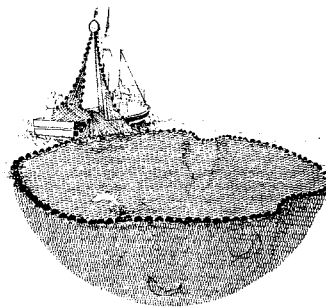
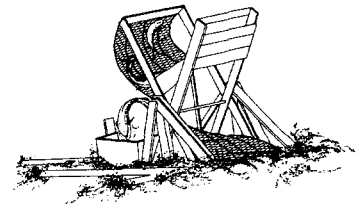
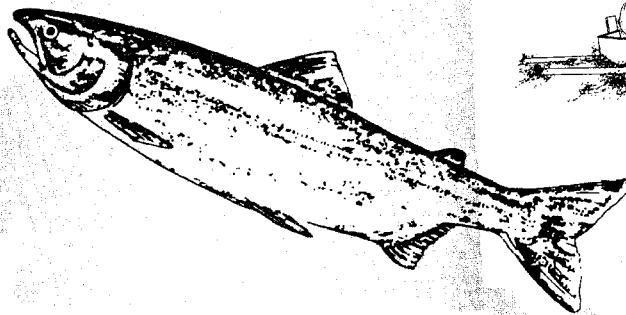
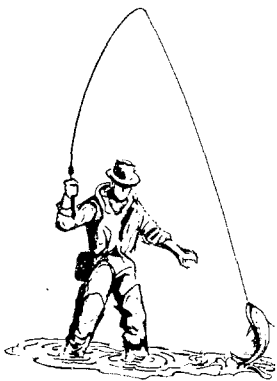
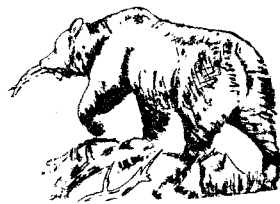


Fishery Management Plan  
**ALASKA PENINSULA BECHAROF  
NATIONAL WILDLIFE REFUGES**



**July 1994**

Region 7

U.S. Fish and Wildlife Service • Department of the Interior

**FISHERY MANAGEMENT PLAN**

**ALASKA PENINSULA  
AND  
BECHAROF  
NATIONAL WILDLIFE REFUGES**

Fiscal Years 1994 - 1998

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May 1994

## SUMMARY STATEMENT

The Alaska Peninsula and Becharof National Wildlife Refuges Fishery Management Plan (Plan) provides the management direction necessary to ensure conservation of fishery resources and habitat. In addition, the Plan provides for continued use of fishery resources by subsistence, commercial, and recreational users consistent with the purposes for which the Alaska Peninsula and Becharof refuges (Complex) were established and are managed.

The Complex's biological and physical environment is described and fishery resources, human use, management history, and major issues and concerns are discussed. This information was obtained from the Refuge Comprehensive Conservation Plans, a literature search, and discussions with Alaska Department of Fish and Game personnel. Objectives and tasks are developed to address the issues and concerns. Federal tasks are assigned priorities and costs for each year of continuation. The Plan encompasses a five year period, at which time it will be revised.

Major issues and concerns identified include the following: competition between user groups; incomplete salmon escapement data bases to refine management of the Complex fish populations; and inadequate fishery law enforcement. In some cases, concerns were identified because of the perception that they would develop into serious problems if current levels of use or consumption were allowed to continue or expand. Objectives developed to address major concerns range from program administration to harvest regulation and data collection. These objectives are aimed at expanding the fishery management program to gather the best available information and improving the management data base. Objectives are stepped down into specific tasks and dollar values are assigned in Section 8 of the Plan. Section 9 presents a listing of Fish and Wildlife Service tasks in order of priority. Alaska Department of Fish and Game tasks through 1998 also appear in Section 9, but are not arranged in priority order.

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## SECTION 1. INTRODUCTION

The Alaska Peninsula and Becharof National Wildlife Refuges Comprehensive Conservation Plans (U.S. Fish and Wildlife Service 1985a and 1987) identify broad fishery management goals on a geographic basis. This Fishery Management Plan (Plan) specifies step down prioritized planning for Alaska Peninsula and Becharof National Wildlife refuges fishery resources. This initial five year Plan outlines the fishery management activities to be accomplished, the five year anticipated demands upon fishery resources, and integrates fishery management activities with the multiple use of aquatic habitats. The fishery resources on the Alaska Peninsula and Becharof refuges are managed cooperatively by the U.S. Fish and Wildlife Service (Service) and the Alaska Department of Fish and Game (Department) as promulgated by a Memorandum of Understanding dated March 13, 1982 (Appendix A).

This Plan will cover three refuge units in the Alaska Peninsula/Becharof Refuge Complex (Complex): the Alaska Peninsula Refuge (Ugashik and Chignik Units), Becharof Refuge, and Seal Cape of Alaska Maritime Refuge. The Service plans to reorganize the four Alaska Peninsula refuges (Alaska Peninsula Refuge, Alaska Peninsula Unit of Alaska Maritime Refuge, Becharof Refuge and Izembek Refuge). The Service has submitted draft language which would amend the Alaska National Interest Lands Conservation Act (ANILCA) as it pertains to refuge boundaries in Alaska. As written, the Becharof Refuge would be consolidated with the Chignik and Ugashik units of the Alaska Peninsula Refuge. Seal Cape would be removed from the Alaska Maritime Refuge and incorporated into the Alaska Peninsula Refuge. The resulting "Conservation System Unit" would be named the Alaska Peninsula National Wildlife Refuge. The Pavlov Unit of the Alaska Peninsula Refuge would be incorporated into the Izembek Refuge. The refuges are currently being managed as a refuge complex until this proposal is legislatively enacted. Because the Pavlov Unit of the Alaska Peninsula Refuge is administered by the Izembek Refuge Manager from Cold Bay, this unit will be covered in the Izembek Refuge Fishery Management Plan.

On November 16, 1978, the Secretary of the Interior invoked his emergency withdrawal powers under Section 204(e) of the Federal Land Policy Management (Organic Act) and withdrew land throughout Alaska. Part of this withdrawal, Public Land Order (Order) 5653 (as amended), included lands which are now the Alaska Peninsula Refuge. In December 1980 the passage of the ANILCA created the Alaska Peninsula National Wildlife Refuge from the lands in the Order.

On December 1, 1978, President Carter established the Becharof National Wildlife Monument by Presidential Proclamation 4614. The Monument then became protected from all forms of land entry under existing Public Domain laws. In 1980, with the passage of the ANILCA, the Becharof Monument became the Becharof National Wildlife Refuge.

Along with the ANILCA, other major legislation has had profound effects on land status in both refuges. These other acts include the Alaska Statehood Act and the Alaska Native Claims Settlement Act (Claims Act). Both pieces of legislation provided a legal means of transfer of lands

under Federal trusteeship to State and Native ownership. The implementation of these acts continues to create a dynamic land status on the Complex due to selections, transfers and relinquishments by Natives, Native Corporations and the State of Alaska.

Many other laws, regulations, and congressional mandates influence these refuges. However, the salient authority is contained in ANILCA purposes. The purposes for which the Becharof Refuge was established and shall be managed include:

i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, brown bears, salmon, migratory birds, the Alaskan Peninsula caribou herd and marine birds and mammals;

(ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to insure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge. [ANILCA 302(2)(B)]

The Alaska Peninsula Refuge purposes include, "...brown bears, the Alaska Peninsula caribou herd, moose, sea otters and other marine mammals, shorebirds and other migratory birds, raptors, including bald eagles and peregrine falcons, and salmonids and other fish". [ANILCA 302(1)(B)]

Species mentioned in ANILCA specific to Alaska Maritime Refuge (Seal Cape) include, "...marine mammals, marine birds and other migratory birds, the marine resources upon which they rely, bears, caribou and other mammals". [ANILCA 303(1)(B)].



## SECTION 2. GENERAL PHYSICAL AND BIOLOGICAL ENVIRONMENT

### PHYSICAL ENVIRONMENT

#### Location

The Complex is located on the Alaska Peninsula in southwestern Alaska (Figure 1). The Alaska Peninsula splits Bristol Bay and the Bering Sea on the north and west from the Pacific Ocean on the south and east. This rugged peninsula juts out in a southwesterly crescent from the mainland beginning at the 59th parallel of latitude and running nearly 670 km (400 miles) to about the 54th parallel. The southwestward crescent is continued for another 2500 km (1,500 miles) by the Aleutian Islands. The backbone of the Alaska Peninsula is the Aleutian Mountain Range. This volcanic mountain range lies along the Pacific coast on the east side of the peninsula. Numerous peaks rise above 1700 m (6,000 feet) elevation. This creates a Pacific coast that is rocky and has deep fjords. The Aleutian Range, including the Aleutian Islands, contains nearly 50 volcanoes known to have erupted or vented steam since 1760. They are part of a chain of volcanoes that rim the Pacific Ocean known as the "Ring of Fire". The Alaska Peninsula and Becharof National Wildlife refuges are superimposed over this rugged range of mountains. Becharof Refuge is situated in the northeastern part of the peninsula and contains approximately 480,000 hectares (1.2 million acres). It is located 16 km (10 miles) south of King Salmon and 472 km (295 miles) southwest of Anchorage. The refuge lies between Katmai National Park and Alaska Peninsula Refuge. The Alaska Peninsula Refuge boundaries encompass about 1.7 million hectares (4.3 million acres) of land stretching for nearly 544 km (340 miles) along the Alaska Peninsula. The refuge is subdivided into three units: the Ugashik, Chignik, and Pavlof units.

The Ugashik Unit's northeastern boundary is about 96 km (60 miles) south of the refuge headquarters at King Salmon and 576 km (360 miles) southwest of Anchorage. It is bounded on the north by the Becharof Refuge and on the south by the Aniakchak National Monument and Preserve. The Chignik Unit bounds the Monument's southern boundary with the Pavlof Unit occupying the southwestern end of the Alaska Peninsula. Izembek Refuge adjoins the unit's southwest corner. The Alaska Peninsula Unit of the Alaska Maritime Refuge includes all federally owned islands, sea stacks, columns, islets and rocks off the south side of the Alaska Peninsula between the tip of the Alaska Peninsula and Katmai National Park. Seal Cape, a small headland 30 miles south of the village of Chignik, is the only portion of the unit located on the Alaska Peninsula.

#### Climate

The Alaska Peninsula has a moderate polar maritime climate characterized by high winds, mild temperatures, cloud cover, and frequent precipitation. Fog and drizzle are frequent in summer. Severe storms can occur year-round, often with intense winds.

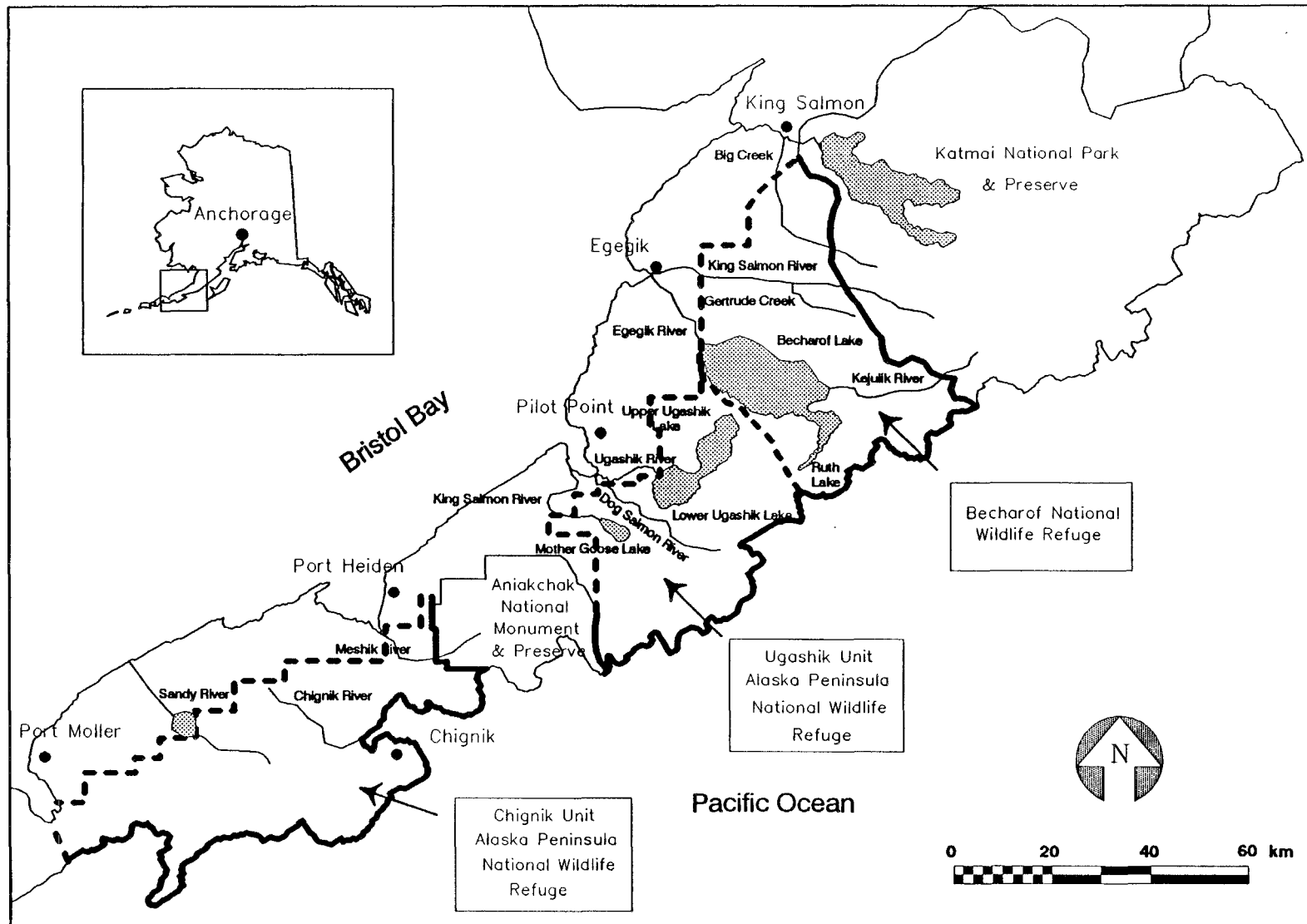


Figure 1. Alaska Peninsula (Ugashik and Chignik Units) and Becharof National Wildlife Refuges.

## Topography

Landforms of the Complex include rugged mountain crests, active volcanoes, glaciers, summit ice fields, glacial lakes, moraines, and low tundra wetlands. Lands on the Bristol Bay side of the peninsula gradually slope toward the Bristol Bay coastal plain northwest of the mountains. The coastal plain terrain is flat with lakes and meandering streams. The Pacific Ocean side of the peninsula ends abruptly at the sea in rugged cliffs.

The lowest elevation on the west side of Becharof Refuge is about 14 m (50 feet) above sea level. The highest elevations on the refuge are about 1375 m (5,000 feet) where the northern boundary crosses the Kejulik Mountains. The Kejulik River Valley, about six miles wide at Becharof Lake, splits the main trend of the Aleutian Range, separating the rugged Kejulik Mountains from the coastal range. A few glaciers are on slopes and upper valleys of higher peaks on the northeast boundary of the refuge. The refuge landscape consists of tundra, lakes, wetlands, and volcanic peaks. Becharof Lake, the second largest lake in Alaska, is nestled between the low tundra wetlands to the north and west and the Aleutian Mountain Range to the east and south. Mount Peulik drops to the edge of the lake about midway along its southern shore. The geologically active Ukinrek Maars bares scars of the eruption that took place in 1977.

Landforms of the Alaska Peninsula Refuge include rugged mountain crests, rounded sub-summits, U-shaped valleys with sheer walls, sea cliffs and fjords, low tundra wetlands, glacial lakes, and moraines. The dominant geographical feature is the rugged Aleutian Range. Eleven major volcanoes, including seven that are active, are inside the refuge. They range from 1340 to 2525 m (4,400 to 8,300 feet) in elevation. Cinder beds radiate from eruptive centers in the volcanic systems and the volcano slopes are covered with glaciers and summit ice fields. The refuge lands on the Bristol Bay side of the range gradually slope toward the Bristol Bay coastal plain northwest of the mountains. The coastal plain terrain is flat, with lakes, and meandering streams. Remnants of glacial moraines provide the only local relief. Toward the tip of the peninsula the southwestern half of the refuge has fewer lakes and assumes a progressively narrower slope.

The extremely rugged coastline of the Alaska Peninsula Unit of the Alaska Maritime Refuge is deeply indented by Seal Bay, Sweater Bay and Devil's Bay. Cliffs line much of the coastline although there are sand beaches in Devil's Bay. The fjord-like bays cut the cape into two principal arms both of which top out at over 550 m (2,000 feet).

## Oil and Gas

Lands of Complex have attracted oil and gas exploration activity since the early 1900's (Bascle et.al 1987). Exploratory wells drilled adjacent to and in the Complex have resulted in minor shows of oil or gas. Natural oil and gas seeps occur on the Complex (Blasko 1976). The geology indicates that the oil and gas potential for the Complex ranges

from no potential to high potential, with moderate to high potential covering most of the Complex (Bascle et.al 1987).

### **Water Resources**

Water is an important resource of the Complex affecting the landscape, fish and wildlife populations, human uses and management. Hydrological and water quality data on water resources is very limited. Pacific Ocean side streams are relatively short and straight with few tributaries and impoundments, while the Bristol Bay side streams meander with frequent tributaries and impoundments. Major drainage basins of each refuge are discussed in the following paragraphs.

#### **Becharof Refuge**

Becharof Refuge has four major drainage basins: a tributary of the Naknek River; the King Salmon River; the Egegik River; and east slope Pacific Ocean coastal streams (Figure 1).

The King Salmon River and a tributary of the Naknek River drain Becharof Refuge north of Becharof Lake and west of the mountains. The U.S. Geological Survey has not named the Naknek River tributary, although locally it is called Big Creek (not to be confused with Big Creek west of the Becharof Refuge). Little hydrological information exists on Big Creek. It originates in the mountains south of Brooks Lake in Katmai National Park and is not glacially fed. The stream flows approximately 60 km (40 miles) in a northwesterly direction, joining the Naknek River at a point about 6 km (4 miles) east of the town of King Salmon. The stream has numerous tributaries and several small lakes and ponds. Its drainage basin is almost entirely within Becharof Refuge boundaries.

The King Salmon River originates in the Kejulik Mountains in Katmai National Park, and flows west about 160 km (100 miles) into the Egegik River near the village of Egegik. It drains about 2,530 km<sup>2</sup> (990 miles<sup>2</sup>). River discharge and flow regimes are unknown. Three major tributaries located within Katmai National Park; Contact; Angle; and Takayofo Creeks; form the headwaters of the King Salmon River. Their individual drainage areas have not been determined. The waters of Angle Creek, and to a lesser degree Takayofo Creek, are derived from glaciers in the Kejulik Mountains. Sediments carried by these creeks contribute to the turbidity of the King Salmon River. Gertrude Creek and several smaller tributaries located within Becharof Refuge boundaries, contribute to the flow. There are several small lakes and ponds in the drainage basin.

The Egegik drainage originates in the Aleutian Range, flows west through Becharof Lake, and empties into Egegik Bay. Its basin includes Becharof Refuge's two largest lakes, Ruth and Becharof Lakes. Becharof Lake has several tributaries, with Ruth and Kejulik Rivers having the greatest discharge. Ruth River begins as the outlet of Ruth Lake and flows 1,200 m (0.75 mile) and drains into Becharof Lake. The Kejulik River originates in the glaciers in the Kejulik Mountains and flows about 40 km (25 miles) into the northeast end of Becharof Lake. The Egegik River, from the outflow of Becharof Lake to its mouth, is approximately

50 km (30 miles) long and has a total drainage area of 7,014 km<sup>2</sup> (2,740 miles<sup>2</sup>). The discharge and flow regimes of the river are unknown. The Egegik River has two other major tributaries, Shosky Creek and the previously discussed King Salmon River. Shosky Creek is located on the western-most part of Becharof Refuge, north of Becharof Lake. It is about 30 km (20 miles) long and empties into the Egegik River just east of Becharof Refuge. The drainage areas of both Shosky Creek and the Kejulik River have not been determined.

Becharof Refuge east of the Aleutian Range contains many named and unnamed streams and rivers. The mountain streams range from 3-8 km (2-5 miles) in length, and flow east into the Pacific Ocean. Hydrologic and wetlands classifications are incomplete for this area. There is little information on stream flow regimes and discharges.

Becharof Refuge contains 173 lakes of over 10 hectares (25 acres), as well as numerous ponds and potholes. Only 32 of these lakes are larger than 40 hectares (100 acres). A few lakes are glacially fed. Most of the lakes (79%) are located below the 150 m (500 ft) elevation. Approximately 65% of the lakes are landlocked while about 35% have ocean access.

Two major lakes are located in Becharof Refuge. Becharof Lake, approximately 117,000 hectares (290,000 acres) in area, is the second largest lake in Alaska. The discharge from Becharof Lake is unknown, but its large size stabilizes the discharge of the Egegik River. Ruth Lake, about 400 hectares (1,000 acres) in area, is located a few miles south of Becharof Lake and drains into the Island Arm portion of Becharof Lake.

#### Alaska Peninsula Refuge - Ugashik Unit

Major drainage basins on the Pacific Ocean side of the Alaska Peninsula Refuge are Kialagvik Creek and Yantarni Creek. Basins on the Bering Sea side of the peninsula are: the upper portions of the Ugashik River (Ugashik Lakes section); Dog Salmon River; and King Salmon River (Mother Goose Lake section). Major basins and drainage ways are described in the following paragraphs.

Headwaters of the Ugashik drainage begin south of Mt. Peulik and Becharof Lake. Most of the headwater streams flow northwest into Upper and Lower Ugashik Lakes. The Ugashik Narrows, a short section of river approximately 800 m (0.5 mile) long, connects the Upper and Lower Ugashik Lakes. The Lower Ugashik Lake outflow, at an elevation of approximately 4 m (13 ft) above sea level, forms the Ugashik River channel. After leaving the lake, the river meanders approximately 61 km (38 miles) through a glacial outwash plain before ending in Ugashik Bay and estuary.

Glacial ice fields near Mt. Kialagvik, at an elevation of approximately 1,219 m (4,000 ft), feed the headwaters of the Dog Salmon River. Turbid glacial streams descend rapidly down steep slopes, forming the river at an elevation of about 30 m (100 ft). Several small clear tributaries also feed the Dog Salmon River along its entire length. The river

meanders northwest approximately 104 km (65 miles) through a long low valley, before reaching upper Ugashik Bay at a point approximately 6-8 km (4-5 miles) downstream from the village of Ugashik.

The King Salmon River headwaters originate at elevations between 914-1,219 m (3,000-4,000 ft) near Mt. Chiginagak. Many of the headwater streams, fed by glaciers, flow rapidly down steep slopes and then meander across the low-gradient coastal plain before entering Mother Goose Lake. The King Salmon River channel originates at the outflow of Mother Goose Lake. Other streams join the King Salmon River channel further west. It flows west, out of the Alaska Peninsula Refuge, and then north before entering the Ugashik Bay near the village of Pilot Point.

#### Alaska Peninsula Refuge - Chignik Unit

Drainage basins on the Pacific Ocean side of the Alaska Peninsula Refuge are Main Creek, Chignik River, Kametolook River, and Big River basins. Basins on the Bering Sea side of the peninsula are the upper portions of Meshik River, Muddy River, and Sandy River basins. Major basins and drainage ways are described below. The Meshik River drainage originates outside of the Alaska Peninsula Refuge, on the south-facing slopes of Aniakchak Peak, and on the other nearby mountains. The many short, headwater streams flow rapidly down the steep slopes and form the main river channel. The river flows slowly to the west before entering the shallow Port Heiden estuary just outside of the Alaska Peninsula Refuge's western boundary.

The Chignik River basin drains east into the Pacific Ocean. The tributary headwaters originate on Refuge lands while the majority of the drainage lies outside Refuge boundaries. Some headwater streams originate from the western slopes of the Aleutian Range, and from glaciers near the north side of the 2,156 m (7,075 ft) Mount Veniaminof. These streams flow into Black Lake or the Chignik River. Other headwater streams originate from a glacial moraine west and north of Black Lake, which is only 19 km (12 miles) from the tidal flats of Bristol Bay. This divide, at an elevation of 11 m (36 ft), separates waters that flow northwest into the Bering Sea from waters that flow southeast toward Chignik Bay. The outflow of Black Lake forms the Chignik River channel. The river gradually flows south to southeast, through a break in the mountains, into the 13 km (8 mile) Chignik Lake. Along its course many streams, draining the steep slopes of the Aleutian Range, join the river. From the lake, the river flows along a fault line into Chignik Lagoon and estuary. Before the fault existed, however, the Chignik River flowed northwest to Bristol Bay.

The Kametolook, Stepovak, and Big Rivers flow into the Pacific Ocean and are located to the southwest of the Chignik River drainage. Kametolook and Stepovak originate from the ice fields on the southwest side of Mount Veniaminof and are characterized by braided channels flowing through glacial outwash.

All of the streams and rivers south of the Meshik River drainage that flow from the western slopes of the Aleutian Range into Bristol Bay are

grouped into one drainage basin. This basin includes the drainages on the western slope of Mount Veniaminof, Muddy River, and Sandy River. There is little hydrologic information on these streams.

### **Water Rights**

Water rights were reserved by Congress to support the purposes for which each refuge was established. The federal government also has the opportunity to acquire state water rights administratively under Alaska Statute 46.15 for portions of or all of its water bodies within each refuge without quantifying and asserting its federal reserved claim for water. The State of Alaska recommends that the Service utilize the State adjudication process for filing for water rights on Service lands.

## **BIOLOGICAL ENVIRONMENT**

### **Vegetation**

Becharof Refuge lies in a transition zone between forest/tundra plant communities to the north, and the generally treeless grass/sedge/low-shrub tundra typical of the peninsula to the south. The transition occurs between the King Salmon River and Naknek River drainages.

The Alaska Peninsula Refuge consists of low-profile tundra and is nearly continuous from the Ugashik Lakes south to False Pass and the end of the peninsula. Deciduous vegetation occurs as cottonwood mainly in the Mother Goose Lake area; elsewhere the category generally occurs as alder in tall, low, or dwarf shrub growth form on the Alaska Peninsula Refuge. Tall and low willow are the dominant deciduous species associated with riparian areas.

### **Wildlife**

The Complex support diverse population of wildlife including: waterfowl; marsh and water birds; shorebirds; seabirds; raptors; upland birds; passerines; wolves; fox; lynx; hares; brown bears; caribou; moose; and marine mammals. Brown bear, caribou, and moose are the primary big game species.

Becharof Refuge's fauna includes a large population of brown bears. Moose inhabit the area in moderate numbers and over 15,000 caribou migrate through the area during fall and winter. Other animals found are wolves, foxes, wolverines and lynx. Sea otters, sea lions, and harbor seals inhabit the shorelines as do nesting bald eagles, peregrine falcons, and thousands of seabirds on the rocky sea cliffs of the Pacific coast. Nesting and migratory waterfowl are found on wetlands and lakes throughout the refuge.

Alaska Peninsula Refuge has over 30 species of mammals present, including brown bear, moose, caribou, wolf and wolverine. Sea otters, sea lions, and harbor seals inhabit the Pacific coastal area. The refuge's lakes and wetlands are heavily used by nesting and migrating waterfowl.

Alaska Peninsula Unit of the Alaska Maritime Refuge at Seal Cape is primarily a nesting area for seabirds. Principal nesting seabird species are cormorants, black-legged kittiwakes, Kittlitz's and marbled murrelets, and glaucous-winged gulls. Murrelets are often encountered in the protected bays around the cape.



### SECTION 3. REFUGE FISHERY RESOURCES

The Complex fishery resources are large and diverse and include the following principal species: chinook, chum, coho, pink and sockeye salmon; rainbow/steelhead trout; Dolly Varden; Arctic char; lake trout; Arctic grayling; northern pike; and burbot. In addition, at least 23 other fish species occur in fresh and saltwater habitats (Appendix B). Salmon stocks that originate on the Complex support subsistence, commercial, and sport fisheries.

The fisheries of each refuge are discussed in the following paragraphs by drainage basin using the basins identified in the Complex Comprehensive Conservation Plans (U.S. Fish and Wildlife Service 1985b and 1985c).

#### BECHAROF REFUGE

##### Naknek Drainage, Big Creek

Big Creek supports spawning populations of chinook, chum, and coho salmon. Approximately 50% of the Naknek River chinook salmon escapement spawn in Big Creek (Minard 1987). Big Creek is also a major spawning stream for Naknek River chum salmon and one of three major coho salmon spawning tributaries. The majority of salmon spawning in Big Creek occurs within Becharof Refuge. The mean chinook salmon aerial escapement index for 1981-1986 is 6,260 fish. Chum salmon aerial escapement indexes during 1982-1984 average 5,067 fish and 1,435 coho salmon were recorded during a 1981 float survey.

Big Creek originating salmon are not targeted in the Naknek-Kvichak commercial fisheries district, although all three species are caught incidentally in the commercial and subsistence fisheries targeting sockeye salmon. The Naknek River sport fishery harvests all three salmon species originating in Big Creek, with chinook and coho the main target species. The majority of sport fishing activity in Big Creek occurs in the lower reaches of the stream. Big Creek also supports spawning populations of rainbow trout, Arctic grayling, Dolly Varden, and northern pike.

##### King Salmon River Drainage

The King Salmon River supports chinook, chum, coho, pink, and sockeye salmon, although sockeye are minimal in number. Gertrude Creek, a main stem clear water tributary, supports chinook, chum, coho, and pink salmon spawning populations. Aerial escapement surveys are incomplete for the King Salmon River system because of turbidity, but the following chinook salmon mean indexes were observed for the years listed: Gertrude Creek, 493 fish, 1981-1988; Takayofa Creek, 249 fish, 1981-1988; and Contact Creek, 157 fish, 1982-1988 (R. Russell, Alaska Department of Fish and Game, personal communication). Pink salmon were only reported for Gertrude Creek in 1983 with 58 fish counted during a float survey. King Salmon River originating salmon are harvested in the Egegik district commercial fishery.

In addition to salmon, Gertrude Creek also supports populations of Arctic grayling, Dolly Varden, and rainbow trout. Rainbow trout and Dolly Varden were found primarily in the lower 15 km (9 miles) of Gertrude Creek. Arctic grayling were found throughout Gertrude Creek, however, they were most abundant in the upper 10 km (6 miles). Rainbow trout ranged from 310-588 mm fork length (FL); Dolly Varden ranged from 315-546 mm FL; and Arctic grayling ranged from 265-492 mm FL (Adams et al. 1993).

#### **Egegik River Drainage**

Principal fish species of the Egegik River drainage include: chinook, chum, coho, pink, and sockeye salmon; lake trout; Dolly Varden; Arctic grayling; northern pike; and burbot.

Sockeye are the most abundant salmon with a 10-year (1982-1991) average total run of 7,910,240 (Alaska Department of Fish and Game 1992a). The remaining salmon species are listed in order of abundance: chum, coho, pink, and chinook. Sockeye salmon spawn in Becharof Lake tributary streams with approximately 85% of the sockeye spawning occurring in tributary streams to the Island Arm of the lake. The Kejulik River and Bible Creek are also important sockeye salmon spawning tributaries.

The Egegik and King Salmon River drainages support the Egegik commercial fishing district, which is managed by the Department as a sockeye salmon fishery utilizing set and drift gill net gear. Commercial fishing begins in early June with chinook salmon targeted during the first half of the month. Sockeye salmon enter the fishery in mid-June, peak in early July, and are finished by early August. Chum salmon timing corresponds with the sockeye salmon, consequently these fish are harvested incidental to the sockeye. Coho salmon enter the fishery in late July, peak around mid-August, and are finished by mid-September. The catch by year is presented in Table 1. The 10-year (1982-1991) mean harvest of sockeye salmon in the Egegik district is 6,438,640 (Alaska Department of Fish and Game 1992a). The district 10-year (1982-1991) average harvest of the other salmon species are: 2,978 chinook; 133,019 chum; and 45,351 coho (Alaska Department of Fish and Game 1992a). Pink salmon are not targeted specifically, but are caught incidentally to sockeye and coho salmon with a 10-year (1982-1991) average catch of 4.428 fish.

Commercial harvest of sockeye salmon is regulated by the Department under the emergency order process, which provides the means to adjust fishing periods in order to obtain escapement past the Egegik River test fishery and counting tower. The sockeye salmon escapement point goal past the Egegik River counting tower is one million fish. Harvest of salmon prior to and following the emergency order period, mid-June to mid-July, is allowed five and four days a week, respectively, with the closed days provided for chinook and coho salmon escapement. Chinook, chum, and coho salmon escapement into the Egegik River drainage is monitored by aerial surveys. Aerial survey estimates for these species are considered indexes rather than estimates of total escapement, as the surveys are not conducted throughout the spawning periods. Mean aerial survey escapement indexes for these species are: 200 chinook, 1984-1988,

Table 1. Estimated commercial catches of salmon in the Ugashik and Egegik fishing districts, 1981-1992 (Alaska Department of Fish and Game 1992a).

Year	Chinook	Chum	Coho	Pink	Sockeye	Total
<u>Ugashik District<sup>a</sup></u>						
1981	3,416	36,275	30,220	29	2,116,066	2,186,006
1982	7,170	53,204	50,803	170	1,139,192	1,250,539
1983	9,176	105,171	7,816	0	3,349,451	3,471,714
1984	4,767	210,611	68,451	2,387	2,658,376	2,944,592
1985	5,840	131,576	60,815	3	6,468,862	6,667,096
1986	2,982	111,112	25,770	98	5,002,949	5,142,911
1987	4,065	101,074	14,785	30	2,128,652	2,248,606
1988	3,444	94,545	52,355	218	1,523,520	1,674,082
1989	2,112	84,673	77,077	29	3,146,239	3,266,995
1990	1,840	32,013	7,733	361	2,149,009	2,216,129
1991 <sup>c</sup>	1,365	56,700	5,399	2	3,039,696	3,142,811
1992 <sup>c</sup>	2,246	56,949	84,898	162	3,355,095	3,449,856
<u>Egegik District<sup>b</sup></u>						
1981	5,468	87,581	32,759	222	4,361,406	4,487,436
1982	4,834	84,329	74,989	1,997	2,447,514	2,613,663
1983	4,758	127,490	25,954	92	6,755,256	6,913,550
1984	4,680	178,096	66,589	5,759	5,190,413	5,445,537
1985	4,015	126,736	32,667	51	7,537,273	7,700,742
1986	1,883	94,666	33,607	2,749	4,852,935	4,985,840
1987	2,959	145,259	30,789	0	5,356,669	5,535,676
1988	3,103	237,888	48,981	4,485	6,456,598	6,751,055
1989	2,034	136,185	49,175	6	8,901,994	9,089,394
1990	1,146	123,087	43,897	11,593	10,371,762	10,551,485
1991 <sup>c</sup>	465	71,313	46,487	121	6,800,798	6,919,184
1992 <sup>c</sup>	564	113,977	47,266	764	15,677,236	15,839,807

a Includes the Ugashik, Dog Salmon, and King Salmon River drainages.

b Includes the Egegik and King Salmon River drainages.

c Preliminary Data

including Shosky Creek; 462 chum, 1984-1985 and 1987-1988, including Shosky Creek; 8,833 pink, 1982, 1984, and 1986; 15,339 coho, 1984-1988 (Alaska Department of Fish and Game 1989a).

Population levels of lake trout, Dolly Varden, Arctic grayling, northern pike, and burbot are unknown at this time, with all of the species thought to be present in at least moderate numbers.

#### **Pacific Coastal Drainages**

The Pacific coastal streams within Becharof Refuge are short, ranging from 3-8 km (2-5 miles) in length, and support chum, coho, pink, and sockeye salmon; and Dolly Varden. Chum and pink are the most abundant salmon with sockeye only reported in one Portage Bay stream. Coho are also produced in these drainages, but quantitative data on their distribution and abundance is not available due to the difficulty of sampling (Alaska Department of Fish and Game 1977). The fishery operates under the emergency order process, while intercepting sockeye salmon returning to the Chignik River drainage. After July 25, the fishery targets local stocks, primarily chum and pink salmon.

### **ALASKA PENINSULA REFUGE - UGASHIK UNIT**

#### **Ugashik River Drainage**

Ugashik River drainage headwaters begin south of Mt. Peulik in the mountains east of Upper and Lower Ugashik Lakes. The Ugashik River originates at the Lower Ugashik Lake outlet, 4 m (13 ft) above mean sea level, and meanders approximately 61 km (338 miles) through a glacial outwash plain before reaching Ugashik Bay. Principal fish species of the Ugashik drainage include: chinook, chum, coho, pink, and sockeye salmon; lake trout; Dolly Varden; Arctic grayling; and northern pike.

Sockeye are the most abundant salmon with a 10-year (1982-1991) average total run of 4,236,651 (Alaska Department of Fish and Game 1992a). The remaining salmon are listed in order of abundance: chum; coho; chinook; and pink. The Ugashik River drainage, in combination with the Dog Salmon River and King Salmon River drainages, support the Ugashik commercial fishing district. This commercial fishery is managed by the Department as a sockeye salmon fishery and consists of set and drift gill net gear. Commercial fishing begins in early June with chinook salmon targeted during the first half of the month. Sockeye salmon enter the fishery in mid-June, peak in early July, and are finished by the end of July. Chum salmon return timing corresponds with the sockeye salmon, consequently chum are harvested with the sockeye. Coho salmon enter the fishery in late July, peak in the latter half of August, and are finished by mid-September. The 10-year (1982-1991) average harvest of Ugashik district sockeye salmon is 3,060,121. District 10-year (1982-1991) average harvests of the other salmon are: 4,271 chinook; 98,074 chum; and 39,152 coho. Pink salmon are not targeted in the district with a 10-year (even years 1982-1991) average catch of 627 fish (Alaska Department of Fish and Game 1992a). Table 1 includes the

Ugashik district commercial salmon harvest by species for the 1981-1992 seasons.

Commercial salmon harvest is regulated by the Department with an emergency order procedure which allows adjustment of the fishing periods to insure upstream escapement of sockeye salmon past the lower river test fishery and Ugashik River counting tower. The escapement goal of sockeye salmon past the counting tower is 700,000 fish. Chinook, chum, and coho salmon escapement into the drainage is monitored by the Department through aerial surveys. Aerial survey escapement estimates for these three species are considered as indexes, rather than total escapement estimates, as the surveys are usually not conducted throughout the spawning periods.

Population levels of lake trout, Dolly Varden, Arctic grayling, and northern pike are unknown, but suspected to be abundant. The Ugashik River drainage is well known for producing trophy class Arctic grayling with the current state record coming from the drainage (Alaska Department of Fish and Game 1993).

#### **Dog Salmon River Drainage**

The Dog Salmon River drainage supports chinook, chum, coho, pink, and sockeye salmon; Dolly Varden; Arctic grayling; and northern pike.

Salmon originating in the Dog Salmon River drainage are harvested in the Ugashik commercial fishing district. Escapement levels are monitored by aerial survey on an opportunistic basis. Actual estimates of Dog Salmon River salmon production and consequent contribution to the Ugashik district commercial harvest are unknown at this time.

Population levels of Dolly Varden, Arctic grayling, and northern pike are unknown in the system. Abundance of these species is thought to be moderate to low in this drainage.

#### **King Salmon River Drainage**

The King Salmon River drainage lies southwest and adjacent to the Dog Salmon River drainage and includes Mother Goose Lake. Headwater tributaries originate near Mt. Chiginagak and many are glacial in origin. The King Salmon River originates at the Mother Goose Lake outlet, flows west out of the Alaska Peninsula Refuge, and turns north prior to emptying into Ugashik Bay near the village of Pilot Point. Three major tributaries intersect the river: Painter; Old; and Pumice creeks.

The King Salmon River drainage supports chinook, chum, coho, pink, and sockeye salmon; and Dolly Varden. King Salmon River drainage originating fish are harvested in the Ugashik commercial fishing district and escapement levels are monitored by aerial survey on an opportunistic basis. Actual salmon escapement into and contributions by this system to the commercial harvest are unknown at this time.

Dolly Varden population levels are unknown in this system. Abundance of this species is thought to be high in the King Salmon River drainage.

#### **Pacific Coastal Drainages**

The Pacific coastal streams within the Ugashik Unit are generally short, ranging from 3-8 km (2-5 miles) in length, and support chum, coho, pink, and sockeye salmon; and Dolly Varden. Chum and pink are the most abundant salmon. Coho are also produced in these drainages, but quantitative data on their distribution and abundance is not available due to the difficulty of sampling (Alaska Department of Fish and Game 1977). The fishery operates under the emergency order process, while intercepting sockeye salmon returning to the Chignik River drainage. After July 25, the fishery targets local stocks, primarily chum and pink salmon.

### **ALASKA PENINSULA REFUGE - CHIGNIK UNIT**

#### **Meshik River Drainage**

The Meshik River drainage lies southwest and adjacent to the King Salmon River drainage and is the last major river system on the Bristol Bay side of the Alaska Peninsula Refuge. Drainage headwaters originate on Aniakchak peak and other nearby mountains. Headwater streams are primarily glacial in origin, and several major tributaries join the river prior to entry into Port Heiden estuary. The Meshik River drainage supports chinook, chum, coho, pink, and sockeye salmon; and Dolly Varden (Wagner and Lanigan 1988). Chum are probably the most abundant salmon followed by coho, sockeye, chinook, and pink salmon. Mean aerial survey indexes for the 1984-1989 salmon seasons are: chinook 3,200; chum 28,200; and sockeye 29,700 (Shaul and Schwarz 1989).

The Meshik River drainage supports the Port Heiden section of the northern Alaska Peninsula commercial fishing area. The Port Heiden section is also an overlap area for the Alaska Peninsula/Aleutian Islands and Bristol Bay salmon fishermen.

Dolly Varden are abundant in the Meshik River drainage with the majority appearing to be anadromous. Dolly Varden collected in the drainage in 1984 ranged up to 600 mm (23.6 inches) in fork length (Wagner and Lanigan 1988).

#### **Bristol Bay Drainage**

The Bristol Bay drainage runs from the Meshik River drainage southwest to Port Moller. Streams in the drainage which originate on the Alaska Peninsula Refuge include: Blueberry Creek; Muddy River; and Sandy River. Chinook, chum, and sockeye salmon spawn in the Sandy River below the lake, while coho and sockeye spawn in the river and tributaries above the lake (Alaska Department of Fish and Game 1987a). The Unangashak River of which blueberry Creek is a tributary is an important coho system. There is also a small sockeye run into a lake which drains in the Unangashak River below Blueberry Creek.

The Sandy River is included in the Bear River section of the northern Alaska Peninsula commercial fishing area. Commercial harvest is regulated by emergency order and based upon aerial survey estimates of sockeye salmon into the Sandy River and the counting tower estimates into the Bear River. Escapement goals for chinook, coho, and chum salmon have not been estimated.

Although steelhead trout have been documented in the Sandy River, no information exists on the population size and structure.

#### **Pacific Coastal Drainages**

Alaska Peninsula Pacific coastal drainages are generally shorter and smaller than Bristol Bay drainages. Larger Pacific coastal drainages with headwater areas within the Alaska Peninsula Refuge (Chignik Unit) include Stepovak River; Big River; and Kametolook River. The lower reaches of these drainages have been conveyed to native corporation ownership. Chum and pink salmon are found in most of the Pacific coastal drainages. Coho salmon are primarily reported in Kametolook and Big Rivers although they exist in numerous other small streams as well. The run timing and remoteness of the area preclude comprehensive enumeration of the coho runs (Alaska Department of Fish and Game 1977). Sockeye salmon are found in Orzinski River, Yantarni Creek, the east stream on Long Beach, in a lake which drains into Agripina Bay, and in a Port Wrangell Bay stream (Alaska Department of Fish and Game 1989b). Dolly Varden probably inhabit all of these systems as well.

The largest Pacific coastal drainage is the Chignik River system. Although the majority of this drainage is under native corporation ownership, it will be briefly discussed as Chignik River origin salmon are intercepted in commercial fishing areas adjacent to Alaska Peninsula Refuge lands. The Chignik River drainage include: Chignik Lake; Black Lake and tributaries; and supports chinook, chum, coho, pink, and sockeye salmon; steelhead trout; and Dolly Varden.

The actual quantity of salmon originating from Alaska Peninsula Refuge lands within the Pacific coastal drainages is unknown, as the quantity and success of spawning that occurs within the refuge is unknown. Most of the commercial fisheries on the Pacific coast side of the peninsula are managed as intercept fisheries, which target Chignik River drainage returning sockeye salmon between June 7 and July 25. Fishing periods are regulated by emergency order and following July 25, the fisheries target locally returning stocks, primarily chum and pink salmon. Orzinski Bay is managed on local sockeye stocks through July and then for pink salmon in August and coho salmon in September. Because of the small size and number of tributaries, the Department generally uses aerial surveys to estimate peak spawner counts for managing the commercial fishery. In 1990 the Department began operating a weir on Orzinski River to count sockeye. A weir had previously been operated from 1929 to 1941 (Alaska Department of Fish and Game 1991).

## SECTION 4. HUMAN USE AND MANAGEMENT HISTORY

### COMMERCIAL FISHING

Bristol Bay salmon stocks have supported commercial harvests since the 1890's (Edfelt 1973). Fishery management policies prior to World War II limited harvest efficiency through gear and vessel restrictions (Alaska Department of Fish and Game 1987b). Power boats were banned from 1923 until 1951 and fishing effort was forced far offshore with the exception of staked or set gill nets. These management policies also had the effect of maximizing employment in the fishery.

During many of the years that the Federal Government managed the sockeye salmon fisheries of southwestern Alaska, desired escapements in the major river systems were established by law. The White Act of June 26, 1924, declared the intent of Congress to limit the catch to 50% of the returning salmon. As knowledge of the life history of sockeye salmon increased, it became apparent that in some years the stocks were so small that the entire returns were not adequate to fully use the spawning grounds or nursery areas; in other years the returns were so large that escapements of 50% were obviously excessive. This provision of the act was repealed on September 4, 1957 (Burgner et al. 1969). Commercial fisheries have been managed by the Department since statehood in 1959.

When World War II manpower restrictions severely reduced the number of fishermen, price inflation and relaxed regulation caused the fishing effort to intensify as large canned salmon inventories were thought to be in the national interest. This resulted in an abnormally high catch during the 1942-1945 period and provided the basis for the logic of a limited entry fishery.

Collapse of the salmon runs and a drop in market demand in the late 1940's closed down many of the huge cannery operations scattered throughout Bristol Bay. Under high seas fishing pressures by the Japanese, salmon harvest continued to decline throughout the 1950's and dipped to low points throughout the 1960's. The hardest times occurred during the early 1970's when two consecutive severe winters killed hundreds of millions of vulnerable eggs and fry. Sockeye salmon harvests hit rock bottom in 1973, and in 1974 President Nixon declared Bristol Bay an economic disaster area.

In 1972, Alaskans voted to develop a limited entry program for the state's fisheries. The limited entry program was designed to respond to a financially distressed industry caused by increasing numbers of commercial fishermen and declining salmon stock levels. The purpose of the program is to stabilize the amount of gear in each fishery at levels which allow for fair dollar returns to the fishermen, aid in effective fisheries management and promote professional and diversified commercial fisheries (Adasiak 1979).

Since 1974, the Japanese High Seas Mothership Gill Net Fishery has decreased high seas exploitation of Bristol Bay sockeye salmon, because of bilateral negotiations of the International North Pacific Fisheries



Commission Treaty. The Mothership fleet was restricted again in 1986 by area and time restraints, which further reduced the interception rate of Bristol Bay sockeye salmon.

Complex originating salmon stocks are included in four Department commercial fishery management areas: Bristol Bay; Alaska Peninsula and Aleutian Islands; Chignik; and Kodiak (Figure 2). Each of the management areas is subdivided into districts and sections within the districts.

Bristol Bay districts which target Becharof Refuge salmon stocks are the Naknek-Kvichak (Big Creek) and Egegik (King Salmon and Egegik Rivers) districts (Figure 2). Salmon returning to Alaska Peninsula Refuge Bristol Bay drainages are harvested in the Ugashik district (Ugashik, Dog Salmon, and King Salmon Rivers) of the Bristol Bay area and the Northern district (Meshik and Sandy Rivers) of the Alaska Peninsula area.

Salmon returning to Pacific drainages of Becharof Refuge are harvested in the Mainland district of the Kodiak Management Area. Salmon returning to Pacific drainages of Alaska Peninsula Refuge are harvested in the following three management areas and associated districts: Kodiak area, Mainland district; Chignik area, Eastern and Western districts; and Alaska Peninsula area, South Central district.

Presently, Bristol Bay sockeye salmon fisheries are regulated by emergency order from mid-June to mid-July. During this time period the fishing periods are regulated to ensure adequate escapement into the river systems. The fishing periods are normally allocated on a twelve or twenty-four hour basis.

The Pacific coastal drainage fisheries for the Complex are managed as intercept fisheries targeting Chignik River origin sockeye salmon during the period June 7 through July 25. Management in the Chignik Bay and Central Districts continue to be managed on the basis of Chignik Sockeye after July 25, however, the management strategy shifts to target local stocks (chum and pink salmon) in other districts. Fishing periods are regulated by emergency orders issued by the Department's Division of Commercial Fisheries.

In the 1970's, the Bristol Bay sockeye salmon industry shifted from an emphasis on canned salmon production towards the fresh and frozen markets. The shift is attributed to: (1) an increased demand for frozen salmon in the Japanese market; (2) a reduced abundance of salmon in some years, which made opening a cannery economically infeasible; (3) competition from processors purchasing salmon for fresh or frozen markets; (4) entry of cash buyers who purchase salmon to export to processors outside the region; and (5) a depressed market for canned salmon that was encouraged by quality control problems, a botulism scare, and consumer disinterest in canned salmon.

Since 1979, chinook and coho salmon harvest has increased in the Egegik and Ugashik districts. The increased harvest of chinook salmon is the result of increased fishing pressure prior to the emergency order period

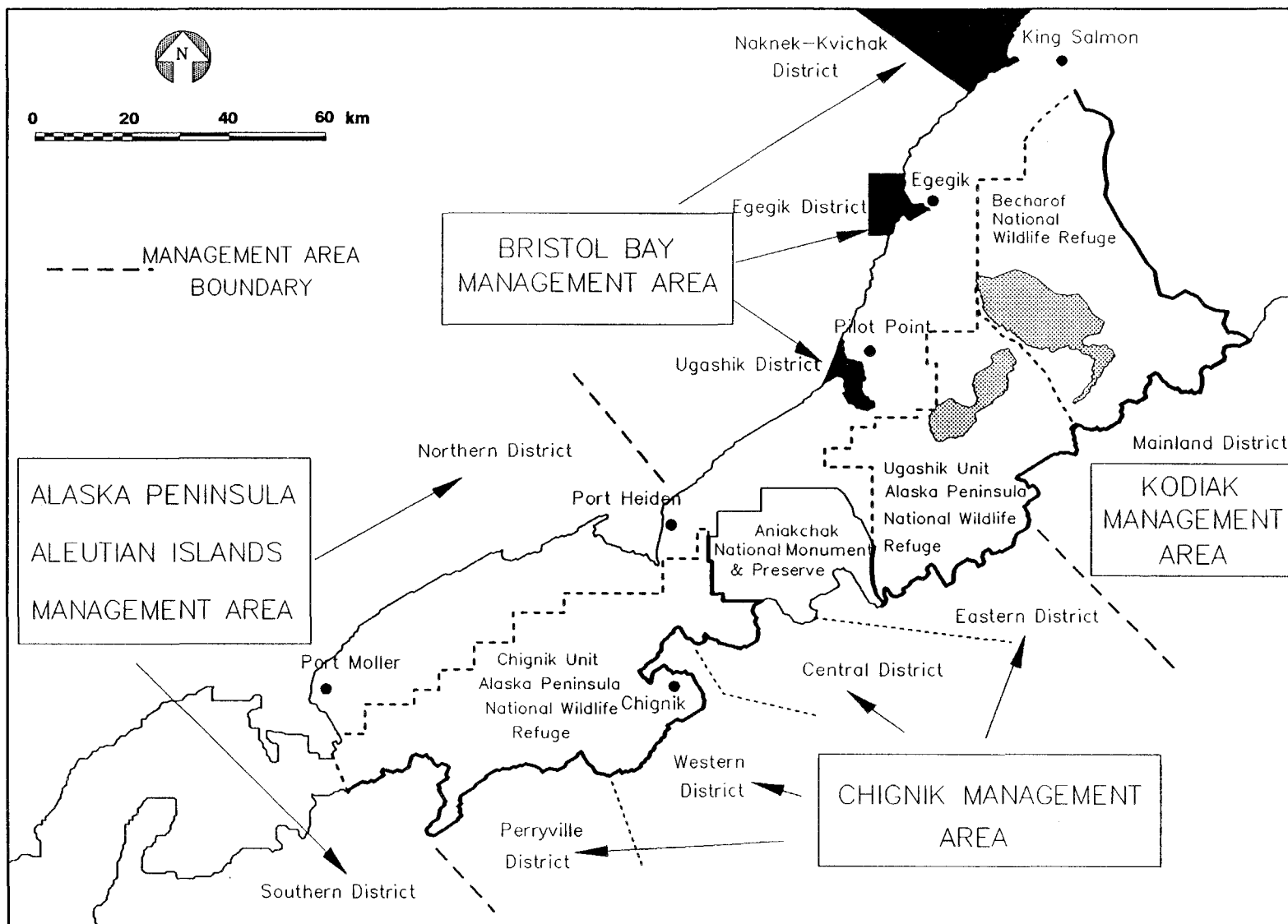


Figure 2. Commercial fishing districts adjacent to the Alaska Peninsula and Becharof National Wildlife Refuges.

and development of markets for fresh and frozen fish markets. In 1988, the month of May was eliminated from the early season in Bristol Bay to allow more chinook to enter escapement because declines in chinook indices had been observed (Alaska Department of Fish and Game 1989a).

The actual commercial catch of salmon originating within the Complex boundaries cannot be accurately determined because escapement is estimated for the entire drainage. Many of the fish caught in the commercial fishery originate on State or Native Corporation lands. However, the magnitude and importance of the salmon fishery to the region can be seen from the annual harvest in the Egegik and Ugashik commercial fishing districts (Table 1). Based on an average from 1978-1991, the ex-vessel value (the price paid to fishermen) of the catch from the Egegik and Ugashik districts is approximately 66 million dollars. Salmon caught in the Egegik and Ugashik districts account for the majority of fish originating within the Complex boundaries. The Egegik and Ugashik districts catch include the adjacent drainages which enter the Egegik-King Salmon River, Ugashik-Dog Salmon River, and King Salmon River. Sockeye salmon dominate catches from all of the Bristol Bay drainages except the Meshik River, which is predominately a coho and chinook salmon fishery.

Pacific drainages the Complex primarily support chum and pink salmon with the major exception of the Chignik River drainage. Sockeye salmon harvested on the Pacific coast side of the Complex consists primarily of intercepted Chignik origin fish; estimated by the Department to be 99% of the sockeye salmon catch (P. Probasco, Alaska Department of Fish and Game, personal communication). Coho salmon harvest is relative small. Chinook salmon catches are probably Chignik River origin, since catches are small and Chignik River is the only drainage reported to support chinook salmon, although other drainages probably have small runs of chinook.

#### SPORT FISHING

The primary species caught in the sport fishery on the Complex are Arctic char/Dolly Varden, Arctic grayling, rainbow trout, and salmon. An average of 2975 angler use days per year were reported by commercial guides fishing the Complex from 1987-1991. Permits issued specifically for sport fish guiding rose sharply from 2 in 1984 to 19 in 1987. Since 1987, permit numbers have remained relatively constant at approximately 20. The number of permits offered presently has no ceiling (U.S. Fish and Wildlife Service 1993). Even though guided use on the Complex has stabilized, it is expected that sport fishing activity on the Complex will continue to increase, especially if restrictions are placed on other sport fisheries throughout Alaska. No projections for future sport fishing effort or harvest are available. However, participation in sport fishing has been increasing nationwide (U. S. Department of Interior 1988). Undoubtedly this trend will also be reflected in increased sport fishing on the refuges. With the probable increase in sport fishing pressure, long term monitoring programs should be implemented at the more heavily fished areas. This information will allow evaluation of the affects of fishing pressure on the fish

populations and allow expedient establishment of stricter regulations if necessary.

Very little specific information on guided and unguided sport fishing is available. The most complete harvest information available on unguided sport fishing is based on mail surveys commonly referred to as the Mills Report. Because of the low sport fishing effort on the Alaska Peninsula when compared to other locations within Alaska, the results of the mail survey does not provide data specific to a particular stream. A minimum number of responses to the survey are required before an estimate can be made for a particular drainage. The only directed creel surveys have been conducted at the Ugashik Narrows (Meyer 1991) and at Gertrude Creek. Limited harvest and use data are available from the Special Use Permits issued guides. This information can be used to estimate the combined number of fish caught and harvested on the Complex, but does not include information to estimate use and harvest by refuge or river system. The lack of information severely hinders the planning process.

Data collected by personnel from the Complex during 1988 through 1990 stationed at Ugashik narrows, showed the majority of anglers utilizing the area are guided. In 1991, personnel from the U.S. Fish and Wildlife Service, King Salmon Fishery Resource Office (KSFRO) conducted a creel census at Gertrude Creek. Similar results to the Ugashik Narrows study were found; guided anglers accounted for the majority of use days. From these data, it is assumed the majority of anglers utilizing the Complex are guided.

Combined information for 1989 and 1990 indicated that Ugashik lakes (15 reports) and Ugashik Narrows (10) were two of the more heavily fished areas on the Complex (U.S. Fish and Wildlife Service 1993). Most of the fishing activity occurs in the Ugashik Narrows, the area between the upper and lower lake, and at the lower lake outlet. The Ugashik Narrows is well known for trophy size Arctic grayling (Meyer 1991). This notoriety for producing trophy Arctic grayling caused the Ugashik drainage to be one of the most heavily fished areas on the Complex (Mills 1985). Concern for the Arctic grayling population prompted the Department to assess the fishery impacts. The results of the study showed the Arctic grayling population abundance and recruitment were depressed (Meyer 1990). In 1990, the Board of Fishery enacted fishing regulations that prohibited fishing for Arctic grayling in the Ugashik drainage.

The King Salmon River (Becharof Refuge) is probably the second most popular drainage fished on the Complex. From the Special Use Permits in 1988, approximately 1,000 use days can be assigned to guided sport anglers utilizing this area. The close proximity to the town of King Salmon (103 km (62 miles)) probably accounts for much of this river's popularity. In the mid 1980's, the Complex manager became concerned that the rainbow trout population in Gertrude Creek may be impacted by the sport fishery. This concern prompted the King Salmon Fishery Resource Office to initiate a rainbow trout study on Gertrude Creek in 1988. The amount of effort appears to have decreased in recent years. A creel survey was conducted in 1991 on Gertrude Creek and found 68 anglers in 26 parties fished 282 hours and captured 829 fish and the

majority of anglers practiced catch and release. Because no historical age composition data are available, changes to the age structure (an indication of population well being) cannot be accurately assessed at this time. Preliminary indications show the population is stable but a reassessment should be conducted in five years.

Another popular guided sport fishing area was the Egegik River drainage. Becharof Lake (6 reports) received considerable pressure while several of its associated waters (Featherly Creek, Ruth Lake, and Egegik River) received similar effort (U.S. Fish and Wildlife Service 1993). According to the Alaska Department of Fish and Game statewide harvest survey, the Egegik River-Becharof Lake system was also documented as receiving considerable sport fishing pressure (Alaska Department of Fish and Game 1992b). Fishing pressure focuses on the capture of coho and sockeye salmon, Dolly Varden, and Arctic grayling. The popularity of fishing at the outlet to Becharof Lake has increased in recent years.

On the Alaska Peninsula, the steelhead run in the Sandy River appears to be a unique resource and may deserve special attention. No guides reported fishing the Sandy River in 1988. However, in 1985 two guides reported fishing this river.

Many other drainages receive fishing effort primarily in conjunction with the late summer and early fall hunting seasons. These drainages include: Meshik River; King Salmon River at Mother Goose Lake; Dog Salmon River; Big Creek; Painter Creek; and Deer Creek.

The Complex is covered by the Bristol Bay and the Alaska Peninsula/Aleutian Island sport fishing management areas. With the exception of special regulations for Arctic grayling in the Ugashik River drainage, chinook salmon in the Naknek River drainage, and the bag limit for rainbow trout during the winter, the regulations are similar for the most popular sport fish caught in both management areas. The 1993 regulations are as follows (Alaska Department of Fish and Game 1993):

#### Bristol Bay Area

Chinook salmon	- 3 per day, 3 in possession, only 2 over 28 inches
Other salmon	- 5 per day, 5 in possession, no size limit
Rainbow trout	- 2 per day, 2 in possession, only 1 over 20 inches (June 8 - October 31)
Rainbow trout	- 5 per day, 5 in possession, only 1 over 20 inches (November 1 - June 7)
Arctic grayling	- 5 per day, 5 in possession, no size limit
Arctic char/ Dolly Varden	- 10 per day, 10 in possession, no size limit
Lake trout	- 4 per day, 4 in possession, no size limit
Burbot	- 15 per day, 15 in possession, no size limit
Northern pike	- 10 per day, 10 in possession, no size limit

#### Alaska Peninsula/Aleutian Island Area

Chinook salmon	- 3 per day, 3 in possession, only 2 over 28 inches
Other salmon	- 5 per day, 5 in possession, no size limit
Rainbow trout	- 2 per day, 2 in possession, only 1 over 20 inches
Arctic grayling	- 5 per day, 5 in possession, no size limit
Arctic char/ Dolly Varden	- 10 per day, 10 in possession, no size limit
Lake trout	- No bag, possession, or size limit
Burbot	- No bag, possession, or size limit
Northern pike	- No bag, possession, or size limit

#### **SUBSISTENCE FISHING**

Complex salmon stocks harvested for subsistence include: chinook; chum; coho; pink; and sockeye. The majority of subsistence fishing for Complex originating salmon occurs either off both refuges land in the vicinity of the villages and communities or in the commercial fishery (Morris 1987; Fall and Morris 1987). Many of the people living in Alaska Peninsula communities are commercial fishermen. These fishermen retain some of the catch for subsistence (Fall and Morris 1987). Because the origin of the fish caught in the commercial fishery is not necessarily known, the number of Complex fish harvested is also unknown. With the exception of the Naknek River, reported subsistence harvest levels of salmon are generally small (less than 2,000 salmon per village). Sport and commercial harvest allocations do not appear to be in immediate conflict with subsistence needs. The quantity of Becharof Refuge originating salmon harvested in the Naknek River drainage is presently unknown, but is probably small. The majority of salmon harvested in the Naknek River for subsistence are sockeye. Few, if any, sockeye salmon in the Naknek River originate from Becharof Refuge. Chinook and coho salmon originating on Becharof Refuge probably have a minor contribution to the Naknek River subsistence fishery.

Subsistence fishing occurs in Becharof and Ugashik lakes for resident fish and salmon, however the amount of effort and number of fish harvested is unknown. While the number of fish harvested is presumed to be small, the fishery is probably very important for preserving the local culture and subsistence traditions. The reader is directed to the Public Use Management Plan for the Complex (U.S. Fish and Wildlife Service 1993) for a more complete discussion of Subsistence needs and issues.

## SECTION 5. ISSUES AND CONCERNS

Fishery issues and concerns have been identified in numerous planning documents for various Bristol Bay areas. Participants at these meetings and correspondents raised numerous issues and concerns which have been condensed into the six issues presented in Table 2 and discussed below. Issues and concerns have also been identified for each river systems on the Complex. The following discussions describe the issues either on a generic basis or as they relate to the individual drainage.

### COMPETITION BETWEEN USER GROUPS

Complex fishery resources, either resident or anadromous stocks, are utilized primarily by subsistence, commercial, and sport user groups. Because these fishery resources are limited and the potential for harvest or use is high, competition for and conflict over the resources are developing. These conflicts between users are primarily centered around the harvest of chinook and coho salmon. As the harvest of chinook and coho salmon by subsistence users appears minimal, the conflict mainly exists between commercial and sport harvest.

Conflicts between sport and commercial fishermen has increased in recent years with the decline in chinook and coho salmon abundance. The cause of the decline is unknown, but, the effect of the decline is an increase in competition for the limited chinook and coho salmon resource. Sport anglers feel that the commercial fishery is overharvesting these stocks. Since the commercial fishery occurs prior to the sport fishery, the number of fish available for sport harvest is reduced, which impacts the sport fishery's ability to harvest their share of the resource. The overall impact results in the reduced escapement of chinook and coho salmon.

There is also a growing competition within the sport user group between guided versus unguided fishermen. The conflict is primarily centered around the overcrowding of prime fishing areas for rainbow trout and Arctic grayling, which also concentrates the fishery impacts on resident fish. As the number of Special Use Permits for sport fishing guides is expected to increase, conflicts can also be expected to increase.

Many of the fishermen that come to Alaska to fish want a "Wilderness experience". As the popularity of certain areas increase, the "wilderness experience" is diminished. Decisions are necessary whether to restrict access to certain areas to maintain quality fishing. Access restrictions, if necessary, would be implemented under provisions of the Public Use Management Plan (U.S. Fish and Wildlife Service 1993). Public notice and comments would be included, and the procedure required by ANILCA "43 CFR part 36" would be followed.

Table 2. Fishery issues and concerns for Alaska Peninsula (Ugashik and Chignik Units) and Becharof National Wildlife Refuges.

Issues/Concerns	References					
	NWR <sup>1&amp;2</sup> CCP	PUMP <sup>3</sup>	BBCSP <sup>4</sup>	BBRMP <sup>5</sup>	ADFG <sup>6</sup> GPBGPR	BBCMP <sup>7</sup>
Competition between users	X	X		X		X
Inadequate salmon escapement data bases	X		X			
Potential overharvest of fish populations	X	X	X	X	X	
Inadequate fishery data bases	X	X				
Inadequate law enforcement	X			X		
Potential degradation of water quality	X					

- 1 Alaska Peninsula National Wildlife Refuge Comprehensive Conservation Plan (U.S. Fish and Wildlife Service 1985b).
- 2 Becharof National Wildlife Refuge Comprehensive Conservation Plan (U.S. Fish and Wildlife Service 1985c).
- 3 Alaska Peninsula/Becharof National Wildlife Refuge Complex Draft Public Use Management Plan and Environmental Assessment (U.S. Fish and Wildlife Service 1993).
- 4 Bristol Bay Comprehensive Salmon Plan (Alaska Department of Fish and Game 1987b)
- 5 Bristol Bay Regional Management Plan and Final Environmental Impact Statement (U.S. Department of Interior 1985)
- 6 Alaska Department of Fish and Game Genetic Policy by Genetic Policy Review Team (Davis 1985).
- 7 Bristol Bay Coastal Management Program, Management Plan (Bristol Bay Coastal Resource Service Area Board 1987).



## INCOMPLETE SALMON ESCAPEMENT DATA BASES TO REFINE MANAGEMENT OF IMPORTANT REFUGE STOCKS

Maintenance of adequate escapement into the Complex's river drainages is becoming more important as commercial fishing effort and harvest increases on salmon stocks originating from the Complex. With increasing fishing pressure and fine tuning of commercial harvest beginning to occur, it is important to accurately assess escapement in a timely manner to avoid overharvesting stocks. At the present time, escapement monitoring is primarily directed toward managing sockeye salmon. Counting towers and aerial overflights are used to gather sockeye escapement data, which allow the in-season management. For most of the drainages originating from the Complex, escapement estimates are not made for chinook, coho, chum, and pink salmon; only indices of relative stock abundance (peak spawner counts) are estimated. While the use of indices may allow comparisons of relative stock strength between years, complete escapement data are needed to prevent over-fishing in drainages where harvest occurs after the commercial fishery. The lack of complete escapement data could especially affect the management of chinook and coho salmon, since these stocks are also harvested after they enter fresh water by sport and subsistence users.

## POTENTIAL OVERHARVEST OF FISH POPULATIONS

The majority of Complex fishery populations are probably impacted by one or more of the following human user groups: commercial; subsistence; or sport fishermen. The potential for change in population diversity and structure now exists for both refuges resident and anadromous species. Overlap in return timing of two or more salmon species to the same river system creates a mixed stock fishery and may result in the overharvest of one of the species. The potential of overharvest occurs if the preferred or primary target species returns in above average abundance. The fishing effort required to harvest the excess number of primary target species may reduce abundance of the secondary target species through incidental catch, such that the escapement goal for this species cannot be met. This situation has become evident in several of the commercial fishing districts where chinook salmon escapements have fallen short of the goal, even though the total run was of adequate size. Early season fishing in the Egegik district has been reduced in an attempt to reduce the impacts on returning chinook salmon. This has been due, in part, to the large sockeye salmon runs. Because chinook and sockeye salmon runs overlap, normal fishing effort during a critically low chinook run year can greatly affect whether the chinook escapement goal will be met.

Sport fishermen are accessing a greater number of drainages with jet motor boats and float aircraft. Populations that were once free from harvests are now vulnerable. Even streams that propeller driven boats traditionally only accessed are vulnerable to increased harvest pressure because of the jet boats ability to navigate shallow water.

Rainbow trout are highly prized in the sport fishery and are targeted when available. Concern over the reported reduction in population

abundance and fish size of Gertrude Creek rainbow trout has resulted in the Service investigation into the status of this population and the impact of the sport fishery upon it.

The state record Arctic grayling was caught from the Ugashik Narrows (between the Upper and Lower Ugashik Lakes). The prospect of catching a trophy Arctic grayling caused the sport fishing effort to increase, which may have adversely impacted the population. In 1987, the Department initiated a study to document the population size. The results of the study showed the Arctic grayling population had severely declined, and in 1990 harvest regulations were imposed, such that fishing for Arctic grayling in the Ugashik Lake system was prohibited.

The impact from sport fishing for anadromous salmonids is usually considered minimal. However, sport fishing impacts on resident salmonids can be substantial, especially for species that are typically long lived.

#### **INCOMPLETE FISHERY INFORMATION TO REFINE MANAGEMENT OF REFUGE POPULATIONS**

Sound scientific management of the Complex's fishery resources requires an adequate data base for decision making. Information required includes: population levels and associated age, weight, length, and sex composition; age at maturity; dependence upon aquatic habitat types; and effects of water quality and quantity on the species. Additional data needs for resident species also include: distribution; food and habitat preference; timing of migration and spawning; dependence upon other fish species; and sensitivity to human disturbance, especially during spawning. Many people are concerned about the physical effects of motorboats, especially jet boats, on resident and anadromous fish. The impacts caused by motor boats, if any, are not understood.

Investigations have been conducted on certain species, but much of the information is applicable to only a few specific populations. Additional populations need to be investigated to determine if previously collected information is applicable to other drainages. In addition, some populations will need to be monitored periodically to determine if changes in population abundance or structure have occurred since the initial investigation. Studies on the effects of motorboats on spawning salmonids are currently being conducted by the University of Alaska Fairbanks and no additional investigations are identified in this plan.

Information on human use and dependence upon Complex resources is becoming increasingly important as competition and conflict begins to develop between user groups for the same finite resources. This information will be essential to determine allocation of resources between user groups as a part of the Public Use Management Plan. Baseline water quality and quantity information is also necessary to evaluate the impact of mining or construction activity within or adjacent to Complex drainages.

## INADEQUATE FISHERY LAW ENFORCEMENT

Law enforcement activity on the Complex should be expanded to protect anadromous and resident fish stocks. The commercial, subsistence, and sport fisheries targeting refuge salmon stocks on and off the Complex are patrolled by State Fish and Wildlife Protection Officers, but their areas of responsibilities are large and personnel numbers are too small to effectively enforce regulation in all of the commercial and sport fisheries. Consequently, their time is primarily spent monitoring commercial fisheries off Complex lands. Fish buyers and processors sometimes assist in regulation enforcement by refusing to purchase fish which are obviously caught during a closed commercial period or from upstream on the spawning ground. Violations, however, continue to be reported.

While Federal law enforcement personnel are responsible to enforce fishing regulations on Federal lands, they are faced with similar circumstances to State law enforcement; Their areas of responsibility are large and personnel numbers too small to effectively enforce sport fishing regulations. Funding is also inadequate to conduct the necessary law enforcement activities. Efforts need to be intensified toward identifying fishing violations on the Complex by increasing patrolling activities. These patrolling activities need to check compliance with Special Use Permits, licensing requirements, and adherence to possession and bag limits.

## POTENTIAL DEGRADATION OF WATER QUALITY

Water quality could be degraded by mining activity or development of lands within or adjacent to the Complex. These activities could result in pollution or siltation of Complex waters because discharge of chemicals, fuel spills or surface vegetation disturbances. In addition, mining activity or development downstream of the Complex could degrade water quality and inhibit or interfere with fish migration and spawning. Fifteen valid mining claims are present on the Complex: one at Braided Creek in the Chignik Unit and a second on an unnamed tributary to the King Salmon River (Becharof Refuge). Water Quality baseline data has been gathered from Braided Creek in response to potential mining activities. Continued periodic monitoring will be required to ensure water quality does not degrade if mining activity intensifies. Baseline data are required from the unnamed tributary document the presence or absence of pollutants.

## SECTION 6. GOALS AND OBJECTIVES

Goal A: To conserve the fish and wildlife populations and habitats in their natural diversity including, but not limited to, salmonids. The fishery resources on the Complex will be managed cooperatively by the Service and the Department.

Subgoal A.1. Administer the Complex fishery program.

Objective A.1.1. To administer the fishery management program on the Complex as a continuing commitment.

Objective A.1.2. To regulate Complex fish populations in accordance with the Memorandum of Understanding (Appendix A) as a continuing commitment.

Subgoal A.2. Manage anadromous fish populations.

Objective A.2.1. To evaluate escapement of salmon into six Complex rivers that drain into Bristol Bay and selected Complex rivers that drain into the Pacific Ocean as a continuing commitment.

Objective A.2.2. To evaluate anadromous fish population characteristics in six Complex rivers that drain into Bristol Bay and selected Complex rivers that drain into the Pacific Ocean by 1998.

Objective A.2.3. To evaluate sockeye smolt emigration from two Complex drainages as a continuing commitment.

Objective A.2.4. To directly monitor sport harvest of anadromous fish populations on two Complex rivers and indirectly monitor the harvest on all Complex rivers a continuing commitment.

Subgoal A.3. Manage resident fish populations.

Objective A.3.1. To directly monitor the sport harvest on one Complex river and indirectly monitor the harvest on all Complex rivers as a continuing commitment.

Objective A.3.2. To evaluate sport fish populations in three Complex rivers and two lakes by 1998.

Subgoal A.4.        Manage habitat.

Objective A.4.1.    To identify spawning, rearing, and over-wintering habitat for five species of Pacific salmon in five drainages by 1997.

Objective A.4.2.    To identify rearing and over-wintering habitat for anadromous and resident fish species in four Complex lakes by 1998.

Goal B:            To fulfill International Treaty obligations of the United States with respect to fish and their habitats.

Subgoal B.1.        None.

Objective B.1.1.    None.

Goal C:            Provide, in a manner consistent with the purposes set forth in Goals A and B, the opportunity for continued subsistence uses of fish resources by local residents.

Subgoal C.1.        Manage and maintain subsistence harvests.

Objective C.1.1.    To monitor and evaluate subsistence harvests and effort within the Complex as a continuing commitment.

Goal D:            Ensure to the maximum extent possible, in a manner consistent with the purposes set forth in Goal A, that water quality and water quantity within the Complex is maintained.

Subgoal D.1.        Manage and maintain Complex water quality and quantity.

Objective D.1.1.    To monitor water quality data from six Complex drainages as a continuing commitment.

## SECTION 7. STRATEGIES AND CONSTRAINTS

### COMMON MANAGEMENT STRATEGIES

The management of fish and wildlife in Alaska is guided by the Master Memorandum of Understanding (Appendix A). Under this agreement, the Service has the responsibility to "manage migratory birds, endangered species, and other species mandated by Federal law, and on Service lands in Alaska to conserve fish and wildlife and their habitats and regulate human use". The Department has the "primary responsibility to manage fish and resident wildlife within the State of Alaska". The State's regulatory process is to be used "to the maximum extent allowed by Federal law in developing new or modifying existing Federal regulation or proposing changes to existing State regulations governing or affecting the taking of fish and wildlife on Service lands in Alaska."

Commercial, sport, and subsistence fisheries are managed in accordance with the policies of the Service and the Department, and regulations of the Alaska Board of Fisheries and Federal Subsistence Board. Management direction recognizes subsistence use as the highest priority among beneficial human uses of the resources. Furthermore, the Federal Government is required by Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980 to provide a subsistence priority for rural Alaskan residents unless the State provides this priority through its laws. In 1989, the Alaska Supreme Court ruled that the subsistence priority for rural Alaskan residents violated the Alaskan Constitution. On July 1, 1990, the Federal government assumed management of subsistence harvest of fish and game on Federal public lands in Alaska. The Federal Subsistence Board was created by the Secretary of Interior with concurrence of the Secretary of Agriculture and given the responsibility for managing subsistence activities on Federal public lands in Alaska. The Federal Subsistence Board now has assumed responsibility for subsistence regulations on the Complex. When necessary, the Service will coordinate with the appropriate state agencies in an attempt to cooperatively resolve all issues. The State of Alaska currently has litigation contesting Federal management of subsistence.

The opportunity for subsistence users to harvest fish from self-sustaining populations is a management objective of the Complex. In order to accomplish this objective, fish populations will be managed to maintain adequate reproduction and to accommodate the needs of dependent fish and wildlife populations and rural residents of the area. A comprehensive data collection will be maintained to ensure that an adequate number of fish are reserved for subsistence harvest prior to the allocation of fish for other user groups. Utilization of refuge fish stocks for subsistence purposes may vary with changes in village population levels, economic conditions, and availability of other wild resources.

The Service has established a policy to provide increased recreational fishing opportunities on National Wildlife Refuges. The Service will ascertain where and if this increased activity can best be accommodated without adversely impacting fish populations, subsistence opportunities

or the "quality" of a "wilderness experience". Changes in the sport fishery harvest regulations regarding fishing methods and bag limits may be proposed pending this evaluation.

Enhancement and restoration of salmon stock originating on Complex lands is allowed under ANILCA which states in section 304(e) "where compatible with the purposes of the refuge unit, the Secretary (of Interior) may permit, subject to reasonable regulations and in accord with sound fisheries management principles, scientifically acceptable means of maintaining, enhancing, and rehabilitating fish stocks. In 1987, the Fish and Wildlife Service (Service) Regional Director issued further policy clarification on restoration and enhancement on Service lands based on ANILCA, The Wilderness Act, and the Refuge Manual (Appendix C). The policy precludes the construction and operation of permanent support facilities in established wilderness, but allows temporary facilities on a case by case basis. Permanent facilities may be permitted on a case by case basis for all other land categories. Recommendations to support construction of permanent support facilities are not anticipated over the five-year duration of this plan.

The following four fishery management concepts were designed to support the management of fish populations emphasizing natural reproduction and natural habitat conditions. Recruiting fish to harvestable size in natural habitats while still allowing harvest is the basic foundation of these concepts. Presently, all Complex waters are managed under the Wild concept and it is anticipated that this concept will remain in effect during the initial five years of the plan.

**Wild** - This concept applies to those waters where management is primarily directed toward providing the fisherman with the opportunity to catch fish from a fishery totally supported by natural reproduction. The wild concept includes only those waters specifically designated for wild fisheries management and not sustained yield waters presently supported by natural reproduction. This distinction is made because future fishing pressure may require supplemental stocking of sustained yield fisheries where fishing pressure or harvest would be limited in lieu of supplemental stocking in a wild fishery.

**Sustained Yield** - This concept applies to waters where management is primarily directed toward providing the fisherman with the opportunity to harvest fish. Sustained yield fisheries may be restored by stocking, but the yield to the angler is a fish that grows to harvestable size in the wild. The opportunity to catch trophy fish, unique species, wild, and large fish is not an intent of management under this concept, even though these representatives may occasionally enter the catch. Sustained yield fisheries are primarily supported by natural reproduction.

Trophy - This concept applies to waters where management is primarily directed toward providing anglers with the opportunity to catch "larger than average" fish. Waters that typically produce larger than average fish are not necessarily trophy waters unless this is a major objective of present and future management. To be managed under the trophy concept, waters must have relatively high productivity or abundant forage. Management procedures such as restrictive creel limits and limits on fishing pressure are usually employed. Trophy waters typically will not support as much harvest or mortality as sustained yield managed waters. Waters managed under this concept should typically ensure a high level of protection for all individual fish that have not yet reached trophy size.

Commercial Wild - This concept applies to waters where management is directed toward maintaining long-term commercial fisheries relying upon existing stocks. Harvest is to be aligned to ensure adequate escapement levels to sustain the current fishery. Either no harvest or limited harvest of spawning adults is expected to be permitted in spawning areas. Sport and subsistence harvest of commercial species may or may not occur.

The Service and the Department will cooperate in the collection of fishery management data from Complex originating species. Cooperative efforts to maintain counting towers and to conduct aerial surveys will benefit both agencies by reducing overall operation costs and increasing data accuracy on which to base management recommendations. The Complex land base and abundance of fish species, both originating on and resident to both refuges requires the sharing of law enforcement responsibilities.

The Department of Public Safety and Department field staff will enforce state regulations within and adjacent to the Complex. The Service will issue federal citations for violations of State laws occurring within the Complex boundaries.

The Service and Department will cooperatively evaluate the results of field studies and surveys with respect to both Complex originating and resident species. The Service will confer and work closely with the Department on the local level in the interpretation of study results and the development of future management direction. The Service may recommend changes in State regulations when biological information indicates that fish populations are being adversely affected.

The Service has prepared, published, and distributed an Alaska Peninsula/Becharof Refuges fishing brochure which describes fishing areas, regulations, identification of fish species, proper disposal of human waste, and general use by the public. This brochure will be reviewed periodically and updated as necessary.



## STRATEGY FOR REFUGE LAKES

### Fish Investigations

Fishery investigations will focus on surveying Becharof, Upper Ugashik, Lower Ugashik, Sandy, and Mother Goose lakes. Efforts will include the collection of basic productivity information; water quality; fish species composition; and age, weight, and length data. Fish populations will be monitored using standard sampling techniques including, but not limited to angling, trapping, and netting. Human use will be monitored through the reporting requirements of Special Use Permits issued to fishing guides and air taxi operators and periodic aerial and creel surveys of Complex lakes. In addition, the Department will continue publishing the Statewide Harvest Report (Mills 1985) which includes sport fish harvest information for Complex waters.

### Evaluation and Recommendation

By determining human use levels, harvest levels, lake productivity, and basic population parameters, decreases in size and changes in age structure can be documented and the appropriate management strategy can be determined. The Service will work with the Department, Board of Fisheries, and Federal Subsistence Board to institute harvest regulations changes designed to restore the population.

### Management Constraints

In implementing this strategy, the following constraints must be considered: (1) data on lake productivity and harvest levels are difficult to obtain; (2) funding levels are too small to obtain the required population data; (3) data on the contribution of fish in the diets of wildlife are limited; and (4) enforcement of regulations will be difficult due to the remoteness of the area.

## STRATEGY FOR REFUGE RIVERS AND STREAMS

### Anadromous Fish Investigations

Service efforts will be to ensure that real time and baseline escapement data for salmon are collected on Complex returning salmon. The Service will assist the Department in enumerating returning Complex fish stocks. Cooperative efforts will be directed toward expanding the number of species monitored on a real time basis and extending project time periods to cover the majority of the runs. Aerial surveys will be conducted on the major river systems and coordinated with the information gathered from tower projects. Mail and creel surveys will be conducted to determine the sport harvest of salmon from the major river drainages. Special Use Permits will be used to estimate the guided sport harvest. Commercial salmon harvested adjacent to Complex boundaries is monitored by the Department through reporting by fish processors. Subsistence harvest monitoring by the Department and Service should include all fish species. Subsistence harvest monitoring

will be coordinated with the Department, Federal Subsistence Board, and the Service.

#### **Evaluation and Recommendation**

Salmon escapement information will be evaluated and coordinated with harvest information to document total run sizes and determine if escapement goals are being met. Commercial harvest is regulated through the limited entry system, limited fishing periods, and the emergency order process.

#### **Resident Fish Investigations**

Resident fish populations will be investigated in three tributaries to Becharof Lake, the Egegik River and one tributary, three tributaries to Ugashik Lake, the King Salmon River (Becharof Refuge), the Dog Salmon River, and the King Salmon River (Ugashik Unit). The King Salmon River (Becharof Refuge) rainbow trout population is currently being investigated by the Service. Becharof and Ugashik Lake tributary Arctic grayling populations are also currently being investigated by graduate students from the University of Arizona Fish and Wildlife Cooperative Unit. Sport fishing effort will be monitored through creel survey investigation. Guided sport fishing effort will be monitored through the reporting requirements of the Complex Special Use Permits issued to guides. Subsistence harvest data will be collected through the Department's and Service's subsistence monitoring program.

#### **Evaluation and Recommendation**

Because rainbow trout are the most popular resident species targeted by the sport fishery, these fish will be used as an indicator to evaluate the fishing impact on all resident species in the King Salmon River (Becharof Refuge). Age and length frequency data for rainbow trout was initially be collected from 1988 through 1992 such that long term changes in population structure can be evaluated. Further evaluation will be necessary in 1997 to determine any population changes. If fishing mortality is found to be excessive, then the Service will recommend stock protection through regulatory changes.

Because of the Arctic grayling fishing closure in the Ugashik drainage, the Arctic grayling populations in the Ugashik and Becharof Lake tributaries are being investigated. Age, length, and abundance data from the Ugashik Arctic grayling population will be compared to historical Ugashik data and data collected from Becharof Lake tributaries. These data should help determine the cause of the Ugashik Arctic grayling population decline, document the further decline or recovery of the population, and provide baseline data for the Becharof Lake Arctic grayling population.

#### **Management Constraints**

In implementing this strategy, the following constraints must be considered for anadromous and resident species: (1) lack of data to set escapement goals for all species except sockeye salmon; (2) funding

levels are too small obtain needed data; (3) regulatory changes needed to meet the objectives may conflict with the desires of some user groups or the Department; (4) regulations will be difficult to enforce, especially in remote areas; (5) resistance may be met in gathering information from user groups; (6) populations may be severely impacted before regulations can be implemented; (7) Service purposes and Department goals and objectives may not be compatible; and (8) even with the most restrictive harvest regulations, fragile resources may suffer from over-harvest.

# SECTION 8. FISHERY MANAGEMENT ACTIVITIES, 1994-1998

Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
Goal A.	To conserve the fish and wildlife populations and habitats in their natural diversity including, but not limited to, salmonids.			
	Subgoal A.1. Administer the Refuge fishery program.			
	Objective A.1.1. To administer the fishery management program on the Alaska Peninsula and Becharof Refuges as a continuing commitment.	Task A.1.1.1. Prepare management recommendations, attend planning meetings, prepare news releases, and coordinate both intra- and inter-agency fisheries matters.	Complex	1994/ 80,000/1.0
				1995/ 80,000/1.0
				1996/ 80,000/1.0
				1997/ 80,000/1.0
				1998/ 80,000/1.0
	Objective A.1.2. To regulate Refuge fish populations in accordance with the Memorandum of Understanding (Appendix A) as a continuing commitment.	Task A.1.1.2. Provide technical advice to Refuge staff.	KSFRO	1994/ 5,000/0.2
				1995/ 5,000/0.2
				1996/ 5,000/0.2
				1997/ 5,000/0.2
				1998/ 5,000/0.2
		Task A.1.2.1. Regulate and monitor sport fish harvest.	ADFG	1994
				1995
				1996
				1997
				1998
		Task A.1.2.2. Regulate and monitor commercial fish harvest.	ADFG	1994
				1995
				1996
				1997
				1998

Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
		Task A.1.2.3. Regulate and monitor subsistence fish harvest.	ADFG Complex	1994/ 5,000/0.2 1995/ 5,000/0.2 1996/ 5,000/0.2 1997/ 5,000/0.2 1998/ 5,000/0.2
		Task A.1.2.4. Evaluate biological data, prepare management proposals for Board of Fisheries, and write emergency orders for management of resident and anadromous fish species.	ADFG	1994 1995 1996 1997 1998
		Task A.1.2.5. Initiate catch and release information and education program for the public.	Complex, ADFG	1994/ 5,000/0.1 1995/ 5,000/0.1 1996/ 5,000/0.1 1997/ 5,000/0.1 1998/ 5,000/0.1
		Task A.1.2.6. Update and distribute brochure on Refuge waters depicting regulations and identification of fish species, proper disposal of human and food waste, rules governing allotments, and use by the public.	Complex	1994 1995/ 10,000/0.2 1996 1997 1998

Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
		Task A.1.2.7. Enforce harvest regulations and monitor public use on Refuge originating fish stocks.	Complex, ADFG/FWP	1994/ 30,000/0.5 1995/ 30,000/0.5 1996/ 30,000/0.5 1997/ 30,000/0.5 1998/ 30,000/0.5
		Task A.1.2.8. Operate public use and information camps at Becharof Lake outlet.	Complex	1994/ 30,000/0.5 1995/ 30,000/0.5 1996 1997 1998
		Task A.1.2.9. Operate public use and information camps at Ugashik Narrows	Complex	1994 1995 1996/ 30,000/0.5 1997/ 30,000/0.5 1998
		Task A.1.2.10. Operate public use and information camps at Gertrude Creek.	Complex	1994 1995 1996/ 30,000/0.5 1997/ 30,000/0.5 1998
		Task A.1.2.11. Operate public use and information camps at Big Creek at the Refuge boundary	Complex	1994 1995 1996 1997/ 30,000/0.5 1998/ 30,000/0.5

Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
Subgoal A.2. Manage anadromous fish populations.				
	Objective A.2.1. To evaluate escapement of salmon into six Refuge rivers that drain into Bristol Bay and selected Refuge rivers that drain into the Pacific Ocean as a continuing commitment.	Task A.2.1.1. Conduct aerial surveys of Big Creek to determine chinook salmon spawning escapement.	Complex, ADFG, KSFR0	1994/ 2,000/0.1
				1995/ 2,000/0.1
				1996/ 2,000/0.1
				1997/ 2,000/0.1
		Task A.2.1.2. Conduct aerial surveys of King Salmon River (Becharof Refuge) and Meshik River and tributaries to determine chinook and coho salmon spawning escapement.	Complex, ADFG, KSFR0	1998/ 2,000/0.1
				1994/ 4,000/0.2
				1995/ 4,000/0.2
				1996/ 4,000/0.2
		Task A.2.1.3. Conduct aerial surveys of King Salmon River (Ugashik Unit) to determine coho salmon escapement.	Complex, ADFG, KSFR0	1997/ 4,000/0.2
				1998/ 4,000/0.2
				1994/ 4,000/0.1
				1995/ 4,000/0.1
		Task A.2.1.4. Estimate sockeye escapement on the Egegik and Ugashik Rivers	ADFG	1996/ 4,000/0.1
				1997/ 4,000/0.1
				1998/ 4,000/0.1
				1994
				1995
				1996
				1997
				1998

Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
		Task A.2.1.5. Conduct aerial surveys of rivers and streams that enter the Pacific Ocean to determine chum, coho, pink, and sockeye salmon escapement.	ADFG, KSFRO	1994/ 10,000/0.1 1995/ 10,000/0.1 1996/ 10,000/0.1 1997/ 10,000/0.1 1998/ 10,000/0.1
	Objective A.2.2. To evaluate anadromous fish population characteristics in six Refuge rivers that drain into Bristol Bay and selected Refuge rivers that drain into the Pacific Ocean by 1997	Task A.2.2.1. Collect data on size, age, abundance, spawning areas, and seasonal movements of salmon and steelhead in the Sandy River drainage area.	KSFRO ADFG	1994 1995/ 50,000/1.0 1996/ 10,000/0.2 1997 1998
		Task A.2.2.2. Collect age and length data on five salmon species in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit), and Dog Salmon River drainages	KSFRO	1994/ 30,000/0.5 1995/ 30,000/0.5 1996/ 30,000/0.5 1997/ 30,000/0.5 1998/ 30,000/0.5
		Task A.2.2.3. Collect age, weight, and length data from salmon species utilizing selected Refuge Pacific Ocean drainages.	KSFRO	1994 1995 1996/ 35,000/0.7 1997/ 35,000/0.7 1998



Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
	Objective A.2.3. To evaluate sockeye smolt emigration from two Refuge drainages as a continuing commitment.	Task A.2.3.1. Operate sockeye smolt sonar counters on Ugashik and Egegik drainages.	ADFG	1994 1995 1996 1997 1998
	Objective A.2.4. To directly monitor sport harvest of anadromous fish populations on two Refuge rivers and indirectly monitor the harvest on all Refuge rivers as a continuing commitment.	Task A.2.4.1. Conduct mail survey of licensed fishers to determine anadromous fish harvest from Refuge waters (Mills Report).	ADFG	1994 1995 1996 1997 1998
		Task A.2.4.2. Conduct creel census at Ugashik Narrows to determine coho salmon harvest.	KSFRO	1994 1995 1996/ 10,000/0.3 1997/ 10,000/0.3 1998
		Task A.2.4.3. Conduct creel census at Becharof Lake outlet to determine coho salmon harvest.	KSFRO	1994/ 10,000/0.3 1995/ 10,000/0.3 1996 1997 1998

Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
Subgoal A.3. Manage resident fish populations.				
	Objective A.3.1. To directly monitor the sport harvest on one Refuge river and indirectly monitor the harvest on all Refuge rivers as a continuing commitment.	Task A.3.1.1. Monitor current system (Special Use Permit, etc.) for overseeing sport fishing activities on Refuge drainages and recommend modifications and improvements.	Complex	1994/ 5,000/0.1
				1995/ 5,000/0.1
				1996/ 5,000/0.1
				1997/ 5,000/0.1
				1998/ 5,000/0.1
		Task A.3.1.2. Conduct creel survey on Gertrude Creek.	KSFRO	1994
				1995
				1996
				1997/ 10,000/0.2
				1998
	Objective A.3.2. To evaluate sport fish populations in three Refuge rivers and two lakes by 1996.	Task A.3.2.1. Collect age, weight, and length data on Arctic grayling and char species in the King Salmon River (Ugashik Unit).	KSFRO	1994/ 50,000/1.0
				1995/ 50,000/1.0
				1996/ 50,000/1.0
				1997
				1998
		Task A.3.2.2. Collect age, weight, and length data from Arctic grayling and char species in the Dog Salmon River.	KSFRO	1994
				1995
				1996/ 50,000/1.0
				1997/ 50,000/1.0
				1998

Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
		Task A.3.2.3. Collect age, weight, and length data from Arctic grayling and char species in the Meshik River.	KSFR0	1994/ 60,000/1.0 1995/ 60,000/1.0 1996 1997 1998
		Task A.3.2.4. Collect age, weight, length, and abundance data from lake trout; determine spawning areas and seasonal movement in Becharof and Ugashik Lakes.	KSFR0	1994 1995 1996/ 40,000/1.0 1997/ 40,000/1.0 1998/ 40,000/1.0
		Task A.3.2.5. Reevaluate the Arctic grayling population in the Ugashik Drainage by 1994.	ADFG	1994 1995 1996 1997 1998
		Task A.3.2.6. Reevaluate the ADFG rainbow trout population in the King Salmon River Drainage (Becharof Refuge) by 1997.	KSFR0	1994 1995 1996 1997/ 50,000/1.0 1998

Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
		Task A.3.2.7. Collect population data on juvenile salmonids in Braided Creek. Data will include species, abundance, age, length, and migration timing.	KSFRO	1994 1995 1996/ 40,000/0.8 1997/ 40,000/0.8 1998/ 10,000/0.3
		Task A.3.2.8. Collect age, weight, and length data from Arctic grayling and char species in the Egegik River and its tributaries.	KSFRO	1994/ 60,000/1.0 1995/ 60,000/1.0 1996 1997 1998
	Subgoal A.4. Manage habitat.			
	Objective A.4.1. To identify spawning, rearing, and over-wintering habitat for five species of Pacific salmon in five drainages by 1998.	Task A.4.1.1. Sample the Egegik, Ugashik, Meshik, King Salmon Meshik, Dog Salmon, and King Salmon River (Ugashik Unit) drainages to determine salmon spawning, rearing, and over-wintering habitat.	KSFRO	1994/ 60,000/1.0 1995/ 60,000/1.0 1996/ 60,000/1.0 1997/ 60,000/1.0 1998/ 60,000/1.0
	Objective A.4.2. To identify rearing and over-wintering habitat for anadromous and resident fish species in four Refuge lakes by 1998.	Task A.4.2.1. Collect limnological and physical habitat data for Becharof, Ugashik, Mother Goose, and Sandy Lakes.	KSFRO	1994 1995/ 30,000/0.8 1996/ 30,000/0.8 1997/ 30,000/0.8 1998/ 30,000/0.8

Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
Goal B.	To fulfill International Treaty obligations of the United States with respect to fish and their habitats.			
	Subgoal B.1. None.			
	Objective B.1.1. None.			
Goal C.	Provide, in a manner consistent with the purposes set forth in Goals A and B, the opportunity for continued subsistence uses of fish resources by local residents.			
	Subgoal C.1. Manage and maintain subsistence harvests.			
	Objective C.1.1. To monitor and evaluate subsistence harvests and effort within the Refuge as a continuing commitment.	Task C.1.1.1. Conduct surveys at Egegik, Pilot Point, Ugashik, Port Heiden, Chignik, Chignik Lake, Chignik Lagoon, Ivanof Bay, and Perryville to monitor subsistence harvest of Refuge originating fish stocks.	Complex ADFG	1994/ 30,000/0.5
				1995/ 30,000/0.5
				1996/ 30,000/0.5
				1997/ 30,000/0.5
				1998/ 30,000/0.5
		Task C.1.1.2. Conduct general survey of tradition subsistence use areas within the Complex boundaries.	Complex	1994/ 5,000/0.1
				1995/ 5,000/0.1
				1996/ 5,000/0.1
				1997/ 5,000/0.1
				1998/ 5,000/0.1

Goals	Objectives	Tasks	Responsible Office	Date/Funding/FTE
Goal D.	Ensure, to the maximum extent possible, in a manner consistent with the purposes set forth in Goal A, that water quality and quantity within the Refuge is maintained.			
	Subgoal D.1. Manage and maintain Refuge water quality and quantity.			
	Objective D.1.1. To monitor water quality from six Refuge drainages as a continuing commitment	Task D.1.1.1. Collect water quality data from Refuge drainages that have mining activity that exceeds maintenance levels.	Complex, Ecological Services (WAES)	1994
				1995
				1996
				1997/ 10,000/0.2
				1998/ 10,000/0.2
		Task D.1.1.2. Collect baseline water quality data from an unnamed tributary to King Salmon River (Becharof Refuge) where a mining claim is located.	Complex, WAES	1994/ 10,000/0.1
				1995/ 10,000/0.1
				1996/ 10,000/0.1
				1997
				1998
		Task D.1.1.3. Collect baseline water quality data from Egegik, Ugashik, King Salmon (Ugashik Unit), and Dog Salmon River drainages.	KSFRO	1994
				1995/ 30,000/0.5
				1996/ 30,000/0.5
				1997/ 30,000/0.5
				1998/ 30,000/0.5

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1994

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.1.1.1. Administer fishery management program	80,000	80,000	Complex
A.1.1.2. Provide technical assistance to Complex staff	5,000	85,000	KSFRO
A.1.2.7. Enforce harvest regulations and monitor public use on Refuge originating fish stocks	30,000	115,000	Complex ADFG/FWP
A.1.2.3. Regulate and monitor subsistence fish harvest	5,000	120,000	ADFG Complex
A.3.1.1. Monitor Special Use Permits for guided sport fishing	5,000	125,000	Complex
A.1.2.8. Operate public use and information camps at Becharof Lake outlet	30,000	155,000	Complex
A.2.4.3. Conduct creel census at Becharof Lake outlet to determine coho salmon harvest	10,000	165,000	KSFRO
A.3.2.8. Collect age, length, and weight data from resident salmonids in the Egegik River and its tributaries	60,000	225,000	KSFRO
A.3.2.3. Collect age, weight, and length data from Arctic grayling and char in the Meshik River	60,000	285,000	KSFRO
C.1.1.1. Conduct subsistence household surveys	30,000	315,000	Complex ADFG
A.2.1.1. Determine chinook salmon escapement on Big Creek	2,000	317,000	KSFRO ADFG Complex

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1994

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.2.1.2. Determine chinook and coho escapement on the King salmon River (Becharof Refuge) and Meshik River	4,000	321,000	KSFRO ADFG Complex
A.2.1.3. Determine coho salmon escapement on King Salmon River (Ugashik Unit)	4,000	325,000	KSFRO ADFG Complex
C.1.1.2. Conduct general survey of traditional subsistence use areas within the Complex boundaries	5,000	330,000	Complex
A.3.2.1 Collect age, weight, and length data from Arctic grayling and char in the King Salmon River (Ugashik Unit)	50,000	380,000	KSFRO
A.2.1.5. Determine chum, coho, pink, and sockeye salmon escapement into Pacific Ocean drainages	10,000	390,000	KSFRO ADFG
A.4.1.1. Determine salmon spawning and rearing habitat in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit) and Dog Salmon drainages	60,000	450,000	KSFRO
A.1.2.5. Initiate catch and release education program	5,000	455,000	Complex ADFG
A.2.2.2. Collect age, weight, and length data on salmon in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit) and Dog Salmon drainages	30,000	485,000	KSFRO



# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1994

<u>Task</u>	<u>Funding</u>	Cumulative <u>Total</u>	Responsible <u>Office</u>
D.1.1.2. Collect baseline water quality data on one tributary to the King Salmon River (Becharof Refuge)	10,000	495,000	Complex WAES

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1995

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.1.1.1. Administer fishery management program	80,000	80,000	Complex
A.1.1.2. Provide technical assistance to Complex staff	5,000	85,000	KSFRO
A.1.2.7. Enforce harvest regulations and monitor public use on Refuge originating fish stocks	30,000	115,000	Complex ADFG/FWP
A.1.2.3. Regulate and monitor subsistence fish harvest	5,000	120,000	ADFG Complex
A.3.1.1. Monitor Special Use Permits for guided sport fishing	5,000	125,000	Complex
A.1.2.8. Operate public use and information camps at Becharof Lake outlet	30,000	155,000	KSFRO
A.3.2.8. Collect age, length, and weight data from resident salmonids in the Egegik River and its tributaries	60,000	215,000	KSFRO
A.3.2.3. Collect age, weight, and length data from Arctic grayling and char in the Meshik River	60,000	275,000	KSFRO
C.1.1.1. Conduct subsistence household surveys	30,000	305,000	Complex ADFG
A.2.1.1. Determine chinook salmon escapement on Big Creek	2,000	307,000	KSFRO ADFG Complex
A.2.1.2. Determine chinook and coho escapement on the King salmon River (Becharof Refuge) and Meshik River	4,000	311,000	KSFRO ADFG Complex

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1995

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.2.1.3. Determine coho salmon escapement on King Salmon River (Ugashik Unit)	4,000	315,000	KSFRO ADFG Complex
C.1.1.2. Conduct general survey of traditional subsistence use areas within the Complex boundaries	5,000	320,000	Complex
A.3.2.1 Collect age, weight, and length data from Arctic grayling and char in the King Salmon River (Ugashik Unit)	50,000	370,000	KSFRO
A.2.1.5. Determine chum, coho, pink, and sockeye salmon escapement into Pacific Ocean drainages	10,000	380,000	KSFRO ADFG
A.4.1.1. Determine salmon spawning and rearing habitat in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit) and Dog Salmon drainages	60,000	440,000	KSFRO
A.1.2.5. Initiate catch and release education program	5,000	445,000	Complex ADFG
A.2.2.2. Collect age, weight, and length data on salmon in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit) and Dog Salmon drainages	30,000	475,000	KSFRO
A.2.4.3. Conduct creel census at Becharof Lake outlet to determine coho salmon harvest	10,000	485,000	KSFRO

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1995

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.4.2.1. Collect limnological and physical habitat data for Becharof, Ugashik, Mother Goose and Sandy lakes	30,000	515,000	KSFRO
A.2.2.1 Collect biological data on salmon and steelhead in the Sandy River	50,000	565,000	KSFRO ADFG
D.1.1.2. Collect baseline water quality data from an unnamed tributary to the King Salmon River (Becharof Refuge)	10,000	575,000	Complex WAES
D.1.1.3. Collect baseline water quality data from Egegik, Ugashik, King Salmon (Ugashik Unit), and Dog Salmon River drainages	30,000	605,000	KSFRO
A.1.2.6. Update and distribute brochure on Complex waters depicting regulations and fish identification	10,000	615,000	Complex

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1996

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.1.1.1. Administer fishery management program	80,000	80,000	Complex
A.1.1.2. Provide technical assistance to Complex staff	5,000	85,000	KSFR0
A.1.2.7. Enforce harvest regulations and monitor public use on Refuge originating fish stocks	30,000	115,000	Complex ADFG/FWP
A.1.2.3. Regulate and monitor subsistence fish harvest	5,000	120,000	ADFG Complex
A.3.1.1. Monitor Special Use Permits for guided sport fishing	5,000	125,000	Complex
A.1.2.9. Operate public use and information camp at Ugashik Narrows	30,000	155,000	Complex
A.2.4.2. Conduct creel census at Ugashik Narrows to determine coho salmon harvest	10,000	165,000	KSFR0
A.1.2.10. Operate public use and information camp at Gertrude Creek	30,000	195,000	Complex
C.1.1.1. Conduct subsistence household surveys	30,000	225,000	Complex ADFG
A.3.2.2. Collect age, length, weight data from Arctic grayling and char in the Dog Salmon River	50,000	275,000	KSFR0
A.2.1.1. Determine chinook salmon escapement on Big Creek	2,000	277,000	KSFR0 ADFG Complex
A.2.1.2. Determine chinook and coho escapement on the King salmon River (Becharof Refuge) and Meshik River	4,000	281,000	KSFR0 ADFG Complex

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1996

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.2.1.3. Determine coho salmon escapement on King Salmon River (Ugashik Unit)	4,000	285,000	KSFRO ADFG Complex
C.1.1.2. Conduct general survey of traditional subsistence use areas within the Complex boundaries	5,000	290,000	Complex
A.3.2.1 Collect age, weight, and length data from Arctic grayling and char in the King Salmon River (Ugashik Unit)	50,000	340,000	KSFRO
A.2.1.5. Determine chum, coho, pink, and sockeye salmon escapement into Pacific Ocean drainages	10,000	350,000	KSFRO ADFG
A.4.1.1. Determine salmon spawning and rearing habitat in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit) and Dog Salmon drainages	60,000	410,000	KSFRO
A.1.2.5. Initiate catch and release education program	5,000	415,000	Complex ADFG
A.2.2.2. Collect age, weight, and length data on salmon in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit) and Dog Salmon drainages	30,000	445,000	KSFRO
A.4.2.1. Collect limnological and physical habitat data for Becharof, Ugashik, Mother Goose and Sandy lakes	30,000	475,000	KSFRO

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1996

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.2.2.3. Collect age, weight and length data from salmon species utilizing selected Complex Pacific Ocean drainages	35,000	510,000	KSFRO
A.3.2.4. Collect biological data from lake trout in Becharof and Ugashik lakes	40,000	550,000	KSFRO
A.3.2.7. Collect population data on juvenile salmonids in Braided Creek.	40,000	590,000	KSFRO
A.2.2.1 Collect biological data on salmon and steelhead in the Sandy River	10,000	600,000	KSFRO ADFG
D.1.1.2. Collect baseline water quality data from an unnamed tributary to the King Salmon River (Becharof Refuge)	10,000	610,000	Complex WAES
D.1.1.3. Collect baseline water quality data from Egegik, Ugashik, King Salmon (Ugashik Unit), and Dog Salmon River drainages	30,000	640,000	KSFRO

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1997

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.1.1.1. Administer fishery management program	80,000	80,000	Complex
A.1.1.2. Provide technical assistance to Complex staff	5,000	85,000	KSFRO
A.1.2.7. Enforce harvest regulations and monitor public use on Refuge originating fish stocks	30,000	115,000	Complex ADFG/FWP
A.1.2.3. Regulate and monitor subsistence fish harvest	5,000	120,000	ADFG Complex
A.3.1.1. Monitor Special Use Permits for guided sport fishing	5,000	125,000	Complex
A.1.2.9. Operate public use and information camp at Ugashik Narrows	30,000	155,000	Complex
A.2.4.2. Conduct creel census at Ugashik Narrows to determine coho salmon harvest	10,000	165,000	KSFRO
A.1.2.10. Operate public use and information camp at Gertrude Creek	30,000	195,000	Complex
A.3.1.2. Conduct creel survey on Gertrude Creek	10,000	205,000	KSFRO
A.1.2.11. Operate public use and information camp at Big Creek	30,000	235,000	Complex
C.1.1.1. Conduct subsistence household surveys	30,000	265,000	Complex ADFG
A.3.2.2. Collect age, length, weight data from Arctic grayling and char in the Dog Salmon River	50,000	315,000	KSFRO
A.2.1.1. Determine chinook salmon escapement on Big Creek	2,000	317,000	KSFRO ADFG Complex



# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1997

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.2.1.2. Determine chinook and coho escapement on the King salmon River (Becharof Refuge) and Meshik River	4,000	321,000	KSFRO ADFG Complex
A.2.1.3. Determine coho salmon escapement on King Salmon River (Ugashik Unit)	4,000	325,000	KSFRO ADFG Complex
C.1.1.2. Conduct general survey of traditional subsistence use areas within the Complex boundaries	5,000	330,000	Complex
A.2.1.5. Determine chum, coho, pink, and sockeye salmon escapement into Pacific Ocean drainages	10,000	340,000	KSFRO ADFG
A.4.1.1. Determine salmon spawning and rearing habitat in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit) and Dog Salmon drainages	60,000	400,000	KSFRO
A.1.2.5. Initiate catch and release education program	5,000	405,000	Complex ADFG
A.2.2.2. Collect age, weight, and length data on salmon in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit) and Dog Salmon drainages	30,000	435,000	KSFRO
A.3.2.6. Reevaluate rainbow trout population in the King Salmon River drainage (Becharof Refuge)	50,000	485,000	KSFRO

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1997

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.4.2.1. Collect limnological and physical habitat data for Becharof, Ugashik, Mother Goose and Sandy lakes	30,000	515,000	KSFRO
A.2.2.3. Collect age, weight and length data from salmon species utilizing selected Complex Pacific Ocean drainages	35,000	550,000	KSFRO
A.3.2.4. Collect biological data from lake trout in Becharof and Ugashik lakes	40,000	590,000	KSFRO
A.3.2.7. Collect population data on juvenile salmonids in Braided Creek.	40,000	630,000	KSFRO
D.1.1.1. Collect water quality data from Complex drainages that have mining activity that exceeds maintenance levels.	10,000	640,000	Complex WAES
D.1.1.3. Collect baseline water quality data from Egegik, Ugashik, King Salmon (Ugashik Unit), and Dog Salmon River drainages	30,000	670,000	KSFRO

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1998

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.1.1.1. Administer fishery management program	80,000	80,000	Complex
A.1.1.2. Provide technical assistance to Complex staff	5,000	85,000	KSFR0
A.1.2.7. Enforce harvest regulations and monitor public use on Refuge originating fish stocks	30,000	115,000	Complex ADFG/FWP
A.1.2.3. Regulate and monitor subsistence fish harvest	5,000	120,000	ADFG Complex
A.3.1.1. Monitor Special Use Permits for guided sport fishing	5,000	125,000	Complex
A.1.2.11 Operate public use and information camp at Big Creek	30,000	155,000	Complex
C.1.1.1. Conduct subsistence household surveys	30,000	185,000	Complex ADFG
A.2.1.1. Determine chinook salmon escapement on Big Creek	2,000	187,000	KSFR0 ADFG Complex
A.2.1.2. Determine chinook and coho escapement on the King salmon River (Becharof Refuge) and Meshik River	4,000	191,000	KSFR0 ADFG Complex
A.2.1.3. Determine coho salmon escapement on King Salmon River (Ugashik Unit)	4,000	195,000	KSFR0 ADFG Complex
C.1.1.2. Conduct general survey of traditional subsistence use areas within the Complex boundaries	5,000	200,000	Complex

## SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1998

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
A.2.1.5. Determine chum, coho, pink, and sockeye salmon escapement into Pacific Ocean drainages	10,000	210,000	KSFRO ADFG
A.4.1.1. Determine salmon spawning and rearing habitat in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit) and Dog Salmon drainages	60,000	270,000	KSFRO
A.1.2.5. Initiate catch and release education program	5,000	275,000	Complex ADFG
A.2.2.2. Collect age, weight, and length data on salmon in Egegik, Ugashik, Meshik, King Salmon (Ugashik Unit) and Dog Salmon drainages	30,000	305,000	KSFRO
A.4.2.1. Collect limnological and physical habitat data for Becharof, Ugashik, Mother Goose and Sandy lakes	30,000	335,000	KSFRO
A.3.2.4. Collect biological data from lake trout in Becharof and Ugashik lakes	40,000	375,000	KSFRO
A.3.2.7. Collect population data on juvenile salmonids in Braided Creek.	10,000	385,000	KSFRO
D.1.1.1. Collect water quality data from Complex drainages that have mining activity that exceeds maintenance levels	10,000	395,000	Complex WAES

# SECTION 9. PRIORITIZED TASKS

## FISCAL YEAR 1998

<u>Task</u>	<u>Funding</u>	<u>Cumulative Total</u>	<u>Responsible Office</u>
D.1.1.3. Collect baseline water quality data from Egegik, Ugashik, King Salmon (Ugashik Unit), and Dog Salmon River drainages	30,000	425,000	KSFRO

## SECTION 9. CONTINUED

### STATE TASKS

<u>Task</u>	<u>Responsible Office</u>
A.1.2.1. Regulate and monitor sport fish harvest	Sport Fish
A.1.2.2. Regulate and monitor commercial salmon harvests	Commercial Fish
A.1.2.3. Regulate and monitor subsistence harvest	Subsistence
A.1.2.4. Evaluate biological data, prepare management proposals, and write emergency orders for management of resident and anadromous fish species	Sport Fish Commercial Fish
A.1.2.5. Initiate catch and release program for public	Sport Fish
A.1.2.7. Enforce harvest regulations on Refuge fish species	Fish & Wildlife Protection
A.2.1.1. Determine chinook salmon escapement on Big Creek	Sport Fish Commercial Fish
A.2.1.2. Determine chinook and coho salmon escapement on the King Salmon River (Becharof Refuge) and Meshik River	Sport Fish Commercial Fish
A.2.1.3. Determine coho salmon escapement on the King Salmon River (Ugashik Unit)	Sport Fish Commercial Fish
A.2.1.4. Estimate sockeye salmon escapement into Egegik and Ugashik Rivers	Commercial Fish
A.2.1.5. Estimate chum, coho, pink, and sockeye escapement in Pacific Ocean drainages	Commercial Fish
A.2.2.1. Collect biological and migration data on salmon and steelhead in the Sandy River	Commercial Fish
A.2.3.1. Operate sockeye smolt sonar counters on Ugashik and Egegik Rivers	Commercial Fish
A.2.4.1. Estimate sport fish harvest using mail survey	Sport Fish
A.3.2.5. Reevaluate Arctic grayling population in Ugashik Narrows	Sport Fish
C.1.1.1. Conduct subsistence household surveys	Subsistence

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Alaska Department of Fish and Game. 1987b. Bristol Bay comprehensive salmon management plan. Juneau, Alaska.

Provides a historical review of Bristol Bay commercial salmon fisheries and suggests long term harvest goals by species for Bristol Bay salmon and possible constraints to achieving the goals.

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Discusses the 1988 management program for Bristol Bay area commercial and subsistence salmon fisheries and commercial herring fisheries. Reports commercial and subsistence catch, escapement, and production information on salmon species harvested in Bristol Bay over a 20 year period.

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Discusses the 1988 management program for Chignik area commercial and subsistence salmon fisheries. Reports commercial and subsistence catch, escapement, and production information on salmon species harvested.

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Discusses the 1991 management program for Bristol Bay area commercial and subsistence salmon fisheries and commercial herring fisheries. Reports commercial and subsistence catch, escapement, and production information on salmon species harvested in Bristol Bay over a 20 year period.

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Alaska Department of Fish and Game. 1993. 1993 Alaska Sport Fishing Regulations Summary. Alaska Department of Fish and Game, Sport Fish Division. Juneau, Alaska.

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Bascle R., D. Evans, A. Seidlitz, and J. Burkowski. 1987. Alaska Peninsula/Becharof National Wildlife Refuges Oil and Gas Assessment. Bureau of Land Management-Alaska, Branch of Minerals Assessment. Anchorage, Alaska.

Describes the oil development history, reviews the geology, and estimates the potential for oil and gas development on the Alaska Peninsula.

Blasko, D.P. 1976. Oil and gas seeps in Alaska: Alaska Peninsula, Western Gulf of Alaska. U.S. Bureau of Mines. Report of Inventory 8122. Anchorage, Alaska.

Describes the oil and gas seeps in the Becharof Lake area from Puale Bay south to Wide Bay and west to Ugashik Lakes.



Bristol Bay Coastal Resource Service Area Board. 1987. Bristol Bay coastal management program, management plan, volume 2. Dillingham, Alaska.

Planning document that provides guidance to government agencies and the private sector in the use of land and water in the coastal areas of Bristol Bay.

Burgner, R.L., C.J. DiCostanzo, R.J. Ellis, G.Y. Harry, Jr., W.L. Hartman, O.E. Kerns, Jr., O.A. Mathisen, and W.F. Royce. 1969. Biological studies and estimates of optimum escapements of sockeye salmon in the major river systems in southwestern Alaska. U.S. Department of Interior. U.S. Fish and Wildlife Service. Fishery Bulletin 67 (2):405-459.

Presents the results of a 1961 and 1962 study effort to determine the optimum escapement levels of sockeye salmon into the following river systems: Wood, Kvichak, Naknek, Ugashik, Chignik, and Karluk. Historical and recent data on sockeye salmon runs was summarized; spawning areas were identified, described, and capacities estimated; and rearing areas were identified, described, and capacities estimated.

Davis, B. 1985. Alaska Department of Fish and Game genetic policy. Unpublished report. Juneau, Alaska.

Describes the State of Alaska's genetic policy aimed at preserving the genetic integrity of important wild stocks.

Edfelt, L. 1973. Statistical history of Alaska salmon catches. Alaska Department of Fish and Game. Technical Data Report Number 9. Juneau, Alaska.

Presents the commercial catches of Alaska salmon, by species and area, from 1882 to 1971.

Fall, J.A., and J.M. Morris. 1987. Fish and wildlife harvests in Pilot Point, Ugashik, and Port Heiden, Alaska Peninsula, 1986-1987. Alaska Department of Fish and Game, Division of Subsistence. Technical Paper Number 158. Juneau, Alaska.

Describes the subsistence harvest of various species of fish and wildlife resources in three villages on the Alaska Peninsula and compares the results to other communities.

Meyer, S.C. 1990. Stock assessment of Arctic grayling at Ugashik Lakes, Alaska. Master's thesis. University of Alaska Fairbanks, Fairbanks, Alaska. 176 pages.

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Meyer, S.C. 1991. Estimates of sport fishing effort, catch, and harvest at Ugashik Narrows and Outlet, 1987-88. Alaska Department of Fish and Game, Fishery Data Series #91-3, Anchorage, AK.

Presents estimates of catch and harvest statistics at Ugashik Narrows and outlet during 1987 and 1988.

Mills, M.J. 1985 Statewide harvest report, federal aid in fish restoration. F-10-1. Alaska Department of Fish and Game, Division of Sport Fish. Volume 27. Juneau, Alaska.

Presents the 1984 findings from an annual survey providing statewide estimates of Alaska sport fishing effort and harvests by fisheries, areas, regions, and species.

Minard, R.E. 1987. Bristol Bay/Lower Kuskokwim area management report to the Alaska Board of Fisheries. Unpublished report. Alaska Department of Fish and Game, Division of Sport Fisheries. Dillingham, Alaska.

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Morris, J.M. 1987. Fish and wildlife uses in six Alaska Peninsula communities: Egegik, Chignik, Chignik Lagoon, Chignik Lake, Perryville, and Ivanof Bay. Alaska Department of Fish and Game, Division of Subsistence. Technical Paper number 151. Juneau, Alaska.

Describes the subsistence harvest of various species of fish and wildlife resources in six villages on the Alaska Peninsula and compares the results to other communities.

Shaul, A.R. and L.J. Schwarz. 1989. 1988 Alaska Peninsula-Aleutian Islands areas salmon and herring annual management report. Regional Information Report Number 4K89-11. Unpublished report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Westward Region. Kodiak, Alaska.

Discusses the 1988 management program for Alaska Peninsula and Aleutian Islands commercial salmon and herring fisheries. Reports commercial and subsistence catches and escapements of salmon and commercial catches of herring.

U.S. Department of Interior. 1985. The Bristol Bay regional management plan and final environmental impact statement. Volume I. Washington D.C.

Presents a comprehensive and systematic management plan for the Bristol Bay region as defined by Section 1203 of the Alaska National Interest Lands Conservation Act. The plan provides for conservation of fish, wildlife, and other significant natural and cultural resources and the rational and orderly development of economic resources in an environmentally sound manner.

U.S. Department of Interior. 1988. 1985 National survey of fishing, hunting, and wildlife associated recreation. U. S. Fish and Wildlife

U.S. Fish and Wildlife Service. 1985a. Record of Decision, Becharof National Wildlife Refuge comprehensive conservation plan, environmental impact statement, and wilderness review. Anchorage, Alaska.

Implements the Becharof National Wildlife Refuge Comprehensive Conservation Plan alternative B with modifications.

U.S. Fish and Wildlife Service. 1985b. Alaska Peninsula National Wildlife Refuge comprehensive conservation plan, environmental impact statement, and wilderness review. Anchorage, Alaska.

Describes the physical and biological environment on the Alaska Peninsula National Wildlife Refuge and presents a range of options for long range management of the refuge as required by Sections 304(g)(5) and 1317 of the Alaska National Interest Lands Conservation Act.

U.S. Fish and Wildlife Service. 1985c. Becharof National Wildlife Refuge comprehensive conservation plan, environmental impact statement, and wilderness review. Anchorage, Alaska.

Describes the physical and biological environment on the Becharof National Wildlife Refuge and presents a range of options for long range management for the Becharof National Wildlife Refuge as required by Sections 304(g)(5) and 1317 of the Alaska National Interest Lands Conservation Act.

U.S. Fish and Wildlife Service. 1987. Record of Decision, Alaska Peninsula National Wildlife Refuge comprehensive conservation plan, environmental impact statement, and wilderness review. Anchorage, Alaska.

Implements the Alaska Peninsula National Wildlife Refuge Comprehensive Conservation Plan alternative B with modifications.

U.S. Fish and Wildlife Service. 1993. Alaska Peninsula/Becharof National Wildlife Refuge Complex Draft Public Use Management Plan and Environmental Assessment. King Salmon, Alaska.

The document describes five alternatives for managing public use and identifies the Fish and Wildlife Service's preferred alternative.

Wagner, T.A. and S.H. Lanigan. 1988. Survey of fishery resources in the Meshik River drainage basin. Alaska Fisheries Technical Report Number 1. U.S. Fish and Wildlife Service. King Salmon, Alaska.

Presents the results of a fish resource inventory of the Meshik River drainage and discusses the potential impacts to salmonids of developing and operating an oil pipeline between Port Heiden and the Gulf of Alaska.

Appendix A. Master Memorandum of Understanding between Alaska  
Department of Fish and Game and U.S. Fish and Wildlife  
Service.

MASTER MEMORANDUM OF UNDERSTANDING

BETWEEN

THE ALASKA DEPARTMENT OF FISH AND GAME

Juneau, Alaska

AND

THE U.S. FISH AND WILDLIFE SERVICE

DEPARTMENT OF THE INTERIOR

Anchorage, Alaska

This Master Memorandum of Understanding between the State of Alaska, Department of Fish and Game, hereinafter referred to as the Department, and the U.S. Fish and Wildlife Service, hereinafter referred to as the Service, reflects the general policy guidelines within which the two agencies agree to operate.

WHEREAS, the Department, under the Constitution, laws, and regulations of the State of Alaska (Appendix I), is responsible for the management, protection, maintenance, enhancement, rehabilitation, and extension of the fish and wildlife resources of the State on the sustained yield principle, subject to preferences among beneficial uses; and

WHEREAS, the Service, by authority of the Constitution, laws of Congress and regulations of the U.S. Department of Interior (Appendix II) has a mandated management responsibility for certain species or classes of wildlife and is responsible for the management of Service lands in Alaska, and the conservation of fish and wildlife resources on these lands; and

WHEREAS, the Department and the Service share a mutual concern for fish and wildlife resources and their habitats and both are engaged in extensive fish and wildlife conservation, management, and protection programs and desire to develop and maintain a cooperative relationship which will be in the best interests of both parties, the concerned fish and wildlife resources and their habitats, and produce the greatest public benefit; and

WHEREAS, it has been recognized in the Alaska National Interest Lands Conservation Act and subsequent implementing Federal regulations that the resources and uses of Service lands in Alaska are substantially different than those of other states; and

Appendix A. Continued.

WHEREAS, the Department and the Service recognize the increasing need to coordinate resource planning and policy development;

NOW, THEREFORE, the parties hereto do hereby agree as follows:

THE DEPARTMENT OF FISH AND GAME AGREES:

1. To recognize the Service as the agency with the responsibility to manage migratory birds, endangered species, and other species mandated by Federal law, and on Service lands in Alaska to conserve fish and wildlife and their habitats and regulate human use.
2. To manage fish and resident wildlife populations in their natural species diversity on Service lands.
3. To consult with the Regional Director in a timely manner and comply with applicable Federal laws and regulations before embarking on enhancement or construction activities on Service lands.

THE FISH AND WILDLIFE SERVICE AGREES:

1. To recognize the Department as the agency with the primary responsibility to manage fish and resident wildlife within the State of Alaska.
2. To recognize the right of the Department to enter onto Service lands at any time to conduct routine management activities which do not involve construction, disturbance to the land, or alterations of ecosystems.
3. To cooperate with the Department in planning for enhancement or development activities on Service lands which require permits, environmental assessments, compatibility assessments, or similar regulatory documents by responding to the Department in a timely manner with requirements, time tables, and any other necessary input.
4. To manage the fish and wildlife habitat on Service lands so as to insure conservation of fish and wildlife populations and their habitats in their natural diversity.
5. To consider carefully the impact of any proposed treaties or international agreements relating to fish and wildlife resources on the State of Alaska which could diminish the jurisdictional authority of the State and to consult freely with the State when these treaties or agreements have a primary impact on the State.
6. To review present U.S. Fish and Wildlife Service policies and any future proposed changes in those policies in consultation with the Department to determine if modified or special policies are needed for Alaska.

Appendix A. Continued.

7. To adopt refuge management plans whose provisions--including provision for animal damage control--are in substantial agreement with the Department's fish and wildlife management plans, unless such plans are determined formally to be incompatible with the purposes for which the respective refuges were established.
8. To utilize the State's regulatory process to maximum extent allowed by Federal law in developing new or modifying existing Federal regulation or proposing changes in existing State regulations governing or affecting the taking of fish and wildlife on Service lands in Alaska.

THE DEPARTMENT OF FISH AND GAME AND THE FISH AND WILDLIFE SERVICE  
MUTUALLY AGREE:

1. To coordinate planning for management of fish and wildlife resources on Service lands so that conflicts arising from differing legal mandates, objectives, and policies either do not arise or are minimized.
2. To consult with each other when developing policy and legislation which affects the attainment of wildlife resource management goals and objectives of the other agency.
3. To recognize that the taking of fish and wildlife by hunting, trapping, or fishing on Service lands in Alaska is authorized in accordance with applicable State and Federal law unless State regulations are found to be incompatible with documented Refuge goals, objectives, or management plans.
4. To develop such supplemental memoranda of understanding between the Commissioner and the Regional Director as may be required to implement the policies contained herein.
5. That this Master Memorandum of Understanding shall become effective when signed by the Commissioner of the Alaska Department of Fish and Game and the Alaska Regional Director of the U.S. Fish and Wildlife Service and shall continue in force until terminated by either party by providing notice in writing 120 days in advance of the intended date of termination.
6. That amendments to this Master Memorandum of Understanding may be proposed by either party and shall become effective upon approval by both parties.

Appendix A. Continued.

STATE OF ALASKA

Department of Fish and Game

By /s/ Ronald O. Skoog

Ronald O. Skoog  
Commissioner

Date /s/ 13 Mar 82

U.S. DEPARTMENT OF THE  
INTERIOR

Fish and Wildlife Service

By /s/ Keith M. Schreiner

Keith M. Schreiner  
Regional Director, Alaska

Date /s/ 3-13-82



Appendix B. Fish species found in the fresh and saltwater habitats of  
Alaska Peninsula and Becharof Refuges.

Family Name	Scientific Name	Common Name
Petromyzontidae		
	<i>Entosphenus tridentatus</i>	Pacific lamprey
	<i>Lampetra japonica</i>	Arctic lamprey
Clupeidae		
	<i>Clupea harengus pallasii</i>	Pacific herring
	<i>Alosa sapidissima</i>	American shad
Salmonidae		
	<i>Coregonus laurettae</i>	Bering cisco
	<i>Coregonus sardinella</i>	Least cisco
	<i>Coregonus nelsoni</i>	Alaska whitefish
	<i>Prosopium cylindraceum</i>	Round whitefish
	<i>Salvelinus namaycush</i>	Lake trout
	<i>Salvelinus alpinus</i>	Arctic char
	<i>Salvelinus malma</i>	Dolly Varden
	<i>Oncorhynchus mykiss</i>	Rainbow trout
	<i>Oncorhynchus gorbuscha</i>	Pink salmon
	<i>Oncorhynchus nerka</i>	Sockeye salmon
	<i>Oncorhynchus tshawytscha</i>	Chinook salmon
	<i>Oncorhynchus kisutch</i>	Coho salmon
	<i>Oncorhynchus keta</i>	Chum salmon
	<i>Thymallus arcticus</i>	Arctic grayling
Osmeridae		
	<i>Hypomesus olidus</i>	Pond smelt
	<i>Hypomesus pretiosus</i>	Surf smelt
	<i>Osmerus mordax</i>	Rainbow smelt
	<i>Thaleichthys pacificus</i>	Eulachon
Umbridae		
	<i>Dallia pectoralis</i>	Alaska blackfish
Esocidae		
	<i>Esox lucius</i>	Northern pike
Gadidae		
	<i>Lota lota</i>	Burbot
	<i>Eleginus gracilis</i>	Saffron cod
	<i>Gadus macrocephalus</i>	Pacific cod
Gasterosteidae		
	<i>Gasterosteus aculeatus</i>	Threespine stickleback
	<i>Pungitius pungitius</i>	Ninespine stickleback
Cottidae		
	<i>Leptocottus armatus</i>	Pacific staghorn sculpin
	<i>Cottus cognatus</i>	Slimy sculpin
	<i>Cottus aleuticus</i>	Coastrange sculpin
	<i>Cottus asper</i>	Prickly sculpin
	<i>Clinocottus acuticeps</i>	Sharpnose sculpin
Pleuronectidae		
	<i>Liopsetta glacialis</i>	Arctic flounder
	<i>Platichthys stellatus</i>	Starry flounder

Appendix C. Regional policies on refuge fishery enhancement and rehabilitation activities and associated facilities and structures.



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
1011 E. TUDOR RD.  
ANCHORAGE, ALASKA 99503

IN REPLY REFER TO  
DARW/0113W

FEB 19 1987

### MEMORANDUM

To: All Stations, Region 7

From: Regional Director, Region 7

Subject: Clarification of Region 7 Fisheries Management Policies for Refuge Comprehensive Conservation Plans (CCP's)

The following information clarifies and rescinds the guidance approved by me in Joe Mazzoni's May 23, 1986, memorandum (subject: Summary of Fisheries Management Policies for Refuge Comprehensive Conservation Plans).

The following directives are supported by the Alaska National Interest Lands Conservation Act (ANILCA) (specifically, Sections 304[e] and 1310[b]), the Wilderness Act of 1964, and by the Refuge Manual.

- o On all refuge lands in Alaska (including designated wilderness) maintaining, rehabilitating, and enhancing existing fish populations is permitted, where compatible with the purposes of the refuge.
- o In general, restoration activities will be looked upon more favorably than enhancement activities on refuges in Alaska.
- o Long-term (i.e., permanent) facilities may be permitted outside of designated wilderness areas for maintenance, restoration and enhancement activities.
- o In designated wilderness areas, temporary facilities may be permitted to maintain, restore or enhance fisheries if the stocks have been reduced or are threatened as long as the facilities do not significantly detract from wilderness values.
- o New permanent facilities will not be permitted in designated wilderness for fisheries management purposes unless they are essential to accomplish refuge management objectives.
- o Existing facilities may remain and new facilities may be built for fisheries research and monitoring on all refuge lands in Alaska.

Appendix C. Continued.

- ° In making compatibility determinations in designated wilderness areas the Service will consider wilderness values.

The following definitions meet the Service's needs within the CCP's:

- ° Enhancement - Procedures applied to a fish stock to supplement numbers of harvestable fish to a level beyond what could be naturally produced based upon a determination or reasonable estimate of historic levels. This could be accomplished by artificial production systems. It can also be an increase of the amount of productive habitat in the natural environment through physical or chemical changes.
- ° Restoration - Increasing fishery resources to allow full utilization of available habitat or to a population objective based on a determination or reasonable estimate of historic levels. While the goal of restoration is self sustaining populations, situations will exist where the impact (e.g., habitat degradation) is such that some form of fishery management or mitigation activity could continue indefinitely.

All future refuge CCP's, as well as those now in production, will be modified to reflect the above policies.

BACKGROUND FOR FISHERIES MANAGEMENT POLICIES IN WILDERNESS. 2/10/87

The most difficult aspect in formulating this policy is the question of enhancement. The Wilderness Act of 1964 does not specifically address enhancement but does stress preservation of natural conditions. Apparently where enhancement (fish stocking) is presently occurring in wilderness areas designated by that act was occurring prior to designation.

Section 304(e) of ANILCA makes a provision for fisheries enhancement on refuges, subject to compatibility, but does not clarify whether or not this includes wilderness.

Paragraph 304(e) states: "Where compatible with the purposes of the refuge unit, the Secretary may permit, subject to reasonable regulations and in accord with sound fisheries management principles, scientifically acceptable means of maintaining, enhancing and rehabilitation fish stock."

The Refuge Manual 6 RM 8.8H has interpreted paragraph 304(e) to include refuge wilderness with the following statement: "On wilderness lands in Alaska, where compatible with the purposes of the refuge, maintaining, enhancing, and rehabilitating existing fish populations is permitted."

Defining enhancement is difficult because on the one hand it can be stated as "Procedures applied to a fish stock to supplement the numbers of harvestable fish to a level beyond what could be naturally produced." However, on the other hand, there is in most cases a problem of determining what natural production has been historically. In other words there needs to be an established figure for "natural production" before it can be determined if a fisheries program is enhancement or simply rehabilitation. Setting a reasonable estimate of historic levels seems to be the only realistic approach in many cases.

The Wilderness Act section 4(a) states in part: "The purposes of this act are hereby declared to be within and supplemental to the purposes for which...units of the...national wildlife refuge systems are established and administered..."

Section 4(b) qualified the terms "...within and supplemental to the purposes..." by stating: Except as otherwise provided in this act, each agency shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character." (Underlining added)

Section 4(c) states in part that there shall be: "... no structure or installation within any such area."

The Refuge Manual 6 RM 8.8 I addresses structures as follows: "Facilities essential to accomplishing refuge management objectives or those required to provide protection for the wilderness area are permitted, but it is preferable

that they be located outside the wilderness area. These facilities may include, but are not limited to, wildlife watering areas, exclosures, patrol cabins, heliports, airstrips, and temporary fencing. In all instances, facilities should blend with the environment."

ANILCA section 1310, provides for both existing and new facilities for fisheries research and monitoring within conservation system units.

ANILCA section 1315(b), addresses Aquaculture. It allows for permanent improvements and facilities such as fishways, fish weirs, fish ladders, fish hatcheries, spawning channels, stream clearance, egg planting, and other accepted means of maintaining, enhancing, and rehabilitating fish stocks within national forest wilderness and natural forest wilderness study areas.

There no doubt is some significance to the fact that earlier drafts of the d-2 legislation included refuge lands when aquaculture was addressed but the final draft, ANILCA, restricted it to national forests wilderness and wilderness study areas.

In summary, it appears that some degree of enhancement may be allowed in refuge wilderness based upon the Refuge Manual chapter on Wilderness Management 6RMS. It also allows for facilities in wilderness if they are essential to accomplish refuge management objectives. Both of these require a compatibility test which would include consideration of wilderness values.



The use of facilities for fisheries research and monitoring are clearly provided for in ANILCA.

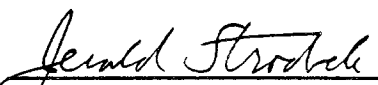
Provisions for aquaculture in ANILCA simply do not apply to refuge lands.

CONCURRENCE AND APPROVAL

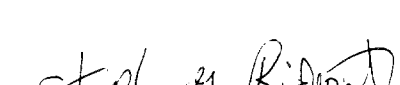
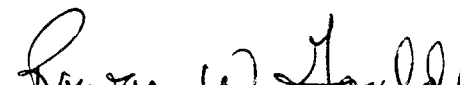
RECOMMEND APPROVAL:

CONCUR:

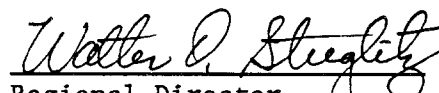
<u></u>	<u>5/2/94</u>	<u></u>	<u>5/2/94</u>
Project Leader	Date	Refuge Manager	Date
King Salmon		Alaska Peninsula/Becharof	
Fishery Resource Office		National Wildlife Refuges	

 6/1/94  
Associate Manager Date  
Refuges and Wildlife

PROGRAM APPROVALS:

<u></u>	<u>6/14/94</u>	<u></u>	<u>6/16/94</u>
Assistant Regional Director	Date	Assistant Regional Director	Date

APPROVED:

 6/21/94  
Regional Director Date  
Region 7