Fishery Management Report No. 08-35

Fishery Management Report for Sport Fisheries in the Northwest/North Slope Management Area, 2006

by

Brendan Scanlon

June 2008

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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FISHERY MANAGEMENT REPORT FOR SPORT FISHERIES IN THE NORTHWEST/NORTH SLOPE MANAGEMENT AREA, 2006

by

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The Division of Sport Fish Fishery Management Reports series was established in 1989 for the publication of an overview of Division of Sport Fish management activities and goals in a specific geographic area. Since 2004, the Division of Commercial Fisheries has also used the Fishery Management Report series. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm. This publication has undergone regional peer review.

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PREFACE

This report provides information for the Northwest/North Slope Management Area and is one in a series of reports annually updating fisheries management information within Region III. The report is provided for the state Board of Fisheries, Fish and Game Advisory Committees, the general public, and other interested parties. It presents fisheries assessment information and the management strategies that are developed from that information. In addition, this report includes a description of the fisheries regulatory process, the geographic, administrative, and regulatory boundaries, funding sources, and other information concerning Sport Fish Division management programs within the area.

The goals of the Sport Fish Division of the Alaska Department of Fish and Game are to protect and improve the state's recreational fisheries resources by managing for sustainable yield of wild stocks of sport fish, providing diverse recreational fishing opportunities, and optimizing social and economic benefits from recreational fisheries. In order to implement these goals the division has in place a fisheries management process.

A regional review is conducted annually during which the status of important area fisheries is considered and research needs are identified. Fisheries stock assessment research projects are developed, scheduled, and implemented to meet information needs identified by fisheries managers. Projects are planned within a formal operational planning process. Biological information gathered from these research projects is combined with effort information and input from user groups to assess the need for and development of fisheries management plans, and to propose regulatory strategies.

Sport Fish Division management and research activities are funded by State of Alaska Fish and Game (ADF&G) and federal aid in Fisheries Restoration funds. ADF&G funds are derived from the sale of state fishing licenses. Federal aid funds are derived from federal taxes on fishing tackle and equipment established by the Federal Aid in Sport Fish Restoration Act (also referred to the Dingell-Johnson Act or D-J Act). The D-J funds are provided to the states at a match of up to three-to-one with the ADF&G funds. Additional funding specified for providing, protecting, and managing access to fish and game is provided through a tax on boat gas and equipment established by the Wallop-Breaux (W-B) Act. Other peripheral funding sources may include contracts with various government agencies and the private sector.

This area management report provides information regarding the Northwest/North Slope and its fisheries for 2006, with preliminary information from the 2007 season. This report is organized into two primary sections: a management area overview including a description of the management area and a summary of effort, harvest and catch for the area; and a section on the significant area fisheries including specific harvest and catch by species and drainage.

ABSTRACT

Sport fisheries season summaries and management recommendations for 2006 in the Northwest/North Slope Management Area are presented. The Northwest Management Area consists of all waters north of the Yukon River drainage in Norton Sound, the Seward Peninsula, Kotzebue Sound (including the major drainages of the Kobuk and Noatak rivers), the Chukchi Sea past Point Hope, and all north-draining waters of the Brooks Range east to the Canadian border. Sport and subsistence fisheries target king, coho and pink salmon, Dolly Varden, sheefish, and northern pike. In 2006, angler-days totaled 24,286 with the largest proportion coming from the Unalakleet River drainage. Coho salmon were the predominant sport species harvested in 2006 with 11,643 fish taken, followed by Dolly Varden (5,613) and pink salmon (5,305). Summaries of major sport, commercial and subsistence fisheries within the Northwest/North Slope Management Area are detailed, including descriptions of recent performances, Alaska Board of Fisheries regulatory actions, social and biological issues, and descriptions of ongoing research and management activities.

Key Words: Northwest Alaska, Nome, Kotzebue, Unalakleet, North Slope, sport fisheries, subsistence, king salmon, coho salmon, pink salmon, Arctic grayling, Dolly Varden, sheefish, northern pike.

INTRODUCTION

The Alaska Board of Fisheries (BOF) divides the state into eighteen regulatory areas to organize the sport fishing regulatory system by drainage and fishery. These areas (different from regional management areas) are described in Title 5 of the Alaska Administrative Code Chapters 47 - 70. Sport Fish Division of the Alaska Department of Fish and Game (ADF&G) divides the state into three administrative Regions with boundaries roughly corresponding to groups of the BOF regulatory areas. Region I covers Southeast Alaska (the Southeast Alaska regulatory area). Region II covers portions of Southcentral and Southwest Alaska (including the Prince William Sound, Kenai Peninsula, Kenai River drainage, Cook Inlet – Resurrection Bay Saltwater, Anchorage Bowl, Knik Arm, Susitna River drainage, West Cook Inlet, Kodiak, Bristol Bay, and the Alaska Peninsula and Aleutian Islands regulatory areas). Region III includes Upper Copper River and Upper Susitna River area and the Arctic-Yukon-Kuskokwim Region (including the North Slope, Northwestern, Yukon River, Tanana River, Kuskokwim-Goodnews regulatory areas).

Region III is the largest geographic region, encompassing the majority of the landmass of the state of Alaska (Figure 1). The region contains over 1,146,000 km^2 (442,500 mi^2) of land, some of the state's largest river systems (the Yukon, the Kuskokwim, the Colville, Noatak, Upper Copper and Upper Susitna River drainages), thousands of lakes and thousands of miles of coastline and streams. Regional coastline boundaries extend from Cape Newenham in the southwest, around all of western, northwestern and northern Alaska to the Canadian border on the Arctic Ocean. Region III as a whole is very sparsely populated, with the most densely populated center located in the Tanana River Valley. Fairbanks (population about 30,000) is the largest community.

For administrative purposes Sport Fish Division has divided Region III into six fisheries management areas (Figure 1). They are:

The Northwestern/North Slope Management Area (Norton Sound, Seward Peninsula, Kotzebue Sound, and North Slope drainages);

The Yukon Management Area (the Yukon River drainage except for the Tanana River drainage);

The Upper Copper/Upper Susitna Management Area (the Copper River drainage upstream of Canyon Creek and Haley Creek, and the Susitna River drainage above the Oshetna River);

The Upper Tanana River Management Area (the Tanana River drainage upstream from Banner Creek and the Little Delta River);

The Lower Tanana River Management Area (the Tanana River drainage downstream from Banner Creek and the Little Delta River); and,

The Kuskokwim Management Area (the entire Kuskokwim River drainage and Kuskokwim Bay drainages).

Area management biologists for the six areas are located in Nome/Fairbanks, Fairbanks, Glennallen, Delta Junction, Fairbanks, and Bethel/Fairbanks, respectively.

THE ALASKA BOARD OF FISHERIES

The Alaska Board of Fish (BOF) is a seven-member board that sets fishery regulations and harvest levels, allocates fishery resources, and approves or mandates fishery conservation plans for the State of Alaska. Board members are appointed by the governor for three years terms and must be confirmed by the legislature.

Statewide fisheries issues may be considered at any BOF meeting. Under the current operating schedule, the BOF considers fishery issues for regulatory areas or groups of regulatory areas on a 3-year cycle. Proposals to create new or modify existing regulations and management plans are submitted by ADF&G and the public (any individual can submit a proposal to the BOF) for evaluation by the BOF. During its deliberations the BOF receives input and testimony through oral and written reports from ADF&G staff, members of the general public, representatives of local fish and game advisory committees, and special interest groups such as fishermen's associations and clubs. The public provides their input concerning regulation changes and allocation through submission of written proposals and testifying directly to the BOF, by participating in local fish and game advisory committee meetings, or by becoming members of local fish and game advisory committees.

ADVISORY COMMITTEES

Local Fish and Game Advisory Committees have been established throughout the state to assist the Boards of Fish and Game in assessing fisheries and wildlife issues and proposed regulation changes. Advisory committee members are nominated from the local public and voted on by all present during an advisory committee meeting. Most active committees in urban areas meet in the fall and winter on a monthly basis. Rural committees generally have only one fall and one spring meeting due to funding constraints. Advisory meetings allow opportunity for direct public interaction with department staff attending the meetings that answer questions and provide clarification concerning proposed regulatory changes regarding resource issues of local and statewide concerns. The Boards Support Section within the Division of Administration provides administrative and logistical support for the BOF and Fish and Game Advisory Committees. During 2006, the department had direct support responsibilities for 81 advisory committees in the state.

Within the Northwest/North Slope Management Area there are nine advisory committees: the Arctic, Kotzebue, Lower Kobuk, Noatak/Kivalina, Northern Norton Sound, Northern Seward Peninsula, St. Lawrence Island, Southern Norton Sound, and Upper Kobuk committees. In addition, advisory committees from the Yukon River drainage occasionally comment on proposals concerning Northwest fisheries.

RECENT BOARD OF FISHERIES ACTIONS

The BOF meets annually, but deliberates on each individual regulatory area on a 3-year cycle, most recently for the Northwest/North Slope Management Area in February 2007. During this meeting, two new regulations were produced for the Northwest/North Slope Management Area. First, the BOF adopted a management plan encompassing subsistence, sport, and commercial king salmon fisheries in the Unalakleet River drainage (Appendix A). In addition, the BOF amended a regulation regarding subsistence fishing to state that a person may not sport fish for salmon in Northern Norton Sound freshwaters and take a subsistence harvest the same day. In January 2004, the BOF adopted three regulations regarding salmon fisheries in the Unalakleet drainage. Two involved daily and seasonal limits for king salmon (which were subsequently superseded by the adoption of the management plan in 2007), and the other regulation adopted a bag limit for other salmon (excluding king salmon) of 10 fish per day of which only four could be coho, chum, or sockeye in combination. The only other regulation change in 2004 was the adoption of the AYK Arctic grayling management plan that changed the background bag and possession limit from 10 fish to five.

ADF&G EMERGENCY ORDER AUTHORITY

ADF&G has emergency order (EO) authority (5 AAC 75.003, 2006) to modify time, area, and bag/possession limit regulations. Emergency orders are implemented to deal with conservation issues that are not adequately controlled by existing regulations. Once implemented, an EO deals with the situation until it is resolved or the BOF can formally take up the issue. Emergency orders are also used as a tool for inseason management of fisheries. Inseason management is usually in accordance with a fisheries management plan approved by the BOF. Emergency orders issued under this authority for the Northwest/North Slope Management Area during 2006-2007 are summarized in Appendix B.

FEDERAL SUBSISTENCE

The Alaska National Interest Lands Conservation Act (ANILCA) established a priority subsistence use of fish and game for rural residents on lands and waters for which the federal government asserts jurisdiction. The state of Alaska also has established a priority for subsistence use of fish and game by Alaskan residents (AS 16.05.258), but cannot discriminate between residents (Alaska State Constitution Article VIII, sections 3 and 15). Since the state did not amend the Alaska Constitution to conform to federal regulations, the federal government has asserted authority to ensure a priority subsistence use of fish and game for rural residents on federal lands and certain adjacent waters. On October 1, 1999 the federal government asserted management responsibilities for subsistence fisheries on federal public lands (includes non-navigable waters on public lands). Following the "Katie John" decision by the 9th Circuit Court in 1995, the federal government expanded the definition of public land to include waters for which the federal agencies assert reserved water rights. Under current practice, the federal land management agencies assert management to protect the priority subsistence use by qualified rural residents in non-navigable waters within federal public lands (includes BLM lands) and in navigable waters adjacent to or within federal conservation units (generally does not include BLM lands). The state retains all other fish and wildlife management authorities, including management on federal land.

The development of regulations for subsistence fisheries under federal management occurs within the established Federal Subsistence Board (FSB) process. The public provides their input concerning regulation changes by testifying in Federal Subsistence Regional Advisory Council meetings or by becoming council members. Ten Regional Advisory Councils have been established throughout Alaska to assist the FSB in determining local subsistence issues and providing recommendations on proposed fishing and hunting regulations on the fish and game populations under consideration. Each Regional Council meets twice a year, and subsistence users and other members of the public can comment on subsistence issues at these meetings.

Within the Northwest/North Slope Management Area the subsistence fisheries under federal management include those in the Bering Land Bridge National Preserve, Selawik National Wildlife Refuge, Kobuk Valley National Park, Noatak National Preserve, Cape Krusenstern National Monument, Alaska Maritime National Wildlife Refuge, Gates of the Arctic National Park, and the Arctic National Wildlife Refuge. The Unalakleet National Wild and Scenic River is under federal fisheries management but only from the headwaters down to the Chiroskey River. In addition, portions of the Kobuk, Noatak, Salmon, and Selawik rivers are designated as Wild and Scenic Rivers. The Northwest/North Slope Management Area fisheries fall under the purview of the Seward Peninsula, Northwest, and North Slope Regional Advisory Committees (RAC's). The most recent meetings were held in August (North Slope RAC), September (Northwest RAC) and October (Seward Peninsula RAC). There were no fisheries proposals generated from these meetings in 2007.

REGION III SPORT FISH DIVISION RESEARCH AND MANAGEMENT STAFFING

The Region III Sport Fish Division staff biologists are organized into a research group and a management group. The management group consists of a management supervisor, an area biologist for each of the six management areas, one or more assistant area management biologists, and two stocked water biologists. The area biologists evaluate fisheries and propose and implement management strategies through plans and regulation in order to meet divisional goals. A critical part of these positions is interaction with the BOF, advisory committees, and the general public. The stocked waters biologists plan and implement the regional stocking program for recreational fisheries. The regional management biologist assigned to the Region III headquarters office in Fairbanks also administers the regional fishing and boating access program.

The research group consists of a research supervisor, a salmon research supervisor, a resident species supervisor, research biologists, and various field technicians. The research biologists plan and implement fisheries research projects in order to provide information needed by the management group to meet divisional goals. The duties of the management and research biologists augment one another.

STATEWIDE HARVEST SURVEY

Sport fishing effort and harvest of sport fish species in Alaska have been estimated and reported annually since 1977 using a mail survey (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995-1996, 2001a-d, Walker et al. 2003, Jennings et al. (2004, 2006a,b, 2007, *in prep* a,b). The survey is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. It is not designed to provide estimates of effort directed towards a single species. Species-specific

catch-per-unit-effort (CPUE) information can seldom be derived from the report. Two types of questionnaires are mailed to a stratified random sample of households containing at least one individual with a valid fishing license (resident or non-resident). Information gathered from the survey includes participation (number of anglers, trips, and days fished), number of fish caught and number harvested by species and site. These surveys estimate the number of angler-days of fishing effort expended by sport anglers fishing Alaskan waters as well as the sport harvest. Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site-by-site basis. The survey results for each year are not available until the following year; hence the results for 2006 were not available until fall 2007. Additionally, creel surveys have been selectively used to verify the mail survey for fisheries of interest, or for fisheries that require more detailed information or in-season management.

The utility of statewide survey estimates depends on the number of responses received for a given site (Mills and Howe 1992). In general, estimates from smaller fisheries with low participation are less precise than those of larger fisheries with high participation. Therefore the following guidelines were implemented for evaluating survey data:

1. estimates based on fewer than 12 responses should not be used other than to document that sport fishing occurred;
2. estimates based on 12 to 29 responses can be useful in indicating relative orders of magnitude and for assessing long-term trends; and,
3. estimates based on 30 or more responses are generally representative of levels of fishing effort, catch, and harvest.

SECTION I: NORTHWEST/NORTH SLOPE MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION AND ITS FISHERIES RESOURCES

The Northwest/North Slope Management Area includes all waters north of the Yukon River drainage in Norton Sound, the Seward Peninsula, Kotzebue Sound (including the major drainages of the Kobuk and Noatak rivers), the Chukchi Sea past Point Hope, and all north-draining waters of the Brooks Range east to the Canadian border (Figures 2-6). The total land area consists of approximately 383,301 km^2 (147,992 mi^2). The management area is composed of three subareas, the Seward Peninsula/Norton Sound subarea, the Kotzebue /Chukchi Sea subarea, and the North Slope subarea. Fish species present in the Northwest/North Slope Management Area include anadromous Dolly Varden *Salvelinus malma*, king *Oncorhynchus tshawytscha*, coho *O. kisutch*, chum *O. keta*, sockeye *O. nerka* and pink salmon *O. gorbuscha*; Bering cisco *Coregonus laurettae*, humpback whitefish *Coregonus pidschian*, as well as freshwater resident Arctic grayling *Thymallus arcticus*, Dolly Varden *Salvelinus malma*, Arctic char *Salvelinus alpinus*, northern pike *Esox lucius*, sheefish *Stenodus leucichthys*, round whitefish *Prosopium cylindraceum*, least cisco *C. sardinella*, humpback whitefish *C. pidschian*, broad whitefish *C. nasus*, burbot *Lota lota* and lake trout *Salvelinus namaycush*.

Seward Peninsula/Norton Sound Subarea

The Seward Peninsula-Norton Sound subarea (Figures 2-4) includes all westerly flowing waters and adjacent marine (salt) waters, north of the Yukon River drainage and south of the Selawik River in the Kotzebue Sound/Chukchi Sea subarea (ADF&G 1984). Streams in eastern Norton Sound (Figure 3) include the Golsovia, Unalakleet, Egavik, Shaktoolik, Inglutalik, Ungalik and Koyuk rivers. All but the Koyuk drain the Nulato Hills which separate Norton Sound from the Yukon and Koyukuk River valleys. Of these, the Unalakleet River is the largest and most heavily utilized. The village of Unalakleet is located at the mouth of this river. The Unalakleet River has been designated a National Wild and Scenic River and supports anadromous populations of Dolly Varden, king, coho, chum and pink salmon and resident populations of Dolly Varden, Arctic grayling and whitefish *Coregonus sp.* Other area streams provide the opportunity for high-quality fisheries for the same species, but are not as intensively fished because of their remote nature and difficult access.

Many streams located along the southern half of the Seward Peninsula between Koyuk and Teller, (Figure 4) including the Fish, Niukluk, Bonanza, Eldorado, Nome, Snake, Sinuk, Feather, Tisuk, Pilgrim, and Kuzitrin rivers, are accessible via the Nome road system and offer sport fishing opportunity for Arctic grayling, Dolly Varden, salmon and northern pike (Fish, Pilgrim and Kuzitrin rivers). Small sockeye salmon runs have historically occurred in the Pilgrim and Sinuk rivers although they have increased markedly in recent years, and a few remnant late run sockeye are present in most other locations. King salmon are present in the Pilgrim, Niukluk and Fish rivers. Trophy Arctic grayling, larger than 1.4 kg (3 lbs), are present in many Seward Peninsula waters where some of Alaska's largest Arctic grayling have been taken. Of the 110 largest Arctic grayling registered in the ADF&G trophy fish program, 30 were taken from Seward Peninsula waters, and 20 of those were taken from the Sinuk River. Remote streams such as the Koyuk, Tubutulik, Kwiniuk, and Agiapuk rivers are accessible by aircraft or boat from nearby villages. These rivers receive little sport fishing effort but provide opportunity for remote high-quality fisheries. For more detail on fisheries on these and other remote systems, see Scanlon and DeCicco (2007)

Kotzebue/Chukchi Sea Subarea

The Kotzebue/Chukchi Sea subarea includes all waters and drainages of the Selawik, Kobuk, Noatak, Wulik, Kivalina and Kukpuk rivers (Figure 5). The area also includes all salt water from the northern half of Eschscholtz Bay, including the Chamisso Island area and the northern half of Kotzebue Sound to and including Point Hope (ADF&G 1984).

The Noatak River is a National Wild and Scenic River and most of the drainage is included in the Noatak National Preserve (Figure 5). The extreme upper headwaters of both the Noatak and Kobuk rivers are included in Gates of the Arctic National Park. A portion of the lower Kobuk Valley, between the villages of Kiana and Ambler, is included in the Kobuk Valley National Park. The Salmon River tributary, as well as the upper main stem of the Kobuk River are National Wild and Scenic Rivers, as is the Selawik River. Much of the Selawik River valley is part of the Selawik National Wildlife Refuge. These three large river systems contain abundant fisheries resources.

Whitefish, Arctic grayling, Dolly Varden, lake trout, ninespine stickleback, burbot and northern pike are resident in the Noatak River drainage. Sheefish use the lower reaches of the river for feeding during the spring of the year, but are not known to spawn there (Alt 1987). This system

is known for its trophy size Dolly Varden. Many thousands of anadromous Dolly Varden overwinter in the lower 300 km of the river and spawn in some of the river's tributary streams. The Noatak River produces a large run of chum salmon that contributes to a Kotzebue-based commercial fishery. During the commercial salmon fishery, in August, a significant incidental harvest of adult Dolly Varden can occur.

The Kobuk River contains the largest spawning population of sheefish in northwestern Alaska. Sheefish migrate over 300 miles to spawn in the upper reaches of the drainage. Hotham Inlet, Selawik Lake and the delta system at the river's mouth serve as winter feeding areas for juvenile and adult sheefish. The Alaska state record sheefish, 24 kg (53 lbs), was taken in 1986 from the upper Kobuk River. Abundant whitefish (*C. sardinella*, *C. nasus*, *C. pidschian*) utilize the river, as well as Selawik Lake and Hotham Inlet (Kobuk Lake). Whitefish support important subsistence fisheries in villages along the river. Dolly Varden, northern pike, Arctic grayling, burbot, lake trout and Arctic char inhabit various parts of the Kobuk watershed.

The Selawik River also supports a spawning population of sheefish that shares rearing and winter feeding areas with the Kobuk River population. Sheefish in both populations are slower growing, but live longer and attain a larger size than those in other areas of Alaska (Alt 1987). The Selawik River drainage and associated wetlands provide abundant habitat for whitefish and northern pike.

Other important waters in the subarea include the Wulik and Kivalina rivers that drain into the Chukchi Sea near the village of Kivalina. These drainages provide rearing, spawning and winter habitat for diadromous Chukchi Sea Dolly Varden. All five species of North American Pacific salmon, Arctic grayling, burbot and whitefish also occur in these relatively small drainages, but populations are not large.

North Slope Brooks Range Subarea

The North Slope of the Brooks Range subarea (Figure 6) includes all waters north of the Brooks Range flowing into the Beaufort and Chukchi seas from Point Hope on the west to the Canadian border on the east including adjacent saltwater areas. Major drainages in this area include the Colville, Sagavanirktok, Canning, and Kuparuk rivers. These drainages provide rearing, spawning and winter habitat for diadromous Beaufort Sea Dolly Varden. The state's third largest lake, Teshekpuk Lake, is found here on the coastal plan, as are hundreds of smaller lakes. Most of these lakes are inaccessible by road and too shallow to support fish populations, but there are dozens of lakes that contain lake trout, Arctic char, Arctic grayling, and burbot. These populations are generally slow-growing and can support only minimal harvests.

COMMERCIAL FISHERIES

Although small when compared to the major commercial fisheries in southeast and southwest Alaska, the commercial fisheries in northwest Alaska form an economic base for income and employment in many local communities. Commercial harvests of salmon, herring, halibut and crab are usually much larger than sport harvests for those species (except on the North Slope where currently there are no commercial fisheries for salmon, and consequently all references to commercial fisheries in this report refer to those in Norton and Kotzebue sounds). In addition, extremely limited commercial fisheries exist for freshwater species such as sheefish, Dolly Varden and whitefish. Although personal use fisheries are also allowed, there has been no participation in these fisheries in the NW/NSMA largely because all Alaska residents qualify as

subsistence users. Subsistence harvests of salmon, Dolly Varden, sheefish, whitefish and crab are very important to the economies of the many small villages in the NW/NSMA, and are generally much larger than the sport fish harvests which generally make up the smallest component of overall use in most years.

The Commercial Fisheries Division (CFD) regulates commercial fisheries in the Northwest/North Slope Management Area. Commercial fisheries for salmon in the Norton Sound management district have been ongoing since 1961. The initial species of interest were king and coho salmon, but fisheries have also developed for chum and pink salmon. The district is divided into six subdistricts to facilitate management of individual stocks or stock groups. Subdistricts include: 1) Nome, 2) Golovin, 3) Moses Point, 4) Norton Bay, 5) Shaktoolik, and 6) Unalakleet (Figure 7). Conservation concerns for chum salmon stocks have resulted in very little commercial salmon fishing in the Nome Subdistrict since the early 1980s. There has likewise been little recent commercial fishing in the Norton Bay subdistrict, but this has largely been the result of limited markets in this remote area (Georgette and Shiedt 2005). Average commercial harvests over the last five years (2001-2005) in the entire Norton Sound district have been 76 king, 35,663 coho, 5,382 chum, 73 sockeye and 0 pink salmon (Table 1). The 2005 season was the best in recent years with a harvest of 151 king, 280 sockeye, 85,255 coho and 3,983 chum salmon. In 2006, commercial harvests in Norton Sound were 12 king, 8 sockeye, 130,808 coho, and 10,042 chum salmon. The 2006 coho salmon harvest is the all-time high in the Norton Sound commercial fishery (Soong et al. 2008).

The Port Clarence District includes all waters from Cape Douglas north to Cape Prince of Wales, including the drainages of the Pilgrim and Kuzitrin rivers (Figure 7). Commercial salmon fishing has been prohibited in this district since 1967. Few stocks are present and their run sizes are relatively small, however, the sockeye run into Salmon Lake that passes through the district has increased to over 85,000 fish in 2004, 56,000 in 2005, and 52,000 in 2006. Because of the existence of important subsistence fisheries on these stocks, commercial fishing has never reopened, but is being discussed for 2007.

The Kotzebue Sound District includes all waters from Cape Prince of Wales to Point Hope (Figure 8) and is the northern most commercial fishing district in Alaska. The current commercial fishery opened under state management in 1962, but there are documented sales of salmon in the Kotzebue area dating back to the early 1900s. This is primarily a chum salmon fishery with a few king salmon taken annually and an incidental take of Dolly Varden that pass through the fishery in August. Average commercial harvests over the past five years (2001-2005) in the Kotzebue Sound District have been about 74,497 chum salmon and about 65 Dolly Varden (Soong et al. *in prep;* Table 1). In 2006, the chum salmon harvest in the Kotzebue Sound District was 130,660 fish (Table 1). There is also a directed under ice commercial fishery on sheefish in Hotham Inlet. Documented annual harvests in this fishery have averaged fewer than 50 fish over the past five years, and the harvest quota of 25,000 pounds has never been met. Georgette and Shiedt (2005) document these fisheries in greater detail.

The CFD conducts annual assessments of salmon escapements using weirs, counting towers and aerial surveys. Weirs and towers are thought to provide more accurate measures of escapement than aerial surveys, and these methods have been expanded to cover more streams during recent years (Table 2). The status of Norton Sound chum salmon stocks of concern was recently reviewed by the BOF and biological escapement goals (BEGs) for chum salmon based on aerial survey counts in Nome Subdistrict streams have been established. In addition, Sustainable

Escapement Goals (SEGs) have recently been developed for salmon stocks that lacked adequate data for the development of more formalized BEGs (Table 3). Optimal Escapement Goals (OEGs) have also been developed for some species/river combinations. An OEG is a specific management objective for escapement that considers biological and allocative factors and may differ from the SEG or BEG. The BOF places an OEG into regulation and the department manages to maintain escapements within the bounds of the OEG. With the exception of the goal for the Kwiniuk River that is based on a tower count, the escapement goals are based on aerial survey data, but these goals will likely be revised using tower or weir counts when sufficient data become available.

SUBSISTENCE FISHERIES

There are approximately 23,000 people living in the NW/NSMA. Except for the two larger communities of Nome and Kotzebue, the population is scattered among 26 small villages along the coast and the major area rivers (Alaska Dept. of Labor 1991). Most of the population is composed of Alaska Natives, many of whom lead a relatively traditional lifestyle. Many area residents rely heavily on the subsistence use of fish and wildlife for their livelihood. Subsistence use of salmon is monitored in village surveys conducted by the Division of Subsistence. Recent subsistence salmon harvests (2001-2005) have averaged about 81,000 fish in the Norton Sound District (Table 4). This average harvest was composed of 4,575 king, 591 sockeye, 13,796 coho, 52,768 pink, and 10,783 chum salmon. In 2006, 83,185 salmon were harvested in Norton Sound. Of these, 2,691 were king, 923 sockeye, 16,127 coho, 69,221 were pink, and 5,938 were chum salmon. The recent five-year average subsistence salmon harvest in the Port Clarence District was about 13,867 fish, composed of 162 king, 5,740 sockeye, 1,337 coho, 4,224 pink and 2,404 chum salmon (Soong et al. 2008; Table 4).

In 2003, subsistence fishing opportunity in the Nome subdistrict of Norton Sound was severely restricted because of low salmon abundance. In 2004, fishing opportunity was expanded because of abundant sockeye and pink salmon. In 2005 and 2006, higher than expected runs of chum salmon in addition to abundant pink and sockeye runs allowed for a more relaxed subsistence fishing schedule. In addition to salmon, other fish, including saffron cod, rainbow smelt, Dolly Varden and whitefish are taken. In the Kotzebue Sound District, the recent five-year subsistence salmon harvest has been about 49,519 chum salmon; however, subsistence harvest surveys (for all species) were not conducted in the in the Kotzebue area in 2005 or 2006 (Table 4). In the Kotzebue District sheefish are also an important subsistence resource, especially in Kotzebue, Selawik, and the villages along the Kobuk River. In 2003, an estimated 7,813 sheefish were harvested, and in 2004, an estimated 10,163 sheefish were harvested, the highest harvest recorded since 1971. The relative importance of whitefish is higher in the Kotzebue Sound District than in many areas of the state. The average subsistence harvest of whitefish for the village of Noatak and the five Kobuk River villages combined from 1998-2002 was 44,552. In 2003, 73,242 whitefish were estimated harvested, and in 2004, 50,501 were estimated harvested (Georgette et al. 2003a,b, 2004; Georgette and Shiedt 2005). No harvest data on whitefish has been collected since 2004.

ESTABLISHED MANAGEMENT PLANS AND POLICIES

Regulations governing fisheries in the Northwest/North Slope Management Area are found in 5 AAC 70.006 through 5 AAC 70.011 (sport fishing), and in 5 AAC 01.100 through 5 AAC 01.190 (subsistence fishing). The Wild Arctic Grayling Management Plan, which regulates

Arctic grayling sport fisheries for long-term sustained yield throughout Region III, is found in 5 AAC 70.055. A management plan for lake trout in the AYK region was adopted by the BOF in February 2006 (5 AAC 70. 055). The newly-adopted (February 2007) Unalakleet River King Salmon Management Plan, which encompasses sport, subsistence, and commercial regulations, is found in 5 AAC 04.395.

MAJOR ISSUES FOR THE NORTHWEST/NORTH SLOPE MANAGEMENT AREA

1. Unalakleet River King salmon. The Unalakleet sustains the highest sport fishing effort of any single river in the NW/NSMA, and supports the largest directed king salmon fishery in the area. In addition, the residents of Unalakleet and Shaktoolik depend heavily on king salmon for subsistence uses and, when escapements are large enough, income through a directed commercial fishery. Currently there is a Sustainable Escapement Goal (SEG) for king salmon using an expansion of the tower counts on the North River (a large Unalakleet tributary) of 1,200 to 2,600 fish. After a historic high of 4,185 fish in 1985 tower counts have declined steadily, and the counts have failed to reach the lower end for the past three years (2004 – 2006). In 2006, the count was 906 fish, which is the all-time low. Uncertainty regarding the reasons for the decline in escapement coupled with continued pressure from multiple user groups makes the Unalakleet River king salmon stock a primary concern for fisheries managers in western Alaska.

2. Wulik River Dolly Varden. Development of a world-class zinc deposit at the Red Dog site in the upper Wulik River drainage carries the risk of heavy metal contamination on one of the most important streams in Northwest Alaska for Dolly Varden. There has been concern that heavy metal contamination of Red Dog and Ikalukrok creeks would occur both from natural leaching of the ore body as it was stripped for ore production and from discharge of contaminated waters into the river. A contamination problem in 1989 and 1990 has been controlled with additional wastewater treatment and the construction of a clean water bypass system in Red Dog Creek. Water quality is monitored by the Department of Natural Resources (DNR) and mine personnel. Contamination from dust along the road corridor has recently been documented by the NPS. The Division of Sport Fish counts Dolly Varden overwintering in the Wulik River annually, and in cooperation with the DNR, collects fish from which tissues are excised for heavy metal analyses twice each year.

3. Nome area gold mining. The future development of large-scale lode deposits of gold near Nome has the potential to degrade fish habitat in the Snake, Cripple and Solomon River drainages. Interest in mining is directly related to the world price of gold. In the recent past, development interest had declined with the price of gold, but in the past five years interest and development potential has escalated.

4. Rural resentment of sport fishing and sport anglers. Rural Alaskans often feel resentment toward “outsiders” who come into remote areas traditionally used by local people for subsistence hunting or fishing. There is sometimes a cultural bias against the concept of "sport fishing" and local residents feel that people do not have the right to "play" with food resources. The bias can be particularly strong towards

catch-and-release practices and has led to some resentment of sport anglers who wish to fish in remote waters of NWMA, and to proposals before the BOF that would have eliminated catch-and-release in some fisheries.

5. Effects of federal subsistence fisheries management on sport fishing opportunity in the NW/NSMA. During October 1999, the federal government through the US Fish and Wildlife Service (USFWS) Office of Subsistence Management took over management of subsistence fisheries on waters within or adjacent to Federal Conservation units. There is concern that a result of this action will be reduced opportunity for sport fishing throughout much of Alaska. Since there is a large amount of Federal Public land within the NW/NSMA that is used by local residents for subsistence purposes, the potential loss of sport fishing opportunity in remote areas of the NW/NSMA is of acute concern to anglers and sport fish managers. The ADF&G continues to work with federal managers and Rural Advisory Councils to address fisheries issues as they arise.

ACCESS PROGRAM

The Sport Fish Access Program was initiated nationwide in 1984 as a result of the Wallop-Breaux Amendment to the Sport Fish Restoration (Dingell-Johnson or D-J) Act. The Sport Fish Access program is comprised of two parts. The first involves major capital improvement projects, such as boat launches, parking areas, camping areas, handicap-accessible public fishing docks, access roads and trails, and the purchase or lease of lands or right-of-ways to ensure public access to fishing sites. The second portion of the program is called the Small Access Site Maintenance Project. This annually funded program involves maintaining and upgrading existing angler access sites. Activities include placing and maintaining signs at lake and river access sites, constructing and maintaining trails, and securing public rights-of way to fishing sites. Portable toilets, picnic tables and trash removal are provided at heavily used roadside sites. At remote sites, this project provides tent platforms and outhouses; it also publishes brochures on fishing and boating opportunities.

To date, few access projects have been proposed for the rural areas of the NWMA; however, a boat launching facility was recently built in the village of Unalakleet using Access funds and a proposal for a boat ramp on the Nome River by the City of Nome is in progress.

INFORMATION AND EDUCATION

Information regarding regulations, publications, stocking and fishing reports, news releases and emergency orders for the Northwest/North Slope Management Area can be found at the Department of Fish and Game, Division of Sport Fish website (www.sf.adfg.state.ak.us/statewide/index.cfm). From this website, anglers interested in fishing in the NW/NSMA can read the area descriptions, and download the *Nome Roadside Fishing Guide*, the *Sheefish Catch & Release* publication (for anglers interested in fishing the Kobuk or Selawik River drainages) and the *Sportfishing along the Dalton Highway* brochure (for those interested in fishing along the roadside on the North Slope). Also, the *Dolly Varden and Arctic Char in Alaska* brochure can be helpful for anglers who fish in the NW/NSMA as both species are found in the area.

In the NW/NSMA, there are nine federal management areas with access to excellent sport fishing and pristine wilderness. These are: the Bering Land Bridge National Preserve, Selawik

National Wildlife Refuge, Kobuk Valley National Park, Noatak National Preserve, Cape Krusenstern National Monument, Alaska Maritime National Wildlife Refuge, Gates of the Arctic National Park, and the Arctic National Wildlife Refuge. The Unalakleet National Wild and Scenic River is under federal fisheries management but only from the headwaters down to the Chiroskey River. A listing of the addresses and contact numbers for these information sources can be found in Appendix D.

There are three regional information and education (I&E) staff located in the Fairbanks office. An Information Officer II and a seasonal Fisheries Technician III respond to questions from the public at the office and via phone and e-mail. In addition, I&E staff distribute and update fishery brochures, fishing regulations, the regional webpage, coordinate the Fairbanks Outdoor Show booth and Kid's Fish & Game Fun Day, and the Becoming an Outdoorswoman (BOW) program. An Education Associate II coordinates the sport fishing component of the Alaska Conservation Camp and works with schools in various communities throughout the region to provide a curriculum in sport fishing and aquatic education.

SPORT FISHING EFFORT, HARVEST, AND CATCH

Recreational angler effort has been estimated for the Northwest/North Slope Management Area with a mail survey since 1977 (Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006 a, b, 2007, *In prep a,b*). The results of this survey indicate that effort in the NW/NSMA has remained more or less stable since 1997. Effort since 1986 has ranged from 21,000 to 40,000 angler days per year (Table 5). During 2006, the total sport fishing effort for the NW/NSMA was estimated at 24,286 angler days. The recent five-year average (2001-2005) sport fishing effort for the NW/NSMA is 23,027 angler days (Table 5).

The Seward Peninsula and Norton Sound subarea accounts for most of the sport fishing in the NW/NSMA. Effort in the subarea has averaged 13,276 angler days over the past five years (2001-2005, Table 5). Rivers supporting the most sport fishing effort in the NWMA have been the Unalakleet, Fish/Niukluk, and Nome rivers. Angler effort was estimated at 4,062 angler days for the Unalakleet River in 2006, approximately 27% of the total effort in the subarea (Table 5). The Nome River has been closed to fishing for Arctic grayling and chum salmon since the early 1990s, and it is likely that these closures have contributed to a reduction of fishing effort on this stream. Annual effort in the Nome River has averaged 1,475 angler days over the past five years (2001-2005) but increased to 4,517 angler days in 2006. The increase in effort in 2006 was likely due to the large runs of pink and coho salmon present, as well as increased employment in the Nome area and subsequent rise in the number of nonresident anglers that lived in Nome for the summer. The Fish/Niukluk river system has sustained an annual average of about 2,198 angler days of effort for the past five years. In 2006, effort on this river system was estimated at 1,067 angler days. Estimated effort on the Snake and Pilgrim rivers has averaged about 707 angler days each over the previous five years (Table 5).

In the Kotzebue/Chukchi Sea subarea, sport fishing effort has been somewhat more variable, ranging from 3,000 to 6,800 angler days per year over the past 10 years (Table 5). After showing a decline to about 3,800 angler days in 1997 and 1998, effort has stabilized between 5,500 and 6,500 angler days over the past few years, and in 2006 there were an estimated 6,334 angler days in the subarea (Table 5). The large drainages of the Kobuk and Noatak rivers support more than half of the freshwater effort in this subarea during most years while the remainder is dispersed among smaller drainages such as the Wulik, Kivalina and Selawik rivers,

and many of the area's lakes. Expense of travel, difficulty of access and small human population likely account for the low levels of sport fishing effort reported in this region.

In the North Slope subarea, sport fishing effort is generally light but variable, with most effort focused on streams and lakes along the Dalton Highway (Haul Road) where access is less difficult. The average effort over the last ten years (1996-2005) was 4,582 angler days, with 50% of that coming from Haul Road fisheries (Table 5). Most of this effort has been historically directed at Dolly Varden, Arctic char, lake trout, and Arctic grayling fisheries in close proximity to the road system.

While total sport fishing effort in the NW/NSMA in 2006 was near the recent 10-year average, harvest and catch of Pacific salmon in the NW/NSMA in 2006 were both well above the average (Tables 6 and 7). In 2006, the estimated number of salmon harvested in the NW/NSMA was 18,989 fish and the catch was 54,907 fish, which was 87% and 59% higher respectively than the recent 10-year averages. Much of this increase can be attributed to record and near-record high returns of pink and coho salmon in Southern and Northern Norton Sound. While harvest and catch of Dolly Varden in NW/NSMA in 2006 was near the recent 10-year average, for other species including Arctic grayling, lake trout, and northern pike, harvests and/or catches in 2006 were well below average (Tables 6 and 7), which likely reflects changes in angler preferences towards higher catch rates and larger fish rather than harvest as a primary motivation, and not any declines in abundances of these species. More detailed descriptions of specific important fisheries by location and species can be found in Section II.

SECTION II: MAJOR NORTHWESTERN AND NORTH SLOPE AREA FISHERIES OVERVIEW

NW/NSMA waters offer some of the most remote and diverse angling opportunities available in Alaska. Opportunities to fish for Dolly Varden, sheefish and Arctic grayling in pristine areas without encountering other anglers are widespread. Angling opportunities for salmon, especially chum and coho are not as well known but can be excellent. Marine sport fisheries have been virtually non-existent throughout the area, although since 2002 more saltwater sport fishing effort was documented in Norton Sound than ever before (about 1,600 angler days/yr). Guided fishing comprises a small amount of the effort in northwestern Alaska. An unpublished survey conducted by the Division of Sport Fish for the 1994 season estimated that only about 1% of the total sport fishing effort in the Seward Peninsula-Norton Sound subarea was by guided anglers while about 5% of the effort in the Kotzebue-Chukchi Sea subarea was guided. Through the ice jigging for saffron cod, smelt, flounder, sheefish, and other species are common near settlements, but these fisheries generally operate under subsistence fishing regulations.

NORTHWESTERN ALASKA SALMON FISHERIES

Sport fishing for salmon takes place throughout the management area. However, the vast majority of salmon fishing occurs in the Seward Peninsula/Norton Sound subarea with concentrations near Unalakleet and in waters accessible from the Nome area road system. Some salmon fishing effort occurs in association with wilderness float trips in Kotzebue Sound

drainages, but the amount of sport fishing effort expended toward salmon in the northern part of the management area is very light and harvests are very small.

Over the past five years (2001-2005), about 47% of the total average harvest has been coho salmon, 33% pink salmon, 12% chum salmon, 5% king salmon, and 2% sockeye salmon. During years of high pink salmon abundance such as 2002, 2004 and 2006, harvests of this species have comprised about 40% of the total annual salmon harvest. However, during years of low pink salmon abundance such as 2001, 2003 and 2005 they accounted for only about 3% of the harvest (Table 6).

Regulatory History

Prior to 1966, the daily bag limit was 15 fish (of all species) in freshwaters of western Alaska. From 1966 through 1970 an exception was made in the Unalakleet River where the daily bag limit was six salmon (all species). In 1970, the daily limit of six salmon on the Unalakleet River was dropped, and a 15 salmon limit was adopted for the entire AYK Region with exceptions outside the NW/NSMA. Salmon Lake and its tributaries were closed to salmon fishing in 1980. The general daily bag limit of 15 salmon in the NWMA remained in effect until 1985 when the king salmon limit was set at five per day and the "other salmon" limit was set at 10 per day. An exception was made for the Snake and Nome rivers where the "other salmon" limit was 15 per day of which only five could be chum or coho. In 1987 emergency regulations were adopted that set the king salmon daily bag limit at one fish and the "other salmon" limit at 10 per day. In 1988, the king salmon daily bag limit for the AYK Region outside the Tanana River drainage was set at three per day with only two over 28 inches and the "other salmon" limit was retained at 10 per day; however, in Seward Peninsula waters, the king salmon limit was one per day with 10 "other salmon" of which only three could be chum or coho, and in the Unalakleet River, the king salmon limit was set at one per day. Also in 1988, chum salmon fishing was closed by EO on the Nome River. This closure was extended to all rivers from the Sinuk to the Solomon in 1991. In 1992, this closure was adopted into regulation by the BOF. These regulations remained in effect until 1997 when the BOF broke out the "other salmon" bag limits for Northern Norton Sound and adopted daily bag limits of 10 pink, three coho, three sockeye, and three chum salmon. However, the chum salmon closure in the Nome Subdistrict remained in effect. In 2000, the "other salmon" daily bag and possession limit was reduced from 10 salmon to five salmon in the Unalakleet River. In addition, a regulation to address the possible high catch-and-release mortality of coho in the estuary of the Unalakleet River was adopted. This regulation closed the area downstream from the South River for the remainder of that day, to all sport fishing for those anglers that had harvested a bag limit of coho salmon. In addition, a statewide daily bag limit of 10 jack king salmon (under 20 inches in length) was adopted.

UNALAKLEET RIVER SALMON FISHERIES

Background and Historical Perspective

The village of Unalakleet with a population of about 800 is located on the shore of Norton Sound at the mouth of the Unalakleet River. Daily air service from Anchorage and Nome provides access for anglers visiting the Unalakleet area. The Unalakleet River supports substantial runs of king, chum, coho and pink salmon. Most of the angling effort on the Unalakleet River is directed toward king and coho salmon, but other species of salmon, Arctic grayling and Dolly Varden are also targeted. The king salmon run usually begins in mid-June, peaks during the last week of

June and continues through mid-July. Anglers access the river by boat from the village of Unalakleet and are composed of a mix of local residents, visitors who rent boats or fish with friends and visitors who either stay at the Unalakleet Lodge, or are guided by local resident guides. Most sport fishing effort occurs in the lower 15 miles of the Unalakleet River and in the lower five miles of the North River, a tributary which enters the Unalakleet River about seven miles upstream from its confluence with the Bering Sea.

The U. S. Air Force operated a sport fishing recreational camp on the Unalakleet River, eight miles upstream of the village, during the 1960s. A commercial sport fishing lodge was constructed there in the late 1960s. This fishing lodge is still being operated. The Unalakleet Native Corporation owned the lodge for several years and contracted operations. The lodge is currently in private ownership. Local residents guide anglers on the river, and guiding operations from the Yukon River drainage sometimes visit the river during the peak of the king and coho salmon runs. However, the majority of angling on the Unalakleet River is by unguided anglers. An unpublished survey by the Division of Sport Fish in the 1990s estimated that only about 8.5% of salmon anglers on the Unalakleet River were guided. Based on estimated effort levels and known effort by the largest guiding business, it is likely that guiding currently accounts for about 15 - 20% of the angling effort on the Unalakleet River.

Recent Fishery Performance

Since 1995, the Unalakleet River sustained the highest sport fishing effort of any single river in the NWMA in all but three years. Unalakleet River salmon harvests trended upward between 1990 and 2000, and have remained relatively stable since (Table 8). The 2002 effort was the highest recorded at 8,195 angler days. The average annual sport harvest of salmon of all species from the Unalakleet River in 2001 - 2005 has been about 4,300 fish. Coho comprised about 67% of the average harvest while king salmon made up about 7%. Approximately 61% of the entire NWMA harvest of king salmon, and 67% of the coho salmon harvest were taken from the Unalakleet River in 2006.

In 2006, the king salmon fishery was closed by EO on July 5 based on record-low early season returns. (Appendix B). The North River did not reach the lower end of its escapement goal (1,200-2,400 king salmon) with a total escapement of 906 king salmon in 2006. No other management actions were taken on the Unalakleet River in 2006.

The estimated sport harvest of king salmon in the Unalakleet River remained fairly stable from 1998 to 2002 averaging about 420 annually. In 2003 the harvest dropped to an estimated 97 fish, which was likely a result of fishery restrictions; however, in 2004 the harvest was near the previous average with 356 estimated harvested even with restrictions in place (Table 8). In 2005, 216 king salmon were harvested and in 2006, 304 fish were harvested. The total escapements of king salmon into the Unalakleet River were estimated for the first time in 1997 and 1998 by expanding the tower estimate from the North River to include the entire drainage based on proportion of radio-tagged fish moving upstream in each drainage. In both 1997 and 1998 about 40% of the radio-tagged king salmon swam past the North River tower, and king salmon escapement into the Unalakleet River was estimated at 11,204 and 5,220 respectively (Wuttig 1998 and 1999).

Over the past five years (2001-2005) the commercial harvests of king salmon in the Unalakleet Subdistrict have been declining and have averaged 76 fish (Table 1). Since 1961, harvests have ranged from four in 2002 to 12,621 in 1985. There was no directed commercial fishing for king

salmon between 2002 and 2004 (Soong et al. 2008). Unalakleet and Shaktoolik king salmon stocks were designated "stocks of concern" by the BOF in January 2004, and escapement goals in these drainages are currently being reviewed by the department. Records of subsistence harvests of king salmon in Unalakleet have ranged from 90 fish in 1966 to 6,325 fish in 1997 (Table 4). The recent five-year average (2001-2005) harvest was 2,701 fish. The 2006 subsistence harvest was estimated at 2,155 king salmon. The sport fish harvest over the same five-year period has averaged 397 fish, or about 15% of the total Unalakleet salmon harvest (Table 8). In 2006 the estimated sport fish harvest of 394 fish was about 18% of the total Unalakleet king salmon harvest.

Coho salmon are the most sought after salmon species in the Unalakleet drainage. The run usually begins around August 1, peaks during mid-August and continues through mid-September. The estimated sport harvest of coho salmon from 2001 - 2005 averaged 2,958 fish. The estimated harvest of coho salmon in the Unalakleet River was 3,524 in 2004, 3,959 fish in 2005, and 4,985 in 2006 (Table 8). The coho sport fishery is more consumptive than most other Unalakleet salmon fisheries. Approximately 55% of coho caught are harvested while about 30% of king, 21% of chum, and 27% of pink salmon (2002-2006 average) caught are harvested.

From 2001-2005 commercial harvests of coho salmon in the Unalakleet subdistrict have averaged 26,932 fish. Since 1961 they have ranged from 79 in 1964 to 98,336 in 2006 (Soong et al. 2008). Between 2001 and 2005, subsistence harvests of coho salmon in the community of Unalakleet averaged 6,915 fish and the 2006 subsistence harvest was estimated at 7,937 coho (Table 4). The sport fish harvest from 2001 - 2005 has averaged 2,958 fish, or about 64% of the total salmon harvest (Table 8). Historical escapement data for coho salmon in the entire Unalakleet River drainage are not available, for until recently there was no information on the proportion of the run spawns in the mainstem Unalakleet River. However, North River tower counts likely give an indication of recent run strength. Based on the tower counts, the 2005 run (19,189) was over twice the size of the 2004 and 2006 runs (9,646 and 9,386; Table 2). A radio telemetry project to estimate the proportion of the Unalakleet River coho salmon run moving past the North River tower was initiated in 2004 and continued through 2006. Results suggest that approximately 8 - 15% of the Unalakleet River coho run migrates up the North River and is enumerated at the tower (Joy and Reed 2007).

Fishery Objectives and Management

There have been no specific management objectives identified for salmon fisheries on the Unalakleet River prior to 2007. In February 2007, the BOF adopted the Unalakleet River King Salmon Management Plan, which uses North River tower counts as a trigger to regulate the subsistence, sport, and commercial fisheries for king salmon in season (Appendix A). In comparison to commercial and subsistence salmon harvests, sport harvests are small and have a limited impact on salmon stocks. The goal of sport fishery management in the Unalakleet River is to maintain opportunity for anglers to participate in the fisheries and maintain adequate escapements of salmon into the system. Emergency actions to restrict harvest are generally not considered unless other harvests and escapement monitoring projects indicate that a particular run is small or that restrictions in subsistence fisheries may be necessary in order to allow for sufficient spawning escapement. Biological Escapement Goals (BEG's) based on tower estimates will not be established until an adequate history of reliable tower count data has been accumulated. A revised SEG range for king salmon of 1,200 and 2,600 for the North River was

adopted by the BOF in 2007. When other escapement goals have been developed, more precise management to attain those goals will become possible.

Current Issues and Fishery Outlook

Although sport fishing has been ongoing in the Unalakleet River drainage for many years, there is some local resentment of visiting anglers because some Unalakleet residents feel that "outsiders" are competing for the local salmon resources. Declines in chum and coho salmon runs throughout western Alaska have impacted the Unalakleet River drainage, although the effect appears to be less dramatic than in Nome Subdistrict streams where chum runs have a long history of being depressed. Recent increases in escapements suggest that coho and chum escapements in the Unalakleet River are returning to more acceptable levels, particularly for coho salmon. While the commercial harvests of king salmon in the Unalakleet Subdistrict have declined during the past five years, sport harvests have stayed fairly consistent.

The upper reaches of the Unalakleet River (from the Chiroskey River to the headwaters) are a National Wild and Scenic River under federal management. With the federal takeover of subsistence management on federal waters, the possibility exists that subsistence management in the upper reaches of the river could affect sport fishing opportunity in the Unalakleet River. To date, federal and state management have not been in conflict for fisheries in the Unalakleet River drainage.

Recent Board of Fisheries Actions

In 2004, the BOF designated king salmon on the Unalakleet River a stock of concern and consequently instituted an annual sport bag limit of four fish per year, of which only two can come from the North River, and the daily bag limit was increased from one to two fish per day. Previously, there was no annual limit and the daily bag limit was one fish per day. This action was in response to having failed to meet the lower end of the escapement goal (1,200 – 2,600 at the North River counting tower) for the previous three years. In addition, the "other salmon" limit was set at 10 fish of which only four could be chum, coho, or sockeye in combination.

In 2007, the BOF adopted the Unalakleet River King Salmon Management Plan, which used the escapement goal range and cumulative tower counts as triggers to manage the subsistence, sport, and commercial fisheries in season (Appendix A). In this plan, the daily bag and possession limit for king salmon 20 inches or longer was reduced from two to one fish, and the annual limit was reduced from four to two fish.

Current or Recommended Research and Management Activities

Salmon escapements in the Unalakleet River are monitored using a counting tower in the North River, test-netting in the Unalakleet River downstream from the mouth of the North River, and by aerial surveys. The tower is a cooperative project funded through the Norton Sound Economic Development Corp. and operated by the Unalakleet IRA with guidance by the ADF&G, CFMD. Aerial surveys are difficult in the Unalakleet River because of its dark bottom and tannin-stained water. These surveys provide a measure of the minimum escapement, but are unreliable as an indicator of total escapement in this river. Water in the North River is clear, and the tower provides a reliable estimate of escapement into that system in years for which counts are obtained.

A three-year coho radiotelemetry project supported in part by the BLM was begun in 2004. Approximately 200 coho were fitted with radio transmitters each year and tracked to spawning locations. Results of this project suggest that 8 - 15% of coho entering the Unalakleet River migrate up the North River to spawn (Joy and Reed 2007). A similar research project was conducted on king salmon in the Unalakleet River during 1997 and 1998. In 1997, 37.2% of radio-tagged king salmon and 40.1% in 1998 spawned in the North River (Wuttig 1998, 1999). These data are used to expand the North River tower estimate to allow a relative estimate of the escapement in the entire system.

The Sport Fish Division staff have frequently assisted and cooperated informally with the CFD and the Native Village of Unalakleet (NVU) on projects, including the partial funding of counting towers from which spawning escapements are estimated, surveys for abundance, and observation of spawning concentrations. Emergency Orders restricting the harvest of salmon are usually coordinated with the CFD. In June 2006, low catches of king salmon in the CFD test-netting in the Unalakleet River suggested a very weak king salmon run and it appeared that the lower end of the escapement goal would not be reached at the North River counting tower. Because of these indicators, EO-3-KS-01-06 was issued on July 5, 2006 eliminating the use of bait while sport fishing in the Unalakleet and Shaktoolik rivers and prohibiting the retention of king salmon. This order remained in effect until August 15, 2006 (Appendix B).

NOME AREA ROADSIDE SALMON FISHERIES

Background and Historical Perspective

Nine rivers accessible from the road system near Nome sustain some level of sport fishing effort for salmon. Sport fishing on the Nome River has accounted for about 11% of all the fishing effort in the entire northwestern management area during the last five years (Table 9). An average of 1,348 salmon was harvested from the Nome River during 2001 - 2005, of which 73% were pink salmon (Table 9). Chum and coho salmon escapements have increased in the Nome River during the past three years (Table 2). If this trend continues, effort is likely to increase in this drainage, and chum salmon restrictions (the sport fishery is currently closed to fishing for chum salmon) may be relaxed.

The alternate-year strong pink salmon run in Norton Sound has a major influence on salmon harvests in sport fisheries on road accessible streams. This relationship has been strongest in the Nome River because of its proximity to Nome and ease of access to visitors and residents alike. Salmon harvests from the Nome River increased 10 fold between 1997 and 1998, and dropped 10 fold in 1999, reflecting the strong even-year pink salmon run in spite of a reduced amount of angler effort. Effort on the Nome River has dropped continuously from a high of 7,200 angler days in 1990 to about 1,000 angler days in 2001 (Table 9). Estimated effort nearly doubled to over 1,900 angler days in 2002, decreased in 2003, and increased again in 2004 and 2005. Trends in effort have generally coincided with the abundance of pink salmon available to anglers. The pink salmon harvest of about 1,985 fish in 1998 was likely influenced by a strong run of 359,469 fish and reduced subsistence opportunity on depressed chum salmon stocks that likely focused local sport fishing effort on the abundant pink salmon, in part to meet the local need for salmon. In 2000 and 2002, only 578 and 312 pink salmon were estimated harvested from the Nome River. These lower harvests were likely influenced by the early season fishery closure in order to implement Tier II subsistence chum salmon fisheries, and lower escapements of 41,673 pink salmon in 2000 and 35,057 in 2002.

The Niukluk and Fish rivers are also popular sport fishing locations for salmon. Two guiding operations with small lodges are located on the Niukluk River. In addition, Nome-based guides fish these rivers as well as other road accessible waters. Many residents of Nome have summer cabins on the Niukluk River at the village of Council or fish camps along the river. Since the construction of the bridge over Safety Sound in 1980, and improvements to the road, access to the Niukluk and Fish rivers has increased, and this area has become a desirable destination for the road-bound angler. Over the past five years (2001-2005), the drainage has sustained an average annual effort of 2,363 angler days, and an average of 878 salmon have been harvested annually from the Fish and Niukluk rivers (Table 10). Escapements of chum and coho salmon have been relatively weak during most of those years, and inseason fishery restrictions have been necessary, although in 2006 over 7,000 coho passed the tower on the Niukluk River (Table 2). Historically, the escapement of king salmon into the Niukluk River has been less than 200 fish.

The Pilgrim River, with its headwaters at Salmon Lake, has historically been somewhat less popular for salmon fishing; however, large sockeye escapements over the past four years have drawn additional effort to this drainage (Table 2). All five species of Pacific salmon occur in the Pilgrim River. Sockeye spawn in Salmon Lake and the runs appear to be responding positively to lake fertilization and favorable marine conditions, however, the effects of both of these variables has been difficult to measure. The escapement of sockeye past the weir in the lower Pilgrim River from 2003-2006 has ranged from 42,729 – 85,520 fish (Table 2). These compare to an average escapement of 5,800 for 3 years of enumeration between 1997 and 2002 (Table 2). There is a Bureau of Land Management (BLM) campground at the outlet of Salmon Lake, and from there the river can be floated for about 25 river miles to the bridge at mile 65 of the Kougarok Road. Riverboats can be launched at the bridge for access to downstream locations. The Pilgrim River sustained an average annual effort of about 535 angler days and about 375 salmon have been harvested annually during 2001 - 2005 (Table 11). The large returns of sockeye in 2003 and 2004 resulted in increased sport fishing effort and an estimated harvest of 1,225 salmon including 575 sockeye in 2003 and 404 sockeye in 2004 (Table 11). In 2005 harvest dropped to 102 fish and in 2006 was zero. The Pilgrim River is also open to subsistence fishing with gill nets and beach seines, so it is likely that local residents that desire sockeye salmon from the Pilgrim River would use these techniques under a subsistence fishing permit rather than by sportfishing with hook and line and this may explain in part the reported drop-off in sport harvest. The Fish/Niukluk and the Pilgrim rivers are the only road accessible rivers where fishing for chum salmon is still allowed, however the combined annual harvests (2001-2005) from these drainages have only been 204 chum salmon (Tables 10 and 11).

The mouth of the Snake River is in downtown Nome. This small stream can be accessed from a bridge at about mile 8 of the Teller Road and from the nearby Glacier Creek Road. Over the past five years (2001-2005) the Snake River has sustained an average annual effort of 297 angler days, with an annual harvest of 132 salmon, of which 86% are coho and 11% pink salmon (Table 12). Other popular road accessible waters include the Solomon, Kuzitrin, and Sinuk rivers. The annual harvests in these rivers combined for the past five years (2001-2005) have averaged about 90 coho and 70 pink salmon. During years of high pink salmon abundance (even years) this species has dominated catches and harvests in most Nome roadside streams (Tables 13–15).

Recent Fishery Performance

While pink salmon are by far the most prevalent salmon found in the Nome area streams, the estimated harvest of pink salmon in the Nome River was only 12 fish in 2003, but jumped to

3,369 in 2004 when over 1,000,000 pink salmon were estimated in the river and in 2006, with an escapement of over 600,000 pink salmon, harvest was 2,422 fish. The estimated harvest of coho salmon in the Nome River in 2006 was a record-high 2,768 fish, coinciding with a record escapement of 8,126 fish (Table 2). Chum salmon fishing has been closed for many years because of depressed stocks and both runs and harvests of sockeye and king salmon in the Nome River are negligible.

Sport fishing effort in the Fish/Niukluk river system from a high of about 4,000 angler days in 1993 to 1,344 angler days in 1998, but has been steady at about 2,000 angler days for the past five years (Table 10). The estimated harvest of salmon was about 1,100 in 2006, of which 90% were coho salmon (948 fish). In 2005 and 2006, no chum salmon were reported harvested (Table 10). Although sport fishing for chum salmon is allowed in this drainage, harvests remained low except for 2004. The estimated king harvest was 37 fish in 2005, but zero in 2006 (Table 10). A low harvest of only a few hundred pink salmon occurred in the even years since 1998 in spite of an abundant run of this species, with over 1,000,000 fish on the Niukluk River in some years.

The Pilgrim River is the other road accessible water where chum salmon fishing is still allowed, but there has been no recorded harvest in recent years. Effort there in 2006 was estimated at 337 angler days, below the recent five-year average of 556 angler days (Table 11). Large returns of sockeye salmon in recent years (Table 2) have likely provided for some level of reduced effort on other species and other systems. The high quality of these salmon coupled with ease of access and ability to use subsistence gear (gill nets and seines) in the river provide local residents with a large easily-harvested source of fish without having to use sport fishing gear for less-desirable species.

Fishery Objectives and Management

There have been no specific management objectives identified for salmon fisheries for the Nome roadside streams. The goal of sport fishery management in these waters is to maintain opportunity for anglers to participate in the fisheries and to assure that escapement goals are met. Sport fishery harvests are small, and emergency actions to restrict harvest are generally not contemplated unless escapement-monitoring projects indicate that the particular run is small and that restrictions in subsistence fisheries may be necessary in order to meet escapement goals. Biological Escapement Goals (BEGs), based on aerial surveys, are in place. BEG goals based on tower estimates (Snake and Pilgrim rivers) and weir counts (Nome River and Pilgrim River) will not be established until more years of reliable data have been accumulated.

Current Issues

Chum salmon stocks have steadily declined on the Seward Peninsula since the early 1980s. This has led to increasingly restrictive sport and commercial management and the initiation of Tier II subsistence in the Nome Subdistrict. It is anticipated that until chum salmon populations recover, there will be a need to continue with very restrictive measures to protect local stocks. All rivers in northern Norton Sound from the Sinuk in the west to Topkok in the east are closed to sportfishing for chum salmon, and will remain closed until runs rebuild. In addition, restrictions to the sport harvest of coho salmon in the Nome area have been necessary during recent years. Increased effort is being directed at the enumeration of coho salmon escapements in Nome area streams using tower and weir projects. Chum salmon runs have stabilized and even increased in some drainages in recent years suggesting that runs may be in the process of

recovering; however, the decline in chum salmon escapement into the Niukluk River over the past five years while other drainages are showing relatively stable runs is a growing concern in the NWMA.

Recent Board of Fisheries Actions

No proposals, other than those previously discussed for the Unalakleet River king salmon, were adopted by the BOF at either the 2004 or 2007 meetings.

Current and Recommended Research and Management Activities

Current research and management activities on Nome roadside salmon populations are primarily conducted by the CFD in conjunction with Kawerak Corporation's fisheries office. These groups cooperatively staff and manage escapement enumeration projects on the Niukluk, Eldorado, Pilgrim, and Snake rivers. All projects are counting towers except the Nome River and Pilgrim rivers where weirs are operated by CFD throughout the salmon runs. The weirs direct the movement of all fish, and fish are counted as they are permitted to pass through an opening in the weir several times each day. The BLM has operated a weir at the outlet of Glacial Lake from 2001 through 2006 to enumerate sockeye migrating into the lake and the Unalakleet IRA. BLM also operated a tower on the North River, in cooperation with Norton Sound Economic Development Corporation (NSEDC).

NORTHWESTERN ALASKA DOLLY VARDEN AND ARCTIC CHAR

Background and Historical Perspective

Arctic char occur in lakes in the Kigluaik Mountains and in some headwater lakes in the Kobuk and Noatak river drainages of the western and northwestern portions of the NW/NSMA while Dolly Varden are common inhabitants of most coastal streams and large rivers (Figures 2 through 6). Although the department combines Dolly Varden and Arctic char for bag limits and data collection, they are two different species with distinctly different life histories. Arctic char are present only as lake resident populations, while Dolly Varden may be present as lake resident, stream resident, or anadromous populations. Arctic char distribution is very limited in the NW/NSMA and the vast majority of char fisheries are directed toward Dolly Varden.

Many northwestern Alaska residents maintain a traditional subsistence lifestyle. Dolly Varden comprise an important part of their traditional harvest, and in some communities they outrank salmon and whitefish in importance to the subsistence economy. The number of Dolly Varden harvested for subsistence purposes is largely undocumented in northwestern Alaska, but vastly exceeds the number taken by sport anglers. Intermittent community subsistence harvest estimates dating to 1959 for Kivalina and Noatak (Table 16) and personal observation by the area biologist suggest that 15,000 to 25,000 Dolly Varden are harvested annually in this area. However, the actual magnitude of the annual harvests throughout the northwest Alaska is not known. Fish are captured with gill nets or beach seines during open water periods and with hook and line during winter. Dolly Varden are also an important subsistence resource in Norton Sound; however, their relative importance is minor compared to salmon.

Observations and aerial surveys suggest that Dolly Varden spawner abundance is low in most rivers; however, spawning occurs in almost all drainages of Norton Sound, some northern Seward Peninsula rivers, and the major drainages of Kotzebue Sound and the Chukchi Sea. Aerial surveys of spawning Dolly Varden conducted during the mid-1980s indicated that about

9,000-12,000 spawned annually in the Noatak drainage (Table 17). Total abundance of spawning Dolly Varden in northwestern Alaska is unknown; however, partial surveys in 2002-2005 and angler reports suggested that spawner abundance in Noatak, Wulik and Kivalina river streams has declined.

Anadromous Dolly Varden make their first seaward migration at age-3 or age-4, and after moving to sea in the spring to feed during the summer, they return to freshwater each winter. Upon reaching sexual maturity at ages 6-9, they return to their home river to spawn. Each fall, nonspawning Dolly Varden return to freshwater to overwinter in mixed-stock aggregations. Some Dolly Varden stocks spawn in August, while others spawn in September or October. During summer, spawning Dolly Varden are caught in some northwestern Alaskan streams; however, most sport fisheries for char target overwintering populations of Dolly Varden either in the fall as they enter freshwater from the sea, or in the spring as they move toward the sea. Since overwintering populations are composed of mixed stocks, potentially from a wide geographic area, harvests in the few rivers with good angler access have been sustainable. Harvests can be substantial in streams along the Nome road system and if similar harvests were directed towards a single stock they would likely not be sustainable.

Movements of Norton Sound Dolly Varden are tied to those of salmon, and Dolly Varden are sometimes present in streams during summer to feed on salmon eggs, especially during years of high pink salmon abundance. They are also likely to remain in streams during the spring following a large pink salmon run in order to feed on abundant outmigrating fry. The timing of the fall movement of Dolly Varden into Seward Peninsula streams has varied widely over the past 10 years resulting in annual changes in the availability of Dolly Varden to the fall fishery. Fisheries and harvests in this area follow these patterns of availability. In 1988, the BOF adopted the bag limit of 10 Dolly Varden/Arctic char per day with 10 in possession with exceptions for the Noatak, Wulik, and Kivalina rivers where only two of the 10 fish could be over 20 inches in length. In 1994, the BOF adopted the current daily bag and possession limits for char in the AYK region with 10 fish per day, only two over 20 inches allowed in marine or flowing waters and two fish per day (no size limit) allowed in lakes. Due to habitat preferences, these regulations allow a liberal limit for Dolly Varden while protecting spawning fish, and a conservative limit for Arctic char (found primarily in lakes) without the need for anglers to differentiate between these two closely related species.

Drainages of Kotzebue Sound and the Chukchi Sea are known for the large size of anadromous Dolly Varden available to the sport angler. Since the inception of ADF&G's Trophy Fish Program in 1967, 140 out of 219 qualifying fish (66%) in the Dolly Varden/Arctic char category have come from the NW/NSMA. In the 10 year period 1992-2001, 107 out of 119 (90%) have come from northwestern Alaska. In addition, the current Alaska sport fish angling record for Arctic char/Dolly Varden (27 lbs. 4 oz.) was a Dolly Varden taken from the Wulik River in 2002, surpassing the previous record of 20 lbs 12 oz taken from the same river in 2000.

Recent Fishery Performance

Over the past five years (2001-2005) sport harvests of Dolly Varden/Arctic char have averaged 3,650 Dolly Varden annually in the Seward Peninsula/Norton Sound subarea and 1,228 in the Kotzebue/Chukchi Sea subarea (Table 17). The slightly higher harvest rate in the Seward Peninsula/Norton Sound area is likely because local residents have good road access to fishing areas where fish taken on rod and reel are used for food. In the Kotzebue area, fishing sites are

accessed by aircraft or raft and much of the effort is from outside the local area by anglers seeking a quality fishing experience. Estimated sport fishing effort levels in both the Seward Peninsula/Norton Sound area and the Kotzebue have been fairly consistent over the past several years. Estimated mean annual catch (which includes fish that are kept and those released) for 2001-2005 was 10,102 Dolly Varden in the Seward Peninsula/Norton Sound area, and 4,560 in the Kotzebue/Chukchi Sea area (Table 17). Estimated catches of Dolly Varden in the Seward Peninsula/Norton Sound subarea have varied from 5,700 in 1998 to 25,000 in 1991. Catches of Dolly Varden in the Kotzebue/Chukchi Sea subarea have averaged 5,174 fish over the past five years (Table 17). During the past five years, about 70% of all Dolly Varden caught in the Seward Peninsula/Norton Sound area are released while about 80% in the Kotzebue area are released. The catch of Dolly Varden per angler day has averaged much higher in the Kotzebue area than in the Seward Peninsula area. This is likely because much of the effort on the Seward Peninsula is directed at other species, while most of the Kotzebue area effort is directed at Dolly Varden or sheefish.

Dolly Varden harvests have been reported in most of the rivers in the Seward Peninsula/Norton Sound subarea with highest harvests coming from the Nome, Unalakleet, Solomon and Fish/Niukluk rivers (Table 18). In the Kotzebue/Chukchi Sea subarea, the highest harvests are from the Noatak and the "other rivers" category that includes the Wulik River and to a lesser degree, the Kivalina River.

The Wulik River is located about 90 miles north of Kotzebue and is well known as an excellent fishing destination for large Dolly Varden (Figure 5). The river is about 90 miles long and enters the Chukchi Sea through Kivalina Lagoon near the village of Kivalina. Dolly Varden from the Wulik River are heavily used for subsistence by the residents of Kivalina (Table 16). During the most recent five-year period (2001-2005), estimated sport fishing effort has averaged about 500 angler-days. Sport fishing occurs throughout the open water period, but the majority of effort and harvest occurs during late August and September when Dolly Varden return from the sea to winter in the river.

The estimated sport harvest in the Wulik River during 2005 was 176 fish with the 2005 catch estimated at 2,260 Dolly Varden, and sport fishing effort was estimated to be 493 angler days, which are all near historical averages. In 2006, harvest jumped up to 989 fish, catch was 4,001 fish, and angler days increased to 993 (Table 18). The source of this increase in harvest, catch and effort is not known; however, a hunting lodge that operates throughout the late summer and fall does allow clients to fish while in camp and occasionally drops off floaters upriver who may be fishing. The river is well known for its large run of anadromous Dolly Varden, but effort remains relatively low because of the river's remote location and difficult access.

Fishery Objectives and Management

Management of Dolly Varden in Norton Sound streams is structured to maintain opportunity and allow a relatively liberal bag from mixed stock population aggregations. In the Kotzebue subarea, the intent is to maintain a high quality fishery with the opportunity to harvest a small number of large sized char under a conservative bag that protects the spawning component of the population, minimizes conflicts with subsistence users, and does not adversely affect the population structure. Because of the differential size structure of the population groups north and south of the Bering Strait, these objectives can be addressed with the same general bag and possession limit regulation of 10 fish per day with only two over 20 inches in length.

Current Issues and Fishery Outlook

With over 100,000 anadromous Dolly Varden overwintering annually, the Wulik River is probably the most important Dolly Varden stream in northwestern Alaska (Table 19). Fish from this river are also an important subsistence food to the residents of Kivalina (Table 16). The Red Dog Mine is located in the headwaters of this drainage and poses a potential threat to these fish and the water quality of the river. Water quality near the mine is systematically monitored and except for a pollution event in 1989-1990 that has been corrected, the mine has operated in an environmentally sensitive manner. The Red Dog Mine funds a program run by the Alaska Department of Natural Resources (ADNR) to monitor heavy metals concentrations in receiving waters and in fish tissues. Fish tissues are sampled for heavy metals in the spring and the fall each year on a continuing basis in cooperation with the ADNR. The recent discovery of additional ore bodies will likely add new challenges from mineral development in this important drainage.

The question of how great an impact Dolly Varden have on salmon, especially chum salmon populations in Norton Sound, has been raised by Nome residents in a number of public meetings. The department has no data concerning the possible effects of Dolly Varden egg and fry predation on salmon numbers; however, there has been no detectable increase in Dolly Varden numbers in Norton Sound to account for increased predation activity, and Dolly Varden have not been found to be significant predators on chum salmon in published predation studies.

Dolly Varden in Norton Sound are widespread, they spawn in most rivers and overwinter in all major drainages. In the Kotzebue area, the fishery is likely to grow slowly in popularity as more anglers experience these high quality-fishing opportunities. Until these fisheries grow to the point that harvests are thought to affect spawner abundance, spawner success, or population structure, it is unlikely that additional management action will be necessary. Lower spawning runs into Noatak River tributaries in 2002–2004 may indicate a change in population structure; however, aerial survey counts of overwintering fish in the Wulik River have exceeded 100,000 fish. Spawning and overwintering populations will continue to be monitored in the future to determine if this trend continues.

Recent Board of Fisheries Actions

Population assessments conducted on the Nome and Solomon rivers in 1991 and 1992 suggested that the number of fish overwintering in these drainages could not sustain harvest levels occurring at that time. Consequently, the daily bag limit was reduced by EO to two fish. Subsequent studies showed that these populations were composed of mixed stocks and that at least 20% of the fish overwintering in a given river could be expected to overwinter in a different river the next year. Tag recoveries showed that fish ranged throughout northern Norton Sound over a wide geographic area. Since exploitation occurs primarily on mixed stocks in only a few locations and many of the represented stocks sustain no other exploitation, harvest levels were thought to be sustainable. Long-term harvest data supported this assumption and the reduced bag limit was rescinded. In the November 1994 meeting, the BOF adopted regulations that created a 10 fish with only two 20 inches or longer daily bag and possession limit for Dolly Varden/Arctic char in flowing and marine waters for the entire AYK Region. A separate daily bag limit of two fish (no size limit) was also created for lakes. The intent of these bag limits was to have a fairly liberal limit for resident and migratory Dolly Varden that protects spawning-sized fish, while maintaining a conservative limit for lake resident Arctic char without requiring

anglers to differentiate between these two closely related species. This bag limit has not needed to be adjusted, and no recent EO has been issued regarding char in northwest Alaska.

Current and Recommended Research and Management Activities

The ADF&G began an effort to assess Dolly Varden populations in waters of the Seward Peninsula in 1991. Abundances and size compositions have been estimated for Dolly Varden overwintering in the Nome River in 1991 and 1992, and in the Solomon River in 1991. In addition, the movement of marked fish from the Nome River in 1991 to other rivers in 1992 was estimated (DeCicco 1992a and 1993a). These data in combination with harvest estimates and observed changes in abundances have been used to guide ADF&G management activities. It has been discovered that Dolly Varden that overwinter in a particular stream may overwinter in other streams during subsequent years. Hence, a restrictive bag limit in one stream does not necessarily protect a single stock because fish range widely and stocks mix over a broad geographic area. During the winter of 2000/2001 Dolly Varden were radio-tagged in the Nome and Solomon rivers in order to document the critical wintering areas in these rivers (DeCicco 2001). Periodic assessment of Dolly Varden populations should continue as needed.

Studies in the Kotzebue area have occurred intermittently since 1967, but in recent years have been limited to counting spawning Dolly Varden in Noatak River tributary streams with the assistance of the National Park Service (NPS), and counting Dolly Varden overwintering in the Wulik River with the assistance of the ADNR and the Red Dog Mine. Data on the abundance of Dolly Varden spawning in the Noatak River system and overwintering in the Wulik River will continue to be collected in cooperation with these agencies. A genetics study funded through the USFWS Office of Subsistence Management to determine the relationships among stocks north and south of the Bering Strait has been ongoing for the past five years. It appears that stocks in western Alaska are structured along geographic lines with good separation among stocks (Crane et al. 2005). A detailed study of a single spawning stock in the Noatak drainage was begun in 2001. This spawning stock assessment project was completed, but high water conditions during critical times of fish movement in both 2001 and 2002 resulted in incomplete data (Scanlon 2004). In October 2003, 15 Dolly Varden were radio-tagged in the Wulik River to determine movement over the course of the winter. These fish remained in the same vicinity as tagged until June 2005 (DeCicco *in prep*). At that time two fish, likely spawners, remained in the Wulik River, and one had been captured at Kivalina. The rest could not be located. The movement to sea had already occurred and it is believed that the remainder had already migrated to salt water.

NORTHWESTERN ALASKA ARCTIC GRAYLING

Background and Historical Perspective

Sport fisheries for grayling in the northwestern area are relatively small with average estimated annual harvests of 1,200 in the Seward Peninsula/Norton Sound subarea and 1,400 in the Kotzebue/Chukchi Sea subarea (Tables 20 and 21). Even though the harvests are relatively small, Arctic grayling are the most numerous species harvested in the Kotzebue/Chukchi Sea subarea and the third or fourth most commonly harvested species in the Seward Peninsula/Norton Sound subarea.

The Seward Peninsula has long been known for its production of large Arctic grayling with approximately 25% of all trophy grayling registered with the department's trophy fish program coming from this area. However, most populations are quite small and since they often inhabit

small streams, they must be managed as independent stocks with regulations tailored to the individual populations (or groups of similarly structured populations) to prevent overexploitation.

Since 1989, the stock status of grayling populations in several rivers where sport fishing occurs on the Seward Peninsula has been investigated (DeCicco 1990, 1991, 1992b, 1993b, 1994-1999, 2002 and *in prep*; DeCicco and Gryska 2007; DeCicco and Wallendorf 2000; Gryska 2004, 2006; Gryska and Taras 2007; Joy 2007). The Nome River stock was found to be overexploited, while the Niukluk, Fish, Pilgrim, Snake and Sinuk rivers populations are believed to be sustaining current levels of harvest. The Solomon River was found to have a very small Arctic grayling population.

Grayling densities in most Seward Peninsula rivers are low. They generally range from about 40 to 60 grayling per mile in the Nome and Sinuk rivers, to about 200 grayling per mile in the Pilgrim River. Densities in the Niukluk and Fish rivers are higher at about 470 grayling per mile in the Niukluk and about 500 grayling per mile in the Fish (DeCicco 2002). In contrast, interior Alaskan populations often exceed 500 fish per mile. Arctic grayling from rivers on the Seward Peninsula are large in general and are generally older and larger when they first spawn than grayling in Interior Alaska streams. Arctic grayling from the Snake River were found to be 50% mature at 307 mm FL (330 mm TL) and 99% mature at 404 mm FL (439 mm TL) (DeCicco and Gryska 2007). Arctic grayling from northwestern Alaska can live for more than 20 years and one fish from the Eldorado River was determined to be approximately 29 years using otolith analysis. Some grayling may survive to grow very large, particularly in rivers where fishing effort is light. For example, in the lightly exploited Sinuk River, almost 70% of the 1991 sample was age-8 or older and the average total length of all fish sampled was over 457 mm.

Arctic grayling occur in almost all streams and in many of the lakes in the Kotzebue area, but are inaccessible by road and therefore, lightly exploited. Most grayling in this area are captured in association with wilderness float trips or as an alternate species in trips directed toward fishing for Dolly Varden or sheefish. Over the past five years (2001-2005) the estimated harvest rates have only been about 10% of those captured (Table 21).

Prior to 1988, the daily bag limit for Arctic grayling in the NWMA was 15 fish, only two of which can be 20 inches or larger. In 1988, the BOF established a separate daily bag and possession limit for Arctic grayling in Northern Norton Sound of five per day, with only one 15 inches or larger. The effect of this change is reflected in harvest estimates that averaged about 4,300 grayling annually from 1980-1988, but dropped to about 1,550 from 1990-2000. Measurable increases in populations in the Fish and Niukluk rivers were likely due to this regulatory change. Both populations have nearly doubled in abundance when compared to estimates from the early 1990s (Gryska and Taras 2007; Viavant *in prep*).

Recent Fishery Performance

Seward Peninsula/Norton Sound Subarea

Estimated harvests of Arctic grayling by sport anglers in the Seward Peninsula/Norton Sound area have declined since 1991 when harvest peaked at 5,121 fish. During the recent 5-year period, harvests have averaged about 1,151 per year (Table 20).

The estimated catch of Arctic grayling fluctuates greatly from year to year ranging from approximately 6,000 to 20,000 fish during the past 10 years. Catch-and-release appears to be a

prevalent practice in the Seward Peninsula/Norton Sound area with average catch retention for Arctic grayling of only 10% for 2001-2005 and 12% for 1996-2005.

Current exploitation rates on most northwestern Alaska Arctic grayling populations are unknown, but since most are in remote areas, exploitation is believed to be light. Some estimates of exploitation in Nome area roadside streams are available by combining harvest data with abundance data. Based on this information, exploitation rates of Arctic grayling were estimated to range from 10 to 20% in some streams during the early 1990s. More recent estimates for the Niukluk and Fish rivers suggest that annual exploitation in these streams has been less than 5% over the past 10 years. These data suggest a change in angler motivation toward enjoyment of a quality fishing experience, away from harvest as a primary reason for fishing.

Kotzebue Subarea

In the Kotzebue/Chukchi Sea subarea, estimated harvests over the past five years (2001-2005) have ranged between 270 and 2,000 fish (Table 21). Catches over the same period have ranged quite widely from about 2,900 in 2005 to about 21,700 in 2002. In 2006, the harvest and catch was 760 and 6,907 fish, respectively. The percentage of catch that was harvested has ranged from 8% in 1990 to 19% in 2004, and has averaged about 14% annually over the past five years. Most grayling from this area are harvested in association with float trips or while fishing for other species. It is likely that harvests will remain relatively stable until participation in this area increases significantly.

Fishery Objectives and Management

Research on the status of resident Arctic grayling populations in the rivers accessible from the road system in northern Norton Sound has been ongoing for about 20 years. Arctic grayling in northwestern Alaska may live for more than 20 years and attain a large size. They spawn in the spring and the summer is spent feeding to recover condition lost during reproduction. Data on population abundance, age, and size composition by river throughout this period has allowed the development of regulations tailored to individual rivers or groups of rivers that share population characteristics. Overall management objectives for these Arctic grayling populations are to maintain a given abundance of fish >15 inches in length in populations, and to allow for population recovery in systems that have been stressed by over exploitation. Maintaining the opportunity to participate in high quality Arctic grayling fisheries is also an objective of management. The background daily bag and possession limits are five fish per day with only one fish 15 inches or larger. This bag limit is appropriate for drainages with Arctic grayling populations that have characteristics of lightly exploited populations. These characteristics include large average size and a high proportion of sexually mature fish that are 7 years of age or older in the population. Abundance is directly related to the river's size and flow characteristics, therefore, both abundance and population density may vary by river. Rivers that share these characteristics and regulations include the Fish/Niukluk River system, the Eldorado, and Sinuk rivers. On the other extreme are overexploited populations where abundance is very low. Rivers like the Nome and Solomon are in this category. These rivers are closed to all fishing for Arctic grayling.

Populations intermediate between these two categories include those in the Pilgrim and Snake rivers. These populations contain a smaller proportion of sexually mature fish, have been impacted somewhat by harvest, but Arctic grayling are still relatively abundant and populations appear stable. In these rivers the regulations allow harvest of two Arctic grayling per day with

only one over 15 inches. Populations are assessed periodically to estimate whether they are maintaining desired characteristics. Recent stock assessments of Arctic grayling populations in road accessible waters suggest that the current management approach is working, and that population size and size compositions are being sustained.

Management objectives have not been developed for remote Arctic grayling waters of the remainder of the Seward Peninsula or the Kotzebue subarea. Anglers rarely visit these waters, and populations are presumed to be unexploited. The general regulations for these waters provide for a daily bag and possession limit of five fish with no size limits. Until effort and harvests increase dramatically, it is likely that regulations will remain unchanged. The recently developed region-wide Arctic grayling management plan prescribing a five fish background limit was approved by the BOF in January 2004.

Current Issues and Fishery Outlook

There is concern on the part of the public and ADF&G staff that populations of grayling in the vicinity of Nome that are road accessible, especially the Nome and Solomon rivers, have been overexploited and may not recover for many years. The Nome River population has showed little change in abundance over the past several years. An experimental restoration project in 1998 to increase survival of young-of-the-year Arctic grayling by rearing them in a gravel pit failed. Additional restoration efforts were conducted more recently using a different rearing pond. In 2002 and 2003, a total of 1,574 pen-reared Arctic grayling were released into the Nome River. The population was assessed in 2005 to estimate its abundance and the contribution of pen-reared fish to the population. Although the number of small fish captured was insufficient to estimate their abundance, more were captured than in past assessments indicating that there may be an increase in smaller Arctic grayling in this river. By 2008, these fish should be large enough to be recruited to the sampling gear for stock assessment projects. The abundance of fish >15 inches has declined since 1999 (DeCicco 2007). Other road accessible populations would be vulnerable to over exploitation if fishing practices and motivations were to change, however, at this time other populations appear to be healthy, and able to sustain the current low levels of effort and harvest.

Northwestern Alaska, particularly Seward Peninsula waters provide some of the best opportunities in the state to capture large-sized Arctic grayling. Under the current regulations, it appears that maintaining the quality of these fisheries is favorable. Populations in the Fish and Niukluk rivers have recovered from relatively low levels of abundance in the early 1990s, and the outlook in these rivers is promising. Populations in both the Snake and Sinuk River are slightly larger than when last assessed and appear to be sustaining current levels of exploitation, and the population in the Pilgrim River appears stable.

Recent Board of Fisheries Actions

In 1992 the daily bag and possession limit for Arctic grayling in the Pilgrim River was reduced to two per day with only one fish 15 inches or larger, and the Nome and Solomon rivers were closed to fishing for Arctic grayling by EO. In 1993, the daily bag and possession limit in the Snake River was made the same as that in the Pilgrim River. At the 1994 meeting, the BOF adopted these bag limit changes for the Snake and Pilgrim rivers into regulation. After a population assessment in the Nome River in 1997 found that the population had not increased after five years of emergency closure, the BOF adopted regulations closing the Nome and

Solomon rivers to fishing for Arctic grayling. In 2000 the BOF also closed these rivers to subsistence fishing for Arctic grayling.

In 2004, the Regional Wild Arctic Grayling Management Plan (5 AAC 70.055) was established. The plan created three management approaches with associated regulatory options; regional management, conservative management, and special management. The regulations adopted under the regional management approach (five fish bag and possession limit, season open year round) did change the general Arctic grayling regulations in the NWNSMA from 10 to five fish, with the exceptions of the Dalton Highway Corridor, Northern Norton Sound, and the Unalakleet River drainage which already had bag limits of five fish and those fisheries classified under the conservative and special management approach. Currently, two fisheries within the NWNSMA are classified under the conservative management approach, the Snake and Pilgrim rivers. There are two NWNSMA fisheries classified as special management, the Nome and Solomon rivers.

Current or Recommended Research and Management Activities

The ADF&G began an ongoing effort to assess Arctic grayling populations in waters of the Seward Peninsula in 1989. Abundance and age and size compositions have been estimated for Arctic grayling in the Fish, Niukluk, Nome, Pilgrim, Snake and Sinuk rivers. These data in combination with harvest estimates have been used to guide ADF&G management activities. Assessments of the Nome River grayling population in 1997 and 2000 found that it had not recovered even with years of closure to sport fishing. This project has resulted in the closure of these rivers to all harvest of Arctic grayling, and an experimental restoration project in the Nome River (DeCicco 2004). The 2005 stock assessment project failed to show that the population had recovered and the fishery remained closed. Stock assessment in the Fish and Niukluk rivers in 1998 and 1999 found that grayling populations had increased significantly since the early 1990s (Gryska and Taras 2007). These changes are likely a delayed effect of regulation changes made in 1988. A stock assessment in the Niukluk River in 2005 found that the population is being maintained at the higher level of abundance. Recent stock assessments in the Sinuk, Snake and Pilgrim rivers have found that Arctic grayling populations are maintaining both their length structure and abundance suggesting that they are able to sustain current levels of harvest (Gryska 2004 , 2006; DeCicco and Gryska 2007). In 2004 several large Arctic grayling were collected from the Tubutulik River, a lightly exploited population, to estimate maximum age. These fish ranged in age from nine to 17 years. A management plan is being updated to address Nome roadside Arctic grayling fisheries (Scanlon *in prep*).

KOTZEBUE SOUND SHEEFISH

Background and Historical Perspective

Within the NW/NSMA, spawning stocks of sheefish occur only in the Kobuk and Selawik rivers (Alt 1975) with the exception of a small population that resides in the Koyuk River of Norton Bay.

The drainages of Kotzebue Sound are known for the large size of sheefish that are available to the sport angler. These remote high quality sport fisheries are considered by many to be among the pinnacle of Alaskan freshwater sport fishing. Since the inception of ADF&G's Trophy Fish Program in 1967, all but one of the qualifying sheefish has come from the Kobuk River.

Kotzebue Sound sheefish are distributed throughout the nearshore estuarine areas of Kotzebue Sound. The major concentration occurs in Hotham Inlet, but also occurs in the Sheshalik and

Krusenstern areas and in southern Kotzebue Sound (Figure 5). Nearly all sheefish occupying the estuarine environment during summer are immature or nonspawning adults. Adult prespawning fish move upstream during summer on the Kobuk and Selawik rivers to spawn in the fall. The Kobuk River stock spawns upstream from the village of Kobuk, with the greatest observed concentrations between the Mauneluk River and Beaver River. After spawning is complete in late September or early October, fish disperse to downstream overwintering areas. Tag recoveries showed that the two stocks mix in Hotham Inlet winter habitats, but maintained fidelity to their spawning areas.

Subsistence fisheries are given priority and are currently unrestricted. The commercial fishery and much of the subsistence harvest takes place through the ice while sport fisheries are mainly summer and fall activities. The same population(s) of sheefish contributes to all harvests. The annual commercial sales of sheefish in Kotzebue have ranged from 20 to 850 fish since 1991 (Georgette and Shiedt 2005). The estimated subsistence harvest in the villages of the Kobuk River has averaged about 6,250 fish over the five-year period 2000-2004. All villages were not surveyed during 2001 and 2002, so the actual harvests were probably higher. In 2004, the subsistence harvest was estimated at 10,163 fish (Table 22). These surveys were not conducted for 2005 or 2006. Since subsistence practices have not changed appreciably in recent years, it is likely that Kobuk River subsistence harvests reflect trends in the spawning population of sheefish. Winter gill net harvests from the fishery near Kotzebue were estimated at about 15,000 in 1995-1996, and about 14,000 in 1996-1997 (Taube 1997; Taube and Wuttig 1998). During the winter of 2000/2001, a complete census of participants in the winter fishery documented the harvest at 14,533 (Savereide 2002). Sheefish are also taken by jigging lures under the ice in Hotham Inlet and Selawik Lake, but harvests are undocumented. Overall it is likely that 20,000-30,000 sheefish are taken for subsistence annually in northwestern Alaska.

The Sport Fish Division conducted studies of the ecology, movements, and growth of sheefish between 1966 and 1979. Much of this work was conducted in northwestern Alaska and was summarized by Alt (1987). After conducting a feasibility experiment in 1994, ADF&G Division of Sport Fish, in cooperation with the National Park Service (NPS), began a project to estimate abundance of sheefish spawning in the Kobuk River. This project continued through 1997 and established baseline estimates on spawner abundance, age, size and sex composition of the spawning population. Tag recovery data indicated that, although some sheefish were capable of spawning in consecutive years, most spawned every other year. Spawner abundance in the Kobuk River was estimated at about 32,250 in 1995, 43,000 in 1996 and 27,000 in 1997 (Taube 1997; Taube and Wuttig 1998). The U. S. Fish and Wildlife Service (Underwood et al. 1998) estimated the abundance of sheefish spawning in the Selawik River at 5,200 in 1995 and 5,150 in 1996. Anecdotal reports based on catches by residents of Kotzebue, Sheshalik and Kobuk River villages indicate that there are more sheefish now than ever before. The USFWS repeated abundance estimates in the Selawik River in 2004 and 2005. Preliminary estimates indicated that the spawner abundance was about 23,000 in 2004 and 45,000 in 2005 (R. Brown, Research Biologist, USFWS, Fairbanks; personal communication). Most of the increase was in the smaller size classes of spawners and indicates strong recruitment into the spawning population. If similar increases are occurring in the Kobuk stock, the anecdotal reports of high sheefish abundance are indeed correct.

Most sheefish sport fishing effort occurs on the Kobuk River spawning population. Most of the area-wide subsistence harvest and the entire commercial harvest of sheefish occur on the entire

(spawners and nonspawners) population. When taken in combination, recent sport harvests of about 1,200 fish annually are easily sustainable (Table 23). Although spawner abundances have recently been estimated, the total size of the area wide population is not known, and the sport harvest must be viewed in relation to other ongoing harvests. It was always assumed that subsistence harvests are much greater than either commercial or sport harvests, and recent data support this assumption. In order to ensure sustained yields from these population(s), a management approach involving the subsistence and commercial fisheries for sheefish is recommended. Sheefish are very fecund fish with some large females containing over 400,000 eggs. Such populations may be subject to episodic recruitment events depending on environmental conditions. If spawner abundances are maintained above some threshold level, intermittent years of good recruitment should carry the population through years when environmental conditions are less favorable.

Recent Fishery Performance

Estimated annual sport harvests of sheefish by anglers in northwestern Alaska since 1978 have fluctuated from a high of about 3,400 to a low of about 150 with an average annual harvest of 1,268 fish from 2001 through 2005 (Table 23). The sport harvest in 2005 was 393 fish, and in 2006 the harvest was 810 fish. In addition to harvests, catches have been estimated through the SWHS since 1990. Estimates of sheefish catch (which includes fish that are kept and those released) for the past five years was 3,669 fish, indicating that about 66% of all sheefish captured in northwestern Alaska by sport anglers are released. In a 1997 experiment to determine hooking mortality rates of sheefish in the Kobuk River, the mortality of fish caught and released on sport fishing gear was found to be low (3.3% for treble hook lures, and 1.7% for single hook lures; Stuby and Taube 1998). Overall mortality was 2.4%. The Kobuk River is probably the most popular sheefish destination in North America, and people from the world over go there to fish for this unique species. In spite of the worldwide reputation of this destination, the level of fishing effort is still quite low. The five-year (2001-2005) average effort on the Kobuk River was 1,976 angler-days (Table 5). The Kobuk River accounted for about 33% of the overall estimated freshwater sport fishing effort in the Kotzebue subarea (6,334 total angler-days) in 2006.

Fishery Objectives and Management

The Kobuk River sheefish fishery is managed to maintain opportunity to participate in this unique high-quality sport fishery while keeping harvests from spawning areas low. In order to accommodate local use of this resource downstream from major spawning areas, the daily bag limit is generous downstream from the Mauneluk River, 10 sheefish per day. In the spawning area upstream from the Mauneluk River, the bag and possession limit is two fish per day. The majority of anglers visiting the Kobuk River to fish for sheefish use the area upstream from the Mauneluk River. The Selawik River has similar regulations.

Current Issues and Fishery Outlook

Local Alaska Native residents of Kobuk River villages have expressed concern over some practices of sport anglers on the upper Kobuk River in the vicinity of the sheefish spawning grounds. Catch-and-release fishing is considered by some local residents to be disrespectful and damaging to the fish. Discarding filleted carcasses in the water is thought to drive other sheefish away from the area. The ADF&G Division of Subsistence investigated local concerns in the upper Kobuk River in 1986 and determined that some concerns could be addressed if sport

fishers were more aware of local customs and culture. Catch-and-release fishing is viewed as a conservation tool by ADF&G and by many anglers and although sheefish may be sensitive to rough handling, the department has demonstrated that they can be released without significant mortality. An educational brochure explaining proper catch-and-release techniques for sheefish has been developed in association with the NPS. This brochure has been made available to those fishing on the upper Kobuk River. It is hoped that with proper handling, impacts of catch-and-release fishing to the spawning population can be minimized.

Because the subsistence component of the harvest is high, and some sheefish spawning areas are located within federally managed lands, the possibility exists that federal subsistence management in these areas may affect sport fishing opportunity; however, this has not yet been the case. The outlook for sheefish fisheries in northwestern Alaska is good in the immediate future. Although overall harvest levels are substantial, populations appear to be healthy, spawner abundances are increasing and sport harvests are low.

Recent Board of Fisheries and Management Actions

During 1988, the Board of Fisheries adopted the current regulations for sheefish in the waters of northwestern Alaska: 10 fish per day and 10 in possession, with an exception for the Kobuk River upstream of the Mauneluk River where the bag and possession limit is two sheefish. The ADF&G believes that these regulations are sufficient to allow ample opportunity for sport fishing, yet keep harvests of spawning fish low. The 10 fish limit in the lower Kobuk River and the remainder of the management area is liberal enough to allow local fishermen who choose to catch sheefish on sport fishing tackle the opportunity to take sheefish without the need to fish with nets. During the January 2001 meeting, the BOF reduced the sheefish daily bag and possession limit in spawning areas on the Selawik River to two sheefish. This made regulations on the Selawik River consistent with those already in place on the Kobuk River.

Current or Recommended Research and Management Activities

The department believes that recent research conducted cooperatively with the USFWS and the NPS has provided substantial background data on spawner abundance for the two stocks comprising the Kobuk-Selawik sheefish population. These data will be used as a baseline to which future population assessments can be compared. In 2008, ADF&G, in cooperation with USFWS, will begin a study on the Kobuk River sheefish population using radio telemetry to determine spawning locations, estimate abundance, and determine timing of outmigration of post-spawners to Hotham Inlet. This project will last five years, and may involve using hydroacoustics to count the outmigrating fish if funding permits. A study to document the winter subsistence harvest of sheefish in Kotzebue Sound was completed in 2001 (Savereide 2002). This study was funded through the USFWS Office of Subsistence Management. The USFWS repeated the abundance estimate for the Selawik River in 2004 and 2005. Results from that study indicate that the number of sheefish spawning in the Selawik River has increased dramatically, and no immediate management actions or research is necessary.

NORTH SLOPE DOLLY VARDEN AND ARCTIC CHAR

Background and Historical Perspective

In the North Slope subarea of the NW/NSMA, Arctic char occur in lakes on the north-facing side of Brooks Mountain Range, while the closely-related Dolly Varden are common inhabitants of

most large rivers on the North Slope in most drainages of the eastern coastal plain from the Canadian Border to the Colville River. The department groups Dolly Varden and Arctic char together for regulatory purposes, primarily because of the difficulty of distinguishing between the two based solely on physical appearance. However, the two species have distinct life history traits. Distribution of Arctic char is very limited in the North Slope subarea and the vast majority of fisheries are directed toward Dolly Varden. For the purposes of the following discussion this species complex will be referred to as "char"

Char are a major component of the harvest and catch in the North Slope area contributing more than 40% of the harvest and 30% of the catch for the primary sport species during the recent 10-year period (Table 24). On the North Slope most sport fisheries for char target overwintering populations of Dolly Varden either in the fall as the fish return to freshwater from the sea, or in the spring as they move toward the sea to feed.

On the North Slope, char spawn and overwinter in spring water upwelling areas. The char become increasingly concentrated in the spring areas beneath and adjacent to the inriver glaciers (aufeis) that form during winter. Streams that are known to support significant populations of char in the North Slope subarea include the Kongakut, Hulahula, Canning, Sagavanirktok, and Anaktuvuk rivers. Overwintering locations are in some cases different from spawning locations such that non-spawning fish from several neighboring tributaries may concentrate in a single drainage. The upper Ivishak River, a tributary of the Sagavanirktok River provides a large overwintering area used by fish in non-spawning years from nearby tributaries such as the Ribdon, Lupine and Echooka rivers.

The population of char using the Sagavanirktok River is considered particularly vulnerable because of potential habitat degradation resulting from oil and gas development that has occurred in Prudhoe Bay (Sagavanirktok River Delta). Access for anglers to the migratory route of this stock is provided by the Dalton Highway which parallels most of the main stem of the Sagavanirktok River. In 1994, the entire length of the Dalton highway was opened to public travel. Prior to this, the North Slope portion of the road was technically open only as far north as the Wiseman area in theUupper Koyukuk drainage.

Aerial surveys of index areas in the Ivishak River were initiated in 1971 and attempted annually through 1984 as a means of monitoring changes in this stock. The number of char counted in the Ivishak index area ranged from about 8,000 to as many as 36,000 in the 11 years the survey was conducted (Table 25). In 1989, 1993, and 1995 the aerial surveys were again conducted; counts were 12,650, 3,057, and 27,036 char. The low estimate from 1993 was conducted at least two weeks earlier than other counts and it is likely that many of the fish had not completed the upstream migration.

From 2001 - 2003 a study was conducted by ADF&G and funded by the federal OSM. One aspect of this project was an investigation of the validity of using aerial surveys as a char stock assessment tool. The project was designed to estimate the precision of aerial surveys of overwintering aggregations, and determine the relationship between aerial survey index counts and traditional mark-recapture abundance estimates of the same overwintering aggregations. Another part of the project used radio telemetry to better describe overwintering and spawning locations and to investigate the year-to-year variability in the location of these habitats.

The mark-recapture estimated abundances of char in the aerial index area in 2001, 2002 and 2003 were 49,523 fish (SE=7,277), 21,634 fish (SE=3,075) and 9,259 (SE=1,156), respectively.

The average aerial index count based on all surveys was 10,932 (SE=314) in 2001 and 5,408 (SE=363) for 2002 and 2,720 (SE=133) for 2003 (Table 25). These results indicate that the replicate aerial counts have relatively low variability and that these aerial counts appear to represent approximately 22% to 24% of the abundance in the same index area as measured by mark-recapture methods. The study also shows substantial variability in the annual number of char overwintering in the index area. During the 3 years of the study a significant decrease in the number of char was observed. Most significantly this study demonstrates that aerial surveys of overwintering aggregations of char in North Slope drainage can be used as an indicator of overwintering abundance.

In the Anaktuvuk River drainage, an index area was established in 1979 and annual counts were attempted through 1984. Counts ranged from 15,717 to 5,462, declining each year. In 1989 anecdotal reports from local residents and long-time users of this stock indicated that the fish were not present in traditional areas including the overwintering/spawning area near Rooftop Ridge (index area). The primary users of char from this area are Barrow residents that fly into a nearby privately owned airstrip. ADF&G personnel planned to conduct an aerial survey of the Anaktuvuk River in 1989 but the survey was not conducted due to weather conditions. No survey of the Anaktuvuk River char stock was conducted until 2002 when an index of 4,800 fish was counted in a helicopter survey (Table 25).

The Kongakut River is a popular destination for float trips in the eastern part of the Arctic National Wildlife Refuge (ANWR). Concern by refuge staff and members of the public over perceived declines in the number of char available during summer resulted in a joint project to assess this stock. In 1995, the project attempted to estimate abundance of char in a section of the river. However, too few fish were captured during the summer sampling period. The ADF&G conducted an aerial survey in September of 1995 to determine if there had been a substantial decrease in the number of spawning and overwintering fish that were using the river. The count in 1995 was 14,080, substantially greater than the other two estimates available (Table 25). More recent survey counts of char in the Kongakut River are not available.

Recent Fishery Performance

Estimates of catch and harvest of char from the North Slope subarea through 2002 have suggested a stable level of use. Total average annual catch has been about 5,000 and average harvest about 1,500 fish (Table 24). Estimates of effort since 2002 have been lower; harvests and catch in 2003 and 2004 were approximately 20% of the previous 10-year average (1993-2002). A modest increase in effort was reported in 2005; harvest was estimated to be about 600 char with a total catch of 1,800 fish. Historically about 50% of the total use of char has come from waters adjacent to the Dalton Highway. In contrast in 2005, an estimated 100 char (20%) were harvested from waters in the Dalton Highway corridor and the total catch was about 600 fish (34% of total North Slope use).

Fishery Objectives and Management

Fishery management for char reflects the different life history characteristics that these two closely related species exhibit. Dolly Varden (which inhabit streams and are often anadromous) can be exploited at much higher rates than can lake-dwelling Arctic char. The life history characteristics of lake-dwelling Arctic char are very similar to lake trout and these populations can support only low rates of exploitation.

In lakes char (primarily Arctic char) are managed to provide a conservative level of yield. In streams char (primarily Dolly Varden) are managed to encourage participation in the fishery while limiting harvest of spawning adults.

Current Issues and Fishery Outlook

A large increase in fishing effort and catch of char and the other two key sport species (Arctic grayling and lake trout) was anticipated with the opening of the entire length of the Dalton Highway to public travel in 1994 and again with the improvement of the roadway south of Atigun Pass in 2001 and 2002. Estimates from the SWHS do not indicate that this has occurred (Table 24).

There is a concern among indigenous people of the North Slope that a growing sport fishery for char may conflict with local subsistence fisheries.

Oil and gas development adjacent to and within the migration routes of char in North Slope waters carries the potential for serious impacts through contamination or alteration of habitat. Char using the Sagavanirktok drainage pass through Prudhoe Bay, one of the most heavily industrialized areas in Alaska. Current plans for oil and gas leases in the foothill region of National Petroleum Reserve-Alaska are of particular concern. These new lease areas include the critical overwintering/spawning habitat in the spring areas of the Anaktuvuk River drainage. Seismic surveys are planned for the portions of the Sagavanirktok, Anaktuvuk and Canning rivers that are the primary spawning and overwintering habitats for these char stocks. Department staff continues to assert that these critical habitats must be excluded from all surface development and that travel routes be redirected.

Recent studies in the Sagavanirktok River drainage (Viavant 2005) indicate declining abundance of overwintering and spawning char. Fluctuations in the abundance of char stocks on the North Slope have been reported before (Yoshihara 1973; Bendock and Burr 1984) but not of this magnitude.

The results from the radio telemetry study show that the specific locations of critical spawning and overwintering habitat used by anadromous char in the Beaufort Sea drainages may change significantly between years within a relatively large area within a drainage (Viavant 2003). Protection of such habitat should not be based on locations determined only for one or a few seasons.

Char will likely continue to provide a substantial portion of the sport fishery that occurs on the North Slope. The waters within the Dalton Highway corridor will continue to support most of the total catch and harvest of char in the North Slope sub area. Increased numbers of visitors are reportedly floating streams (Kongakut, Hulahula, Canning rivers) in the Arctic National Wildlife Refuge. Modest increases in catch and harvest of char can be anticipated with the increased visitor use of the area.

Recent Board of Fisheries Actions

In 1994, the BOF adopted new regulations for Dolly Varden and Arctic char for the entire AYK region. It is difficult for many anglers to distinguish between Dolly Varden and Arctic char in the field. However these two species have substantially different biological characteristics and cannot withstand the same exploitation rates. Dolly Varden (which inhabit streams and are often anadromous) can be exploited at much higher rates than can lake dwelling Arctic char.

The BOF adopted the following regulations: in flowing waters the bag and possession limit for these species is 10 per day with only two 20 inches in length or greater; in all lakes the bag and possession limit is two per day with no size limit. The BOF aligned lake trout harvest regulations with lake dwelling Arctic char in 2004.

Current or Recommended Research and Management Activities

Establishment of annual aerial index counts of the Ivishak and Anaktuvuk rivers overwintering areas is recommended. Annual monitoring of these stocks is important particularly in light of apparent declining abundance of char in the area and the increased oil and gas development activity in this area.

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TABLES AND FIGURES

Table 1.–Commercial salmon harvest from the Norton Sound and Kotzebue districts, 1981-2006.

	Norton Sound					Kotzebue	
Year	King	Sockeye	Coho	Pink	Chum	Chum	Dolly Varden
1981	7,929	56	31,562	232,479	173,422	677,239	3
1982	5,892	10	91,690	230,281	203,050	417,790	3,447
1983	10,308	27	49,735	76,913	320,029	175,762	190
1984	8,455	6	67,875	119,381	147,269	320,206	347
1985	19,491	195	21,968	3,647	135,305	521,406	454
1986	6,395	204	35,573	41,260	145,968	261,436	5
1987	7,080	286	24,279	2,260	103,047	109,467	1,261
1988	4,096	1,216	37,214	74,634	108,204	352,915	752
1989	5,707	271	44,091	123	41,250	254,617	3,093
1990	8,896	434	56,710	501	64,823	163,263	604
1991	6,068	204	63,647	0	86,871	239,923	6,136
1992	4,541	260	105,418	6,469	84,971	289,184	1,977
1993	9,971	265	42,098	157,574	54,413	73,071	76
1994	5,285	77	102,140	982,389	18,578	153,452	149
1995	8,860	124	47,863	81,644	43,268	290,730	2,090
1996	4,984	0	68,206	487,441	10,631	82,110	188
1997	12,573	161	32,284	20	34,103	142,720	3,320
1998	7,429	7	29,623	588,043	16,324	55,907	349
1999	2,508	0	12,662	0	7,881	138,605	1,502
2000	752	14	44,409	166,548	6,150	159,802	7
2001	213	43	19,492	0	11,100	211,662	0
2002	5	1	1,759	0	600	8,390	0
2003	12	0	17,058	0	3,560	25,423	20
2004	0	40	54,750	0	7,668	51,038	124
2005	151	280	85,255	0	3,983	75,971	181
2006	12	3	130,808	0	10,042	130,660	0
96-05 Average	**2,863**	**55**	**36,550**	**124,205**	**10,200**	**95,163**	**569**
01-05 Average	**76**	**73**	**35,663**	**0**	**5,382**	**74,497**	**65**

Table 2.–Weir or tower documented salmon escapement in Norton Sound, 1996-2006.

	Year										
River/Fish	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Nome River											
King	5	22	70	3	24	7	7	12	51	70	43
Chum	3,339	5,147	1,930	1,048	4,065	2,859	1,720	1,958	3,903	5,584	4,128
Pink	95,681	8,035	359,469	2,033	41,673	3,138	35,057	11,402	1,051,146	285,759	611,550
Coho	66	312	96	417	696	2,418	3,418	548	2,283	5,848	8,126
Snake River											
King	5	12		20	28	33	7	50	17	31	32
Chum	2,772	6,184	11,067	484	1,911	2,182	2,669	2,179	2,145	2,967	4,128
Pink	44,558	6,742	219,697	116	4,723	1,295	4,042	2,829	126,917	13,813	73,734
Coho	1,638	1,127	178	90	406	1,335	396	489	474[a]	2,925	4,926
Eldorado River											
King	27	98	446	28	33	50	25	29	25	32	41
Chum	12,665	14,302	13,808	4,218	11,617	11,635	10,260	3,589	3,273	10,426	41,985
Pink	46,095	1,022	137,283	977	55,992	488	115,652	173	60,861	12,356	22,368
Coho	324	194	21	510	192	1,509	516	115	1,149	679	523
Pilgrim River											
King	ND	356	ND	ND	72	ND	168	1,016	925	216	275
Chum	ND	14,418	ND	ND	861	ND	5,538	15,192	10,228	9,715	45,410
Pink	ND	5,557	ND	ND	374	ND	3,870	14,100	50,757	13,298	18,701
Coho	ND	452	ND	ND	21	ND	216	677	1,556	304	962
Sockeye	ND	1,234	ND	ND	12,141	ND	4,012	42,729	85,520	56,484	52,223
Niukluk River											
King	243	259	260	40	48	30	542	179	135	41	39
Chum	80,178	57,305	45,588	29,573	30,662	33,999	20,018	10,158	10,791	25,596	29,199
Pink	1,154,922	10,468	1,624,438	20,351	961,603	41,625	636,404	75,855	1,022,302	270,424	1,371,919
Coho	12,818	3,997	810	4,260	11,382	3,468	7,269	1,282	1,833[b]	2,727	11,169
North River											
King	1,197	4,185	2,100	2,263	1,046	1,337	1,484	1,452	1,105	1,019	906
Chum	9,789	6,904	1,562	5,600	4,971	6,515	5,918	9,859	9,624	11,984	5,385
Pink	332,539	127,926	74,045	48,993	69,703	24,737	321,756	280,212	1,149,294	1,670,934	2,169,890
Coho	1,229	5,768	3,361	4,792	6,959	12,383	2966[b]	5,837	9,646	19,189	9,835

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Table 2.–Page 2 of 2.

River/Fish	Year 1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Kwiniuk River											
King	578	974	303	116	144	261	1,632	749	645	342	195
Chum	28,493	20,119	24,247	8,763	12,897	16,598	37,864	12,117	10,371	12,083	39,519
Pink	907,893	9,535	655,934	607	750,173	8,423	1,114,616	22,332	3,045,915	341,048	1,347,090
Coho	0[b]	0[b]	0[b]	0[b]	2[b]	9,531	6,459	5,484	10,523	12,950	22,341

[a] Incomplete count because of high water 1,916 coho counted by aerial survey in the Snake River.

[b] Incomplete count because of high water or tower not run through end of season.

Table 3.-Salmon escapement goals (SEG, BEG, or OEG) for Norton Sound area streams, 2006.

Location	Type	Chum	Type	King	Type	Sockeye	Type	Coho	Type	Pink
Salmon Lake	ND	ND	ND	ND	Aerial	Combined	ND	ND	ND	ND
Grand Central River	ND	ND	ND	ND		4,000-8,000	ND	ND	ND	ND
Pilgrim River	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glacial Lake	ND	ND	ND	ND	Aerial	800-1,600	ND	ND	ND	ND
Sinuk River	Aerial	4,000-6,200	ND	ND	ND	ND	ND	ND	ND	ND
Cripple River	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Penny River	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Snake River	Weir	1,600-2,500	ND	ND	ND	ND	ND	ND	ND	ND
Nome River	Weir	2,900-4,300	ND	ND	ND	ND	ND	ND	Weir	13,000
Flambeau River	ND	4,100-6,300	ND	ND	ND	ND	ND	ND	ND	ND
Eldorado River	Weir	6,000-9,200	ND	ND	ND	ND	ND	ND	ND	ND
Solomon River	ND	1,100-1,600	ND	ND	ND	ND	ND	ND	ND	ND
Ophir Creek	ND	ND	ND	ND	ND	ND	Aerial	Combined	ND	ND
Niukluk River	ND	ND	ND	ND	ND	ND	ND	950-1,900	Tower	8,400
Fish River	ND	Combined	Aerial	Combined	ND	ND	ND	ND	ND	ND
Boston Creek	ND	23,200-46,400	ND	100-250	ND	ND	ND	ND	ND	ND
Kwiniuk	Tower	11,500-23,000	Tower	300-550	ND	ND	Aerial	650-1,300	Tower	12,500
Tubutulik	Aerial	9,200-18,400	ND	ND	ND	ND	ND	ND	ND	ND
Inlutalik River	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ungalik River	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Shaktookik	ND	ND	Aerial	400-800	ND	ND	ND	ND	Aerial	48,000
Unalakleet River	ND	Combined	Aerial	Combined	ND	ND	ND	ND	ND	ND
Old Woman River	ND	2,400-4,800	ND	550-1,100	ND	ND	ND	ND	ND	ND
North River	ND	ND	Tower	1,200-2,400	ND	ND	Aerial	550-1,100	Tower	25,000

Table 4.-Subsistence salmon harvest the Norton Sound, Port Clarence, and Kotzebue Districts, 1982-2006.

	Norton Sound					Port Clarence					Kotzebue
Year	King	Sockeye	Coho	Pink	Chum	King	Sockeye	Coho	Pink	Chum	Chum
1982	1,011	8	14,612	54,249	18,580	8	255	110	765	5,845	9,459
1983	1,942	86	8,799	21,894	11,492	23	405	100	4,345	684	19,648
1984	4,733	17	8,470	34,600	8,231	17	261	ND	615	299	5,486
1985	1,830	119	6,496	5,312	18,457	ND	ND	ND	ND	ND	7,231
1986	150	107	688	8,720	8,085	ND	ND	ND	ND	ND	17,411
1987	200	107	1,100	1,251	8,394	ND	ND	ND	ND	ND	12,901
1988	63	133	1,076	2,159	5,952	ND	ND	ND	ND	ND	7,067
1989	24	131	5,150	18,424	4,787	ND	ND	ND	ND	ND	13,723
1990	2,534	234	510	2,233	4,246	28	535	472	395	410	3,894
1991	395	166	3,432	3,749	6,375	ND	ND	ND	ND	ND	4,353
1992	252	163	2,762	13,503	2,944	ND	ND	ND	ND	ND	11,103
1993	420	80	3,287	2,599	3,401	ND	ND	ND	ND	ND	12,260
1994	7,375	1,162	22,124	71,065	25,120	ND	ND	ND	ND	ND	12,160
1995	7,284	3,595	21,620	38,134	41,259	181	1,979	1,692	3,849	2,042	26,612
1996	7,255	1,181	26,305	64,724	34,586	76	4,481	1,739	3,293	6,011	38,867
1997	8,903	1,045	14,505	24,549	25,249	195	4,558	2,079	2,587	1,264	39,076
1998	6,242	393	13,743	46,480	14,010	158	3,177	829	755	2,099	26,242
1999	4,331	866	12,233	19,193	13,049	287	1,665	1,759	7,812	2,621	21,398
2000	3,690	324	13,455	37,864	12,989	89	2,392	1,030	786	1,936	14,264
2001	4,751	750	11,293	29,822	13,963	72	2,851	935	1,387	1,275	21,538
2002	4,792	443	11,773	56,311	13,095	74	3,692	1,299	1,183	1,910	28,975
2003	4,728	522	11,446	46,336	9,498	133	3,732	2,194	3,394	2,699	ND
2004	4,419	458	10,892	70,945	3,592	177	4,495	1,434	4,113	2,430	17,024
2005	4,848	914	16,127	60,427	13,765	276	8,288	1,031	5,817	2,501	10,616
2006	24	159	3808	9329	940	152	8,492	726	6,615	2,479	ND
96-05 Average	**5,396**	**690**	**14,177**	**45,665**	**15,380**	**102**	**9,940**	**1,061**	**4,939**	**4,353**	**-**
01-05 Average	**4,708**	**617**	**12,306**	**52,768**	**10,783**	**161**	**4,334**	**1,332**	**3,445**	**2,121**	**22,392**

[1] Data from Soong et. al. 2006.

Table 5.- Sport fishing effort (in angler-days) by major fisheries and subareas in the NW/NSMA, 1986-2006.

	Seward Peninsula/Norton Sound Sub-Area							Kotzebue/Chukchi Sea Sub-Area					North Slope Sub-Area			NW/NSMA
Year	Nome	Fish/Niukluk	Unalakleet	Snake	Pilgrim	Other	Total	Noatak	Kobuk	Wulik	Other	Total	Haul Road	Other	Total	Total
1986	6,023	1,888	6,457	850	868	2,021	18,107	2,141	2,646	168	1,358	6,313	842	3,937	4,779	29,199
1987	1,865	2,473	942		1,159	14,974	21,413	3,584	5,133	303	1,201	10,221	2,278	2,978	5,256	36,890
1988	6,058	2,245	1,219	2,128	4,822	3,806	20,278	2,492	2,100	455	232	5,279	1,265	1,276	2,541	28,098
1989	6,569	2,124	1,701	436	1,678	5,184	17,692	2,552	1,729	107	544	4,932	1,266	2,852	4,118	26,742
1990	7,194	2,059	3,957	775	1,710	6,104	21,799	1,423	1,306	285	768	3,782	2,502	1,262	3,764	29,345
1991	4,646	2,524	5,616	2,384	3,183	5,269	23,622	4,235	2,353	93	2,862	9,543	3,535	3,756	7,291	40,456
1992	6,455	2,742	2,433	2,379	1,184	7,491	22,684	2,611	2,095	469	970	6,145	2,211	2,729	4,940	33,769
1993	3,633	3,962	2,153	1,468	1,195	6,519	18,930	3,013	2,604	350	1,842	7,809	3,421	2,179	5,600	32,339
1994	5,116	3,082	2,349	880	844	6,651	18,922	2,747	1,153	762	1,374	6,036	2,926	2,481	5,407	30,365
1995	3,044	2,603	3,832	1,968	1,253	6,947	19,647	2,504	3,681	647	1,663	8,495	3,275	2,369	5,644	33,786
1996	2,920	2,120	2,539	1,269	840	4,095	13,783	2,039	1,358	274	1,900	5,571	2,700	1,787	4,487	23,841
1997	1,914	3,017	4,393	445	820	3,261	13,850	1,159	825	553	1,192	3,729	3,224	2,054	5,278	22,857
1998	1,371	1,344	3,795	376	546	6,184	13,616	765	2,053	202	781	3,801	2,121	1,532	3,653	21,070
1999	1,463	4,916	4,176	977	433	3,041	15,006	3,142	2,099	737	793	6,771	2,473	2,757	5,230	27,007
2000	1,455	3,451	6,257	377	753	3,385	15,678	1,713	2,298	336	878	5,225	2,325	2,414	4,739	25,642
2001	1,045	2,822	2,793	853	491	1,899	9,903	2,702	925	592	1,275	5,494	4,256	1,776	6,032	21,429
2002	1,901	1,805	8,195	514	562	3,604	16,581	1,218	3,286	610	1,171	6,285	2,224	3,808	6,032	28,898
2003	651	1,625	3,056	701	1,560	4,810	12,403	1,855	2,039	397	1,830	6,121	1,103	1,607	2,710	21,234
2004	1,636	2,786	4,527	486	594	2,393	12,422	1,130	2,760	219	1,246	5,355	873	2,438	3,311	21,088
2005	2,142	1,954	4,768	836	327	5,044	15,071	1,310	868	493	393	3,064	1,881	2,471	4,352	22,487
2006	4,517	1,067	4,062	855	337	4,010	14,848	2,538	2,104	993	699	6,334	1,298	1,806	3,104	24,286
96-05 Avg.	1,650	2,584	4,450	683	693	3,772	13,831	1,703	1,851	441	1,146	5,142	2,318	2,264	4,582	23,555
01-05 Avg.	1,475	2,198	4,668	678	707	3,550	13,276	1,643	1,976	462	1,183	5,264	2,067	2,420	4,487	23,027

Table 6.- Sport fish harvest by species in the NW/NSMA, 1986-2006.

Year	King Salmon	Coho Salmon	Sockeye Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Lake Trout	Arctic Grayling	Northern Pike	Whitefish	Sheefish	Burbot
1986	1,077	3,775	0	3,177	2,392	10,421	7,229	919	12,790	3,470	4,485	3,195	201
1987	638	1,841	945	1,304	1,255	5,983	9,207	433	8,653	1,719	498	1,023	11
1988	418	4,838	782	2,857	1,819	10,714	6,438	328	8,548	2,129	891	964	36
1989	165	3,847	97	3,146	1,334	8,589	8,999	597	7,617	712	804	131	158
1990	334	3,003	93	6,981	816	11,227	4,958	555	2,791	2,277	400	151	50
1991	404	5,205	237	1,758	1,474	9,078	10,924	349	5,282	1,823	1,617	603	116
1992	212	4,566	82	6,605	659	12,124	2,981	649	2,113	812	55	1,125	42
1993	576	3,576	10	1,827	929	6,918	7,601	340	4,113	1,181	324	631	256
1994	600	5,013	18	6,106	777	12,514	5,825	150	2,812	663	196	230	373
1995	347	3,564	83	966	715	5,675	4,721	164	2,930	471	421	861	125
1996	406	6,905	100	5,627	1,238	14,276	6,112	185	4,815	840	260	485	405
1997	968	3,891	30	1,276	506	6,671	5,866	130	4,067	508	631	710	493
1998	545	3,693	16	4,951	815	10,020	4,117	252	3,268	270	100	293	259
1999	573	4,719	0	3,038	603	8,933	7,927	178	4,053	548	380	628	125
2000	675	6,487	32	2,439	1,062	10,695	8,641	134	3,348	768	1,329	664	521
2001	271	4,541	39	349	3,225	8,425	5,944	154	3,067	471	2,412	1,056	101
2002	814	4,057	0	4,070	1,346	10,287	4,602	305	5,774	535	495	476	244
2003	239	3,050	572	2,285	553	6,699	6,257	109	4,373	869	919	735	22
2004	418	5,302	404	7,549	707	14,380	5,711	212	3,675	1,583	2,513	652	79
2005	561	7,076	232	3,004	436	11,309	3,700	177	2,177	564	514	393	50
2006	427	11,643	22	5,305	1,592	18,989	5,613	44	1,483	107	654	607	63
96-05 Average	**547**	**4,972**	**143**	**3,459**	**1,049**	**10,170**	**5,888**	**184**	**3,862**	**696**	**955**	**609**	**230**
01-05 Average	**461**	**4,805**	**249**	**3,451**	**1,253**	**10,220**	**5,243**	**191**	**3,813**	**804**	**1,371**	**662**	**99**

Table 7.- Sport fish catch by species in the NW/NSMA, 1990-2006.

Year	King Salmon	Sockeye Salmon	Pink Salmon	Chum Salmon	Coho Salmon	All Salmon	Dolly Varden	Lake Trout	Arctic Grayling	Northern Pike	Whitefish	Sheefish	Burbot
1990	476	256	14,532	3,347	6,397	25,008	16,105	4,450	15,289	5,892	869	336	50
1991	512	498	4,038	2,664	8,132	15,844	29,742	1,418	37,735	6,136	1,719	1,616	116
1992	640	106	24,436	3,301	8,351	36,834	16,172	1,634	17,348	5,408	230	2,618	58
1993	3,074	116	5,800	2,729	5,903	17,622	32,798	859	29,329	4,461	681	1,354	278
1994	912	105	13,108	2,741	7,049	23,915	20,553	584	20,871	3,273	360	481	633
1995	739	229	3,420	3,657	7,288	15,333	18,796	1,374	26,921	3,277	540	2,980	165
1996	2,166	314	15,466	8,670	11,735	38,351	21,657	924	29,039	4,662	938	3,152	429
1997	5,379	305	5,690	3,454	6,862	21,690	28,861	1,238	44,624	2,845	1,518	2,145	661
1998	1,647	209	23,906	5,043	9,288	40,093	21,627	1,403	27,057	1,556	1,350	803	285
1999	948	124	3,834	5,612	13,417	23,935	33,149	1,168	41,558	4,086	534	5,077	137
2000	1,779	149	11,670	6,966	13,350	33,914	29,596	587	32,703	2,541	2,179	2,628	565
2001	584	53	2,002	6,034	8,162	16,835	17,159	1,375	23,840	3,613	2,778	4,786	146
2002	2,032	53	13,048	6,708	7,406	29,247	15,833	960	43,826	2,335	951	1,960	244
2003	1,314	1,323	8,818	3,159	6,013	20,627	17,474	1,175	33,587	2,230	2,226	5,462	33
2004	2,006	680	42,795	3,777	16,698	65,956	17,511	1,139	23,395	4,074	3,409	1,750	144
2005	1,086	346	25,830	3,491	24,160	54,913	14,858	1,193	20,866	1,572	1,210	1,043	50
2006	2,592	334	24,749	6,950	20,282	54,907	19,721	1,197	14,785	2,316	884	5,051	63
96-05 Average	**1,894**	**356**	**15,306**	**5,291**	**11,709**	**34,556**	**21,773**	**1,116**	**32,050**	**2,951**	**1,709**	**2,881**	**269**
01-05 Average	**1,404**	**491**	**18,499**	**4,634**	**12,488**	**37,516**	**16,567**	**1,168**	**29,103**	**2,765**	**2,115**	**3,000**	**123**

Table 8.-Sport fish effort, catch and harvest estimates by species for the Unalakleet River, 1991-2006.

	Year									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
					Effort					
Days Fished	5,616	2,433	2,153	2,349	3,832	2,539	4,393	3,795	4,176	6,257
					Harvest					
King Salmon	296	117	382	379	259	384	842	513	415	345
Coho Salmon	2,180	1,555	643	2,425	2,033	3,411	2,784	2,742	2,691	4,150
Chum Salmon	497	379	116	220	207	463	228	447	211	403
Pink Salmon	437	779	89	402	222	59	1,055	434	2,946	961
Dolly Varden	1,648	746	602	679	1,061	1,506	936	588	2,384	4,462
Arctic Grayling	1,909	114	131	353	300	420	210	144	277	538
Total Fish Harvest	6,967	3,690	1,963	4,458	4,082	6,243	6,055	4,868	8,924	10,859
					Catch					
King Salmon	375	476	2,340	517	588	2,059	5,144	1,539	669	1,045
Coho Salmon	2,882	2,802	1,572	2,488	3,086	5,863	4,020	3,213	9,593	9,287
Chum Salmon	692	1,412	515	561	966	1,589	1,323	2,218	1,916	3,652
Pink Salmon	559	6,503	605	1,020	799	2,594	4,101	4,853	3,475	3,982
Dolly Varden	2,267	1,942	964	1,253	2,732	3,170	4,400	2,336	10,460	10,293
Arctic Grayling	2,813	1,022	874	1,476	1,332	1,694	4,918	3,256	6,089	6,814
Total Fish Catch	**9,588**	**14,157**	**6,870**	**7,315**	**9,503**	**16,969**	**23,906**	**17,415**	**32,202**	**35,073**

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Table 8.-Page 2 of 2.

	Year							
	2001	2002	2003	2004	2005	2006	Average (1996-2005)	Average (2001-2005)
			Effort					
Days fished	2,793	8,195	3,056	4,527	4,768	3,964	4,450	4,668
			Harvest					
King Salmon	250	544	97	356	216	394	396	293
Coho Salmon	2,766	2,937	1,604	3,524	3,959	4,985	3,057	2,958
Chum Salmon	714	607	191	47	36	224	335	319
Pink Salmon	188	1,378	29	2,003	473	891	953	814
Dolly Varden	1,002	789	134	3,593	500	1307	1,589	1,204
Arctic Grayling	247	773	131	597	52	60	339	360
Total Fish Harvest	5,167	7,028	2,186	10,120	5,236	7,861	6,669	5,947
			Catch					
King Salmon	542	835	505	1,930	431	2,511	1,470	849
Coho Salmon	5,399	3,691	2,832	12,655	14,396	9,397	7,095	7,795
Chum Salmon	2,030	1,653	1,681	1,473	1,822	1,628	1,936	1,732
Pink Salmon	1,197	2,463	3,762	10,332	8,778	4,791	4,554	5,306
Dolly Varden	2,769	2,593	4,284	10,928	3,299	2,935	5,453	4,775
Arctic Grayling	2,331	4,229	6,189	3,478	1,137	669	4,014	3,473
Total Fish Catch	**14,268**	**15,464**	**19253**	**40,796**	**29,863**	**21,931**	**24,521**	**23,929**

Table 9.–Sport fish effort, and harvest by species from the Nome River, 1984-2006, and catch, 1991-2006.

Year	Days Fished	Salmon					All Salmon	Dolly Varden	Arctic Grayling	Whitefish
		King	Coho	Red	Pink	Chum				
					Harvest					
1984	5,714	13	2,648	0	4,128	325	7,114	935	376	13
1985	6,514	20	209	0	349	189	767	1,236	528	0
1986	6,023	0	415	0	491	76	982	1,057	491	0
1987	1,865	0	163	0	235	0	398	906	344	0
1988	6,058	0	1,455	0	528	273	2,256	2,365	946	18
1989	6,569	19	1,233	0	1,573	495	3,320	3,551	2,032	131
1990	7,194	39	407	35	2,651	122	3,254	1,078	33	0
1991	4,646	22	417	0	356	241	1,036	1,220	186	13
1992	6,455	16	713	0	4,397	0	5,126	573	0	0
1993	3,633	93	602	0	723	0	1,418	917	0	0
1994	5,116	0	326	0	4,103	0	4,429	431	16	0
1995	3,044	0	143	0	230	0	373	462	0	0
1996	2,920	0	598	0	3,280	0	3,878	873	0	0
1997	1,914	10	295	0	83	0	388	328	0	0
1998	1,371	0	189	0	1,985	0	2,174	302	0	0
1999	1,463	0	219	0	0	0	219	791	0	0
2000	1,455	0	342	0	578	0	920	340	0	0
2001	1,045	0	297	0	0	0	297	43	0	0
2002	1,901	0	217	0	312	0	529	511	0	0
2003	651	0	68	0	12	0	80	1,223	0	0
2004	1,636	0	270	0	3,369	0	3,639	226	0	0
2005	2,142	0	1,001		1,193		2,194	553	0	0
2006	4,517	0	2,768	0	2,422	0	6,149	959	0	0
96-05 Average	**1,650**	**1**	**350**	**0**	**1,081**	**0**	**1,432**	**519**	**0**	**0**
01-05 Average	**1,475**	**0**	**371**	**0**	**977**	**0**	**1,348**	**511**	**0**	**0**
					Catch					
1991	4,646	22	869	0	894	389	2,174	3,725	1,363	13
1992	6,455	23	1,466	0	9,810	266	11,565	1,130	90	9
1993	3,633	121	764	0	1,756	175	2,816	5,153	569	0
1994	5,116	0	386	0	6,190	36	6,612	631	1,111	0
1995	3,044	0	228	0	980	478	1,686	1,474	571	0
1996	2,920	21	788	0	5,898	432	7,139	1,311	497	0
1997	1,914	20	447	0	190	113	770	873	569	0
1998	1,371	19	863	0	3,482	8	4,372	319	207	0
1999	1,463	0	231	0	13	0	244	1,486	300	0
2000	1,455	0	385	0	876	20	1,281	431	10	0
2001	1,045	0	377	0	32	13	422	94	60	0
2002	1,901	24	549	0	3,090	220	3,883	543	735	0
2003	651	0	90	0	73	0	163	1,276	94	0
2004	1,636	0	428	0	6,189	14	6,631	374	113	0
2005	2,142	0	1,523	0	2,095	0	3,618	992	92	0
2006	4,517	0	4,607	0	6,242	122	13,478	1,947	560	0
96-05 Average	**1,650**	**8**	**568**	**0**	**2,194**	**82**	**2,852**	**770**	**268**	**0**
01-05 Average	**1,475**	**5**	**593**	**0**	**2,296**	**49**	**2,943**	**656**	**219**	**0**

Table 10.–Sport fish effort, and harvest by species from the Fish/Niukluk River, 1984-2006, and catch, 1991-2006.

Year	Days Fished	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Arctic Grayling	Northern Pike	Whitefish	Burbot
						Harvest						
1984	1,115	0	1,090	0	78	52	1,220	325	376	13	0	13
1985	889	0	40	0	70	10	120	195	945	0	0	35
1986	1,888	189	1,359	0	415	0	1,963	1,359	1,114	19	0	0
1987	2,473	36	1,032	0	127	72	1,267	1,376	2,119	471	0	0
1988	2,245	0	800	0	73	127	1,000	891	1,237	0	0	0
1989	2,124	0	728	0	233	107	1,068	734	808	0	70	0
1990	2,059	0	267	0	638	216	1,121	348	415	17	0	0
1991	2,524	14	977	0	356	272	1,619	1,474	1,320	283	13	35
1992	2,742	0	753	0	357	15	1,125	303	158	43	0	0
1993	3,962	9	1,185	0	278	514	1,986	1,003	619	75	9	21
1994	3,082	10	1,122	0	231	119	1,482	708	644	99	0	0
1995	2,603	18	818	0	136	27	999	368	430	0	37	34
1996	2,120	11	1,652	0	404	166	2,233	402	313	145	0	24
1997	3,017	71	462	0	58	0	591	2,071	734	30	131	148
1998	1,344	0	316	0	0	0	316	160	16	0	0	84
1999	4,825	44	1,365	0	80	0	1,489	1,952	860	28	0	89
2000	3,451	174	1,165	0	51	0	1,390	1,687	442	57	0	0
2001	2,822	0	969	0	161	439	1569	1197	430	297	129	43
2002	1,805	75	298	0	254	45	672	259	452	51	16	0
2003	2,448	39	216	0	196	101	552	110	387	0	15	0
2004	2,786	22	291	0	353	435	1,101	120	102	0	45	0
2005	1,954	37	400	0	58	0	495	1,148	402	0	16	0
2006	1,049	0	948	0	134	0	1,082	0	0	0	0	0
96-05 Average	**2,657**	**47**	**713**	**0**	**162**	**119**	**1,041**	**911**	**414**	**61**	**35**	**39**
01-05 Average	**2,363**	**35**	**435**	**0**	**204**	**204**	**878**	**567**	**355**	**70**	**44**	**9**

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Table 10.–Page 2 of 2.

Year	Days Fished	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Arctic Grayling	Northern Pike	Whitefish	Burbot
						Catch						
1991	2,524	22	1,417	0	579	521	2,539	3,439	7,261	764	39	35
1992	2,742	0	1,555	0	1,969	326	3,850	1,041	2,171	256	0	0
1993	3,962	9	1,804	0	909	945	3,667	6,130	5,976	75	44	21
1994	3,082	29	1,448	0	2,052	1,271	4,800	2,125	2,398	596	56	0
1995	2,603	18	1,401	0	300	428	2,147	662	1,169	137	65	34
1996	2,120	64	3,348	0	3,512	1,660	8,584	1,872	4,653	513	94	24
1997	3,017	125	1,751	106	1,209	714	3,905	9,952	10,452	423	315	277
1998	1,344	15	772	0	3,252	822	4,861	1,390	8,159	189	198	84
1999	4,825	55	2,151	0	187	265	2,658	5,601	7,245	264	0	101
2000	3,451	207	2,952	0	3,989	952	8,100	2,261	1,701	114	210	0
2001	2,822	21	1,739	0	279	543	2,582	3064	3972	538	416	43
2002	1,805	111	1,549	0	772	747	3,179	854	6,587	211	148	0
2003	2,448	515	1,447	0	626	258	2,846	1,695	5,495	11	766	0
2004	2,786	22	1,653	0	10,176	979	12,830	849	1,594	82	64	0
2005	1,954	74	1,586	0	1,283	177	3,120	2,688	3,316	238	632	0
2006	1,049	0	1,320	0	700	0	2,020	0	329	59	0	0
96-05 Average	**2,657**	**121**	**1,895**	**11**	**2,529**	**712**	**5,267**	**3,021**	**5,317**	**258**	**284**	**53**
01-05 Average	**2,363**	**149**	**1,595**	**0**	**2,627**	**541**	**4,911**	**1,826**	**4,193**	**216**	**405**	**9**

Table 11.–Sport fish effort and harvest by species from the Pilgrim River, 1984-2006, and catch, 1991-2006.

Year	Days Fished	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Arctic Grayling	Northern Pike	Whitefish	Burbot
						Harvest						
1984	732	65	195	78	104	0	442	195	247	13	0	0
1985	375	10	20	20	50	100	200	14	319	0	0	0
1986	868	38	76	0	0	113	227	189	227	529	0	0
1987	1,159	72	109	435	0	272	888	163	272	199	0	0
1988	4,822	55	218	746	36	346	1,401	327	109	91	36	0
1989	1,678	68	204	78	301	272	923	603	516	415	131	10
1990	1,710	19	81	93	208	41	442	498	415	1,194	0	33
1991	3,183	51	310	124	81	85	651	1,015	459	608	13	0
1992	1,184	55	57	66	55	106	339	131	91	231	0	0
1993	1,195	28	191	10	0	0	229	730	75	207	0	0
1994	844	0	134	9	154	0	297	63	49	108	0	0
1995	1,253	19	113	62	0	73	267	74	52	68	18	11
1996	840	0	133	84	49	0	266	388	73	75	0	0
1997	820	45	0	20	0	0	65	65	81	117	0	0
1998	546	32	6	0	0	0	38	14	0	26	0	0
1999	433	0	33	0	0	0	33	45	11	94	9	0
2000	753	0	179	32	6	0	217	0	57	271	0	0
2001	491	0	29	0	0	0	29	270	43	0	0	0
2002	562	0	0	0	0	0	0	72	31	148	0	0
2003	730	103	113	572	437	0	1,225	482	98	0	304	0
2004	565	0	45	404	0	0	449	0	0	436	0	0
2005	327	0	48	102	23	0	173	12	0	0	0	0
2006	337	0	150	0	67	0	217	0	83	0	0	0
96-05 Average	**607**	**18**	**59**	**121**	**52**	**0**	**250**	**135**	**39**	**117**	**31**	**0**
01-05 Average	**535**	**21**	**47**	**216**	**92**	**0**	**375**	**167**	**34**	**117**	**61**	**0**

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Table 11.–Page 2 of 2.

Year	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Arctic Grayling	Northern Pike	Whitefish	Burbot
						Catch					
1991	65	476	374	406	194	1,515	3,155	4,463	1,499	13	0
1992	55	162	90	714	197	1,218	279	526	863	18	0
1993	92	325	106	392	254	1,169	3,038	2,362	959	0	11
1994	0	436	18	350	146	950	180	266	358	0	0
1995	19	472	163	58	232	944	294	370	656	27	11
1996	0	265	235	364	133	997	509	785	334	0	0
1997	90	49	115	0	15	269	254	429	262	0	0
1998	32	65	145	263	44	549	41	65	77	0	0
1999	20	77	177	0	0	274	585	694	104	9	0
2000	0	200	32	109	24	365	0	221	596	0	0
2001	0	29	14	0	11	54	439	402	0	0	0
2002	0	5	0	0	0	5	75	144	157	0	0
2003	268	203	1,323	1,044	548	3,386	549	397	0	304	0
2004	0	124	680	163	33	1,000	80	0	590	0	0
2005	0	48	102	38	64	252	59	48	24	0	0
2006	0	185	0	134	0	319	64	220	0	0	0
96-05 Average	**41**	**107**	**282**	**198**	**87**	**715**	**259**	**319**	**214**	**31**	**0**
01-05 Average	**54**	**82**	**424**	**249**	**131**	**939**	**240**	**198**	**154**	**61**	**0**

Table 12.–Sport fish effort and harvest by species from the Snake River, 1984-2006, and catch, 1991-2006.

Year	Days Fished	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Arctic Grayling	Whitefish
					Harvest					
1984	418	0	273	0	143	0	416	65	26	0
1985	361	0	120	0	0	0	120	0	139	0
1986	850	0	94	0	378	94	566	57	378	0
1987[a]	-	-	-	-	-	-	-	-	-	-
1988	2,128	0	800	0	546	437	1,783	218	709	0
1989	436	0	10	0	291	97	398	44	101	0
1990	775	10	47	0	111	41	209	66	116	0
1991	2,384	7	798	62	71	93	1,031	1,252	402	0
1992	2,379	8	510	0	183	0	701	115	16	0
1993	1,468	9	248	0	151	0	408	331	467	0
1994	880	0	145	0	452	7	604	117	32	0
1995	1,968	0	85	0	19	0	104	131	18	9
1996	1,269	0	426	0	659	0	1,085	97	121	0
1997	445	0	98	0	0	0	98	81	0	0
1998	376	0	0	0	463	0	765	0	8	0
1999	977	0	209	0	0	0	209	44	113	0
2000	377	0	209	0	103	0	312	199	16	0
2001	853	0	175	0	0	0	175	108	63	0
2002	514	0	35	0	0	0	35	18	110	0
2003	701	0	11	0	0	0	11	13	140	0
2004	468	0	163	0	60	0	223	0	91	0
2005	836	0	182	22	12	0	216	27	33	0
2006	855	0	414	11	430	0	855	51	0	0
96-05 Average	**682**	**0**	**151**	**2**	**130**	**0**	**283**	**59**	**70**	**0**
01-05 Average	**674**	**0**	**113**	**4**	**14**	**0**	**132**	**33**	**87**	**0**

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Table 12.–Page 2 of 2.

Year	Days Fished	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Arctic Grayling	Whitefish
						Catch				
1991	2,384	14	1,798	73	234	109	2,228	3,471	2,096	0
1992	2,379	8	640	0	1,182	0	1,830	180	158	0
1993	1,468	9	306	0	429	37	781	1,003	1,614	0
1994	880	60	235	0	648	37	980	420	377	0
1995	1,968	0	245	0	300	189	734	507	887	9
1996	1,269	0	530	0	967	111	1,608	255	1,055	0
1997	445	0	118	0	0	9	127	243	123	135
1998	376	0	64	0	463	0	527	0	218	0
1999	977	0	606	0	0	0	606	257	723	0
2000	377	0	209	0	103	0	312	199	449	0
2001	853	0	214	0	21	78	313	108	1,385	0
2002	514	0	156	0	0	0	156	18	279	0
2003	701	0	11	0	0	0	11	27	559	0
2004	468	0	307	0	223	14	544	0	238	0
2005	836	0	325	56	70	54	505	423	338	0
2006	855	0	597	11	1790	116	2514	115	262	0
96-05 Average	**682**	**0**	**254**	**6**	**185**	**27**	**471**	**153**	**537**	**14**
01-05 Average	**674**	**0**	**203**	**11**	**63**	**29**	**306**	**115**	**560**	**0**

[a] There were insufficient survey respondents in 1987 to generate estimates specific to the Snake River.

Table 13.–Sport fish effort and harvest by species from the Solomon River, 1984-2006, and catch, 1991-2006.

Year	Days Fished	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Arctic Grayling	Whitefish
					Harvest					
1984	766	0	299	0	0	0	299	221	0	0
1985	2,667	0	80	0	120	219	419	611	0	0
1986	102	0	0	0	38	0	38	0	0	0
1987	272	0	109	0	0	72	181	1,576	91	0
1988	309	0	18	0	0	0	18	36	127	0
1989	492	10	136	0	243	49	438	745	152	0
1990	458	0	12	0	361	14	387	182	17	0
1991	1,057	7	83	0	173	0	263	2,219	158	0
1992	962	0	316	0	210	0	526	131	0	0
1993	1,404	28	420	0	259	0	707	893	0	61
1994	1,193	0	235	0	256	0	491	269	0	19
1995	781	0	38	0	87	0	125	366	0	0
1996	335	0	142	0	0	0	142	49	0	0
1997	434	0	10	0	15	0	25	186	0	26
1998	340	0	0	16	154	0	170	383	0	0
1999	438	0	22	0	0	0	22	154	0	0
2000	242	0	32	0	113	0	145	0	0	0
2001	615	0	39	0	0	0	39	162	0	0
2002	475	0	0	0	0	0	0	29	0	0
2003	168	0	0	0	97	0	97	0	0	0
2004	129	0	90	0	0	0	90	53	0	211
2005	411	0	0	97	23	0	120	0	0	0
2006	251	0	156	0	100	0	256	153	0	0
96-05 Average	**359**	**0**	**34**	**11**	**40**	**0**	**85**	**101**	**0**	**24**
01-05 Average	**360**	**0**	**26**	**19**	**24**	**0**	**69**	**47**	**0**	**42**

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Table 13.–Page 2 of 2.

Year	Days Fished	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Arctic Grayling	Whitefish
					Catch					
1991	1,057	7	83	0	620	47	757	4,549	602	0
1992	962	0	316	0	998	91	1,405	197	38	0
1993	1,404	47	650	0	633	0	1,330	1,725	140	61
1994	1,193	0	255	0	784	7	1,046	520	212	19
1995	781	0	208	0	190	22	420	734	200	0
1996	335	0	237	0	39	0	276	49	97	0
1997	434	0	39	0	74	0	113	415	703	26
1998	340	17	59	64	433	0	573	410	0	0
1999	438	0	185	0	13	0	198	573	21	0
2000	242	57	53	119	288	278	795	1,537	853	0
2001	615	0	39	0	407	0	446	399	0	0
2002	475	0	35	0	192	81	308	18	0	0
2003	168	0	0	0	97	0	97	0	80	0
2004	129	0	90	0	195	0	285	67	130	211
2005	411	0	0	121	47	0	168	0	161	0
2006	251	0	156	32	267	11	466	230	83	0
96-05 Average	**359**	**7**	**74**	**30**	**179**	**36**	**326**	**347**	**205**	**24**
01-05 Average	**360**	**0**	**33**	**24**	**188**	**16**	**261**	**97**	**74**	**42**

Table 14.–Sport fish effort and harvest by species from the Kuzitrin River, 1984-2006, and catch, 1991-2006.

Year	Days Fished	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Arctic Grayling	Northern Pike	Whitefish	Burbot
							Harvest					
1984	279	0	0	0	325	0	325	260	195	156	0	0
1985	84	0	0	0	0	0	0	0	195	14	0	0
1986	318	0	0	0	0	0	0	38	189	151	0	0
1987	1,392	0	0	0	0	0	0	91	181	127	0	0
1988	1,037	0	0	36	55	54	145	109	1,255	437	36	0
1989	313	0	0	0	0	0	0	0	283	233	0	0
1990	572	0	0	0	28	14	42	0	133	746	0	0
1991	836	0	0	10	10	0	20	222	286	481	0	0
1992	469	0	8	0	46	0	54	8	0	128	0	0
1993	463	0	0	0	0	0	0	146	101	209	0	0
1994	643	0	109	0	0	0	109	0	98	169	0	0
1995	413	0	0	0	0	40	40	22	44	137	0	0
1996	483	0	0	0	39	0	39	85	230	497	0	0
1997	440	0	0	0	0	0	0	0	108	216	0	0
1998	122	0	0	0	0	0	0	0	8	38	0	0
1999	355	0	0	0	0	0	0	55	23	233	0	0
2000	373	0	0	0	0	0	0	0	64	63	36	0
2001	297	0	0	0	0	0	0	21	51	52	646	7
2002	203	0	0	0	0	0	0	0	18	127	0	0
2003	214	0	0	0	0	0	0	12	0	388	0	0
2004	215	0	0	0	0	0	0	0	34	404	0	0
2005	139	0	0	0	0	0	0	0	0	514	0	0
2006	70	0	0	0	0	0	0	0	0	0	0	0
96-05 Average	**284**	**0**	**0**	**0**	**4**	**0**	**4**	**17**	**54**	**253**	**68**	**1**
01-05 Average	**232**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**26**	**243**	**162**	**2**

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Table 14.–Page 2 of 2.

Year	Days Fished	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	All Salmon	Dolly Varden	Arctic Grayling	Northern Pike	Whitefish	Burbot
						Catch						
1991	836	0	0	10	41	0	51	333	1,349	1,937	0	0
1992	469	0	89	0	82	0	171	8	481	1,956	37	0
1993	463	0	0	0	0	0	0	263	288	751	9	0
1994	643	0	109	0	16	0	125	0	351	722	0	0
1995	413	0	0	0	0	40	40	54	192	1,005	0	11
1996	483	0	0	0	49	11	60	85	388	2,015	0	0
1997	440	0	0	64	0	0	64	85	1,068	1,503	0	0
1998	122	0	0	0	0	0	0	8	0	38	0	0
1999	355	0	7	7	0	0	14	176	158	1,840	0	0
2000	373	0	0	0	103	0	103	0	859	578	36	0
2001	297	0	0	0	0	0	0	22	760	2,738	646	7
2002	203	0	0	0	139	28	167	0	18	127	0	0
2003	214	13	0	0	0	0	13	0	12	970	0	0
2004	215	0	0	0	0	0	0	0	34	706	0	0
2005	139	0	0	0	0	0	0	0	0	950	0	0
2006	70	0	0	0	134	0	0	0	24	0	0	0
96-05 Average	**168**	**284**	**1**	**1**	**7**	**29**	**4**	**42**	**38**	**330**	**1,147**	**68**
01-05 Average	**156**	**214**	**3**	**0**	**0**	**28**	**6**	**36**	**4**	**165**	**1,098**	**129**

Table 15.–Sport fish effort and harvest by species from the Sinuk River, 1984-2006, and catch, 1991-2006.

Year	Days Fished	Salmon					All Salmon	Dolly Varden	Arctic Grayling	Whitefish
		King	Coho	Red	Pink	Chum				
						Harvest				
1984	366	0	234	26	1,272	143	1,675	844	428	0
1985	806	0	10	0	120	0	130	292	0	0
1986	Nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1987	5,198	0	0	380	91	72	543	652	724	0
1988	1,055	73	91	0	946	146	1,256	146	73	0
1989	906	0	10	0	0	10	20	175	51	104
1990	343	0	12	0	0	14	26	17	0	0
1991	885	0	71	41	51	47	210	729	129	0
1992	1,504	0	40	0	293	0	333	139	0	0
1993	874	9	96	0	115	0	220	536	37	0
1994	1,132	0	109	0	145	0	254	305	8	0
1995	1,295	0	19	21	28	0	68	158	18	0
1996	553	0	189	8	285	0	482	485	97	0
1997	443	0	0	0	54	0	54	346	0	0
1998	123	0	0	0	0	0	0	311	8	0
1999	244	0	0	0	0	0	0	88	11	0
2000	294	0	11	0	10	0	21	59	0	0
2001	490	0	62	39	0	0	101	86	43	0
2002	1,324	0	0	0	0	0	0	47	103	0
2003	430	0	0	0	0	0	0	712	12	0
2004	466	0	13	0	156	0	169	42	0	0
2005	549	0	230	11	62	0	303	141	16	0
2006	1,234	0	191	0	330	0	521	531	138	0
96-05 Average	**492**	**0**	**51**	**6**	**57**	**0**	**113**	**232**	**29**	**0**
01-05 Average	**652**	**0**	**61**	**10**	**44**	**0**	**115**	**206**	**35**	**0**
						Catch				
1991	885	0	167	41	224	186	618	2,584	1,291	0
1992	1,504	0	65	0	1,429	15	1,509	770	300	0
1993	874	9	143	10	547	28	737	1,179	879	0
1994	1,132	0	172	0	348	22	542	830	417	0
1995	1,295	0	113	66	125	44	348	723	498	9
1996	553	0	246	8	736	200	1,190	618	339	0
1997	443	0	196	10	76	160	442	1,249	1,464	0
1998	123	0	0	0	0	0	0	311	25	0
1999	244	0	0	0	0	0	0	198	22	0
2000	294	0	21	0	21	12	54	95	26	0
2001	490	0	96	39	11	0	146	108	218	0
2002	1,324	0	53	0	0	23	76	74	432	20
2003	430	0	0	0	68	14	82	840	249	0
2004	466	0	13	0	1,352	149	1,514	42	0	0
2005	549	0	742	67	279	477	1,565	294	171	0
2006	1,234	0	1,428	269	2,327	709	4,733	2,767	1,331	0
96-05 Average	**492**	**0**	**137**	**12**	**254**	**104**	**507**	**383**	**295**	**2**
01-05 Average	**652**	**0**	**181**	**21**	**342**	**133**	**677**	**272**	**214**	**4**

Table 16.-Documented subsistence harvest of Dolly Varden in Noatak and Kivalina, for selected years 1959-2006.

	Kivalina		
Year	Number	Pounds	Noatak Number
1959	34,240	85,600[a]	ND
1960	49,720	124,300[a]	ND
1962	ND	ND	27,623[b]
1963	ND	ND	4,130
1964	ND	93,995	ND
1965	ND	28,140	ND
1968	49,512	120,214	ND
1969	64,970	152,750	32,350
1970	33,820	79,420	3,700
1971	29,281	68,518	5,320
1972	48,807	114,637	1,492
1979[c]	14,600	ND	ND
1980	ND	ND	9,060
1981[c]	15-18,000	ND	7,220
1982[c]	18,438	69,059	3,056
1983[c]	16,270	68,467	2,676
1984[c]	12,000	ND	4,545
1985[c]	10,500	ND	2,542
1986[c]	7,436	ND	ND
1991	ND	ND	4,814[d]
1992	ND	ND	4,395[d]
1993	ND	ND	4,275[d]
1995	ND	ND	5,762[d]
1996	ND	ND	5,031[d]
1997	ND	ND	4,763[d]
1998	ND	ND	3,872[d]
1999	ND	ND	ND
2000	ND	ND	3,315
2001	ND	ND	2,702
2002	ND	ND	3,242
2003	ND	ND	6,386
2004	ND	ND	11,697
2005	ND	ND	ND
2006	ND	ND	ND

a Sarrio and Kessel 1966.

b Foote and Williamson 1966.

c Data from Sport Fish Division surveys.

d Data from ADF&G Subsistence Division household surveys (Georgette and Utermohle 1998).

Table 17.– Dolly Varden sport harvest and catch in NWMA by subarea, 1978-2006.

	Seward Peninsula/Norton Sound				Kotzebue/Chukchi Sea			
Year	Effort Days Fished	Dolly Varden Harvest	Dolly Varden Catch	% Harvested	Effort Days Fished	Dolly Varden Harvest	Dolly Varden Catch	% Harvested
1978	8,379	1,690	ND		4,997	199	ND	
1979	8,725		ND		2,593	1,772	ND	
1980	7,958	5,811	ND		3,841	301	ND	
1981	10,879	3,981	ND		5,284	1,177	ND	
1982	13,198	6,498	ND		6,906	1,531	ND	
1983	16,944	9,779	ND		7,963	2,192	ND	
1984	17,436	4,260	ND		7,791	3,804	ND	
1985	19,919	5,695	ND		6,701	1,557	ND	
1986	18,107	5,381	ND		6,313	1,300	ND	
1987	20,413	5,506	ND		9,288	1,072	ND	
1988	20,278	4,437	ND		5,279	983	ND	
1989	17,692	7,003	ND		4,932	999	ND	
1990	21,799	3,765	9,118	41	3,782	806	3,747	22
1991	23,622	10,365	25,425	41	9,543	1,149	1,658	69
1992	22,684	2,382	6,012	40	6,145	582	7,054	8
1993	18,930	5,907	22,166	27	7,809	914	7,190	13
1994	18,922	3,071	7,344	42	6,036	2,365	10,733	22
1995	19,647	2,908	7,921	37	8,495	939	7,804	12
1996	13,783	4,285	8,427	51	5,571	913	5,376	17
1997	13,850	4,467	17,988	25	3,729	598	7,346	8
1998	13,616	2,240	5,711	39	3,801	440	8,606	5
1999	15,006	6,708	21,428	31	6,771	796	8,259	10
2000	18,559	7,952	16,348	49	7,129	1,599	8,031	20
2001	10,955	3,174	7,395	43	5,904	1,693	4766	36
2002	18,325	2,252	7,877	29	6,417	1,884	6,552	29
2003	12,403	5,531	12,258	45	6,121	533	4,292	12
2004	13,323	4,318	13,200	33	5,704	1,285	3,777	34
2005	17,067	2,968	9,782	30	5,733	239	3,415	7
2006	16,082	3,180	9,955	32	6,334	2,198	7,836	28
96-05 Average	**14,424**	**4,547**	**12,292**	**38**	**5,683**	**1,069**	**5,938**	**19**
01-05 Average	**14,415**	**3,649**	**10,102**	**36**	**5,453**	**1,127**	**4,560**	**24**

Table 18.– Dolly Varden and Arctic char sport harvest in the NWMA by subarea and river, 1988-2006.

Areas	Year												
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Seward Peninsula/Norton Sound Historic Dolly Varden and Arctic Char Harvest													
Salt Water	418	55	183	0	204	205	90	0	12	189	0	330	1,069
Nome River	2,001	3,551	1,078	1,220	557	917	431	462	873	328	302	791	340
Pilgrim River	327	603	166	856	131	448	63	74	388	65	14	45	0
Unalakleet R	891	570	614	1,474	746	427	410	976	1,506	936	588	2,384	4,462
Fish-Niukluk R.	0	734	348	1,474	270	1,003	699	346	402	2,071	160	1,952	1,687
Sinuk R.	-	-	-	729	139	536	305	158	485	346	311	88	59
Snake R.	-	-	-	1,252	115	331	117	131	97	81	0	44	199
Solomon R.	-	-	-	2,219	131	893	197	366	49	186	383	154	0
Other Streams	1,218	1,545	1,227	1,141	89	1,050	759	395	473	265	482	920	136
Lakes [a]	0	0	332	0	0	97	0	0	0	0	0	0	0
Freshwater Total	4,437	7,003	3,765	10,365	2,178	5,702	2,981	2,908	4,273	4,278	2,240	6,378	6,883
Grand Total	4,855	7,058	3,948	10,365	2,382	5,907	3,071	2,908	4,285	4,467	2,240	6,708	7,952
Kotzebue/Chukchi Sea Historic Dolly Varden and Arctic Char Harvest													
Salt Water	0	0	0	199	0	0	27	22	0	28	0	0	281
Kobuk R.	-	23	34	170	99	9	132	28	172	82	49	49	47
Noatak R.	-	651	386	936	197	325	786	124	632	139	175	255	763
Other Streams	965	302	302	412	279	533	1,402	676	97	347	216	181	467
Lakes [a]	18	23	471	0	107	47	18	0	12	0	0	22	41
Freshwater Total	983	999	1,193	1,518	682	914	2,338	828	913	568	440	507	1,318
Grand Total	983	999	1,193	1,717	682	914	2,365	850	913	596	440	507	1,599

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Table 18.–Page 2 of 2.

Areas	Year						Average	
	2001	2002	2003	2004	2005	2006	1996-2005	2001-2005
Seward Peninsula/Norton Sound Historic Dolly Varden and Arctic Char Harvest								
Salt Water	166	67	0	72	95	0	200	80
Nome River	43	511	1,223	226	553	959	519	511
Pilgrim River	270	72	482	0	12	0	135	167
Unalakleet R	1,002	789	134	3,593	500	1,307	1,589	1,204
Fish-Niukluk R.	1,197	259	110	120	1,148	0	911	567
Sinuk R.	86	47	712	42	141	531	232	206
Snake R.	108	18	13	0	27	51	59	33
Solomon R.	162	18	0	53	0	153	101	47
Other Streams	140	471	2,857	212	141	179	610	764
Lakes [a]	0	0	0	0	0	0	0	0
Freshwater Total	3,008	2,185	5,531	4,246	2,968	3,180	4,154	3,498
Grand Total	3,174	2,252	5,531	4,318	3,063	3,180	4,354	3,578
Kotzebue/Chukchi Sea Historic Dolly Varden and Arctic Char Harvest								
Salt Water	108	18	0	0	0	116	43	25
Kobuk R.	79	197	29	642	0	71	128	189
Noatak R.	1,026	1,495	354	69	63	1,075	494	601
Other Streams	430	174	137	574	176	1,052	309	298
Lakes [a]	50	0	13	0	0	0	14	13
Freshwater Total	1,585	1,866	533	1,285	239	2,122	943	1,102
Grand Total	1,693	1,884	433	1,285	239	2,328	986	1,127

[a] Lake totals are for Arctic char.

Table 19–Aerial counts of Dolly Varden spawning in the Noatak River and overwintering in the Wulik and Kivalina rivers, 1968-2006.

	Spawners	Nonspawners	
Year	Noatak River	Wulik River	Kivalina River
1968	ND	90,286	27,640
1969	ND	297,257	ND
1976	ND	68,300	12,600
1979	ND	55,030	15,744
1980	ND	113,553	39,692
1981	7,922	101,826	45,355
1982	8,275	65,581	10,932
1984	9,290	30,923	5,474
1985	11,073	ND	ND
1986	ND	5,590	5,030
1988	ND	80,000	ND
1989	ND	56,384	ND
1990	7,261	ND	ND
1991	9,605	126,985	35,275
1992	ND	135,135	ND
1993	9,560	144,138	16,534
1994	ND	66,752	ND
1995	6,500	128,705	28,870
1996	12,184	61,005	ND
1997	ND	95,412	ND
1998	ND	104,043	ND
1999	9,636	70,704	ND
2000	ND	ND	ND
2001	ND	92,614	ND
2002	3,655[a]	44,257	ND
2003	ND	ND	ND
2004	ND	101,806	ND
2005	ND	120,848	ND
2006	ND	108,352	ND

[a] Only Kelly River and part of Kugururok River counted.

Table 20.–Arctic grayling sport harvest and catch in Seward Peninsula/Norton Sound waters, 1988-2006.

Areas	Year												
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Harvests													
Salt Water	55	0	0	0	0	0	131	0	0	0	0	0	0
Nome River	891	2,032	33	186	0	0	16	0	0	0	0	0	0
Pilgrim River	109	516	415	445	91	75	49	52	73	81	0	11	58
Unalakleet R		142	99	1,708	98	131	353	291	420	210	144	277	538
Fish-Niukluk R.	1,237	748	415	1,320	128	585	506	404	313	734	16	1,029	442
Sinuk R.	-	-	-	129	0	37	8	18	97	0	8	11	0
Snake R.	-	-	-	402	16	467	32	18	121	0	8	113	16
Solomon R.	-	-	-	158	0	0	0	0	0	0	0	0	0
Other Streams	2,636	767	416	773	159	289	236	254	461	236	122	159	149
Lakes	0	0	0	0	0	0	0	0	0	0	0	0	0
Freshwater Total	4,873	4,205	1,378	5,121	492	1,584	1,200	1,037	1,485	1,261	298	1,600	1,203
Grand Total	4,928	4,205	1,378	5,121	492	1,584	1,331	1,037	1,485	1,261	298	1,600	1,203
Catches													
Salt Water			0	0	0	0	0	0	0	0	0	0	0
Nome River	ND	ND	613	1,363	90	569	1,111	571	497	569	207	300	10
Pilgrim River	ND	ND	1,476	4,463	526	2,362	266	370	821	429	65	694	221
Unalakleet R	ND	ND	448	4,104	1,459	874	1,639	1,471	1,694	4,918	3,256	6,089	6,814
Fish-Niukluk R.	ND	ND	2,189	7,261	2,171	5,976	2,389	1,169	4,653	10,452	8,159	7,414	1,701
Sinuk R.	ND	ND	232	1,291	300	879	417	498	339	1,464	25	22	29
Snake R.	ND	ND	199	2,096	158	1,614	377	887	1,055	123	218	723	449
Solomon R.	ND	ND	33	602	38	140	212	200	97	703	0	21	853
Other Streams	ND	ND	929	1,980	1,030	809	670	622	1,250	1,529	1,570	869	992
Lakes	ND	ND	0	0	0	0	0	0	0	0	0	0	0
Freshwater Total	ND	ND	6,119	23,160	5,772	13,223	7,081	5,788	10,406	20,187	13,500	16,133	11,069
Grand Total	ND	ND	6,119	23,160	5,772	13,223	7,081	5,788	10,406	20,187	13,500	16,133	11,069

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Table 20.–Page 2 of 2.

Areas	Year						Average	
	2001	2002	2003	2004	2005	2006	96-05	01-05
Harvest								
Salt Water	0	0	0	0	0	0	0	0
Nome River	0	0	0	0	0	0	0	0
Pilgrim River	43	31	98	0	0	83	40	34
Unalakleet R	247	773	131	579	32	60	335	352
Fish-Niukluk R.	430	452	387	102	402	0	431	355
Sinuk R.	43	103	12	0	16	138	29	35
Snake R.	63	110	140	91	33	0	70	87
Solomon R.	0	0	0	0	0	0	0	0
Other Streams	168	96	1,010	52	112	138	257	288
Lakes	0	0	0	0	0	0	0	0
Freshwater Total	994	1,565	1,778	824	595	419	1,160	1,151
Grand Total	994	1,565	1,778	824	595	419	1,160	1,151
Catch								
Salt Water	0	0	0	0	0	0	0	0
Nome River	60	735	94	113	92	560	268	219
Pilgrim River	403	144	397	0	48	220	322	198
Unalakleet R	2,331	4,229	6,189	3,478	1,137	669	4,014	3,473
Fish-Niukluk R.	3,972	6,87	5,495	1,594	3,316	311	5,334	4,193
Sinuk R.	218	432	249	0	171	1,331	295	214
Snake R.	1,385	279	559	238	338	262	537	560
Solomon R.	0	0	80	130	161	83	205	74
Other Streams	1,098	351	1,954	533	112	794	1,026	810
Lakes	0	0	0	0	0	0	0	0
Freshwater Total	9,467	12,757	15,017	6,086	5,696	4,230	12,032	9,805
Grand Total	9,467	12,757	15,017	6,086	5,696	4,230	12,032	9,805

Table 21.– Arctic grayling sport harvest and catch in the Kotzebue Sound/Chukchi Sea subarea, 1990-2006.

Area	Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Harvest											
Salt Water	0	0	0	0	10	0	0	0	0	0	0
Kobuk R.	67	446	255	305	178	383	513	476	1,729	672	836
Noatak R.	269	817	105	322	407	185	1,136	872	42	412	223
Other Streams	286	631	248	234	186	263	393	555	0	97	45
Lakes	0	87	360	55	33	79	94	0	17	66	129
Freshwater Total	622	1,981	968	916	804	910	2,136	1,903	1,788	1,247	1,233
Grand Total	622	1,981	968	916	814	910	2,136	1,903	1,788	1,247	1,233
Catch											
Salt Water	0	0	0	0	10	0	0	0	0	0	0
Kobuk R.	790	1,535	1,593	1,717	1,593	5,146	2,469	2,815	5,280	6,680	5,753
Noatak R.	1,462	2,402	1,112	1,718	842	1,114	3,886	2,179	964	3,621	1,668
Other Streams	1,076	1,264	738	3,151	2,653	7,921	3,516	3,182	548	5,114	1,934
Lakes	0	174	1,548	642	374	1,560	1,306	216	404	66	376
Freshwater Total	3,328	5,375	4,991	7,228	5,462	15,741	11,177	8,392	7,196	15,481	9,731
Grand Total	3,328	5,375	4,991	7,228	5,472	15,741	11,177	8,392	7,196	15,481	9,731

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Table 21.–Page 2 of 2.

Area	Year						Average	
	2001	2002	2003	2004	2005	2006	96-05	01-05
Harvests								
Salt Water	0	0	0	0	0	0	0	0
Kobuk R.	355	1,674	781	1157	231	172	842	840
Noatak R.	620	79	528	317	38	301	427	316
Other Streams	111	233	129	509	0	270	207	196
Lakes	158	8	35	0	6	17	51	41
Freshwater Total	1,244	1,994	1,473	1,983	269	760	1,528	1,394
Grand Total	1,244	1,994	1,473	1,983	269	760	1,528	1,394
Catches								
Salt Water	0	0	0	0	1	0	0	0
Kobuk R.	4,103	18,080	5,860	8,369	5,778	2,328	6,105	7,610
Noatak R.	2,123	452	3,875	652	2,072	1,827	1,986	1,507
Other Streams	975	2,703	658	1,274	2,920	2,735	2,073	1,287
Lakes	171	460	233	0	517	17	323	173
Freshwater Total	7,372	21,695	10,626	10,295	2,900	6,907	10,487	10,578
Grand Total	7,372	21,695	10,626	10,295	2,900	6,907	10,487	10,578

Table 22.–Reported subsistence harvest of sheefish, Kotzebue District, 1966-2006a.

Year	Number of Fishermen Interviewed	Reported Harvest	Average Catch Per Household	Hotham Inlet Winter Harvest
1966-67	135	22,400	166	ND
1967-78	146	31,293	214	ND
1968-69	144	11,872	82	ND
1970	168	13,928	83	ND
1971	155	13,583	88	ND
1972	79	3,832	49	ND
1973	65	4,883	75	ND
1974	58	1,062	18	ND
1975	69	1,637	24	ND
1976	57	966	17	ND
1977	95	1,810	19	ND
1978	95	1,810	19	ND
1979	75	3,985	53	ND
1980	74	3,117	42	ND
1981	62	6,651	107	ND
5/82-4/83[b]	430	4,704	36	ND
5/83-4/84[b]	27	764	28	ND
5/84-9/84[b]	30	2,803	93	ND
1985[c]	2	60	30	ND
1986[b, c]	72	721	10	ND
1987[c]	46	276	6	ND
1988[c, d]	ND	ND	ND	ND
1989[d]	ND	ND	ND	ND
1990[d]	ND	ND	ND	ND
1991	40	2,180	55	ND
1992	43	2,821	66	ND
1993[d]	ND	ND	ND	ND
1994	171	3,181[e]	84	ND
1995	314	9,465[e]	24.6	15,161[f]
1996	389	6,465[e]	18	13,704[f]
1997	338	9,805[e]	24.6	ND
1998	435	5,350[e]	13.6	ND
1999	191	8,256[e]	18.6	ND
2000	237	7,446[e]	16.6	14,533[f]
2001	257	3,838[e]	10.6	ND
2002	115	4,310[f]	37.5	ND

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Table 22.–Page 2 of 2.

Year	Number of Fishermen Interviewed	Reported Harvest	Average Catch Per Household	Hotham Inlet Winter Harvest
2003	488	7,823	16	ND
2004	440	10,163	21.5	ND
2005 [d]	ND	ND	ND	ND
2006 [d]	ND	ND	ND	ND

[a] Due to limited survey effort during many years, total catch and effort are minimums and are not comparable among years. Data from Brennan et al. 1999.

[b] Summer harvests only.

[c] Data from fall subsistence salmon surveys may include summer and winter harvests.

[d] Subsistence sheefish harvests not documented.

[e] Reported harvests from Kobuk River villages only.

[f] Data from Sport Fish Division harvest estimates.

Table 23.– Sport fish harvest and catch of sheefish from northwest Alaska waters, 1978-2006.

	Kotzebue/Chukchi Sea Subarea								
	Sheefish		%	Kobuk River		%	Selawik River		%
Year	Harvest	Catch	Harvested	Harvest	Catch	Harvested	Harvest	Catch	Harvested
1978	506	ND		-	ND		-	ND	
1979	709	ND		-	ND		-	ND	
1980	1,713	ND		-	ND		-	ND	
1981	1,263	ND		1,015	ND		-	ND	
1982	2,222	ND		1,886	ND		-	ND	
1983	2,079	ND		1,448	ND		-	ND	
1984	3,050	ND		-	ND		-	ND	
1985	1,645	ND		1,330	ND		-	ND	
1986	3,363	ND		1,590	ND		-	ND	
1987	1,836	ND		865	ND		-	ND	
1988	964	ND		964	ND		-	ND	
1989	629	ND		131	ND		-	ND	
1990	151	403	37	151	336	44.9	0	0	0
1991	603	1,616	37	579	1,568	36.9	24	48	50.0
1992	1,904	3,678	52	627	2,034	30.8	411	411	100.0
1993	1,029	2,273	45	395	1,074	36.8	111	111	100.0
1994	564	958	59	135	386	35.0	95	95	100.0
1995	1,142	3,270	35	748	2,669	28.0	38	47	80.9
1996	485	3,183	15	360	2,850	12.6	94	271	34.7
1997	906	2,341	39	318	1,334	23.8	108	108	100.0
1998	414	924	45	145	617	23.5	148	186	79.6
1999	635	5,134	12	621	5,070	12.2	nd	nd	nd
2000	1,201	3,372	36	362	2,338	15.5	0	0	0
2001	1,305	5,146	25.4	552	4,105	13.4	0	0	0.0
2002	500	1,996	25.1	352	1,710	20.6	119	239	49.8
2003	2,509	7,324	34.3	676	4,517	15.0	59	59	100.0
2004	1,634	2,837	57.6	477	1,575	30.3	58	58	100.0
2005	393	1,043	37.7	393	1,043	37.3	0	0	0
2006	810	5,254	15.4	566	4,929	11.5	0	0	0
96-05 Average	**998**	**3,330**	**33**	**426**	**2,516**	**20**	**65**	**102**	**52**
01-05 Average	**1,268**	**3,669**	**36**	**490**	**2,590**	**23**	**47**	**71**	**50**

Table 24.-Sport fishing effort, and harvest of principal species in the North Slope subarea 1981-2006 and catches, 1990-2006.

Year	Days fished		Lake Trout		Char		Arctic Grayling	
	Total	Haul Road	Total	Haul Road	Total	Haul Road	Total	Haul Road
				Harvest				
1981	2,601	-	454	-	1,188	-	2,904	-
1982	4,879	-	629	-	2,065	-	4,077	-
1983	5,738	911	367	31	2,966	105	2,884	524
1984	8,344	1,620	481	416	1,507	351	2,441	1,247
1985	4,490	1,558	1,707	37	3,489	296	5,382	2,078
1986	4,779	842	415	-	983	322	4,099	907
1987	5,256	2,278	274	50	2,676	1,560	1,932	1,065
1988	2,541	1,265	73	73	1,018	327	983	528
1989	4,118	1,266	482	149	1,031	241	2,113	993
1990	3,764	2,502	168	118	489	219	791	554
1991	7,291	3,535	176	-	1,199	640	3,301	1,921
1992	4,940	2,211	379	293	836	336	1,145	324
1993	5,600	3,421	106	57	1,092	623	1,632	547
1994	5,407	2,926	73	73	589	451	807	371
1995	5,644	3,275	38	38	896	437	983	579
1996	4,487	2,700	19	-	1,108	547	1,194	619
1997	5,278	3,224	57	34	1,018	413	903	426
1998	3,653	2,121	221	129	1,454	1,071	1,182	604
1999	5,230	2,473	77	-	929	341	1,206	365
2000	4,739	2,325	18	18	1,178	267	934	370
2001	6,032	4,256	37	-	1,589	1,006	846	510
2002	6,032	2,224	217	-	773	266	2,215	590
2003	2,710	1,103	98	-	193	-	1,122	263
2004	3,311	873	75	-	180	105	868	103
2005	4,352	1,881	96	-	493	99	1,313	810
2006	3,104	1,298	10	-	304	53	235	68
Average								
1996-05	**4,582**	**2,318**	**92**	**60**	**892**	**457**	**1,178**	**466**
2001-05	**4,487**	**2,067**	**105**		**646**	**369**	**1,273**	**455**

-continued-

Table 24.-Page 2 of 2.

Year	Days fished		Lake Trout		Char		Arctic Grayling	
	Total	Haul Road	Total	Haul Road	Total	Haul Road	Total	Haul Road
					Catch			
1990	3,764	2,502	1,728	1,225	3,744	1,141	5,842	3,240
1991	7,291	3,535	932	161	2,670	1,635	9,200	4,668
1992	4,940	2,211	887	556	3,850	1,769	6,608	2,135
1993	5,600	3,421	266	180	3,946	2,454	9,345	5,505
1994	5,407	2,926	327	316	3,178	2,371	8,552	5,165
1995	5,644	3,275	370	319	3,229	1,780	5,427	3,828
1996	4,487	2,700	298	159	8,06	6,933	7,456	4,708
1997	5,278	3,224	783	67	4,094	1,433	16,248	12,524
1998	3,653	2,121	1,292	269	7,716	4,166	7,529	4,862
1999	5,230	2,473	913	55	4,520	497	9,956	4,875
2000	4,739	2,325	457	457	7,579	2,561	12,523	8,244
2001	6,032	4,256	266	87	6,027	3,244	7,035	5,413
2002	6,032	2,224	410	54	2,195	433	9,374	4,767
2003	2,710	1,103	1,164	103	936	398	7,944	3,326
2004	3,311	873	540	163	803	345	7,014	2,525
2005	4,352	1,881	433	288	1,756	621	12,270	7,769
2006	3,104	1,298	850	401	1,930	53	3,648	759
Average								
1996-05	**4,582**	**2,318**	**656**	**170**	**3,958**	**2,063**	**9,735**	**5,901**
2001-05	**4,487**	**2,067**	**563**	**139**	**2,343**	**1,008**	**8,727**	**4,760**

Table 25.-Aerial survey indices of Arctic char from the Ivishak, Anaktuvuk, and Kongakut rivers of the North Slope, 1971-2006.

Year	Date	Ivishak River	Anaktuvuk River	Kongakut River	Survey Method	Survey Rating	Data Source
1971	22-Sept	24,470	ND	ND	H	Good	Yoshihara 1973
1972	24-Sept	11,937	ND	ND	H	Good	Yoshihara 1972
1973	11-Sept	8,992	ND	ND	H	Excellent	Furniss 1975
1974	10-Sept	11,000	ND	ND	H	Not Rated	Furniss 1975
1975	22-Sept	8,306	ND	ND	H	Not Rated	Bendock 1982
1976	22-Sept	8,570	ND	ND	H	Fair	Bendock 1982
1977	NS	ND	ND	ND	ND	ND	ND
1978	NS	ND	ND	ND	ND	ND	ND
1979	22-Sept	24,403	15,717	ND	S	Excellent	Bendock 1980
1980	NS	ND	ND	ND	ND	ND	ND
1981	22-Sept	24,873	10,536	ND	S	Excellent	Bendock 1982
1982	22-Sept	36,432	6,222	ND	S	Excellent	Bendock 1983
1983	22-Sept	27,820	8,743	ND	S	Excellent	Bendock and Burr 1984
1984	22-Sept	24,818	5,462	ND	S	Excellent	Bendock and Burr 1985
1985	NS	ND	ND	ND	ND	ND	ND
1986	ND	ND	ND	8,900	?	?	Millard USFWS files*
1987	NS	ND	ND	ND	ND	ND	ND
1988	NS	ND	ND	ND	ND	ND	ND
1989	22-Sept	12,650	ND	6,355	H	Good	DeCicco ADF&G files*
1990	NS	ND	ND	ND	ND	ND	ND
1991	NS	ND	ND	ND	ND	ND	ND
1992	NS	ND	ND	ND	ND	ND	ND
1993	3-Sept	3,057	ND	ND	H	Good	Millard USFWS files*
1994	NS	ND	ND	ND	ND	ND	ND
1995	27-Sept	27,036	ND	14,080	H	Good	Burr ADF&G files*

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Table 25.-Page 2 of 2.

Year	Date	Ivishak River	Anaktuvuk River	Kongahut River	Survey Method	Survey Rating	Data Source
2000	22-Sept	4,530[a]	ND	ND	H	Excellent	Viavant 2001
2001	22-Sept	10,932 [b]	ND	ND	H	Excellent	Viavant 2002
2002	22-Sept	5,408 [b]	4,800	ND	H	Excellent	Viavant 2003
2003	22-Sept	2,720 [b]	ND	ND	H	Good	Viavant 2005
2004	ND	ND	ND	ND	ND	ND	ND
2005	ND	ND	ND	ND	ND	ND	ND
2006	22-Sept	5,411 [b]	5,477	ND	H	Good	Viavant ADF&G files*

NS = no survey, H = helicopter, S = fixed wing aircraft (Super Cub; PA-18)

[a] 6 km reach based on multiple aerial surveys.

[b] Complete 28 km index area, based on multiple aerial surveys Sept 18-22.

* M. Millard, Fishery Biologist, USFWS, Fairbanks; personal communication; F. Decicco, SF Biologist, ADF&G, Fairbanks; personal communication; J. Burr, SF Biologist, ADF&G, Fairbanks; personal communication; T. Viavant, SF Biologist, ADF&G, Fairbanks; personal communication.

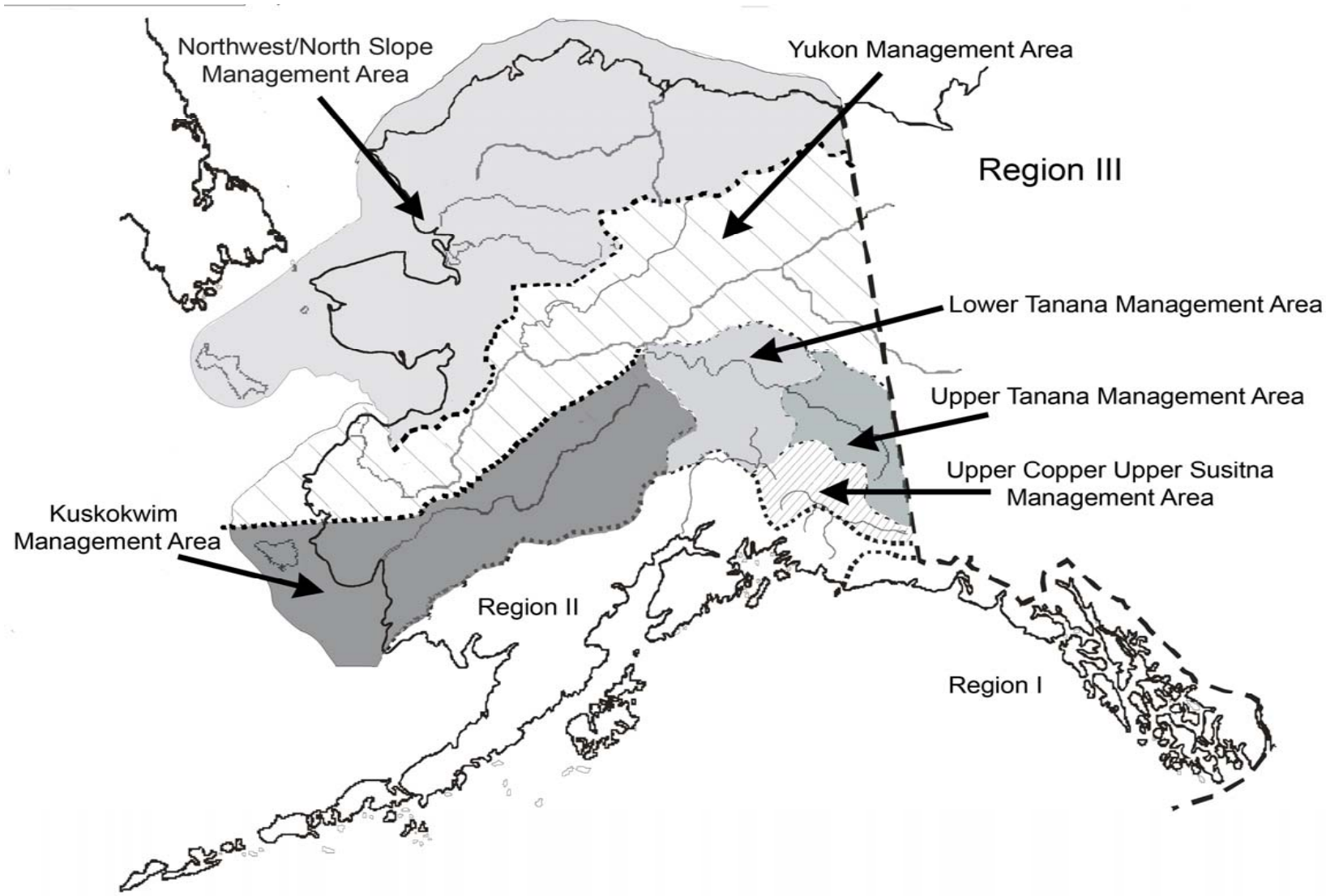

Figure 1.-Map of the sport fish regions in Alaska and the six Region III management areas.

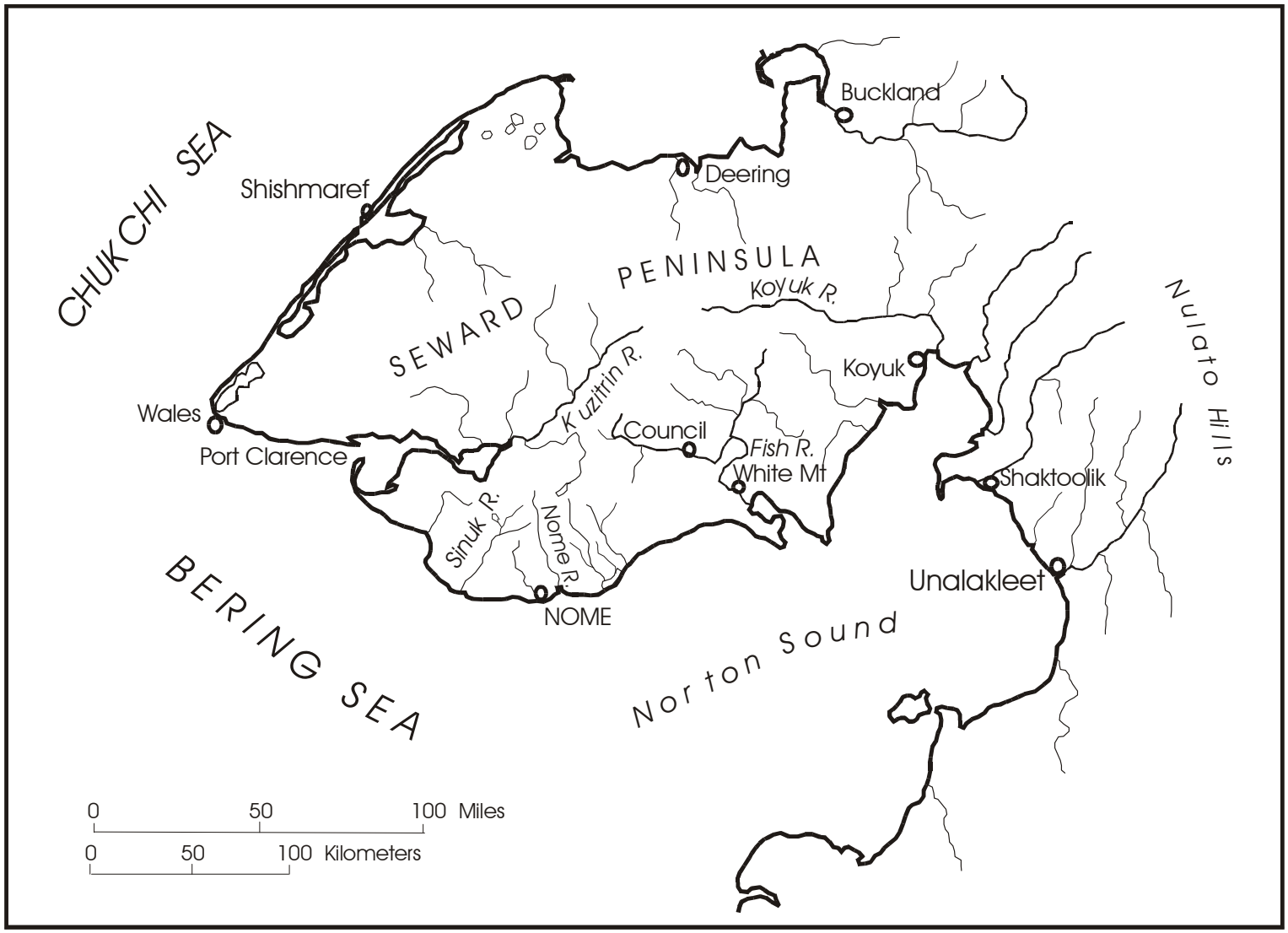

Figure 2.-The Seward Peninsula/Norton Sound subarea.

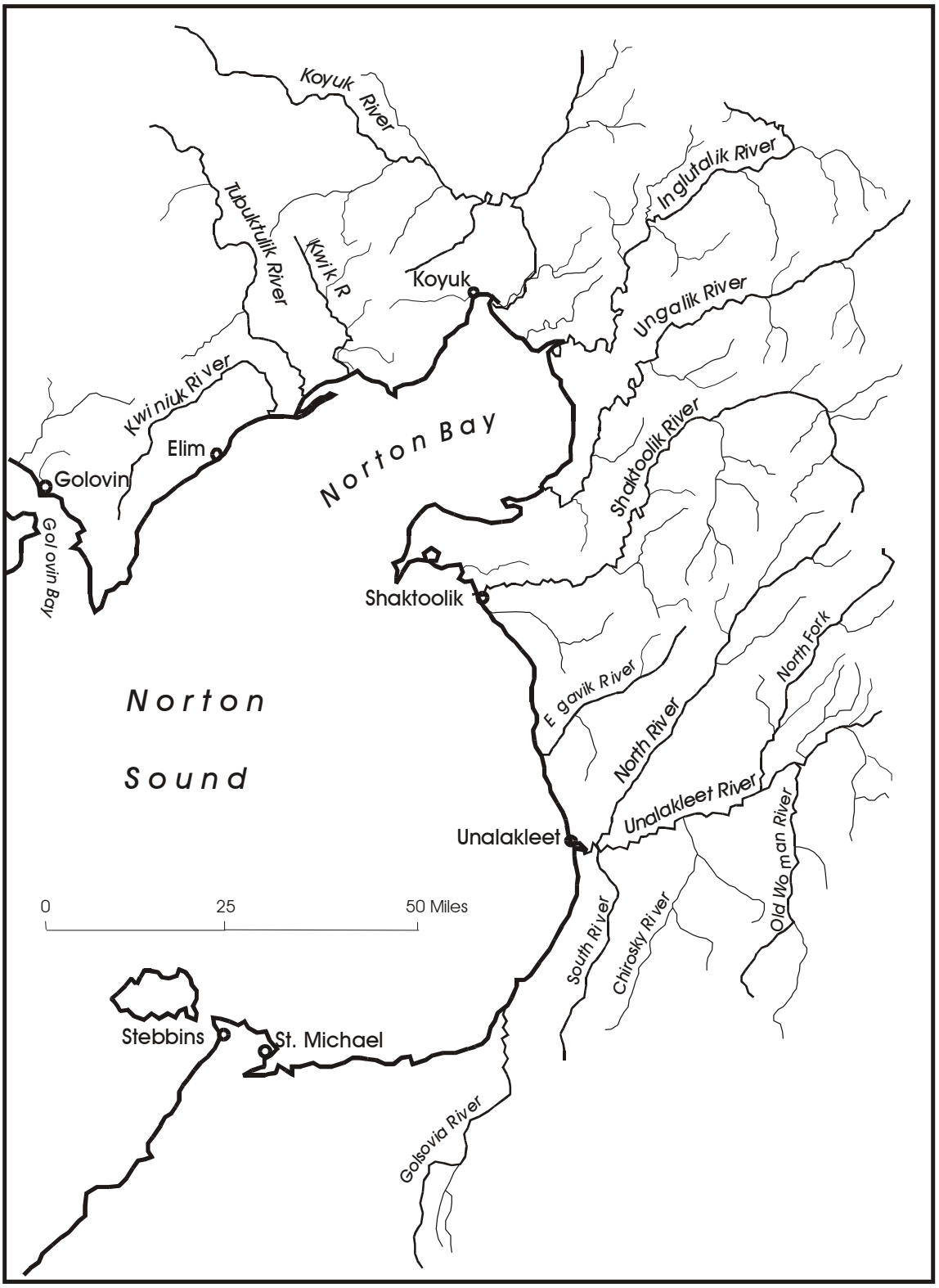

Figure 3.-Eastern Norton Sound.

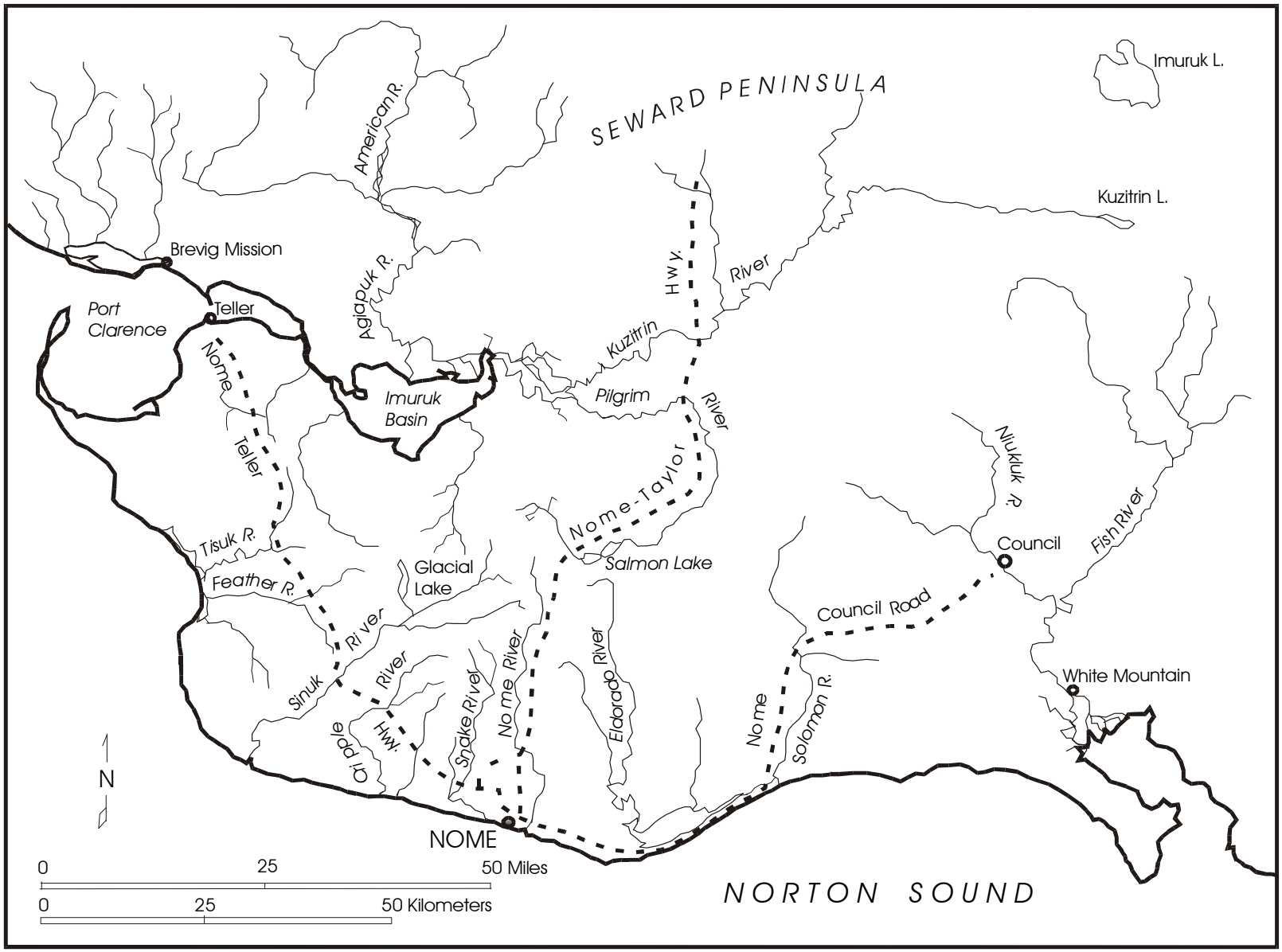

Figure 4.-Southern Seward Peninsula with road accessible waters.

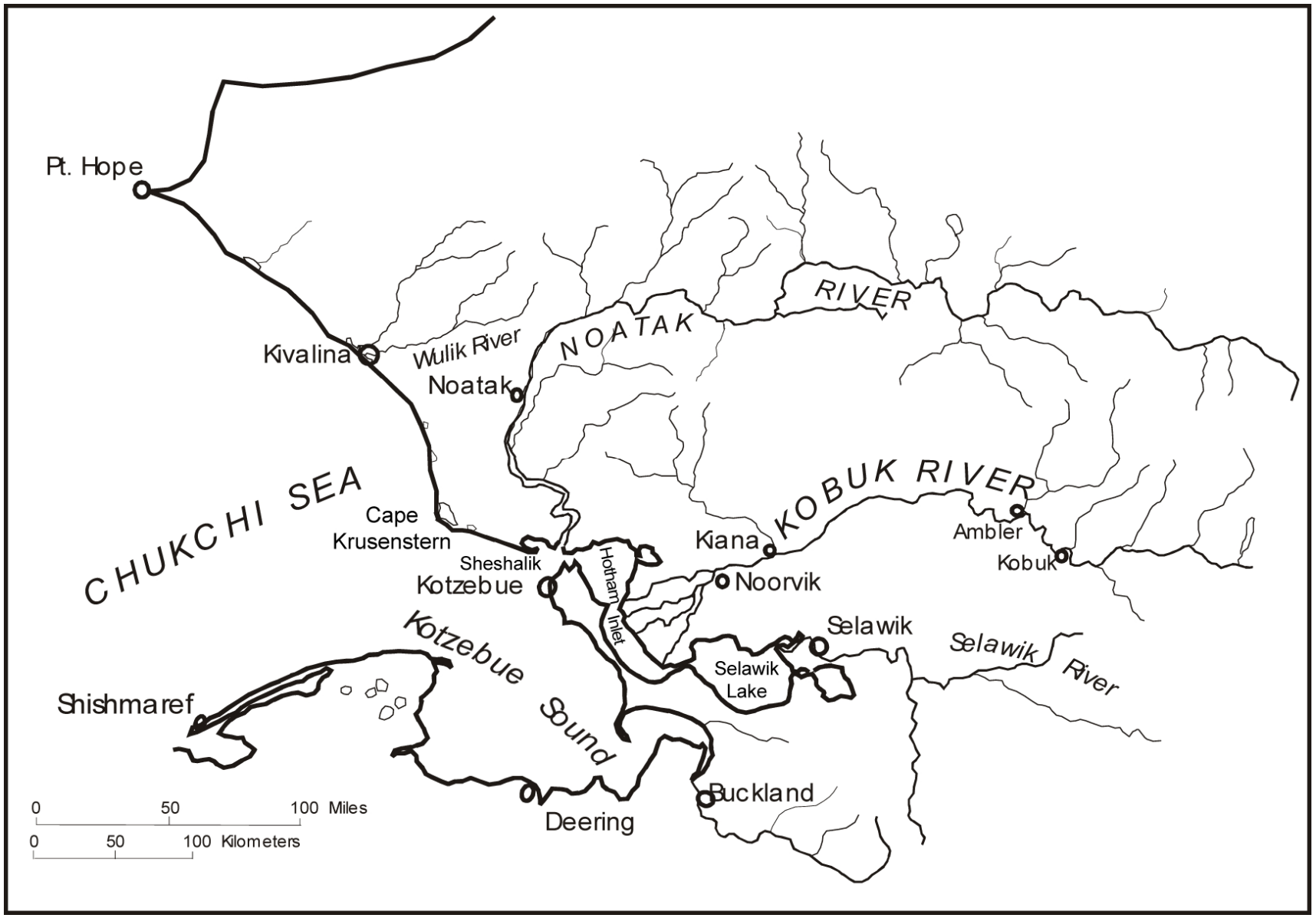

Figure 5.-Kotzebue Sound Chukchi Sea subarea.

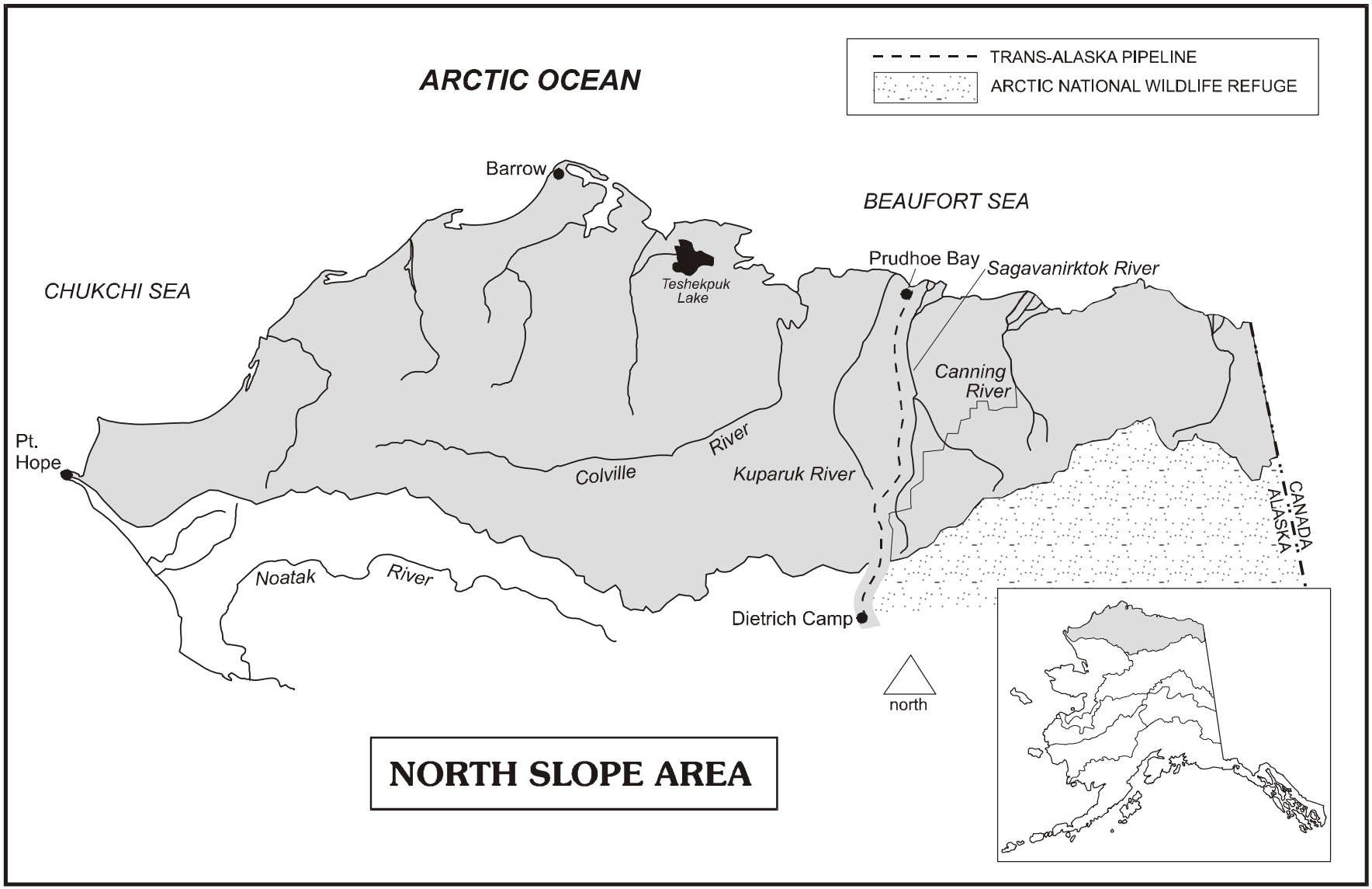

Figure 6.-North Slope subarea.

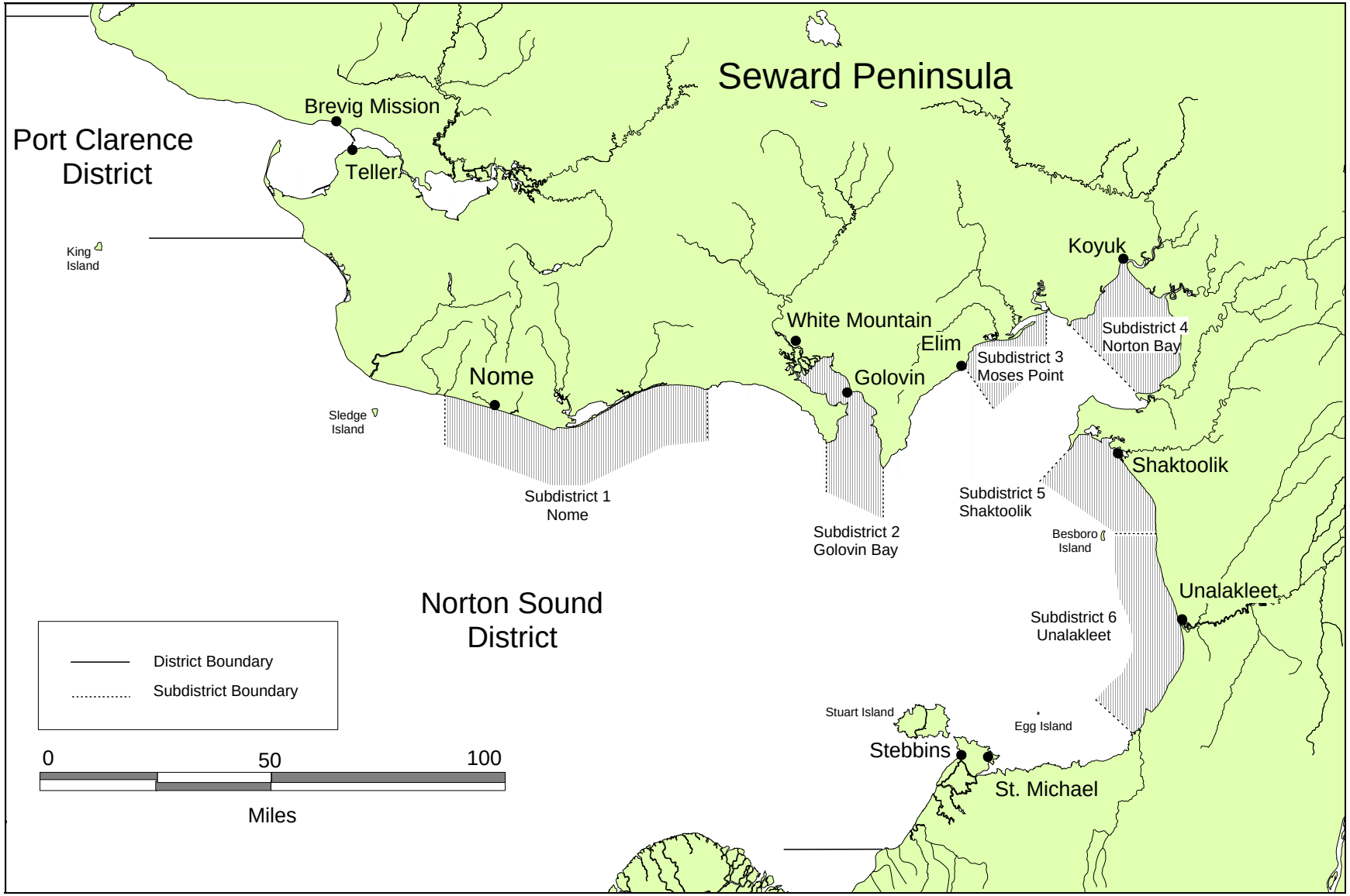

Figure 7.-Commercial salmon fishing subdistricts in Norton Sound and Port Clarence.

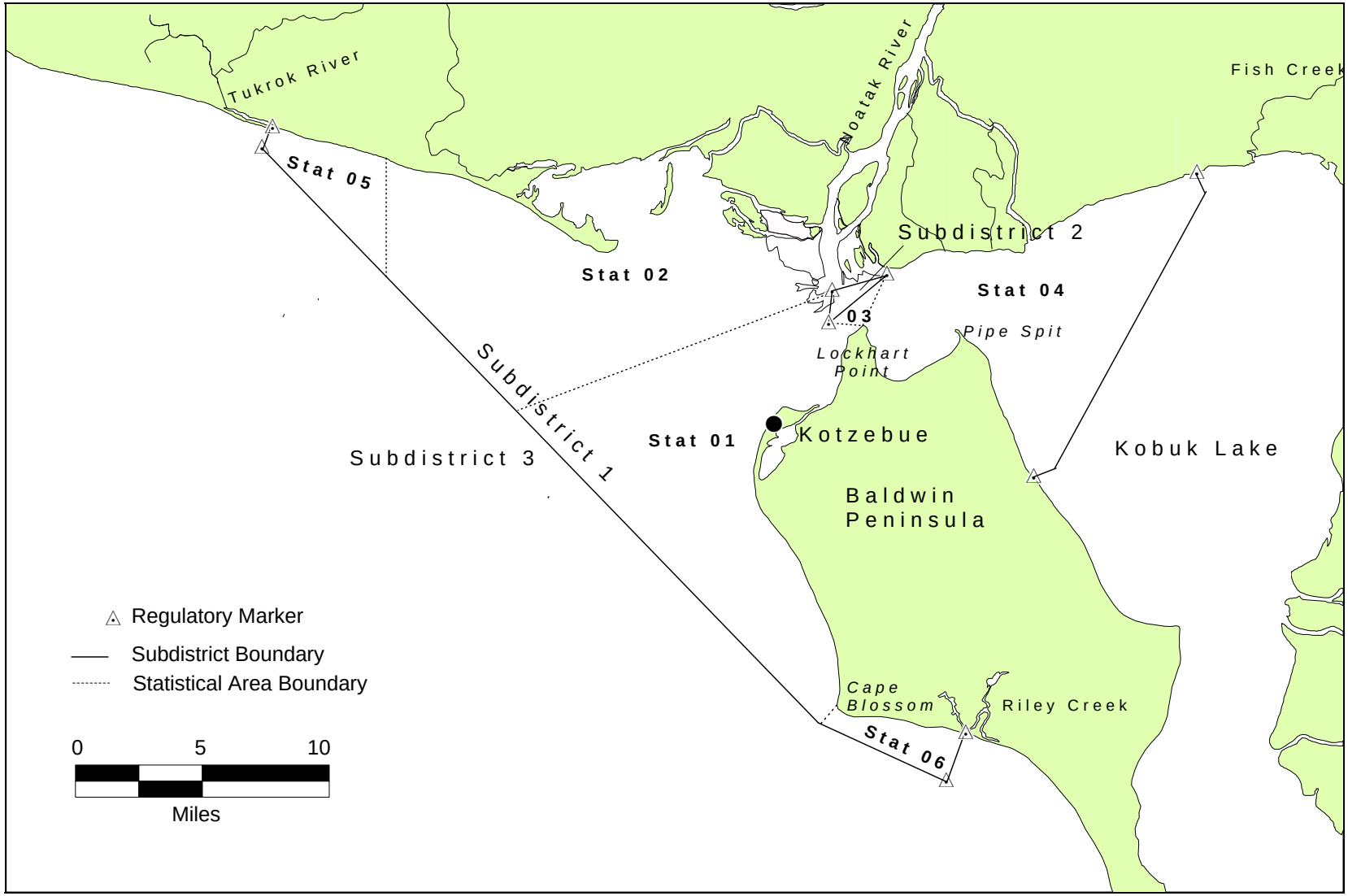

Figure 8.-Kotzebue commercial salmon fishing district.

APPENDIX A
UNALAKLEET RIVER KING SALMON MANAGEMENT PLAN

5 AAC 04.395. Subdistricts 5 and 6 of the Norton Sound District and the Unalakleet River King Salmon Management Plan. (a) The purpose of this management plan is to provide the department management direction for the subsistence, sport, and commercial king salmon fisheries in the marine waters of Subdistricts 5 and 6 and in the Unalakleet River drainage from June 15 through July 15.

(b) From June 15 through June 20,

(1) the commissioner will close, by emergency order, subsistence fishing and immediately reopen subsistence fishing with two 48-hour fishing periods per week in the marine waters of Subdistricts 5 and 6; and two 36-hour fishing periods per week in the inriver fishery;

(2) in the sport fishery,

(A) the bag and possession limit for king salmon is two fish, of which only one fish may be 20 inches or greater in length;

(B) the annual limit for king salmon 20 inches or greater in length is two fish;

(3) commercial fishing is closed.

(c) If the projected escapement is below the lower end of the escapement goal range, all fishing will be closed.

(d) Notwithstanding any provision of 5 AAC 39.222 and 5 AAC 39.223, if the projected king salmon count at the North River counting tower exceeds the midpoint of the escapement goal,

(1) the commissioner may open, by emergency order, a subsistence king salmon fishery in the

(A) marine waters of Subdistricts 5 and 6 for two 48-hour fishing periods per week; and

(B) inriver fishery for two 36-hour fishing periods per week;

Appendix A.–continued.

(2) the commissioner may increase, by emergency order, the sport fish annual limit for king salmon, 20 inches or greater in length, to four fish;

(3) the commissioner may open, by emergency order, a commercial king salmon fishery with two 24-hour fishing periods per week.

(e) If subsistence fishing periods in the Unalakleet River drainage are restricted to less than two 36-hour openings, the sport fish harvest annual limit for king salmon will be reduced to one fish with no size limit.

(f) In Subdistricts 5 and 6, if the marine waters subsistence fishery is restricted to less than two 48-hour fishing periods, the sport fishery will be reduced, by emergency order, to catch-and-release fishing only.

(g) In the Unalakleet River drainage or in the marine waters of Subdistricts 5 and 6, if the subsistence fishery is closed to the retention of king salmon, sport fishing for king salmon will be closed. (Eff. 6/7/2007, Register 182)

Authority: AS 16.05.060 AS 16.05.251 AS 16.05.258

APPENDIX B
SPORT FISH EMERGENCY ORDERS ISSUED DURING 2006

Appendix B.–NW/NSMA sport fish emergency orders issued during 2006.

E.O. Number	Dates	Action
EO-3-KS-01-06	July 8– August 15	Prohibited the retention of King salmon in the Unalakleet and Shaktoolik rivers and prohibited the use of bait.

APPENDIX C
ADDRESS AND CONTACT INFORMATION FOR FEDERAL LANDS IN THE NW/NSMA

Gates of the Arctic National Park and Preserve
http://www.nps.gov/gaar/
P.O. Box 30
Bettles, AK 99726
(907) 692-5494

Arctic National Wildlife Refuge
http://arctic.fws.gov/
101 12th Avenue, Room 236
Fairbanks, Alaska 99701
(907)456-0250 or (800)362-4546

Bering Land Bridge National Preserve
http://www.nps.gov/bela/
PO Box 220
Nome, AK 99762
(907) 443-2522

Alaska Maritime National Wildlife Refuge
http://alaskamaritime.fws.gov/
95 Sterling Highway, Suite 1 MS 505
Homer, Alaska 99603
(907)235-6546

Noatak National Preserve
http://www.nps.gov/noat/
P.O. Box 1029
Kotzebue, AK 99752
(907)442-3890

Kobuk Valley National Park
http://www.nps.gov/kova/
P.O. Box 1029
Kotzebue, AK 99752
(907)442-3890

Selawik National Wildlife Refuge
http://selawik.fws.gov/
P. O. Box 270 MS 565
Kotzebue, Alaska 99752
(907)442-3799

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Cape Krusenstern National Monument
http://www.nps.gov/cakr
P.O. Box 1029
Kotzebue, AK 99752
(907)442-3890

Unalakleet National Wild and Scenic River
http://www.blm.gov/ak/ado/unkriver.html
222 West 7th Avenue, #13
Anchorage, AK 99513
(907) 271-5477