolled development, or poor construction procedures could disturb or destroy an area that is both valuable and irreplaceable. Any development in this sensitive area must be approached cautiously and in a way that maintains the natural values and unique resources.

Management Objective

This AMSA contains a variety of natural values, is privately owned, and is attractive for development. A management plan would determine the highest and best use of the area. Once a use determination has been made, a management plan would be developed that outlines guidelines to protect the migration corridor and important salmon and trout spawning beds.

Lauman, J.E. 1976. Salmonid Passage at Streamroad Crossings. Portland, Oregon: Department of Fish and Wildlife, Environmental Management Section.

McPhee, C. and F. Watts. 1976. Swimming performance of Arctic Grayling in Highway Culverts. U.S. Fish and Wildlife Service.

U.S. Forest Service. 1979. Roadway Drainage Guide for Installing Culverts to Accommodate Fish. Engineering and Aviation Management Division, Alaska Region, U.S. Forest Service, Department of Agriculture, Report No. 42.

APPENDIX I

HABITATS

The following habitats, as defined by 6AAC 80.130, are located in the district

OFFSHORE AREAS

The offshore area is Kvichak Bay within the Borough boundaries.

ESTUARIES

Estuaries conditions exist in both Kvichak Bay and the Naknek River. In the river, estuarine conditions extend 11 miles upstream at periods of low river flow and high tides..

WETLANDS

The tidal marsh, freshwater marsh, and Wet bays and meadows, as illustrated on the Coastal Habitat map, are the only identifiable wetlands within the borough. Detailed information about vegetation type and hydrology is insufficient for further distinction. Further wetland classification should be conducted when more detailed information is available.

TIDE-FLATS

There are extensive tide flats throughout Kvichak Bay and extending along the Naknek River to King Salmon Creek.

HIGH ENERGY COASTAL BLUFFS

Exposed coastal bluffs are along the east side of Kvichak Bay and up the Naknek River.

RIVERS, STREAMS, AND LAKES

These hydrologic features are found throughout the Borough.

APPENDIX II

Important Plants in the Bristol Bay Region

IMPORTANT PLANTS OF THE MARINE COMMUNITY

Diatoms

Asterionella kariana
a. japonica
Bacteriastrum
delicatulum
Biddulphia aurita
B. sinensis
Chaetoceros
atlanticus
C. compressus
C. concovicornia
C. constrictus
C. convolutus
C. debilis
C. didymus
C. furcellatus
C. lacinosus
C. radicans
C. similis
C. socialis
Coscinodiscus
curvatulus
C. radiatus
Coscosira
polychorda
Leptocylindrus
danicus
Melosira sulcata
Nitzschia pacifica
N. closterium
N. delicatissima
N. seriata
Rhizosolenia hebetate
R. semispina

Skeletonema costatum
Synedra sp.
Thalassionema nitzschioides
Thalassiosira aestivalis
T. decipiens
T. gravida
T. nordenskioldi
T. rotula
Thalassiothrix longissima

Dinoflagellates

Ceratium furca
C. fusus
C. longipes
C. pentagonum
C. tripos
Dinophysis acuminata
D. acuta
D. arctica
D. caudata
D. ellipsoides
D. ovum
D. rotundata
Gonyaulax tamarens
Peridinium crassipes
P. depressum
P. divergens
P. ovatum
P. pentagonum
P. steinii
Phalacroma rudgei
Protocentrum micans

Brown algae

Agarum cribrum
Alaria crispa
A. fistulosa

A. praelonga		Navicula sp.
A. taeniata		
A. tenuifolia	Green algae	Phaeotus sp.
A. valida		Pediastrum sp.
Chorda filum		Ankistrodesmus sp.
Costaria costata		Dictyosphaerium sp.
Cymathere triplicate		
Desmarestia sp.	Blue-green algae	Microcystis sp.
Fucus furcatus		Lyngbya sp.
F. inflatus		
F. latifrons	Seed Plants	
Hedophyllum sessile		
Laminaria bullata	Mare's tail	Hippuris vulgaris
L. dentigera	Pondweed	Potamogeton spp.
L. groenlandica	Bur reed	Sparganium sp.
L. longipes	Sedge	Carex spp.
L. saccharina	Cotton grass	Eriophorum spp.
L. setchellii	Duckweed	Lemna trisulca
L. yezoensis	Yellow pond lilly	Nuphar polysepalum
Nereocystis leutkeana	White pond lilly	Nymphaea tetragona
Scytosiphon	Bladderwort	Utricularia vulgaris
lomentaria		
Thalassiophyllum		
clathrus		

IMPORTANT PLANTS OF THE WET TUNDRA COMMUNITY

Red algae	Laurencia spectabilis Porphyra perforate
Green algae	Chatomorpha sp. Ulva latuca
Eelgrass	Zostera marina
Arctic rush	Juncus arcticus
Large-flowered spear grass	Poa emines
Sedges	Carex spp.
Rye grass	Elymus crenarius

Characteristic Species

Bog orchid	Platanthera dilatata
Cotton grass	Eriophorum angustifolium spp. Subarcticum
Sphagnum moss	Sphagnum rubellum

Additional Species

IMPORTANT PLANTS OF THE FRESHWATER COMMUNITY

Diatoms	Melosira sp. Stephanodiscus sp. Fragilaria sp. Asterionella sp. Tabellaria sp. Synedra sp.
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Shrubs

Dwarf birch	Betula nana ssp. Exilis
Blueberry	Vaccinium uliginosum
Labrador tea	Ledum palustre ssp.
Willow	Salix fuscescens

Herbs

Bistort	Polygonum bistorta ssp. Plumosum
Bur reed	Sparganium sp.
Bog cranberry	Oxycoccus microcarpus
Mare's tail	Hippuris vulgaris
Marsh marigold	Caltha palustris ssp. Arctica
Pond weed	Potamogeton sp.
Wild flag	Iris setosa ssp. Setosa

Grasses and sedges

Beach rye grass	Elymus arenarius ssp. Mollis
Marsh arrowgrass	Triglochin palustris
Oat grass	Hordeum brachyantherum
Rush	Luzula Wahlenbergii ssp. Piperi
Sedge	Carex pluriflora
Spear rye grass	Poa eminens
Fern relatives	
Fir clubmoss	Lycopodium selago ssp. Selago
Quillwort	Isoetes maricata ssp. Maritime

Lichens, mosses, and liverworts

**IMPORTANT PLANTS
OF THE MOIST TUNDRA COMMUNITY**

Characteristic Species

Crowberry	Empetrum nigrum ssp. nigrum
Sedge	Carex saxatilis
Hair moss	Dicranum sp.
Reindeer lichen	Cladonia sp.

Additional Species

Shrubs

Arctic willow	Salix arctica ssp. crassijulis
Blueberry	Vaccinium uliginosum
Cranberry	V. Vitis-idaea ssp. Minus
Dwarf birch	Betula nana ssp. Exilis

Herbs

Aster	Aster sibiricus
Bistort	Polygonum bistorta ssp. Plumosum
Buttercup	Ranunculus Eschscholtzii
Goldthread	Coptis trifolia
Lousewort	Pedicularis Kanei ssp. Kanei
Monkshood	Aconitum delphinifolium ssp. Delphinifolium
Violet	Viola epipsila ssp. Repens

Grasses and sedges

Bentgrass	Agrostis borealis
Bluejoint reed grass	Calamagrostis Canadensis
Cotton grass	Eriophorum angustifolium ssp. Subarcticum
Hair grass	Deschampsia caespitosa
Mountain timothy	Phelum commutatum
Wood rush	Luzula parviflora
Sedge	Carex pluriflora

Fern relatives

Alpine clubmoss	Lycopodium alpinum
Fir clubmoss	L. selago ssp. Selago

Lichens and mosses

**IMPORTANT PLANTS
OF THE ALPINE TUNDRA COMMUNITY**

Characteristic Species

Blueberry	Vaccinium uliginosum
Crowberry	Empetrum nigrum ssp. Nigrum
Lichens	

Fragile fern	Cystopteris fragilis ssp. Fragilis
Rockbrake	Cryptogramma crispa var. achrostichoides
Spike moss	Selaginella sibirica

Additional Species

Lichens and mosses

Shrubs

Alpine azalea	Loiseleuria procumbens
Arctic willow	Salix arctica
Bearberry	Arctostaphylos uva- ursi
Cinquefoil	Potentilla fruticosa
Cranberry	Vaccinium vitis-idaea ssp. Minus

**IMPORTANT PLANTS
OF THE BOTTOMLAND
SPRUCE-POPLAR COMMUNITY**

Characteristic Species

White spruce	picea glauca
Balsam poplar	Populus balsamifera

Additional Species

Herbs

Anemone	Anemone parviflora A. narcissiflora ss. villosissima
Aster	Aster sibiricus
Cow parsnips	Heracleum lanatum
Gentian	Gentiana algida
Lousewort	Pedicularis Kanei ssp. Kanei
Lupine	Lupinus nootkatensis
Moss campion	Silene acaulis
Mountain avens	Geum Rossii
Saxifrage	Saxifraga bronchialis ssp. Funstonii
Sweet coltsfoot	Petasites frigidus
Yarrow	Achillea borealis

Trees

Paper birch	Betula papyrifera
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Shrubs

Blueberry	Vaccinium uliginosum
Green alder	Alnus crispa
Littletree willow	Salix arbusculoides
Low bush cranberry	Vaccinium vitis-idaea
Narrow leaf Labrador Tea	Ledum palustre ssp. Decumbe
Rose	Rosa acicularis

Herbs

Bluebell	Mertensia paniculata
Columbine	Aquilegia brevistyla
Fireweed	Epilobium angustifolium

Grasses

Fescue grass	Festuca altaica
Mountain timothy	Phleum commutatum
Tufted hairgrass	Deschampsia caespitosa

Grasses

Bluejoint reed grass	Calmagrostis purpurascens
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Ferns and fern relatives

Ferns and fern relatives

Oak fern	Dryopteris dilatata
Fir clubmoss	Lycopodium selago
Horsetail	Equisetum arvense

Lichens and mosses

**IMPORTANT PLANTS
OF THE LOWLAND
SPRUCE-HARDWOOD COMMUNITY**

Characteristic Species

Black spruce	Picea mariana
Tamarack	Larix laricina
Paper birch	Betula papyrifera

Additional Species

Trees

Aspen	Populus tremuloides
Balsam poplar	Populus balsamifera
White spruce	Picea glauca

Shrubs

Low brush cranberry	Vaccinium vitis-idaea ssp. minus
Bebb willow	Salix babbiana
Littletree willow	S. arbusculoides
Net leaf willow	S. reticulate

Herbs

Arctic dock	Rumex arcticus
Northern water carpet	Chrysosplenium tetrandrum
Sidebells pyrola	Pyrola secunda
Sweet coltsfoot	Petasites frigidus

Grasses and sedges

Grass	Poa paucispicula
Bluejoint reed grass	Calamagrostis Canadensis
Polar grass	Arctagrostis latifolia
Sedge	Carex lugens

Fern relatives

Horsetail	Equisetum scirpoides
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Lichens and mosses

Parakeet auklet	Cyclorhynchus psittacula
Crested auklet	Aethia cristatella
Least auklet	A. pusilla
Whiskered auklet	A. pygmaea
Horned puffin	Fratercula corniculata
Tufted puffin	Lunda cirrhata
Black oystercatcher	Haematopus bachmani
Semipalmated plover	Charadrius semipalmatus
Rock sandpiper	Erolia ptilocnemis
Least sandpiper	F. minutilla
Albatross	Diomedidae (Family)
Shearwaters and fulmars	Procellariidae (Family)
Storm petrels	Hydrobatidae (Family)
Cormorants	Phalacrocoracidae (Family)
Loons	Graviidae (Family)
Phalaropes	Phalaropodidae (Family)
Grebes	Podicepsidae (Family)
Jaegers	Stercorardae (Family)

Mammals

Killer whale	Orcinus orca
Gray whale	Eschrichtius gibbosus
Beluga whale	Delphinapterus leucas
Harbor porpoise	Phocoena phocoena
Walrus	Odobenus rosmarus
Northern fur seal	Callorhinus ursinus
Harbor seal	Phoca vitulina
Stellar sea lion	Eumetopias jubata
Sea otter	Enhydra lutra

**IMPORTANT ANIMALS
OF THE FRESHWATER COMMUNITY**

Invertebrates

Bacteria	Schizomycetes (Phylum)
Rotifers	Rotifera (Class)
Flagellates	Mastigophora (Phylum)
Ciliates	Ciliophora (Phylum)
Flatworms	Turbellaria (Class)
Aquatic earthworms	Oligochaeta (Class)
Crustaceans	Copepoda (Order) Anostraca (Order) Notostraca (Order)
Midge larvae	Chironomidae (Family)
Mosquito larvae	Culicidae (Family)
Dragonfly larvae	Odonata (Order)
Stonefly larvae	Plecoptera (Order)
Mayfly larvae	Ephemeroptera (Order)
Caddisfly larvae	Trichoptera (Order)
Water beetles	Coleoptera (Order)
Clams	Pelecypoda (Class)
Snails	Gastropoda (Class)

Fish

Arctic char	Salvelinus alpinus
Lake trout	S. namaycush
Dolly Varden	S. malma
Rainbow trout	Salmo gairdneri
Arctic grayling	Thymallus arcticus
Northern Pike	Esox lucius
Sculpin	Cottidae (Family)
Whitefish and cisco	Coregonus spp.
Burbot	Lota lota
Ninespine stickleback	Pungitius pungitius
Treespine	Gasterosteus aculeatus
stickleback	
Blackfish	Dallia pectoralis

Birds

Canada goose	Branta Canadensis
Black Brant	B. nigricans
Aldaquaw	Clangula byemalis
Whistling Swan	Olor columbianus
Pintail	Anas acuta
Green – winged teal	A. crecca carolinensis
Peregrine Falcon	Falco peregrinus
Common eider	somateria mollissima
King Eider	S. spectabilis
White-winged scoter	Melanitta deglandi
Red-breasted merdasner	Mergus serrator
Arctic tern	sterna paradisaea
Dipper	cinclus mexicanus
Semipalmated plover	charadrius semipalmatus
Least sandpiper	Erolia minutilla
Other geese	Anserinae (subfamily)
Other Diving Ducks	Aythinae (subfamily)
Other Surface Feeding Ducks	Anatinae (subfamily)
Phalaropes	Phalaropodidae (family)
Loons	Gaviddae (family)
Grebes	Podicepedidae (family)

Mammals

Beaver	Castor Canadensis
Mink	Mustela Vison
Land Otter	Lutra Candensis
Muskrat	Ondatra Zibethica

Important Animals
Of the Wet Tundra Community

Mammals

Common shrew	Sorex cinereus
Tundra shrew	Sorex tundrensis
Beaver	Castor canadensis
Northern bog lemming	Synaptomys borealis'
Muskrat	Ondatra zibethica
Arctic fox	Alopex lagopus
Grizzly bear	Ursus arctos

River otter	Lutra Canadensis	Yellow warbler	dendroica petechia
<u>Caribou</u>	Rangifer tarandus	Gray-crowned rosy Finch	leucosticte tephrocotis
Birds		Common redpoll	acanthis flammea
Whistling swan	lor columbianus	Savannah sparrow	passerculus sandwichensis
Canada goose	ranta Canadensis	Song sparrow	melospiza melodia
Black Brant	ranta Nigricans	Snow bunting	plectrophenax nivalis
Emperor goose	hilacte canagica	Invertebrates	
White-fronted goose	nser albifrons	Spiders and mites	Arachnida (class)
Pintail duck	nas acuta	Insects	Insecta (class)
Greater scaup	ythya marila	Flatworms	Platyhelminthes (phylum)
Oldsquaw	langula hymealis	Roundworms	Nemotada (class)
Spectacled eider	ampronetta fischeri	Important Animals	
Northern Phalarope	obipes lobatus	Of the alpine tundra community	
Western sandpiper	runettes mauri		
Dunlin	rolia alpine	Mammals	
Black turnstone	renaria	Tundra shrew	sorex tundrensis
Melanocephala		Tundra hare	lepus pthus
Ber-tailed godwit	imosa lapponica	Hoary hare	marmota caligata
Whimbrel	numenius phaeopus	Arctic ground Squirrel	citellus parryi
Bristle-thighed curlew	numenius tahitiensis	Greenland collard Lemming	dicrostonyx groenlandicus
Lesser sandhill crane	Grus Canadensis	Tundra vole	microtus oconomus
Rough-legged hawk	Buteo lagopus	Norway rat	rattus norvegicus
Marsh hawk	circus cyaneus	Gray wolf	canis lupus
Snowy owl	Nyctea scandiaca	Red fox	vulpes fulva
Short-eared owl	asio flammeus	Black bear	ursus americanus
Common eider	somateria mollissima	Grizzly bear	ursus arctos
King eider	S. spectabilis	Wolverine	gulo gulo
White-winged scoter	malanitta daglandi	Caribou	Rangifer tarandus
Red-breasted merganser	mergus serrator	Moose	Alces alces
Red phalarope	phalaropus fulicarius	Birds	
Parasitica jaeger parasiticus	stercorarius	Canada goose	Branta Canadensis
Arctic tern	Sterna paradisaea	Golden plover	Pluvialis dominica
Gray jay	perosoreus Canadensis	Western sandpiper	ereunetes mauri
Boreal Chickadee	Parus hudsonicus	Ruddy turnstone	arenaria onterpes
Black-capped Chickadee	Parus atricapillus		
White-winged Crossbill	Loxia Leucoptera		
Bank swallow	riparia riparia		
Dipper	cinclus maxicanus		
Winter wren	troglodytes troglodytes		

Rock ptarmigan	lagopus mutus
Lapland longspur	calcaarius lapponicus
Willow ptarmigan	lagopus lagopus
Common murre	uria aalge
Thick-billed murre	U. lomvia
Pigeon guillemont	Cepphus Columbia
Kittlitz's murrelet	Brachyramphus brevirostri
Ancient murrelet	synthlibormaphus antiquur
Cassin's auklet	ptychoramphus aleutica
Parakeet auklet	cyclorrhynchus psittacula
Crested auklet	aethia cristatella
Least auklet	A. pusilla
Whiskered auklet	A. pygmaea
Horned puffin	Fratercula Corniculata
Tufted Puffin	Lunda cirrhata
Water pipit	anthus spinoletta
Solitary sandpiper	tringa solitaria
Rock sandpiper	erolia ptilocnemis
Aleutian tern	sterna aleutica

Invertebrates

Spiders and mites	Arachnida (class)
Insects	Insecta (class)
Flatworms	Platyhelminthes (phylum)
Roundworms	Nemotada (class)

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Part 1

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