Fishery Management Report No. 12-45

Fishery Management Report for Sport Fisheries in the Northwest/North Slope Management Area, 2011

by

Brendan Scanlon

December 2012

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

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

Mathematics, statistics

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

FISHERY MANAGEMENT REPORT NO. 12-45

FISHERY MANAGEMENT REPORT FOR SPORT FISHERIES IN THE NORTHWEST/NORTH SLOPE MANAGEMENT AREA, 2011

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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. adfg.alaska.gov/ sf/publications/. This publication has undergone regional peer review.

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ABSTRACT

Sport fisheries season summaries for 2011 and preliminary information for 2012 in the Northwest/North Slope Management Area are presented. The Northwest/North Slope Management Area (NW/NSMA) 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, chum, and pink salmon, Dolly Varden, sheefish, Arctic grayling, and northern pike. In 2011, angler-days totaled 18,794, with the largest proportion coming from the Seward Peninsula/Norton Sound area fisheries (0.60). Dolly Varden was the predominant sport species harvested in 2011, with 5,254 fish taken, followed by coho salmon (3,593) and Arctic grayling (2,204). Summaries of major sport fisheries within the NW/NSMA are detailed, including descriptions of recent performances, comparisons to commercial and subsistence harvests, Alaska Board of Fisheries regulatory actions, social and biological issues, and descriptions of ongoing research and management activities.

Key Words: Northwest Alaska, Norton Sound, Kotzebue, Unalakleet, North Slope, sport fisheries, subsistence, king salmon, coho salmon, pink salmon, chum salmon, Arctic grayling, Dolly Varden, sheefish.

EXECUTIVE SUMMARY

This document provides a wide array of information specific to recreational angling opportunities that exist within the Northwest/North Slope Management Area (Figure 1). Information specific to the proposals that the Alaska Board of Fisheries (board) will address at its January 15–20, 2013 meeting is contained within this report. Appendix C (page 55) directs board members to information specific to the January meeting. This table guides the reader to specific information contained within the text, tables, and graphic format that, may be useful in evaluating regulatory proposals. Information specific to recreational fisheries within the Northwest/North Slope Management Area during 2011, including preliminary data from 2012, are presented, along with a brief history of these fisheries and past board decisions that have affected them.

INTRODUCTION

This area management report provides information regarding the Northwest/North Slope Management Area (NW/NSMA) and its fisheries for 2011, with preliminary information from the 2012 season. This report is organized into 2 primary sections: a management area overview, including a description of the NW/NSMA, and a summary of fishing effort, harvest, and catch for the area, and a section on the significant area fisheries, including specific harvest and catch by species and drainage.

ADVISORY COMMITTEES

Local Fish and Game advisory committees (ACs) have been established throughout the state to assist the boards of Fisheries and Game in assessing fisheries and wildlife issues, and proposed regulation changes. AC meetings allow opportunity for direct public interaction with Alaska Department of Fish and Game (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 department's Division of Administrative Services provides administrative and logistical support for the board and ACs. During 2011, the department had direct support responsibilities for 82 ACs in the state.

Within the NW/NSMA there are nine ACs: Arctic, Kotzebue, Lower Kobuk, Noatak/Kivalina, Northern Norton Sound, Northern Seward Peninsula, St. Lawrence Island, Southern Norton

Sound, and Upper Kobuk committees. In addition, the ACs from the Yukon River drainage often comment on proposals concerning NW/NSMA fisheries.

ADF&G EMERGENCY ORDER AUTHORITY

The department has emergency order (EO) authority (5 AAC 75.003) to modify time, area, and bag/possession limit regulations. EOs are implemented to deal with conservation issues for resident species. EOs are also implemented as a tool for inseason management of salmon fisheries. Inseason management is usually in accordance with a fisheries management plan approved by the board. EOs issued under this authority for the NW/NSMA during 2011 and 2012 are summarized in Appendix A.

FEDERAL SUBSISTENCE

The Alaska National Interest Lands Conservation Act (ANILCA) established a priority subsistence use of fish and game for federally-qualified rural residents on lands and waters for which the federal government asserts jurisdiction. The State of Alaska has also established a priority for subsistence use of fish and game by Alaskan residents (AS 16.05.258) on all lands and waters, but cannot discriminate between rural and urban residents (Alaska State Constitution Article VIII, sections 3 and 15). Because of this difference, the federal government 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 regulatory authority for assuring the rural priority for subsistence fisheries on federal public lands, which includes nonnavigable waters on public lands. Following the *State of Alaska v. Katie John* decision by the Ninth Circuit Court in 1995, the federal government expanded the definition of public land to include waters for which federal agencies assert federal reserved water rights. Under current practice, federal land management agencies adopt regulations to provide for priority subsistence use by qualified rural residents in nonnavigable waters within federal public lands (including Bureau of Land Management (BLM) lands) and in navigable waters adjacent to or within federal conservation system units (generally does not include BLM lands). The state retains all other fish and wildlife management authorities, including management on federal land.

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

Within the NW/NSMA, the subsistence fisheries for which the federal government asserts management responsibility include those within and adjacent to 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 Wild and Scenic River (wild classification only) 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 (wild classification only). The NW/NSMA fisheries fall under the purview of the Seward Peninsula, Northwest, and North

Slope RAC's. The most recent meetings were held in August 2012 (North Slope and Northwest) and October 2012 (Seward Peninsula). At these meetings, no federal fisheries proposals for the NW/NSMA were addressed.

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. The Statewide Harvest Survey (SWHS) 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. Questionnaires are mailed to a stratified random sample of households containing at least 1 individual with a valid fishing license (resident or nonresident). Information gathered from the survey includes participation (number of anglers 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. Survey results for each year are available the following year; hence, the results for 2011 were available fall 2012. Additionally, creel surveys have been used to verify the mail survey for fisheries of interest, or for fisheries that require more detailed information or inseason management.

The utility of SWHS estimates depends on the number of responses received for a given site (Mills and Howe 1992; Clark 2009). 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.

For purposes of reporting and organizing statistics in the SWHS, NW/NSMA sites are designated within survey areas "W" (Seward Peninsula-Norton Sound Drainages), "X" (Northwest Alaska Drainages), and "Z" (North Slope Drainages).

SPORT FISH GUIDE LICENSING AND LOGBOOK PROGRAM

Since 1998, the Division of Sport Fish has operated a program to register and/or license both sport fishing guides and sport fishing guide businesses, and to collect information on sport fishing participation, effort, and harvest by saltwater and freshwater-guided clients (Sigurdsson and Powers 2009). In 1998, the board adopted statewide sport fishing guide regulations (5 AAC 75.075) which required all sport fishing guides and businesses to register annually with the department. At this time, the board also adopted statewide regulations that required logbooks for saltwater charter vessels. The logbooks collected information on charter activity (location, effort, and harvest) necessary for the board for allocation and management decisions specific to king salmon *Oncorhynchus tshawytscha*, rockfish *Sebastes* spp., and lingcod *Ophiodon elongatus*, and for the North Pacific Fishery Management Council (NPFMC) for allocation of Pacific halibut *Hippoglossus stenolepis*.

In 2004, the Alaska Legislature adopted House Bill 452 that established licensing requirements for sport fishing guide business owners and sport fishing guides on a statewide basis (effective 2005). This legislation also required logbook reporting for all freshwater guiding businesses, in addition to existing saltwater reporting requirements. Logbook data provides location of fishing effort, level of participation, and number of species kept and released by clients. This information is used for the regulation, development, and management of fisheries and has been published annually since 2009 (data since 2006) in a Fishery Data Series report (Sigurdsson and Powers 2009–2012).

SECTION I: NORTHWEST/NORTH SLOPE MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION AND FISHERIES RESOURCES

The NW/NSMA 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 2–5). The total land area consists of approximately 147,992 mi^2 (383,301 km^2). Fish species present in the NW/NSMA include: anadromous Dolly Varden *Salvelinus malma*; 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*, Arctic char *Salvelinus alpinus*, northern pike *Esox lucius*, sheefish *Stenodus leucichthys*, round whitefish *Prosopium cylindraceum*, least cisco *C. sardinella*, broad whitefish *C. nasus*, burbot *Lota lota*, and lake trout *Salvelinus namaycush*.

Norton Sound/Seward Peninsula Subarea

Drainages in southern Norton Sound 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 (Figure 2). The Unalakleet River has been designated a National Wild River and supports anadromous populations of Dolly Varden; king, coho, chum, and pink salmon; and resident populations of Dolly Varden, Arctic grayling, and whitefishes *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, (Figures 2 and 3) including the Fish, Niukluk, Eldorado, Nome, Snake, Sinuk, Solomon, 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 these runs increased markedly from 2003–2008. Based on counting tower and weir information, a few remnant late-run sockeye salmon are present in other locations in Norton Sound. King salmon are present in the Pilgrim, Niukluk, and Fish rivers. Trophy Arctic grayling, larger than 3 lbs (1.4 kg), are present in many Seward Peninsula waters. Of the 444 Arctic grayling registered in the department trophy fish program since 1967, 61 were taken from Seward Peninsula waters, and 26 of those were taken from the Sinuk River. The new state record Arctic grayling (5lb 3oz) was caught and

released from the Fish River drainage in 2008. 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. Scanlon and DeCicco (2007) provides more detail on these fisheries and other remote systems.

Kotzebue Sound/Chukchi Sea Subarea

Major drainages flowing into the Kotzebue Sound and Chukchi Sea include the Selawik, Kobuk, Noatak, Wulik, Kivalina, and Buckland rivers (Figure 4). The Noatak River is a National Wild River and most of the drainage is included in the Noatak National Preserve (Figure 4). 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, the upper mainstem of the Kobuk River, and the Selawik River are also National Wild rivers. Much of the Selawik River valley is part of the Selawik National Wildlife Refuge.

The Noatak River Drainage supports resident populations of whitefish, Arctic grayling, Dolly Varden, lake trout, burbot, and northern pike. Sheefish use the lower reaches of the river for feeding during the spring, but are not known to spawn there (Alt 1987). 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, since thousands of anadromous Dolly Varden overwinter in the lower 200 miles of the river and spawn in some of the river's tributary streams. 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 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, 53 lb, was taken in 1986 from the Upper Kobuk River. Abundant numbers of whitefish utilize the river, as well as Selawik Lake and Hotham Inlet (known locally as 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 River 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, 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 5 species of North American Pacific salmon, Arctic grayling, burbot, and whitefish occur in these relatively small drainages; however, except for chum salmon in the Wulik River, most populations of these other species are small.

North Slope Area

The North Slope of the Brooks Range (Figure 5) 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 wintering habitat for diadromous Beaufort Sea Dolly Varden. The state's third largest lake, Teshekpuk Lake, is found here on the coastal plain, 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.

SUBSISTENCE FISHERIES

There are approximately 27,000 people living in the NW/NSMA (US Census Bureau 2010). Except for the 2 larger communities of Nome and Kotzebue, the population is scattered among 31 small villages along the coast and the major area rivers. Most of the population is composed of Alaska Natives, many of whom rely heavily on the subsistence use of fish and wildlife for their livelihoods in a mixed market-subsistence economy. 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 to participate in subsistence fisheries. 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.

Subsistence use of salmon is monitored in village surveys conducted by the department's Division of Subsistence and by permits issued by and returned to Division of Commercial Fisheries. Recent subsistence salmon harvests (2006–2010) have averaged about 69,000 fish in the Norton Sound District (Table 1). This average harvest was composed of 2,774 king; 558 sockeye; 15,091 coho; 40,165 pink; and 10,372 chum salmon. In 2011, 42,043 salmon were harvested in the Norton Sound District. Of these, 1,359 were king; 414 sockeye; 8,538 coho; 17,166 were pink; and 14,566 were chum salmon. The recent 5-year (2006–2010) average subsistence salmon harvest in the Port Clarence District was 14,324 fish, composed of 83 king; 5,392 sockeye; 736 coho; 4,204 pink; and 3,910 chum salmon (Menard et al. 2012; Table 1).

In 2001, the board 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. 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 in fresh water, etc.). Sport fish bag and possession limits by species as specified in 5 AAC 70.011 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 is, as well. Fishers cannot combine sport fish bag and possession limits with subsistence harvest permit limits.

The cyclic nature of salmon abundance in Norton Sound streams is apparent by the large variations in annual escapements (Table 2). 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 salmon runs, allowed for a more relaxed subsistence fishing schedule. In 2008, chum salmon returns were down and restrictions were put in place for the subsistence fishery in the Nome

Subdistrict (sport fishing for chum salmon has been closed by regulation since 2001); however, pink salmon escapements were near record highs in many areas (Table 2). Sockeye salmon escapements in the Pilgrim River, which have averaged over 50,000 fish from 2003–2008, but average escapement has dropped to 3,400 fish for 2009–2011 (Menard et al. 2012; Table 2). In addition to salmon, other fish, including saffron cod, rainbow smelt, Dolly Varden, and whitefish, are taken. In the Kotzebue Sound District, the recent 10-year (2001–2010) subsistence salmon harvest has been about 24,000 chum salmon; however, subsistence harvest surveys (for all species) were not conducted in all 11 Kotzebue Sound District villages in all years, and therefore, these reported catches underestimate the total harvest by some unknown amount (Table 1). In 2007, the residents of Kivalina harvested a total of 4,568 chum salmon; however, this survey did not include villages along the Kobuk and Selawik rivers, or the village of Kotzebue, and so total chum salmon harvests were likely much higher (Magdanz et al. 2010).

In the Kotzebue Sound District, sheefish and other whitefish species are also an important subsistence resource, especially in Kotzebue, Selawik, and the villages along the Kobuk River. The relative importance of whitefish is higher in the Kotzebue Sound District than in many areas of the state, with much of the whitefish harvest including sheefish harvested by jigging through the ice in Hotham Inlet in the spring. The average subsistence harvest of whitefish for the village of Noatak and the 5 Kobuk River villages, combined, from 1998 to 2002 was 44,552 fish. In 2003, 73,242 whitefish were estimated harvested, and in 2004, 50,501 were estimated harvested (Fall et al. 2003; Brown et al. 2005; Georgette and Shiedt 2005).

ESTABLISHED MANAGEMENT PLANS AND POLICIES

Regulations governing fisheries in the NW/NSMA are found in 5 AAC 69.101 through 5 AAC 69.995 (North Slope Area sport fishing) and 5 AAC 70.001 through 5 AAC 70.995 (Northwestern Area sport fishing), and in 5 AAC 01.100 through 5 AAC 01.190 (subsistence fishing). 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 (Appendix A).

Fisheries-specific management objectives for the management area have been identified in management plans for Arctic grayling and lake trout. In addition, a series of general divisional criteria have been prepared to guide establishment of fishery objectives, and include:

1. **Management and protection of existing fish resources**. Divisional activities should strive to manage and protect Alaska's wild fish stock resources for future generations;
2. **Public use and benefits of existing fish resources**. Alaska's fishery resources should be made available for public use and benefit on a sustained yield basis;
3. **Rehabilitation of depressed stocks and damaged habitat**. Divisional activities should strive to restore and maintain fish stocks and habitat damaged by man's activities; and,
4. **Enhancement of natural production or creation of new opportunities**. The division should pursue creation of new sport fishing opportunities through rehabilitation of natural stocks or creation of new fisheries where these opportunities do not negatively impact other fisheries.

Two regionwide management plans that affect fisheries in the area have been completed. A regional management plan for Arctic grayling was adopted by the board in January 2004. The *Wild Lake Trout Management Plan* was adopted for the Arctic-Yukon-Kuskokwim region by the

board in February 2007 (Burr 2006). Revision of existing plans, as well as the development of additional fisheries management plans, will occur as needed in response to changes in use patterns as new quantitative information becomes available.

The *Wild Arctic Grayling Management Plan* (5 AAC 69.155; 5 AAC 70.055) plan directs the department to manage wild Arctic grayling populations in the NW/NSMA for long-term sustained yield through a conservative harvest regime. The plan establishes and defines 3 management approaches under which the department shall manage wild Arctic grayling populations in the NW/NSMA: 1) the regional management approach; 2) the conservative management approach; and, 3) the special management approach. The plan also outlines guidelines and considerations for the department, public and/or board to change or address the management approach for a water body or fish stock.

The *Wild Lake Trout Management Plan* (5 AAC 69.140; 5 AAC 70.040) directs the department to manage wild lake trout populations in the NW/NSMA by employing a conservative harvest regime and by maintaining harvest below the maximum sustained yield level. The department may take 1 or more management action if there is a conservation or biological concern for sustainability of the fishery or a stock harvested in that fishery. These actions include reduction of bag and possession limit, reduction of fishing time, allowing only catch-and-release, and modification of methods and means of harvest. The plan also specifies allowable measures to reduce harvest if harvest level exceeds sustainable yield for a 2-year period. Finally, the plan establishes a process for designating special management waters and means for limiting harvest in these areas to meet the management objectives.

MAJOR ISSUES FOR THE NORTHWEST/NORTH SLOPE MANAGEMENT AREA

1. *Unalakleet River king salmon*. The Unalakleet River 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, 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 River tributary) of 1,200 to 2,600 fish. After a historic high of 4,185 fish in 1997, tower counts have declined steadily, and counts have failed to reach the lower end of the SEG for 5 out of the last 10 years (2001–2010). In 2008, the count was 903 fish, which was the all-time low until it was eclipsed in 2011 (864 fish; Table 2). Uncertainty regarding 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 northwestern 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 construction of a clean-water bypass system in Red Dog Creek. Water quality is monitored by the Alaska

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). In addition, final permits have been approved for expansion of the mine (called the Aqqaluk Extension) which will extend the operational life of the mine from an original date for ore depletion of 2012 until 2031. The Division of Sport Fish conducts aerial surveys of Dolly Varden overwintering in the Wulik River annually and in cooperation with the Division of Habitat, collects fish from which tissues are sampled for heavy metal analyses twice each year.

3. *Nome area gold mining*. 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. Recently, a large increase in the number of recreation suction-dredging operations has occurred in the nearshore marine waters of the Nome Subdistrict. This has generated concerns over turbidity plumes and conflicts with subsistence fishers. Interest in mining is directly related to the world price of gold. Development interest had declined with the price of gold, but in the past 6 years, the number of mining operations has increased as the price has reached record-highs.

4. *Rural resentment of sport fishing and sport anglers*. At public meetings in this area, local residents sometimes express resentment toward “outsiders” who come into remote areas traditionally used by local people for subsistence hunting or fishing. They explain that there is a cultural proscription against the concept of "sport fishing" in that people do not have the right to "play" with food resources. This point of view can be particularly strong towards catch-and-release practices and has led to some resentment directed towards sport anglers who wish to fish in remote waters of NW/NSMA, and to proposals before the board 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*. In October 1999, federal fishery managers assumed responsibility for ensuring a rural subsistence priority on navigable waters adjacent to or within the boundaries of federal conservation units. There is continued concern that a result of this action will be reduced opportunity for sport fishing throughout Alaska. Since there is a large amount of federal public land within the NW/NSMA used by local residents for subsistence purposes, the potential loss of sport fishing opportunity in remote areas of the NW/NSMA is of concern to anglers and sport fish managers. The department continues to work with federal managers and Federal Subsistence RACs to address fisheries issues as they arise.

ACCESS PROGRAM

The Wallop-Breaux Amendment to the Federal Aid in Sport Fish Restoration Act (Dingell-Johnson or D-J) mandates that at least 15% of federal funds collected from taxes on boat gas and sport fishing equipment be used by states for development and maintenance of motorized boating access facilities. A broad range of access facilities can be approved for funding if they are constructed to achieve a state fishery management objective. These facilities can include boat ramps and lifts, docking and marina facilities, breakwaters, fish cleaning stations, restrooms, and parking areas.

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. In

early 2010, a request from the city manager of Nome was submitted for a cooperative project with the department to build a boat launch, parking area, and possibly, a restroom facility on the mouth of the Snake River. However, it is unclear whether or not the city of Nome has the resources to maintain these facilities once they are built and therefore, any further planning for this project is suspended until this issue is resolved.

INFORMATION AND EDUCATION

Information regarding regulations, publications, stocking and fishing reports, news releases and EOs for the NW/NSMA can be found from the *Fishing* and *Sport* links at the department's website (http://www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main). From the *Interior Area* and *Northwest Drainages* link on this website, anglers interested in fishing in the NW/NSMA can read area descriptions and from the *Fishing Information* and *fishing brochures* links, download several Division of Sport Fish publications, including: *Nome Roadside Fishing Guide*, *Sheefish Catch & Release* (for anglers interested in fishing the Kobuk or Selawik River drainages), and *Sport Fishing along the Dalton Highway* (for those interested in fishing along the roadside on the North Slope). Also, *Dolly Varden and Arctic Char in Northern Alaska* can be helpful for anglers who fish in the NW/NSMA as both species are found in the area.

There are 3 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, Kid's Fish and Game Fun Day, and the Becoming an Outdoors-Woman (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

Effort, harvest, and catch, statistics for NW/NSMA sport fisheries have been estimated from response to the SWHS since 1977, and reported under the headings of Seward Peninsula-Norton Sound Drainages (Area W), Northwest Alaska Drainages (Area X), and North Slope Drainages (Area Z) (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995-1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, *In prep*). The results of the SWHS indicate that effort in the NW/NSMA has remained more or less stable since 1996; however, estimated sport fishing effort in 2010 and 2011 were the lowest ever recorded. During 2011, total sport fishing effort for the NW/NSMA was estimated at 18,794 angler-days, more than 6,000 less than the recent 10-year (2001–2010) average of 25,012, with all three subareas showing moderate decreases (Table 3). The recent 5-year (2006–2010) average for sport fishing effort for the NW/NSMA is 26,485 angler-days (Table 3).

The Seward Peninsula and Norton Sound subarea accounts for most of the sport fishing in the NW/NSMA. Effort in the subarea has averaged 16,919 angler-days (64% of the area total) from 2006–2010 (Table 3). 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 3,926 angler-days for the Unalakleet River in 2011, approximately 35% of the total effort in the subarea (Table 3). 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 contributed to a reduction of

fishing effort on this stream. Annual effort in the Nome River has averaged 2,619 angler-days from 2001–2010, but has averaged 3,762 from 2006–2010 (Table 3). The recent increases in effort are probably due to the recent large runs of pink and coho salmon, as well as increased employment in the Nome area and the 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 2,406 angler-days of effort from 2006–2010. After 2 years (2008–2009) of fishing effort of over 3,800 angler-days, the number of angler days dropped to 1,844 in 2010,but was back up to 4,738 in 2011 (Table 3). Estimated effort on the Snake and Sinuk rivers has averaged 1,213 and 822 angler-days from 2006–2010, respectively (Table 3).

In the Kotzebue/Chukchi Sea subarea, sport fishing effort has been somewhat more variable, ranging from about 3,100 to 7,400 angler-days per year from 2001–2010 (Table 3). In 2011, there were an estimated 4,523 angler-days in the subarea (Table 3). 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 probably 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) which are more accessible. The average effort from 2001–2010 was 4,358 angler-days, with almost 50% of that coming from Haul Road fisheries (Table 3). In 2011, sport fishing effort was 2,931 angler-days. 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.

Harvest and catch of Pacific salmon were both down precipitously from the recent 10-year averages (Tables 4 and 5). Salmon harvest in 2011 was 5,042 fish, 58% less than the recent 10-year average of 12,134 fish, with king salmon harvest (61 fish) down by 85% (Table 4). Catches of Pacific salmon in the NW/NSMA in 2011 were 21,920 fish, down 46% from the recent 10-year average of 40,830 (Table 5). The Unalakleet River provides for 70% of the harvest and 72% of the catch of king salmon in the NW/NSMA in the past 10 years (Table 6), and with low escapement and consequent early-season closure of the sport fishery by EO (Appendix B), all fishing for king salmon was done on July 11. Much of the decrease in salmon catch and harvest can be attributed to recent smaller runs of coho salmon into Norton Sound drainages and in particular, the Unalakleet River drainage, where coho salmon escapement into the North River dropped from 22,226 fish in 2009 to 7,608 fish in 2010, and 3,624 in 2011 (Table 1). In addition, the daily bag and possession limit in 2009 was doubled from 3 to 6 for coho salmon in the Unalakleet River drainage to provide for increased harvest during such a large return, whereas this was not the case in 2010 and 2011.

Harvest and catch of Arctic grayling was down considerably in 2011 compared to recent averages, while harvest and catch for Dolly Varden was near recent averages. Harvest of Arctic grayling was down 27% in 2011 (2,204 fish) compared to the recent 10-year average of 3,028 fish. Harvest of Dolly Varden in 2011 (5,254 fish) was near the recent 10-year average of 5,053 fish (Table 4). Similarly, catch of Arctic grayling in 2011 (12,675 fish) also fell dramatically from the recent 10-year average (25,979). Catch of Dolly Varden was 17,283 in 2011, down slightly from the recent 10-year average of 18,491 fish (Table 5).

Harvest and catch of all other non-salmon species (except burbot) in 2011 was much lower than the recent 10-year averages (Tables 4 and 5). 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

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, pink, and coho salmon are not as well known, but can be excellent. Marine sport fisheries have been virtually nonexistent throughout the area, although in Norton Sound, anglers occasionally try trolling for salmon (king, coho, and pink) on calm days. The proportion of angler-days spent fishing in salt water is generally less than 5% of the total annual areawide effort. Through the ice jigging for saffron cod, smelt, flounder, sheefish, Arctic grayling, and Dolly Varden is common near coastal settlements, but these fisheries generally operate under subsistence fishing regulations.

This section provides a summary of significant sport fisheries by species in the NW/NSMA in 2011 and 2012, and has direct connection to proposals being addressed by the board in January 2013. Discussion of each fishery will address: 1) historical perspective; 2) recent fishery performance (stock status); 3) fishery objectives and management; 4) current issues; 5) recent actions by the board; and, 6) ongoing and recommended management and research activities. Recent fishery performance will focus on data from 2011. Information regarding the 2012 season will be included as available, but estimates of sport effort and harvest are not yet available for the 2012 season.

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 concentrated effort 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 5 years (2006–2010), about 61% of the total average salmon harvest has been coho, 26% pink, 10% chum, 2% king, and 1% sockeye salmon. In 2011, 71% of the total salmon harvest was coho, 11% pink, 15% chum, 1% king, and 1% sockeye salmon (Table 4).

UNALAKLEET RIVER SALMON FISHERIES

Background and Historical Perspective

The village of Unalakleet, with a population of about 700, 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 first week of July, and continues through late-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 stay at 1 of the 2 sport fishing guide operations on the river. Most sport fishing effort occurs in the lower 15 miles of the Unalakleet River and in the lower 5 miles of the North River, a tributary which enters the Unalakleet River about 7 miles upstream from its confluence with the Bering Sea. Sport fishing for king salmon in the Unalakleet River is popular with both guided and nonresident anglers, as well as local residents. Generally, about 60% of the king salmon harvested from the river each year are taken by local residents.

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 5 years. The 2002 effort was the highest on record at 8,195 angler-days, and from 2006–2010 averaged 4,347 angler-days (Table 3). Unalakleet River salmon harvests trended upward between 1991 and 2000, and have remained relatively stable until 2008, when a record number of salmon were harvested (8,861 fish), principally pink and coho salmon (Tables 6–9). In 2011, the harvest of all salmon species was 3,014 fish, and the average annual sport harvest of all salmon species from the Unalakleet River from 2006–2010 was 6,036 fish. Coho salmon comprised about 63% of the average harvest, while king salmon made up about 5%. Approximately 88% of the entire NW/NSMA harvest of king salmon and 70% of the coho salmon harvest were taken from the Unalakleet River in 2011 (Tables 6 and 7).

Estimated sport harvest of king salmon in the Unalakleet River remained fairly stable from 1993 to 2002, averaging about 431 fish annually. From 2006–2010, king salmon harvest averaged 289 fish per year (Table 6). This decline in harvest was most likely a result of king salmon restrictions (no retention effective the first or second week of July) in all years during this period. In 2008, estimated harvest increased to 580 fish; however, this number may be inflated because 1 respondent reported catching and harvesting 32 "jack" king salmon (<20 inches) in a year with record low escapement (903 fish counted at the North River tower). This response seems very unlikely and these fish were probably Dolly Varden or pink salmon. The harvest estimate for king salmon ≥20 inches was 108 fish, a reasonable number considering the small size of escapement and harvests from recent years. The sport harvest of 53 king salmon in 2011 was the lowest since before 1991 (Table 6).

There have been no directed commercial fishing openings for king salmon since 2001 in the Unalakleet Subdistrict (Menard et al. 2012). Unalakleet and Shaktoolik river king salmon stocks were designated "stocks of concern" by the board in January 2004. King salmon subsistence harvests in Unalakleet have ranged from 90 fish in 1966 to 6,325 fish in 1997 (Menard et al. 2012). The recent 5-year average (2006–2010) harvest was 1,675 fish. The sport fish harvest over the same 5-year period has averaged 286 king salmon (Table 6), or about 3% of the total Unalakleet salmon harvest (Table 6). The 2011 subsistence harvest was estimated at 607 king salmon. In 2011, the estimated sport fish harvest of 53 fish was about 7% of the total Unalakleet king salmon harvest.

In 2012, it was projected that the North River would not reach the lower end of its escapement goal (1,200–2,600 king salmon) based on low catches of king salmon in the Division of Commercial Fisheries' test net in the Unalakleet River and the North River tower count of 41 fish on July 4. As a result, EO-3-KS-06-12 prohibited retention of king salmon and eliminated

use of bait while sport fishing in the Unalakleet and Shaktoolik rivers. This EO was in effect from July 11 until August 15, 2012 (Appendix B). The final count on the North River was 864 fish, the lowest since before 1991 (Table 2).

Coho salmon are the most sought after salmon species in the Unalakleet River drainage. The run usually begins around August 1, peaks during mid-August, and continues through mid-September. Estimated sport harvest of coho salmon in the Unalakleet River has averaged 4,633 fish from 2006–2010, including a record-high of 6,029 fish in 2008 (Table 7). In 2011, 2,493 coho salmon were harvested, the lowest number since 2003 (Table 7). The coho salmon sport fishery is more consumptive than all other Unalakleet River salmon sport fisheries. Approximately 41% of coho salmon caught are harvested, while about 32% of king, 13% of chum, and 15% of pink salmon (2006–2010 average) caught are harvested (Tables 6–9).

From 2006 to 2010, commercial harvests of coho salmon in the Unalakleet Subdistrict have averaged 71,410 fish (Menard et al. 2012). From 2006 to 2010, subsistence harvests of coho salmon in the community of Unalakleet averaged 6,784 fish. The 2011 subsistence harvest was estimated at 2,486 fish, which was the lowest amount since before 1994 (Menard et al. 2012). Rainy weather during coho salmon season, coupled with above-average chum salmon harvests may have been contributing factors to the below-average coho salmon harvests in 2011 (S. Kent, ADF&G, Nome, personal communication).

Historic escapement data for coho salmon in the entire Unalakleet River drainage are not available. Information on the proportion of the run that spawns in the mainstem Unalakleet River was not available until recently; however, counting tower counts from the North River likely provide an indication of recent run strength. Based on the tower counts, the 2005 and 2007 escapements were over twice the size of the 2004 and 2006 escapements (Table 2). In 2009, the escapement was the highest on record, with 22,226 fish past the counting tower. In 2011, the final count at the North River tower was down to 3,624 coho salmon, the lowest since 2002.

Fishery Objectives and Management

Prior to 2007, there were no specific management objectives identified for salmon fisheries on the Unalakleet River. In 2007, the board adopted the *Unalakleet River King Salmon Management Plan*, which mandates inseason management actions in the subsistence, sport, and commercial king salmon fisheries to achieve the escapement goal based on North River tower count projections (Appendix A). In 2007, a revised North River king salmon sustainable escapement goal (SEG) of 1,200 to 2,600 fish was established. The management goal in the Unalakleet River is to maintain adequate escapements of king salmon into the system that will support utilization by the various user groups.

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 a few Unalakleet residents have expressed the point of view during local AC meetings that “outsiders” are competing for the local salmon resources. Previous declines in chum and coho salmon runs throughout Western Alaska impacted the Unalakleet River drainage, although the effect appears to be less dramatic than in Nome Subdistrict streams where chum salmon runs have a long history of decline. Recent increases in escapements suggest that coho and chum salmon returns in the Unalakleet River are

at more acceptable levels, particularly coho salmon (Table 2). While commercial harvests of king salmon in the Unalakleet Subdistrict have been minimal during the past 9 years, sport harvests have stayed fairly consistent.

The upper reaches of the Unalakleet River (from the Chiroskey River to the headwaters) is a designated National Wild River and falls under federal subsistence management authority. Until recently, federal and state management have not been in conflict for fisheries in the Unalakleet River drainage. However, in March 2009, the FSB closed the federal public waters of the Unalakleet River (upstream from the mouth of the Chiroskey River, or approximately 23 river miles from the village) to the taking of king salmon from July 1–31. It is unclear how this will affect sport anglers looking to catch king salmon; however, the vast majority of the sport fishing effort occurs below the Chiroskey River and so will likely not be affected.

Recent Board of Fisheries Actions

In 2004, the board designated king salmon stocks in the Unalakleet River a stock of yield concern and consequently, instituted an annual limit of 4 fish per year, 20 inches or larger in length, of which only 2 could come from the North River, and the bag limit was changed from 1 to 2 fish (only one 20 inches or larger in length). Previously, there was no annual limit and the bag limit was 1 king salmon (20 inches or larger in length) and 10 king salmon less than 20 inches in length. This action was in response to escapements having failed to meet the lower end of the escapement goal for the previous 3 years. In addition, the "other salmon" limit was set at 10 fish, of which only 4 could be chum, coho, or sockeye salmon, in combination. This allowed additional harvest opportunity for pink salmon, but limited chum, coho, and sockeye salmon harvest. Previously, the bag limit for "other salmon" had been 5 fish.

In 2007, the board 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 adoption of this plan, the annual limit was reduced from 4 to 2 king salmon 20 inches or longer.

Current or Recommended Research and Management Activities

Salmon escapements in the Unalakleet River are monitored using a counting tower in the North River, a test net operated 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 Corporation (NSEDC) and operated by the Unalakleet Indian Reorganizational Act Council (IRA), with guidance by the department's Division of Commercial Fisheries, and provides a reliable estimate of escapement into the North River because of water clarity. Aerial surveys are difficult in the Unalakleet River because of its dark bottom and tannin-stained water. These surveys provide a measure of minimum escapement, but are unreliable as an indicator of total escapement in this river. In addition, the department's Division of Commercial Fisheries operates a test net in the Lower Unalakleet River throughout the summer; however, the information collected from this project is primarily as a gauge of run timing for each salmon species and does not produce reliable escapement information.

A 3-year coho salmon radiotelemetry project, supported in part by BLM, began in 2004. Approximately 200 coho salmon were implanted 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% of radiotagged king salmon and 40% 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 drainage. In 2009 and 2010, the radiotelemetry experiment on king salmon was repeated, and preliminary results show that 34% of the escapement went into the North River in 2009, and 53% in 2010. Division of Sport Fish staff have frequently assisted and cooperated informally with the Division of Commercial Fisheries and the Native Village of Unalakleet (NVU) on projects, including partial funding of counting towers (from which spawning escapements are estimated), surveys for abundance, and observation of spawning concentrations.

In 2010, a floating weir was installed in the mainstem Unalakleet River, approximately 14 river miles upstream of the village, to enumerate and sample king salmon, and was scheduled to only be in operation from mid-June through July each year. The weir was installed successfully; however, there were problems capturing king salmon at the weir for biological sampling, and the crew had to beach seine upriver to collect age, sex, and length (ASL) data. Improvements to trap design were made for the 2011 season, and king salmon were easier to capture. In addition, because king salmon were still moving upriver when the weir was removed at the end of July, future seasons will be extended into mid-August to ensure that all king salmon are counted. This is a federally-funded project through the Office of Subsistence Management, with cooperation from the department's divisions of Sport Fish and Commercial Fisheries, BLM, and NSEDC.

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 (Figure 3). The Nome River has accounted for about 14% of all the sport fishing effort in the entire NW/NSMA during 2006 to 2010 (Table 3). An average of 2,497 salmon was harvested from the Nome River during this period, of which 61% were pink salmon (Tables 6-9). Chum salmon escapements had been increasing in the Nome River in recent years since the collapse in 1990, and had reached up to 7,034 fish in 2007, but in 2009 dropped again to 1,565 fish. In 2011, the chum salmon escapement into the Nome River was 3,582 fish (Table 1). The pink salmon escapement dropped from over 1.1 million fish in 2008 to just 16,490 fish in 2009; however, due to the alternating strong (even-year) and weak (odd-year) run life-cycle of pink salmon, this drop was not unexpected. The parent year escapement for the 2009 return was 24,395 fish in 2007. The pink salmon escapement in 2010 was 171,760 fish, a reduction of 87% from record parent year 2008, and in 2011 was down to 14,403 (Table 2).

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. Effort on the Nome River dropped steadily from a high of 7,194 angler-days in 1990 to 651 angler-days in 2003 (Table 3). Trends in effort have generally coincided with abundance of pink salmon available to anglers; however, recent fluctuations in summer employment in the Nome area associated with mining have possibly contributed to recent effort variation, as well. The recent 5-year average (2006–2010) on the Nome River was 3,762 angler-days; however, in 2011, effort was just 725 angler days, the lowest since 2003 (Table 3). The pink salmon harvest of

about 2,954 fish in 2008 was the second highest since 1996, and the number of angler days (5,272) in 2008 was the highest angler effort since 1992. The increased effort and harvest was likely influenced by a strong run of 1.1 million fish and reduced subsistence opportunity on depressed chum salmon stocks that likely focused local subsistence fishing effort on the abundant pink salmon, in part to meet the local need for salmon. In addition, coho salmon catch and harvest has been high, with the recent 5-year averages being more than 50% higher than the recent 10-year averages (Table 7).

The Niukluk and Fish rivers are also popular sport fishing locations for salmon (Figure 3). Two guiding operations are located on the Niukluk River and another uses helicopters to transport clients to the upper reaches of these rivers to fish primarily for Arctic grayling, but also coho salmon and Dolly Varden. 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 or fish camps along the river. Residents of White Mountain also travel upriver to the Niukluk River for recreation and because of the several good spots to beach seine for salmon. Since construction of the bridge over Safety Sound in 1980, as well as improvements to the road, access to the Niukluk and Fish rivers has improved and this area has become a desirable destination for the road-bound angler. From 2006–2010, the drainage sustained an average annual effort of 2,406 angler-days (Table 3), and an average of 1,450 salmon have been harvested annually from the Fish and Niukluk rivers, most of which (79%) are coho salmon (Tables 6–9). Since 2005, the lower bound of the escapement goal range for coho salmon (2,400–6,100) has been met every year, averaging over 7,000 fish (Table 2), however, just 2,405 coho salmon were counted in 2011. Historically, king salmon have not been found in large numbers in the Niukluk River and 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, several large sockeye escapements since 2003 have drawn additional subsistence effort to this drainage (Table 2). All 5 species of Pacific salmon occur in the Pilgrim River. Sockeye salmon spawn in Salmon Lake and initially, runs appeared to be responding positively to lake fertilization conducted by Norton Sound Economic Development Corporation (NSEDC) and favorable marine conditions (C. Lean, Biologist, NSEDC, Nome, personal communication); however, recent escapements have decreased and the efficacy of fertilization to enhance smolt condition or adult returns remains unclear (Hamazaki et al. 2012). Escapement of sockeye salmon past the weir in the Pilgrim River from 2004–2008 ranged from 20,448–85,520 fish, but has averaged just 3,819 from 2009–2011 (Table 2). These compare to an average escapement of 5,400 for 3 years of enumeration between 2000 and 2002 (Table 2). There is a 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 379 angler-days from 2006–2010 (Table 3) and about 89 salmon have been harvested annually during that period (Tables 6–9). Some of this effort was directed towards other species, as the Pilgrim (and the nearby Kuzitrin River) provides anglers with access to the best northern pike fishing on the Nome road system. The Pilgrim River is also open to subsistence fishing with gillnets and beach seines, so it is likely that local residents that desire sockeye salmon from the Pilgrim River would use this gear under a subsistence fishing permit rather than by sport fishing with hook-and-line. This may explain, in part, the lower sport fishing effort and salmon harvest on the Pilgrim River, when compared to those systems with

larger runs of coho and pink salmon, species that are more easily caught by sport fishing gear (such as Nome and Niukluk rivers). The Fish/Niukluk and the Pilgrim rivers are the only road-accessible rivers where sport fishing for chum salmon is currently allowed; however, combined annual harvests (2006–2010) from these drainages have only been 50 chum salmon, all from the Fish River drainage (Table 9).

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 5 years (2006–2010), the Snake River has sustained an average annual effort of 1,213 angler-days, with an annual harvest of 486 salmon, of which 54% were coho salmon and 46% pink salmon (Tables 3 and 6–9). Other popular road-accessible waters include the Solomon and Sinuk rivers. Annual harvests in these rivers, combined, for the past 5 years (2006–2010) have averaged about 332 coho salmon and 232 pink salmon (Tables 7–8). During years of high pink salmon abundance (even years), this species has dominated catches and harvests in most Nome roadside streams (Table 8).

Recent Fishery Performance

While pink salmon are by far the most prevalent salmon found in Norton Sound roadside streams, with over 1 million fish returning to some streams in even years, estimated sport harvest of pink salmon has averaged only about 2,257 fish in 2006–2010 and has comprised just 40% 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. Estimated sport harvest of coho salmon in roadside fisheries around Nome, in 2006–2010, averaged 3,050 fish per year and comprised 57% of the total salmon harvest. 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 sockeye salmon have recently returned in large numbers to the Pilgrim River, they are typically targeted with gillnets and seines under subsistence regulations.

Sport fishing effort in the Fish/Niukluk river system has ranged from a high of about 4,800 angler-days in 1999 to 1,049 angler-days in 2006, and averaged 2,406 angler-days from 2006 to 2010 (Table 3). Estimated harvest of salmon was 739 fish in 2011, of which 95% were coho salmon (700 fish; Tables 6–9). Although sport fishing for chum salmon is allowed in this drainage, harvest has remained low (Table 9) and most of the chum salmon harvested by hook-and-line are by subsistence fishers. 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, although 969 pink salmon were harvested in 2008, a year when the escapement on the Niukluk River was almost 670,000 fish (Tables 2 and 8). In 2011, the pink salmon harvest was 11 fish, and escapement was just over 15,000 fish.

The Pilgrim River is the other road-accessible water where chum salmon sport fishing is still allowed, but there has been no harvest reported since 1995. Effort there in 2011 was estimated at 74 angler-days, well below the recent 5-year (2006–2010) average of 379 angler-days (Table 3). Large returns of sockeye salmon from 2004 to 2008 likely reduced sport effort on other species and other systems, although in 2010, the escapement was 1,654 and in 2011, was 8,849 fish (Table 2). The high quality of the sockeye salmon, coupled with ease of access and ability to use

subsistence gear (gillnets and seines) in the river, provides local residents with an abundant, 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 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 management actions to restrict sport harvest are generally not contemplated unless escapement-monitoring projects indicate that a particular run is small and that restrictions in subsistence fisheries may be necessary in order to meet escapement goals. SEGs, based on aerial surveys, are in place. SEGs based on tower estimates (Snake and Pilgrim rivers) and weir counts (Nome and Pilgrim rivers) will not be established until additional years of reliable data have been accumulated.

Current Issues

Until recently, Seward Peninsula chum salmon stocks had been in a steady decline since the early 1980s (Menard et al. 2012). This led to increasingly restrictive sport and commercial management, and the implementation of a Tier II subsistence fishery (limited to fishers who have a customary and direct dependence on a resource) from 1999–2005 in the Nome Subdistrict. Chum salmon runs have improved in recent years to allow the subsistence fishery to be managed as a Tier I fishery since 2006. All rivers in northern Norton Sound, from the Sinuk River in the west to Topkok Head in the east, are closed to sport fishing for chum salmon. In addition, restrictions to sport harvest of coho salmon in the Nome area have been necessary during recent years. Increased effort is being directed at 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 5 years, while other drainages are showing relatively stable runs, is a concern in the NW/NSMA.

Recent Board of Fisheries Actions

No proposals for the Nome Area salmon sport fisheries were adopted by the board at either the 2007 or 2010 meetings.

Current and Recommended Research and Management Activities

Current research and management activities on Nome roadside salmon populations are primarily conducted by the Division of Commercial Fisheries, in conjunction with NSEDC's fisheries office. These groups cooperatively operate escapement enumeration projects on the Nome, Niukluk, Eldorado, Pilgrim, and Snake rivers. All projects are using weirs, except the Niukluk River, where a counting tower is operated by the Division of Commercial Fisheries 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. Since 2001, a weir has been in operation through BLM, NSEDC, and/or Division of Commercial Fisheries at the outlet of Glacial Lake on the Sinuk River to enumerate sockeye salmon migrating into the lake, and in 2012, a video-enumeration pilot study was begun on the Lower Sinuk River to count all species of salmon, with mixed results. Recently, NSEDC, in cooperation with LGL-Alaska, has conducted experiments on the Fish, Niukluk, and Nome river drainages attempting to estimate

coho salmon escapements using abundance of smolt, as well as measuring available freshwater fry habitat. To date, the results have shown that the relationship between smolt abundance and subsequent adult returns has been difficult to measure.

NORTHWESTERN ALASKA ARCTIC GRAYLING

Background and Historical Perspective

Sport fisheries for Arctic grayling in the NW/NSMA are relatively small when compared to the remainder of the AYK Region, with average annual harvests of 692 fish in the Seward Peninsula/Norton Sound subarea from 2006–2010 (Table 10). Even though harvests are relatively small, Arctic grayling are normally 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 Arctic grayling registered with the department's trophy fish program. However, many 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, stock status of Arctic grayling populations in several rivers where sport fishing occurs on the Seward Peninsula has been monitored (DeCicco 1990–1999, 2002, 2004, 2007; DeCicco and Gryska 2007; DeCicco and Wallendorf 2000; Gryska 2004, 2006, *In prep*; Gryska and Taras 2007; Joy 2006; Viavant *In prep*). The Nome River stock was found to be overexploited, while the current levels of harvest on the Niukluk, Fish, Pilgrim, Snake, and Sinuk rivers populations are believed to be sustainable. The Solomon River was found to have a very low Arctic grayling population and was closed to fishing for Arctic grayling in 1992.

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 and about 500 fish per mile, respectively (DeCicco 2002; Viavant *In prep*). In contrast, Interior Alaska Arctic grayling populations often exceed 500 fish per mile (Ridder et al. 1993; Ridder 2000). 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 fork length (FL) and 99% mature at 404 mm FL (DeCicco and Gryska 2007). Arctic grayling from northwestern Alaska can live for more than 20 years and 1 fish from the Eldorado River was determined to be approximately 29 years old 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 (Joy 2006).

Prior to 1988, the bag limit for Arctic grayling in the NW/NSMA was 15 fish, only 2 of which could be 20 inches or larger. In 1988, the board established a separate bag and possession limit for Arctic grayling in Northern Norton Sound of 5 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 to 2000. This regulatory change likely resulted in nearly doubling of Arctic grayling populations in the Fish

and Niukluk rivers when compared to estimates from the early 1990s (Gryska and Taras 2007; Viavant *In prep*).

Recent Fishery Performance

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. From 2006–2010, harvests averaged 620 fish per year (Table 10).

The estimated catch of Arctic grayling fluctuates greatly from year to year, ranging from approximately 4,000 to 15,000 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 7% from 2006–2010.

Current exploitation rates on most northwestern Alaska Arctic grayling populations are unknown, but since most populations are in remote areas and harvests are low, 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. In addition, guided anglers caught a total of 12,457 Arctic grayling in the Seward Peninsula/Norton Sound subarea from 2006–2011, yet harvested just 57 fish (Sigurdsson and Powers 2009–2012). These data suggest a change in angler motivation away from harvest as a primary reason for fishing.

Fishery Objectives and Management

Research on 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 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 stressed by overexploitation. The areawide bag and possession limits are 5 fish per day, with only 1 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, and 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 2 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, regulations allow harvest of 2 Arctic grayling per day, with only 1 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. Anglers rarely visit these waters and populations are presumed to be unexploited. General regulations for these waters provide for a bag and possession limit of 5 fish, with no size limit. Until effort and harvests increase dramatically, it is likely that regulations will remain unchanged.

In 2004, the *Wild Arctic Grayling Management Plan* (5 AAC 70.055) was adopted. The plan created 3 management approaches with associated regulatory options: regional, conservative, and special management. The regulations adopted under the regional management approach (5 fish bag and possession limit, season open year-round) did change the general Arctic grayling regulations in the NW/NSMA from 10 to 5 fish, with the exceptions of the Dalton Highway Corridor, Northern Norton Sound, and the Unalakleet River drainage, which already had bag limits of 5 fish and those fisheries classified under the conservative and special management approach. The Snake and Pilgrim rivers are classified under the conservative management approach, and the Nome and Solomon rivers are classified under special management.

Current Issues and Fishery Outlook

There is concern on the part of the public and department 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 abundance of fish ≥15 inches has declined since 1999 (DeCicco 2007). The Nome River population has shown 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 (DeCicco 2004). Additional restoration efforts were conducted more recently using a different rearing pond, and in 2002 and 2003, a total of 1,574 pen-reared Arctic grayling were released into the Nome River. The population was re-assessed in 2005 to estimate the abundance and contribution of pen-reared fish into the Nome River. Although the number of small fish captured was insufficient to estimate abundance, more were captured than in past assessments, indicating that there may be an increase in smaller Arctic grayling in this river. By 2009, it was believed that these fish should be large enough to be recruited to the sampling gear for a stock assessment to estimate abundance. In June 2009, catches were so low that sample sizes were not met in order to estimate abundance. 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 stable and are able to sustain the current low levels of effort and harvest.

Northwestern Alaska, particularly Seward Peninsula waters, provides some of the best opportunities in the state to capture large-sized Arctic grayling. Under current regulations, it appears that these trophy fisheries are being maintained. 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 Pilgrim and Sinuk rivers 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

No actions were taken specific to NW/NSMA Arctic grayling fisheries at the 2007 or 2010 board meetings.

Current or Recommended Research and Management Activities

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 use of precision criteria for estimates of abundance generated from future 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. Sporadic catches of sheefish have been recorded in the Serpentine River upstream of Shishmaref, but it is not known if they spawn there (Jim Magdanz, ADF&G, Kotzebue, personal communication).

The drainages of Kotzebue Sound are known for the large size of sheefish available to the sport angler. These remote trophy sport fisheries are considered by many to be among the pinnacle of Alaskan freshwater sport fishing. Since inception of the department's Trophy Fish Program in 1967, all but 1 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 4). 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 have shown that the 2 stocks mix in Hotham Inlet winter habitats, but maintain fidelity to their spawning areas.

Kotzebue Sound sheefish support subsistence, commercial, and sport fisheries. Subsistence fishing is given priority and is currently unrestricted, with little reliable harvest reporting. 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 populations of sheefish contribute 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 averaged about 6,700 fish from 2000–2004 (Table 11). All villages were not surveyed during 2001 and 2002, so the harvest estimate should be considered a minimum. In 2004, the subsistence sheefish harvest was estimated at 10,163 fish (Table 11). These surveys were not conducted from 2005–2011. 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 gillnet harvests from the fishery near Kotzebue were estimated at about 15,000 fish in 1995/1996 and 14,000 fish in 1996/1997 (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 fish (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 15,000–25,000 sheefish are taken for subsistence annually in Northwestern Alaska.

The Division of Sport Fish 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, the department's Division of Sport Fish, in cooperation with the 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. However, more recent results from radiotelemetry research conducted on the Kobuk River sheefish population showed that 44% of spawners tagged in 2008 returned to spawn in 2009, with returning males outnumbering females 3:1 (James Savereide, ADF&G, Fairbanks, personal communication). Spawner abundance in the Kobuk River was estimated at approximately 32,000 fish in 1995, 43,000 fish in 1996, and 33,000 fish in 1997 (Taube and Wuttig 1998). The USFWS (Underwood et al. 1998) estimated the abundance of sheefish spawning in the Selawik River at 5,200 fish in 1995 and 5,150 fish 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 in the last 25 years. The USFWS repeated abundance estimates in the Selawik River in 2004 and 2005. Estimates indicated that the spawner abundance was approximately 24,000 fish in 2004 and 46,000 fish 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, anecdotal reports of high sheefish abundance are indeed correct.

Most sheefish sport fishing effort in the NW/NSMA occurs on the Kobuk River spawning population. Most areawide subsistence and commercial harvests of sheefish occur on the entire (spawners and nonspawners) population. When taken in combination, recent annual sport harvests of about 650 fish are easily sustainable (Table 12). Although spawner abundances have been estimated, the total size of the areawide 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 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 1990, have fluctuated from a high of about 2,500 fish to a low of about 60 fish, with an average annual harvest of 696 fish from 2006–2010 (Table 12). The sport harvest in 2007 was 1,066 fish and in 2008, harvest dropped to 61 fish, all of which were taken in salt water, but in 2009, the harvest went back up to 946 fish. In 2010, the harvest was 595 fish and the catch was 2,928 fish, and in

2011 harvest and catch was 385 fish and 647 fish, respectively (Table 12). Estimates of sheefish catch from 2006–2010 was 3071 fish, indicating that about 74% 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%. In spite of the worldwide reputation of this destination, the level of fishing effort is still quite low. The 5-year (2006–2010) average effort on the Kobuk River was 1,830 angler-days (Table 3). The Kobuk River accounted for about 14% of the overall estimated freshwater sport fishing effort in the Kotzebue subarea (4,523 total angler-days) in 2011 (Table 3).

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 bag limit is 10 sheefish downstream of the Mauneluk River. In the spawning area upstream of the Mauneluk River, the bag and possession limit is 2 fish. The majority of anglers visiting the Kobuk River to fish for sheefish use the area upstream of the Mauneluk River. The Selawik River has similar regulations, with the bag and possession limit of 10 sheefish downstream of the Tagagawik River, and a bag and possession limit of 2 sheefish upstream of this tributary.

Current Issues and Fishery Outlook

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 by some to drive other sheefish away from the area. Catch-and-release fishing is viewed as a conservation tool by the department 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, and 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.

The outlook for sheefish fisheries in Northwestern Alaska is good in the immediate future. Although overall harvest levels are substantial, populations and spawner abundances appear stable and sport harvests are low.

Recent Board of Fisheries and Management Actions

No proposals were submitted specific to the Northwest Area sheefish fisheries for the 2007 and 2010 board meetings.

Current or Recommended Research and Management Activities

Recent research conducted cooperatively with the USFWS and the NPS has provided substantial background data on spawner abundance for the 2 stocks comprising the Kobuk-Selawik sheefish population. These data will be used as a baseline for comparing future population assessments. In 2008, the department, in cooperation with USFWS, began a 5-year study on the Kobuk River

sheefish population using radiotelemetry to determine spawning locations, spawning frequency, and timing of outmigration of postspawners to Hotham Inlet.

In 2011, USFWS began a study to look at the genetic composition of the wintertime subsistence sheefish harvest in Hotham Inlet, specifically to see what proportion is from the Selawik River stock and what proportion is from the Kobuk River (Ray Hander, USFWS, Fairbanks, personal communication).

In 2004, a permafrost slump located approximately 50 km upstream from the Selawik River 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 could potentially impact 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). In fall 2011, USFWS initiated a 3-year experiment to look for any effects of the thaw slump on recruitment and survival of eggs deposited after the slump occurred; results are not yet available (Ray Hander, USFWS, Fairbanks, personal communication).

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TABLES AND FIGURES

Table 1.–Subsistence salmon harvest in the Norton Sound, Port Clarence, and Kotzebue Districts, 1992–2011.

	Norton Sound						Port Clarence						Kotzebue
Year	King	Sockeye	Coho	Pink	Chum	Total	King	Sockeye	Coho	Pink	Chum	Total	Chum
1992	252	163	2,762	13,503	2,944	19,624	ND	ND	ND	ND	ND	ND	14,303
1993	420	80	3,287	2,599	3,401	9,787	ND	ND	ND	ND	ND	ND	15,430
1994	5,116	747	17,429	66,656	15,613	105,561	203	2,220	1,892	4,309	2,294	10,918	36,226
1995	5,339	3,316	17,811	37,363	31,707	95,536	76	4,481	1,739	3,293	6,011	15,600	102,881
1996	4,944	586	21,040	60,676	20,286	107,532	194	2,634	1,258	2,236	4,707	11,029	99,740
1997	6,104	785	11,600	22,438	12,866	53,793	158	3,177	829	255	2,099	6,518	57,906
1998	5,063	307	10,418	24,721	5,036	45,545	289	1,696	1,759	7,815	2,621	14,180	48,980
1999	4,331	866	12,233	19,186	13,049	49,665	89	2,392	1,030	786	1,936	6,233	94,342
2000	3,690	324	13,455	37,773	12,989	68,231	72	2,851	935	1,387	1,275	6,520	65,975
2001	4,724	750	11,293	29,812	13,963	60,542	84	3,692	1,299	1,183	1,910	8,168	49,232
2002	4,792	443	11,773	56,669	13,095	86,772	133	3,732	2,194	3,394	2,699	12,152	16,880
2003	4,728	536	11,446	46,338	9,498	72,546	177	4,495	1,434	4,113	2,430	12,649	19201
2004	4,448	541	11,579	72,887	4,541	93,996	278	8,688	1.131	5,818	2,505	18,520	24,637
2005	3,383	857	12,783	57,785	6,115	80,923	152	8,492	726	6,615	2,479	17,290	ND
2006	3,258	572	19,210	56,579	5,992	85,611	102	9,940	1,061	4,939	4,353	18,464	ND
2007	2,646	938	11,879	20,954	12,011	48,428	85	9,484	705	1,468	4,454	20,395	ND
2008	2,465	363	17,604	54,927	8,709	84,068	125	5,069	512	7,527	2,449	16,196	ND
2009	3,382	369	14,898	26,112	8,946	53,707	40	1,643	804	1,882	3,060	7,429	ND
2010	2,120	549	11,863	42,254	16,201	72,987	63	824	596	5,202	5,232	11,197	ND
2011	1,359	414	8,538	17,166	14,566	42,043	57	1,611	393	2,610	4,338	9,009	ND
2001–2010 Average	**3,595**	**592**	**13,433**	**46,432**	**9,907**	**73,958**	**124**	**5,606**	**933**	**4,214**	**3,157**	**14,034**	**27,488**
2006–2010 Average	**2,774**	**558**	**15,091**	**40,165**	**10,372**	**68,960**	**83**	**5,392**	**736**	**4,204**	**3,910**	**14,324**	**ND**

ND = No data.

Table 2.–Salmon escapement goals and documented salmon escapements in Norton Sound, 2001–2011.

River/Fish	Escapement Goal	Type	Year 2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Nome River													
Chum	2,900–4,300	SEG-Weir	2,859	1,720	1,957	3,903	5,677	4,128	7,034	2,607	1,565	5,906	3,582
Pink	>3,200 (odd yrs)	SEG-Weir	3,138	35,057	11,402	1,051,146	285,759	611,550	24,395	1,186,554	16,490	171,760	14,403
Coho	–[c]	–[c]	2,418	3,418	548	2,283	5,848	8,307	2,437	4,605	1,370	4,114	1,833
Snake River													
Chum	1,600–2,500	SEG-Weir	2,182	2,669	2,179	2,145	2,967	4,128	8,147	1,224	891	6,973	4,343
Pink	–[c]	–[c]	1,295	4,042	2,829	126,917	13,813	73,734	4,634	145,761	769	51,099	7,011
Coho	–[c]	–[c]	1,335	396	489	474[a]	2,925	4,926	1,781	5,206	50	2,243	343
Eldorado River													
Chum	6,000–9,200	SEG-Weir	11,635	10,260	3,589	3,273	10,426	41,985	21,312	6,746	4,983	42,612	16,227
Pink	–[c]	–[c]	488	115,652	173	60,861	12,356	22,368	833	244,641	1,119	48,316	489
Coho	–[c]	–[c]	1,509	516	115	1,149	679	523	2	38	2	2	1
Pilgrim River													
Chum	–[c]	–[c]	ND	5,538	15,192	10,228	9,715	45,410	35,334	25,008	5,427	25,379	41,740
Pink	–[c]	–[c]	ND	3,870	14,100	50,757	13,298	18,701	3,616	92,641	483	29,237	3,364
Coho	–[c]	–[c]	ND	216	677	1,556	304	962	605	260	18	272	269
Sockeye (Salmon Lake)	4,000–8,000	SEG-Aerial	ND	4,012	42,729	85,520	56,484	52,223	43,432	20,448	953	1,654	8,849
Niukluk River													
Chum	>23,000	SEG-Tower	33,999	20,018	10,158	10,791	25,596	29,199	50,994	12,078	15,879	48,561	23,607
Pink	>10,500	SEG-Tower	41,625	636,404	75,855	1,022,302	270,424	1,371,919	43,617	669,234	24,201	434,205	15,425
Coho	2,400–7,200	SEG-Tower	3,468	7,269	1,282	1,833[b]	2,727	11,169	3,498	13,779	6,861	9,042	2,405
North River													
King	1,200–-2,600	SEG-Tower	1,337	1,484	1,452	1,105	1,019	906	1,950	903	2,355	1,256	864
Chum	–[c]	–[c]	6,515	5,918	9,859	9,624	11,984	5,385	8,046	9,502	8,739	16,131	19,898
Pink	>25,000	SEG-Tower	24,737	321,756	280,212	1,149,294	1,670,934	2,169,890	583,320	240,286	42,960	150,807	123,892
Coho	–[c]	–[c]	12,383	2966[b]	5,837	9,646	19,189	9,835	19,965	15,648	22,226	7,608	3,624

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Table 2.–Page 2 of 2.

River/Fish	Escapement Goal	Type	Year 2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Kwiniuk River													
King	300–550	SEG-Tower	261	1,632	749	645	342	195	258	237	444	135	57
Chum	11,500–23,000	OEG-Tower	16,598	37,864	12,117	10,371	12,083	39,519	27,756	9,462	8,739	71,388	31,604
Pink	>8,400	SEG-Aerial	8,423	1,114,616	22,332	3,045,915	341,048	1,347,090	54,255	1,442,237	42,960	634,220	30,023
Coho	650–1,300	SEG-Aerial	9,531	6,459	5,484	10,523	12,950	22,341	9,429	10,680	9,036	8,049	3,288

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

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

[c] No escapement goals have been established for these species in these rivers.

Table 3.–Sport fishing effort (angler-days) by major fisheries and subareas in the NW/NSMA, 1992–2011.

	Seward Peninsula/Norton Sound Subarea								Kotzebue/Chukchi Sea Subarea					North Slope Subarea			NW/NSMA
Year	Nome	Fish/ Niukluk	Unalakleet	Snake	Sinuk	Pilgrim	Other	Total	Noatak	Kobuk	Wulik	Other	Total	Haul Road	Other	Total	Total
1992	6,455	2,742	2,433	2,379	1,504	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	874	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	1,132	808	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	1,295	717	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	553	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	443	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	123	546	6,184	13,616	765	2,053	202	781	3,801	2,121	1,532	3,653	21,070
1999	1,463	4,825	4,176	977	244	433	3,041	14,915	3,142	2,099	737	793	6,771	2,473	2,757	5,230	26,916
2000	1,455	3,324	6,201	397	294	747	3,385	15,509	1,713	2,298	336	878	5,225	2,325	2,414	4,739	25,473
2001	1,045	2,484	2,793	853	490	491	1,899	9,565	2,702	925	592	1,275	5,494	4,256	1,776	6,032	21,091
2002	1,901	1,646	8,195	514	1,324	562	3,604	16,422	1,218	3,286	610	1,171	6,285	2,224	3,808	6,032	28,739
2003	651	2,273	3,056	701	430	730	4,810	12,221	1,855	2,039	397	1,830	6,121	1,103	1,607	2,710	21,052
2004	1,636	2,786	4,527	468	466	594	2,393	12,404	1,130	2,760	219	1,246	5,355	873	2,438	3,311	21,070
2005	2,142	1,954	4,768	836	549	327	5,044	15,071	1,310	868	493	393	3,064	1,881	2,471	4,352	22,487
2006	4,517	1,049	4,062	855	1,234	337	4,010	14,830	2,538	2,104	993	699	6,334	1,298	1,806	3,104	24,268
2007	3,887	1,483	4,205	1,873	933	240	4,979	16,667	2,935	1,627	205	260	5,027	799	3,355	4,154	25,848
2008	5,272	3,842	5,129	1,740	878	590	5,422	21,995	1,621	1,183	395	1,222	4,421	3,774	1,825	5,599	32,015
2009	2,808	3,813	5,329	564	447	482	4,004	17,000	2,561	3,283	428	1,159	7,431	1,813	2,092	3,905	28,336
2010	2,326	1,844	3,012	1,032	616	248	1,532	10,610	745	955	334	1,436	3,470	3,724	660	4,384	18,464
2011	725	4,738	3,926	405	467	74	1,005	11,340	3,002	613	443	465	4,523	1,746	1,185	2,931	18,794
2001–2010 Average	**2,619**	**2,317**	**4,508**	**944**	**737**	**460**	**3,770**	**15,354**	**1,862**	**1,903**	**467**	**1,069**	**5,300**	**2,175**	**2,184**	**4,358**	**25,012**
2006–2010 Average	**3,762**	**2,406**	**4,347**	**1,213**	**822**	**379**	**3,989**	**16,919**	**2,080**	**1,830**	**471**	**955**	**5,337**	**2,282**	**1,948**	**4,229**	**26,485**

Table 4.–Sport fish harvest by species in the NW/NSMA, 1992–2011.

Year	King Salmon	Coho Salmon	Pink Salmon	Chum Salmon	Sockeye Salmon	Dolly Varden/ Arctic Char	Lake Trout	Arctic Grayling	Northern Pike	Whitefish	Sheefish	Burbot
1992	212	4,566	6,605	659	82	2,981	649	2,113	812	55	1,125	42
1993	576	3,576	1,827	929	10	7,601	340	4,113	1,181	324	631	256
1994	600	5,013	6,106	777	18	5,825	150	2,812	663	196	230	373
1995	347	3,564	966	715	83	4,721	164	2,930	471	421	861	125
1996	406	6,905	5,627	1,238	100	6,112	185	4,815	840	260	485	405
1997	968	3,891	1,276	506	30	5,866	130	4,067	508	631	710	493
1998	545	3,693	4,951	815	16	4,117	252	3,268	270	100	293	259
1999	573	4,719	3,038	603	0	7,927	178	4,053	548	380	628	125
2000	675	6,487	2,439	1,062	32	8,641	134	3,348	768	1,329	664	521
2001	271	4,541	349	3,225	39	5,944	154	3,067	471	2,412	1,056	101
2002	814	4,057	4,070	1,346	0	4,602	305	5,774	535	495	476	244
2003	239	3,050	2,285	553	572	6,257	109	4,373	869	919	735	22
2004	418	5,302	7,549	707	404	5,711	212	3,675	1,583	2,513	652	79
2005	561	7,076	3,004	436	232	3,700	177	2,177	564	514	393	50
2006	427	11,643	5,305	1,592	22	5,613	44	1,483	107	654	607	63
2007	293	6,939	1,631	723	72	5,883	7	1,735	585	1,147	1,066	0
2008	594	11,927	7,567	2,954	209	4,523	0	2,181	566	307	61	130
2009	291	6,579	1,305	652	0	5,747	63	4,604	582	418	946	6
2010	61	5,876	2,712	865	0	2,551	129	1,206	595	398	595	18
2011	61	3,593	566	764	58	5,254	0	2,204	148	20	385	134
2001–2010 Average	**397**	**6,699**	**3,578**	**1,305**	**155**	**5,053**	**120**	**3,028**	**646**	**978**	**659**	**71**
2006–2010 Average	**333**	**8,593**	**3,704**	**1,357**	**61**	**4,863**	**49**	**2,242**	**487**	**585**	**655**	**43**

Table 5.–Sport fish catch by species in the NW/NSMA, 1992–2011.

Year	King Salmon	Coho Salmon	Pink Salmon	Chum Salmon	Sockeye Salmon	Dolly Varden/ Arctic Char	Lake Trout	Arctic Grayling	Northern Pike	Whitefish	Sheefish	Burbot
1992	640	8,351	24,436	3,301	106	16,172	1,634	17,348	5,408	230	2,618	58
1993	3,074	5,903	5,800	2,729	116	32,798	859	29,329	4,461	681	1,354	278
1994	912	7,049	13,108	2,741	105	20,553	584	20,871	3,273	360	481	633
1995	739	7,288	3,420	3,657	229	18,796	1,374	26,921	3,277	540	2,980	165
1996	2,166	11,735	15,466	8,670	314	21,657	924	29,039	4,662	938	3,152	429
1997	5,379	6,862	5,690	3,454	305	28,861	1,238	44,624	2,845	1,518	2,145	661
1998	1,647	9,288	23,906	5,043	209	21,627	1,403	27,057	1,556	1,350	803	285
1999	948	13,417	3,834	5,612	124	33,149	1,168	41,558	4,086	534	5,077	137
2000	1,779	13,350	11,670	6,966	149	29,596	587	32,703	2,541	2,179	2,628	565
2001	584	8,162	2,002	6,034	53	17,159	1,375	23,840	3,613	2,778	4,786	146
2002	2,032	7,406	13,048	6,708	53	15,833	960	43,826	2,335	951	1,960	244
2003	1,314	6,013	8,818	3,159	1,323	17,474	1,175	33,587	2,230	2,226	5,462	33
2004	2,006	16,698	42,795	3,777	680	17,511	1,139	23,395	4,074	3,409	1,750	144
2005	1,086	24,160	25,830	3,491	346	14,858	1,193	20,866	1,572	1,210	1,043	50
2006	2,592	20,282	24,749	6,950	334	19,721	1,197	14,785	2,316	884	5,051	63
2007	1,034	13,449	6,854	6,841	116	18,535	322	22,153	16,578	1,543	1,639	105
2008	823	28,338	39,416	10,513	446	25,512	21	23,145	3,508	1,346	482	188
2009	623	17,338	8,197	5,379	112	25,465	184	30,878	3,061	1,226	5,050	6
2010	99	14,245	8,244	3,743	0	12,845	258	23,318	3,228	1,621	2,928	43
2011	574	12,042	3,134	6,098	72	17,283	0	12,675	691	555	647	142
2001–2010 Average	**1,219**	**15,609**	**17,995**	**5,660**	**346**	**18,491**	**782**	**25,979**	**4,252**	**1,719**	**3,015**	**102**
2006–2010 Average	**1,034**	**18,730**	**17,492**	**6,685**	**202**	**20,416**	**396**	**22,856**	**5,738**	**1,324**	**3,030**	**81**

Table 6.–King salmon sport harvest and catch in Seward Peninsula/Norton Sound rivers, 1992–2011.

Harvest

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1992	16	55	117	0	0	8	0	8	204
1993	93	28	382	9	9	9	28	37	595
1994	0	0	379	10	0	0	0	211	600
1995	0	19	259	18	0	0	0	142	438
1996	0	0	384	11	0	0	0	267	662
1997	10	45	842	71	0	0	0	138	1,106
1998	0	32	513	0	0	0	0	45	590
1999	0	0	415	44	0	0	0	171	630
2000	0	0	345	174	0	0	0	370	889
2001	0	0	250	0	0	0	0	84	334
2002	0	0	544	75	0	0	0	183	802
2003	0	103	97	39	0	0	0	0	239
2004	0	0	356	22	0	0	0	157	535
2005	0	0	216	37	0	0	0	308	561
2006	0	0	394	0	0	0	0	33	427
2007	0	0	147	0	0	0	0	130	277
2008	0	0	580	0	0	0	0	0	580
2009	13	0	248	30	0	0	0	0	291
2010	0	0	61	0	0	0	0	0	61
2011	0	0	53	0	0	0	0	8	61
2001–2010 Average	**1**	**10**	**289**	**20**	**0**	**0**	**0**	**90**	**411**
2006–2010 Average	**3**	**0**	**286**	**6**	**0**	**0**	**0**	**33**	**327**

Catch

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1992	23	55	476	0	0	8	0	8	570
1993	121	92	2,340	9	9	9	47	440	3,067
1994	0	0	517	29	0	60	0	271	877
1995	0	19	588	18	0	0	0	224	849
1996	21	0	2,059	64	0	0	0	277	2,421
1997	20	90	5,144	125	0	0	0	138	5,517
1998	19	32	1,539	15	0	0	17	98	1,720
1999	0	20	669	55	0	0	0	279	1,023
2000	0	0	1,045	207	0	0	57	711	2,020
2001	0	0	542	21	0	0	0	105	668
2002	24	0	835	111	0	0	0	1026	1,996
2003	0	268	505	515	0	0	0	13	1,301
2004	0	0	1,930	22	0	0	0	401	2,353
2005	0	0	431	74	0	0	0	569	1,074
2006	0	0	2,511	0	0	0	0	65	2,576
2007	0	0	776	0	0	0	0	162	938
2008	0	0	796	0	0	0	0	0	796
2009	13	0	515	95	0	0	0	0	623
2010	0	0	99	0	0	0	0	0	99
2011	0	0	534	32	0	0	0	8	574
2001–2010 Average	**4**	**27**	**894**	**84**	**0**	**0**	**0**	**234**	**1,242**
2006–2010 Average	**3**	**0**	**939**	**19**	**0**	**0**	**0**	**45**	**1,006**

Table 7.–Coho salmon sport harvest and catch in Seward Peninsula/Norton Sound rivers, 1992–2011.

Harvest

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1992	713	57	1,555	753	40	510	316	727	4,671
1993	602	191	643	1,185	96	248	420	398	3,783
1994	326	134	2,425	1,122	109	145	235	1,051	5,547
1995	143	113	2,033	818	19	85	38	456	3,705
1996	598	133	3,411	1,652	189	426	142	738	7,289
1997	295	0	2,784	462	0	98	10	744	4,393
1998	189	6	2,742	316	0	0	0	1,188	4,441
1999	219	33	2,691	1,365	0	209	22	1,043	5,582
2000	342	179	4,150	1,165	11	209	32	1,353	7,441
2001	297	29	2,766	969	62	175	39	465	4,802
2002	217	0	2,937	298	0	35	0	724	4,211
2003	68	113	1,604	216	0	11	0	1,027	3,039
2004	270	45	3,524	291	13	163	90	1,410	5,806
2005	1,001	48	3,959	400	230	182	0	2,079	7,899
2006	2,768	150	4,985	948	191	414	156	2,671	12,283
2007	797	118	4,117	786	54	142	337	546	6,897
2008	1,793	57	6,029	1,986	322	563	63	1,134	11,947
2009	229	15	5,027	928	74	55	130	121	6,579
2010	602	40	3,006	1,069	210	131	122	696	5,876
2011	68	0	2,493	700	15	9	0	297	3,582
2001–2010 Average	**804**	**62**	**3,795**	**789**	**116**	**187**	**94**	**1,087**	**6,934**
2006–2010 Average	**1,238**	**76**	**4,633**	**1,143**	**170**	**261**	**162**	**1,037**	**8,716**

Catch

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1992	1,466	162	2,802	1,555	65	640	316	1,409	8,415
1993	764	325	1,572	1,804	143	306	650	583	6,147
1994	386	436	2,488	1,448	172	235	255	2,317	7,737
1995	228	472	3,086	1,401	113	245	208	1,733	7,486
1996	788	265	5,863	3,348	246	530	237	1,196	12,473
1997	447	49	4,020	1,751	196	118	39	867	7,487
1998	863	65	3,213	772	0	64	59	5,123	10,159
1999	231	77	9,593	2,151	0	606	185	1,540	14,383
2000	385	200	9,287	2,952	21	209	53	1,273	14,380
2001	377	29	5,399	1,739	96	214	39	629	8,522
2002	549	5	3,691	1,549	53	156	35	1,522	7,560
2003	90	203	2,832	1,447	0	11	0	1,603	6,186
2004	428	124	12,655	1,653	13	307	90	2,376	17,646
2005	1,523	48	14,396	1,586	742	325	0	7,563	26,183
2006	4,607	185	9,397	1,320	1,428	597	156	3,232	20,922
2007	919	201	8,967	1,014	184	184	381	1,547	13,397
2008	2,507	222	11,511	7,752	749	941	94	4,488	28,264
2009	270	15	14,425	2,095	131	55	193	136	17,320
2010	680	106	8,968	1,273	558	131	159	2,370	14,245
2011	68	0	9,802	1,279	15	9	0	654	11,827
2001–2010 Average	**1,195**	**114**	**9,224**	**2,143**	**395**	**292**	**115**	**2,547**	**16,025**
2006–2010 Average	**1,797**	**146**	**10,654**	**2,691**	**610**	**382**	**197**	**2,355**	**18,830**

Table 8.–Pink salmon sport harvest and catch in Seward Peninsula/Norton Sound rivers, 1992–2011.

					Harvest				
Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1992	4,397	55	779	357	293	183	210	129	6,403
1993	723	0	89	278	115	151	259	635	2,250
1994	4,103	154	402	231	145	452	256	1,308	7,051
1995	230	0	222	136	28	19	87	206	928
1996	3,280	49	59	404	285	659	0	1,236	5,972
1997	83	0	1,055	58	54	0	15	193	1,458
1998	1,985	0	434	0	0	463	154	3,903	6,939
1999	0	0	2,946	80	0	0	0	13	3,039
2000	578	6	961	51	10	103	113	1,064	2,886
2001	0	0	188	161	0	0	0	11	360
2002	312	0	1,378	254	0	0	0	2,359	4,303
2003	12	437	29	196	0	0	97	1,451	2,222
2004	3,369	0	2,003	353	156	60	0	2,368	8,309
2005	1,193	23	473	58	62	12	23	1,183	3,027
2006	2,422	67	891	134	330	430	100	943	5,317
2007	402	0	618	30	0	0	281	270	1,601
2008	2,954	0	2077	969	175	539	141	1,404	8,259
2009	178	0	579	23	12	35	12	466	1,305
2010	1,716	0	535	99	49	121	63	134	2,717
2011	85	0	391	10	0	0	0	80	566
2001–2010 Average	**1,256**	**53**	**877**	**228**	**78**	**120**	**72**	**1,059**	**3,742**
2006–2010 Average	**1,534**	**13**	**940**	**251**	**113**	**225**	**119**	**643**	**3,840**
					Catch				
Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1992	9,810	714	6,503	1,969	1,429	1,182	998	3,250	25,855
1993	1,756	392	605	909	547	429	633	1,126	6,397
1994	6,190	350	1,020	2,052	348	648	784	2,867	14,259
1995	980	58	799	300	125	300	190	521	3,273
1996	5,898	364	2,594	3,512	736	967	39	1,928	16,038
1997	190	0	4,101	1,209	76	0	74	304	5,954
1998	3,482	263	4,853	3,252	0	463	433	13,023	25,769
1999	13	0	3,475	187	0	0	13	147	3,835
2000	876	109	3,982	3,989	21	103	288	2,618	11,986
2001	32	0	1,197	279	11	21	407	748	2,695
2002	3,090	0	2,463	772	0	0	192	6,881	13,398
2003	73	1,044	3,762	626	68	0	97	3,294	8,964
2004	6,189	163	10,332	10,176	1,352	223	195	15,430	44,060
2005	2,095	38	8,778	1,283	279	70	47	13,324	25,914
2006	6,242	134	4,791	700	2,327	1790	267	8,294	24,545
2007	745	0	4,256	178	121	234	311	909	6,754
2008	8,785	49	15,470	3,491	1,202	810	236	8,587	38,630
2009	238	0	5,593	351	133	35	47	1,404	7,801
2010	2,206	0	3,074	674	581	264	329	1,066	8,194
2011	85	0	2,301	10	0	0	80	658	3,134
2001–2010 Average	**2,970**	**143**	**5,972**	**1,853**	**607**	**345**	**213**	**5,994**	**18,096**
2006–2010 Average	**3,643**	**37**	**6,637**	**1,079**	**873**	**627**	**238**	**4,052**	**17,185**

Table 9.–Chum salmon sport harvest and catch in Seward Peninsula/Norton Sound rivers, 1992–2011.

					Harvest				
Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1992	0	106	379	15	0	0	0	23	523
1993	0	0	116	514	0	0	0	61	691
1994	0	0	220	119	0	7	0	190	536
1995	0	73	207	27	0	0	0	87	394
1996	0	0	463	166	0	0	0	33	662
1997	0	0	228	0	0	0	0	50	278
1998	0	0	447	0	0	0	0	235	682
1999	0	0	211	0	0	0	0	0	211
2000	0	0	403	0	0	0	0	694	1,097
2001	0	0	714	439	0	0	0	556	1,709
2002	0	0	607	45	0	0	0	166	818
2003	0	0	191	101	0	0	0	0	292
2004	0	0	47	435	0	0	0	16	498
2005	0	0	36	0	0	0	0	294	330
2006	0	0	224	0	0	0	0	120	344
2007	0	0	85	11	0	0	0	9	105
2008	0	0	175	166	0	0	0	414	755
2009	0	0	258	71	0	0	0	83	412
2010	0	0	59	0	0	0	0	59	118
2011	0	0	77	29	0	0	0	33	139
2001–2010 Average	**0**	**0**	**240**	**127**	**0**	**0**	**0**	**172**	**538**
2006–2010 Average	**0**	**0**	**160**	**50**	**0**	**0**	**0**	**137**	**347**
					Catch				
Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1992	266	197	1,412	326	15	0	91	129	2,436
1993	175	254	515	945	28	37	0	265	2,219
1994	36	146	561	1,271	22	37	7	482	2,562
1995	478	232	966	428	44	189	22	525	2,884
1996	432	133	1,589	1,660	200	111	0	550	4,675
1997	113	15	1,323	714	160	9	0	495	2,829
1998	8	44	2,218	822	0	0	0	1,746	4,838
1999	0	0	1,916	265	0	0	0	234	2,415
2000	20	24	3,652	952	12	0	278	781	5,719
2001	13	11	2,030	543	0	78	0	5,857	8,532
2002	220	0	1,653	747	23	0	81	2,132	4,856
2003	0	548	1,681	258	14	0	0	303	2,804
2004	14	33	1,473	979	149	14	0	1,168	3,830
2005	0	64	1,822	177	477	54	0	675	3,269
2006	122	0	1,628	0	709	116	11	300	2,886
2007	121	128	554	190	91	15	105	1,842	3,046
2008	157	0	4,055	277	120	92	204	1,056	5,961
2009	0	0	1,885	71	8	0	0	149	2,113
2010	53	0	2,127	501	52	0	0	124	2,857
2011	13	0	3,944	144	0	17	101	84	4,303
2001–2010 Average	**70**	**78**	**1,891**	**374**	**164**	**37**	**40**	**1,361**	**4,015**
2006–2010 Average	**91**	**26**	**2,050**	**208**	**196**	**45**	**64**	**694**	**3,373**

Table 10.–Arctic grayling sport harvest and catch in Seward Peninsula/Norton Sound rivers, 1992–2011.

Harvest

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	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
2008	0	0	346	322	0	34	0	263	965
2009	0	0	457	456	34	0	0	256	1,169
2010	0	0	148	0	68	0	0	16	232
2011	0	0	10	1,342	0	28	0	18	1,398
2001–2010 Average	**0**	**28**	**278**	**256**	**49**	**61**	**0**	**216**	**886**
2006–2010 Average	**0**	**22**	**204**	**158**	**63**	**35**	**0**	**144**	**620**

Catch

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1992	90	526	1,459	2,171	300	158	38	1,030	5,772
1993	569	2,362	874	5,976	879	1,614	140	809	13,223
1994	1,111	266	1,639	2,389	417	377	212	670	7,081
1995	571	370	1,471	1,169	498	887	200	622	5,788
1996	497	821	1,694	4,653	339	1,055	97	1,250	10,406
1997	569	429	4,918	10,452	1,464	123	703	1,529	20,187
1998	207	65	3,256	8,159	25	218	0	1,570	13,500
1999	300	694	6,089	7,414	22	723	21	869	16,132
2000	10	221	6,814	1,701	29	449	853	992	11,069
2001	60	403	2,331	3,972	218	1,385	0	1,098	9,467
2002	735	144	4,229	6,587	432	279	0	351	12,757
2003	94	397	6,189	5,495	249	559	80	1,954	15,017
2004	113	0	3,478	1,594	0	238	130	533	6,086
2005	92	48	1,137	3,316	171	338	161	112	5,,375
2006	560	220	669	311	1,331	262	83	794	4,230
2007	61	26	2,375	3,287	902	260	0	937	7,848
2008	183	13	3,497	4,073	84	234	0	1,659	9,743
2009	214	0	4,497	6,458	352	364	13	1,724	13,257
2010	28	93	3,304	3,659	348	55	0	146	7,633
2011	0	0	1,937	2,588	0	671	0	18	5,214
2001–2010 Average	**214**	**134**	**3,171**	**3,875**	**409**	**397**	**47**	**931**	**9,141**
2006–2010 Average	**209**	**70**	**2,868**	**3,558**	**603**	**235**	**19**	**1,052**	**8,542**

Table 11.–Estimated subsistence sheefish harvest, Kotzebue District, 1970–2011[a].

Year	Number of Fishers Interviewed	Reported Harvest	Average Catch Per Household	Hotham Inlet Winter Harvest
1970	168	13,928	83	ND
1971	155	13,583	88	ND
1972	79	3,832	49	ND
1973	65	4,883	75	ND
1974	58	1,062	18	ND
1975	69	1,637	24	ND
1976	57	966	17	ND
1977	95	1,810	19	ND
1978	95	1,810	19	ND
1979	75	3,985	53	ND
1980	74	3,117	42	ND
1981	62	6,651	107	ND
5/82–4/83[b]	430	4,704	36	ND
5/83–4/84[b]	27	764	28	ND
5/84–9/84[b]	30	2,803	93	ND
1985[c]	2	60	30	ND
1986[b, c]	72	721	10	ND
1987[c]	46	276	6	ND
1988[c, d]	ND	ND	ND	ND
1989[d]	ND	ND	ND	ND
1990[d]	ND	ND	ND	ND
1991	40	2,180	55	ND
1992	43	2,821	66	ND
1993[d]	ND	ND	ND	ND
1994	171	3,279	84	ND
1995	314	9,465	25	15,161[e]
1996	389	6,953	18	13,704[e]
1997	338	9,805	25	ND
1998	435	5,350	14	ND
1999	191	8,936	19	ND
2000	237	7,569	17	14,533[e]
2001	257	3,838	11	ND
2002	115	4,310	38	ND
2003	488	7,815	16	ND
2004	440	10,233	23	ND
2005	ND	ND	ND	ND
2006	77[f]	1,298	14	ND
2007	90[g]	99	1	ND
2008	ND	ND	ND	ND
2009	ND	ND	ND	ND
2010	ND	ND	ND	ND
2011	ND	ND	ND	ND

ND = No data.

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

[b] Summer harvest only.

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

[d] Subsistence sheefish harvest not documented.

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

[f] Reported harvest from Kiana Village only. Data from Magdanz et al. 2011.

[g] Reported harvest from Noatak Village only. Data from Magdanz et al. 2011.

Table 12.–Sport fish harvest and catch of sheefish from northwest Alaska waters, 1992–2011.

Year	Total Harvest		%	Kobuk River		%	Selawik River		%
	Harvest	Catch	Harvested	Harvest	Catch	Harvested	Harvest	Catch	Harvested
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
2008	61	482	13	0	209	0	0	0	0
2009	946	5,050	19	747	4,474	17	0	0	0
2010	595	2,928	20	86	1,910	5	221	368	60
2011	385	647	60	257	455	57	0	0	0
2001–2010 Average	**982**	**3,370**	**31**	**459**	**2,576**	**21**	**0**	**0**	**0**
2006–2010 Average	**696**	**3,071**	**26**	**428**	**2,561**	**18**	**44**	**74**	**12**

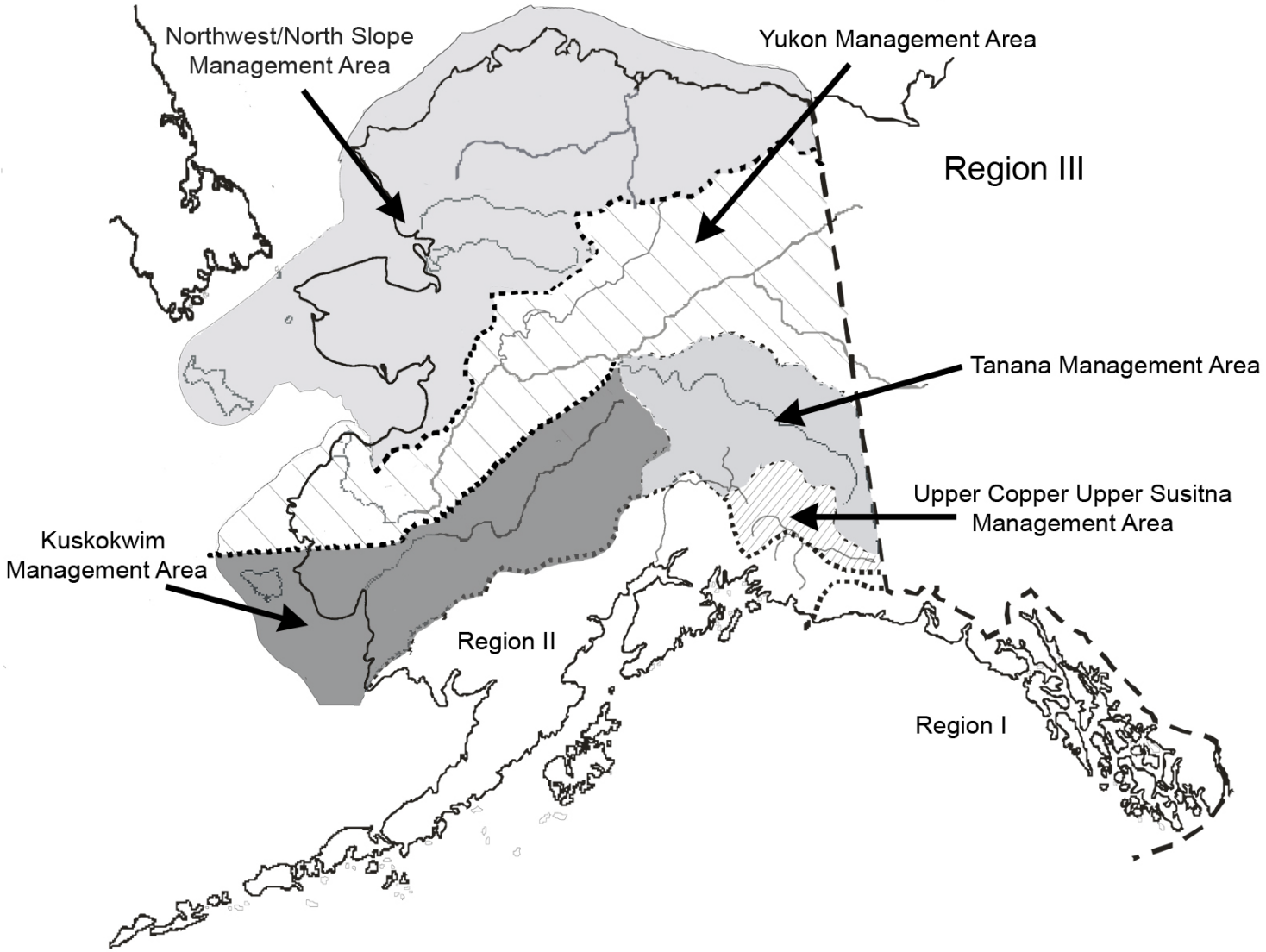

Figure 1.–Map of the sport fish regions in Alaska and the 5 Region III management areas.

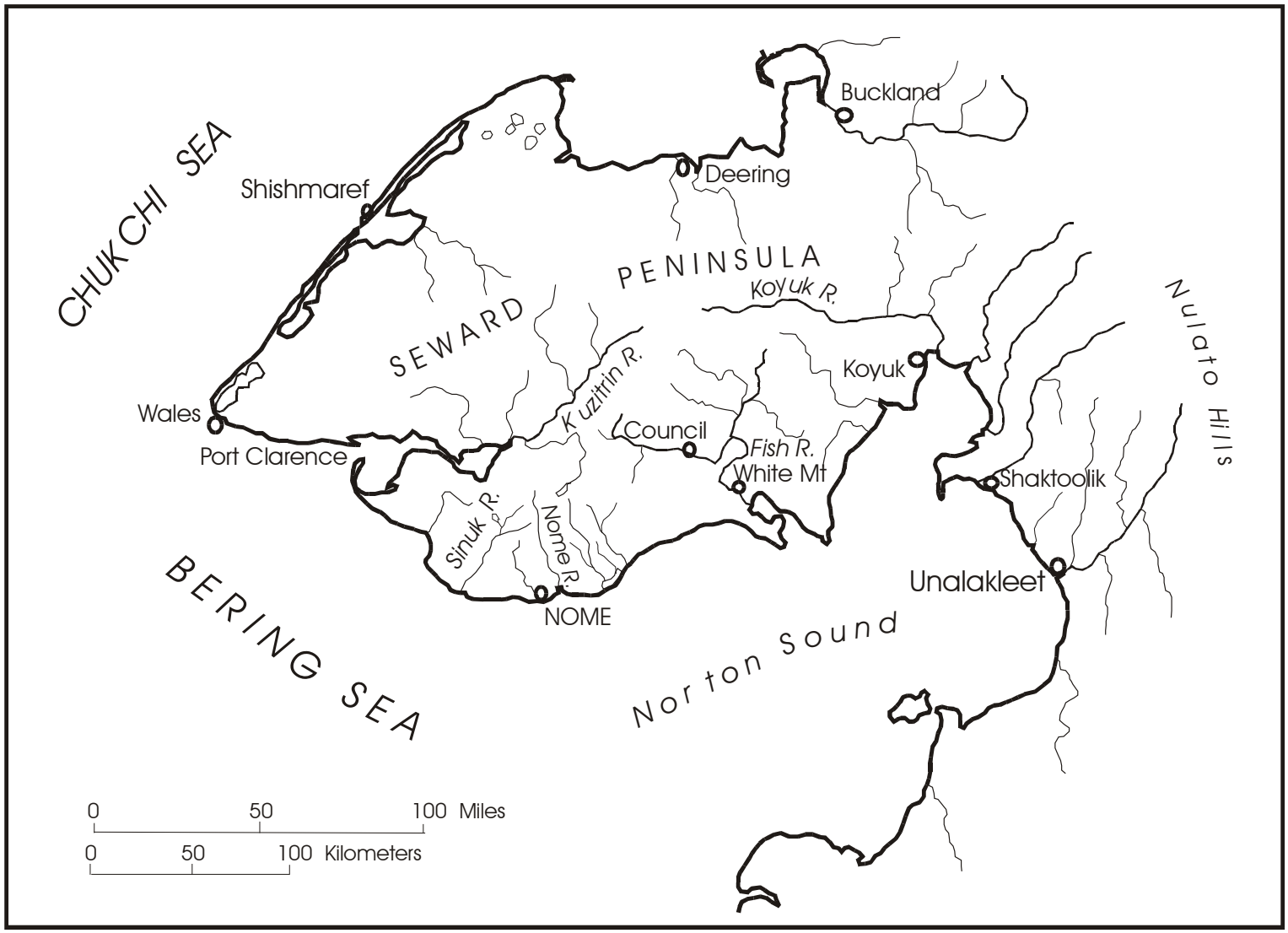

Figure 2.–The Seward Peninsula/Norton Sound subarea.

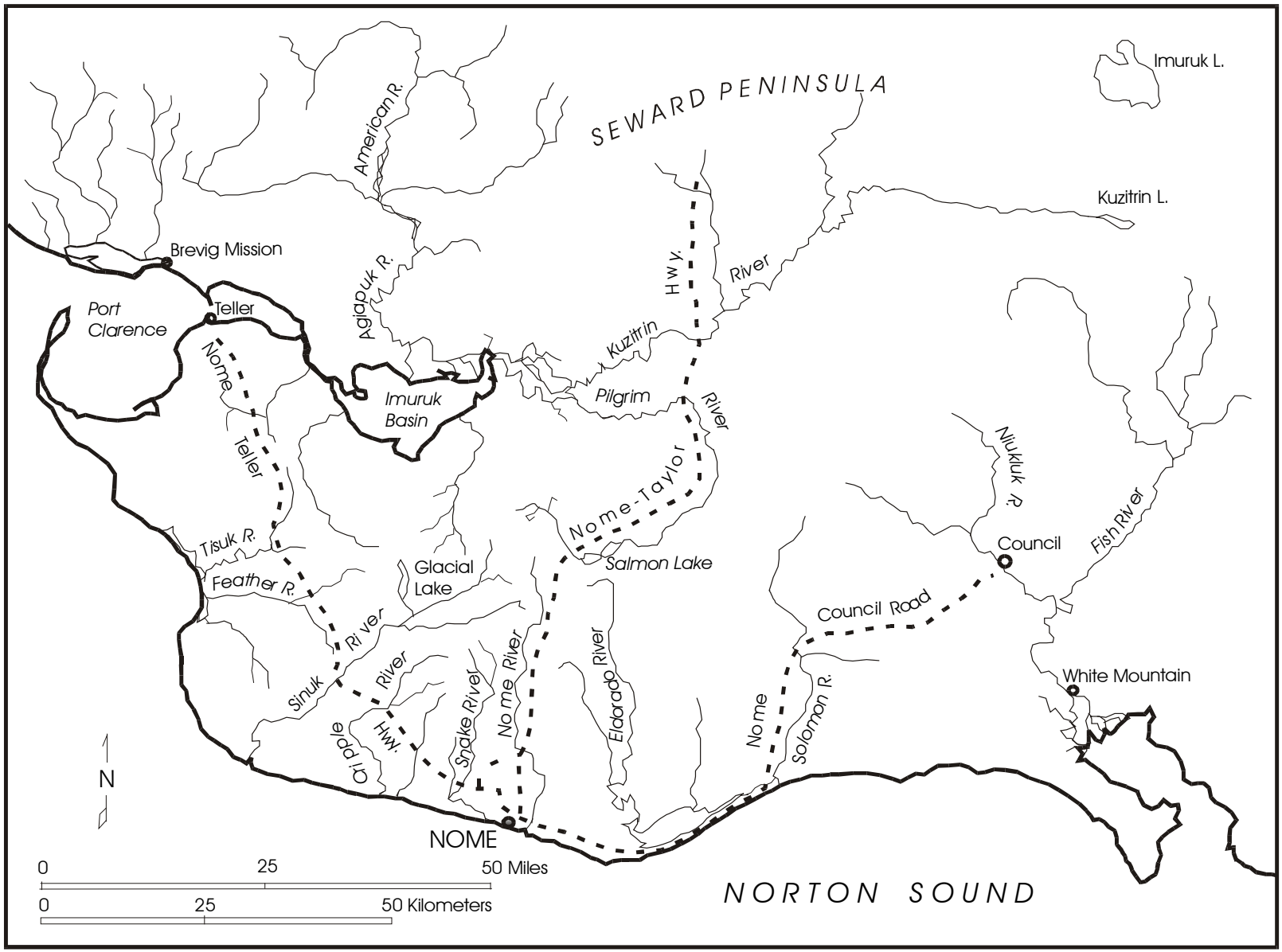

Figure 3.–Southern Seward Peninsula with road accessible waters.

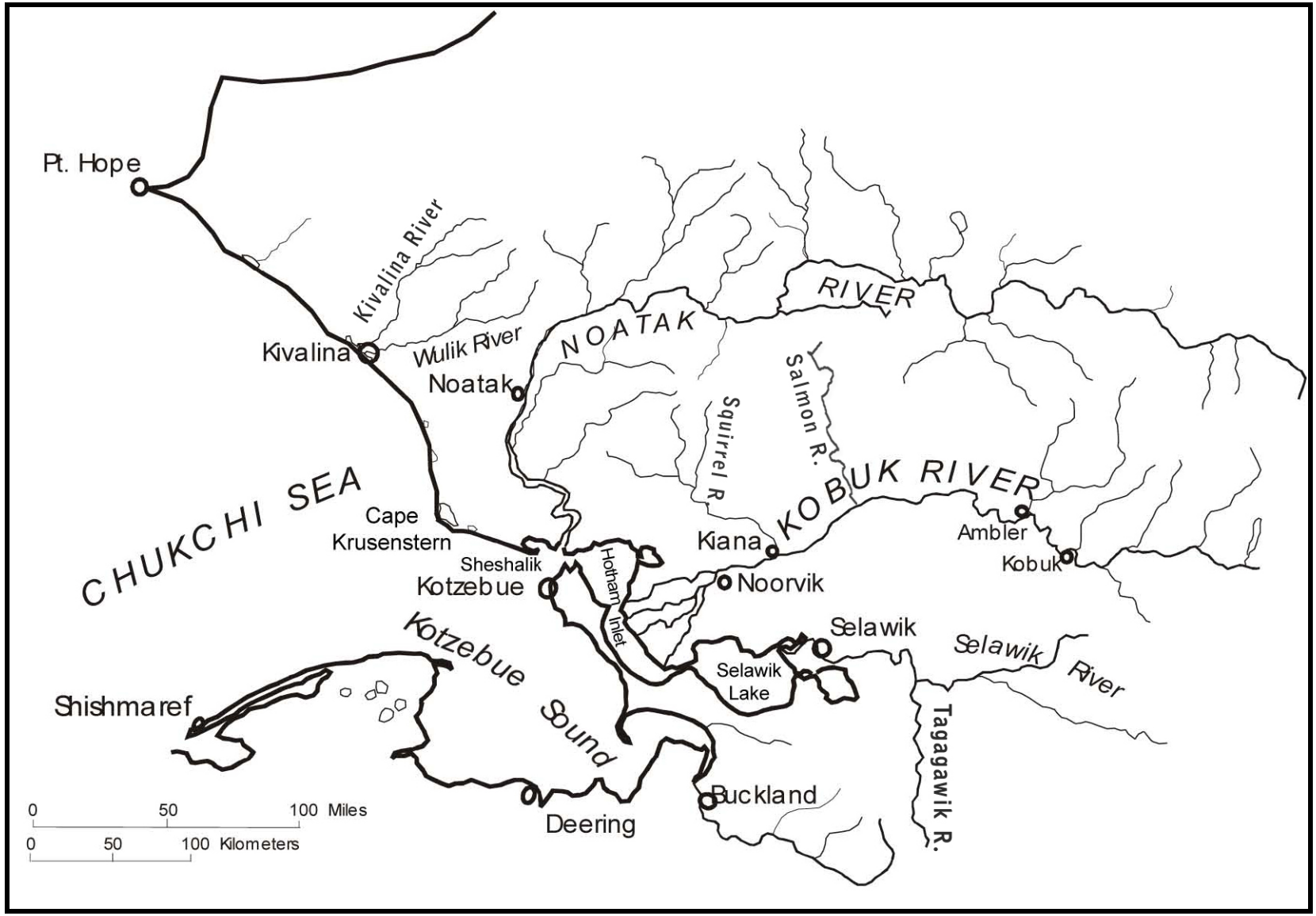

Figure 4.–Kotzebue Sound/Chukchi Sea subarea.

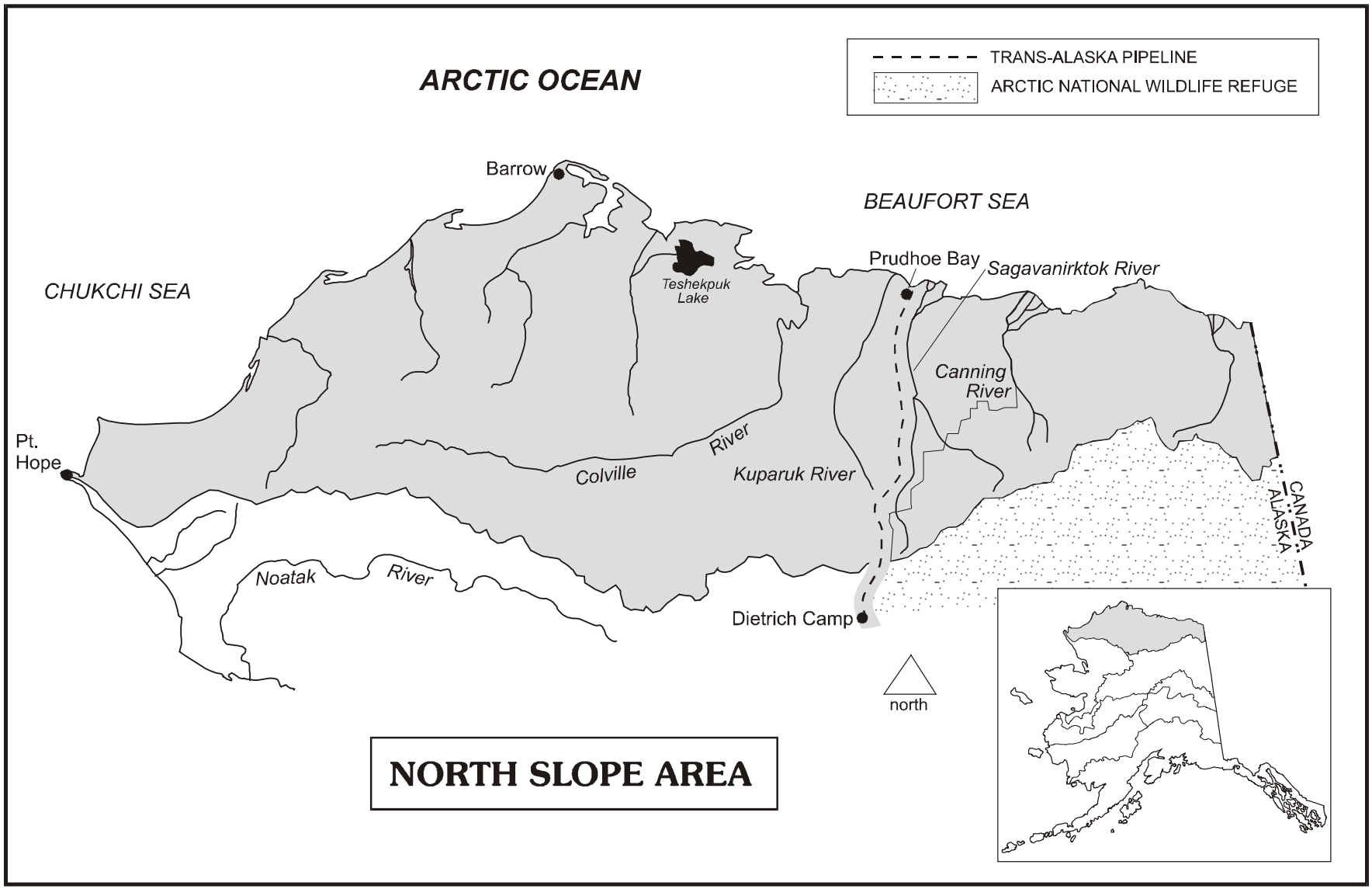

Figure 5.–North Slope subarea.

APPENDIX A
UNALAKLEET RIVER KING SALMON MANAGEMENT PLAN

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

(b) From June 15 through June 20,

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

(2) in the sport fishery,

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

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

(3) commercial fishing is closed.

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

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

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

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

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

(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 2011 AND 2012

Appendix B1.– NW/NSMA sport fish emergency orders issued during 2011 and 2012.

E.O. Number	Effective Dates	Action
EO-3-KS-04-11	July 9–August 15	Closes sport fishing for king salmon and prohibits the use of bait in the Unalakleet and Shaktoolik river drainages.
EO-3-SS-01-11	August 27–October 15	Closes sport fishing or coho salmon and prohibits the use of bait in all fresh water drainages and salt waters of Northern Norton Sound between Cape Rodney and Topkok Head to sport fishing for coho salmon
EO-3-KS-06-12	July 11–August 15	Closes sport fishing for king salmon and prohibits the use of bait in the Unalakleet and Shaktoolik river drainages.

APPENDIX C
REFERENCE INFORMATION SPECIFIC TO 2012 ALASKA BOARD OF FISHERIES PROPOSALS

Appendix C1.–Reference information specific to 2012 Alaska Board of Fisheries proposals.

Proposal	Proposal Subject	Text (page #)	Table #	Figure #	Appendix
92	Allow large hooks for taking fish other than salmon	23	11, 12		
102	Allow subsistence fishing through the ice for Arctic grayling with hook and line in the Nome River	20	4, 5, 10	3	
129	Open waters of Northern Norton Sound to sport harvest of chum salmon	16	4, 5, 9	3	