Fishery Management Report No. 09-40

Fishery Management Report for Sport Fisheries in the Northwest/North Slope Management Area, 2007

by

Brendan Scanlon

September 2009

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

Symbols and Abbreviations

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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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by

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September 2009

The Fishery Management Reports series was established in 1989 by the Division of Sport Fish for the publication of an overview of management activities and goals in a specific geographic area, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. 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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This document should be cited as:
Scanlon, B. 2009. Fishery Management Report for sport fisheries in the Northwest/North Slope Management Area, 2007. Alaska Department of Fish and Game, Fishery Management Report No. 09-40, Anchorage

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PREFACE

This report provides information for the Northwest/North Slope Management Area (NW/NSMA) 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 Dingle-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 2007, with preliminary information from the 2008 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 2007 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), 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 2007, angler-days totaled 25,848 with the largest proportion coming from the Unalakleet River drainage. Coho salmon was the predominant sport species harvested in 2007 with 6,939 fish taken followed by Dolly Varden (5,883) and pink salmon (1,631). 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, Chinook salmon, king salmon, coho salmon, pink salmon, Arctic grayling, Dolly Varden, sheefish, northern pike, Management Report.

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 Fisheries (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-year 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 2007, the department had direct support responsibilities for 82 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 Chinook (king) salmon *Oncorhynchus tshawytscha* 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 Wild Arctic Grayling Management Plan (5 AAC 70.055) 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, 2007) 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 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. A listing of the addresses and contact numbers for these federal management units can be found in Appendix D.

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, 1981, 1982-1994; Howe et al. 1995-1996, 2001a-d, Walker et al. 2003, Jennings et al. (2004, 2006a,b, 2007, 2009, *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 2007 were not available until fall 2008. 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), 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). Fish species present in the Northwest/North Slope Management Area include anadromous Dolly Varden *Salvelinus malma*, Chinook (king), 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, broad whitefish *C. nasus*, burbot *Lota lota* and lake trout *Salvelinus namaycush*.

NORTON SOUND/SEWARD PENINSULA

Drainages in eastern Norton Sound (Figure 3) include the Golsovia, Unalakleet, Egavik, Shaktoolik, Inglutalik, Ungalik and Koyuk rivers. All but the Koyuk River 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 (northern pike are found in the 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 since 1967, 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 SOUND/CHUKCHI SEA

Major drainages flowing into the Kotzebue Sound and Chukchi Sea include the Selawik, Kobuk, Noatak, Wulik, Kivalina and Buckland rivers (Figure 5). 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, 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 numbers of 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 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 AREA

The North Slope of the Brooks Range (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 livelihood 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.

Commercial fisheries for salmon in the Norton Sound District have been ongoing since 1961. The initial species of interest were king and coho salmon, but commercial 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 (2002–2006) in the entire Norton Sound District have been 36 king, 57,926 coho, 5,171 chum, 65 sockeye and 0 pink salmon (Table 1). The 2006 season was the best in recent years, particularly for coho, with a total harvest of 12 king, 3 sockeye, 130,808 coho, 3,769 pink and 10,042 chum salmon. In 2007, commercial harvests in Norton Sound were 19 king, 2 sockeye, 126,115 coho, 22,431 chum salmon, and 3,769 pink salmon. The 2007 coho salmon harvest is the second highest on record in the Norton Sound commercial fishery and the chum salmon harvest was the largest since 1997 (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. In 2007, due to these recent increases in sockeye salmon returns, a commercial fishery for sockeye salmon was permitted for the first time, with a guideline harvest limit of 10,000 sockeye salmon. However, participation was low (three permit holders) and catches of chum salmon exceeded sockeye salmon 3 to 1 (3,183 to 1,152; Soong et al. 2008).

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 (2002–2006) in the Kotzebue Sound District have been 59,797 chum salmon and 65 Dolly Varden (Soong et al. 2008; Table 1). In 2007, the chum salmon harvest in the Kotzebue Sound District was 147,087 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.

Commercial Fisheries Division (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 2). 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 adopts an OEG as regulation and the department manages to maintain escapements within the bounds of the OEG. Currently, there are 25 escapement goals for Norton Sound area salmon stocks (10 for chum, five for king, five for pink, three for coho, and 2 for sockeye salmon; Table 2).

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, and by permits issued by and returned to Division of Commercial Fisheries. Recent subsistence salmon harvests (2002–2006) have averaged about 86,000 fish in the Norton Sound District (Table 3). This average harvest was composed of 4,333 king, 582 sockeye, 13,496 coho, 58,120 pink, and 9,188 chum salmon. In 2007, 48,694 salmon were harvested in the Norton Sound District. Of these, 2,646 were king, 938 sockeye, 12,023 coho, 21,039 were pink, and 12,048 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 3).

In 2001, the BOF passed a regulation expanding legal gear for subsistence fishers to include a line attached to a rod or pole in all waters of northern Norton Sound from Cape Espenberg along the coast to Bald Head Point, which encompasses all waters of the Port Clarence District, as well as the Nome and Golovin subdistricts (Figure 7). Although standard sport fishing gear can be used for subsistence fishing in these areas, sport fish methods and means regulations still apply (e.g., no snagging, etc.). Sport fish bag and possession limits by species as specified in 5 AAC 70.022 also apply, except when fishing through the ice or when a subsistence permit is required (such as in the Port Clarence District and the Nome and Golovin subdistricts) in which case the limits specified in the subsistence permit will apply. However in all areas where sport gear is legal subsistence gear as well, fishers cannot combine sport fish bag and possession limits with subsistence harvest permit limits.

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 2005–2007, 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 Kotzebue area in 2005 or 2006 (Table 3). In the Kotzebue Sound 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 to 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 whitefishes 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 recently-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 1997 tower counts have declined steadily, and the counts have failed to reach the lower end of the SEG for four out of the last 10 years (1998–2007). In 2006, the count was 906 fish, which is the all-time low, but in 2007, a late push of fish came into the river and the final tower count was 1,948 fish. Uncertainty regarding the reasons for the declines 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 National Park Service (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 NW/NSMA, 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 right-of-ways 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 NW/NSMA; however, a boat launching facility was recently built in the village of Unalakleet using Access funds. A proposal for a boat ramp on the Nome River by the City of Nome was discussed but never submitted to ADF&G.

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.

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, 2006a-b, 2007, 2009,*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 4). During 2007, the total sport fishing effort for the NW/NSMA was estimated at 25,848 angler-days. The recent five-year average (2002–2006) sport fishing effort for the NW/NSMA is 23,599 angler-days (Table 4).

The Seward Peninsula and Norton Sound subarea accounts for most of the sport fishing in the NW/NSMA. Effort in the subarea has averaged 14,265 angler-days over the past five years (2002–2006, Table 4). Rivers supporting the most sport fishing effort in the NW/NSMA have been the Unalakleet, Fish/Niukluk, and Nome rivers. Angler effort was estimated at 4,205 angler-days for the Unalakleet River in 2007, approximately 25% of the total effort in the subarea (Table 4). 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 2,169 angler-days over the past five years (2002–2006) but increased to 4,517 angler-days in 2006 and 3,887 in 2007. The recent increases in effort is 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 1,847 angler-days of effort for the past five years. In 2007, effort on this river system was estimated at 1,539 angler-days. Estimated effort on the Snake and Pilgrim rivers has averaged about 670 angler-days each over the previous five years (Table 4).

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 4). After showing a decline to about 3,800 angler-days in 1997 and 1998, effort has stabilized between 5,000 and 6,500 angler-days over the past few years, and in 2007 there were an estimated 5,027 angler-days in the subarea (Table 4). 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 (1997–2006) was 4,444 angler-days, with 50% of that coming from Haul Road fisheries (Table 4). 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.

Total sport fishing effort in the NW/NSMA in 2007 was near the recent 10-year average. Harvest and catch of Pacific salmon in the NW/NSMA in 2007 were also both near the 10-year averages, but had declined significantly from 2006 (Tables 5 and 6). In 2007, the estimated number of salmon harvested in the NW/NSMA was 9,658 fish and the catch was 28,294 fish, which was 49% and 48% lower respectively than the recent 10-year averages. Much of this decrease can be attributed to reductions of pink and coho salmon returns from the previous year, which were record and near-record high returns of pink and coho salmon in Southern and Northern Norton Sound in 2006. While harvest and catch of Dolly Varden in NW/NSMA in 2007 were near recent 10-year averages, catches of other species including Arctic grayling and lake trout were well below average (Tables 5 and 6). This likely reflects changes in angler preferences towards higher catch rates of larger fish rather than harvest as a primary motivation, and probably not any declines in abundances of these species. Reported catches of northern pike were 6.5 times the recent 5-year average, but this was likely caused by the survey response from one individual who claimed to fish an extraordinary amount of time for northern pike on the Kuzitrin River in 2007, and may not reflect real trends in area-wide effort for northern pike. 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 in Norton Sound anglers occasionally try trolling for salmon (king, coho, and pink) on calm days, but the proportion of angler-days spent fishing in saltwater is generally less than 5% of the total annual area-wide effort. Guided sport fishing comprises a small amount of the effort in northwestern Alaska, and in 2007 there was no sport fish guiding activity on the North Slope. 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 (2002–2006), about 50% of the total average harvest has been coho salmon, 36% pink salmon, 8% chum salmon, 4% king salmon, and 2% sockeye salmon. In 2007, 72% of the total average harvest was coho salmon, 17% pink salmon, 7% chum salmon, 3% king salmon, and 1% sockeye salmon (Table 5).

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. Sportfishing for king salmon in the Unalakleet River is popular with both guided, non-resident anglers as well as local residents. Generally about 50% of the king salmon harvested from the river each year are taken by local residents. 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. 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 25% of the total 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 NW/NSMA in all but two years. The 2002 effort was the highest record at 8,195 angler-days, and in the last five years (2002–2006) has averaged 4,902 angler-days. Unalakleet River salmon harvests trended upward between 1990 and 2000, and have remained relatively stable since (Table 7). The average annual sport harvest of all salmon species from the Unalakleet River in 2002–2006 has been about 4,900 fish. Coho comprised about 70% of the average harvest while king salmon made up about 7%. Approximately 50% of the entire NW/NSMA harvest of king salmon, and 68% of the coho salmon harvest were taken from the Unalakleet River in 2007.

In 2007, the king salmon fishery was closed by EO on July 6 based on near record-low early season returns. (Appendix B). Based on the North River Tower count on July 3 (30 fish), it was projected that the North River would not reach the lower end of its escapement goal (1,200–2,400 king salmon) in 2007. However, an unusually late-season push of king salmon came in to the river, ending with a total escapement of 1,948 fish. Nevertheless, the sport fishery was not reopened, in part due to a shift in effort to coho salmon, which returned in record numbers (19,965 fish past the tower; Table 2). In response to the record run of coho salmon, the daily bag and possession limit was increased by EO from three to ten effective August 17. No other management actions were taken in 2007.

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 7). In 2006, 304 king salmon were harvested and in 2007, 147 fish were harvested. The total escapement 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 radiotagged fish moving upstream in each drainage. In both 1997 and 1998 about 40% of the radiotagged king salmon were located above 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 (2002–2006) the commercial harvests of king salmon in the Unalakleet Subdistrict have been declining and have averaged 36 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 2007 (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 (Soong et al. 2008). The recent five-year average (2002–2006) harvest was 2,405 fish. The 2007 subsistence harvest was estimated at 1,665 king salmon. The sport fish harvest over the same five-year period has averaged 321 fish, or about 13% of the total Unalakleet salmon harvest (Table 7). In 2007 the estimated sport fish harvest of 147 fish was about 9% 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 harvest of coho salmon in the Unalakleet River was 3,959 in 2005, 4,985 fish in 2006, and 4,117 in 2007 (Table 7). The coho salmon sport fishery is more consumptive than most other Unalakleet salmon fisheries. Approximately 40% of coho caught are harvested while about 26% of king, 13% of chum, and 16% of pink salmon (2002–2006 average) caught are harvested. The sport fish harvest from 2002 to 2006 has averaged 3,402 fish, or about 69% of the total sport salmon harvest (Table 7).

From 2002 to 2006 commercial harvests of coho salmon in the Unalakleet subdistrict have averaged 43,579 fish. Since 1961 they have ranged from 79 in 1964 to 98,336 in 2006 (Soong et al. 2008). Between 2002 and 2006, subsistence harvests of coho salmon in the community of Unalakleet averaged 7,249 fish and the 2007 subsistence harvest was estimated at 6,003 coho. 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), and in 2007 the escapement past the North River tower was 19,994 (Table 2). A radiotelemetry 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 mandates inseason management actions in the subsistence, sport, and commercial king salmon fisheries based on North River tower count projections to achieve the escapement goal (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. A revised sustainable escapement goal (SEG) range for king salmon of 1,200 and 2,600 for the North River was adopted by the BOF in 2007.

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 salmon returns in the Unalakleet River are at more acceptable levels, particularly for coho salmon. While the commercial harvests of king salmon in the Unalakleet Subdistrict have been minimal 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) comprise 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 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 salmon in combination.

In 2007, the BOF adopted the Unalakleet River King Salmon Management Plan, which used thresholds within the escapement goal range and projected North River tower counts to trigger inseason management actions in the subsistence, sport, and commercial fisheries (Appendix A). With the adoption of 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 salmon radiotelemetry project supported in part by the BLM was begun in 2004. Approximately 200 coho salmon were fitted with radio transmitters each year and tracked to spawning locations. Results of this project suggest that 8%–15% of coho salmon 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 radiotagged king salmon and 40.1% in 1998 spawned in the North River (Wuttig 1998 and 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 2007, low catches of king salmon in the CFD test-netting in the Unalakleet River suggested a very weak king salmon run and low king salmon counts at the North River counting tower it appeared that the lower end of the escapement goal would not be met. As a result, EO-3-KS-01-07 eliminated the use of bait while sport fishing in the Unalakleet and Shaktoolik rivers and prohibiting the retention of king salmon. This order was in effect from July 6 until August 15, 2007 (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. The Nome River has accounted for about 9% of all the sport fishing effort in the entire NW/NSMA during the last five years (Table 5). An average of 2,326 salmon was harvested from the Nome River during 2002 to 2006, of which 63% were pink salmon (Table 8). Chum 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 8). Estimated effort nearly doubled to over 1,900 angler-days in 2002, decreased in 2003, and increased again in 2004–2006. Trends in effort have generally coincided with the abundance of pink salmon available to anglers; however, recent increases in summer employment in the Nome area have contributed to the recent effort increase as well. 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 (Figure 4). Two guiding operations 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 (2002–2006), the drainage has sustained an average annual effort of 2,008 angler-days, and an average of 780 salmon have been harvested annually from the Fish and Niukluk rivers (Table 9). Escapements of chum and coho salmon have been relatively weak during some of those years, and inseason fishery restrictions have been necessary, although in 2006 over 11,000 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 five 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 2003–2007 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 504 angler-days and about 413 salmon have been harvested annually during 2002 to 2006 (Table 10). The large returns of sockeye in 2003 and 2004 resulted in increased sport fishing effort and an estimated harvest of 1,225 salmon including 572 sockeye in 2003 and 404 sockeye in 2004 (Table 10). In 2005 harvest dropped to 102 fish and in 2006 and 2007 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 currently allowed, however the combined annual harvests (2002–2006) from these drainages have only been 116 chum salmon (Tables 9 and 10).

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 (2002–2006) the Snake River has sustained an average annual effort of 675 angler-days, with an annual harvest of 268 salmon, of which 60% are coho and 37% pink salmon (Table 11). Other popular road accessible waters include the Solomon, Kuzitrin, and Sinuk rivers. The annual harvests in these rivers combined for the past five years (2002–2006) have averaged about 136 coho and 154 pink salmon. During years of high pink salmon abundance (even years) this species has dominated catches and harvests in most Nome roadside streams (Tables 11–14).

Recent Fishery Performance

While pink salmon are by far the most prevalent salmon found in the Nome area streams, with over one million fish returning to some streams in even years, the estimated harvest of pink salmon has averaged only about 4,400 fish in 2002–2006, and has comprised just 36% of the total salmon harvest. While not nearly as abundant, coho salmon are much more popular likely due to their size, aggressiveness, and superior flavor. The estimated harvest of coho in 2002–2006 averaged 6,226 fish per year and comprised 50% of the total salmon harvest (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 area are negligible, although while sockeye have been returning in large numbers recently to the Pilgrim River they are most normally caught with nets and seines under subsistence regulations.

Sport fishing effort in the Fish/Niukluk river system has ranged from a high of about 4,000 angler-days in 1993 to 1,344 angler-days in 1998, but has been steady at about 1,850 angler-days for the past five years (Table 9). The estimated harvest of salmon was 827 fish in 2007, of which 95% were coho salmon (786 fish). In 2005 and 2006, no chum salmon were reported harvested and only 11 chum were harvested in 2007 (Table 9). Although sport fishing for chum salmon is allowed in this drainage, harvest has remained low. The estimated king harvest was 37 fish in 2005, but zero in 2006 and 2007 (Table 9). 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. This low harvest of pink salmon is likely due to the poor condition of the fish by the time they reach the Niukluk River.

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 2007 was estimated at 240 angler-days, below the recent five-year average of 504 angler-days (Table 10). 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 additional 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 NW/NSMA.

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. A weir has been in operation through BLM, Norton Sound Economic Development Corporation (NSEDC), and/or CFD at the outlet of Glacial Lake since 2001 to enumerate sockeye migrating into the lake.

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 and North Slope Alaska residents maintain a traditional subsistence lifestyle. Dolly Varden comprises 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 are largely undocumented in northwestern Alaska, but vastly exceeds the number taken by sport anglers. Intermittent community subsistence harvest estimates dating to 1959 for the villages of Kivalina and Noatak (Scanlon 2008) and personal observation by the area biologist and subsistence resource specialist suggest that 15,000 to 30,000 Dolly Varden are harvested annually in this area (James Magdanz, ADF&G, Kotzebue, personal communication). 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 16). 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 to some degree.

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 (2002–2006) 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 Sound/Chukchi Sea subarea (Table 15). 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 Sound subarea, 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 subarea and the Kotzebue Sound subarea have been fairly consistent over the past several years. Estimated mean annual catch (which includes fish that are kept and those released) for 2002–2006 was 10,614 Dolly Varden in the Seward Peninsula/Norton Sound subarea, and 5,174 in the Kotzebue Sound/Chukchi Sea subarea (Table 15). Estimated catches of Dolly Varden in the Seward Peninsula/Norton Sound subarea have varied from 5,700 in 1998 to 25,000 in 1991. During the past five years, about 66% of all Dolly Varden caught in the Seward Peninsula/Norton Sound subareas are released while about 78% in the Kotzebue Sound subarea are released. The catch of Dolly Varden per angler day has averaged much higher in the Kotzebue Sound subarea than in the Seward Peninsula subarea. This is likely because much of the effort on the Seward Peninsula subarea is directed at other species, while most of the Kotzebue Sound subarea 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, and Fish/Niukluk rivers (Table 15). 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 (James Magdanz, ADF&G, Kotzebue, personal communication). During the most recent five-year period (2002–2006), 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.

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 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 Sound subarea, 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, there are large gaps in the survey data and the current status of the spawning populations of Dolly Varden in the Noatak and Wulik Rivers is unknown. Recent aerial survey counts suggest that the population of overwintering fish in the Wulik River is healthy, and counts have regularly exceeded 100,000 fish. Spawning and overwintering populations will continue to be monitored in the future when possible.

Recent Board of Fisheries Actions

Population assessments conducted on the Nome and Solomon rivers in 1991 and 1992 suggest 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 from 10 fish 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

ADF&G began an effort to assess Dolly Varden populations in waters of the Seward Peninsula in 1991. Abundance and size composition have been estimated for Dolly Varden overwintering in the Nome River in 1991 and 1992, and 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 radiotagged 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 Sound subarea have occurred intermittently since 1967, but in recent years have been limited to aerial index counts of spawning Dolly Varden in Noatak River tributary streams with the assistance of the National Park Service (NPS), and index counts of 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 radiotagged 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 *unpublished*). At that time two fish, likely spawners, remained in the Wulik River, and one had been captured at Kivalina. The remaining radiotagged fish could not be located and it is believed that these fish had already migrated to salt water.

NORTHWESTERN ALASKA ARCTIC GRAYLING

Background and Historical Perspective

Sport fisheries for Arctic grayling in the northwestern area are relatively small with average estimated annual harvests of 1,054 in the Seward Peninsula/Norton Sound subarea and 1,390 in the Kotzebue/Chukchi Sea subarea during the last five years (Tables 17 and 18). 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 Arctic grayling populations in several rivers where sport fishing occurs on the Seward Peninsula has been investigated (DeCicco 1990, 1991, 1992b, 1993b, 1994-1999, 2002; DeCicco and Gryska 2007; DeCicco and Wallendorf 2000; Gryska 2004, 2006; Gryska and Taras 2007; Joy 2006; Viavant *In prep*). 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.

Arctic grayling densities in most Seward Peninsula rivers are low. They generally range from about 40 to 60 fish per mile in the Nome and Sinuk rivers, to about 200 fish per mile in the Pilgrim River. Densities in the Niukluk and Fish rivers are higher at about 470 fish per mile in the Niukluk and about 500 fish per mile in the Fish (DeCicco 2002; Viavant *In prep*). 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 Arctic 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 Arctic 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 Arctic 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 (2002-2006) the estimated harvest rates have only been about 10-12% of those captured (Table 18).

Prior to 1988, the daily bag limit for Arctic grayling in the NW/NSMA 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 Arctic 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 subarea have declined since 1991 when harvest peaked at 5,121 fish. During the recent 5-year period, harvests have averaged about 1,036 fish per year (Table 17).

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 subarea with average catch retention for Arctic grayling of only 10% for 2002–2006 and 12% for 1997–2006.

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 (2002–2006) have ranged between 270 and 2,000 fish (Table 18). Catches over the same period have ranged quite widely from about 2,900 in 2005 to about 21,700 in 2002. In 2007, the harvest and catch was 849 and 6,163 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 subarea 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 subarea 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 approximately 20 years. Arctic grayling in northwestern Alaska may live for more than 20 years and attain a large size. 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 overexploitation. 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.

Current Issues and Fishery Outlook

There is concern on the part of the public and ADF&G staff that populations of Arctic 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 2009, 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 *in prep*). Other road accessible populations would be vulnerable to overexploitation 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 Wild Arctic Grayling Management Plan (5 AAC 70.055) was adopted. 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

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 the Nome River 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 (Viavant *in prep*). 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 specifically address Nome roadside Arctic grayling fisheries using bag and possession limits based on specific threshold abundances, in addition to the use of precision criteria for estimates of abundance generated from stock assessments (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 maintain 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 19). These surveys were not conducted for 2005–2007. 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 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 approximately 32,000 in 1995, 43,000 in 1996 and 33,000 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. Estimates indicated that the spawner abundance was approximately 24,000 in 2004 and 46,000 in 2005 (Hander et al. 2008). 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 20). 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 1,169 fish from 2002 through 2006 (Table 20). The sport harvest in 2006 was 810 fish, and in 2007 the harvest was 1,066 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 3,691 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 (Figure 5). In spite of the worldwide reputation of this destination, the level of fishing effort is still quite low. The five-year (2002–2006) average effort on the Kobuk River was 2,211 angler-days (Table 4). The Kobuk River accounted for about 32% of the overall estimated freshwater sport fishing effort in the Kotzebue subarea (5,027 total angler-days) in 2007.

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 upstream of the Tagagawik 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, began a five-year study on the Kobuk River sheefish population using radio telemetry to determine spawning locations, spawning frequency, and determine timing of outmigration of post-spawners to Hotham Inlet. 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 from 5,990 (95% CI = 4,098 – 7,882) to 23,652 (95% CI = 13,383 – 33,920) in 2004 and 46,324 (95% CI = 25,069 – 67,580) in 2005 (Hander et al. 2008). In 2004, a permafrost slump located approximately 50 km upstream from the known spawning area for sheefish began to emit a large amount of silt in the river, and continues to erode during the open water season. It has been speculated that the effects of the could potentially impact the spawning success on sheefish in the Selawik River by clogging interstitial spaces in the gravel and cobble substrate where fertilized eggs are thought to settle and develop through the winter (Waters 1995). Tentatively, there are plans to revisit the sheefish spawning population starting in 2012 to look for any effects of the thaw slump on the recruitment and survival of eggs deposited after the slump occurred (Ray Hander, USFWS, Fairbanks, personal communication).

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 essentially all the fisheries are directed toward Dolly Varden.

Dolly Varden are a major component of the harvest and catch in the North Slope area contributing more than 40% of the harvest and almost 30% of the catch for the primary sport species during the recent 10-year period (Table 21). 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, Dolly Varden spawn and overwinter in spring water upwelling areas. The Dolly Varden 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 Dolly Varden 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 Dolly Varden 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 the Upper 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 Dolly Varden counted in the Ivishak index area ranged from about 8,000 fish to as many as 36,000 fish in the 11 years the survey was conducted (Table 22). In 1989, 1993, and 1995 the aerial surveys were again conducted; counts were 12,650, 3,057, and 27,036 Dolly Varden. 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 to 2003 a study was conducted by ADF&G and funded by the federal OSM to look at Dolly Varden spawning and overwintering in the Ivishak, Canning, Sagavanirktok, Hulahula, and Kongakut rivers (Viavant 2001-2003, 2005). One aspect of this project was an investigation of the validity of using aerial surveys as a Dolly Varden 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 radiotelemetry 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 Dolly Varden 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 22; Viavant 2001-2003, 2005). 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 Dolly Varden overwintering in the index area. During the 3 years of the study a significant decrease in the number of Dolly Varden was observed, however, in 2006 and 2007 aerial surveys were again flown on the Ivishak River and counts had increased to 5,411 and 6,520, respectively (Table 22; Viavant 2008). Most significantly this study demonstrates that aerial surveys of overwintering aggregations of Dolly Varden 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 Dolly Varden 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 Dolly Varden stock was conducted until 2002 when an index of 4,800 fish was counted in a helicopter survey, and in 2006 and 2007 when 5,477 and 5,807 fish were counted (Table 22; Viavant 2008).

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 Dolly Varden available during summer resulted in a joint project to assess this stock. In 1995, the project attempted to estimate abundance of Dolly Varden 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 22). More recent survey counts of Dolly Varden in the Kongakut River are not available.

Recent Fishery Performance

Estimates of catch and harvest of Dolly Varden 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 21). 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 500 Dolly Varden with a total catch of 1,800 fish. The recent five-year average (2002–2006) catch

and harvest is 1,524 and 389 fish, respectively. Historically about 50% of the total use of Dolly Varden has come from waters adjacent to the Dalton Highway.

Fishery Objectives and Management

Fishery management for Dolly Varden and Arctic 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, Arctic char are managed to provide a conservative level of yield. In streams, 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 Dolly Varden 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 21).

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

Oil and gas development adjacent to and within the migration routes of Dolly Varden in North Slope waters carries the potential for serious impacts through contamination or alteration of habitat. Dolly Varden using the Sagavanirktok River 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 Dolly Varden 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 Dolly Varden. Fluctuations in the abundance of Dolly Varden stocks on the North Slope have been reported before (Yoshihara 1973; Bendock and Burr 1984) but not of this magnitude.

The results from the radiotelemetry study show that the specific locations of critical spawning and overwintering habitat used by anadromous Dolly Varden 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.

Dolly Varden 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 Dolly Varden 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 Dolly Varden 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 Dolly Varden in the area and the increased oil and gas development activity in this area.

ACKNOWLEDGMENTS

The author thanks Tom Taube, Region III Management Coordinator, and John Burr, Yukon Area Management Biologist, for guidance and editorial assistance, and Rachael Kvapil, Region III Publications Technician, for assistance in final report preparation.

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TABLES AND FIGURES

Table 1.–Commercial salmon harvest from the Norton Sound and Kotzebue districts, 1982–2007.

	Norton Sound					Kotzebue	
Year	King	Sockeye	Coho	Pink	Chum	Chum	Dolly Varden
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
2007	19	2	126,115	3,769	22,431	147,087	0
97-06 Average	**2,366**	**55**	**42,810**	**75,461**	**10,141**	**100,748**	**550**
02-06 Average	**36**	**65**	**57,926**	**0**	**5,171**	**59,757**	**65**

Table 2.–Salmon escapement goals and documented salmon escapements in Norton Sound, 1997–2007.

River/Fish	Escapement Goal	Type	Year										
			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Nome River													
King			22	70	3	24	7	7	12	51	70	43	13
Chum	2,900-4,300	Weir	5,147	1,930	1,048	4,065	2,859	1,720	1,958	3,903	5,584	4,128	7,034
Pink	13,000	Weir	8,035	359,469	2,033	41,673	3,138	35,057	11,402	1,051,146	285,759	611,550	24,395
Coho			312	96	417	696	2,418	3,418	548	2,283	5,848	8,126	2,437
Snake River													
King			12		20	28	33	7	50	17	31	32	61
Chum	1,600-2,500	Weir	6,184	11,067	484	1,911	2,182	2,669	2,179	2,145	2,967	4,128	8,147
Pink			6,742	219,697	116	4,723	1,295	4,042	2,829	126,917	13,813	73,734	4,634
Coho			1,127	178	90	406	1,335	396	489	474[a]	2,925	4,926	1,781
Eldorado River													
King			98	446	28	33	50	25	29	25	32	41	14
Chum	6,000-9,200	Weir	14,302	13,808	4,218	11,617	11,635	10,260	3,589	3,273	10,426	41,985	21,312
Pink			1,022	137,283	977	55,992	488	115,652	173	60,861	12,356	22,368	833
Coho			194	21	510	192	1,509	516	115	1,149	679	523	2
Pilgrim River													
King			356	ND	ND	72	ND	168	1,016	925	216	275	501
Chum			14,418	ND	ND	861	ND	5,538	15,192	10,228	9,715	45,410	35,334
Pink			5,557	ND	ND	374	ND	3,870	14,100	50,757	13,298	18,701	3,616
Coho			452	ND	ND	21	ND	216	677	1,556	304	962	605
Sockeye			1,234	ND	ND	12,141	ND	4,012	42,729	85,520	56,484	52,223	43,432
Niukluk River													
King			259	260	40	48	30	542	179	135	41	39	30
Chum			57,305	45,588	29,573	30,662	33,999	20,018	10,158	10,791	25,596	29,199	50,994
Pink	12,500	Tower	10,468	1,624,438	20,351	961,603	41,625	636,404	75,855	1,022,302	270,424	1,371,919	43,617
Coho	2,400-6,100	Tower	3,997	810	4,260	11,382	3,468	7,269	1,282	1,833[b]	2,727	11,169	3,498
North River (Unalakleet)													
King	1,200-2,600	Tower	4,185	2,100	2,263	1,046	1,337	1,484	1,452	1,105	1,019	906	1,950
Chum			6,904	1,562	5,600	4,971	6,515	5,918	9,859	9,624	11,984	5,385	8,046
Pink	25,000	Tower	127,926	74,045	48,993	69,703	24,737	321,756	280,212	1,149,294	1,670,934	2,169,890	583,320
Coho	550-1,100	Aerial	5,768	3,361	4,792	6,959	12,383	2966[b]	5,837	9,646	19,189	9,835	19,944
Kwiniuk River													
King	300-550	Tower	974	303	116	144	261	1,632	749	645	342	195	258
Chum	11,500-	Tower	20,119	24,247	8,763	12,897	16,598	37,864	12,117	10,371	12,083	39,519	27,756
Pink	12,500	Aerial	9,535	655,934	607	750,173	8,423	1,114,616	22,332	3,045,915	341,048	1,347,090	54,255
Coho	650-1,300	Aerial	0[b]	0[b]	0[b]	2[b]	9,531	6,459	5,484	10,523	12,950	22,341	9,429

[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.–Subsistence salmon harvest the Norton Sound, Port Clarence, and Kotzebue Districts, 1983–2007.

	Norton Sound						Port Clarence						Kotzebue
Year	King	Sockeye	Coho	Pink	Chum	Total	King	Sockeye	Coho	Pink	Chum	Total	Chum
1983	1,942	86	8,799	21,894	11,492	44,213	23	405	100	4,345	684	5,557	19,648
1984	4,733	17	8,470	34,600	8,231	56,051	17	261	ND	615	299	1,192	5,486
1985	1,830	119	6,496	5,312	18,457	32,214	ND	ND	ND	ND	ND	ND	7,231
1986	150	107	688	8,720	8,085	17,750	ND	ND	ND	ND	ND	ND	17,411
1987	200	107	1,100	1,251	8,394	11,052	ND	ND	ND	ND	ND	ND	12,901
1988	63	133	1,076	2,159	5,952	9,383	ND	ND	ND	ND	ND	ND	7,067
1989	24	131	5,150	18,424	4,787	28,516	ND	ND	ND	ND	ND	ND	13,723
1990	2,534	234	510	2,233	4,246	9,757	28	535	472	395	410	1,840	3,894
1991	395	166	3,432	3,749	6,375	14,117	ND	ND	ND	ND	ND	ND	4,353
1992	252	163	2,762	13,503	2,944	19,624	ND	ND	ND	ND	ND	ND	11,103
1993	420	80	3,287	2,599	3,401	9,787	ND	ND	ND	ND	ND	ND	12,260
1994	7,375	1,162	22,124	71,065	25,120	126,846	ND	ND	ND	ND	ND	ND	12,160
1995	7,284	3,595	21,620	38,134	41,259	111,892	181	1,979	1,692	3,849	2,042	9,743	26,612
1996	7,255	1,181	26,305	64,724	34,586	134,051	76	4,481	1,739	3,293	6,011	15,600	38,867
1997	8,903	1,045	14,505	24,549	25,249	74,251	195	4,558	2,079	2,587	1,264	10,683	39,076
1998	6,242	393	13,743	46,480	14,010	80,868	158	3,177	829	755	2,099	7,018	26,242
1999	4,331	866	12,233	19,193	13,049	49,672	287	1,665	1,759	7,812	2,621	14,144	21,398
2000	3,690	324	13,455	37,864	12,989	68,322	89	2,392	1,030	786	1,936	6,233	14,264
2001	4,751	750	11,293	29,822	13,963	60,579	72	2,851	935	1,387	1,275	6,520	21,538
2002	4,792	443	11,773	56,311	13,095	86,414	74	3,692	1,299	1,183	1,910	8,158	28,975
2003	4,728	522	11,446	46,336	9,498	72,530	133	3,732	2,194	3,394	2,699	12,152	ND
2004	4,419	458	10,892	70,945	3,592	90,306	177	4,495	1,434	4,113	2,430	12,649	17,024
2005	4,848	914	16,127	60,427	13,765	96,081	276	8,288	1,031	5,817	2,501	17,913	10,616
2006	2,876	572	17,242	56,579	5,992	83,261	152	8,492	726	6,615	2,479	18,464	ND
2007	2,646	938	12,023	21,039	12,048	48,694	85	9,484	705	1,468	4,454	16,196	ND
97-06 Average	**4,958**	**629**	**13,271**	**44,851**	**12,520**	**76,229**	**161**	**4,334**	**1,332**	**3,445**	**2,121**	**11,393**	**22,392**
02-06 Average	**4,333**	**582**	**13,496**	**58,120**	**9,188**	**85,719**	**162**	**5,740**	**1,337**	**4,224**	**2,404**	**13,867**	**18,872**

Note: Data from Soong et. al. 2008.

Table 4.–Sport fishing effort (in angler-days) by major fisheries and subareas in the NW/NSMA, 1987–2007.

	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
1987	1,865	2,473	942	ND	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
2007	3,887	1,539	4,205	1,873	240	4,923	16,667	2,935	1,627	205	260	5,027	2,281	1,873	4,154	25,848
97-06 Avg.	**1,810**	**2,479**	**4,602**	**642**	**642**	**3,763**	**13,938**	**1,753**	**1,926**	**513**	**1,026**	**5,218**	**2,178**	**2,266**	**4,444**	**23,600**
02-06 Avg.	**2,169**	**1,847**	**4,922**	**678**	**676**	**3,972**	**14,265**	**1,610**	**2,211**	**542**	**1,068**	**5,432**	**1,476**	**2,426**	**3,902**	**23,599**

Table 5.–Sport fish harvest by species in the NW/NSMA, 1987–2007.

Year	King Salmon	Coho Salmon	Sockeye Salmon	Pink Salmon	Chum Salmon	Total Salmon	Dolly Varden	Lake Trout	Arctic Grayling	Northern Pike	Whitefish	Sheefish	Burbot
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
2007	293	6,939	72	1,631	723	9,658	5,883	7	1,735	585	1,147	1,066	0
97-06 Average	**549**	**5,446**	**135**	**3,427**	**1,085**	**10,641**	**5,838**	**170**	**3,529**	**622**	**995**	**621**	**196**
02-06 Average	**492**	**6,226**	**246**	**4,443**	**927**	**12,333**	**5,177**	**169**	**3,496**	**732**	**1,019**	**573**	**92**

Table 6.–Sport fish catch by species in the NW/NSMA, 1990–2007.

Year	King Salmon	Sockeye Salmon	Pink Salmon	Chum Salmon	Coho Salmon	Total 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
2007	1,034	116	6,854	6,841	13,449	28,294	18,535	322	22,153	16,578	1,543	1,639	105
97-06 Average	**1,937**	**358**	**16,234**	**5,119**	**12,564**	**36,212**	**21,579**	**1,144**	**30,624**	**2,717**	**1,704**	**3,071**	**233**
02-06 Average	**1,806**	**547**	**23,048**	**4,817**	**14,912**	**45,130**	**17,079**	**1,133**	**27,292**	**2,505**	**1,736**	**3,053**	**107**

Table 7.–Sport fish effort, catch and harvest estimates by species for the Unalakleet River, 1992–2007.

Year	Angler-days	Salmon King	Salmon Coho	Salmon Pink	Salmon Chum	Total Salmon	Dolly Varden	Arctic Grayling
				Harvest				
1992	685	117	1,555	779	379	2,830	746	114
1993	625	382	643	89	116	1,230	602	131
1994	777	379	2,425	402	220	3,426	679	353
1995	1,009	259	2,033	222	207	2,721	1,061	300
1996	695	384	3,411	59	463	4,317	1,506	420
1997	941	842	2,784	1,055	228	4,909	936	210
1998	835	513	2,742	434	447	4,136	588	144
1999	995	415	2,691	2,946	211	6,263	2,384	277
2000	1,002	345	4,150	961	403	5,859	4,462	538
2001	2,793	250	2,766	188	714	3,918	1,002	247
2002	8,195	544	2,937	1,378	607	5,466	789	773
2003	3,056	97	1,604	29	191	1,921	134	131
2004	4,527	356	3,524	2,003	47	5,930	3,593	597
2005	4,768	216	3,959	473	36	4,684	500	52
2006	3,964	394	4,985	891	224	6,494	1,307	60
2007	4,205	147	4,117	618	85	4,967	731	10
97-06 Average	**3,108**	**397**	**3,214**	**1,036**	**311**	**4,958**	**1,570**	**303**
02-06 Average	**4,902**	**321**	**3,402**	**955**	**221**	**4,899**	**1,265**	**323**
				Catch				
1992	685	476	2,802	6,503	1,412	11,193	1,942	1,022
1993	625	2,340	1,572	605	515	5,032	964	874
1994	777	517	2,488	1,020	561	4,586	1,253	1,476
1995	1,009	588	3,086	799	966	5,439	2,732	1,332
1996	695	2,059	5,863	2,594	1,589	12,105	3,170	1,694
1997	941	5,144	4,020	4,101	1,323	14,588	4,400	4,918
1998	835	1,539	3,213	4,853	2,218	11,823	2,336	3,256
1999	995	669	9,593	3,475	1,916	15,653	10,460	6,089
2000	1,002	1,045	9,287	3,982	3,652	17,966	10,293	6,814
2001	2,793	542	5,399	1,197	2,030	9,168	2,769	2,331
2002	8,195	835	3,691	2,463	1,653	8,642	2,593	4,229
2003	3,056	505	2,832	3,762	1,681	8,780	4,284	6,189
2004	4,527	1,930	12,655	10,332	1,473	26,390	10,928	3,478
2005	4,768	431	14,396	8,778	1,822	25,427	3,299	1,137
2006	3,964	2,511	9,397	4,791	1,628	18,327	2,935	669
2007	4,205	776	8,967	4,256	554	14,553	4,763	2,375
97-06 Average	**3,108**	**1,515**	**7,448**	**4,773**	**1,940**	**15,676**	**5,430**	**3,911**
02-06 Average	**4,902**	**1,242**	**8,594**	**6,025**	**1,651**	**17,513**	**4,808**	**3,140**

Table 8.–Sport fish effort, and harvest by species from the Nome River, 1985–2007, and catch, 1992–2007.

Year	Angler-days	Salmon King	Salmon Coho	Salmon Pink	Salmon Chum	Total Salmon	Dolly Varden	Arctic Grayling
					Harvest			
1985	6,514	20	209	349	189	767	1,236	528
1986	6,023	0	415	491	76	982	1,057	491
1987	1,865	0	163	235	0	398	906	344
1988	6,058	0	1,455	528	273	2,256	2,365	946
1989	6,569	19	1,233	1,573	495	3,320	3,551	2,032
1990	7,194	39	407	2,651	122	3,289[a]	1,078	33
1991	4,646	22	417	356	241	1,036	1,220	186
1992	6,455	16	713	4,397	0	5,126	573	0
1993	3,633	93	602	723	0	1,418	917	0
1994	5,116	0	326	4,103	0	4,429	431	16
1995	3,044	0	143	230	0	373	462	0
1996	2,920	0	598	3,280	0	3,878	873	0
1997	1,914	10	295	83	0	388	328	0
1998	1,371	0	189	1,985	0	2,174	302	0
1999	1,463	0	219	0	0	219	791	0
2000	1,455	0	342	578	0	920	340	0
2001	1,045	0	297	0	0	297	43	0
2002	1,901	0	217	312	0	529	511	0
2003	651	0	68	12	0	80	1,223	0
2004	1,636	0	270	3,369	0	3,639	226	0
2005	2,142	0	1,001	1,193	0	2,194	553	0
2006	4,517	0	2,768	2,422	0	6,149	959	0
2007	3,887	0	797	402	0	1,199	625	0
97-06 Average	**1,810**	**1**	**567**	**995**	**0**	1,563	**528**	**0**
02-06 Average	**2,169**	**0**	**865**	**1,462**	**0**	2,326	**694**	**0**
					Catch			
1992	6,455	23	1,466	9,810	266	11,565	1,130	90
1993	3,633	121	764	1,756	175	2,816	5,153	569
1994	5,116	0	386	6,190	36	6,612	631	1,111
1995	3,044	0	228	980	478	1,686	1,474	571
1996	2,920	21	788	5,898	432	7,139	1,311	497
1997	1,914	20	447	190	113	770	873	569
1998	1,371	19	863	3,482	8	4,372	319	207
1999	1,463	0	231	13	0	244	1,486	300
2000	1,455	0	385	876	20	1,281	431	10
2001	1,045	0	377	32	13	422	94	60
2002	1,901	24	549	3,090	220	3,883	543	735
2003	651	0	90	73	0	163	1,276	94
2004	1,636	0	428	6,189	14	6,631	374	113
2005	2,142	0	1,523	2,095	0	3,618	992	92
2006	4,517	0	4,607	6,242	122	13,478	1,947	560
2007	3887	0	919	745	121	1,785	754	61
97-06 Average	**1,810**	**6**	950	**2,228**	**51**	3,486	834	274
02-06 Average	**2,169**	**5**	1,439	**3,538**	**71**	5,555	1,026	319

[a] In 1990, 35 sockeye salmon were harvested from the Nome River, and are included in this total.

Table 9.–Sport fish effort, and harvest by species from the Fish/Niukluk River, 1985–2007, and catch, 1992–2007.

Year	Angler-days	King Salmon	Coho Salmon	Pink Salmon	Chum Salmon	Total Salmon	Dolly Varden	Arctic Grayling	Northern Pike	Burbot
						Harvest				
1985	889	0	40	70	10	120	195	945	0	-
1986	1,888	189	1,359	415	0	1,963	1,359	1,114	19	-
1987	2,473	36	1,032	127	72	1,267	1,376	2,119	471	-
1988	2,245	0	800	73	127	1,000	891	1,237	0	0
1989	2,124	0	728	233	107	1,068	734	808	0	0
1990	2,059	0	267	638	216	1,121	348	415	17	0
1991	2,524	14	977	356	272	1,619	1,474	1,320	283	35
1992	2,742	0	753	357	15	1,125	303	158	43	0
1993	3,962	9	1,185	278	514	1,986	1,003	619	75	21
1994	3,082	10	1,122	231	119	1,482	708	644	99	0
1995	2,603	18	818	136	27	999	368	430	0	34
1996	2,120	11	1,652	404	166	2,233	402	313	145	24
1997	3,017	71	462	58	0	591	2,071	734	30	148
1998	1,344	0	316	0	0	316	160	16	0	84
1999	4,825	44	1,365	80	0	1,489	1,952	860	28	89
2000	3,451	174	1,165	51	0	1,390	1,687	442	57	0
2001	2,822	0	969	161	439	1569	1197	430	297	43
2002	1,805	75	298	254	45	672	259	452	51	0
2003	2,448	39	216	196	101	552	110	387	0	0
2004	2,786	22	291	353	435	1,101	120	102	0	0
2005	1,954	37	400	58	0	495	1,148	402	0	0
2006	1,049	0	948	134	0	1,082	0	0	0	0
2007	1,539	0	786	30	11	827	193	12	0	0
97-06 Average	**2,550**	**46**	**643**	**135**	**102**	**926**	**870**	**383**	**46**	**38**
02-06 Average	**2,008**	**35**	**431**	**199**	**116**	**780**	**327**	**269**	**10**	**0**
						Catch				
1992	2,742	0	1,555	1,969	326	3,850	1,041	2,171	256	0
1993	3,962	9	1,804	909	945	3,667	6,130	5,976	75	21
1994	3,082	29	1,448	2,052	1,271	4,800	2,125	2,398	596	0
1995	2,603	18	1,401	300	428	2,147	662	1,169	137	34
1996	2,120	64	3,348	3,512	1,660	8,584	1,872	4,653	513	24
1997	3,017	125	1,751	1,209	714	4,011[a]	9,952	10,452	423	277
1998	1,344	15	772	3,252	822	4,861	1,390	8,159	189	84
1999	4,825	55	2,151	187	265	2,658	5,601	7,245	264	101
2000	3,451	207	2,952	3,989	952	8,100	2,261	1,701	114	0
2001	2,822	21	1,739	279	543	2,582	3064	3972	538	43
2002	1,805	111	1,549	772	747	3,179	854	6,587	211	0
2003	2,448	515	1,447	626	258	2,846	1,695	5,495	11	0
2004	2,786	22	1,653	10,176	979	12,830	849	1,594	82	0
2005	1,954	74	1,586	1,283	177	3,120	2,688	3,316	238	0
2006	1,049	0	1,320	700	0	2,020	0	329	59	0
2007	1,539	0	1,014	178	190	1,402	1,852	3,287	0	0
97-06 Average	**2,550**	**115**	**1,692**	**2,247**	**546**	**4,610**	**2,833**	**4,885**	**213**	**51**
02-06 Average	**2,008**	**144**	**1,511**	**2,711**	**432**	**4,799**	**1,213**	**3,464**	**120**	**0**

[a] In 1997, 106 sockeye salmon were harvested from the Fish/Niukluk River drainage, and are included in this total.

Table 10.–Sport fish effort and harvest by species from the Pilgrim River, 1985–2007, and catch, 1992–2007.

Year	Angler-days	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	Total Salmon	Dolly Varden	Arctic Grayling	Northern Pike
					Harvest					
1985	375	10	20	20	50	100	200	14	319	0
1986	868	38	76	0	0	113	227	189	227	529
1987	1,159	72	109	435	0	272	888	163	272	199
1988	4,822	55	218	746	36	346	1,401	327	109	91
1989	1,678	68	204	78	301	272	923	603	516	415
1990	1,710	19	81	93	208	41	442	498	415	1,194
1991	3,183	51	310	124	81	85	651	1,015	459	608
1992	1,184	55	57	66	55	106	339	131	91	231
1993	1,195	28	191	10	0	0	229	730	75	207
1994	844	0	134	9	154	0	297	63	49	108
1995	1,253	19	113	62	0	73	267	74	52	68
1996	840	0	133	84	49	0	266	388	73	75
1997	820	45	0	20	0	0	65	65	81	117
1998	546	32	6	0	0	0	38	14	0	26
1999	433	0	33	0	0	0	33	45	11	94
2000	753	0	179	32	6	0	217	0	57	271
2001	491	0	29	0	0	0	29	270	43	0
2002	562	0	0	0	0	0	0	72	31	148
2003	730	103	113	572	437	0	1,225	482	98	0
2004	565	0	45	404	0	0	449	0	0	436
2005	327	0	48	102	23	0	173	12	0	0
2006	337	0	150	0	67	0	217	0	83	0
2007	240	0	118	0	0	0	118	0	26	0
97-06 Average	**556**	**18**	**60**	**113**	**53**	**0**	**245**	**96**	**40**	**109**
02-06 Average	**504**	**21**	**71**	**216**	**105**	**0**	**413**	**113**	**42**	**117**
					Catch					
1992	1,184	55	162	90	714	197	1,218	279	526	863
1993	1,195	92	325	106	392	254	1,169	3,038	2,362	959
1994	844	0	436	18	350	146	950	180	266	358
1995	1,253	19	472	163	58	232	944	294	370	656
1996	840	0	265	235	364	133	997	509	785	334
1997	820	90	49	115	0	15	269	254	429	262
1998	546	32	65	145	263	44	549	41	65	77
1999	433	20	77	177	0	0	274	585	694	104
2000	753	0	200	32	109	24	365	0	221	596
2001	491	0	29	14	0	11	54	439	402	0
2002	562	0	5	0	0	0	5	75	144	157
2003	730	268	203	1,323	1,044	548	3,386	549	397	0
2004	565	0	124	680	163	33	1,000	80	0	590
2005	327	0	48	102	38	64	252	59	48	24
2006	337	0	185	0	134	0	319	64	220	0
2007	240	0	201	0	0	128	329	0	26	0
97-06 Average	**556**	**41**	**99**	**259**	**175**	**74**	**647**	**215**	**262**	**181**
02-06 Average	**504**	**54**	**113**	**421**	**276**	**129**	**992**	**165**	**162**	**154**

Table 11.–Sport fish effort and harvest by species from the Snake River, 1985–2007, and catch, 1992–2007.

Year	Angler-days	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	Total Salmon	Dolly Varden	Arctic Grayling
					Harvest				
1985	361	0	120	0	0	0	120	0	139
1986	850	0	94	0	378	94	566	57	378
1987[a]	-	-	-	-	-	-	-	-	-
1988	2,128	0	800	0	546	437	1,783	218	709
1989	436	0	10	0	291	97	398	44	101
1990	775	10	47	0	111	41	209	66	116
1991	2,384	7	798	62	71	93	1,031	1,252	402
1992	2,379	8	510	0	183	0	701	115	16
1993	1,468	9	248	0	151	0	408	331	467
1994	880	0	145	0	452	7	604	117	32
1995	1,968	0	85	0	19	0	104	131	18
1996	1,269	0	426	0	659	0	1,085	97	121
1997	445	0	98	0	0	0	98	81	0
1998	376	0	0	0	463	0	765	0	8
1999	977	0	209	0	0	0	209	44	113
2000	377	0	209	0	103	0	312	199	16
2001	853	0	175	0	0	0	175	108	63
2002	514	0	35	0	0	0	35	18	110
2003	701	0	11	0	0	0	11	13	140
2004	468	0	163	0	60	0	223	0	91
2005	836	0	182	22	12	0	216	27	33
2006	855	0	414	11	430	0	855	51	0
2007	1873	0	142	15	0	0	157	461	141
97-06 Average	**640**	**0**	**150**	**3**	**107**	**0**	**260**	**54**	**57**
02-06 Average	**675**	**0**	**161**	**7**	**100**	**0**	**268**	**22**	**75**
					Catch				
1992	2,379	8	640	0	1,182	0	1,830	180	158
1993	1,468	9	306	0	429	37	781	1,003	1,614
1994	880	60	235	0	648	37	980	420	377
1995	1,968	0	245	0	300	189	734	507	887
1996	1,269	0	530	0	967	111	1,608	255	1,055
1997	445	0	118	0	0	9	127	243	123
1998	376	0	64	0	463	0	527	0	218
1999	977	0	606	0	0	0	606	257	723
2000	377	0	209	0	103	0	312	199	449
2001	853	0	214	0	21	78	313	108	1,385
2002	514	0	156	0	0	0	156	18	279
2003	701	0	11	0	0	0	11	27	559
2004	468	0	307	0	223	14	544	0	238
2005	836	0	325	56	70	54	505	423	338
2006	855	0	597	11	1790	116	2514	115	262
2007	1873	0	184	15	234	15	448	481	260
97-06 Average	**640**	**0**	**261**	**7**	**267**	**27**	**562**	**139**	**457**
02-06 Average	**675**	**0**	**279**	**13**	**417**	**37**	**746**	**117**	**335**

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

Table 12.–Sport fish effort and harvest by species from the Solomon River, 1985–2007, and catch, 1992–2007.

Year	Angler-days	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	Total Salmon	Dolly Varden	Arctic Grayling
					Harvest				
1985	2,667	0	80	0	120	219	419	611	0
1986	102	0	0	0	38	0	38	0	0
1987	272	0	109	0	0	72	181	1,576	91
1988	309	0	18	0	0	0	18	36	127
1989	492	10	136	0	243	49	438	745	152
1990	458	0	12	0	361	14	387	182	17
1991	1,057	7	83	0	173	0	263	2,219	158
1992	962	0	316	0	210	0	526	131	0
1993	1,404	28	420	0	259	0	707	893	0
1994	1,193	0	235	0	256	0	491	269	0
1995	781	0	38	0	87	0	125	366	0
1996	335	0	142	0	0	0	142	49	0
1997	434	0	10	0	15	0	25	186	0
1998	340	0	0	16	154	0	170	383	0
1999	438	0	22	0	0	0	22	154	0
2000	242	0	32	0	113	0	145	0	0
2001	615	0	39	0	0	0	39	162	0
2002	475	0	0	0	0	0	0	29	0
2003	168	0	0	0	97	0	97	0	0
2004	129	0	90	0	0	0	90	53	0
2005	411	0	0	97	23	0	120	0	0
2006	251	0	156	0	100	0	256	153	0
2007	943	0	337	0	281	0	618	481	0
97-06 Average	**350**	**0**	**35**	**11**	**50**	**0**	**96**	**111**	**0**
02-06 Average	**287**	**0**	**49**	**19**	**44**	**0**	**113**	**45**	**0**
					Catch				
1992	962	0	316	0	998	91	1,405	197	38
1993	1,404	47	650	0	633	0	1,330	1,725	140
1994	1,193	0	255	0	784	7	1,046	520	212
1995	781	0	208	0	190	22	420	734	200
1996	335	0	237	0	39	0	276	49	97
1997	434	0	39	0	74	0	113	415	703
1998	340	17	59	64	433	0	573	410	0
1999	438	0	185	0	13	0	198	573	21
2000	242	57	53	119	288	278	795	1,537	853
2001	615	0	39	0	407	0	446	399	0
2002	475	0	35	0	192	81	308	18	0
2003	168	0	0	0	97	0	97	0	80
2004	129	0	90	0	195	0	285	67	130
2005	411	0	0	121	47	0	168	0	161
2006	251	0	156	32	267	11	466	230	83
2007	943	0	381	44	311	105	857	560	0
97-06 Average	**350**	**7**	**66**	**34**	**201**	**37**	**345**	**365**	**203**
02-06 Average	**287**	**0**	**56**	**31**	**160**	**18**	**265**	**63**	**91**

Table 13.–Sport fish effort and harvest by species from the Kuzitrin River, 1985–2007, and catch, 1992–2007.

Year	Angler-days	King Salmon	Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	Total Salmon	Dolly Varden	Arctic Grayling	Northern Pike
						Harvest				
1985	84	0	0	0	0	0	0	0	195	14
1986	318	0	0	0	0	0	0	38	189	151
1987	1,392	0	0	0	0	0	0	91	181	127
1988	1,037	0	0	36	55	54	145	109	1,255	437
1989	313	0	0	0	0	0	0	0	283	233
1990	572	0	0	0	28	14	42	0	133	746
1991	836	0	0	10	10	0	20	222	286	481
1992	469	0	8	0	46	0	54	8	0	128
1993	463	0	0	0	0	0	0	146	101	209
1994	643	0	109	0	0	0	109	0	98	169
1995	413	0	0	0	0	40	40	22	44	137
1996	483	0	0	0	39	0	39	85	230	497
1997	440	0	0	0	0	0	0	0	108	216
1998	122	0	0	0	0	0	0	0	8	38
1999	355	0	0	0	0	0	0	55	23	233
2000	373	0	0	0	0	0	0	0	64	63
2001	297	0	0	0	0	0	0	21	51	52
2002	203	0	0	0	0	0	0	0	18	127
2003	214	0	0	0	0	0	0	12	0	388
2004	215	0	0	0	0	0	0	0	34	404
2005	139	0	0	0	0	0	0	0	0	514
2006	70	0	0	0	0	0	0	0	0	0
2007	471	0	0	0	0	0	0	0	0	165
97-06 Average	**243**	**0**	**0**	**0**	**0**	0	0	9	31	204
02-06 Average	**168**	**0**	**0**	**0**	**0**	0	0	2	10	287
						Catch				
1992	469	0	89	0	82	0	171	8	481	1,956
1993	463	0	0	0	0	0	0	263	288	751
1994	643	0	109	0	16	0	125	0	351	722
1995	413	0	0	0	0	40	40	54	192	1,005
1996	483	0	0	0	49	11	60	85	388	2,015
1997	440	0	0	64	0	0	64	85	1,068	1,503
1998	122	0	0	0	0	0	0	8	0	38
1999	355	0	7	7	0	0	14	176	158	1,840
2000	373	0	0	0	103	0	103	0	859	578
2001	297	0	0	0	0	0	0	22	760	2,738
2002	203	0	0	0	139	28	167	0	18	127
2003	214	13	0	0	0	0	13	0	12	970
2004	215	0	0	0	0	0	0	0	34	706
2005	139	0	0	0	0	0	0	0	0	950
2006	70	0	0	0	134	0	0	0	24	0
2007	471	0	15	0	0	0	15	0	0	15,913
97-06 Average	**243**	**1**	**1**	**7**	**38**	**3**	**36**	**29**	**293**	**945**
02-06 Average	**168**	**3**	**0**	**0**	**55**	**6**	**36**	**0**	**18**	**551**

Table 14.–Sport fish effort and harvest by species from the Sinuk River, 1985–2007, and catch, 1992–2007.

Year	Angler-days	Salmon King	Salmon Coho	Salmon Red	Salmon Pink	Salmon Chum	Total Salmon	Dolly Varden	Arctic Grayling
					Harvest				
1985	806	0	10	0	120	0	130	292	0
1986	nd	nd	nd	nd	nd	nd	nd	nd	nd
1987	5,198	0	0	380	91	72	543	652	724
1988	1,055	73	91	0	946	146	1,256	146	73
1989	906	0	10	0	0	10	20	175	51
1990	343	0	12	0	0	14	26	17	0
1991	885	0	71	41	51	47	210	729	129
1992	1,504	0	40	0	293	0	333	139	0
1993	874	9	96	0	115	0	220	536	37
1994	1,132	0	109	0	145	0	254	305	8
1995	1,295	0	19	21	28	0	68	158	18
1996	553	0	189	8	285	0	482	485	97
1997	443	0	0	0	54	0	54	346	0
1998	123	0	0	0	0	0	0	311	8
1999	244	0	0	0	0	0	0	88	11
2000	294	0	11	0	10	0	21	59	0
2001	490	0	62	39	0	0	101	86	43
2002	1,324	0	0	0	0	0	0	47	103
2003	430	0	0	0	0	0	0	712	12
2004	466	0	13	0	156	0	169	42	0
2005	549	0	230	11	62	0	303	141	16
2006	1,234	0	191	0	330	0	521	531	138
2007	471	0	0	0	0	0	0	0	0
97-06 Average	**492**	**0**	**51**	**6**	**57**	**0**	**113**	**232**	**29**
02-06 Average	**652**	**0**	**61**	**10**	**44**	**0**	**115**	**206**	**35**
					Catch				
1992	1,504	0	65	0	1,429	15	1,509	770	300
1993	874	9	143	10	547	28	737	1,179	879
1994	1,132	0	172	0	348	22	542	830	417
1995	1,295	0	113	66	125	44	348	723	498
1996	553	0	246	8	736	200	1,190	618	339
1997	443	0	196	10	76	160	442	1,249	1,464
1998	123	0	0	0	0	0	0	311	25
1999	244	0	0	0	0	0	0	198	22
2000	294	0	21	0	21	12	54	95	26
2001	490	0	96	39	11	0	146	108	218
2002	1,324	0	53	0	0	23	76	74	432
2003	430	0	0	0	68	14	82	840	249
2004	466	0	13	0	1,352	149	1,514	42	0
2005	549	0	742	67	279	477	1,565	294	171
2006	1,234	0	1,428	269	2,327	709	4,733	2,767	1,331
2007	243	1	1	7	38	3	36	29	293
97-06 Average	**168**	**3**	**0**	**0**	**55**	**6**	**36**	**0**	**18**
02-06 Average	**243**	**1**	**1**	**7**	**38**	**3**	**36**	**29**	**293**

Table 15.– Dolly Varden and Arctic char sport harvest in the NW/NSMA by subarea and river, 1992–2007.

	Seward Peninsula/Norton Sound Dolly Varden and Arctic char Harvests										Kotzebue/Chukchi Sea Dolly Varden and Arctic char Harvests				
Year	Salt Water	Nome River	Pilgrim River	Unalakleet River	Fish-Niukluk River	Sinuk River	Snake River	Solomon River	Other Streams	Lakes [a]	Salt Water	Kobuk River	Noatak River	Other Streams	Lakes [a]
1992	204	557	131	746	270	139	115	131	89	0	0	99	197	279	107
1993	205	917	448	427	1,003	536	331	893	1,050	97	0	9	325	533	47
1994	90	431	63	410	699	305	117	197	759	0	27	132	786	1,402	18
1995	0	462	74	976	346	158	131	366	395	0	22	28	124	676	0
1996	12	873	388	1,506	402	485	97	49	473	0	0	172	632	97	12
1997	189	328	65	936	2,071	346	81	186	265	0	22	11	103	344	0
1998	0	302	14	588	160	311	0	383	482	0	0	49	175	216	0
1999	330	791	45	2,384	1,952	88	44	154	920	0	0	49	255	470	22
2000	069	340	0	4,462	1,687	59	199	0	136	0	281	47	763	467	41
2001	166	43	270	1,002	1,197	86	108	162	140	0	108	79	1,026	430	50
2002	67	511	72	789	259	47	18	18	471	0	18	197	1,495	174	0
2003	0	1,223	482	134	110	712	13	0	2,857	0	0	29	354	137	13
2004	72	226	0	3,593	120	42	0	53	212	0	0	642	69	574	0
2005	95	553	12	500	1,148	141	27	0	141	0	0	0	63	176	0
2006	0	959	0	1,307	0	531	51	153	179	0	116	71	1,075	1052	14
2007	14	625	0	731	193	144	461	481	159	0	20	29	2,379	496	0
97-06 Average	**199**	**528**	**96**	**1,570**	**870**	**236**	**54**	**111**	**580**	**0**	**55**	**117**	**538**	**404**	**14**
02-06 Average	**47**	**694**	**113**	**1,265**	**327**	**295**	**22**	**45**	**772**	**0**	**27**	**188**	**611**	**423**	**5**

[a] Lake totals are for Arctic char.

Table 16.–Aerial counts of Dolly Varden spawning in the Noatak River and overwintering in the Wulik and Kivalina rivers, 1968–2007.

	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
2007	ND	99,311	ND

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

Table 17.–Arctic grayling sport harvest and catch in Seward Peninsula/Norton Sound waters, 1992–2007.

Harvest

Year	Nome River	Pilgrim River	Unalakleet River	Fish-Niukluk River	Sinuk River	Snake River	Solomon River	Other Streams	Total
1992	0	91	98	128	0	16	0	159	492
1993	0	75	131	585	37	467	0	289	1,584
1994	16	49	353	506	8	32	0	236	1,200
1995	0	52	291	404	18	18	0	254	1,037
1996	0	73	420	313	97	121	0	461	1,485
1997	0	81	210	734	0	0	0	236	1,261
1998	0	0	144	16	8	8	0	122	298
1999	0	11	277	1,029	11	113	0	159	1,600
2000	0	58	538	442	0	16	0	149	1,203
2001	0	43	247	430	43	63	0	168	994
2002	0	31	773	452	103	110	0	96	1,565
2003	0	98	131	387	12	140	0	1,010	1,778
2004	0	0	579	102	0	91	0	52	824
2005	0	0	32	402	16	33	0	112	595
2006	0	83	60	0	138	0	0	138	419
2007	0	26	10	12	77	141	0	48	314
97-06 Average	**0**	**41**	**299**	**399**	**33**	**57**	**0**	**224**	**1,053**
02-06 Average	**0**	**42**	**315**	**269**	**54**	**75**	**0**	**282**	**1,037**

Catch

Year	Nome River	Pilgrim River	Unalakleet River	Fish-Niukluk River	Sinuk River	Snake River	Solomon River	Other Streams	Total
1992	90	526	1459	2171	300	158	38	1030	5,772
1993	569	2362	874	5976	879	1,614	140	809	13,223
1994	1111	266	1639	2389	417	377	212	670	7,081
1995	571	370	1471	1169	498	887	200	622	5,788
1996	497	821	1694	4653	339	1055	97	1250	10,406
1997	569	429	4918	10452	1464	123	703	1529	20,187
1998	207	65	3256	8159	25	218	0	1570	13,500
1999	300	694	6089	7414	22	723	21	869	16,132
2000	10	221	6814	1701	29	449	853	992	11,069
2001	60	403	2331	3972	218	1385	0	1098	9,467
2002	735	144	4229	6587	432	279	0	351	12,757
2003	94	397	6189	5495	249	559	80	1954	15,017
2004	113	0	3478	1594	0	238	130	533	6,086
2005	92	48	1137	3316	171	338	161	112	5,375
2006	560	220	669	311	1331	262	83	794	4,230
2007	61	26	2375	3287	902	260	0	937	7,848
97-06 Average	**274**	**262**	**3911**	**4900**	**394**	**457**	**203**	**980**	**11,381**
02-06 Average	**319**	**162**	**3140**	**3461**	**437**	**335**	**91**	**749**	**8,694**

Table 18.– Arctic grayling sport harvest and catch in the Kotzebue Sound/Chukchi Sea subarea, 1992–2007.

			Harvest		
Year	Kobuk River	Noatak River	Other Streams	Lakes	Total
1992	255	105	248	360	968
1993	305	322	234	55	916
1994	178	407	186	33	804
1995	383	185	263	79	910
1996	513	1,136	393	94	2,136
1997	476	872	555	0	1,903
1998	1729	42	0	17	1,788
1999	672	412	97	66	1,247
2000	836	223	45	129	1,233
2001	355	620	111	158	1,244
2002	1,674	79	233	8	1,994
2003	781	528	129	35	1,473
2004	1,157	317	509	0	1,983
2005	231	38	0	6	275
2006	172	301	270	17	760
2007	307	433	32	64	836
97-06 Average	**808**	**343**	**195**	**44**	1,390
02-06 Average	**803**	**253**	**228**	**13**	1,297
			Catch		
Year	Kobuk River	Noatak River	Other Streams	Lakes	Total
1992	1,593	1,112	738	1,548	4,991
1993	1,717	1,718	3,151	642	7,228
1994	1,593	842	2,653	374	5,462
1995	5,146	1,114	7,921	1,560	15,741
1996	2,469	3,886	3,516	1,306	11,177
1997	2,815	2,179	3,182	216	8,392
1998	5,280	964	548	404	7,196
1999	6,680	3,621	5,114	66	15,481
2000	5,753	1,668	1,934	376	9,731
2001	4,103	2,123	975	171	7,372
2002	18,080	452	2,703	460	21,695
2003	5,860	3,875	658	233	10,626
2004	8,369	652	1,274	0	10,295
2005	1,639	435	826	0	2,900
2006	2,328	1,827	2,735	17	6,907
2007	2,191	1,965	32	1,975	6,163
97-06 Average	6,091	1,780	1,995	194	10,060
02-06 Average	7,255	1,448	1,639	142	10,484

Table 19.–Reported subsistence sheefish harvest, Kotzebue District, 1966–2007.

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[a]	430	4,704	36	ND
5/83-4/84[a]	27	764	28	ND
5/84-9/84[a]	30	2,803	93	ND
1985[c]	2	60	30	ND
1986[a, b]	72	721	10	ND
1987[b]	46	276	6	ND
1988[b, c]	ND	ND	ND	ND
1989[c]	ND	ND	ND	ND
1990[c]	ND	ND	ND	ND
1991	40	2,180	55	ND
1992	43	2,821	66	ND
1993[c]	ND	ND	ND	ND
1994	171	3,181[d]	84	ND
1995	314	9,465[d]	24.6	15,161[e]
1996	389	6,465[d]	18	13,704[e]
1997	338	9,805[d]	24.6	ND
1998	435	5,350[d]	13.6	ND
1999	191	8,256[d]	18.6	ND
2000	237	7,446[d]	16.6	14,533[e]
2001	257	3,838[d]	10.6	ND
2002	115	4,310[d]	37.5	ND
2003	488	7,823	16	ND
2004	440	10,163	23	ND
2005[c]	ND	ND	ND	ND
2006[c]	ND	ND	ND	ND
2007[f]	90	99	1	ND

Note 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.

[a] Summer harvests only.

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

[c] Subsistence sheefish harvests not documented.

[d] Reported harvests from Kobuk River villages only.

[e] Taube 1997, Taube and Wuttig 1998, Savereide 2002.

[f] Reported harvests from Noatak Village only. Data from Magdanz et al. *in prep*.

Table 20.– Sport fish harvest and catch of sheefish from northwest Alaska waters, 1979–2007.

	Total Harvest		%	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	45	0	0	0
1991	603	1,616	37	579	1,568	37	24	48	50
1992	1,904	3,678	52	627	2,034	31	411	411	100
1993	1,029	2,273	45	395	1,074	37	111	111	100
1994	564	958	59	135	386	35	95	95	100
1995	1,142	3,270	35	748	2,669	28	38	47	81
1996	485	3,183	15	360	2,850	13	94	271	35
1997	906	2,341	39	318	1,334	24	108	108	100
1998	414	924	45	145	617	24	148	186	80
1999	635	5,134	12	621	5,070	12	nd	nd	Nd
2000	1,201	3,372	36	362	2,338	16	0	0	0
2001	1,305	5,146	25	552	4,105	13	0	0	0.0
2002	500	1,996	25	352	1,710	21	119	239	50
2003	2,509	7,324	34	676	4,517	15	59	59	100
2004	1,634	2,837	58	477	1,575	30	58	58	100
2005	393	1,043	38	393	1,043	37	0	0	0
2006	810	5,254	15	566	4,929	12	0	0	0
2007	1,066	1,639	65	742	1,283	58	0	0	0
97-06 Average	**1,031**	**3,537**	**33**	**446**	**2,724**	**20**	**55**	**72**	**48**
02-06 Average	**1,169**	**3,691**	**34**	**493**	**2,755**	**23**	**47**	**71**	**50**

Table 21.–Sport fishing effort, and harvest of principal species in the North Slope subarea 1982–2007 and catch, 1990–2007.

Year	Angler-days		Lake Trout		Dolly Varden/Arctic char		Arctic grayling	
	Total	Haul Road	Total	Haul Road	Total	Haul Road	Total	Haul Road
				Harvest				
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	170	235	131
2007	4,154	1,873	0	-	151	130	572	293
Average								
1997-06	**4,444**	**2,178**	**91**	**60**	**811**	**415**	**1,082**	**417**
2002-06	**3,902**	**1,476**	**99**	**0**	**389**	**160**	**1,151**	**379**

-continued-

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Year	Angler-days		Lake Trout		Dolly Varden/Arctic 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
2007	2,975	1,789	183	183	1,941	1631	8,142	6463
Average								
1996-05	**4,444**	**2,178**	**711**	**194**	**3,756**	**1,458**	**9,354**	**5,662**
2001-05	**3,902**	**1,476**	**679**	**202**	**1,524**	**535**	**8,050**	**4,140**

Table 22.–Aerial survey indices of Dolly Varden from the Ivishak, Anaktuvuk, and Kongakut rivers of the North Slope subarea, 1971–2007.

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	H	Unknown	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*

-continued-

Table 22–-Page 2 of 2.

Year	Date	Ivishak River	Anaktuvuk River	Kongakut 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	5,411b	5,477	ND	H	Good	Viavant ADF&G files*
2007	19-Sept	6,520	5,807	ND	H	Good	Viavant ADF&G files*

NS = no survey, H = helicopter, S = fixed wing aircraft (Super Club; 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.

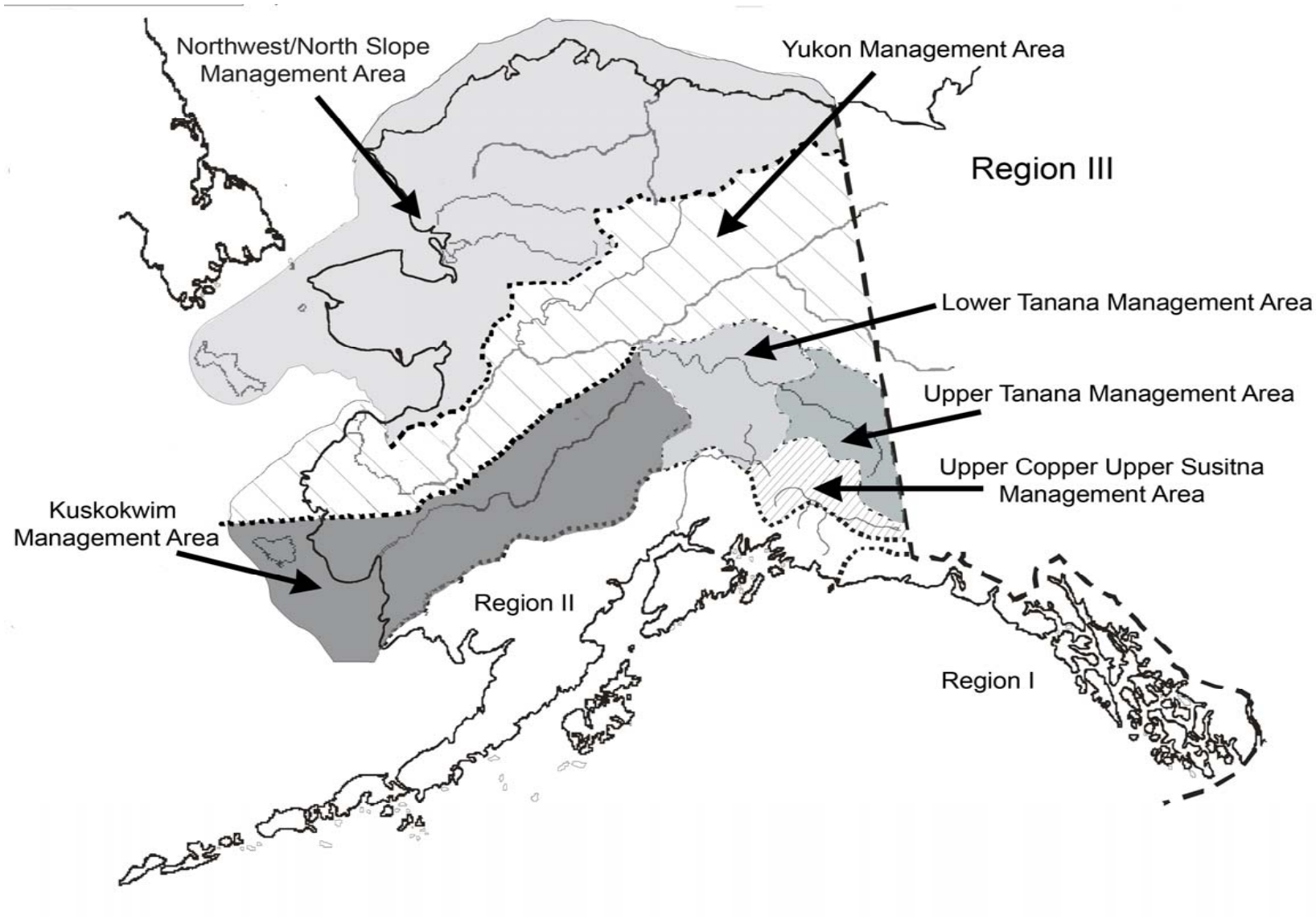

Figure 1.–Map of the sport fish regions in Alaska and the six Region III management areas.

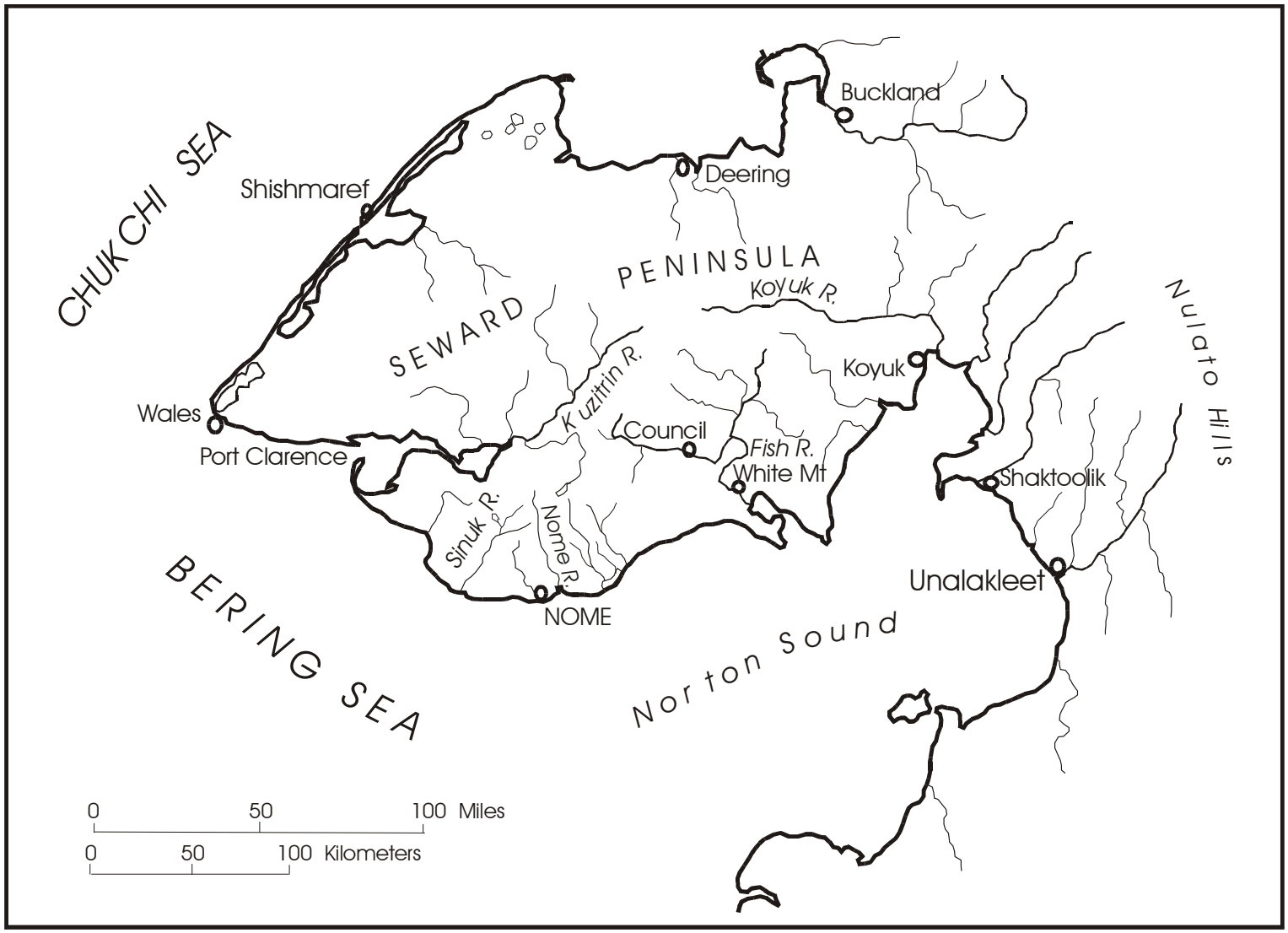

Figure 2.–The Seward Peninsula/Norton Sound subarea.

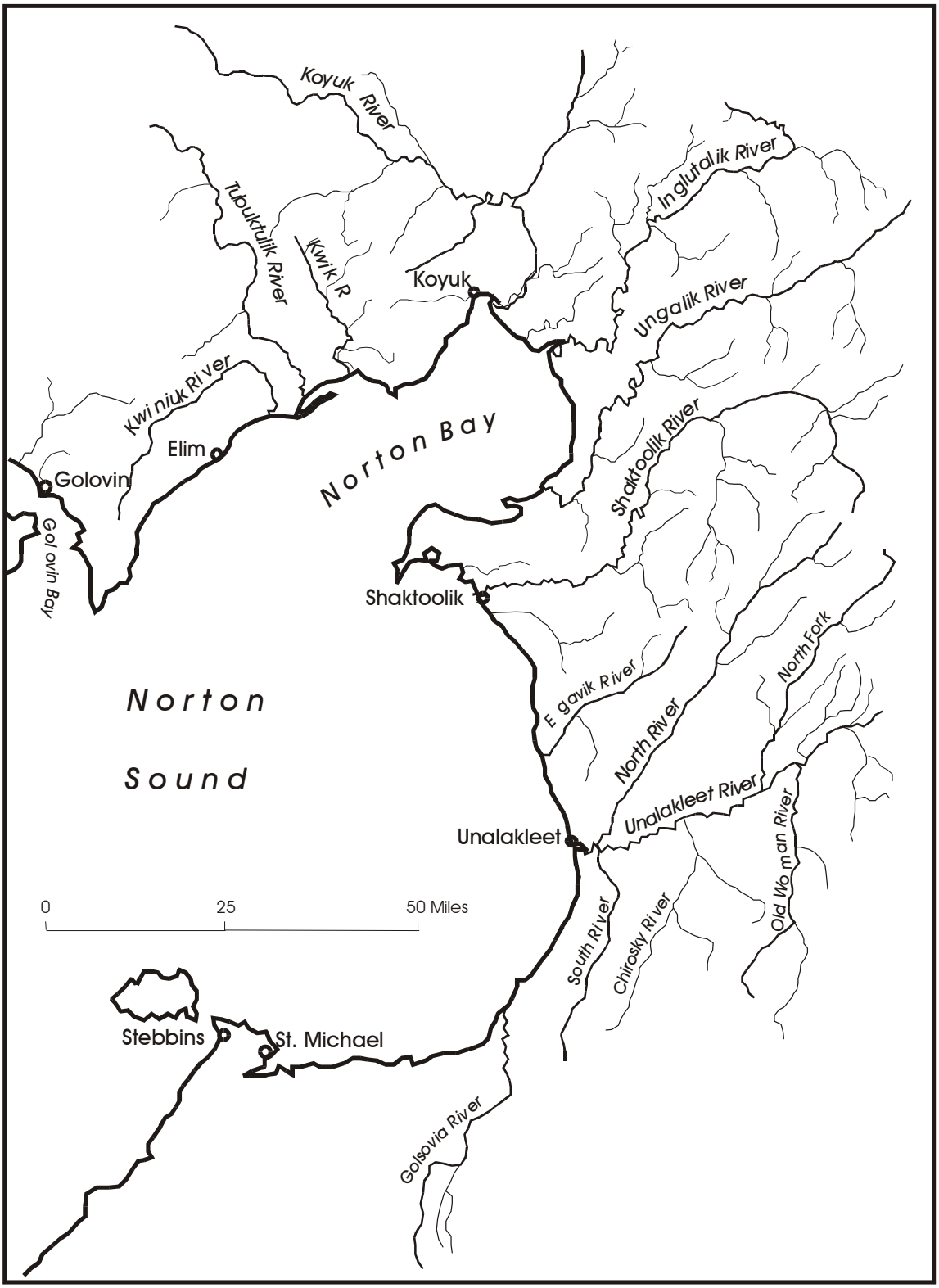

Figure 3.–Major drainages of Southern Norton Sound.

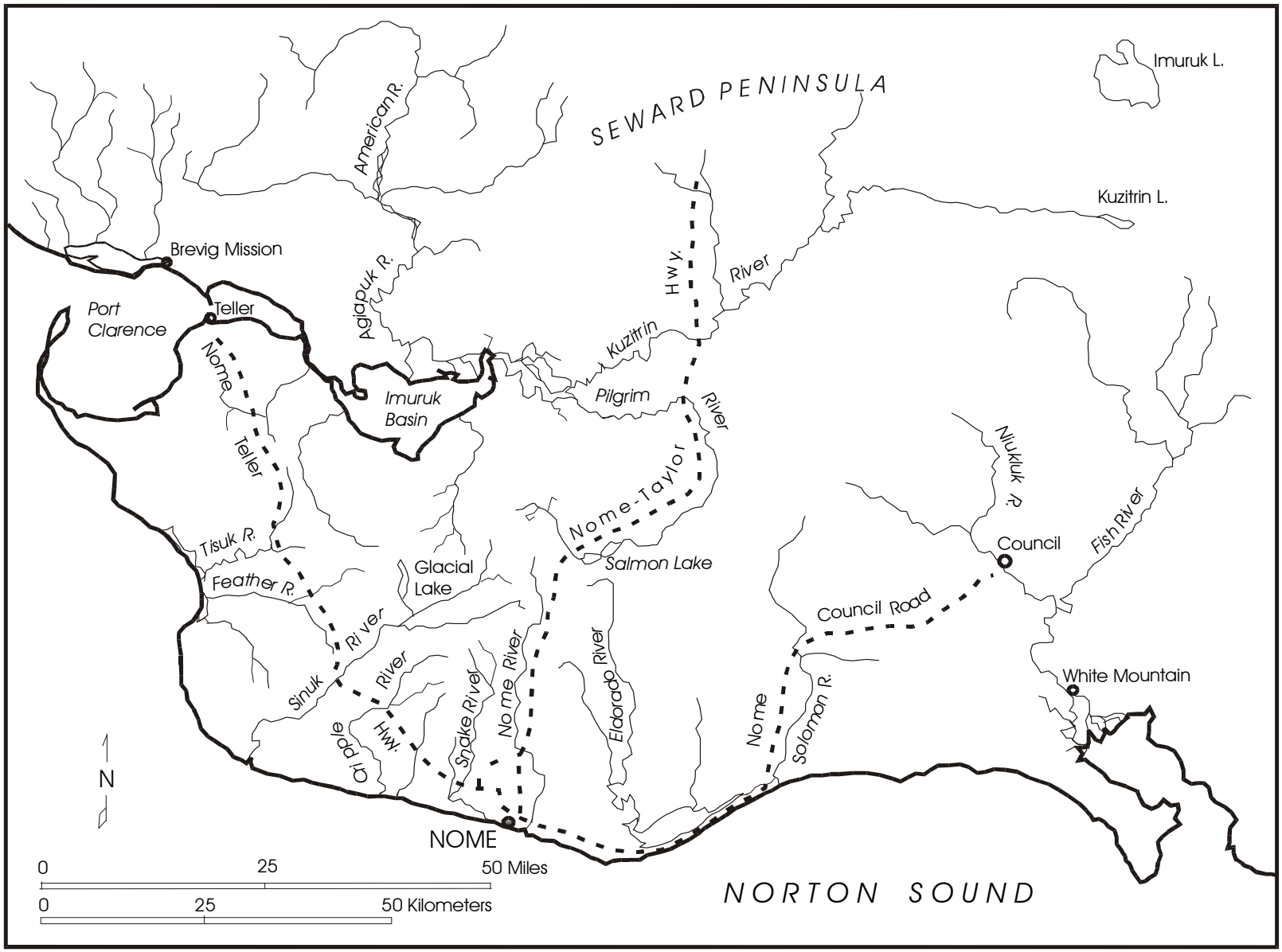

Figure 4.–Southern Seward Peninsula with road accessible waters.

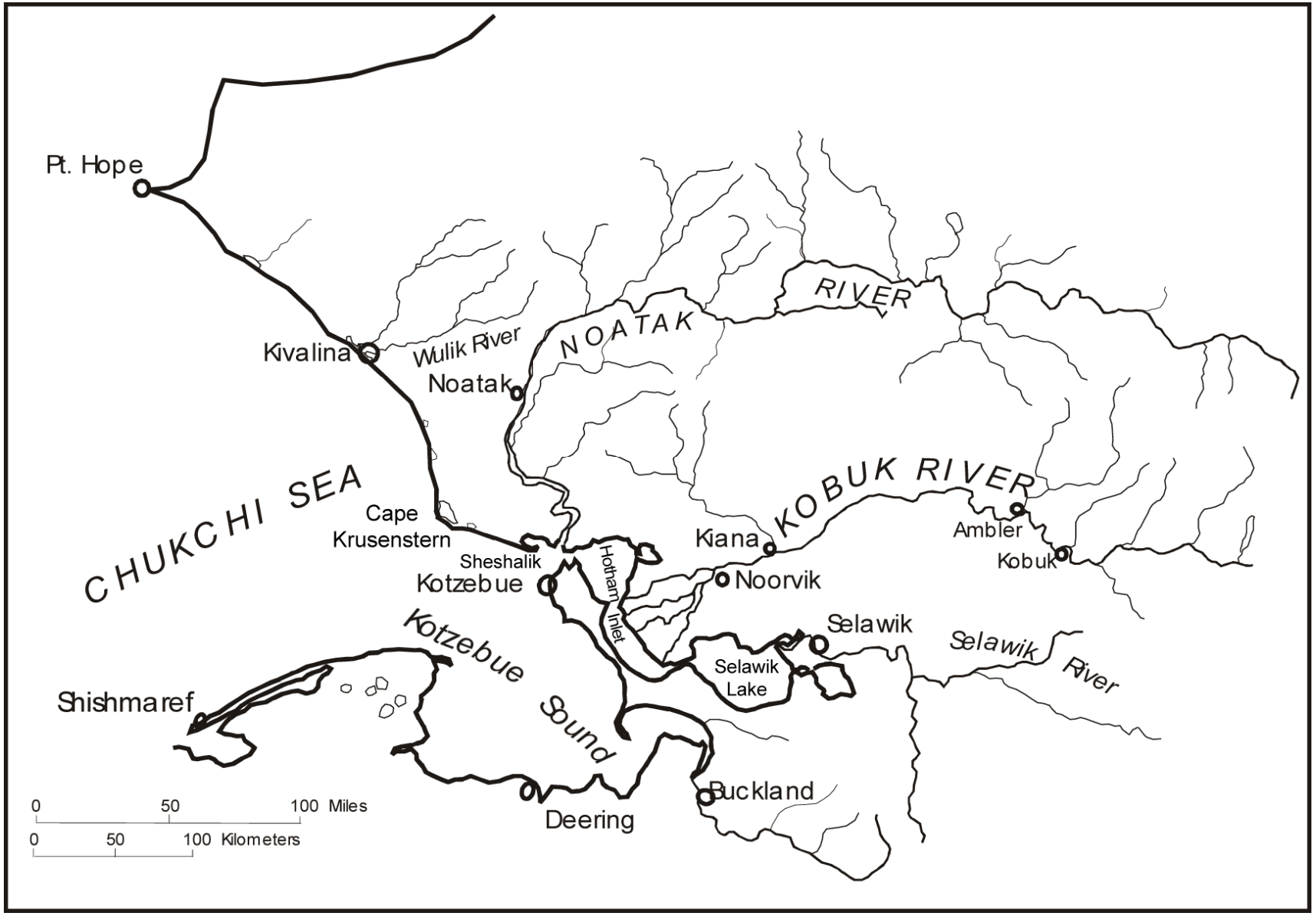

Figure 5.–Kotzebue Sound/Chukchi Sea subarea.

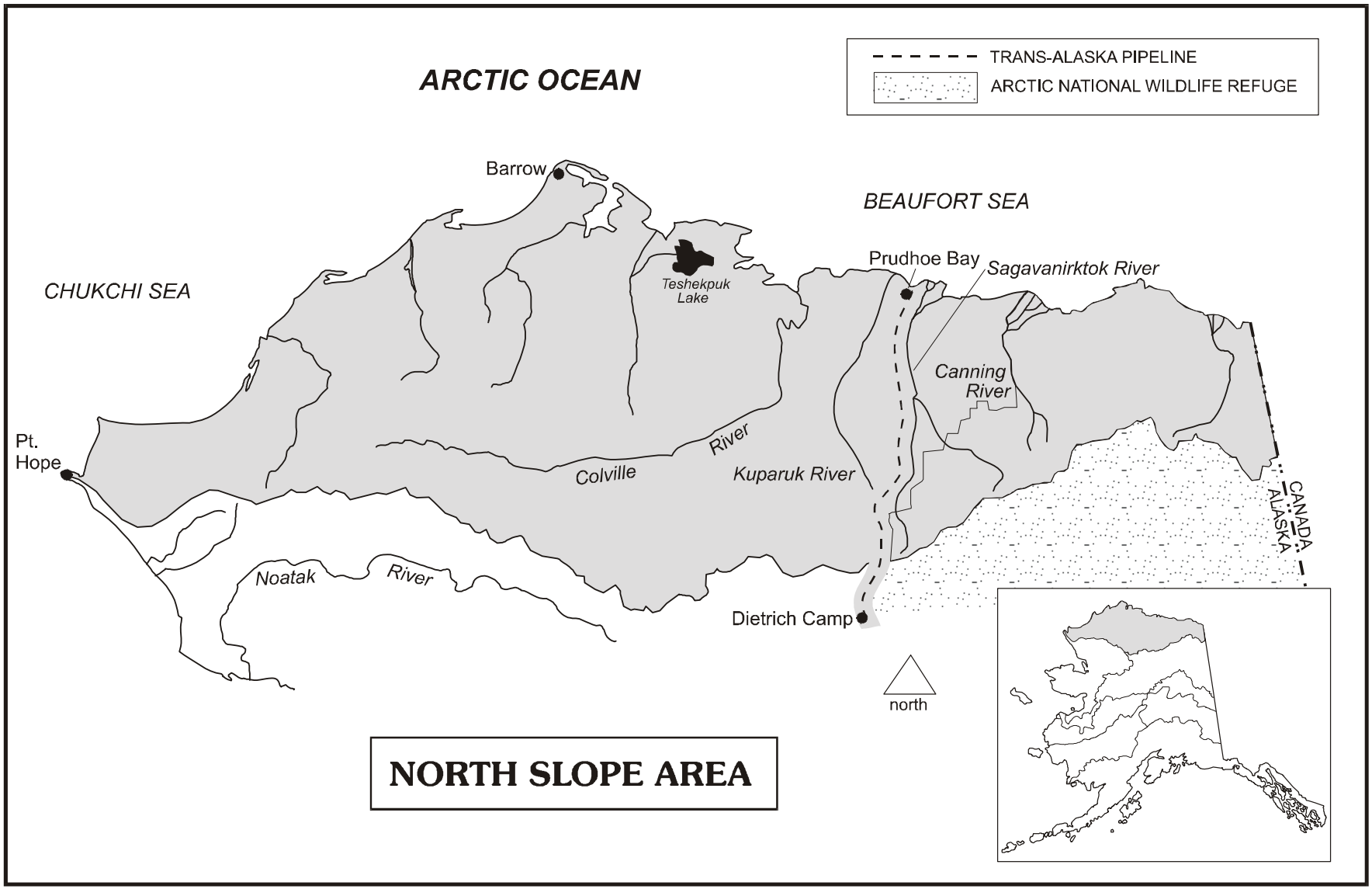

Figure 6.–North Slope subarea.

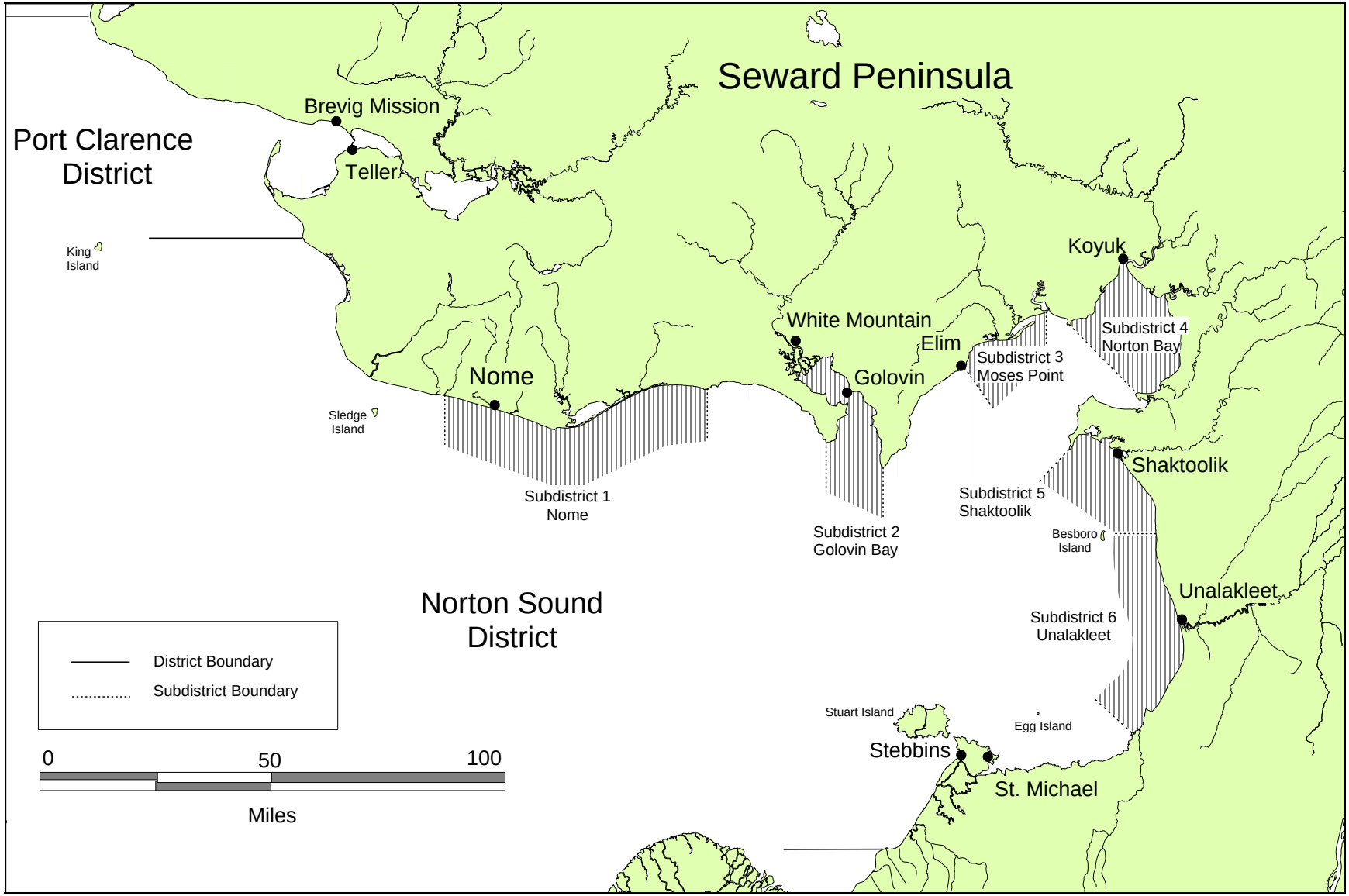

Figure 7.–Commercial salmon fishing subdistricts in Norton Sound and Port Clarence.

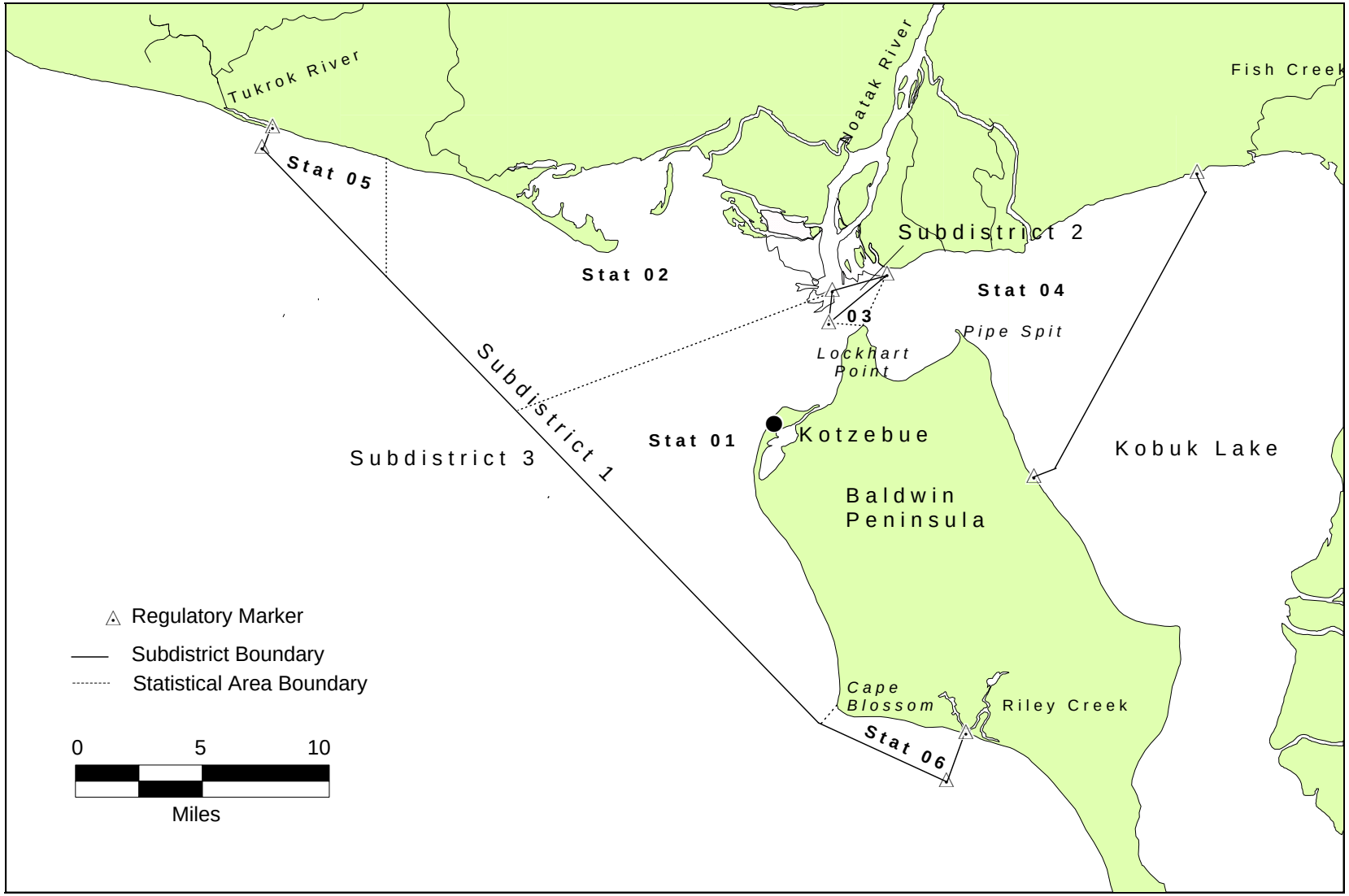

Figure 8.–Kotzebue commercial salmon fishing district.

APPENDIX A
UNALAKLEET RIVER KING SALMON MANAGEMENT PLAN ADOPTED BY THE BOF IN 2007

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

-continued-

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

(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 2007

Appendix B.–NW/NSMA sport fish emergency orders issued during 2007.

E.O. Number	Dates	Action
EO-3-KS-01-07	July 5– August 15	Prohibited the retention of king salmon in the Unalakleet and Shaktoolik rivers and prohibited the use of bait.
EO-3-SS-01-07	August 17– October 15	Increases the sport fish bag and possession limit for coho salmon to ten (10) fish in all waters of the Unalakleet River drainage.

APPENDIX C
ADDRESS AND CONTACT NUMBERS FOR INFORMATION SOURCES REGARDING FISHERIES IN THE NW/NSMA

Appendix C-Addresses and contact numbers for information sources regarding NW/NSMA.

Organization	Address	Phone	Internet address
Alaska Department of Fish and Game, Nome Area office	PO Box 1148 Nome, AK 99762	(800) 443-5167	www.adfg.state.ak.us
Fairbanks Regional office	1300 College Road Fairbanks, AK 99701-1599	(907) 459-7207	
Gates of the Arctic National Park and Preserve	P.O. Box 30 Bettles, AK 99726	(907) 692-5494	www.nps.gov/gaar/
Arctic National Wildlife Refuge	101 12th Avenue, Room 236 Fairbanks, AK 99701	(907) 456-0250	www.Arctic.fws.gov/
Bering Land Bridge National Preserve	PO Box 220 Nome, AK 99762	(907) 443-2522	www.nps.gov/bela/
Alaska Maritime National Wildlife Refuge	95 Sterling Highway, Suite 1 MS 505 Homer, Alaska 99603	(907) 235-6546	alaskamaritime.fws.gov/
Noatak National Preserve	P.O. Box 1029 Kotzebue, AK 99752	(907) 442-3890	www.nps.gov/noat/
Kobuk Valley National Park	P.O. Box 1029 Kotzebue, AK 99752	(907) 442-3890	www.nps.gov/kova/
Selawik National Wildlife Refuge	P. O. Box 270 MS 565 Kotzebue, Alaska 99752	(907) 442-3799	www.selawik.fws.gov/
Cape Krusenstern National Monument	P.O. Box 1029 Kotzebue, AK 99752	(907) 442-3890	www.nps.gov/cakr
Unalakleet National Wild and Scenic River	222 West 7th Avenue, #13 Anchorage, AK 99513	(907) 271-5477	www.blm.gov/ak/ado/unk river.html
NANA Regional Corporation	P.O. Box 49 Kotzebue, AK 99752	(800) 478-3301	www.info@nana.com
Nome Eskimo Community	P.O. Box 1090 Nome, Alaska 99762	(907) 443-2246	nomeeskimo@gci.net
Unalakleet IRA Council	P.O. Box 270 Unalakleet, Alaska 99684	(907) 624-3622	unkira.org
Norton Sound Economic Development Corporation	P.O. Box 358 Nome, AK 99762	(888) 650-2477	www.nsedc.com

APPENDIX D
REGULATORY HISTORY REGARDING SALMON SPORT FISHERIES IN THE NW/NSMA

Appendix D.–Regulatory history regarding salmon sport fisheries in the NW/NSMA.

Date	Regulation Adopted
Prior to 1966	Daily bag and possession limit of 15 fish of all salmon species in all freshwaters
1966–1970	Daily bag and possession limit of six fish of all species for Unalakleet River
1970	Daily bag and possession limit back to 15 fish of all species for Unalakleet River
1980	Salmon Lake and all tributaries closed to salmon fishing
1985	Daily bag and possession limit for king salmon set at five fish
1985	Daily bag and possession limit for chum, pink sockeye, and coho set at 15 fish
1985	Daily bag and possession limit for non-king salmon set at 15, only five of which can be chum or coho
1987	Daily bag and possession limit for king salmon set at one fish and all other salmon at 10
1988	Daily bag and possession limit for non-king salmon set at 10, of which only three could be chum or coho
1988	Chum salmon fishing closed in the Nome River
1992	Chum salmon fishing closed in all freshwaters of the Nome Subdistrict
1997	Daily bag and possession limits set at 10 pink, three coho, three sockeye, and three chum salmon for all of Northern Norton Sound, with Nome Subdistrict remaining closed to chum salmon fishing
2000	Daily bag and possession limit for non-king salmon reduced from 10 to five fish in the Unalakleet River drainage
2004	In 2004, an annual bag limit was set at 4 Chinook/year, of which 2 can be from the North River, and the daily bag limit was set at 2 fish
2007	As part of newly-adopted Unalakleet king salmon management plan, annual limit for king salmon in the Unalakleet River drainage reduced from four to two fish per year