

**Fishery Management Report No. 00-5**

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**Fishery Management Report for Sport Fisheries in the  
Northwest Alaska Management Area, 1995-1997**

by

**Fred DeCicco**

June 2000

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Alaska Department of Fish and Game

Division of Sport Fish



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<b>Weights and measures (metric)</b>		<b>General</b>		<b>Mathematics, statistics, fisheries</b>	
centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	$H_A$
deciliter	dL	All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
gram	g	and	&	catch per unit effort	CPUE
hectare	ha	at	@	coefficient of variation	CV
kilogram	kg	Compass directions:		common test statistics	F, t, $\chi^2$ , etc.
kilometer	km	east	E	confidence interval	C.I.
liter	L	north	N	correlation coefficient	R (multiple)
meter	m	south	S	correlation coefficient	r (simple)
metric ton	mt	west	W	covariance	cov
milliliter	ml	Copyright	©	degree (angular or temperature)	°
millimeter	mm	Corporate suffixes:		degrees of freedom	df
<b>Weights and measures (English)</b>		Company	Co.	divided by	÷ or / (in equations)
cubic feet per second	ft <sup>3</sup> /s	Corporation	Corp.	equals	=
foot	ft	Incorporated	Inc.	expected value	E
gallon	gal	Limited	Ltd.	fork length	FL
inch	in	et alii (and other people)	et al.	greater than	>
mile	mi	et cetera (and so forth)	etc.	greater than or equal to	≥
ounce	oz	exempli gratia (for example)	e.g.,	harvest per unit effort	HPUE
pound	lb	id est (that is)	i.e.,	less than	<
quart	qt	latitude or longitude	lat. or long.	less than or equal to	≤
yard	yd	monetary symbols (U.S.)	\$, ¢	logarithm (natural)	ln
Spell out acre and ton.		months (tables and figures): first three letters	Jan, ..., Dec	logarithm (base 10)	log
<b>Time and temperature</b>		number (before a number)	# (e.g., #10)	logarithm (specify base)	log <sub>2</sub> , etc.
day	d	pounds (after a number)	# (e.g., 10#)	mideye-to-fork	MEF
degrees Celsius	°C	registered trademark	®	minute (angular)	'
degrees Fahrenheit	°F	trademark	™	multiplied by	x
hour (spell out for 24-hour clock)	h	United States (adjective)	U.S.	not significant	NS
minute	min	United States of America (noun)	USA	null hypothesis	$H_0$
second	s	U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	percent	%
Spell out year, month, and week.				probability	P
<b>Physics and chemistry</b>				probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
all atomic symbols				probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
alternating current	AC			second (angular)	"
ampere	A			standard deviation	SD
calorie	cal			standard error	SE
direct current	DC			standard length	SL
hertz	Hz			total length	TL
horsepower	hp			variance	Var
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

***FISHERY MANAGEMENT REPORT NO. 00-5***

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NORTHWEST ALASKA MANAGEMENT AREA**

by

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## **PREFACE**

This report is organized into two major sections. Section I provides an overview of the Northwestern Management Area. Included is a description of the area and how management activities are organized; a description of the Alaska Board of Fisheries Process; an inventory of fisheries resources available in the area; an historical perspective of sport angler effort and harvest within waters of the management area; a description of research and activities conducted within the management area; and a summary of major social and biological fisheries issues that may exist in the area. Section II provides a more detailed summary of all the major fisheries in the NWMA. Included are a description and historical perspective of each fishery; description of recent performance of the fishery; a description of recent Board of Fishery actions in the fisheries; a discussion of any social or biological issues that may be associated with each fishery; and a description of any ongoing or recommended research or management activities directed at each fishery.

## ABSTRACT

An estimated 3,800 anglers expended 20,300 angler days of sport fishing effort in the Northwestern Management Area during 1997. About 2,900 anglers fished 15,500 days in the Seward Peninsula/Norton Sound sub-area and 950 anglers fished 4,800 days in the Kotzebue/Chukchi Sea sub-area. An estimated 49,800 fish were reported captured in the NWMA, of which 14,600 were harvested. Almost 80% of the harvest came from the Seward Peninsula/Norton Sound sub-area, where salmon comprised 55% of the harvest. In the Kotzebue/Chukchi Sea sub-area, sheefish comprised 33% of the harvest while Dolly Varden and Arctic grayling comprised 40% of the harvest. The Alaska Board of Fisheries adopted two proposals concerning salmon and two proposals concerning Arctic grayling in northwestern Alaska during 1997.

Key words: Arctic, Yukon, Kuskokwim, Tanana River, sport fishery, fishery management, recreation, harvest, effort, abundance, regulation, plans.

## SECTION I: NORTHWESTERN MANAGEMENT AREA OVERVIEW

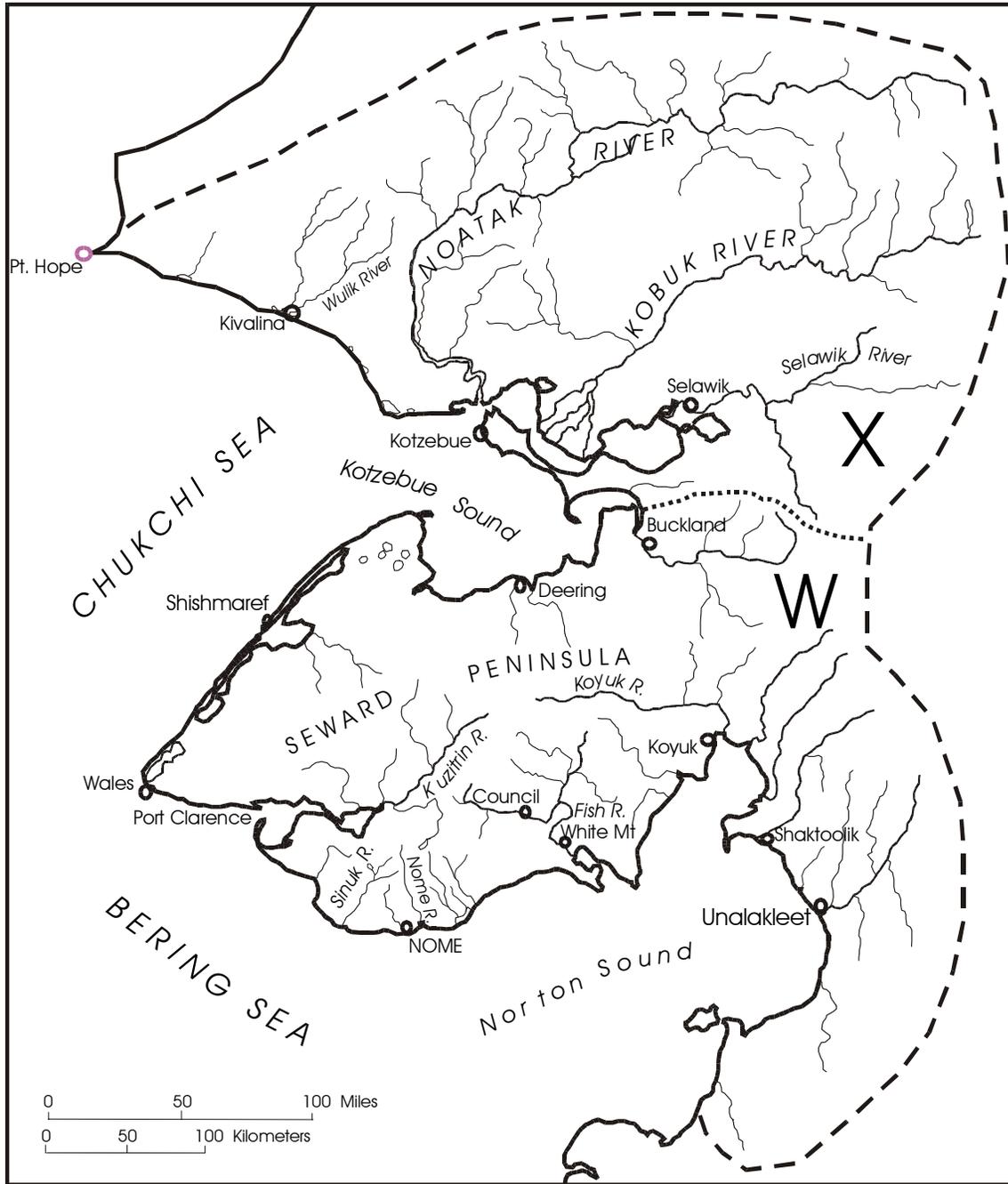
### MANAGEMENT AREA DESCRIPTION AND ITS FISHERIES RESOURCES

The Northwest Alaska sport fish management area (Figure 1) 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 the eastern Chukchi Sea to Point Hope. The total land area consists of approximately 67,800 sq mi (173,500 km<sup>2</sup>). The management area is comprised of two sub-areas, the Seward Peninsula/Norton Sound sub area in the south and the Kotzebue/Chukchi Sea sub area to the north. Fish species present in the Northwest Management Area (NWMA) include anadromous Dolly Varden *Salvelinus malma*, chinook *Oncorhynchus tshawytscha*, coho *O. kisutch*, chum *O. keta*, sockeye *O. nerka* and pink salmon *O. gorbuscha*; Bering cisco *Coregonus laurettae*, humpback whitefish *Coregonus pidscian*, as well as freshwater resident Arctic grayling *Thymallus arcticus*, Dolly Varden *Salvelinus malma*, Arctic char *Salvelinus alpinus*, northern pike *Esox lucius*, sheefish *Stenodus leucichthys*, round whitefish *Prosopium cylindraceum*, least cisco *C. sardinella*, humpback whitefish *C. pidscian*, broad whitefish *C. nasus*, burbot *lota lota* and lake trout *Salvelinus namaycush*. Most of these species are harvested in sport, personal-use or subsistence fisheries in the area. In addition, marine species such as red king crab *Paralithodes camtschatica*, Pacific herring *Clupea harengus*, rainbow smelt *Osmerus mordax*, saffron cod *Eleginus gracilis*, and starry flounder *Platichthys stellatus* are also harvested.

### Seward Peninsula/Norton Sound Sub-area

The Seward Peninsula-Norton Sound sub-area (statewide harvest Area W; Figure 1) includes all westerly flowing waters and adjacent marine (salt) waters, north of the Yukon River drainage and south of the Selawik River in the Kotzebue Sound/Chukchi Sea sub area (ADF&G 1984).

Streams in eastern Norton Sound (Figure 2) include the Golsovia, Unalakleet, Egavik, Shaktoolik, Inglutalik, Ungalik and Koyuk rivers. All but the Koyuk drain the Nulato Hills which separate Norton Sound from the Yukon and Koyukuk River valleys. The Unalakleet River is the largest and most heavily utilized of these. The village of Unalakleet is located at the mouth of this river and a permanent lodge on the lower river offers sport fishing guide services to Unalakleet River and its tributaries. The Unalakleet River has been designated a National Wild and Scenic River and supports anadromous populations of Dolly Varden, chinook, coho, chum



**Figure 1.-The Northwestern Management Area. Dashed lines indicate boundaries between harvest reporting areas W and X.**



and pink salmon and resident populations of Dolly Varden, Arctic grayling and whitefish *Coregonus sp.* Other area streams provide the opportunity for high quality fisheries for the same species, but are not as intensively fished because of the limited access.

Many streams located along the southern half of the Seward Peninsula between Koyuk and Teller, (Figure 3) including the Fish, Niukluk, Bonanza, Eldorado, Nome, Snake, Sinuk, Feather, Tisuk, Pilgrim, and Kuzitrin rivers are accessible via the Nome Road system and offer sport fishing opportunity for Arctic grayling, Dolly Varden, salmon and northern pike (Fish, Pilgrim and Kuzitrin rivers). Small sockeye salmon runs occur in the Pilgrim and Sinuk rivers, and a few remnant late run sockeye are present in most other locations while chinook salmon are present in the Pilgrim and Fish rivers. Trophy Arctic grayling, larger than 1.4 kg (3 lbs), are present in most Seward Peninsula waters and many of Alaska's largest Arctic grayling have been taken there. Of the 110 largest Arctic grayling registered in the ADF&G trophy fish program, 30 were taken from Seward Peninsula waters, and 20 of those were taken from the Sinuk River. Remote streams such as the Koyuk, Tubutulik, Kwiniuk, 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.

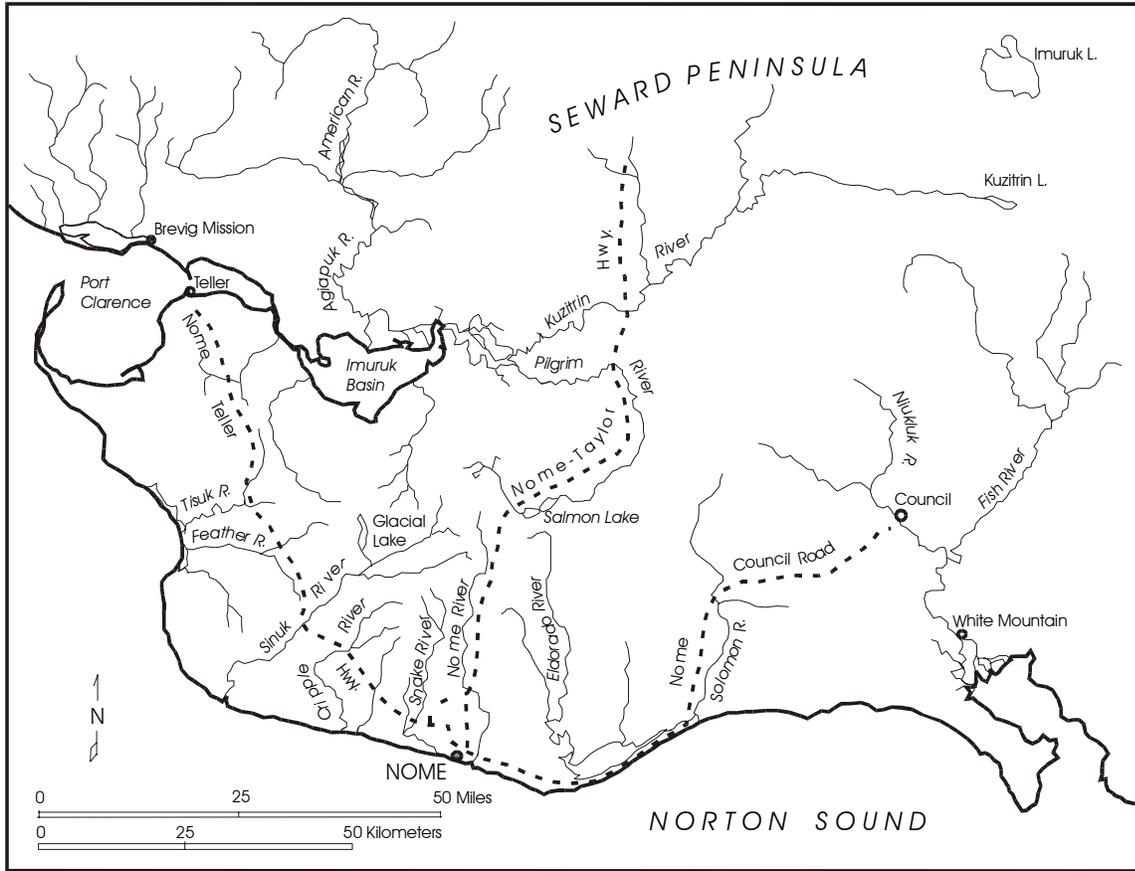
Most of the streams draining the northern half of the Seward Peninsula have never been visited by Division personnel but likely have limited sport fishing potential due to relatively small flow volumes and difficult access. Much of the northwestern Seward Peninsula is part of the Bering Land Bridge National Park Preserve (Figure 4).

Other than thaw lakes on the northern side of the Seward Peninsula, there are few lakes in the sub area. Unique lake formations include five marr lakes south of Cape Espenberg. These lakes were formed by subpermafrost steam explosions and contain a combination of Arctic char, least cisco and sticklebacks. The largest inland body is Imuruk Lake in the north-central portion of the Seward Peninsula. It is approximately 32 km<sup>2</sup> in area, and drains northward through the Inmachuk River. Salmon spawn at the outlet in the fall and the lake supports whitefish and Dolly Varden.

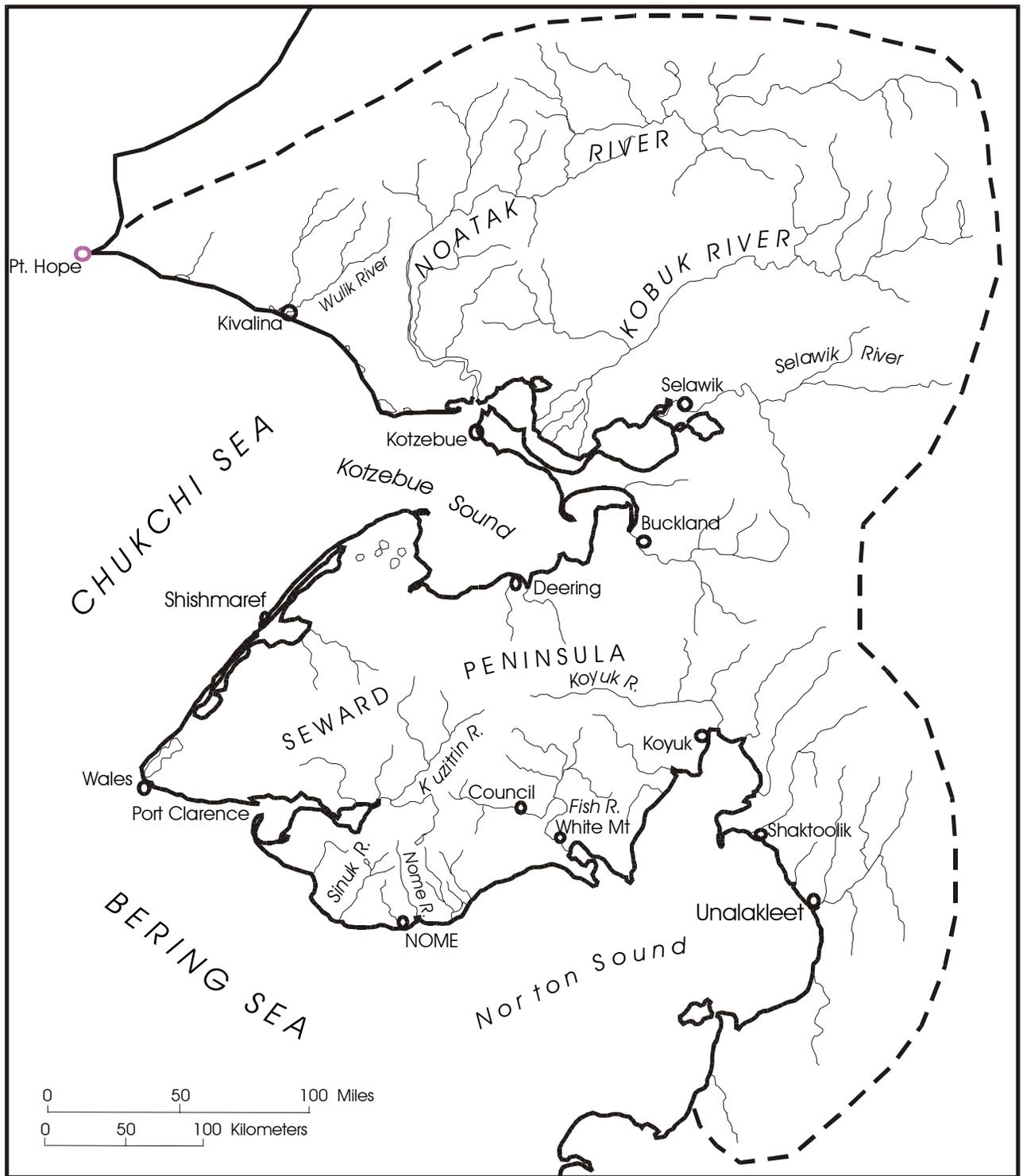
Some small alpine lakes in the Kigluaik Mountains northeast of Nome contain lake resident Arctic char, (Kretsinger 1987) while others contain Dolly Varden. Glacial Lake in the Sinuk River drainage contains sockeye salmon and round whitefish while Salmon Lake, located about 150 km northeast of Nome in the headwaters of the Pilgrim River, contains sockeye salmon, Arctic grayling, round whitefish, least cisco, slimy sculpin, ninespine stickleback, burbot and Dolly Varden which use it as a migration corridor. Even though this lake can be reached by road, it receives little sport fishing use. However, during the first half of the century it was an important fishing area for gold miners in the area. Subsistence fishing for salmon in Salmon Lake has been prohibited for many years because the sockeye stock was practically eliminated by early fisheries. Sport fishing for salmon in the lake and it's tributaries is presently prohibited.

### **Kotzebue/Chukchi Sea Sub-Area**

The Kotzebue/Chukchi Sea sub-area, statewide harvest Area X, includes all waters and drainages of the Selawik, Kobuk, Noatak, Wulik, Kivalina and Kukpuk rivers (Figure 1). The area also includes all salt water in the northern half of Eschscholtz Bay, including the Chamisso Island area and the northern half of Kotzebue Sound to and including Point Hope (ADF&G 1984).



**Figure 3.-Southern Seward Peninsula with road accessible waters.**



**Figure 4.- Northwestern Management Area with approximate boundaries of federally controlled areas are: 1. Cape Krusenstern National Monument (NPS); 2. Noatak National Preserve (NPS); 3. Kobuk Valley National Park (NPS); 4. Gates of the Arctic National Park (NPS); 5. Selawik National Wildlife Refuge \*USFWS); and, 6. Bering Land Bridge National Preserve (NPS).**

The most important streams of Kotzebue/Chukchi Sea sub-area are the Noatak and Kobuk rivers, each of which drains approximately 12,000 sq mi (31,000 km<sup>2</sup>) of the southern slope of the western Brooks Range. The Kobuk River is 350 mi (560 km) in length while the Noatak is 400 mi (640 km) (U.S. Army Corps of Engineers 1967). The third largest drainage is that of the Selawik River, with an approximate area of 4,600 sq mi (11,700 km<sup>2</sup>). Aquifers provide groundwater which stabilizes flow and water temperature fluctuations on the lower main stem of the Noatak River and in tributaries of the Kobuk River. These areas provide important overwintering and spawning habitats for fish.

The Noatak River is a National Wild and Scenic River (Appendix A) and most of the drainage is included in the Noatak National Park Preserve (Figure 4). The extreme upper headwaters of both the Noatak and Kobuk rivers are included in the Gates of the Arctic National Park. A portion of the lower Kobuk Valley between Kiana and Ambler is included in the Kobuk Valley National Park, and the Salmon River tributary, as well as the upper main stem of the Kobuk River are National Wild and Scenic Rivers as is the Selawik River. Much of the Selawik River valley is part of the Selawik National Preserve.

These three large river systems contain abundant fisheries resources. The Noatak River produces a large run of chum salmon which maintain a Kotzebue-based commercial fishery. Many thousands of anadromous Dolly Varden overwinter the lower 300 km of the river and spawn in some of the river's tributary streams. During the commercial salmon fishery in August a significant incidental harvest of adult Dolly Varden is sometimes taken. This system is known for its trophy size Dolly Varden, and the current state record (19.75 lbs.) was taken in 1991 from the Kelly River. Whitefish, Arctic grayling, burbot and northern pike are resident in the Noatak River. Sheefish use the lower reaches of the river for feeding during the spring of the year, but are not known to spawn there (Alt 1987).

Both the Selawik and Kobuk rivers support spawning populations of sheefish in their upper reaches. Hotham Inlet, Selawik Lake and the delta systems at the river mouths serve as overwinter feeding areas for juvenile and adult sheefish. Sheefish in these populations are slower growing, but attain a larger size than those in other areas of Alaska. The Alaska state record sheefish, 24 kg (53 lbs), was taken in 1986 from the upper Kobuk River. Abundant whitefish (*C. sardinella*, *C. nasus*, *C. pidscian*) utilize the rivers, including Selawik Lake and Hotham Inlet (Kobuk Lake). Dolly Varden, northern pike, Arctic grayling, burbot, lake trout and Arctic char inhabit various parts of the Kobuk watershed. The Wulik and Kivalina rivers, which empty into the Chukchi Sea near the village of Kivalina, are well known as trophy streams for Dolly Varden.

Sport fishing effort in northwest Alaska is relatively light compared to most other areas in the state. Heaviest use occurs on the Noatak, Kobuk, and Wulik rivers. Many visitors to Gates of the Arctic National Park and Kobuk Valley National Park participate in float trips on the Kobuk River from Walker Lake to Kobuk village (Alt 1984; ADF&G 1986; National Park Service (NPS) 1984, 1985). A small amount of shore fishing with hook and line for sheefish takes place near Kotzebue in the summer.

Guided and unguided anglers and river floaters use the Noatak River as do Kotzebue area residents who boat or fly to different parts of the river to fish or hunt. The most popular fishing area is the Kelly River, but other tributaries such as the Nimiuktuk and Kugururok rivers are also used occasionally for Dolly Varden fishing (Alt 1978).

Raft, canoe, and kayak trips are increasingly popular on the Noatak River. Arctic grayling, Dolly Varden, northern pike and lake trout are available in the upper Noatak River, and downstream from the Nimiuktuk River, chum salmon also occur. Lake trout occur in Matcharak, Feniak, and Desperation lakes and in other lakes in the middle and upper Noatak drainage. Some lakes also contain Arctic char. Most lakes in the area are accessible during summer months only by floatplane. Thirteen lakes surveyed by Alt (1978) in the upper Noatak River all contained fish. Round whitefish lake trout and Arctic grayling were the most common species. Least cisco, northern pike, Arctic char, slimy sculpin *Cottus cognatus*, salmon (chum and sockeye), and ninespine stickleback *Pungitius pungitius* were also found.

The lower floodplains of the Kobuk and Selawik rivers, especially in the vicinity of the Kobuk River delta, and the lower Noatak River contain hundreds of shallow thaw lakes of various sizes. Fisheries resources in this area have been poorly inventoried, but populations of whitefish, and northern pike are known to be seasonally present. Dolly Varden spawn in several Kobuk River tributary streams. The mountains in the upper Kobuk River drainage contain several relatively large, oligotrophic lakes. Lake trout, Arctic grayling, Arctic char, northern pike and several species of whitefish species inhabit these lakes. These include Walker, Nutuvukti, and Selby lakes.

Most sport fishing throughout the region is by private individuals fishing on their own. The sport fish guiding industry, while present in many of the region's best fishing waters, is not as large or well developed as in other parts of the state. DeCicco and Barnes (1992) produced a list of guide services by area, species and fishery.

## **RURAL ALASKA SPORT FISHING**

With the exception of the limited road system around Nome, waters of the Northwestern Management Area are not accessible from highways or roads of any kind. Small communities are scattered along the major river systems of the area and along the coast of western Alaska. The communities are invariably located on or near water because of the importance of fish as a food source to native people historically and today. Native residents harvest a substantial amount of fish and game resources for personal subsistence use. Subsistence fishing is usually conducted nylon gillnets or seines. Recreational, or sport fishing with rod and reel is practiced to some extent by rural residents, but often as an extension of subsistence activities and less for recreational purposes. Consequently, harvest estimates of sport caught fish from rural Alaska are generally low, in part because local residents usually fish under subsistence regulations and because the small amount of sport fishing done is sometimes considered a subsistence activity. Since statewide harvest estimates are based upon surveys of licensed sport fishers, the rural harvests may not be fully documented.

## **AYK SPORT FISHING REGULATIONS**

Published regulations for the Northwestern Management Area for 1997 are reproduced as Appendix B.

## **SPORT ANGLER EFFORT**

Recreational angler effort has been estimated for the NWMA with a mail survey since 1977 (Mills 1979-1994, Howe et al. 1995-1998). The results of this survey, which estimates angler days of sport fishing effort by area, are not available until the following year. Estimates of

harvest by species and area are also calculated, but effort by species is not. Beginning in 1990, catch by species and area was also estimated. Effort in the NWMA has remained more or less stable since 1982, ranging from 20,000 to 30,000 angler days most years (Table 1, Figure 5). Effort levels in the Seward Peninsula and Norton Sound sub-area have averaged around 20,000 angler days over the past 10 years showing a slight decline to 15,500 angler days in 1997. The Nome River has sustained the more fishing effort than any other stream in the NWMA for seven of the past 10 years. In 1997, the Unalakleet River supported more than twice the effort of any other single stream in the management area. In the Kotzebue/Chukchi Sea sub area, sport fishing effort has been more variable, ranging from 4,000 to 10,000 angler days per year over the past 10 years, and showing a recent decline to 4,800 angler days in 1997. The large drainages of the Kobuk and Noatak rivers support about half of the freshwater effort in this sub-area during most years. The fraction of the entire AYK Region effort expended in the Northwest Management Area has declined from over 15% in 1992 to approximately 6% in 1997 (Table 2). The recent addition of the Glennallen area to the AYK Region as well as lower effort in the NWMA during 1997 account for the decline.

### **OTHER USER GROUPS (COMMERCIAL AND SUBSISTENCE)**

Although small when compared to the major commercial fisheries in southeast and southwest Alaska, the commercial fisheries in northwest Alaska form an economic base for income and employment in many local communities. Commercial harvests for salmon, herring, halibut and crab are much larger than sport harvests for those species. In addition, extremely limited commercial fisheries exist for freshwater species such as sheefish, Dolly Varden and whitefish. Although personal-use fisheries are also allowed, there has been no participation in these fisheries in the NWMA. Subsistence harvests of salmon, Dolly Varden, sheefish, whitefish and crab are very important to the economies of the many small villages in the NWMA, and are much larger than the sport fish harvests which make up the smallest component of overall use in most years.

The Division of Commercial Fisheries Management and Development (CFMD) manages commercial fisheries in the Northwestern Management Area. Commercial fisheries for salmon in the Norton Sound management district has been ongoing since 1961. The initial species of interest were chinook and coho, but fisheries have also developed for chum salmon and pink salmon. The district is divided into six subdistricts to facilitate management of individual stocks or stock groups. Subdistricts include: 1) Nome, 2) Golovin, 3) Moses Point, 4) Norton Bay, 5) Shaktoolik, and 6) Unalakleet (Figure 6). Conservation concerns have resulted in very little commercial salmon fishing in the Nome subdistrict since the early 80's. There has likewise been little recent commercial fishing in the Norton Bay subdistrict, but this has primarily been the result of limited markets in this remote area (Brennan et al. 1998). Average commercial harvests over the last five years in the Norton Sound district have been 8,000 chinook, 59,000 coho, 32,000 chum, and 342,000 pink salmon (Table 2). The Port Clarence District includes all waters from Cape Douglas north to Cape Prince of Wales, including the drainages of the Pilgrim

**Table 1.-Number of sport anglers and angler-days of effort expended in the NWMA, 1977-1997.**

YEAR	Sew Pen/Norton Sound		Kotzebue/Chukchi Sea		Total Northwest Mgt. Area	
	Number of Anglers	Effort Angler Days	Number of Anglers	Effort Angler Days	Number of Anglers	Effort Angler Days
1977		7,828		3,487		11,315
1978		8,379		4,997		13,376
1979				2,593		
1980		7,958		3,841		11,799
1981		10,879		5,219		16,098
1982		13,198		6,840		20,038
1983		12,678		7,963		20,641
1984	1,597	12,558	696	5,710	2,293	18,268
1985	2,854	18,141	1,788	6,701	4,642	24,842
1986	2,872	17,257	1,570	5,744	4,442	23,001
1987	2,528	20,381	2,090	9,288	4,618	29,669
1988	2,661	19,456	959	5,248	3,620	24,704
1989	2,560	15,443	1,028	4,453	3,588	19,896
1990	2,686	18,833	991	3,682	3,677	22,515
1991	3,236	22,118	1,606	2,967	4,842	25,085
1992	3,540	22,684	1,421	6,145	4,961	28,829
1993	3,134	18,930	1,575	7,809	4,709	26,739
1994	3,016	18,922	1,100	6,036	4,116	24,958
1995	3,719	14,677	1,957	8,495	5,676	23,172
1996	3,308	18,637	1,501	7,060	4,809	25,697
1997	2,936	15,520	864	4,772	3,800	20,292
77-97 Avg	2,903	15,724	1,368	5,669	4,271	21,547
87-97 Avg	3,029	18,691	1,372	5,996	4,401	24,687
93-97 Avg	3,223	17,337	1,399	6,834	4,622	24,172

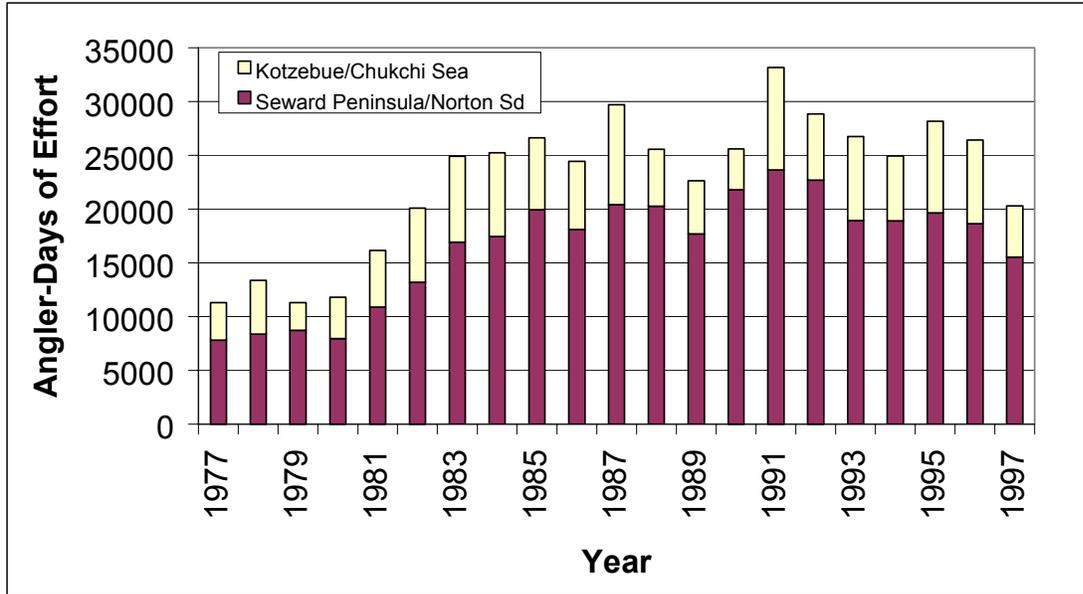


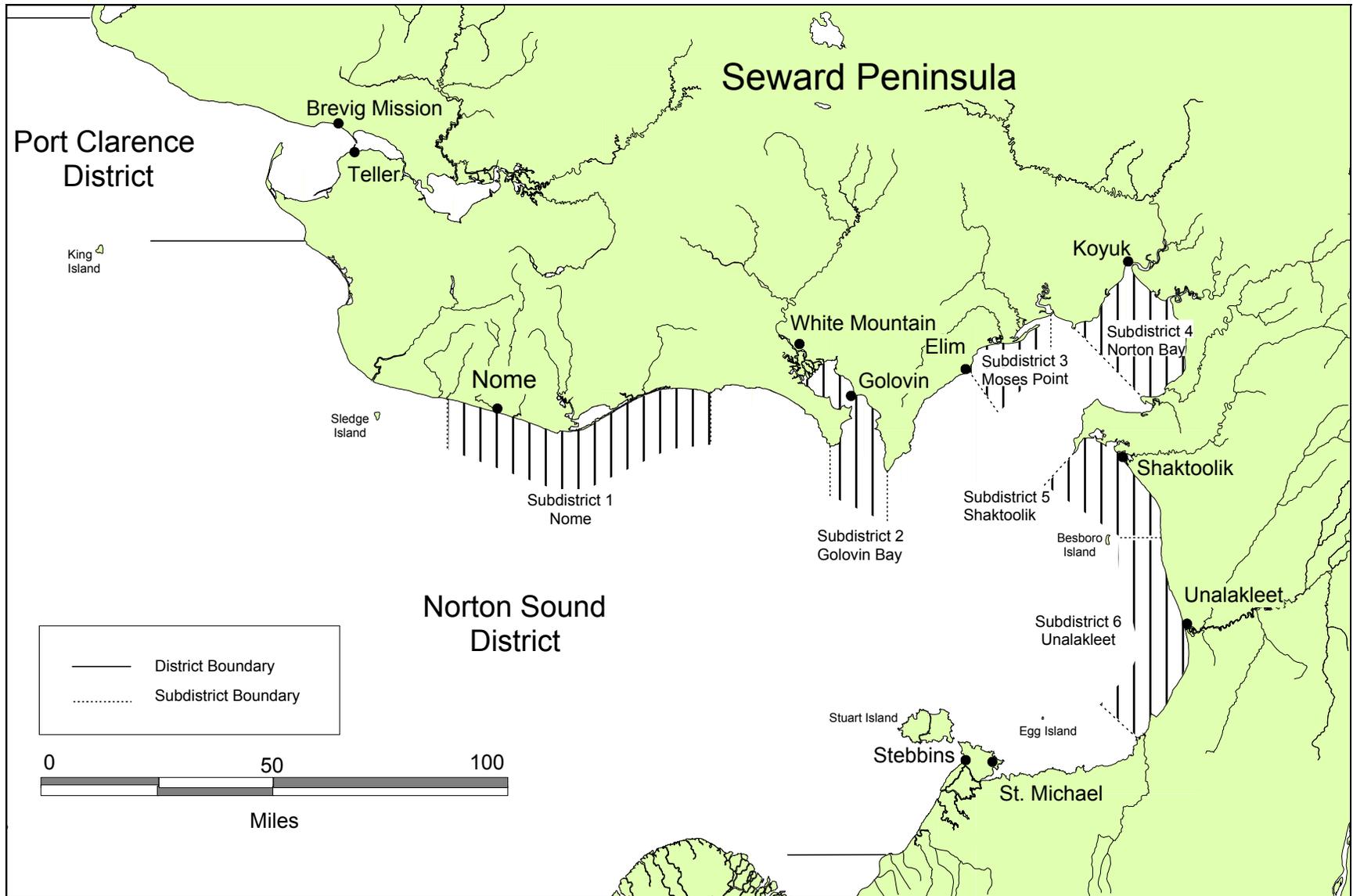
Figure 5.-Sport fishing effort in angler-days in the NWMA, 1977-1997.

**Table 2.-Commercial harvests of salmon in Norton Sound 1980-1997.**

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1980	6,311	40	29,842	227,352	180,792	444,337
1981	7,929	56	31,562	232,479	169,708	441,734
1982	5,892	10	91,690	230,281	183,335	511,208
1983	10,308	27	49,735	76,913	319,437	456,420
1984	8,455	6	67,875	119,381	146,442	342,159
1985	19,491	166	21,968	3,647	134,928	180,200
1986	6,395	233	35,600	41,260	146,912	230,400
1987	7,080	207	24,279	2,260	102,457	136,283
1988	4,096	1,252	37,214	74,604	107,966	225,132
1989	5,707	265	44,091	123	42,625	92,811
1990	8,895	434	56,712	501	65,123	131,665
1991	6,068	203	63,647	0	86,871	156,789
1992	4,541	296	105,418	6,284	83,394	199,933
1993	8,972	279	43,283	157,574	53,562	263,670
1994	5,285	80	102,140	982,389	18,290	1,108,184
1995	8,860	128	47,862	81,644	42,898	181,392
1996	4,984	1	68,206	487,441	10,609	571,241
1997	12,573	161	32,284	20	34,103	79,141
10 Year Avg <sup>a</sup>	6,998	310	60,086	179,058	54,544	300,996
5 Year Avg <sup>b</sup>	8,135	130	58,755	341,814	31,892	440,726

a 1988-1997

b 1993-1997



**Figure 6.-Commercial salmon fishing subdistricts in Norton Sound.**

and Kuzitrin rivers (Figure 7). Commercial salmon fishing has been prohibited in this district since 1967. Few stocks are present and their run sizes are relatively small. Because of the existence of important subsistence fisheries on these stocks, commercial fishing has never reopened. The Kotzebue Sound District includes all waters from Cape Prince of Wales to Point Hope (Figure 8) and is the northern most commercial fishing district in Alaska. The recent commercial fishery opened under state management in 1962, but there are documented sales of salmon in the Kotzebue area dating back to the early 1900's. This is primarily a chum salmon fishery with an incidental take of Dolly Varden which pass through the fishery in the August. Average commercial harvests over the past five years in the Kotzebue Sound District have been 148,500 chum salmon and about 1,200 Dolly Varden (Table 3). A few chinook are also taken in fishery. There is also a directed under ice commercial fishery on sheefish in Hotham Inlet. Documented annual harvests in this fishery have averaged only 250 fish over the past five years. Brennan et al (1998) document these fisheries in greater detail.

The CFMD conducts annual assessments of salmon escapements using counting towers and aerial surveys. Escapement goals for chum salmon have been established for Norton Sound streams and are currently under review. Biological Escapement Goals (BEG's) are being developed for all species through the current review process, and should be available within the next year.

There are approximately 16,000 people in the NWMA. Except for the two larger communities of Nome and Kotzebue, the population is scattered among 26 small villages along the coast and the major area rivers (Alaska Dept. of Labor 1991). Most of the population is comprised of Alaska Natives, many of whom lead a relatively traditional lifestyle. Most area residents rely heavily on the subsistence use of fish and wildlife for their livelihood. Subsistence use of salmon is monitored in village surveys conducted by the Division of Subsistence. Recent subsistence salmon harvests have averaged about 114,000 in the Norton Sound District; 12,000 in the Port Clarence District; and 58,000 in the Kotzebue Sound District (Table 4). More than 240,000 salmon were taken for subsistence use in Northwestern Alaska during 1996. In addition to salmon, saffron cod, rainbow smelt, Dolly Varden and whitefish are taken. In the Kotzebue District sheefish are also an important subsistence resource, especially in the Kobuk River villages, and Selawik. The relative importance of whitefish is higher in the Kotzebue Sound District than in many areas of the state. The 1997 subsistence harvest of whitefish was estimated at 84,851 for the village of Noatak and the five Kobuk River villages combined.

## **ALASKA BOARD OF FISHERIES ACTIVITIES**

The development of regulations for recreational fisheries in the NWMA occurs within the established Alaska Board of Fisheries (BOF) process. Local fish and game advisory committees have been established throughout Alaska to assist the BOF by bringing local issues to their attention, and proposing or commenting on regulation changes proposed for upcoming BOF meetings. Active committees meet at least once a year and in the fall prior to scheduled BOF meetings in order to provide timely information regarding regulation proposals or concerns that may affect a local area. Staff from the various divisions of ADF&G are often invited to attend committee meetings to interact with the public and provide information to the committee regarding issues of local concern. Within the NWMA there are eight local advisory committees to serve resource users of the area: Kotzebue, Noatak/Kivalina, Upper Kobuk, Lower Kobuk,

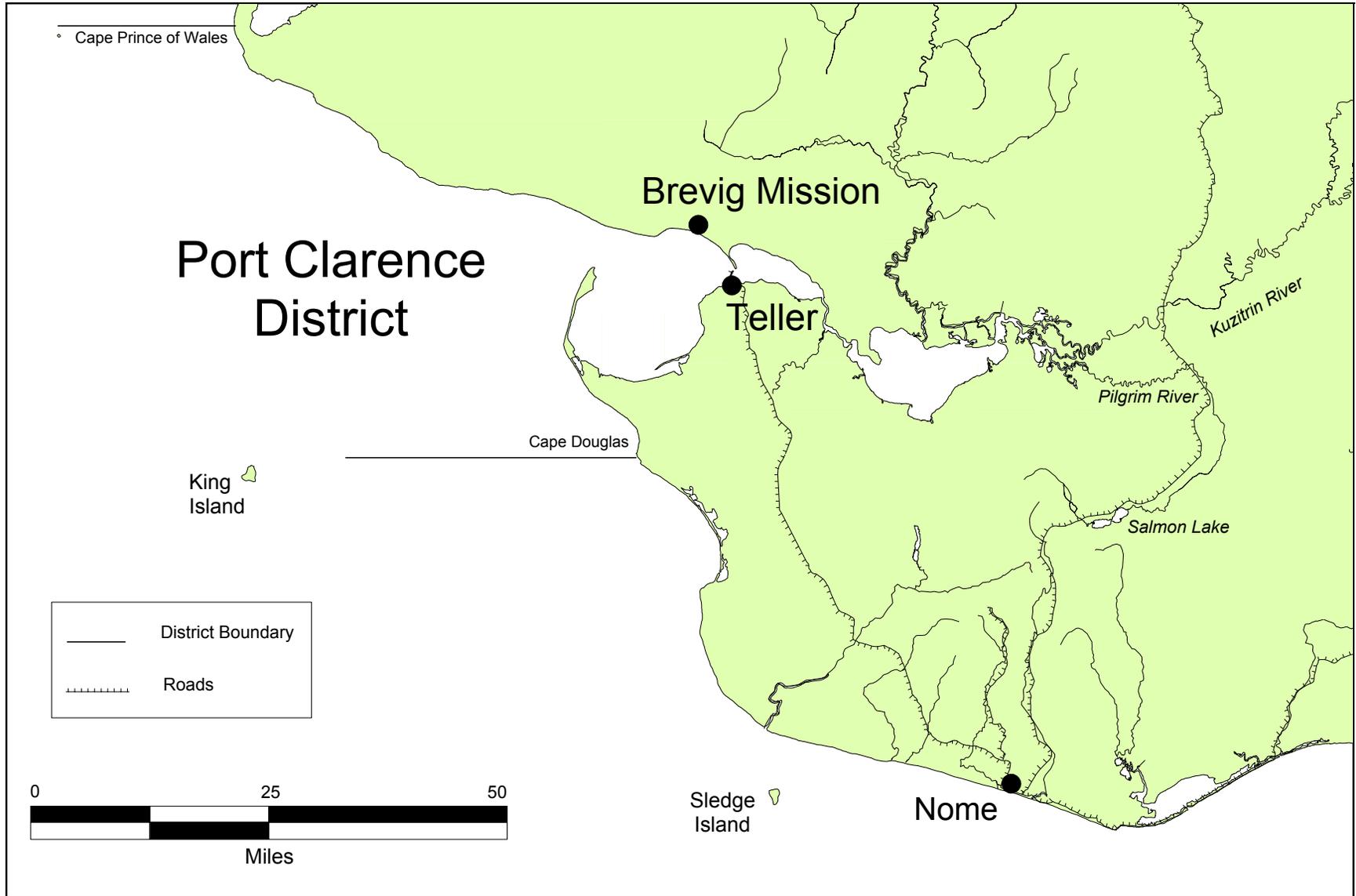


Figure 7.-Port Clarence commercial fishing district.

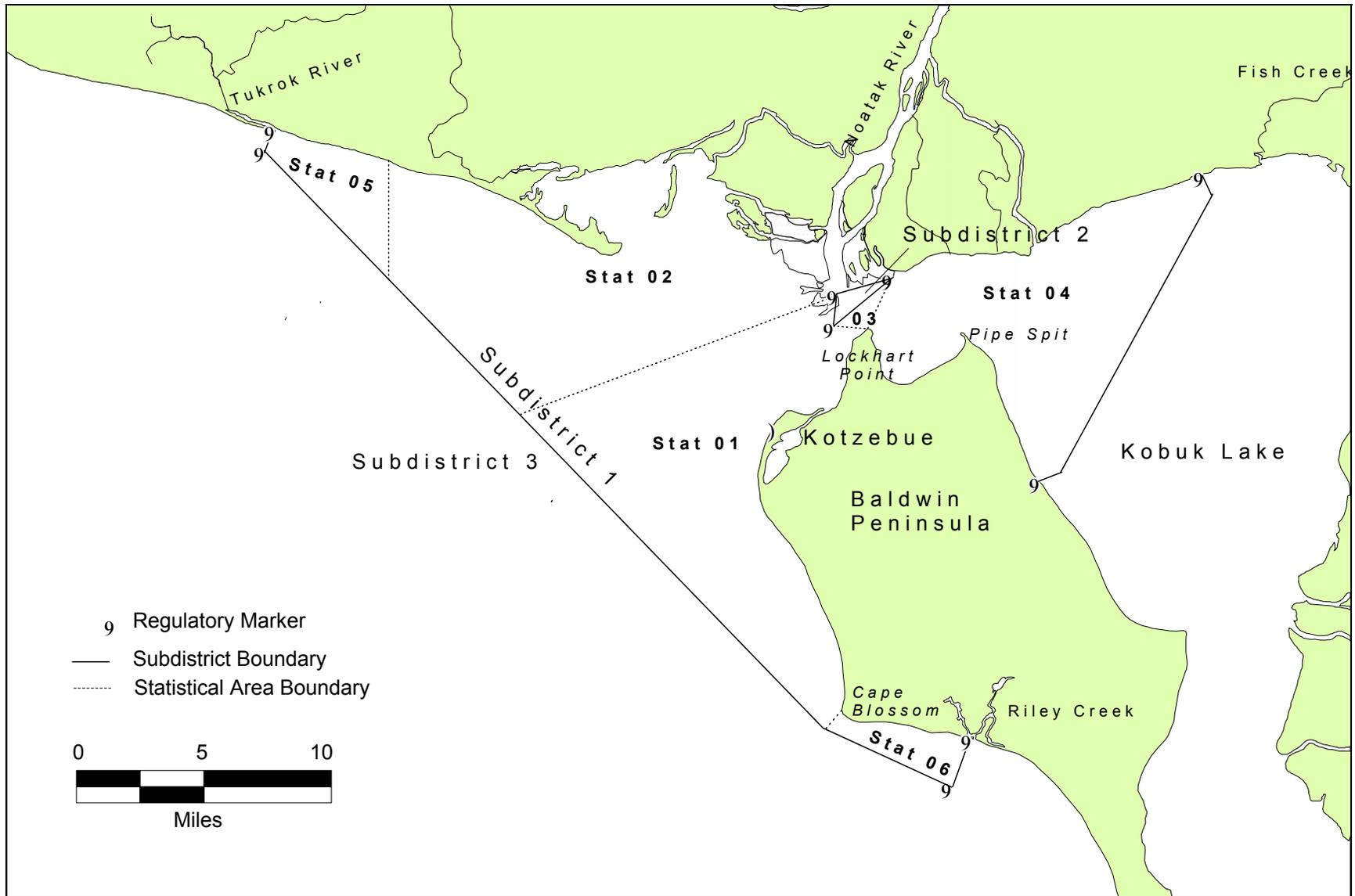


Figure 8.-Kotzebue commercial salmon fishing district.

**Table 3.-Commercial harvests of salmon and incidental species in Kotzebue Sound 1980-1997.**

Year	Chum	Sheefish	Dolly Varden	
			Sold	Caught
1980	367,284	1,175	3,049	
1981	677,239	278	3	
1982	417,790	2,629	3,447	
1983	175,762	1,424	190	845
1984	320,206	927	347	1,090
1985	521,406	342	454	3,600
1986	261,436	26	5	2,373
1987	109,467	670	1,261	
1988	352,915	943	752	
1989	254,617	2,335	3,093	
1990	163,263	687	604	
1991	239,923	852	6,136	
1992	289,184	289	1,977	
1993	73,071	210	76	
1994	153,452		149	
1995	290,730	226	2,090	
1996	82,110	308	188	
1997	142,720		3,320	
10 Year Average <sup>a</sup>	204,199	731	1,839	
5 Year Average <sup>b</sup>	148,417	248	1,165	

<sup>a</sup> 1988-1997

<sup>b</sup> 1993-1997

**Table 4.-Subsistence salmon harvests from Norton Sound, Port Clarence, and Kotzebue (includes sheefish, Dolly Varden and whitefish) subdistricts, 1980-1997.**

Year	Norton Sound District						Port Clarence District						Kotzebue District			
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chum	Sheefish	DV	WF
1980	1,397		8,625	63,778	19,622	93,422	7	3,195	5	3,170	1,715	8,092		3,117		49,106
1981	2,021	38	13,416	28,741	32,866	77,082	8	255	110	765	5,845	6,983		6,651	20,056	37,746
1982	1,011	8	14,612	54,249	18,580	88,460	23	405	100	4,345	684	5,557		4,704	21,114	
1983							17	261		615	299	1,192		764	20,815	16,389
1984														2,803	14,542	28,614
1985														60	10,500	
1986														721	7,482	11,854
1987														276		20,020
1988																14,000
1989							28	535	472	395	410	1,840				
1990																
1991														2,180		16,015
1992														2,821		17,485
1993														2,441		19,060
1994	7,374	1,161	22,124	71,066	25,020	126,745	181	1,979	1,692	3,849	2,042	9,743		3,181		
1995	7,766	1,222	23,015	38,594	43,014	113,611	76	4,481	1,739	3,293	6,011	15,600		9,465		
1996	7,255	1,182	26,304	64,724	34,585	134,050	195	4,558	2,079	2,587	1,264	10,683		6,953		
1997	8,998	1,892	16,476	27,200	26,803	81,369	158	3,177	829	755	2,099	7,018	57,906	9,805		84,851
Recent																
4 Yr Ave	7,848	1,364	21,980	50,396	32,356	113,944	153	3,549	1,585	2,621	2,854	10,761		7,351		

<sup>a</sup> Sheefish

<sup>b</sup> Dolly Varden

<sup>c</sup> Whitefish, includes humpback, broad and least cisco

Northern Seward Peninsula, Norton Sound, Southern Norton Sound and St. Lawrence Island advisory committees.

The current BOF schedule provides for meetings rotated through areas of the state on a three-year schedule. The last BOF meeting which addressed the NWMA occurred in December 1997. The BOF adopted several regulations that affected sport fisheries in the NWMA during the December meeting. Two regulations dealt with salmon fisheries, and two with Arctic grayling. The daily bag and possession limit for Chinook salmon was set at one fish for the entire NWMA. In northern Norton Sound, the daily bag and possession limits for "other salmon" was changed from an aggregate limit to a bag limit by species. Fishing for Arctic grayling was closed on the Nome and Solomon rivers. See the following sections for a more detailed descriptions of these changes. In addition, a special meeting to hear local concerns regarding salmon issues in northern Norton Sound was scheduled to be held in Nome during March 1998.

The area management biologist possesses emergency order authority (5AAC 75.003) which allows the in season modification of time, area, and bag/possession limit regulations as necessary to address conservation concerns on a species, area or fishery basis. Emergency orders issued in the NWMA during the reporting period are summarized in Appendix C.

### **ESTABLISHED MANAGEMENT PLANS AND POLICIES**

There are presently no specific BOF adopted management plans that pertain to the NWMA. However, the Division of Sport Fisheries has developed objectives for the region or its constituent areas and have identified them in fishery based management plans. In addition, a series of general divisional criteria that have been prepared to guide the establishment of fishery objectives are listed below:

1. **Management and protection of existing fish resources.** Divisional activities should strive to manage and protect Alaska's wild stocks of fish 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.** Division activities should strive to restore and maintain fish stocks and habitat damaged by man's activities.
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 affect other fisheries.

Management plans prepared for specific NWMA fisheries also identify a series of fishery objectives. While in some cases the objectives are different, objectives that recur frequently in the plans include:

1. Management of sport fisheries so that harvests do not jeopardize sustained yield of the harvested stocks;

2. Maintenance, and/or improvement of public access to fishing opportunities;
3. Promote awareness of sport fishing opportunities that exist; and,
4. Ensure that management costs do not outweigh the public benefits that may be achieved in the fishery.

## **MAJOR ISSUES FOR THE NORTHWESTERN MANAGEMENT AREA**

1. Nome subdistrict salmon. Chum salmon stocks in the Nome subdistrict have been depressed for since the mid 1980's. Department divisions have been cooperating in the recovery of these stocks. Efforts, including egg incubation boxes, fishery closures and increased escapement monitoring are ongoing. A lake fertilization project on Salmon Lake to increase zooplankton production for rearing sockeye has also been undertaken. Sport Fish Division has participated in these efforts through the Regional Planning Team (RPT), and by cooperating with other divisions.
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 waste water treatment and the construction of a clean water bypass system. Water quality is monitored by the Division of Habitat and mine personnel. The Division of Sport Fish counts Dolly Varden overwintering in the Wulik River annually and collects fish for tissue sampling heavy metal concentrations.
3. Nome area gold mining. The future development of large scale lode deposits of gold near Nome has the potential to degrade fish habitat in the Snake, Cripple and Solomon river drainages.
4. Rural resentment of sport fishing and sport anglers. Rural Alaskans often feel resentment toward "outsiders" who come into remote areas traditionally used by local people for subsistence hunting or fishing. They sometimes have a cultural bias against the concept of "sport fishing" and feel that people do not have the right to "play" with food resources. The bias can be particularly strong towards catch-and-release practices and has lead to resentment towards sport anglers who wish to fish on private and public lands within the NWMA.

## **SECTION II: MAJOR NORTHWESTERN AREA FISHERIES OVERVIEW**

### **NORTHWEST ALASKA SPORT FISHERIES**

Waters of the area offer some of the most remote and diverse angling opportunities available in Alaska. Trophy fish opportunities for Dolly Varden, sheefish and Arctic grayling are well known. Angling for salmon, especially chinook and coho is not as well known, but can be excellent seasonally in several streams that produce good runs. Marine sport fisheries, are practically non-existent. Through the ice jigging for saffron cod, smelt, flounder, sheefish, and other species are common near settlements, but these fisheries generally operate under subsistence fishing regulations. The following sections discuss the major sport fisheries in the NWMA by species. Discussion of each fishery will deal with 1) historical perspective, 2) fishery objectives, 3) inseason management and recent BOF actions, 4) recent fishery performance, 5) current issues and 6) recommended management and research programs. Recent fishery performance will focus on data from 1995-1997. Observations regarding the 1998 season may be included for some fisheries, but data on harvest are not yet available for the current year.

### **NORTHWESTERN ALASKA SALMON**

#### **Fishery Description and Historical Perspective**

Guided and non-guided sport fishing for salmon takes place throughout the area with concentrations near Unalakleet, and in waters accessible from the Nome area road system. Some 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, consequently, harvests are very small.

Total fishing effort estimated to have occurred for all species of fish in the NWMA has ranged from about 11,000 angler-days in the late 1970's to 33,000 angler-days in 1991 (Table 1). Salmon harvest is estimated to have ranged from 3,800 fish in 1977 to 20,000 fish in 1982 (Table 5). Mean annual harvest of salmon of all species from 1987 to 1997 is 10,000 fish, with 97% of the harvest reported from Seward Peninsula and Norton Sound, and only about 3.0% from Kotzebue drainages. Over the past 5 years, about 51% of the total average harvest has been coho salmon, 34% pink salmon, 8% chum salmon, and 6% chinook salmon. During years of high pink salmon abundance such as 1992, 1994 and 1996, harvests of this species have comprised about 50% of the total annual salmon harvest. However, during years of low pink salmon abundance such as 1993, 1995 and 1997, coho salmon have accounted for about 60% of the total salmon harvest. Historical salmon harvest estimates by location are provided in Tables 6-9.

#### **Norton Sound Salmon**

The Unalakleet River supports substantial runs of all salmon species except sockeye. Guided and non-guided fishing effort is primarily focused on chinook and coho salmon, but chum and pink salmon are also harvested. There is one commercial sport fishing lodge located about 8 m upstream on the river which hosts around 200 to 250 visiting anglers each year. Several local residents also guide anglers on the river. During 1989, guided anglers from the lodge caught more than 8,000 salmon in the Unalakleet River but killed fewer than 10% of these fish. Of the

**Table 5.-Effort in angler days, and recreational harvest of salmon by species in the Norton Sound/Seward Peninsula and Kotzebue/Chukchi Sea sub-areas, and total for the NWMA 1977-1997.**

Year	Norton Sound/ Seward Peninsula	Kotzebue	NWMA	Norton Sound/ Seward Peninsula	Kotzebue	NWMA	Norton Sound/ Seward Peninsula	Kotzebue	NWMA
	Effort	Effort	Effort	KS	KS	KS	Coho	Coho	Coho
1977	7,828	3,487	11,315	197	16	213	449	0	449
1978	8,379	4,997	13,376	303	0	303	742	0	742
1979	8,725	2,593	11,318		10			0	
1980	7,958	3,841	11,799	52	9	61	1,455	0	1,455
1981	10,879	5,284	16,163	70	22	92	1,504	0	1,504
1982	13,198	6,906	20,104	409	0	409	2,986	0	2,986
1983	16,944	7,963	24,907	687	0	687	3,823	0	3,823
1984	17,436	7,791	25,227	247	13	260	7,582	0	7,582
1985	19,919	6,701	26,620	239	0	239	1,177	51	1,228
1986	18,107	6,313	24,420	1,077	0	1,077	3,926	0	3,926
1987	20,413	9,288	29,701	615	95	710	2,319	11	2,330
1988	20,278	5,279	25,557	400	18	418	5,038	0	5,038
1989	17,692	4,932	22,624	203	0	203	4,158	0	4,158
1990	21,799	3,782	25,581	364	0	364	3,305	0	3,305
1991	23,622	9,543	33,165	404	0	404	5,800	0	5,800
1992	22,684	6,145	28,829	204	8	212	4,671	0	4,671
1993	18,930	7,809	26,739	595	0	595	3,783	9	3,792
1994	18,922	6,036	24,958	600	0	600	5,547	0	5,547
1995	19,647	8,495	28,142	438	0	438	3,705	0	3,705
1996	18,637	7,763	26,400	274	0	274	6,801	0	6,801
1997	15,520	4,772	20,292	893	0	893	4,837	0	4,837
Average	16,548	6,177	22,726	468	10	478	4,475	5	4,480
87-97 Avg	19,831	6,713	26,544	454	11	465	4,542	2	4,544
Recent5yr	18,331	6,975	25,306	560	0	560	4,935	2	4,936

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**Table 5.-Page 2 of 3.**

Year	Norton Sound/ Seward Peninsula	Kotzebue	NWMA	Norton Sound/ Seward Peninsula	Kotzebue	NWMA	Norton Sound/ Seward Peninsula	Kotzebue	NWMA
	Chum	Chum	Chum	Pink	Pink	Pink	Red	Red	Red
1977	670	28	698	2,402	8	2,410	0	0	0
1978	546	254	800	7,399	0	7,399	0	0	0
1979		27			0			0	
1980	1,601	86	1,687	7,732	0	7,732	0	0	0
1981	1,889	32	1,921	3,101	0	3,101	0	0	0
1982	2,620	346	2,966	13,742	0	13,742	0	0	0
1983	2,042	463	2,505	4,583	0	4,583	0	0	0
1984	1,481	312	1,793	8,322	0	8,322	351	0	351
1985	1,036	310	1,346	1,138	68	1,206	20	0	20
1986	1,719	749	2,468	3,172	62	3,234	19	0	19
1987	814	402	1,216	1,304	0	1,304	924	21	945
1988	1,583	236	1,819	2,912	0	2,912	782	0	782
1989	1,497	41	1,538	3,564	10	3,574	165	0	165
1990	925	0	925	7,647	0	7,647	198	0	198
1991	1,415	59	1,474	1,738	91	1,829	237	0	237
1992	523	220	743	6,403	293	6,696	131	0	131
1993	691	443	1,134	2,250	0	2,250	10	0	10
1994	536	248	784	7,051	51	7,102	18	0	18
1995	394	321	715	928	38	966	104	0	104
1996	316	539	855	5,591	0	5,591	22	0	22
1997	281	288	569	594	0	594	23	0	23
Average	944	298	1,241	3,758	44	3,802	215	2	216
87-97 Avg	816	254	1,070	3,635	44	3,679	238	2	240
Recent5yr	444	368	811	3,283	18	3,301	35	0	35

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**Table 5.-Page 3 of 3.**

Year	Norton Sound/ Seward Peninsula	Kotzebue	NWMA
	Total	Total	Total
1977	3,718	52	3,770
1978	8,990	254	9,244
1979		37	
1980	10,840	95	10,935
1981	6,564	54	6,618
1982	19,757	346	20,103
1983	11,135	463	11,598
1984	17,983	325	18,308
1985	3,610	429	4,039
1986	9,913	811	10,724
1987	5,976	529	6,505
1988	10,715	254	10,969
1989	9,587	51	9,638
1990	12,439	0	12,439
1991	9,594	150	9,744
1992	11,932	521	12,453
1993	7,329	452	7,781
1994	13,752	299	14,051
1995	5,569	359	5,928
1996	13,004	539	13,543
1997	6,628	288	6,916
Average	9,859	358	10,217
87-97 Avg	9,684	313	9,997
Recent5yr	9,256	387	9,644

**Table 6.-Recreational harvest of chinook salmon by sport anglers in the NWMA averaged for 1977-1986 and annually for the period 1987-1997.**

Seward Peninsula/Norton Sound sub-area												
Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		72	0	38	20	0	0	19	0	91	79	149
Nome River			0	19	29	22	16	93	0	0	0	11
Pilgrim River			55	68	19	51	55	28	0	19	0	47
Unalakleet R.				49	276	296	117	382	379	259	176	609
Fish-Niukluk R.			0	0	0	14	0	9	10	18	10	77
Sinuk R.						0	0	9	0	0	0	0
Snake R.						7	8	9	0	0	0	0
Solomon R.						7	0	28	0	0	0	0
Other Streams			172	29	10	7	8	18	211	51	9	0
Lakes			0	0	0	0	0	0	0	0	0	0
Freshwater Total		543	182	165	334	404	204	576	600	347	195	744
Grand Total	365	615	182	203	354	404	204	595	600	438	274	893

Kotzebue/Chukchi Sea sub-area												
Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		0	0	0	0	0	0	0	0	0	0	0
Kobuk R.		95		0	0	0	8	0	0	0	0	0
Noatak R.		0		0	0	0	0	0	0	0	0	0
Other Streams		0	18	0	0	0	0	0	0	0	0	0
Lakes		0	0	0	0	0	0	0	0	0	0	0
Freshwater Total		95	18	0	0	0	0	0	0	0	0	0
Grand Total	7	95	18	0	0	0	0	0	0	0	0	0

**Table 7.-Recreational harvest of coho salmon by sport anglers in the NWMA averaged for 1977-1986 and annually for the period 1987-1997.**

Seward Peninsula/Norton sub-area												
Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		489	200	311	302	595	105	216	534	141	438	550
Nome River			1,291	1,233	384	417	713	602	308	143	616	322
Pilgrim River			218	204	81	310	57	191	134	113	136	0
Unalakleet R.				1,185	1,826	2,156	1,304	643	2,017	1,816	2,559	2,992
Fish-Niukluk R.			800	728	267	977	753	1,185	1,122	818	1,708	497
Sinuk R.					445	71	40	96	109	19	199	11
Snake R.						798	510	248	145	85	447	107
Solomon R.						83	316	420	217	38		
Other Streams			2,529	497	0	393	873	0	961	532	698	358
Lakes			0	0	0	0	0	182	0	0	0	0
Freshwater Total		1,830	4,838	3,847	3,003	5,205	4,566	3,567	5,013	3,564	6,363	4,287
Grand Total	2,627	2,319	5,038	4,158	3,305	5,800	4,671	3,783	5,547	3,705	6,801	4,837

Kotzebue/Chukchi Sea sub-area

Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		0	0	0	0	0	0	0	0	0	0	0
Kobuk R.		0		0	0	0	0	0	0	0	0	0
Noatak R.		11		0	0	0	0	0	0	0	0	0
Other Streams		0	0	0	0	0	0	9	0	0	0	0
Lakes		0	0	0	0	0	0	0	0	0	0	0
Freshwater Total		11	0	0	0	0	0	9	0	0	0	0
Grand Total	5	11	0	0	0	0	0	9	0	0	0	0

**Table 8.-Recreational harvest of chum salmon by sport anglers in the NWMA averaged for 1977-1986 and annually for the period 1987-1997.**

Seward Peninsula/Norton sub-area												
Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		0	0	204	109	0	0	37	7	0	11	39
Nome River			273	495	95	241	0	0	0	0	0	0
Pilgrim River			346	272	41	85	106	0	0	73	0	0
Unalakleet R.				68	298	497	349	116	183	178	133	228
Fish-Niukluk R.			127	107	216	272	15	489	119	0	151	0
Sinuk R.						47	0	0	0	0	0	0
Snake R.						93	0	0	7	0	0	0
Solomon R.						0	0	0	0	0	0	0
Other Streams		814	837	351	166	180	53	49	220	143	21	14
Lakes			0	0	0	0	0	0	0	0	0	0
Freshwater Total		814	1,583	1,293	816	1,415	523	654	529	394	305	242
Grand Total	1,512	814	1,583	1,497	925	1,415	523	691	536	394	316	281

Kotzebue/Chukchi Sea sub-area												
Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		11	0	0	0	0	84	185	0	0	0	0
Kobuk R.		53		10	0	27	15	128	0	138	141	61
Noatak R.		264		31	0	32	121	130	226	151	322	170
Other Streams		74	236	0	0	0	0	0	22	32	76	57
Lakes		0	0	0	0	0	0	0	0	0	0	0
Freshwater Total		391	236	41	0	59	136	258	248	321	539	288
Grand Total	261	402	236	41	0	59	220	443	248	321	539	288

**Table 9.-Recreational harvest of pink salmon by sport anglers in the NWMA averaged for 1977-1986 and annually for the period 1987-1997.**

Seward Peninsula/Norton sub-area												
Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		0	55	418	666	71	1,474	423	996	0	338	187
Nome River			528	1,573	2,637	356	4,397	723	3,293	230	3,165	90
Pilgrim River			36	301	208	81	55	0	154	0	48	0
Unalakleet R.				49	1,180	437	779	89	402	222	58	159
Fish-Niukluk R.			73	233	638	356	357	278	231	126	203	66
Sinuk R.						51	293	115	145	28	278	15
Snake R.						71	183	151	452	19	644	0
Solomon R.						173	192	259	171	87		
Other Streams		1,304	2,220	990	2,318	142	147	212	1,207	216	857	77
Lakes			0	0	0	0	0	0	0	0	0	0
Freshwater Total		1,304	2,857	3,146	6,981	1,667	6,403	1,827	6,055	928	5,253	407
Grand Total	5,732	1,304	2,912	3,564	7,647	1,738	7,877	2,250	7,051	928	5,591	594

Kotzebue/Chukchi Sea sub-area

Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		0	0	10	0	0	91	0	0	0	0	0
Kobuk R.		0	0	0	0	64	0	0	0	19	0	0
Noatak R.		0	0	0	0	9	202	0	0	19	0	0
Other Streams		0	0	0	0	18	0	0	51	0	0	0
Lakes		0	0	0	0	0	0	0	0	0	0	0
Freshwater Total		0	0	0	0	91	202	0	51	38	0	0
Grand Total	14	0	0	10	0	91	293	0	51	38	0	0

salmon killed, about 12% were chinook and 73% were coho. The average annual sport harvest of salmon of all species from the Unalakleet River from 1995 to 1997 has been about 3,100 fish. Coho comprised about 80% of the average harvest while chinook made up about 11% (Howe et al. 1995-1998).

The chinook salmon run usually begins in mid June and continues through early July. Anglers access the river by boat from the village of Unalakleet and are comprised of a mix of local residents, visitors who rent boats, and visitors who either stay at the Unalakleet Lodge or are guided by local resident guides. The 1997 harvest of about 600 chinook was the second highest on record, only the 1986 estimated harvest of 850 chinook was higher. Effort in 1997 for all species was about 5,400 angler days, also the second highest on record (Table 10).

Nine rivers accessible from the road system near Nome sustain some level of sport fishing effort for salmon. Estimated harvests from these rivers have averaged about 7,800 salmon annually, of which coho and pink salmon have comprised about 85%. The Nome River has sustained more sport fishing effort than any other single water body in northwestern Alaska because of its proximity to Nome and the adjacent road. Sport fishing on the Nome River has accounted for an annual average of 22% of all the fishing effort in the entire northwestern management area since 1983 (Table 11).

Chum salmon stocks in the Nome area are depressed, and an effort to restore these runs is ongoing. Salmon sport fisheries in northwestern Alaska are managed in cooperation with the Division of Commercial Fisheries. Subsistence uses are given priority and much of the commercial catch occurs prior to the time when sport fishing is at its peak in the rivers (marine sport fishing is negligible). Since the availability of salmon resources is limited and local chum salmon populations are depressed, particularly in the Nome area where sport fishing effort is greatest, the Nome area has most often required restrictive management measures.

In 1984 the BOF reduced the bag and possession limits in the Nome and Snake rivers to 15 salmon other than king salmon, only 5 of which could be chum and coho in combination, and in 1985 all but the lower two miles of the Nome River was closed to all sport fishing for salmon by emergency order.

In 1987, additional regulations were adopted in Seward Peninsula drainages (Cape Prince of Wales to Cape Darby) which reduced the bag and possession limit for salmon other than chinook to 10 per day, 10 in possession, only three of which could be chum or coho salmon in combination. The limit for chinook salmon was set at one per day and in possession.

The Nome River was closed in July 1990 to the taking chum salmon on sport fishing gear, and the following year, another emergency order closed Nome area waters to the retention of both chum and pink salmon. The area affected by this action was more widespread than in previous years and included all waters from the Sinuk River in the west to the Solomon River in the east.

Due to continued low escapements of chum salmon in Nome area streams, a proposal to close sport fishing for chum salmon in the rivers addressed in the 1991 emergency order was brought before the BOF and enacted into regulation. This regulation is intended to protect chum salmon stocks and will remain in effect until stocks recover and surpluses above the escapement goals are available for harvest by sport anglers.

**Table 10.-Recreational effort in angler days by sport anglers in the NWMA averaged for 1977-1986 and annually for the period 1987-1997.**

Seward Peninsula/Norton Sound sub-area												
	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		1,032	822	2,249	2,966	1,504	3,333	1,875	2,638	2,303	1,860	1,497
Nome River			5,639	6,569	6,609	4,609	6,306	3,562	4,953	3,044	4,030	2,431
Pilgrim River			4,729	1,645	1,627	3,085	1,184	1,017	808	1,239	1,304	1,047
Unalakleet R.				1,701	3,957	5,518	2,209	2,118	1,709	3,552	3,065	5,428
Fish-Niukluk R.			2,183	1,992	2,059	2,470	2,635	3,589	2,859	1,808	2,706	1,823
Sinuk R.						885	1,504	874	1,132	1,295	822	
Snake R.						2,384	2,379	1,468	880	1,968	1,686	584
Solomon R.						1,057	950	1,404	1,123	781		499
Other Streams		18,099	6,812	3,487	4,468	2,092	2,172	2,961	2,280	3,657	3,120	2,153
Lakes		2,282	93	49	113	18	12	82			44	31
Freshwater Total		20,381	19,456	15,443	18,833	22,118	19,351	17,055	16,284	17,344	16,777	14,023
Grand Total	12,937	21,413	20,278	17,692	21,799	23,622	22,684	18,930	18,922	19,647	18,637	15,520

Kotzebue/Chukchi Sea sub-area												
	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		933	31	479	100	1,434	388	616	449	685	703	152
Kobuk R.		4,864		1,465	1,306	2,206	1,526	2,015	919	2,846	1,705	887
Noatak R.		3,313		2,469	1,306	3,708	2,273	2,064	1,442	2,138	1,787	1,206
Other Streams		1,010	4,702	219	719	1,889	1,331	2,548	2,805	2,233	2,731	2,426
Lakes		101	546	300	351	306	627	584	421	593	837	101
Freshwater Total		9,288	5,248	4,453	3,682	8,109	5,757	7,193	5,587	7,810	7,060	4,620
Grand Total	5,588	10,221	5,279	4,932	3,782	9,543	6,145	7,809	6,036	8,495	7,763	4,772

**Table 11.-Subsistence harvests of Dolly Varden in the villages of Kivalina and Noatak, 1959-1997.**

Year	Kivalina		Noatak Number
	Number	Pounds	
1959 <sup>a</sup>	34,240	97,600	
1960 <sup>a</sup>	49,720	124,300	35,000 <sup>b</sup>
1962			27,623
1963			4,130
1964		93,995 <sup>c</sup>	
1965		28,140 <sup>c</sup>	
1968 <sup>c</sup>	49,512 <sup>e</sup>	120,214	
1969	64,970	152,750	32,350
1970	33,820	79,420	3,700
1971	29,281 <sup>e</sup>	68,518	5,320
1972	48,807 <sup>e</sup>	114,637	1,492
1979	14,600 <sup>e</sup>		
1980			9,060
1981	15-18,000 <sup>e</sup>		7,220 <sup>e</sup>
1982	18,438 <sup>d</sup>	69,059 <sup>c</sup>	3,056 <sup>e</sup>
1983	16,270 <sup>e</sup>	68,467 <sup>c</sup>	2,676 <sup>e</sup>
1984	12,000 <sup>e</sup>		4,545 <sup>e</sup>
1985	10,500 <sup>e</sup>		2,542 <sup>e</sup>
1986	7,436 <sup>e</sup>		
1991			4,814 <sup>e</sup>
1992			4,395 <sup>e</sup>
1993			4,275 <sup>e</sup>
1995			5,762 <sup>e</sup>
1996			5,031 <sup>e</sup>
1997	21,149 <sup>e</sup>		4,763 <sup>e</sup>

<sup>a</sup> Sarrio and Kessel 1966.

<sup>b</sup> Foote and Williamson 1966.

<sup>c</sup> Burch 1985.

<sup>d</sup> Braund and Burnham 1982.

<sup>e</sup> ADF&G survey data

Two emergency orders were issued addressing salmon in the Nome area in 1992. The first closed the Tubutulik and Kwiniuk rivers to sport fishing for chum salmon. The second, because of near record pink salmon runs, increased the bag and possession limits for pink salmon from 10 per day to 20 per day in Nome area streams.

### **Recent Board of Fisheries and Management Actions**

During the December 1997 meeting the BOF adopted two salmon regulation changes for the NWMA. The first established a uniform daily bag and possession limit for chinook salmon in the entire NWMA at one fish. This replaced a three fish (only one over 28") daily bag and possession except for the Unalakleet River where a one fish limit was already in place. Since the Unalakleet River has the strongest chinook run in the NWMA, having a more liberal limit in other parts of the area where chinook runs were small made little sense. The other change was for northern Norton Sound, which includes the streams accessible from the Nome Road system. The "other salmon" aggregate limit of 10 fish per day only three of which could be chum or coho was split out to provide separate daily bag and possession limits by species. The new limits were set at 10 pink, 3 coho, 3 chum, and 3 sockeye. The new regulation will provide for more precise management by species, and is less ambiguous for the inexperienced angler. Nome subdistrict streams still remain closed to fishing for chum salmon. The BOF also scheduled a special meeting in Nome for March 1998 to discuss the chum salmon situation in the Nome subdistrict.

### **Recent Fishery Performance**

Estimated effort in the NWMA from 1995-1997 was slightly lower than in recent prior years, while salmon harvests were near the average observed during recent past (Table 5). A strong pink salmon return to Norton Sound in 1996 accounted for a high catch and harvest of this species. A very weak run of coho in 1997 forced the emergency order closure of all northern Norton Sound streams to the retention of coho salmon. Commercial and subsistence fishing were also curtailed. A strong chinook run in the Unalakleet River and an increase in effort during 1997 resulted in a near record sport harvest of 600 fish, over three times that of the previous year (Table 6).

### **Current Issues**

Chum salmon stocks have steadily declined on the Seward Peninsula since the early 1980's, as evidenced by failure to achieve desired spawning escapements in many key streams where spawners are enumerated. This has created the need for increasingly restrictive sport, commercial and even subsistence fishing regulations. It is anticipated that until chum salmon populations recover, there will be a need to continue with very restrictive measures to protect local stocks. All rivers in northern Norton Sound from the Sinuk in the west to Topkok in the west are closed to fishing for chum salmon, and will remain closed until runs rebuild. In addition, restrictions to the sport harvest of coho salmon in the Nome area have been necessary during recent years. Increased effort is being directed at the enumeration of coho salmon escapements in Nome area streams through the cooperative funding of counting tower projects.

### **Ongoing Research and Management Activities**

A two-year research project was initiated on the Unalakleet in 1997. This project used radio telemetry to estimate the proportions of the chinook salmon escapement that spawn in the North River and the main Unalakleet River upstream from the North River. In 1997, 62.8% (SE=4%) of the radio tagged chinook spawned in the North River (Wuttig 1998). If a similar proportion are found to use the North River in 1998, then this relative proportion can be used to expand the

North River tower estimate to allow estimation of the escapement in the entire system. The sport fish staff frequently assist and cooperate informally with the Commercial Fisheries Division on projects, including the partial funding of counting towers from which spawning escapements are estimated, surveys for abundance, observation of spawning concentrations, and recommendation of potential egg take sites. Emergency orders restricting the harvest of salmon are usually coordinated with the Commercial Fisheries Division.

## **NORTHWESTERN ALASKA DOLLY VARDEN AND ARCTIC CHAR**

### **Fishery Description and Historical Perspective**

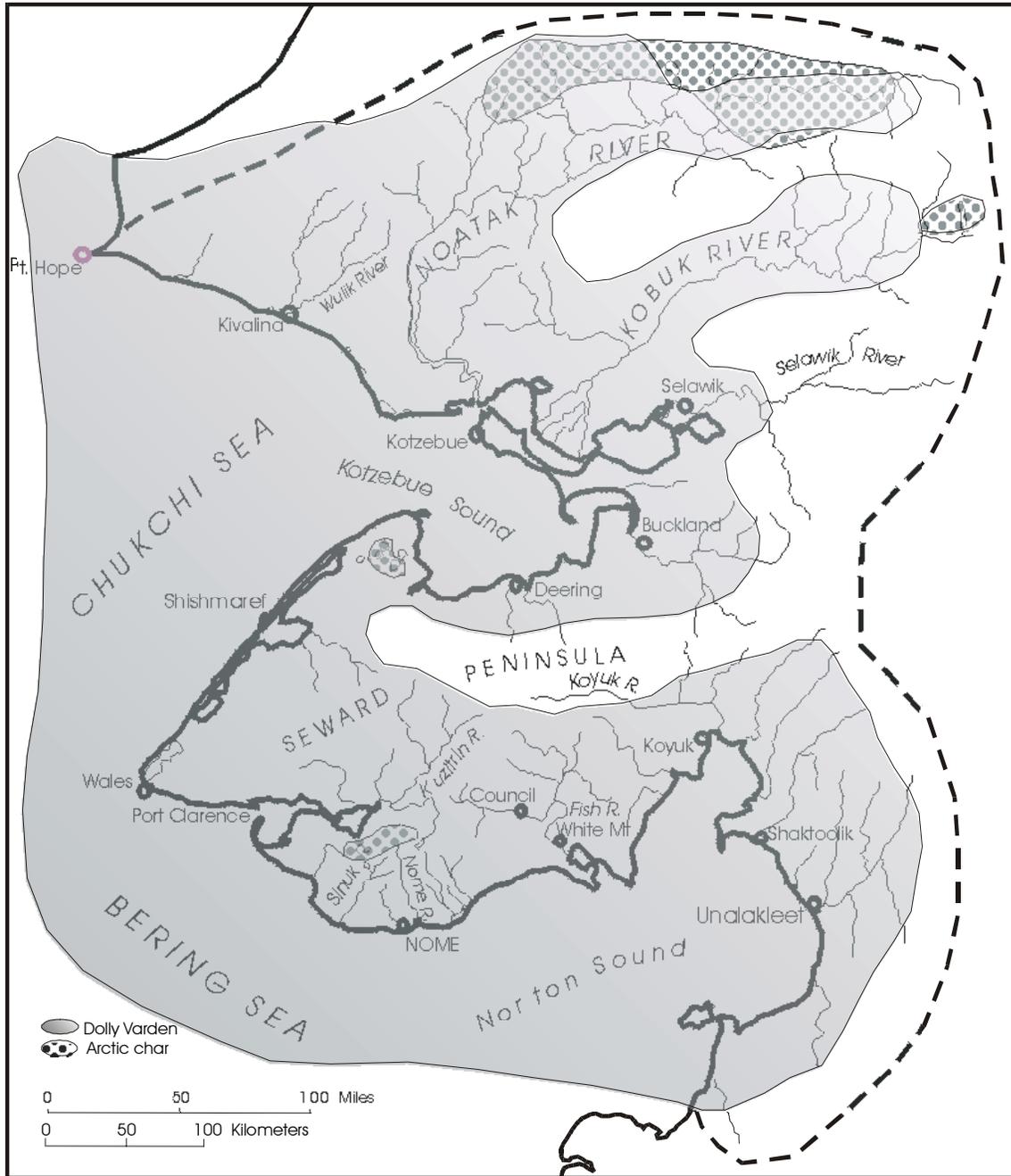
In the Northwestern Management Area, Arctic char occur in lakes in the Kigluaik Mountains and in some headwater lakes in the Kobuk and Noatak river drainages, while Dolly Varden are common inhabitants of most coastal streams and large rivers (Figure 9). Although the Department groups Dolly Varden and Arctic char for bag limits and record keeping, the two species are separate and Arctic char distribution is very limited in the NWMA and the vast majority of fisheries are directed toward Dolly Varden.

Many northwestern Alaska residents maintain a traditional lifestyle, and are dependent to some degree on locally harvested fish resources. Dolly Varden comprise an important part of this traditional harvest, and in Kivalina they outrank salmon and whitefish in importance to subsistence economy. The number of Dolly Varden harvested for subsistence purposes in northwestern Alaska vastly exceeds the number taken by sport anglers. Intermittent community subsistence harvest estimates dating to 1959 for Kivalina and Noatak (Table 12) and personal observation of the area biologist suggest that 15,000 to 25,000 Dolly Varden are harvested annually in this area. The actual magnitude of the annual harvests throughout the NWMA is not known. Fish are captured with gill nets or beach seines during open water periods, and with gill nets or with hook and line during winter. Dolly Varden are also an important subsistence resource in Norton Sound, however their relative importance is minor that of salmon.

Observations and aerial surveys suggest that Dolly Varden spawner abundance is low in most rivers, however, spawning occurs in almost all drainages of Norton Sound, some northern Seward Peninsula rivers, and the major drainages of Kotzebue Sound and the Chukchi Sea. Aerial surveys of spawning Dolly Varden conducted during the mid 1980's indicated that about 12,000-15,000 spawn annually in the Noatak drainage (DeCicco 1985). Total abundance of spawning Dolly Varden in northwestern Alaska is unknown.

Drainages of Kotzebue Sound and the Chukchi Sea are known for the large size of anadromous Dolly Varden available to the sport angler. Since the inception of ADF&G's Trophy Fish Program in 1967, out of 166 qualifying fish in the Dolly Varden/Arctic char category, 90 (54%) have come from the NWMA, and in the past 10 years (1987-1996) 73 out of 93 (78%) have come from northwestern Alaska. In addition, the current Alaska sport fish angling record for Arctic char/Dolly Varden (19 lbs. 12 oz.) is a Dolly Varden taken from the Noatak River in 1991.

During summer, spawning Dolly Varden are targeted in some northwestern Alaskan streams, however, most sport fisheries for char target overwintering populations of Dolly Varden either in the fall as they enter freshwater from the sea, or in the spring as they move toward the sea for feeding. Since overwintering populations are comprised of mixed stocks, potentially from a



**Figure 9.-Distribution of Dolly Varden and Arctic char in the Northwestern Management area.**

**Table 12.-Sport fishing effort, harvests and catches of Dolly Varden in the sub-areas of the NWMA 1977-1997.**

Year	Seward Peninsula/Norton Sound					Kotzebue/Chukchi Sea				
	Number of Anglers	Effort Angler Days	Dolly Varden Harvest	Dolly Varden Catch	Percent Harvest	Number of Anglers	Effort Angler Days	Dolly Varden Harvest	Dolly Varden Catch	Percent Harvest
1977		7,828	1,621				3,487	469		
1978		8,379	1,690				4,997	199		
1979		8,725					2,593	1,772		
1980		7,958	5,811				3,841	301		
1981		10,879	3,981				5,284	1,177		
1982		13,198	6,498				6,906	1,531		
1983		16,944	9,779				7,963	2,192		
1984	1,597	17,436	4,260			696	7,791	3,804		
1985	2,854	19,919	5,695			1,788	6,701	1,557		
1986	2,872	18,107	5,381			1,570	6,313	1,300		
1987	2,528	20,413	5,506			2,090	9,288	1,072		
1988	2,661	20,278	4,437			959	5,279	983		
1989	2,560	17,692	7,003			1,028	4,932	999		
1990	2,686	21,799	3,765	9,118	41	991	3,782	806	3,747	22
1991	3,236	23,622	10,365	25,425	41	1,606	9,543	1,149	1,658	69
1992	3,540	22,684	2,382	6,012	40	1,421	6,145	582	7,054	8
1993	3,134	18,930	5,907	22,166	27	1,575	7,809	914	7,190	13
1994	3,016	18,922	3,071	7,344	42	1,100	6,036	2,365	10,733	22
1995	3,719	19,647	2,908	7,921	37	1,957	8,495	939	7,804	12
1996	3,308	18,637	3,672	7,150	51	1,501	7,763	528	3,075	17
1997	2,936	15,520	2,711	8,968	30	864	4,772	480	3,782	13
Average	2,903	16,548	5,003	12,998	38	1,398	6,177	1,269	6,364	20
87-97 Avg	3,029	19,831	4,702	11,763	40	1,372	6,713	983	5,630	17
Recent 5Yr	3,223	18,331	3,654	10,710	34	1,399	6,975	1,045	6,517	16

wide geographic area, harvests in the few rivers with good angler access have been sustainable. In some streams along the Nome road system, if such harvests were directed towards a single stock they would likely not be sustainable. Movements of Norton Sound Dolly Varden are tied to those of salmon, and Dolly Varden are present in streams during late summer to feed on salmon eggs during years of high pink salmon abundance. They are also likely to remain in streams during the spring following a large pink salmon run in order to feed on outmigrating fry. The timing of the fall movement of Dolly Varden into Seward Peninsula streams has varied widely over the past 10 years resulting in annual changes in the availability of Dolly Varden to the fall fishery. Consequently, fisheries in this area follow these patterns of availability. In 1988, the BOF adopted the bag limit of 10 Dolly Varden/Arctic char per day with 10 in possession with exceptions for the Noatak, Wulik and Kivalina Rivers where only two of the 10 fish could be over 20 inches in length.

### **Recent Board of Fisheries and Management Actions**

Population assessments conducted on the Nome and Solomon rivers in 1991 and 1992 suggested that the number of fish overwintering in these drainages could not sustain recent harvest levels. Consequently, the daily bag limit was reduced by emergency order to two fish. Subsequent studies showed that these populations were comprised of mixed stocks and that at least 20% of the fish overwintering in a given river could be expected to overwinter in another river the next year (DeCicco 1992b, 1993b). Tag recoveries showed that fish range over a wide geographic area. Since exploitation occurs primarily on mixed stocks in only a few locations and many of the represented stocks sustain no other exploitation, harvest levels were thought to be sustainable. Long-term harvest data support this assumption and the reduced bag limit was rescinded. In the November 1994 meeting, the BOF adopted regulations that created a 10 fish with only two over 20 inches daily bag and possession limit for Dolly Varden/Arctic char in flowing and marine waters for the entire AYK Region. A separate daily bag limit of two fish (no size limit) was also created for lakes. The effects of these new bag limits are to have a fairly liberal limit for resident and migratory Dolly Varden which protects spawning sized fish, while maintaining a conservative limit for lake resident Arctic char without requiring anglers to differentiate between the two species.

### **Recent Fishery Performance**

Estimated harvests of Dolly Varden by sport anglers in the Seward Peninsula/Norton Sound sub-area have averaged about 5,000 fish over the past 20 years (Table 13). In the Kotzebue/Chukchi Sea sub-area, sport harvests have averaged 1,200 Dolly Varden annually. During the past five years, the harvests have averaged 3,650 and 1,050 respectively. Estimated mean annual catch (which includes fish that are kept and those released) since 1990 has been 10,700 Dolly Varden in the Seward Peninsula/Norton Sound area, and 6,500 in the Kotzebue/Chukchi Sea area. The data suggest that about 65% of all Dolly Varden captured in the Seward Peninsula/Norton Sound area are released while about 84% in the Kotzebue area are released. The higher harvest rate in the Seward Peninsula/Norton Sound area is likely because local residents have good road access to fishing areas where fish taken on rod and reel are used for food. In the Kotzebue area, fishing sites are accessed by air and much of the effort is from outside the local area by anglers seeking a quality fishing experience. While effort levels in both the Seward Peninsula/Norton Sound area and the Kotzebue area were slightly lower in 1997, the catches of Dolly Varden were up from 1996. The catch of Dolly Varden per angler day has averaged much higher in the Kotzebue area

**Table 13.-Recreational harvest of Dolly Varden by sport anglers in the NWMA averaged for 1977-1986 and annually for the period 1987-1997.**

Seward Peninsula/Norton sub-area												
Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		0	55	418	666	71	1,474	423	996	0	338	187
Nome River			528	1,573	2,637	356	4,397	723	3,293	230	3,165	90
Pilgrim River			36	301	208	81	55	0	154	0	48	0
Unalakleet R.				49	1,180	437	779	89	402	222	58	159
Fish-Niukluk R.			73	233	638	356	357	278	231	126	203	66
Sinuk R.						51	293	115	145	28	278	15
Snake R.						71	183	151	452	19	644	0
Solomon R.						173	192	259	171	87		
Other Streams		1,304	2,220	990	2,318	142	147	212	1,207	216	857	77
Lakes			0	0	0	0	0	0	0	0	0	0
Freshwater Total		1,304	2,857	3,146	6,981	1,667	6,403	1,827	6,055	928	5,253	407
Grand Total	5,732	1,304	2,912	3,564	7,647	1,738	7,877	2,250	7,051	928	5,591	594

Kotzebue/Chukchi Sea sub-area												
Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		0	0	10	0	0	91	0	0	0	0	0
Kobuk R.		0	0	0	0	64	0	0	0	19	0	0
Noatak R.		0	0	0	0	9	202	0	0	19	0	0
Other Streams		0	0	0	0	18	0	0	51	0	0	0
Lakes		0	0	0	0	0	0	0	0	0	0	0
Freshwater Total		0	0	0	0	91	202	0	51	38	0	0
Grand Total	14	0	0	10	0	91	293	0	51	38	0	0

than in the Seward Peninsula area. This is likely because much of the effort on the Seward Peninsula is directed at salmon while most of the Kotzebue area effort is directed at Dolly Varden. Historical harvests by river are provided in Table 14.

### **Current Issues**

With over 100,000 anadromous Dolly Varden overwintering annually, the Wulik River is probably the most important Dolly Varden stream in northwestern Alaska (Table 15). Fish from this river are very important as a subsistence food to the residents of Kivalina who harvest 15,000 to 20,000 annually. The Red Dog Mine is located in the headwaters of this drainage and poses a potential threat to these fish and the water quality of the river. Water quality near the mine is systematically monitored and except for a pollution event in 1989-1990, the mine has operated in an environmentally sensitive manner. A monitoring program run by the Division of Habitat is in place to track heavy metals concentrations receiving water and in fish tissues. Fish are sampled in the spring and the fall each year on a continuing basis in cooperation with the Division of Habitat. A recent development has been the identification of selenium in high concentration. Potential effects and treatment methods are currently being researched by the Division of Habitat and mine personnel.

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

### **Ongoing Research and Management Activities**

ADF&G began an effort to assess Dolly Varden populations in waters of the Seward Peninsula in 1991. Abundances and size compositions have been estimated for Dolly Varden overwintering in the Nome River in 1991 and 1992, and in the Solomon River in 1991. In addition, the movement of marked fish from the Nome River in 1991 to other rivers in 1992 was estimated (DeCicco 1993b). These data in combination with harvest estimates and observed changes in abundances have been used to guide ADF&G management activities in exploited waters. It has been learned that Dolly Varden which overwinter in a particular stream may overwinter in other streams during other years. Hence, a restrictive bag limit in one stream does not necessarily protect a single stock because fish range widely and stocks mix over a broad geographic area. Periodic assessment of Dolly Varden populations will continue.

Studies in the Kotzebue area have continued intermittently since 1967, but in recent years have been limited to counting spawning Dolly Varden in Noatak River tributary streams with the assistance of the National Park Service (NPS), and to counting Dolly Varden overwintering in the Wulik River with the assistance of the Habitat Division of ADF&G. Data on the abundance of Dolly Varden spawning in the Noatak River system and overwintering in the Wulik River will continue to be collected in cooperation with the NPS and the Habitat Division.

**Table 14.-Aerial survey counts of Dolly Varden spawners in the Noatak River drainage and nonspawners overwintering in the Wulik River 1968-1997.**

Year	Spawners	Nonspawners	
	Noatak River <sup>a</sup>	Wulik River	Kivalina River
1968		90,286	27,640
1969		297,257	
1976		68,300	12,600
1979		55,030	15,744
1980		113,553	39,692
1981	7,922	101,826	45,355
1982	8,275	65,581	10,932
1984	9,130	30,923	5,474
1985	10,979		
1986		5,590	5,030
1988		80,000	
1989		56,384	
1990	7,261		
1991	9,605	126,985	35,275
1992		135,135	
1993	9,560	144,138	16,534
1994		66,752	
1995	6,500	128,705	28,870
1996	12,184	61,005	
1997		95,412	

<sup>a</sup> Total counts from Kelly, Kugururok, Nimiuktuk and Eli rivers.

**Table 15.-Sport fishing effort, harvests and catches of Arctic grayling in the sub areas of NWMA 1977-1997.**

Year	Seward Peninsula/Norton Sound					Kotzebue/Chukchi Sea				
	Number of Anglers	Effort Angler Days	Arctic Grayling Harvest	Arctic Grayling Catch	Percent Harvest	Number of Anglers	Effort Angler Days	Arctic Grayling Harvest	Arctic Grayling Catch	Percent Harvest
1977		7,828	1,607				3,487	1,407		
1978		8,379	1,455				4,997	1,997		
1979		8,725					2,593	2,145		
1980		7,958	1,635				3,841	1,790		
1981		10,879	2,104				5,284	5,346		
1982		13,198	6,225				6,906	3,421		
1983		16,944	8,241				7,963	4,715		
1984	1,597	17,436	2,349			696	7,791	2,753		
1985	2,854	19,919	4,501			1,788	6,701	2,943		
1986	2,872	18,107	4,042			1,570	6,313	5,121		
1987	2,528	20,413	4,600			2,090	9,288	2,121		
1988	2,661	20,278	4,873			959	5,279	2,692		
1989	2,560	17,692	4,205			1,028	4,932	1,415		
1990	2,686	21,799	1,378	6,119	23	991	3,782	622	3,328	19
1991	3,236	23,622	5,121	23,160	22	1,606	9,543	1,981	5,375	37
1992	3,540	22,684	492	5,774	9	1,421	6,145	968	4,991	19
1993	3,134	18,930	1,584	13,223	12	1,575	7,809	916	7,228	13
1994	3,016	18,922	1,331	7,081	19	1,100	6,036	814	5,472	15
1995	3,719	19,647	1,037	5,788	18	1,957	8,495	910	15,741	6
1996	3,208	18,637	1,192	6,342	19	1,501	7,763	1,934	10,702	18
1997	2,936	15,520	802	17,421	5	864	4,772	747	5,202	14
Average	2,896	16,548	2,939	10,614		1,368	6,177	2,227	7,255	
87-97 Avg	3,020	19,831	2,420	10,614		1,372	6,713	1,375	7,255	
Recent 5 Yr	3,203	18,331	1,189	9,971		1,399	6,975	1,064	8,869	

## **NORTHWESTERN ALASKA ARCTIC GRAYLING**

### **Fishery Description and Historical Perspective**

Arctic grayling are the most numerous species harvested in the Kotzebue/Chukchi Sea sub-area and the third or fourth most commonly harvested species in the Seward Peninsula/Norton Sound sub-area. In general, the sport fisheries for grayling in the northwestern area are small with average estimated annual harvests of 2,900 in the Seward Peninsula/Norton Sound sub-area and 2,200 in the Kotzebue/Chukchi Sea sub-area (Table 16). Average harvests have declined to about 1,200 fish and 1,100 fish for these areas over the past five years.

The Seward Peninsula has long been known for its production of large sized Arctic grayling with approximately 25% of all trophy grayling registered with the department's trophy fish program coming from this area. However, most populations are quite small and since they are resident in separate, often small streams, they must be managed as independent units with regulations tailored to the individual populations or groups of similarly structured populations.

Since 1989, the stock status of grayling populations in several rivers where sport fishing occurs on the Seward Peninsula has been investigated (DeCicco 1990, 1991, 1992a, 1993a, 1994-1997). The Nome River stock was found to be overexploited, while the Niukluk, Fish, Pilgrim, Snake and Sinuk rivers populations are believed to be sustaining current levels of harvest. The Solomon River was found to have a very small Arctic grayling population.

Except for the Niukluk River which had about 375 grayling per mile in 1991, Arctic grayling densities in Seward Peninsula rivers are low. They ranged from about 40 to 60 grayling per mile in the Nome and Sinuk rivers, to about 200 grayling per mile in the Fish and Pilgrim rivers. In contrast, interior Alaskan populations often exceed 500 fish per mile. Average size of grayling from Seward Peninsula rivers is generally large and they are generally older and larger when they first spawn than grayling in Interior Alaska streams. Since they can live many years, some 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 almost 19 inches. However, the density of fish was low, approaching that of the Nome River which has been the most heavily fished stream in the area.

Populations of grayling in the Kotzebue area are inaccessible by road and are in most cases, lightly exploited. Grayling occur in almost all streams of the area, and in many of the lakes as well. Most grayling in this area are captured in association with wilderness float trips or as an alternate species in trips directed toward Dolly Varden or sheefish. Over the past five years the estimated harvest rates have been about 13% of those captured.

Prior to 1988, the daily bag limit for Arctic grayling in the NWMA was 15 with only two over 20 inches in aggregate with trout and char with a possession limit of two daily bags. In 1988, the BOF established a separate daily bag and possession limit for Arctic grayling in Northern Norton Sound of 5 per day, with only one over 15 inches. The effect of this change is reflected in harvest estimates which averaged about 4,300 grayling annually from 1980-1988, and about 1,400 from 1989-1997. It is anticipated that measurable effects of this regulatory change may be found in future population abundances when compared to abundance estimates from the early 1990's.

**Table 16.-Recreational harvest of Arctic grayling by sport anglers in the NWMA averaged for 1977-1986 and annually for the period 1987-1997.**

Seward Peninsula/Norton Sound sub-area												
Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		0	55	0	0	0	0	0	131	0	0	0
Nome River			891	2,032	33	186	0	0	16	0	0	0
Pilgrim River			109	516	415	445	91	75	49	52	56	59
Unalakleet R.				142	99	1,708	98	131	353	291	376	157
Fish-Niukluk R.			1,237	748	415	1,320	128	585	506	404	187	346
Sinuk R.						129	0	37	8	18	68	
Snake R.						402	16	467	32	18	94	0
Solomon R.						158	0	0	0	0		0
Other Streams		4,600	2,636	767	416	773	159	289	236	254	411	240
Lakes			0	0	0	0	0	0	0	0	0	0
Freshwater Total		4,600	4,873	4,205	1,378	5,121	492	1,584	1,200	1,037	1,192	802
Grand Total	3,573	4,600	4,928	4,205	1,378	5,121	492	1,584	1,331	1,037	1,192	802

Kotzebue/Chukchi Sea sub-area												
Areas	1977-86	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Salt Water		0	0	0	0	0	0	0	10	0	0	0
Kobuk R.		401		268	67	446	255	305	178	383	468	149
Noatak R.		1,087		912	269	817	105	322	407	185	641	439
Other Streams		612	2,674	150	286	631	248	234	186	263	731	159
Lakes		21	18	85	0	87	360	55	33	79	94	0
Freshwater Total		2,121	2,692	1,415	622	1,981	968	916	804	910	1,934	747
Grand Total	3,163	2,121	2,692	1,415	622	1,981	968	916	814	910	1,934	747

### **Recent Board of Fisheries and Management Actions**

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

### **Recent Fishery Performance**

Estimated harvests of Arctic grayling by sport anglers in the Seward Peninsula/Norton Sound area have been declining since a high of 5,121 reached in 1991. Since then harvests have averaged a little over 1,000 per year. Estimated harvests have trended slightly downward over the past five years of record, from about 1,600 in 1993 to about 800 in 1997 while the estimated catch more than doubled between 1996 and 1997 (Table 16). It appears that catch and release practices are increasing in these grayling fisheries. The percentage of captured grayling that were harvested averaged about 17% from 1993 through 1996 and dropped to about 5% in 1997. Historic harvests by river are provided in Table 17.

Current exploitation rates on most northwestern Alaska grayling populations are unknown, but since most are in remote areas, exploitation is believed to be light. Some estimates of exploitation in Nome area roadside streams are available by combining harvest data with abundance data. Using these data for years with abundance estimates, exploitation rates of Arctic grayling have been estimated to range from 10 to 20% in these streams.

In the Kotzebue/Chukchi Sea area, harvests over the past five-year have remained stable between 750 and 900 fish annually with the exception of 1996 when almost 2,000 Arctic grayling were harvested. Catches over the same period have ranged quite widely from about 16,000 in 1995 to about 5,000 in 1997. The percentage of catch harvested has ranged from about 37% in 1992 to 6% in 1995. It has been about 16% during each of the past two years. Most grayling from this area are harvested in association with float trips or for variety while fishing for other species. It is likely that harvests will remain stable until participation in this area increases significantly.

### **Current Issues**

There is concern on the part of the public and ADF&G staff that populations of grayling in the vicinity of Nome that are road accessible, especially the Nome and Solomon rivers, have been over harvested and may not recover for many years. The Nome River population showed no increase over the past five years. A restoration project may be planned for this population. Other road accessible populations would be vulnerable to overexploitation if fishing practices and motivations were to change, however, at this time populations appear to be healthy.

### **Ongoing Research and Management Activities**

ADF&G began an ongoing active effort to assess Arctic grayling populations in waters of the Seward Peninsula in 1989. Abundance and age and size compositions have been estimated for Arctic grayling in the Fish, Niukluk, Nome, Pilgrim, Snake and Sinuk rivers. These data in combination with harvest estimates and observed changes in abundance or size or age

**Table 17.-Sport fishing effort, harvests and catches of sheefish in the NWMA 1977-1997.**

Kotzebue/Chukchi Sea sub-area					
Year	Number of Anglers	Effort Angler Days	Sheefish Harvest	Sheefish Catch	Percent Harvest
1977 <sup>a</sup>		3,487	656		
1978		4,997	506		
1979		2,593	709		
1980		3,841	1,713		
1981		5,284	1,263		
1982		6,906	2,222		
1983		7,963	2,079		
1984	696	7,791	3,050		
1985	1,788	6,701	1,645		
1986	1,570	6,313	3,363		
1987	2,090	9,288	1,836		
1988	959	5,279	964		
1989	1,028	4,932	629		
1990	991	3,782	151	403	37
1991	1,606	9,543	603	1,616	37
1992	1,421	6,145	1,904	3,678	52
1993	1,575	7,809	1,029	2,273	45
1994	1,100	6,036	564	958	59
1995 <sup>b</sup>	1,957	8,495	1,142	3,270	35
1996	1,501	7,763	362	1,458	25
1997	864	4,772	992	1,931	51
Average	1,368	6,177	1,304	1,948	
87-97 Avg	1,372	6,713	925	1,948	
Recent 5yr	1,399	6,975	818	1,978	

<sup>a</sup> Mills 1978-1994.

<sup>b</sup> Howe et al. 1995-1998

compositions have been used to guide ADF&G management activities. Special regulations in some streams and the closure of both the Solomon and Nome Rivers to grayling have resulted. An assessment of the Nome River grayling population in 1997 found that it has not recovered even with five years of closure to sport fishing. A restoration project is planned in which young of the year Arctic grayling will be captured and transported to a gravel pit where it is hoped that they will survive the winter. The following spring, they will be captured, marked and moved back to the river. If a trial experiment is successful, this activity will be conducted on a larger scale in the future in the hope of establishing a dominate year class or two. Since Arctic grayling in this area are long lived, one or two strong year classes should carry the population for many years, and may stabilize the population at a higher abundance level. Periodic assessment of grayling populations will be continued on a rotating basis so changes in stock status can be tracked and chances of a stock being overexploited can be minimized. In the next two years assessments are planned for the Niukluk River and the Fish River.

## **KOTZEBUE SOUND SHEEFISH**

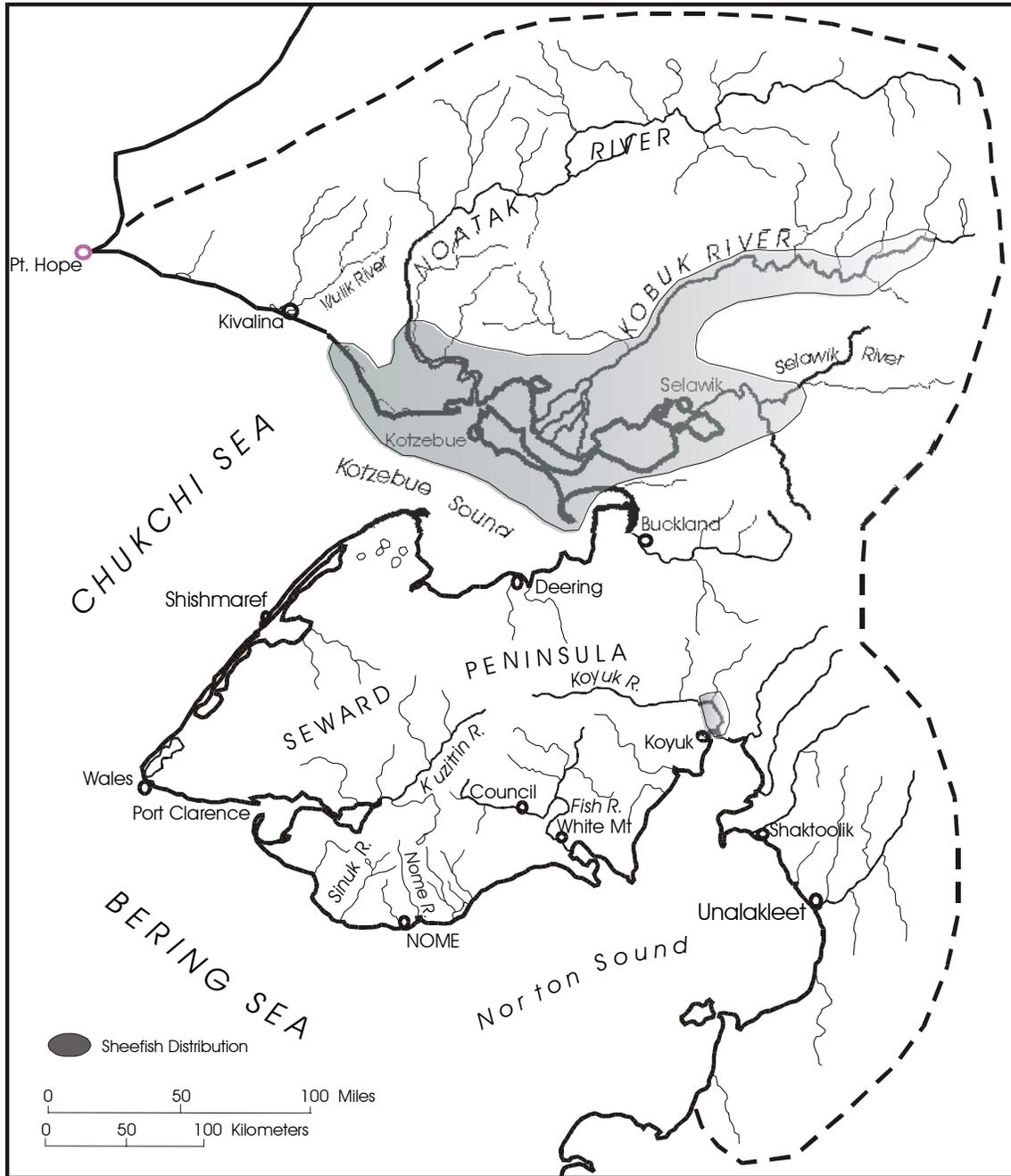
### **Fishery Description and Historical Perspective**

Within the NWMA, except for a small population of sheefish that resides in the Koyuk River of Norton Bay, spawning stocks of sheefish occur only in the Kobuk and Selawik rivers (Alt 1975).

The drainages of Kotzebue Sound are known for the large size of sheefish which are available to the sport angler. These are high quality sport fisheries in remote locations, and are considered by many some to be one of the "crown jewels" of Alaskan fishing. Since the inception of ADF&G's Trophy Fish Program in 1967, all but one of the qualifying sheefish have come from the Kobuk River.

Kotzebue Sound sheefish are distributed throughout the near shore estuarine areas of Kotzebue Sound. The major concentration is in Hotham Inlet but a few fish occur in the Sheshalik and Krusenstern areas as well as in southern Kotzebue Sound, especially in summer (Figure 10). Nearly all sheefish occupying the estuarine environment during summer are immature, while adult prespawning fish move upstream on the Kobuk and Selawik rivers to spawn just before freeze-up in the fall. The largest (27,000 to 43,000) and most utilized stock spawns in the upper Kobuk River, upstream from the village of Kobuk, with the greatest observed concentration between the Maneluk River and the Selby River. After spawning is complete in late September, fish disperse to downstream overwintering areas.

Sport fisheries for sheefish are managed by the Division of Sport Fish of ADF&G. Subsistence fisheries are given priority. The commercial fishery and much of the subsistence harvest takes place through the ice while sport fisheries are mainly summer and fall activities. The same population(s) contribute to all harvests. The annual commercial sales of sheefish in Kotzebue have ranged from 200 to 850 fish since 1991 (Brennan et al 1998). The magnitude of the subsistence harvest in the villages of the Kobuk River was estimated at about 7,000 in 1996 (Georgette and Utermohle 1998) and about 10,000 in 1997 (Brennan et al 1998). Since subsistence practices have not changed appreciably in recent years, it is likely that Kobuk River subsistence harvests have been relatively stable at, or near, these levels. Winter harvests from the fishery near Kotzebue were estimated at about 15,000 in 1995-1996, and about 14,000 in 1996-1997 (Taube 1997, 1998).



**Figure 10.-Sheefish distribution in the Northwestern Management Area.**

The Sport Fish Division of ADF&G 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 some familiarization work in 1994, ADF&G Division of Sport Fish in cooperation with the National Park Service (NPS), began a project in to estimate the abundance of sheefish spawning in the Kobuk River. This project continued through 1997 and established base line estimates on spawner abundance, age, size and sex composition of the spawning population. Estimates of spawner abundance for the three years of study were 32,000, 43,000 and 27,000 respectively. Tag recovery data indicated that, although some sheefish were capable of spawning in consecutive years, most spawned every other year. The abundance of sheefish spawning in the Selawik River was estimated at 5,200 and 5,300 in 1995 and 1996 by the U. S. Fish and Wildlife Service (Underwood et al. 1998).

Most sheefish sport fishing effort occurs on the Kobuk River spawning population. Most of the area-wide subsistence harvest and the entire commercial harvest of sheefish occurs on the entire (spawners and nonspawners) population. When taken in isolation, recent sport harvests of about 800 fish annually are easily sustainable. Although spawner abundances have recently been estimated, the total size of the area wide population is not known, and the sport harvest must be viewed in relation to other ongoing harvests. It was always assumed that subsistence harvests are much greater than either commercial or sport harvests, and recent data support this assumption. In order to ensure sustained yields from this population(s), a management approach involving the subsistence and commercial fisheries for sheefish is recommended.

### **Recent Board of Fisheries and Management Actions**

During 1988, the Board of Fisheries adopted the current regulations for sheefish in the waters of northwestern Alaska: 10 fish per day and 10 in possession, with an exception for the Kobuk River upstream of the Mauneluk River where only two sheefish may be caught per day or possessed. ADF&G believes that these regulations are sufficient to allow ample opportunity for sport fishing yet keep harvests within what is thought to be a sustainable level. The 10 fish limit in the lower Kobuk River and the remainder of the management area is liberal enough to allow local fishermen who choose to catch sheefish on sport fishing tackle the opportunity to take sheefish without the need to fish with nets. There have been no recent BOF or management actions regarding sheefish in the NWMA.

### **Recent Fishery Performance**

Estimated harvests of sheefish by sport anglers in northwestern Alaska have fluctuated from a high of about 1,900 in 1992 to a low of about 360 in 1996 with an average annual harvest of about 1,300 fish over the past 21 years (Table 18). The most recent five year average harvest has been about 800 sheefish. In addition to harvests, catches have been estimated through the SWHS since 1990. Estimates of sheefish catch (which includes fish that are kept and those released) for the past five years was about 2,000 fish, indicating that about 60% of all sheefish captured in northwestern Alaska by sport anglers are released. In a 1997 hook and release study, the mortality of sheefish 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).

### **Current Issues**

Local 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

**Table 18.-Sport fishing effort, harvests and catches of northern pike in the sub-areas of the NWMA 1977-1997<sup>a</sup>.**

Year	Seward Peninsula/ Norton Sound Sub-area					Kotzebue/Chukchi Sea Sub-area				
	Number Of Anglers	Effort Angler Days	Northern Pike		Percent Harvest	Number of Anglers	Effort Angler Days	Northern Pike		Percent Harvest
			Harvest	Catch				Harvest	Catch	
1977		7,828	302			3,487	147			
1978		8,379	389			4,997	389			
1979		8,725				2,593	527			
1980		7,958	284			3,841	852			
1981		10,879	303			5,284	465			
1982		13,198	210			6,906	454			
1983		16,944	798			7,963	1,262			
1984	1,597	17,436	208		696	7,791	312			
1985	2,854	19,919	56		1,788	6,701	383			
1986	2,872	18,107	699		1,570	6,313	2,752			
1987	2,528	20,413	906		2,090	9,288	813			
1988	2,661	20,278	564		959	5,279	1,565			
1989	2,560	17,692	648		1,028	4,932	64			
1990	2,686	21,799	1,957	4,145	47	991	3,782	320	1,730	18
1991	3,236	23,622	1,429	4,257	34	1,606	9,543	394	1,879	21
1992	3,540	22,684	479	3,742	13	1,421	6,145	333	1,666	20
1993	3,134	18,930	537	2,117	25	1,575	7,809	559	2,209	25
1994	3,016	18,922	376	1,731	22	1,100	6,036	287	1,488	19
1995	3,719	19,647	215	1,856	12	1,957	8,495	256	1,421	18
1996	3,208	18,637	410	1,747	23	1,501	7,763	82	816	10
1997	2,936	15,520	386	709	54	864	4,772	160	507	32
Average <sup>a</sup>	2,896	16,548	558	2,538		1,368	6,177	589	1,465	
87-97 Avg	3,020	19,831	719	2,538		1,372	6,713	439	1,465	
Recent 5yr <sup>b</sup>	3,203	18,331	385	1,632		1,399	6,975	269	1,288	

<sup>a</sup> Mills 1977-1994; Howe et al. 1995-1997.

<sup>b</sup> 1993 – 1997.

and release fishing is considered by some local residents to be disrespectful and damaging to the fish, and the discarding of filleted carcasses in the water is thought to drive other sheefish away from the area. The ADF&G Division of Subsistence investigated local concerns in the upper Kobuk River in 1986 and determined that some concerns could be addressed if sport fishers were more aware of local customs and culture. Catch and release fishing is viewed as a conservation tool by ADF&G and by many anglers and although Sheefish are very sensitive to rough handling, the Department believes that if handled gently, they can be released without significant mortality. The recent mortality study supports this position, however, an educational brochure explaining proper hook and release techniques for sheefish is being planned in association with the NPS.

### **Ongoing Research and Management Activities**

The department believes that recent research conducted cooperatively with the USFWS and the NPS has provided substantial background data on spawner abundance for the two stocks comprising the Kobuk-Selawik sheefish population. These data will be used as a base line to which future population assessments can be compared. Current sport fish harvests are not thought to be affecting the sustained yields of this species.

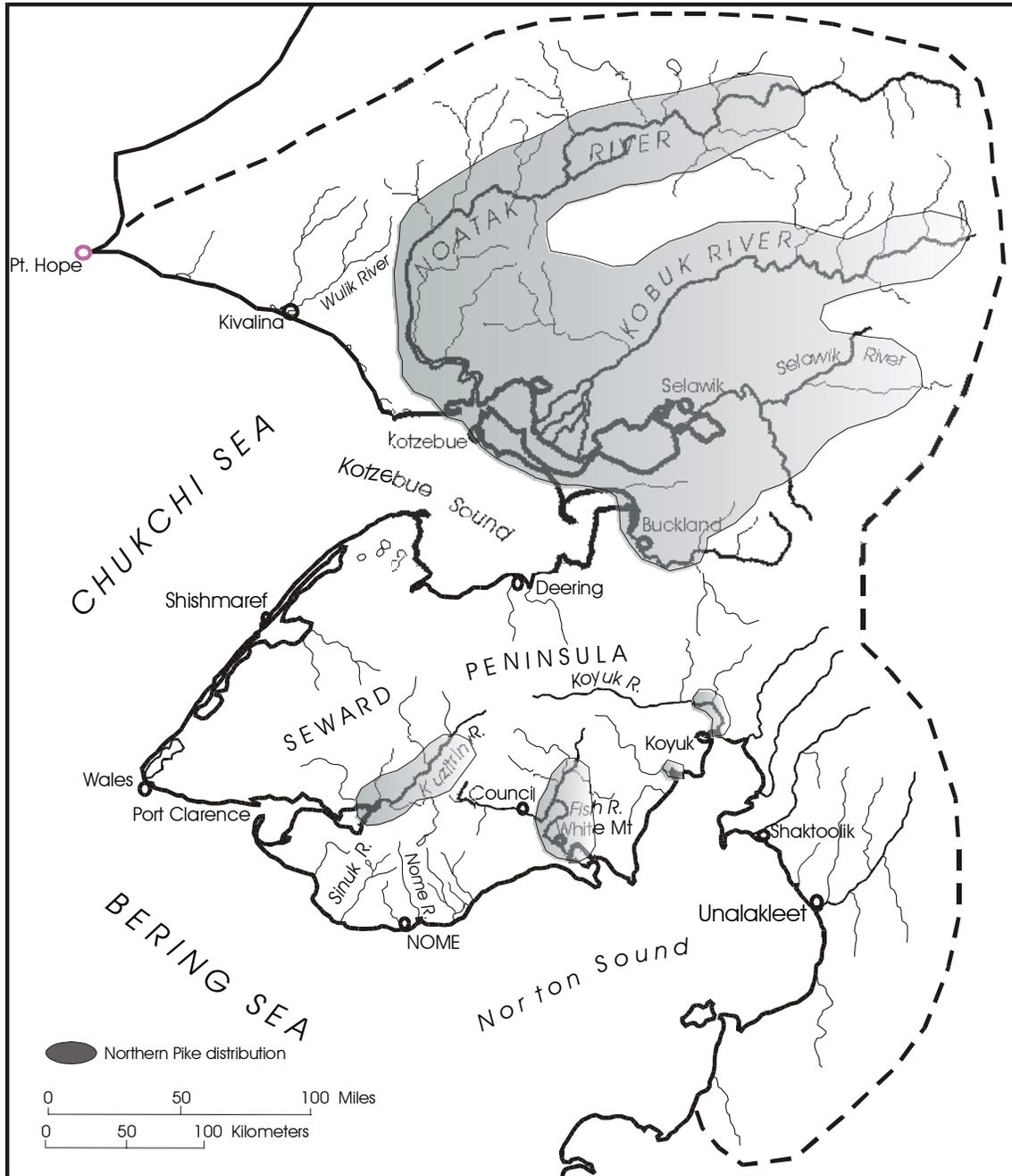
## **NORTHWESTERN ALASKA NORTHERN PIKE**

### **Fishery Description and Historical Perspective**

Northern pike are present throughout the northern regions of the world. They are primarily a freshwater resident species, but are known to enter weakly brackish waters in the Baltic and in some other areas. The known distribution of northern pike in northwestern Alaska is shown in Figure 11.

Northern pike occur in most of the lakes and flowing waters of the Noatak and Kobuk Rivers and are particularly common in wetlands of the lower reaches, delta areas, and in lakes in lowland areas adjacent to these rivers. Northern pike are also common residents of the waters along the western shores of Hotham Inlet, Selawik Lake and the entire Selawik lowland area. They occur in the lower portions of the Buckland River drainage, and may also be present in some lakes and streams on the northern Seward Peninsula. On the remainder of the Seward Peninsula, northern pike are common residents of Imuruk Basin and the middle and lower reaches of the Pilgrim and Kuzitrin Rivers. These two adjacent drainages form a large interconnected wetland area (approximately 380 km<sup>2</sup>) in their lower reaches. In addition there is another large wetland area (approximately 650 km<sup>2</sup>) farther upstream in the Kuzitrin River drainage. Northern pike also inhabit most of the Fish River drainage and have even been observed in the fast clear waters of the Niukluk River downstream from Council. They occur in the Koyuk River and may be present in the Kwik River near Moses Point, but are not known to be present in other Norton Sound drainages south of the Koyuk River.

The majority of northern pike harvested in northwestern Alaska are taken for subsistence. Few community harvest estimates are available, however, in 1986, 5,750 northern pike were estimated to have been harvested by the community of Kotzebue. During the mid 1980's a commercial freshwater fishery occurred near Selawik. In 1985, the USFWS estimated that the spring subsistence/commercial harvest (only some of the fish were sold) of northern pike was between 5,671 and 9,138 fish. Currently, without the commercial fishery, the annual harvest at



**Figure 11.-Northern pike distribution in the NWMA.**

Selawik is still likely several thousand northern pike. Northern pike are also harvested by residents of the lower Kobuk River villages of Noorvik and Kiana, and the residents of Teller who fish in Imuruk Basin drainages. Additional harvests of northern pike may take place near other area villages. The total annual northwestern Alaska northern pike subsistence harvest is likely 15,000 fish or more.

### **Recent Board of Fisheries and Management Actions**

There have been no recent BOF or management actions concerning northern pike. The current daily bag and possession limit in the NWMA is 10 fish with no size limit.

### **Recent Fishery Performance**

Estimated harvests of northern pike by sport anglers on the Seward Peninsula have averaged about 550 fish since 1977, with the largest annual harvest estimated at nearly 2,000 in 1990 (Table 18). The average annual harvest for the past five years was 385 fish. Estimates of catch (which includes fish that are kept and those released) since 1990 indicate that about 70% of all pike caught in the past 8 years have been released. It is assumed that anglers are selectively retaining larger sized northern pike. Most of the harvest of pike on the Seward Peninsula takes place in the Pilgrim or Kuzitrin River drainages. During 1992 and 1993 the abundance of northern pike in the lower Pilgrim and Kuzitrin rivers was estimated at about 10,000 fish over 300 mm (12 in) in length for the portion of the population inhabiting these rivers from the road crossings downstream to their confluence (Burkholder 1993, 1994). Northern pike populations have been shown to sustain annual harvests of about 15%. Current exploitation of the Pilgrim-Kuzitrin population appears to be less than 5%, which is well within sustainable levels.

Estimated sport harvests of northern pike in the Noatak-Kobuk-Selawik area of northwestern Alaska have averaged about 590 fish since 1977 (Table 18). Estimated harvests reached a high of 2,752 fish in 1986, and a low of 64 fish in 1989. The average annual harvest for the past five years has been about 270 fish. Since assessment of northern pike populations has not been carried out in this area of northwestern Alaska, the health of populations and relative influence of harvests can only be inferred by comparing the area to other parts of Alaska. The amount of suitable northern pike habitat in the Noatak-Kobuk-Selawik area is much greater (by approximately 50 times) than that available to northern pike in the Pilgrim-Kuzitrin area, and the sport harvests are much lower. It is unlikely that sport fisheries are adversely impacting northern pike populations, even when taken in addition to a subsistence harvest of 6,000 to 10,000 fish.

### **Current Issues**

There are no current issues regarding northern pike in the NWMA. Harvest level will continue to be monitored through the SWHS. If harvests increase dramatically, additional research may be undertaken.

### **Ongoing Research Activities**

There are no current research activities associated with northern pike in the NWMA.

## **ACKNOWLEDGMENTS**

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## **APPENDIX A**

## **Appendix A.—National Wild and Scenic Rivers in the NWMA.**

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### Streams Within The National Park System

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Kobuk River. The portion within the Gates of the Arctic National Park and Preserve.

Noatak River. The river from its source in the Gates of the Arctic National Park to its confluence with the Kelly River in the Noatak National Preserve.

Salmon River. The portion within the Kobuk Valley National Park.

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### Streams Within The National Wildlife Refuge System

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Selawik River. The portion from a fork of the headwaters in township 12N, Range 10E, Kateel River meridian to the confluence of the Kugarak River; within the Selawik National Wildlife Refuge .

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### Streams Located Outside National Parks and Refuges

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Unalakleet River. The segment of the main stem from the headwaters in township 12S, Range 3W, Kateel River meridian extending downstream approximately 65 miles to the western boundary of township 18S, range 8W.

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## **APPENDIX B**

## Appendix B.—Northwestern Area sport fishing regulations summary for 1997.

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### NORTHWESTERN ALASKA SEASONS

Entire year for all species except halibut. Halibut season is February 1-December 31.

### BAG, POSSESSION, AND SIZE LIMITS GENERAL REGULATIONS

The general regulations for all waters of the Northwestern Area are listed below. Special regulations for individual water bodies appear afterward (at bottom of page).

Species	Daily bag,	Possession and size limits
King salmon	1	(no size limit)
Other salmon	10	(no size limit)
Arctic char/Dolly Varden (all Lakes)	2	(no size limit)
flowing and salt water	10	(only 2 over 20 inches)
Lake trout	4	(no size limit)
Arctic grayling	10	(no size limit)
Sheefish	10	(no size limit)
Northern pike	10	(no size limit)
Burbot	15	(no size limit)
Halibut	2 per day, 4 in possession,	no size limit
outlet stream (Pilgrim River) 300 feet downstream from	Other fish	no limit
Shellfish	See Page XX	

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### SPECIAL REGULATIONS

**KOBUK RIVER DRAINAGE** (upstream of the mouth of the Mauneluk River):

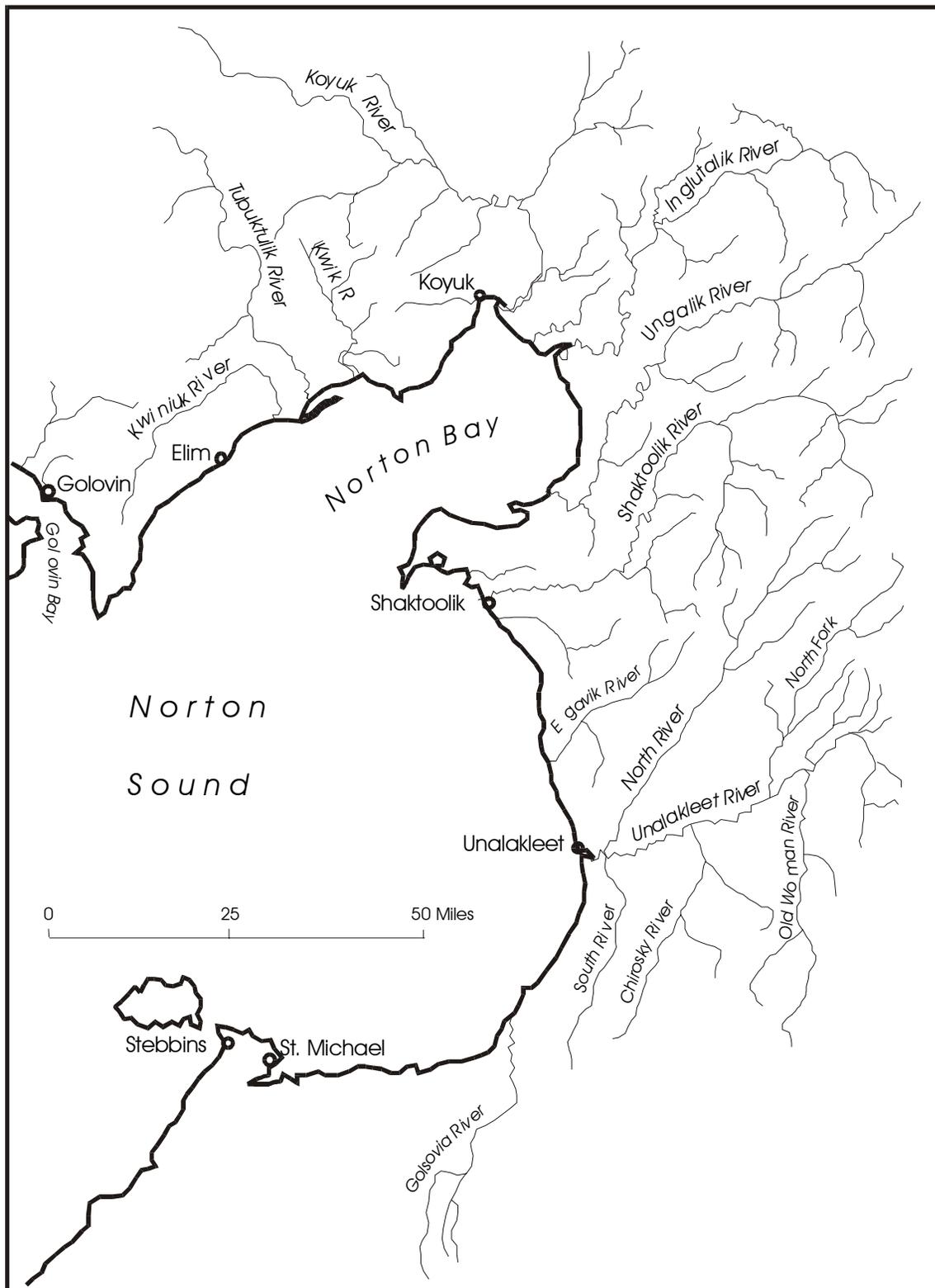
1. **Sheefish:** Daily bag and possession limit is 2 fish, no size limit

**NORTHERN NORTON SOUND** (all waters draining into Norton Sound from Cape Darby to Cape Prince of Wales (see map):

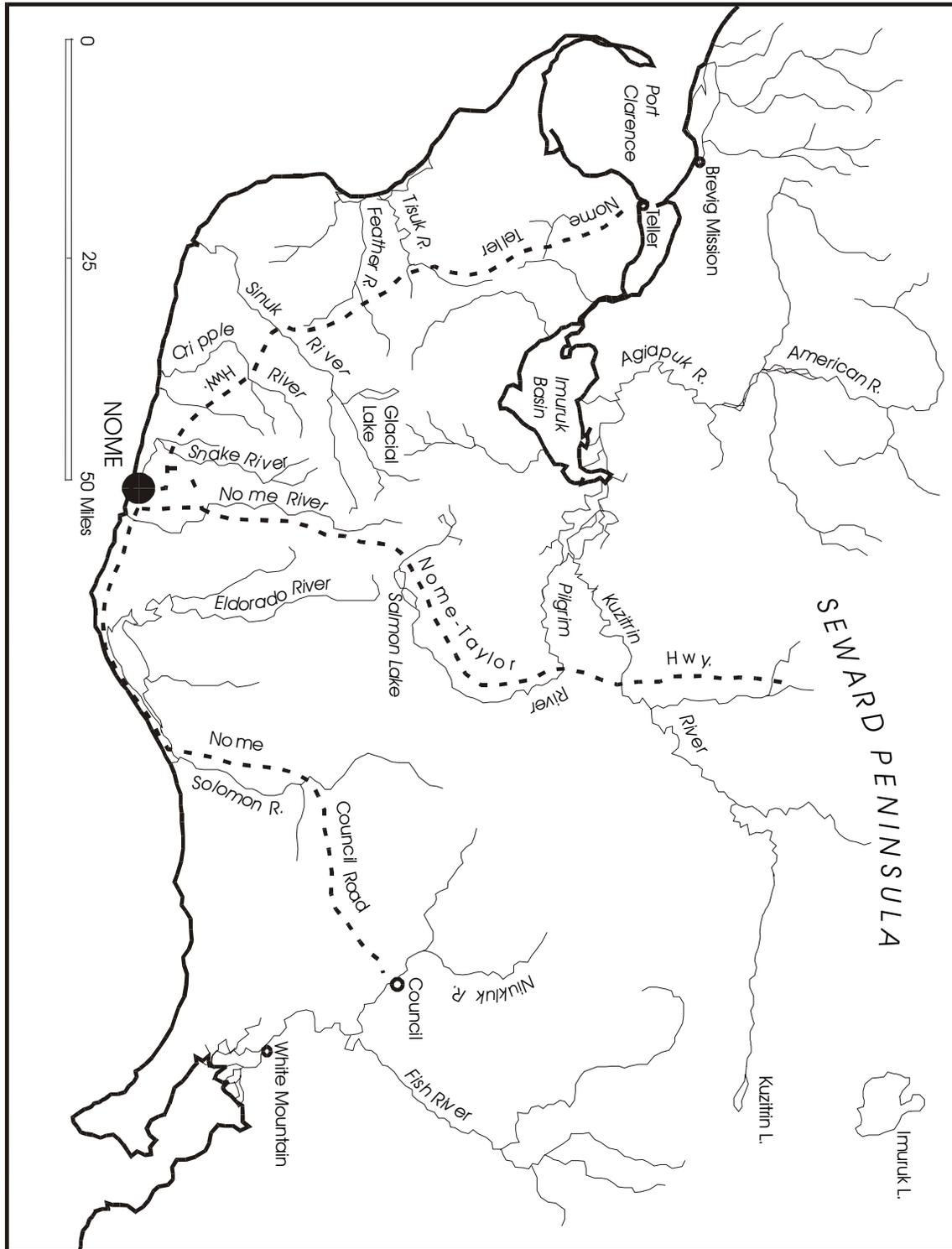
1. **Chum salmon:** Daily bag and possession limit is 3 fish, no size limit  
\*\*All freshwater drainages and marine waters between the west bank of the Sinuk River and Topkok Head (see map) are *closed to chum salmon fishing*.\*\*
2. **Coho salmon:** Daily bag and possession limit is 3 fish, no size limit
3. **Sockeye salmon:** Daily bag and possession limit is 3 fish, no size limit
4. **Pink salmon:** Daily bag and possession limit is 10 fish, no size limit
5. **Arctic grayling:** Daily bag and possession limit is 5 fish, **only 1 over 15 inches**
6. **Salmon Lake**, its tributaries, and the lake outlet are *closed to salmon fishing*.
7. **Nome River:** *Closed to fishing for Arctic grayling*
8. **Pilgrim River drainage:** Arctic grayling daily bag and possession limit is 2 fish, **only 1 over 15 inches**.
9. **Snake River drainage:** Arctic grayling daily bag and possession limit is 2 fish, **only 1 over 15 inches**.
10. **Solomon River:** *Closed to fishing for Arctic grayling*

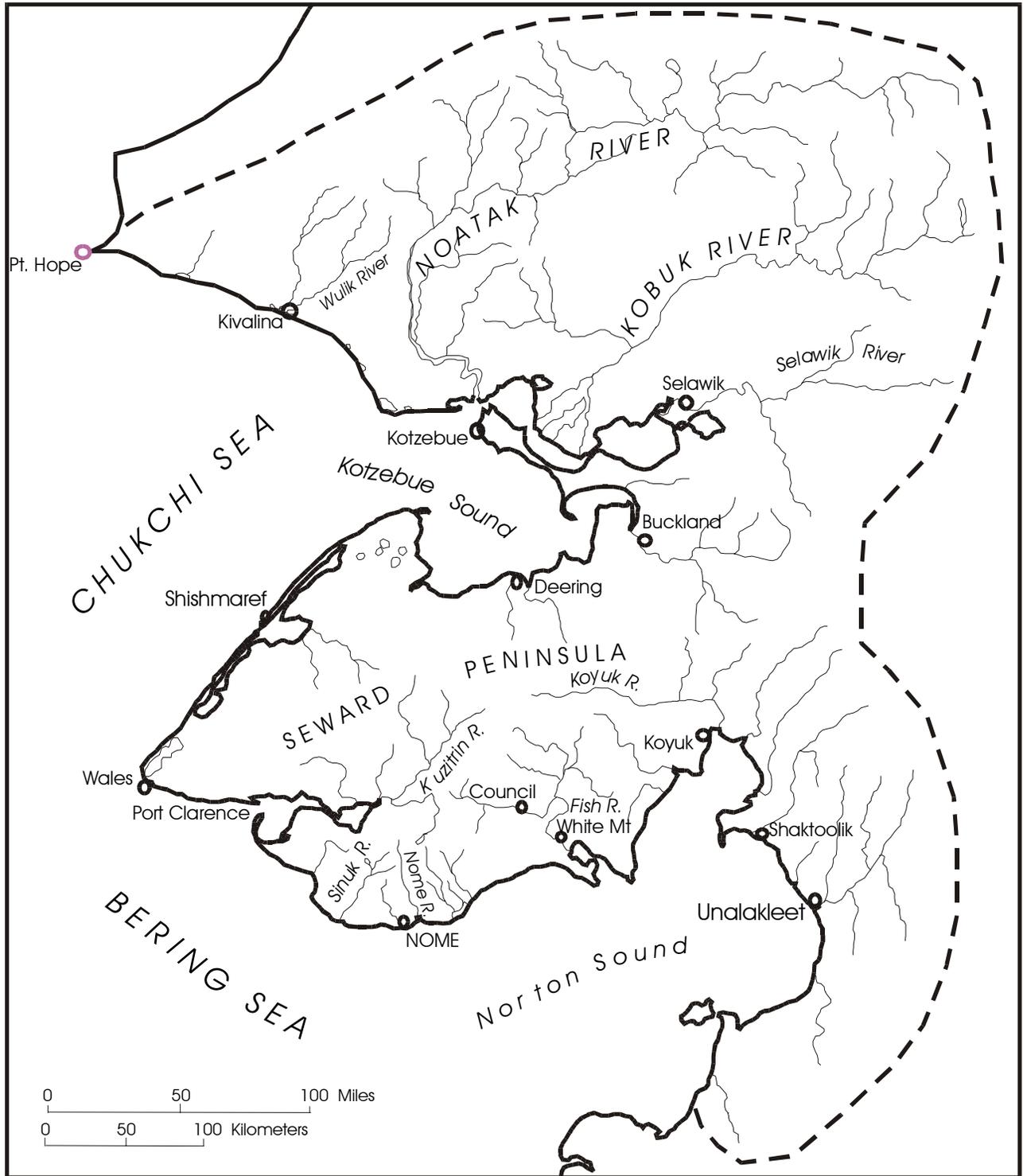
**UNALAKLEET RIVER DRAINAGE:**

1. **Arctic grayling:** Daily bag and possession limit is 5 fish, **only 1 over 15 inches**

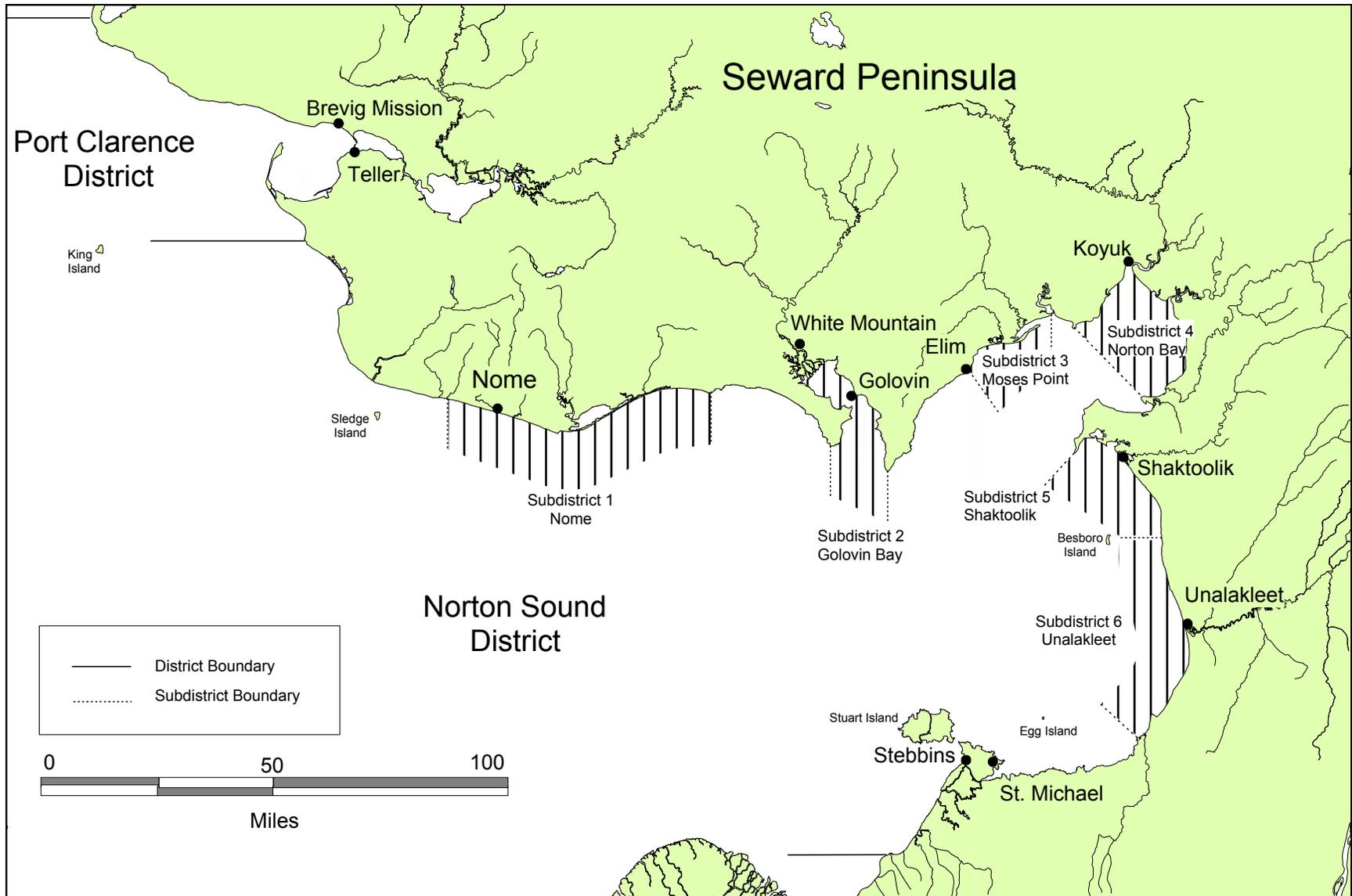


**Figure 2.-Eastern Norton Sound.**

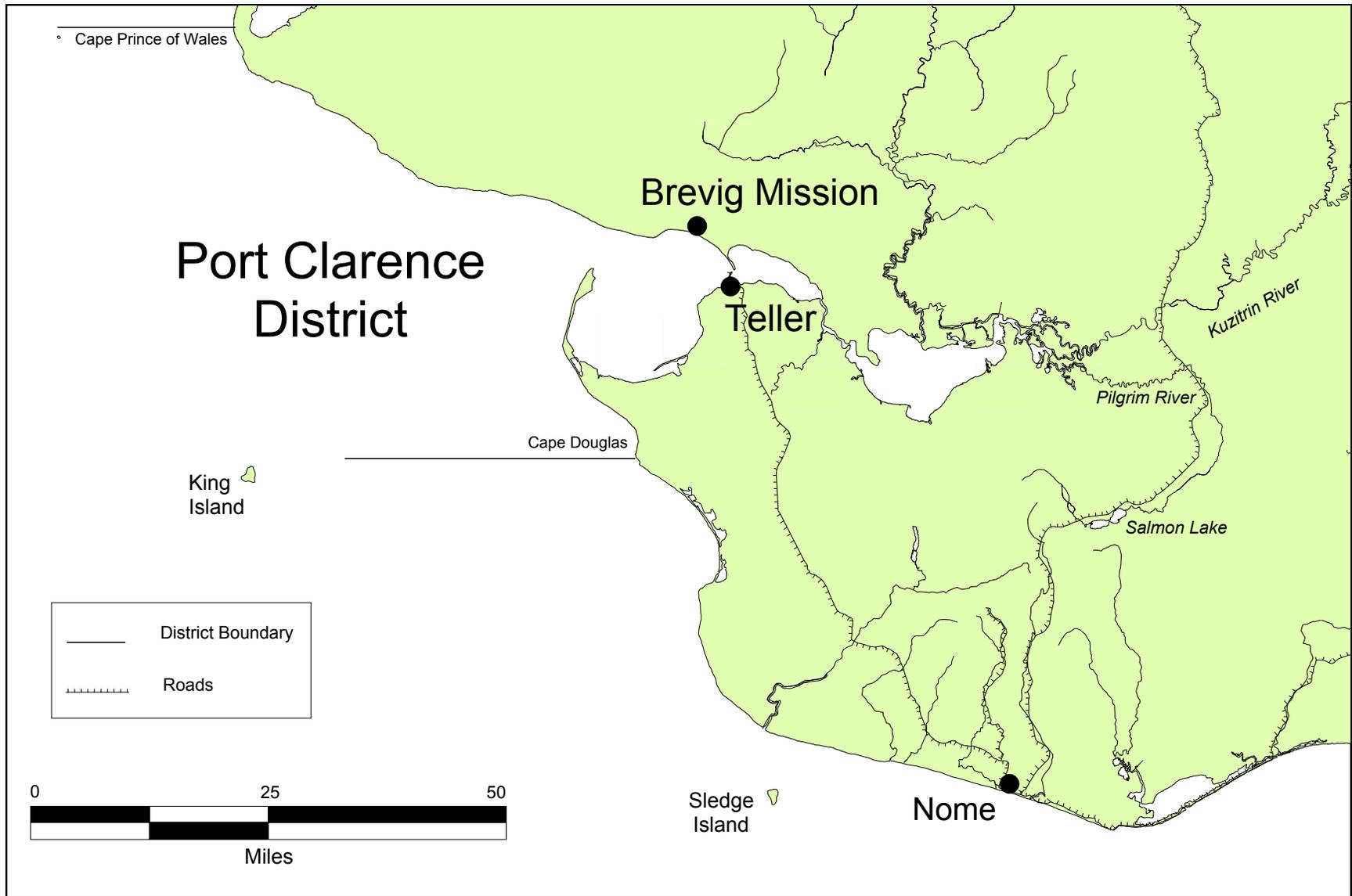




**Figure 4.-Northwestern Management Area with approximate boundaries of federally controlled areas are: 1. Cape Krusenstern National Monument (NPS); 2. Noatak National Preserve (NPS); 3. Kobuk Valley National Park (NPS); 4. Gates of the Arctic National Park (NPS); 5. Selawik National Wildlife Refuge \*USFWS); and, 6. Bering Land Bridge National Preserve (NPS).**



**Figure 6.-Commercial fishing subdistricts in Norton Sound.**



**Figure 7.-Port Clarence commercial fishing district.**

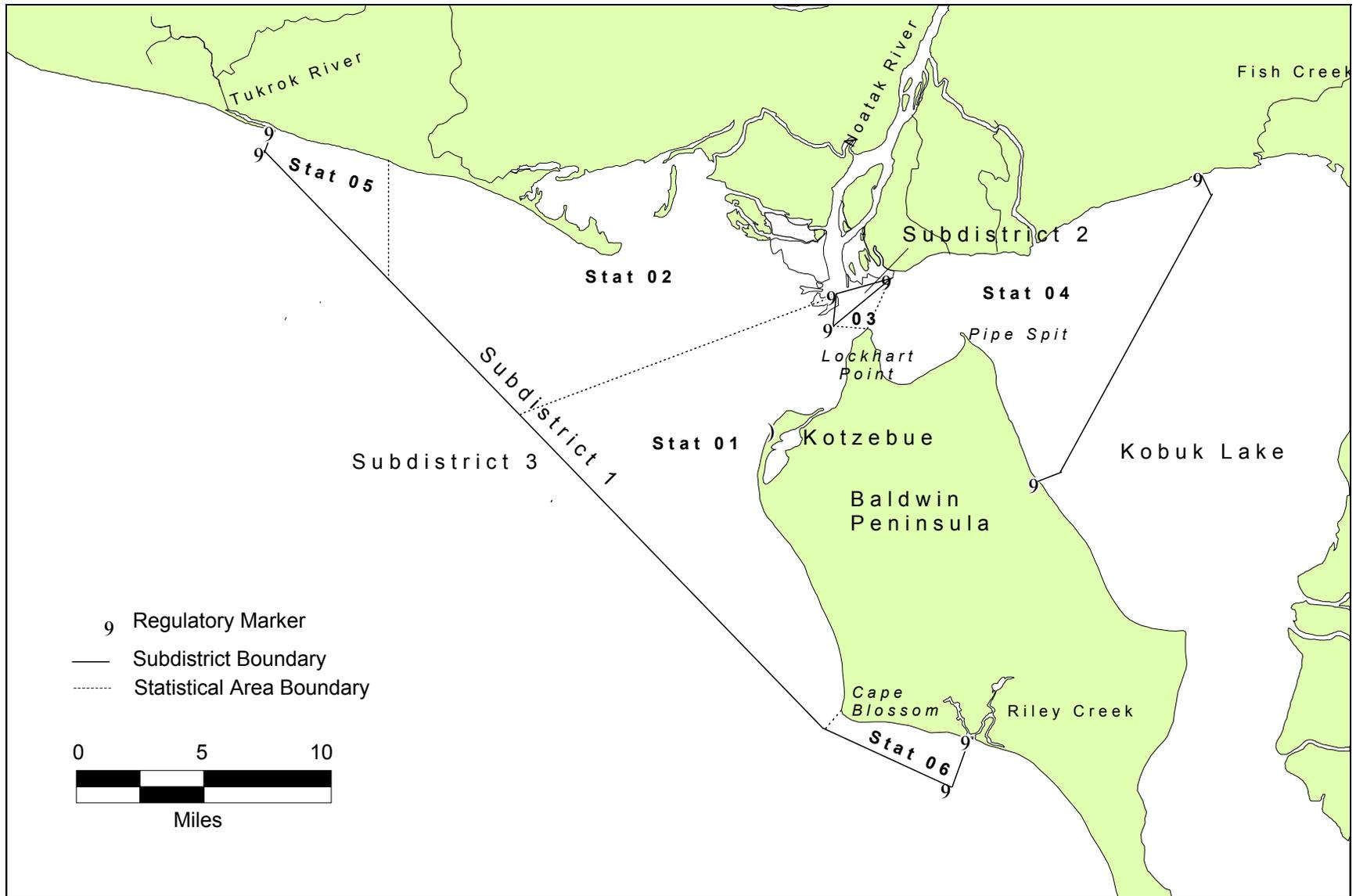


Figure 8.-Kotzebue commercial fishing district.